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"Does mindfulness meditation affect fairness preferences?"

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Abstract

This research aimed to investigate the effect of mindfulness meditation on fairness preferences, looking at individuals' giving behaviour in modified dictator games. Previous studies showed that individuals gave more in standard dictator games after mindfulness meditation. This study used modified dictator games with different relative prices. An experiment was conducted and participants were randomly allocated to an online intervention of mindfulness meditation or an online intervention with the Stroop task. Overall, the sample size used is 138 respondents. Findings revealed that there is no evidence indicating that individuals after mindfulness meditation give more in dictator games. The conclusion regarding the main effect does not change after the first robustness check that took place by looking at people who spent the expected time in the experiment, on the contrary individuals that had the Stroop task intervention were found to give more when the dictator games were efficient, whereas results of a second robustness check looking individuals with prior meditation experience suggested that mindfulness meditation has as an effect of decreasing the passing tokens in dictator games.

Keywords

Mindfulness meditation, fairness preferences, decision making

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Introduction

"Mindfulness is the miracle by which we master and restore ourselves." (Hanh,1976). Mindfulness historically originated from the Eastern world and has its roots in the Buddha teaching, called Dhamma (Sanskrit Dharma), a set of principles and practices that can sustain individuals in their pursuit of happiness and spiritual freedom (Bodhi,2011). As mentioned by Bodhi (2011), the Buddha gave attention to mindfulness by including it as a factor of the path where effort and concentration connect "*the energetic application of the mind to its stilling and unification*".

Mindfulness has been defined as the awareness coming from paying attention, to being present in the moment, and the nonjudgmental awareness of one's experience (Kabat-Zinn,2003) or as an openness to novelty (Langer,1989). Mindfulness has been called "the heart" in Buddhist meditation (Thera,1962, as described in Kabat-Zin,2003) and it is often considered as "insight" meditation, meaning deep exploration into the nature of the mind (Kabat-Zin,2003). Cultivation of mindfulness can be accomplished through several practices such as mindfulness meditation (Baer et. al,2004). As it is described and explained, in detail, in the literature review, mindfulness practices such as meditation have some major mechanisms through which it works. Some of these are specified as attention regulation, body awareness, emotion regulation, and change in perspective on the self (Hölzel et al., 2011).

Through the aforementioned mechanisms, mindfulness meditation has been suggested to have beneficiary effects on several psychiatric, functional somatic, or stress-related symptoms (Hölzel et al., 2011) and it has raised its interest in several fields. One additional field in which mindfulness has become popular is decision-making. A recent study by Lutz et al. (2008), investigated the brain activity of individuals practicing meditation and found that a meditative practice including the generation of a state in which compassion and loving-kindness, can enhance empathetic response to social stimuli. In a similar framework, Iwamoto et al. (2020), explored the correlation between mindfulness meditation and human altruism, based on their results, a positive relationship was found between them.

Based on Rushton (1984), altruistic behaviour arises when individuals sacrifice to benefit others without expecting a personal reward. This idea is not accepted in classic economics as there is a major assumption in which, all individuals are exclusively motivated by their material self-interest (Fehr & Schmidt, 2006). However, as mentioned by Fehr and Schmidt (2006), there is evidence that people have other-regarding preferences, meaning that

concerns regarding fairness strongly motivate many people. As presented, in detail, in the literature review, based on research findings individuals were found to have fairness preferences in various frameworks. In the context of people resist to inequitable outcomes (Fehr &Schmidt,1999; Bolton & Ockenfels, 2000), be willing to sacrifice something for the purpose of increasing the welfare of another person (Frohlich et al., 1984), or be willing to give everything in the context of perfect substitutes preferences (Andreoni & Miller, 2002).

