

Investigating the Effects of Trait Mindfulness on Stress with College Students

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### Abstract

This research looked at the relationship between subjective trait mindfulness and perceived stress on performance on the stroop. As stress is a major issue with college student's mental health and academic performance it is important to investigate means of reducing it. Thirty participants were obtained by convenience sampling from the National College of Ireland (NCI). Participants completed the mindful Attention Awareness Scale (MAAS) and Perceived Stress scale (PSS) and then carried out the stroop task. Cross sectional design was used to test the research question. It was hypothesised that those who have higher trait mindfulness would have better performance on the stroop task (less errors and faster time to completion), decreased perceived stress and physiological responses (lower temperature and lower heart rate). Results showed that there was no significant difference found between mindful and non-mindful individuals in perceived stress and induced stress on the stroop task. It appears that mindfulness has to be trained in order to observe significant effects on the stroop task. Limitations are discussed further.

## Investigating the Effects of Trait Mindfulness on Stress with College Students

There has been an increase attraction in studies investigating mindfulness in recent years (Lang, 2017). This area has become associated as a valid way of promoting health and well-being as it has been shown to prevent innate stress reactions (Brown, Weinstein & Creswell, 2012; Park, Reilly Spong & Gross, 2014). There is a relationship between high levels of stress, mental illness and physical illness (Brotman, Golden, & Wittstein, 2007; Myers, Sweeney, Popick, Weslet, Bordeld, & Fingerhut, 2012). College students appear to be a population particularly vulnerable to stress due to academic pressure (DeBearard, Spielmans, & Julka, 2004). Mindfulness has been shown to improve cognitive control (Moore and Malinowski, 2009). Furthermore higher levels of mindfulness have been correlated with lower levels of stress (Goldberg, Del Re, Hoyt & Davis, 2014; Stanley, Schaldach, Kiyonaha & Jha , 2011).

### **Literature Review**

Mindfulness originated from Buddhist culture, it means, “to remember” (Brown, Ryan & Creswell, 2007, p211). Mindfulness involves viewing and accepting the present moment without judgmental thoughts (Baer, 2003; Bishop, 2002). It is a form of attention in the brain, which is activated by the pre-frontal cortex (Chambers, Cheun Yee Lo, & Allen, 2008; Prinsloo, Derman, Lambert, Ruch. 2013). Mindfulness involves seeing events as they are rather than through schemas of memory (Brown and Ryan, 2003). However, there is still a need for a general definition of mindfulness (Lutz, Jha, Dunne, Saron, 2015). Even in the Buddhist culture there is no general definition for mindfulness, as each type of practice differs (Williams & kabat-Zinn, 2011).

### **Mindfulness Interventions**

Many clinical therapies have introduced mindfulness into treatment of mood and stress related illnesses (Kabat- Zinn, 1990) such as mindfulness based stress reduction (MBSR: Kabat- Zinn, 1982). Different forms of

mindfulness are practised under MBSR, which allows the individual to be aware of their natural response and control it (Kabat-Zinn, 1982). In addition, it has been used to treat post-traumatic stress disorder (PTSD; Lang, 2017). Those who participated in MBSR had less personal experience of stress (Shapiro, Brown, & Biegel, 2007). Mindfulness research has identified that mindfulness increases through meditation (Prinsloo, Derman, Lambert & Ruach, 2013). It also has been found to be a valid method to relieve stress (Krisanaprakornkit, Krisanaprakornkit, Piyavhatkul, & Laopaiboon, 2006). According to Lang (2017), understanding stress biologically is important in order to understand the effects of mindfulness. Mindfulness meditation has been shown to do the opposite to stress by reducing inflammation and promoting a healthy gut (Househam, Peterson, Mills & Chopra, 2017). In a Thai nursing population research showed how biofeedback and mindfulness meditation helped lower stress and anxiety (Ratanasiripong, Park, Ratanasiripong & Kathalae, 2015)

### **Stress and college students**

It was discovered that extreme levels of stress were associated with deterioration in health both physically and emotionally (APA, 2010). In most cases light stressors are not damaging for young people (Schneiderman 1983). However if the stress carries on over long periods of time and the body keeps inducing the stress responses, it can have severe effects on the health of the individual (Schneiderman 1983, as stated in Schneiderman, Ironson & Siegel, 2005). Prolonged stress can lead to depression, anxiety and many different health related illnesses (Brotman, Golden, & Wittstein, 2007; Hofmann, Sawyer, Witt, & Oh, 2010). There is also evidence to show how severe stress can affect students ability to focus their attention and use their cognitive skills (Abdollahi, 2016). Furthermore, there is a relationship between extreme stress, poor cognitive function and disease (Brotman, Golden, Wittstein, 2007). According to the American college health associations over half of students experience medium to severe stress on daily basis (Myers et al., 2012). College students are often at greater risk of higher levels of reported stress which can then effect their exam results and exposes them to other mental health issues (DeBerard et al., 2004; Myers et al., 2012;). Research has shown that poor exam performance can be due to stress related physical and psychological issues (DeBerard et al., 2004). Students often turn to unhealthy coping

strategies to deal with stress such as the overuse of substances (DeBearard et al; 2004). However, all students differ in their degree of stress and how they react to it (Ramasubramanian, 2017). Psychology students who exhibited high levels of stress were more likely to also have higher test scores (Nelson, Dell' Oliver, Koch, Buckler, 2001). There is evidence to show that stress increases performance given that the students focus more (Nelson, Dell' Oliver, Koch, Buckler, 2001). It has been reported that more research is required in order to educate administrators of ways in which stress can be reduced with college students (Myers et al., 2012). Furthermore, stress has effect on student's health and academic performance (DeBerard et al., 2004).

### **Stress and mindfulness**

According to Brown and Ryan (2003) there are copious amounts of research towards the benefits of mindfulness. Mindfulness has been shown to help young adults (Ramasubramanian, 2017) coping skills in the face of stress (Goldberg , De Re, Hoyt, & Davis 2014; Krisanaprakornkit, Krisanaprakornkit, Piyayhatkul, & Laopaiboon, 2006). It is suggested that a mindful state allows the individual to face their stress and control their response (Kabat-Zinn, 2003). On the other side, avoidance of stress has been related to many negative outcomes (Carmody & Baer, 2009). Severe stress can have major effects to the body similar to those with depression (Hill, Hellemans, Verma, Gorzalka Weinberg (2012). Research has demonstrated the effect mindfulness can have on many different stress related diseases (Edenfield & Saed, 2012). Mindfulness meditation has been shown to stimulate the Parasympathetic nervous system (PNS) during times of stress (Edenfield & Saed, 2012). This causes a decrease in heart rate, which leads to a more relaxed state (Benson & Klipper 1975). This allows the individual to react more appropriately to aversive events (Edenfield & Saed, 2012). It has also been reported to prevent depression reoccurring, (Teasdale, Sega, Williams, Ridgeway, Soulsby & Lau, 2000) help reduce inflammation (Malarkey Jarjoura & Klayy, 2013), reduce anxiety and improve well-being (Brown & Ryan, 2003). Overall higher trait mindfulness has been shown to be correlated with decreased personal perception of stress (Edenfield & Saeed, 2012; Godberg, Del Re, Hoyt & Davic, 2014; Lutz, Jha, Dunne & Saron, 2015; Stanley, Jha, 2011; Myers et al., 2012; Schaldach, Kiyonagra) and induced stress (Anderson, Lau, Segal & Bishop, 2007; Jain et al., 2007; ).