This research is trying to investigate the effect of mindfulness meditation in decision-making and more specifically to explore the relationship between mindfulness meditation and individuals' fairness preferences. As mentioned, there is already research regarding the relationship between mindfulness and altruism or cooperation, nevertheless, this study wants to confirm previous research but also to allow investigate the relationship between mindfulness and the different degrees of people's fairness preferences. Taking all the aforementioned into consideration, the goal of this research is to answer the following research question:

"Does mindfulness meditation affect fairness preferences?"

In order to answer the research question, first, a literature review is provided of relevant topics to understand the framework, and to answer the research questions and the hypothesis that are tested. Following, a description of the methodology used is taken place, including the way the data were collected for the purpose of this research, and the used approach of data analysis. After the methodology, the results are demonstrated. Finally, a discussion of the summary of the results and limitations of the study is given followed by a conclusion of the research.

Literature review

Mindfulness
Definition
Mindfulness has raised interest over the last few years, although seems to be something new, its origins actually go back 25 centuries to the teaching of the Buddha (Bodhi, 2011). The Buddha's teaching called the *Dhamma* was offered as a body of principles and practices that sustain human beings in their quest for happiness and spiritual freedom. Bodhi (2011) mentions that mindfulness refers to a specific aspect of the Buddha's practice, which includes the cultivation of moment-to-moment awareness and non-judgmental attention.

Mindfulness consists of two different yet related approaches (Pirson et al.,2018). The first one (Brown & Ryan,2003; Kabat-Zinn, 2003) is derived from the traditions such as Buddhism and refers to the moment-to-moment nonjudgmental awareness of one's experience. The second approach (Langer,1989), a socio-cognitive one, has its origins in the Western world and is defined as openness to novelty.

Regarding the first, Brown and Ryan (2003), refer to mindfulness as the state of being consciously attentive to and aware of what is taking place at the present moment. In the paper of Brown and Ryan (2003), awareness is described as the continuous monitoring of the inner and outer environment, whereas attention is explained as a process of focusing awareness, which provides intense sensitivity to a limited range of experiences. Kabat-Zinn (2003), states that mindfulness is "insight" meditation, meaning that it is a deep non-conceptual seeing into the nature of the mind as well as the world. The concept of nonjudgmental awareness is presented also by Baer (2003), by stating that mindfulness is the nonjudgmental observation of the ongoing stream of both internal and external stimuli as they arise.

The second approach differs because it includes the external material and social context of the individuals (Pirson et al.,2018). According to Pirson et al. (2018), Western mindfulness is defined as an active, novel distinction-drawing mindset that results in someone being situated in the present moment, being sensitive to the context, and being guided by rules and routines. Mindfulness is described as cognitive flexibility that increases the degree to which an individual is seeking new perspectives (novelty seeking), engaging in creative activity (novelty producing), and the degree to which someone is able to engage with the current situation (engagement) (Pirson et al.,2018). Based on this approach when an individual is mindful, it means that s/he is actively engaged in the present, and sensitive to both context and perspective (Carson & Langer, 2006).

Mindfulness meditation

As mentioned in the introduction, mindfulness can be cultivated through several practices and meditation techniques (Baer et al.,2004). One of them is mindfulness meditation, which is mentioned to develop positive qualities such as awareness, insight, compassion, and equanimity (Baer et al.,2004). It Is important to describe how mindfulness meditation works and what its components are.

As Tang et al. (2015) discuss in their study, mindfulness practices vary from Buddhist meditation traditions and mindfulness-based approaches such as integrative body-mind training (IBMT) to mindfulness-based stress reduction (MBSR), IBMT is categorized as open-monitoring mindfulness meditation whereas the latter, MBSR, as both focused attention and

open-monitoring practice. Tang et al. (2015) suggest that mindfulness meditation includes at least three components: enhanced attention control, improved emotion regulation, and altered self-awareness.

The intervention of mindfulness-based stress reduction (MBSR) is described by Kabat-Zinn (2003), as a vehicle for effective training in mindfulness meditation and its immediate applications to stress. Kabat-Zinn (2003) described this intervention as a tool that is supposed to offer an environment in which methods are experimented with for relieving the suffering of both mind and body. Inside the program, the MBSR instructor has the task to transcribe the meditative challenges into methods and forms that are pertinent to participants' lives.

Lutz et al. (2008), in their research, analyse both focused attention meditation and open-monitoring meditation. They give a schematic description of both styles. More specifically, regarding focused attention meditation, the main components that it consists of are directing and sustaining attention on a selected object, detecting mind wandering and distractors, shifting the attention back to the selected object, and re-evaluating the distractor. As open-monitoring meditation is concerned, the main components that constitute the practice are the no-direct focus on objects, nonreactive meta-cognitive monitoring, and nonreactive awareness of emotional evaluation of endogenous stimuli.

The several components through which mindfulness meditation exerts its effects are described, in detail, by Hölzel et al. (2011). As reported in their paper the combination of components that describe much of mindfulness's mechanism is attention regulation, body awareness, emotion regulation, and change in perspective on the self.

With the term attention regulation, the authors (Hölzel et al., 2011), refer to the necessity to cultivate attention regulation early in the practice as attention regulation. That is, focused attention meditation is recommended before moving on to other types of meditation. Continuously, regarding the term body awareness, the authors (Hölzel et al., 2011) refer to the ability to notice subtle sensations of the body, during mindfulness practice, the focus of attention is on internal experiences such as breathing or emotions. The third factor, namely emotional regulation is the process by which one influences which emotions he or she has, when she or he has them, and how he or she experiences or expresses the emotions (Gross, 2014). Hölzel et al. (2011) suggest that mindfulness meditation has positive effects on emotion regulation. In the end, the last referred factor is the change in perspective on the self. The authors, (Hölzel et al., 2011), claim that mindfulness meditation can change the perspective of the self. More specifically, can facilitate a process called "decentering", which is "a detachment

from identification with the contents of consciousness". In other words, a shift to a more objective perspective on one's thoughts or emotions.

State vs Trait

Mindfulness has been conceptualized as a state which can be practiced in mindfulness meditation. When defined as a trait, mindfulness then refers to one's propensity to be mindful in daily life (Kiken et al.,2015). In a recent study by Davidson (2010), the author argues that the state and the trait are distinct yet related constructs that need different ways of measurement. For this research, a short online mindfulness meditation is used in order to cultivate mindfulness, therefore, the mindfulness state is measured.

Baer et al. (2004), indicate the importance of methods for measuring mindfulness. Two of the main reasons Baer et al. (2004) argue for the importance of measuring mindfulness is, at first, that interventions that claim to teach several skills have to be evaluated through assessing participants' acquisition of those skills, and secondly that in order to investigate mechanisms of action of mindfulness practice, it is important to measure mindfulness.

There are three self-report scales designed to measure the mindfulness state, namely state-MAAS, Toronto Mindfulness Scale, and State Mindfulness Scale. The State-MAAS is a measurement scale designed to evaluate the current expression of mindful attention to daily activities (Tanay & Bernstein,2013). The second aforementioned scale, namely Toronto Mindfulness Scale, consists of statements assessing subjective aspects of attentional self-regulation characterized by curiosity, acceptance, and openness to experience (Lau et al.,2006). The last measurement, State Mindfulness Scale (SMS), was introduced by Tanay and Bernstein (2013) and consists of 21 items in order to measure state mindfulness. The State Mindfulness Scale (SMS), assesses different aspects of mindfulness such as present-moment awareness, attentional focus, or acceptance of one's experiences.

Ruimi et al. (2022), suggest that State-MAAS and the Toronto scale have some limitations. The first one (State-MAAS), captures the lack of attention and awareness of one's engagement in daily experiences and not during meditation, whereas the second one (Toronto scale) does not reflect the qualities of mindful awareness as it focuses on curiosity and has limited reference to mindfulness of physical sensations. On the contrary, the State Mindfulness Scale (SMS), assesses the breadth of objects, such as body and mind, as well as the qualities of mindfulness awareness (e.g., curiosity, sensitivity to experience) in different contexts, such as mindfulness meditation (Ruimi et al., 2022). Taking all the aforementioned into consideration, for the current study, the State Mindfulness Scale (SMS) is used to measure the state of mindfulness.