Perceived stress was shown not to be directly related to how often one practices mindfulness (Myers et al., 2012). Based on Carmody and Baer (2008) findings, mindfulness training improves mindfulness as a trait which then reduces stress (Myers et al., 2012). However, the misconceptions of what mindfulness is and individual nature can affect the results (Myers et al., 2012). It was also cross sectional and limited to mostly females (Myers et al., 2012). Men and women differ in their response to stress (Prinsloo, Derman, Lambert & Rauch, 2013). According to Ramasubramanian (2017) there is still a lack of research on mindfulness with college students. It is suggested that mindfulness could be used as an intervention for students and that future research should also look further into how mindfulness helps students deal with stress (Ramasubramanian, 2017). Furthermore, Myers et al (2012) stated how further research should encompass males in addition to females.

### **Mindfulness as a trait**

Research has shown that mindfulness is an individual construct that can be influenced by the environment (Brown, Ryan and Creswell, 2007). There are many self-report measures of trait mindfulness such as the Five-factor mindfulness questionnaire (FFMQ, Baer, Smith, Hopkins, Kitemeyer and Toney, 2006) and mindfulness attention awareness scale (MAAS, Brown & Ryan 2003) (See appendix A). Mindfulness self-reports are being used across patients (Park, Reilly-Spong et al., 2013). Brown and Ryan (2003) have looked at mindfulness as a natural trait without practise. Brown and Ryan (2003) state that mindfulness allows wellbeing by focusing on the present experience. It is proposed that everyone has the ability to focus on his or her attention and be conscious (Brown & Ryan, 2003). Mindfulness as a trait is seen in both those who engage in mindfulness and those who do not (Lutz, Jha, Dunne & Saron, 2015). Likewise, individuals vary in their desire to be mindful and it is different for each person as mindfulness can be effected by other variables (Brown & Ryan, 2003). There is debate over it being a stable trait (Chambers, Gullon & Allen, 2009). The view that mindfulness is a consistent trait does not consider the ability to increase mindfulness (e.g. Chambers, Gullone, & Allen, 2009). Following on from this, referring to mindfulness as a cognitive process causes difficulty in acknowledging variability between individuals (Chambers, Gullone, & Allen, 2009). According to Lutz, Jha,



Dunne and Saron, (2015), mindfulness should be looked at as a flexible trait that can be trained and varies from one person to another.

MAAS was developed to measure mindfulness for the general population so that non-experienced meditators could use it (Park, Spong & Gross, 2014). It is the most common one-dimensional scale for mindfulness (Brown & Ryan, 2003). It is positively associated with different factors of well-being and negatively associated with stress. MAAS was also shown to be elevated in meditators (Park, Spong & Gross, 2014). Comparing Zen meditators with non-meditators mindfulness increased with training (Brown & Ryan, 2003). In addition, the MAAS was valid and reliable within a college population (Brown & Ryan, 2003). Mindfulness interventions have also been shown to increase trait mindfulness (Collard, Avny & Boniwell, 2008). Furthermore, Sharpio, Brown, Thorsen and Plante (2011) identified how college students who were involved in mindfulness intervention had an increase in trait mindfulness and general well-being than those who did not. There is still lack of understanding of how the scales can account for the cognitive processing that occurs in mindfulness (Van Dam, Hobkirk, Danoff burg & Earleywine, 2012). There is also uncertainty over if these scales are measuring other types of training (Antonova, Chadwick & Kumari, 2015). For instance, experienced Buddhist mediators scored similarly to those who did not practice mindfulness (Antonova, Chadwick & Kumari, 2015). These scales may not take into account certain differences experienced mediators may gain (Lutz, Jha, Dunne, Saron & 2015). Leigh Bown and Maelatt (2005) showed that heavy drinkers scored higher on mindfulness than those practicing mindfulness. It is suggested physiological measures are important alongside self-report measures (Shearer, Hunt, Chowdhury & Nicol, 2016).

### **Mindfulness and stroop**

The stroop task (1935) is a scientific task, which induces stress in a controlled environment (Renaud & Blodin, 1997). It is a challenging cognitive task, which involves balancing multiple areas of cognition (Miyak, Friedman, Emerson, Witzki, Howter & Wager, 2000; Folstein & Van Petten, 2008). Trait mindfulness has been correlated with less chance of negative mental states (Brown & Ryan, 2003), regulation of emotions (Broderick, 2005) and a more developed amygdala which controls response (Creswell, Way, Eisenberger & Lieberman

,2007). There has even been research showing a difference between meditators and non-meditators in the stroop task (Chan & Woollacott, 2007; Jha et al., 2007; Moore & Malinowski, 2009). The stroop task causes stress due to the interference effect (Moore, Gruber, Derose and Malinowski, 2012). This task performance is a demonstration of strong mental control (Moore and Malinowski, 2009). Those in mindfulness training group have displayed better performance in the stroop task in identifying the color of the word (Moore & Malinowski, 2009). Mindfulness training can improve immediate processing and orientation of attention especially for tasks that demand a quick response (Lutz, Jha, Dunne, Saron, 2015). This training allowed individuals to be faster on attention task than a control group (Jha & colleagues, 2007). However contrasting evidence was found after a shorter training (Elliott, Wallace, & Giesbrecht, 2014) There appears to be a dose response relationship (Lutz et al., 2015). According to Moore (2012) it is useful to investigate mindfulness meditation and the stroop task to see if skills related to mindfulness are related to different tasks. Heart rate variability and mindfulness have been shown to be related to stimulation in frontal areas of the brain (Creswell, et al., 2007). Even small periods of mindful meditation influence how many errors and how the brain integrates information during the stroop (Moore et al., 2012). Moore et al (2012) showed evidence towards how meditation training promoted neural activity to control actions during the stroop task. According to Lutz et al., (2015) it is important to investigate mindfulness in relation to observable changes in behaviour rather than just neurologically. Moore et al (2012) did not find a difference between meditators and controls in the stroop task performance. There is a concern in relation to how valid the stroop task may be as an example of stress in a real-world setting (Prinsloo et al., 2013). It is noted that the way in which the stroop task is carried out by the researcher can have different effects on results (Salo, Henik & Roberston, 2001) as the stroop is sensitive to other experimental factors ( Chiesa, Calati & Seratti, 2011).