Fairness

In economics, a major assumption is that individuals act in their own self-interest. In individual choice settings, a behaviour from an individual that deviates from acting for one's self-interest is considered to be irrational (Berg et al, 1995). Nonetheless, as mentioned in the research of Berg et al. (1995), a paradox was observed in group settings in which self-interest behaviours led to everyone being worse off. Similarly, Kahneman et al. (1986) argue that "*It is often viewed as an embarrassment to the basic theory that people vote, do not always free-ride, and commonly allocate resources equitably to others and to themselves when they are free to do other-wise*". Nevertheless, results of an experiment Kahneman et al. (1986) conducted, investigating whether individuals consider cost-plus as the rule of fair pricing, they found that the standards of fairness that individuals applied, were more advantageous to firms than the ones suggested by the cost-plus rule.

Subsequently, a large body of evidence indicates that a substantial percentage of individuals are strongly motivated by other-regarding preferences and concerns for fairness cannot be ignored in social interactions (Fehr & Schmidt, 2006). Güth et al. (1982) investigate the ultimatum bargaining behaviour experimentally and found that fairness preferences played an important role in ultimatum bargaining and people were willing to sacrifice some of their own material payoffs in order to achieve more fair outcomes. As mentioned by Fehr and Schmidt (2006), there are several developed theories that differentiate in the assumption regarding purely selfish preferences.

To begin with, Fehr and Schmidt (1999), investigate the effect of fairness motive on people's behaviour. Their study models fairness as self-centred inequity aversion, meaning that people resist inequitable outcomes. That is, they are willing to give up some material payoff in order to move in the direction of more equitable outcomes. Their model has an assumption that individuals are heterogenous, which facilitates understanding why individuals in some cases demand "fair" outcomes while in other cases the fairness concerns do not seem to have much of an effect. In the same line is research from Bolton and Ockenfels (2000), who discuss fairness, developing a similar model with the difference that individuals are concerned about the subject's average payoff being close to their own payoff.

In the frame of fairness considerations, Frohlich et al. (1984) mention altruistic preferences as the willingness of an individual to sacrifice something in order to increase the welfare of another person. Whereas Levine (1998), model fairness by suggesting that the subject's weight on the opponent's monetary payoffs depend on both their coefficient of

altruism and their believed opponent's coefficient. By means of some experimental games, the results were that this theory did relatively better compared to the selfish theory.

Furthermore, Charness and Rabin (2002), introduce a model to explain other-regarding preferences in which there is a combination of altruistic preferences and a form of inequality aversion, mentioned as quasi-maximin preferences. Through a range of experimental games, they show that subjects have fairness concerns and care about the other's payoff. Their results indicate that other-regarding preferences seem to have a significant impact on decision-making as individuals behave differently in different situations.

Andreoni and Miller (2002), conceptualize the subject's concern about fairness and altruism as well-behaved preferences. In their analysis, they let π_i act for the monetary payoff for the person i and Π for the set of possible payoffs for a game, so π_s stands for the subject's self-payoff and π_0 for the opponent's payoff. Hence, they claimed that if a subject s can be thought of choosing the $(\pi_s, \pi_0) \in \Pi$ that maximizes utility, then with the assumption that the subjects in experiments are money maximizers, it must be assumed that they maximize a utility in the form of $U_s = \pi_s$. The authors introduced a more general form of utility in order to allow capturing other-regarding preferences:

$$U_s = u_s(\pi_s, \pi_0)$$

Based on their experimental findings, people differ on whether they care about fairness at all, and when they do care about fairness, it can take a range of forms as Leontief, meaning people divide the surplus equally, Utilitarian (perfect substitutes), give everything when the price of giving is less than one and keep everything when the price is greater than one, to pure selfish. Andreoni and Miller (2002) concluded that based on their results many individuals had other-regarding preferences, such as altruism in dictator games, and they additionally indicated that individuals were heterogenous, suggesting that accounting for these differences is a necessary part of understanding choices.

Mindfulness and Fairness

As mentioned in the introduction, mindfulness has found to affect several aspects of fairness. Kahneman (2012) introduces a two-system approach to decision-making. He presents two conditions of information processing that operate simultaneously. System 1 occurs when the decision-maker operates fast, automatically, stereotypically, or unconsciously, when in System 2 operates slowly, effortfully, logically, and consciously. In most cases, System 1 can induce several biases when it comes to decision-making. Biases and judgments are less likely to prevent the expression of helping behaviour when mindfulness is cultivated, as it helps to

perceive thoughts as mental events and not literal truths (Condon,2017, as described in Donald et al.,2019).

In recent research investigating mindfulness and fairness preferences (Sun et al.,2015), the authors mention that mindfulness meditation may be able to reduce some habitual tendencies such as reacting automatically in a negative manner. They additionally conclude that mindfulness meditation may enhance decision-making through emotional regulation, improving cognitive control over intuitive decisions and induction of empathetic concern. Characterized those elements as fundamental for prosocial behaviours.

Donald et al. (2019), in their study on mindfulness, they are discussing regarding how mindfulness might enhance prosocial behaviour, aspects that impact fairness concerns. One of the ways they mentioned was that mindfulness may alter someone's affective experience. In order to support their idea, they state some findings of Cameron and Fredrickson (2015), based on their research in which they investigated mindfulness and helping behaviour. Mindfulness and some of its core components, as is present-focused attention, seem to associate with experiencing more positive emotions and fewer negative emotions. Those positive emotions were found to be linked, subsequently, to helping. Those findings were in line with scientific research examining brain circuity (Lutz et al.,2008), in which the authors presenting with their results that, several brain networks that are associated with prosocial emotions, were activated for mediators compared to non-mediators.

As for positive emotions such as compassion, a recent study examined whether mindfulness meditation could increase compassionate responses to suffering (Condon et al., 2013). What they found was that those individuals, who had a mindfulness meditation intervention, had better prosocial responses than those who had not. Whereas, Wallmark et al. (2013), reason that mindfulness meditation is proven to enhance compassion in itself and based on the results of their study mindfulness meditation alters altruist orientation.

In line with the above aforementioned, Iwamoto et al. (2020), argue based on their findings that mindfulness meditation, even a short online one, activated human altruism and increases social cooperation. According to their findings, individuals who participated in mindfulness meditation seemed to donate more and be more cooperative in dictator games than those who did not. Those findings can be substantiated also by the research of Masters-Waage et al. (2021), in which authors investigated the relationship between cooperation and mindfulness. In one of their studies, they defined cooperation as if the negotiators equally shared the fixed pie. In their results, they found that mindfulness meditation increased cooperation.

Taking the relevant literature into account and the respective results, it is expected that mindfulness meditation is likely to affect an individual's fairness concerns and make people give more in dictator games, therefore the following hypothesis is tested:

H_1: *Individuals give more in dictator games after mindfulness practice.*

Gender differences

Eagly (2009) discusses gender differences in prosocial behaviour. At first, she states that "*the experiences and observations of everyday life suggest that gender remains a multifaceted system of influences on person choices, social interaction, and societal institutions*". As she mentions, two dimensions that can summarize beliefs about the genders are communion or connection with others and agency or self-assertion. Based on a gender role analysis, prosocial behaviour is suggested to be more common among women when those behaviours have a communal focus and more common among men when they have an agentic focus. As the author claims, although prosocial behaviour yields patterns when it comes to gender specialization, she does not end up with a more helpful sex.