Stress is a major problem in today's society as seen with its relationship with many different types of physical and mental illness (Brotman, Golden, & Wittstein, 2007; American Psychological association, 2012). College can often be a mentally stressful environment (Myers et al., 2012). If this stress is not controlled it can lead to poor health, unhealthy behaviours (Pritchard, Wilson, & Yamnitz, 2007) and can have a negative effect

on student's exam results (DeBerard, Spielmans & Julka, 2004). Therefore, it is essential to investigate means of preventing stress in students. Based on past research there is most definitely evidence towards mindfulness and mindfulness practises preventing perceived stress (Brown, Weinstein and Creswell, 2012) and induced stress (Jain et al., 2007). Mindfulness allows students to control their stress reactions in the face of new mental activities (Shearer, Hunt, Chowdhury & Nicol, 2016). There has already been research to demonstrate how those who practise meditation have different performance then non-meditators (Moore, Gruber, Derosé and Malinowski, 2009) and that it is a naturally occurring trait (Brown and Ryan ,2003). Research has not directly looked at the relationship between mindfulness as a natural trait in relation to stress induced in the stroop task while also including college students of equal genders. Therefore, there is a demand to investigate the relationship between mindfulness and stress further in this population. There is inconsistent results regarding the stroop task and mindfulness (Moore & Malinowski, 2009; Moore et al., 2012). This research is adding strength to past research by having a subjective and objective measure of stress. Furthermore there has been lack of investigation of mindfulness in college students (Ramasubramanian ,2017) . This is an important population to investigate given that they have significant number of exams and cognitive performance is of value. This research will not be testing for anxiety based on mindfulness scores being negatively correlated with anxiety (Park, Spong, Gross, 2013; Brown & Ryan, 2003).

The overall aim is to investigate the relationship between mindfulness and stress in college students to see if those who are more mindful are less stressed, make fewer errors and take less time in the stroop task. The research question is, does increased mindfulness correlate with less stress, errors and time on the stroop task with college students? The first objective is to see if there is a relationship between mindfulness scores and stress induced from stroop task. The second objective is to see if mindful and non-mindful participants score differently in stress levels on the stroop and perceived stress scale. The third objective is to compare the number of errors to see if those who are more mindful will also make fewer errors due to less stress. In addition to see how much time it takes for mindful and non-mindful individuals to complete the task to see if those who are more mindful will also take less time due to less stress.

Hypotheses

1. College students who score higher on the MAAS mindfulness questionnaire will display lower physiological responses in the domains of pulse rate and body temperature.
2. College students who score high on mindfulness will score lower on subjective stress compared to those who score low on mindfulness.
3. Students who are more mindful will be faster at completing the task and will have fewer errors and take less time than those who are less mindful.

## Methods

### Participants

Participants consisted of college students from the National college of Ireland (NCI) aged between 18-25. Thirty participants were collected in total. Out of these thirty participants, 16 (53.3 %) were female and 14 (46.7%) were male. Participants were collected by convenience sampling. To be included in the study participants had to be attending NCI and be within the age limit stated above. Similarly, participants with a diagnosis of a major mental health disorder or heart problems were not included due to the nature of this study. A post was shared on the college Facebook page and in-group chats to inform students of the study and give them an opportunity to take part. In addition, posters were displayed throughout NCI with the title and an email for further information for taking part (See appendix E).

### Design

This study was a quantitative, cross sectional, within subjects design. The independent variable of interest was trait mindfulness (MAAS). The dependent variables of interest were stress from the stroop task (temperature and heart rate) perceived stress (PSS), reaction time, and errors.

### Materials

A basic questionnaire was filled out prior to commencement to ascertain sample requirements (See appendix D) A self-report questionnaire called Mindfulness Attention Awareness Scale ( MAAS ,Brown and Ryan, 2003)(See appendix A) was used to assess mindfulness as a trait. It is a 15 item scale with a 6 point likert scale, 6 = almost never, 1=almost always (Brown and Ryan, 2003). Higher scores on this signify higher mindfulness (Weinstein, Brown and Ryan, 2009). This scale measures mindfulness as a single form (Brown and Ryan, 2003). It is a valid measurement of everyday mindfulness (Brown and Ryan, 2003; see Brown et al., 2007 for review). According to Park, Spong & Gross (2013) the MAAS scale has good internal consistency, with Cronbach coefficient reported 0.78- 0.92. In this current study the Cronbach coefficient was .82. The Perceived stress scale (PSS-10) established by Cohen, Kamarck & Mermelstein, (1983) . It was used to

measure self-reported stress alongside the stroop. It is a 5 point likert scale with 4= “very often”, 0 =”never”. (See appendix B). It is the most recognised measure for self-reported stress (Cohen et al., 1983). In this study the cronbachs alpha coefficient was .65. The stroop task was used to measure physiological stress. PowerLab software and the lab tutor software was where the task was completed and where time was recorded. Data was collected and displayed on the software. The words and colours in the task were either RED, GREEN, BLUE or YELLOW. The experiment consisted of 4 trials and two conditions. The temperature probe and thermistor pod were used to measure temperature while the transduction pulse transducer measured heart rate. Number of errors was recorded on a sheet with a copy of the task.

Apparatus: PowerLab software, lab tutor software, Temperature probe, thermistor probe, transduction pulse transducer, recording sheet, self-report questionnaires, medical tape.

### **Procedure**

Prior to participating, participants were given a brief summary of what was involved and were screened online beforehand. Those who did not fulfil the requirements were thanked and informed that they did not need to participate in this study. If requested they were given an information sheet either by email or by hand before the day (See appendix C). Participants were advised against consuming coffee, alcohol or having big meal before entering the laboratory. Prior to participants arrival the researcher logged into the LabTutor student’s software 2013. The PowerLab software was switched on. When the students arrived, they were given an information sheet, consent form, MAAS questionnaire and Perceived stress scale (See appendix). If participants were unsure of any parts of information they were encouraged and given time to ask any questions. Once all the sheets were completed, physiological instruments were taped onto the non-dominant hand of the participant using medical tape. First the temperature probe was taped on the palm of their index finger. Then the heart rate pulse transducer was taped onto the middle finger. It was ensured that both were securely taped but not overly tight. Participants were then advised to lay their hands and fingers gently on the table away from the keyboard. Students were reminded that the task involved reading the word instead of the colour for condition 1. They were advised to do it as accurate and as fast as possible while also being informed what constituted an error.

For example, if the participant said the colour then the word that would be counted as an error. The researcher then scrolled the mouse to the end of the line and pressed start. Errors and measurements were recorded on a sheet by the researcher. Once the participant had completed all the words the researcher pressed stop on the stroop task. The mouse was taken back to the nearest line and the temperature, heartbeat and time was displayed and recorded by the researcher. These steps were repeated again for trial 2, word of colour. Then similarly repeated for trial 3 and 4 , colour of word Trial 3 and 4 involved the interference effect in which participants had to read the colour of the word instead of the word. At no point did the researcher press stop on the stroop task. After the task was finished the student was thanked for their time, re informed that their information would be unidentifiable and were given the option of a follow up email.

## Results

### Analysis

MAAS scores were divided into low (1) and high (2) mindfulness based on if their score fell before or after the mean. Descriptive statistics insinuated that the mean score on the Mindfulness questionnaire was 3.71 which means that the majority of people are falling just above the mean for high mindfulness (see table 1). Perceived stress scores were obtained by adding up the total scores and reverse coding (items 4, 5, 7, and 8). The scores were divided into low (0-13), medium (14-26) and high (27-40) based on Cohen et al (1983). Total scores for the stroop trials (trial 3 and 4) were obtained by getting the mean stroop score. Inferential statistics used for the normally distributed variables were a paired samples t test, independent samples T-test and a one way factorial anova. Non-parametric tests were, Wilcoxon Signed-ranks, the kruskal Wallis test and Mann-Whitney test. Also, a Chi square test of independence and one way between groups ANOVA with post hoc tests were performed.



*Descriptive statistics for all continues and categorical variables*

	n	Mean	Median	SD	Range	Cronbach's Alpha
Total MASS		3.71	3.77	0.71	2.47-5.47	0.2
Total stress score		20.97	21	6.9	10.-35	0.2
Time		125.86	124.15	27.01	86.96-213	0.2
Temperature		26.4	24.88	4.49	20.91-33.5	0.16
Heart rate		67.13	70.75	12.84	43.50-92	0.015
Errors		4.92	4.5	4.03	0.50-19	0.00
Low MASS	6(20%)	2.73	2.73	1.69	2.47-2.93	
High MASS	24(80%)	3.95	3.87	3.95	3.27-5.47	
Low perceived stress	6(20%)	11	11	0.89	10-12.	
Medium perceived stress	18(60%)	21.11	21	3.07	15-16	
High perceived stress	6(20%)	30.05	30	3.89	27-35	

n=30

**Practice effects in the stroop**

A paired-samples t-test was conducted in order to evaluate the impact of the task on time to complete the task. The results indicated that there was not a statistically significant decreases in time from trial 3 ( $M = 126.93$ ,  $SD = 28.94$ ) to trial 4 reaction time ( $M = 124.78$ ,  $SD = 26.93$ ),  $t(29) = .82$ ,  $p = .42$ . The eta squared statistic (0.02) indicated a small effect size.

A paired-samples t-test was conducted in order to evaluate the impact of the task on temperature. The results indicated that there was not a statistically significant increase in temperature from trial 3 ( $M = 25.94$ ,  $SD = 4.51$ ) to trial 4 temperature ( $M = 26.15$ ,  $SD = 4.62$ ),  $t(29) = -0.667$ ,  $p = .52$ . The eta squared statistic (0.01) indicated a very small effect size.

The Wilcoxon Signed-ranks test indicated trial 3 heart rate ( $Mdn = 24.90$ ), were not significantly less than that trial 4 heart rate ( $Mdn = 25.04$ )  $Z = -1.616$ ,  $p = .32$

A Wilcoxon Signed-ranks test indicated that the median for trial 3 errors ( $Mdn = 5.0$ ), was not significantly more than that trial 4 errors ( $Mdn = 4.0$ )  $Z = -1.29$ ,  $p = .90$

**Effect of stress type on physiological response and performance on the stroop test**

A one way between groups analysis of variance was conducted to explore the impact of perceived stress on time and temperature for trials 3 and 4 on the stroop task, as measured by the perceived stress scale. Participants were divided into 3 groups for perceived stress (Group 1 low, Group 2 medium: and group 3 high). There was a non-statistical difference at the p level in time for the three groups [ $F(2,27)=.76$   $p=.48$ ]. The effect size, calculated using eta squared was .05 which is small effect (see figure 1.1). There was a non-statistical difference at the p level in temperature for the three groups [ $F(2,27)=.11$   $p=.9$ ]. The effect size, calculated using eta squared was .01 which is small effect size (See figure 1.2). Post hoc comparisons using the Tukey HSD test indicated that the mean time score for low stress ( $M=136.67$ ,  $SD=50.41$ ) was not significantly different for medium ( $M=121.31$ ,  $SD=18.37$ ) or high stress ( $M=128.68$ ,  $SD=17.84$ ). Post hoc comparisons using the Tukey HSD test indicated that the mean temperature for low stress ( $M=26.28$ ,  $SD=27.01$ ) was not significantly different for medium ( $M=25.74$ ,  $SD=.44$ ) or high stress ( $M=26.70$ ,  $SD=5.16$ ).

Kruskal wallis test indicated there was not a statistical significant difference in heart rate for the different stress types ( $H(2)=4.07$ ,  $p=.13$ ) with a mean rank of 20.5 for high stress, 15.58 for medium and 10.25 for low stress (see figure 1.3).

Kruskal wallis test indicated that there was not a statistical significant difference in errors for the different stress types ( $H(2)=2.05$ ,  $p=.36$ ) with a mean rank of 16.42 for high stress, 13.83 for medium and 19.58 for low stress (See figure 1.4)

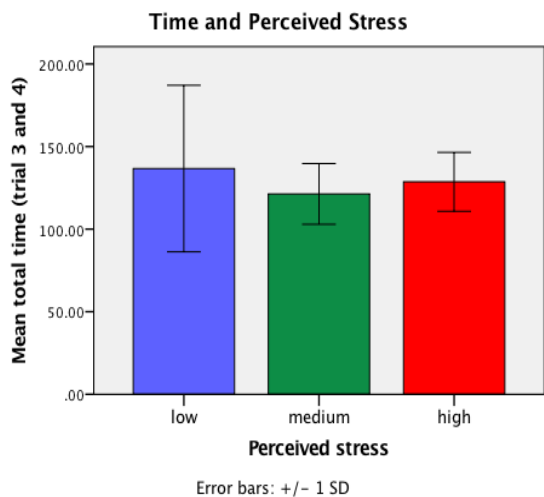


Figure 1.1. Impact of time and perceived stress and perceived

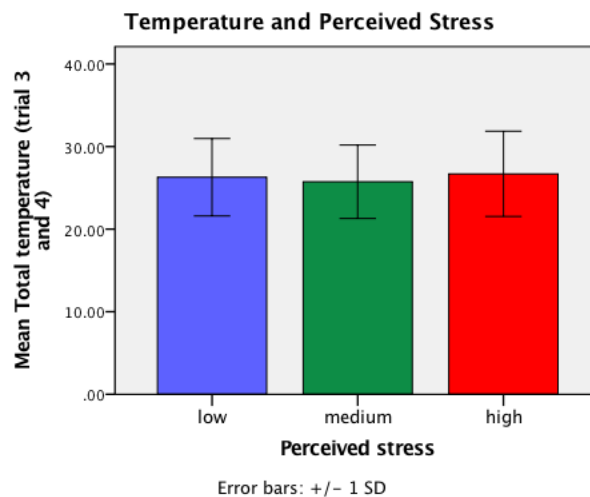


Figure 1.1. Impact of temperature stress and perceived

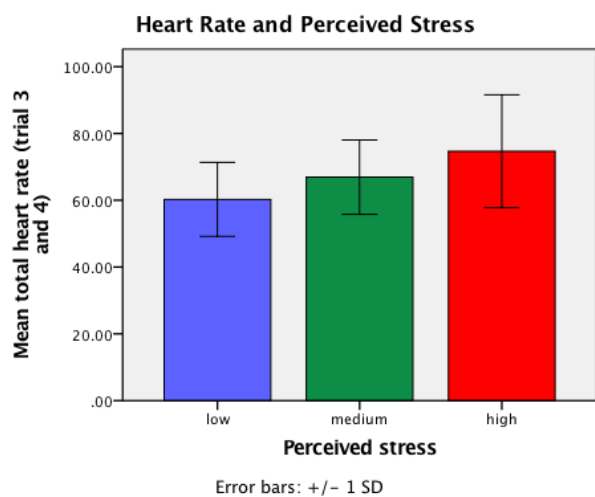


Figure 1.3. Impact of perceived stress on heart rate.