Research findings suggest that, depending on the price of giving, either gender can be found to be more altruistic (Andreoni & Vesterlund, 2001). The authors of this research, examining modified dictator games, found systematic differences among the genders, suggesting that those findings may have interesting consequences in economic behaviour. More specifically, men were more altruistic when the price of giving was low, whereas when the price was high women appeared to be more generous. Additionally, they claimed that men are more likely to be totally selfish or selfless compare to women that found to care more about equalizing payoffs.

Findings from several pieces of research differ on which sex is fairer. At first, Eckel and Grossman (1998), in their study they investigated the results of Dictator experiments among the different sex, they found that women, on average donated twice as much as men, in other anonymous subjects. Subsequently, similar results were found in the study of Nowell and Tinkler (1994), using public goods games as an experimental setting, they found some evidence that female groups were more cooperative than men groups. On the contrary, the findings of Brown-Kruse and Hummels (1993) suggest the opposite results. That is, in laboratory public goods contribution, male groups were found to be more cooperative. In the end, those varieties of behaviours based on gender, are supported also by Croson and Gneezy (2009), through several experimental games they found sex differences in behaviours regarding fairness, however the results varied.

When it comes to the different effects by gender, evidence has been found regarding the differential effects of mindfulness interventions by gender. A systematic review by Katz and Toner (2013), mentions that several quasi-experimental studies found that women benefitted more from mindfulness meditations. In addition to these results, a study by Britton et al. (2010) on the contribution of mindfulness intervention to sleeping quality, support those findings as based on their results women were found to benefit more. On the other hand, research regarding mindfulness intervention and smoking-related behaviour (Bowen & Marlatt, 2009), did not find gender differences on the outcome between the manipulation conditions.

Therefore, it seems important to consider if mindfulness meditation has differential effects, on fairness concerns, based on gender. So, a second hypothesis is tested:

H_2: *Mindfulness meditation has differential effects on fairness preferences between the genders.*

Methodology

Experimental Design

In order to answer the research question above an online experiment in Qualtrics is conducted. The experiment is shared through online platforms, namely LinkedIn, Facebook, WhatsApp, and Instagram. Before the data collection, the procedure of ethical approval took place, using the ethical approval questionnaire of the Erasmus University Rotterdam. The results of the questionnaire ensured that the experiment is ethically approved.

At the beginning of the experiment, participants are informed about the task and they answer if they consent to use their data. After that, instructions about the task are given to them also with an estimated time for the experiment, as can be seen in Figure A1, in Appendix A. When the experiment begins, participants are randomly allocated into two groups. In the first group (treatment group) cultivation of the state of mindfulness is taking place using a 3-minutes video (Calvert, 2013), guided by Dr. Rochelle Calvert. This video has been used before in a study by Emge et al. (2019), as the authors mention this video is very popular based on the views and rankings and it is selected by clinicians for the relaxing tone and the quality of the speaker's voice. While in the second group (control group), a 3-minute video with the Stroop task was used (MindfulThinks ,2017). Both videos were placed in the Qualtrics program in order to avoid participants leave the experiment, and had the same length to ensure there is no

time effect. Therefore, the independent variable, which is named *mindfulness treatment*, takes the value 1 if individuals have the mindfulness meditation video, and 0 if individuals have the Stroop task video.

For the participants that belong to the treatment group, with the mindfulness meditation video, an introduction regarding the meditation procedure is given to them to understand the benefits of this procedure and to attach importance to the task. Details of the introduction can be found in Figure A2, Appendix A. The mindfulness meditation video was a breathing space video targeting focus, de-stress, and relaxation. Through that video, it was tried to cultivate the participants' mindfulness state and develop participants' awareness, insight, compassion, and equanimity as mentioned above in the literature section. The Qualtrics is programmed to show up a reminder, indicating the importance to follow the entire meditation, if the participant tried to move on the experiment before the entire 3 minutes of the video. Details of the reminder message can be found in Figure A2, Appendix A.