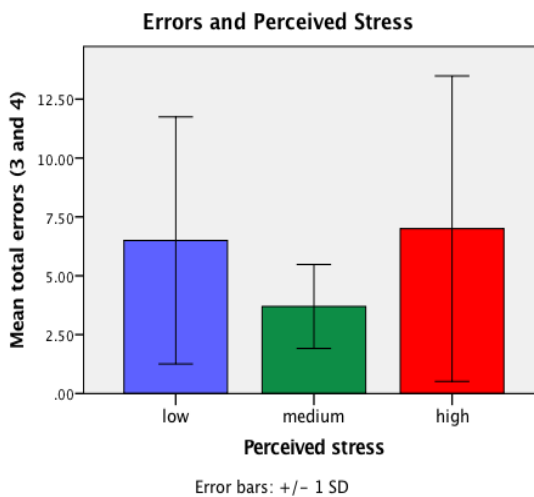


figure 1.4. Impact of perceived stress on errors

**Effects of mindfulness on physiological response and performance on the stroop test**

An independent-samples t-test was conducted to compare time for high and low mindfulness. There was no significant difference in scores for high mindfulness ( $M = 126.43$ ,  $SD=28.99$ ) than low mindfulness ( $M = 123.56$ ,  $SD = 18.88$ ,  $t(28) = -.23$ ,  $P=.44$ ). The magnitude of the difference in the means was very small (eta squared= 0.002) (See figure 2.1).

An independent-samples t-test was conducted to compare temperature for low and high mindfulness groups. Results indicated that scores were not significantly higher for those in low mindfulness ( $M = 27.19$ ,  $SD = 4.92$ ) than high mindfulness in temperature ( $M = 25.76$ ,  $SD = 4.44$   $t(28) = .69$ ,  $p = .69$ ). The magnitude of the difference in the means was small (eta squared= 0.02)( See figure 2.2).

A Mann-Whitney test indicated that heart rate was not significantly greater for those with high mindfulness ( $Mdn = 69.25$ ) than for those with low mindfulness ( $Mdn = 71.75$ ),  $U = 66.5$ ,  $p = .78$   $r = -0.05$  (See figure 2.3)

The Mann-Whitney test indicated that errors was not significantly greater for those with high mindfulness ( $Mdn = 4.5$ ) than for those with low mindfulness ( $Mdn = 5$ ),  $U = 43.5$ ,  $p = .14$ ,  $r = -0.27$ . (See figure 2.4).

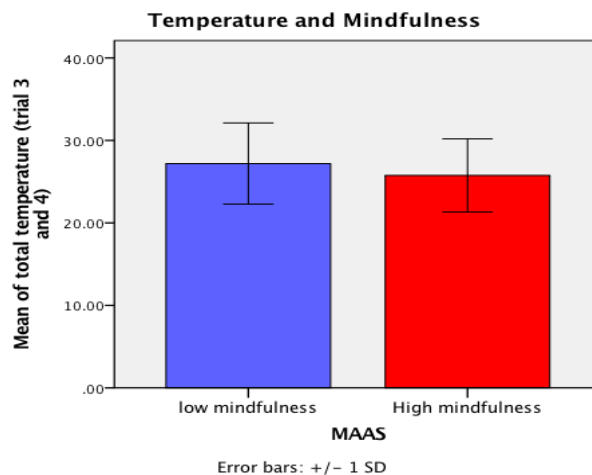
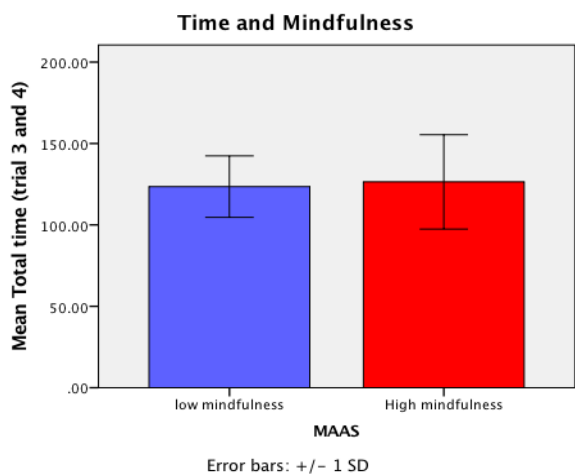


Figure 2.1. Relationship between time and mindfulness

figure 2.2. Relationship between and mindfulness

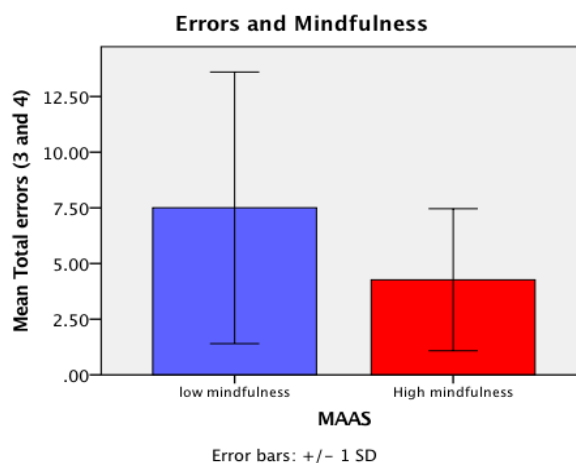


Figure 2.3. Relationship between heart rate and mindfulness

figure 2.4. Relationship between and mindfulness. and errors

### **Relationship between perceived stress and mindfulness**

A chi-square test of independence was calculated comparing the frequency of perceived stress (low, medium and high) in high and low mindfulness. A non-significant interaction was found  $\chi^2(2)=4.31, p=.12$ .

### **Interaction between mindfulness and stress on the stroop**

A two way analysis of variance was conducted on the influence of two independent variables stress and mass on the different measures of the stroop, time, temperature, heart rate and errors. A two-way analysis of variance was conducted on the influence of two independent variables (MAASs scores and stress score) on the temperature scores. Stress type included three level (low, medium , high) and mindfulness consisted of two levels (low and high. The main effect for MAAS yielded an f ratio of  $F(1, 24)=.380, p=.54$  indicating a non-significant difference between high ( $M=25.75, SD=4.43$ ) and low mass ( $M=27.19, SD= 4.91$ .) The main effect for stress yielded an f ratio  $F(2,24)=.29, p>.05$ . indicating a non-significant difference for high stress ( $M=26.70, SD=5.16$ ), medium stress ( $M=27.74 SD=4.44$ ) and low mindfulness ( $M=26.28, SD=4.69$ ). The interaction effect was non-significant  $F(2,24)=4.74, P=.75$ .

A two-way analysis of variance was conducted on the influence of two independent variables (MAASs scores and stress score) on the time taken. Stress type included three level (low, medium , high) and mindfulness consisted of two levels (low and high. The main effect for MAAS yielded an f ratio of  $F(1, 24)=.6, p=.45$  indicating a non-significant difference between high ( $M=126.43, SD=29$ ) and low mass ( $M=123.56, SD=18.88$ ).The main effect for stress yielded an f ratio  $F(2,24)=.06, p>.05$ . indicating a non-significant difference for high stress ( $M=128.68, SD=17.84$ ), medium stress ( $M=121.31, SD=18.38$ ) and low mindfulness ( $M=136.68, SD=50.41$ ). The interaction effect was non-significant  $F(2,24)=0.70, P=.94$ .