For the participants that belong to the control group, with the Stroop task video, an introduction regarding the Stroop task is given to them in order to understand the task. Details of the introduction can be found in Figure A3, Appendix A. The video entails the Stroop task, which is explained in details below, in which participants named the colours of the words that were presented to them.

Stroop task

For this research, as mentioned, a Stroop task is used as a control group in the experimental design. The mentioned task is from J. Ridley Stroop. The Stroop task is considered to be one of the benchmark measures of attention (MacLeod, 1992).

The Stroop task is one of the experiments Stroop J. R conducted in his research in 1935 (Stroop,1992), to assess the effect of practice in reacting to colour stimuli, in the presence of conflicting word stimuli on the reaction times. One example of the experiments is that participants had to name the colour of the print of the series of names, ignoring colours named by the words, for instance, where the word "blue" was printed in red it was to be called "red". In his research, Stroop (1992), found that it took longer time for participants to name the colour when the word and the colour were different, compared to when they were the same.

The task that is used in the current research is the one experiment that Stroop (1992) mentions as a "Naming colour of word test where the colour of the print and the word are different". It is considered to be a task that increases cognitive ability (Dyer,1973). This task has been found, from previous research, to affect attention and response inhibition as well (Dyer,1973). The Stroop task is going to be used as a control group, a benchmark, to investigate

the effect of mindfulness meditation on decision making, and more specifically on giving behaviour in dictator games. In previous research, an active control group was used, involving logic problems, as a benchmark for mindfulness intervention (DeSteno et al., 2018). Furthermore, as mentioned above in the literature review, mindfulness meditation has also the features of increasing cognitive ability and response attention, thus Stroop task seems to be an appropriate control group for mindfulness meditation.

Manipulation questions

Consequently, a manipulation check is conducted, namely the mindfulness state. Respondents are answering 3 questions about how well their experience of the past 5 minutes is described by certain statements from items of the State Mindfulness Scale (SMS) (Tanay & Bernstein, 2013). Those 3 questions can be found in Figure A4, Appendix A. This self-report measure was picked because, as the authors mention, it is designed to measure respondents' perceived level of attention and awareness of a specific period of time but also context, meaning following a mindfulness meditation. For these questions, a 5-point Likert scale is used (1=*not at all*, 5=*very well*). The average of those 3 questions is taken to create the SMS scale.

Decision questions

The questions above are followed by some games in order to evaluate fairness preferences and measure the dependent variable, which is named *passing tokens*. The games are a modification of the dictator game based on a study by Andreoni and Vesterlund (2001). In these games, the subjects decide how to allocate a fixed payoff between themselves and another anonymous subject, over a series of different "budgets" of payoffs, with different relative prices of their own payoff and other-payoff. This then allows for observing individual preferences regarding the degree of fairness preferences, that is, their giving behaviour in those games, and discussing variation among the participants. Therefore, the dependent variable is continuous, in order to allow reflect the different degrees of fairness preferences of each individual.

All participants are given the same set of decision problems. They are informed that their task is to allocate a fixed number of tokens between themselves and an anonymous person, as can be seen in Figure A4, in Appendix A. For each of the decision problems, the number of tokens to be divided and the number of points a token is worth for each subject differs. The tokens that the subjects have to allocate are worth either 1,2 or 3 points each, and the total tokens available are 40, 60, 75, or 100. Participants are told that each point earned is worth 0.10€ in a payoff. For each decision problem, participants are told they can hold tokens for

themselves or pass them (or part of them) to the other anonymous player so that $\pi_s + \pi_0 = m$. Subjects are making decisions by filling in the blanks in the statements like the following:

"Divide 40 tokens: Hold _ at 3 points each, and Pass _ at 1 point each."