A two-way analysis of variance was conducted on the influence of two independent variables (MAASs scores and stress score) on pulse rate . Stress type included three level (low, medium , high) and mindfulness consisted of two levels (low and high). The main effect for MAAS yielded an f ratio of  $F(1, 24)=.01, p=.92$

indicating a non-significant difference between high ( $M=66.73$ ,  $SD=12.87$ ) and low mass ( $M=68.75$ ,  $SD=13.79$ ). The main effect for stress yielded an  $f$  ratio  $F(2,24)=1.05$ ,  $p=0.92$ , indicating a non-significant difference indicating a non-significant difference for high stress ( $M=74.67$ ,  $SD=16.93$ ), medium stress ( $M=66.92$ ,  $SD=11.14$ ) and low mindfulness ( $M=60.25$ ,  $SD=11.14$ ). The interaction effect was non-significant  $F(2,24)=1.76$ ,  $P=.37$ .

A two-way analysis of variance was conducted on the influence of two independent variables (MAASs scores and stress score) on errors scores. Stress type included three level (low, medium, high) and mindfulness consisted of two levels (low and high). The main effect for MAAS yielded an  $f$  ratio of  $F(1, 24)=.380$ ,  $p=.30$  indicating a non-significant a non-significant difference between high ( $M=4.27$ ,  $SD=3.19$ ) and low mass ( $M=7.5$ ,  $SD=6.10$ ). The main effect for stress yielded an  $f$  ratio  $F(2,24)=1.05$ ,  $p>.05$ , indicating a non-significant difference for high stress ( $M=7$ ,  $SD=6.49$ ), medium stress ( $M=3.69$ ,  $SD=1.78$ ) and low mindfulness ( $M=6.5$ ,  $SD=5.24$ ). The interaction effect was non-significant  $F(2,24)=2.55$ ,  $P=.27$

### **Findings**

The results from the statistical tests performed did not find any significant findings towards the main hypothesis. There was no significant difference between high and low mindfulness on physiological responses, performance on the stroop test and perceived stress.



## Discussion

The overall aim was to investigate the relationship between mindfulness and stress in college students to see if those who are more mindful, are less stressed, make fewer errors in the stroop task. Specifically it was hypothesised that college students who have higher trait mindfulness would have better performance on the stroop task (less errors and faster time to completion), decreased perceived stress and physiological responses (lower temperature and lower heart rate). From the data analysis, there was not a significant difference between those who are high in mindfulness and low in mindfulness in perceived stress and induced stress from the stroop task. Firstly, those who scored higher in the MAAS did not display significant differences in physiological responses in the domains of pulse rate and body temperature, than those with low mindfulness. Secondly, mindful individuals did not have significant differences with non-mindful individuals regarding perceived stress. Thirdly, mindful individuals did not make more errors or take more time than non-mindful individuals. Furthermore, those who are more mindful were not less stressed than non-mindful individuals.

### **Physiological responses and performance on the stroop**

Research in the past has found that college students higher in mindfulness also had lower induced stress (Jain et al., 2007). It has been stated that during times of stress those high in mindfulness can stimulate the PNS in order to decrease heart rate, which causes a more relaxed state (Edenfield & Saed, 2012). Furthermore, this should allow the participants to react more appropriately to aversive events (Edenfield & Saed, 2012). This particular research did not show evidence towards those high in mindfulness having low physiological responses. This contradicts with past research that shows mindfulness practice reduces biological stress responses (Anderson, Lau, Segal & Bishop, 2007). Anderson, Lau, Segal and Bishops, (2007) study was longitudinal, which meant individuals received mindfulness training. It also involved Sustained Attention task, which could have caused increased stress. Furthermore, this could have been the reason for a non-significant difference in stress for this study.

The result of this study is consistent to findings found by Moore, Gruber, Deroose and Malinowski (2012) who uncovered no difference in behaviour outcomes of the stroop for those who participated in mindfulness training. However this is in contrast to research that has shown differences between those who practise mindfulness and a control (Jha et al , 2007; Moore and Malinowski, 2009). Variances in training and ceiling effects could be the cause of the differences in the previous studies (Moore, Gruber, Deroose and Malinowski ,2012). Moore and Malinowski, (2009) showed that those in the mindfulness group to be more accurate and faster than a control group (Jha et al., 2007) in their responses to the stroop . However, this was not found when participants were given shorter mindfulness training (Eliott, Wallace, & Giesbrecht, 2014). According to Lutz, Jha, Dunne, Saron (2015) there appears to be a dose response relationship. Therefore, participants higher in trait mindfulness may not be displaying significant differences due to lack of mindfulness training. The results of this current research are consistent with passed research, as participants did not receive any mindfulness training therefore they may not have had the ability and awareness to accurately report mindfulness. Furthermore, the mean score for mindfulness was marginally falling into the high category. This meant participants that are possibly in the low to medium range in mindfulness fell into the high category. It is suggested that the division of mindfulness into two categories of high and low should be reevaluated.

#### Perceived stress

Overall research has shown higher trait mindfulness to be correlated with decreased personal perception of stress (Edenfield & Saeed,2012; Godberg, Del Re, Hoyt & Davic, 2014; Lutz, Jha, Dunne & Saron, 2015 Myers et al 2012; Palmer and Rodger, 2009; Stanley, Scaldach, Kiyonaga & Jha, 2011) . This particular research did not show evidence towards those high in mindfulness having lower perceived stress. This could be a result of lack of research on mechanisms underlying the validity of self-reported mindfulness (Stanley, Scaldach, Kiyonaga & Jha ,2011). There may be other affective factors contributed to the stress reduction in other studies such as resilience as suggested by Stanley, Scaldach, Kiyonaga & Jha (2011). Futhermore the

majority of participants fell into the moderate to high category for perceived stress. This could have been a result of the experiment taking place near exam time.

#### Limitations and future research

It is suggested that this data may not be completely interpretable due to the experimental materials used. The physiological measures of temperature and heart rate were not valid as they failed to obtain accurate results. However, there was consistency in the reliability of these scores as the results displayed were consistently invalid in values. As this was cross sectional research the main focus was looking at the relationship between values. Therefore, these results were not completely devalued for this research question. It is suggested that the way in which the stroop task is run by the researcher can affect how the participant performs (Salo et al., 2001). There is a possibility of the researcher affecting the administration of the test, i.e. the Hawthorne affect (Adair, 1984; Salo et al., 2001) as stated in Moore\*. There is also concern over the external validity of the stroop task to be able to measure everyday stress (Prinsloo, Derman, Lambert & Rauch, 2013). In addition, it was not possible for the researcher to control for all experimental effects. Although participants were asked to avoid stimulants prior to taking part, it was not probable to completely eliminate these factors. Different stimulants such as coffee could have increased temperature and heart rate. The research was also limited to the small homogenous sample size used. This could have affected statistical power to pick up on minor effects between mindful and non-mindful individuals (Goldberg, De Re, Hoyt and Davis). Following on from this, these results are limited by generalizability to the convenience sample used from the National College of Ireland.

In addition, the self-reports are vulnerable to bias and social desirability. This research focused on self-reported mindfulness and perceived stress. To some degree the MAAS has been shown to be associated with social conformity (Brown and Ryan, 2003). There is still a question in relation to the mechanisms underlying mindfulness. Individuals may not understand mindfulness as a construct, which can then affect how they score themselves (Myers et al., 2012). MAAS has been shown to pick up on minute variations between individuals. (Brown and Ryan, 2003). In this research, more people appeared to be scoring in the high mindfulness range.

However this could be a result of the way in which high and low mindfulness groups were divided in this study .It is noted that the MAAS lacks content validity. As seen in previous studies where heavy drinkers scored higher on mindfulness than those who practiced mindfulness (Leigh et al., 2005). Furthermore it is recommended that these scales should be carefully used (Park , Reilly-Spong & Gross , 2013). Mindfulness may not be a natural trait as Brown and Ryan (2003) proposed. Alternatively, mindfulness could be viewed as a flexible trait that can be trained and varies from one person to another (Lutz, Jha, Dunne & Saron, 2015). As seen in previous studies where low levels of training had no effect on behavioral outcomes ( Moore, Gruber, Deroose & Malinowski, 2012) . Our research showed no significant difference in high and low mindfulness in relation stress therefore mindfulness training might be required in order to see this effect. As stated by Carmody and Baer (2008) mindfulness training has an indirect relationship with mindfulness as a trait and stress. Furthermore, mindfulness training increases trait mindfulness, which then reduces stress.

It is strongly suggested that these findings should not be over interpreted due to the constraints of the sample and experimental nature. It is advised that future research could repeat this study using a controlled experimental design including more participants. It also may be of more significance to include college students of both genders who practise mindfulness regularly. Furthermore, to compare trait mindfulness in those who practise mindfulness and those who do not to see if mindfulness training has a more significant impact on these outcomes of stress. It appears that mindfulness training has a more significant relationship with stress (Edenfield & Saeed,2012; Godberg, Del Re, Hoyt & Davic, 2014; Lutz, Jha, Dunne & Saron, 2015 Myers et) . Likewise, gender differences could be compared to see if gender plays a role in the relationship between mindfulness and stress. Furthermore, mindfulness training may be a more suitable method of reducing stress in college students. In addition, research should examine further how the mechanisms underlying mindfulness helps students to deal with stress. There is still lack of understanding on how the scales can account for the cognitive processing that occurs in mindfulness (Van Dam, Hobkirk, Danoff burg, & Earleywine, 2012 ). People who seek out mindfulness training might have an anxious disposition to begin with. Following on from this, future experiments could be tuned to take these factors into account. This particular study commenced

during the end of semester one which is a particularly stressful time for college students . Might be more appropriate for further research to test participants earlier on in semester when student's baseline stress would be lower.

This topic of research is of greater importance due to the physical and psychological issues that are associated with stress (Brotman, Golden, & Wittstein, 2007; American Psychological association, 2012. It was stated that there is lack of research on mindfulness in college students (Ramasubramanian ,2017) . Therefore the college environment was a suitable context to test this hypothesis. Furthermore it was of particular importance to investigate the effects of stress on this population due the increased stress that students experience in college and the effects it can have on their exam scores and their well being (;Myers et al .,2012; Nguyen-Fneg, Greer & Fraizer, 2017;DeBerard et al., 2004). If this stress is not controlled it can lead to unhealthy coping mechanisms ( DeBearard, Spielmans, & Julka, 2004). Although all students experience some degree of stress, according to Brown and Ryan (2003) it is important how students deal with this stress and mindfulness has been stated as a valid way of reducing stress with college students (Shearer, 2016; Tan and Martin , 2012; Omn, sharpie, Thorsesen, Plante and Findlers, 2008). This research added to past research by looking at mindfulness as a natural trait rather than a practised trait in relation to stress induced from the stroop. Further strength was added by having a subjective and objective measure of stress. In addition, this study accounted for close to an even amount of both and females.

## Conclusion

Nevertheless, this research, limited by the conditions already outlined, demonstrated that there were no significant relationships between mindfulness as a trait, perceived stress and the experience of stress induced by the Stroop task in this study. Furthermore, there were no significant differences in time and errors for those high and low in mindfulness. Although the relationship was not statistically significant there is abundance of research to show that there is a relationship between mindfulness training and stress (e.g.Edenfield & Saeed,2012; Godberg, Del Re, Hoyt & Davic, 2014; Lutz, Jha, Dunne & Saron, 2015 Myers et al 2012; Palmer and Rodger, 2009; Stanley, Schaldach, Kiyonagra & Jha, 2011 ) .It appears if students are given some training

in mindfulness it could give them an understanding and help them to cope with stressful situations. It is anticipated that this research will encourage further research on how mindfulness as a trait and mindfulness training can help college students deal with different types of stress in college in order to improve their academic performance and their health. Furthermore, this could encourage mindfulness interventions to be developed in colleges to train students on how to become more mindful .

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## Appendix

### Appendix A: MAAS

#### Day-to-Day Experiences

**Instructions:** Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. 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.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I could be experiencing some emotion and not be conscious of it until some time later.	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else.	1	2	3	4	5	6
I find it difficult to stay focused on what's happening in the present.	1	2	3	4	5	6
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	1	2	3	4	5	6
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6
It seems I am "running on automatic," without much awareness of what I'm doing.	1	2	3	4	5	6
I rush through activities without being really attentive to them.	1	2	3	4	5	6
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware of what I'm doing.	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I drive places on 'automatic pilot' and then wonder why I went there.	1	2	3	4	5	6
I find myself preoccupied with the future or the past.	1	2	3	4	5	6
I find myself doing things without paying attention.	1	2	3	4	5	6
I snack without being aware that I'm eating.	1	2	3	4	5	6

## Appendix B: PSS

## PERCEIVED STRESS SCALE

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

Name \_\_\_\_\_ Date \_\_\_\_\_

Age \_\_\_\_\_ Gender (Circle): M F Other \_\_\_\_\_

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. In the last month, how often have you been upset because of something that happened unexpectedly?                 | 0 | 1 | 2 | 3 | 4 |
| 2. In the last month, how often have you felt that you were unable to control the important things in your life?     | 0 | 1 | 2 | 3 | 4 |
| 3. In the last month, how often have you felt nervous and "stressed"?  | 0 | 1 | 2 | 3 | 4 |
| 4. In the last month, how often have you felt confident about your ability to handle your personal problems?         | 0 | 1 | 2 | 3 | 4 |
| 5. In the last month, how often have you felt that things were going your way?                                       | 0 | 1 | 2 | 3 | 4 |
| 6. In the last month, how often have you found that you could not cope with all the things that you had to do?       | 0 | 1 | 2 | 3 | 4 |
| 7. In the last month, how often have you been able to control irritations in your life?                              | 0 | 1 | 2 | 3 | 4 |
| 8. In the last month, how often have you felt that you were on top of things?  | 0 | 1 | 2 | 3 | 4 |
| 9. In the last month, how often have you been angered because of things that were outside of your control?           | 0 | 1 | 2 | 3 | 4 |
| 10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? | 0 | 1 | 2 | 3 | 4 |

  
**mind garden**  
 info@mindgarden.com  
 www.mindgarden.com

References

The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 386-396.  
 Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social Psychology of Health*. Newbury Park, CA: Sage, 1988.



## Appendix C: Information sheet

### *EXAMPLE PARTICIPANT INFORMATION SHEET*

#### **PROJECT TITLE**

Investigating the Effects of Trait Mindfulness on Stress with College Students.

**Named Researcher/s: Juliette Sejean**

**College email:** x15760175@student.ncirl.ie

#### **INVITATION**

You are being asked to take part in a research study investigating the effects of mindfulness on stress. The named researcher above is Juliette Sejean a Final year Psychology student in the National College of Ireland. An assigned psychology supervisor will be present during the research day. The overall aim is to investigate the relationship between mindfulness and stress in college students to see if those who are more mindful are less stressed, make fewer errors and take less time in the Stroop task. The Psychology Research Ethics Committee has approved this project.

#### **WHAT WILL HAPPEN**

In this study, you will be first asked to complete two questionnaires. These are the Perceived Stress Scale which provides a measure of your stress over this last month and the MAAS which is a measure of how mindful you are

After completing the questionnaires, you will be required to complete a cognitive task (Stroop Test) which will be administered through a desktop computer. While doing these tasks you will have a temperature probe and a pulse rate monitor attached to the fingers of your non-dominant hand. These will provide a measure of your body temperature and pulse rate respectively.

The Stroop Task, which has two levels. Firstly, the task involves reading the words and ignoring the colour.

**BLUE YELLOW GREEN ORANGE**

Then you will be asked to say the colour of the word while ignoring the word. This part of the task is more challenging.

**BLUE YELLOW GREEN ORANGE**

While doing the task heart rate and temperature will continue to be recorded. Also errors and time taken will be recorded.

#### **TIME COMMITMENT**

The study typically takes approximately forty-five minutes in total and will only require one session. The questionnaires will take approximately 10 minutes to complete. The Stroop Task will take 15 minutes to administer.

#### **PARTICIPANTS' RIGHTS**

You may decide to stop being a part of the research study at any time without explanation. You have the right to ask that any data you have supplied to that point be withdrawn/destroyed on the day of research. Once you

are out of the research room your data will not be identifiable to you. You have the right to omit or refuse to answer or respond to any question that is asked of you (as appropriate, “and without penalty”). You have the right to have your questions about the procedures answered (unless answering these questions would interfere with the study’s outcome). If you have any questions as a result of reading this information sheet, you should ask the researcher before the study begins.

### **BENEFITS AND RISKS**

The Stroop Task may cause heart rate and temperature to increase, which could be uncomfortable for participants. This could cause discomfort especially in those who are already experiencing moderate to high levels of stress. In addition, the task could be mentally challenging for some participants. Likewise the perceived stress scale could be confronting for some participants who are experiencing stress. Also the self-report (MAAS) could cause distress. Both of the self-reports contain questions that are personal and could resurface feeling or cause an emotional state in participants. However, both questionnaires, the Stroop task and the perceived stress scale are valid, widely used tools in psychological research. As stress is a major problem in today’s society as seen with its relationship with many different types of physical and mental illness (Brotman, Golden, & Wittstein, 2007) (American Psychological association, 2012) and has huge effects on college students (Prichad, Wilson, & Yamnitz, 2007). Mindfulness has been shown to prevent innate stress reactions (Brown et al., 2012). Therefore, based on research it essential to investigate the relationship of stress, mindfulness and attention in college students. Scores from these tests would not be sufficient basis for overall mindfulness level, stress or attention levels. Unfortunately, it is not possible to provide feedback of individual scores.

### **COST, REIMBURSEMENT AND COMPENSATION**

Your participation in this study is completely voluntary. J.

### **CONFIDENTIALITY/ANONYMITY**

The data collected will not contain any personal information about you apart from the criteria on the consent form. Once you leave the research room the data will not be identifiable. / No one will link the data you provided to the information you supplied (e.g., gender, age group). Data will only be stored in the university locked for five years then destroyed. The data will be used for the named researcher’s final year project and be presented in front of a small group of students and lecturers.

### **FOR FURTHER INFORMATION**

(Supervisor’s/ Researcher Juliette Sejean) will be glad to answer your questions about this study at any time. You may contact him/her at. (By email: [x15760175@student.ncirl.ie](mailto:x15760175@student.ncirl.ie)/ or by number 0876344291)  
If you want to find out about the final results of this study, you should contact the name researcher.

*Appendix D: Information sheet***INFORMED CONSENT FORM****Title of Project:**

Investigating the Effects of Trait Mindfulness on Stress with College Students

**Named Researcher/s:**

NAME: Juliette Sejean

COLLEGE EMAIL: x15760175@student.ncirl.ie

**The aim of research proposal**

The overall aim of this research is to investigate whether being mindful has effects on stress and sustained attention.

**Participant – please complete the following**-Male  Female 

How would you rate your current stress levels?

Low  moderately low  medium  moderately high  extremely high **(Circle Yes or No for each question)**

Are you between the age ranges 18(+6) yrs? Yes/No

Do you attend university in Dublin/Kildare? Yes/No

Do you have any cardiac problems/ take cardiac medication? Yes/No

Do you engage in recreational drugs? Yes/No

Have you been diagnosed with a clinical mental disorder? Yes/No

Have you ingested any stimulants such as coffee in the last 2-3 hours? Yes/No

Have you read or had read to you the Information sheet? Yes/No

Do you understand the information provided? Yes/No

Have you had an opportunity to ask questions and discuss this study? Yes/No

Have you received satisfactory answers to all your questions? Yes/No

**Conformation that involvement in the Research Study is voluntary.**

I have read, or had read to me, this consent form. I have had opportunity to ask questions about the consent form and all the questions have been answered to my satisfaction. I freely and voluntarily agree to be part of this research study, which respect my legal and ethical rights. I am aware that I may withdraw at any time, without giving reason, and without this decision affecting me in any way. I have received a plain language statement.

**Advice as to arrangements to be made to protect confidentiality of data, including that confidentiality of information provided is subject to legal limitations.**

My identity and other personal information will not be revealed, published or used in further studies. All information will have my name and address removed to protect confidentiality. Any other information that may identify me will also be removed.

Confidentiality is assured but I am aware that confidentiality of information provided can only be protected within the limitations of the law. It is possible for data to be subject to subpoena, freedom of information claim or mandated reporting by some professions.

**Consent**

I have read and understood the information in this form. The researchers have answered my questions and concerns, and I have a copy of this consent form. Therefore, I consent to take part in this research project

Please tick box if you consent:

**Participant:** \_\_\_\_\_

**Researcher:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Date:** \_\_\_\_\_

Appendix E: Poster

 **Are you a college student?**   
**YES? GREAT!...**

**Please contact ASAP for further info to take part in a fun, psychological experiment on Mindfulness & Stress.**



Mind Full, or Mindful?

**Email: [x15760175@student.ncirl.ie](mailto:x15760175@student.ncirl.ie)**