The values of the tokens can be used in order to calculate the participant's budget in terms of payoffs. For example, consider "Budget" in the decision example above. In that case, if the participant transfers one token, raises the other anonymous subject's payoff by 1 point, and reduces his own payoff by 3, meaning that the price of the other subject's payoff is 1 and the price of the participant's price payoff is 0.33. So, the token endowment is an income variable in which the inverse of the hold value is the price of the participant's self-payoff, and the inverse of the passed value is the price of the other-subject payoff. For the decisions in which the relative price is 1, the choices are like the standard dictator games. During the experiment, the order of the decisions is randomized.

The Qualtrics was programmed in order to ensure that the amount of the hold and pass tokens add up to the total number of tokens to be divided. What is more, a table is demonstrated to the participants, calculating the points and euros depending on their choice to facilitate the procedure for them. The decision questions can be found in Figure A4, Appendix A.

At the end of the experiment, a few demographic characteristics and control questions of the respondents are asked, namely age, gender, level of education, nationality, occupation, financial situation, and whether they had practice meditation before. Those questions were answered as Tang et al. (2015) mention that is important to control for variables that might be confounded with the mindfulness meditation training such as changes in one's lifestyle. The questions can be found in Figure A4, Appendix A.

In conclusion, participants came across the study by being asked to share the experiment with their friends and family. The target group was any person over the age of 18.

Analysis

For the data analysis, first, descriptive statistics are provided. In order to answer the research question and more specifically the first hypothesis, whether individuals give more in dictator games after a mindfulness meditation, in the beginning, a graph is provided with the average passing tokens by each group (treatment and control), across the 8 budget decisions.

In order to properly test the first hypothesis, further analysis is conducted by examining the correlations between the variables. For this analysis, the data are pooled together and converted to a long format to analyze the observations as panel data. Each of the 8 budget decisions individuals has to make is considered a different point in time.

At first, a Pooled OLS regression is used to examine the correlations,

$$Y_{it} = \beta_0 + \beta_1 * \chi_{1,it} + \beta_2 * \chi_{2,it} + \beta_3 * \chi_{3,it} + \beta_4 * \chi_{4,it} + \beta_5 * \chi_{5,it} + \beta_6 * \chi_{6,it} + \beta_7 * \chi_7, it$$
$$+ \beta_8 * \chi_{8,it} + \beta_9 * \chi_{9,it} + u_{it}$$

, where Y_{it} is the dependent variable namely *Passing Tokens*, $\chi_{1,it}$ is the independent variable, namely *mindfulness treatment*, taking value 1 if individual is in the treatment group (mindfulness meditation) and 0 if individual is in the control group (Stroop task). The variables $\chi_{2,it}$ to $\chi_{9,it}$ are the control variables namely, *age, biological gender, education level, financial situation, occupation, meditation before, SMS scale,* and a dummy variable called *efficiency* which takes the value 1 if the relative price in the budget decision is equal or greater than 1, and value 0 if the relative price in the budget decision is less than 1. Secondly, two Pooled OLS regressions are used with 2 interaction terms. The purpose of including the interaction term is to examine which group is more sensitive to the change of the price, that is which group cares more about efficiency and the influence of that on the outcome. Wooldridge (2014), mentions that interaction terms allow the partial effect of an explanatory variable to depend on the level of another variable and give a different way of finding outcome differentials across, in this research's case, all efficiency-group condition combinations. The first interaction term that is used, has as a reference category the control group (having the Stroop task) and the budget decision having a relative price below the value 1, whereas the second interaction term, has as a reference category the treatment group (having mindfulness meditation) and the budget decision having a relative price below the value 1.

In order to answer the second hypothesis, whether mindfulness meditation has a differential effect on fairness concerns between the biological genders, the use of two interaction terms took place. The first interaction term that is used, has as a reference category the control group (having the Stroop task) and being a male, whereas the second interaction term, has as a reference category the control group (having the Stroop task) and being a female. In those regressions, it is investigated the partial effect of being in the mindfulness condition when the biological gender is male for the first interaction and the partial effect of being in the mindfulness condition when the biological gender is female, in the second interaction (Wooldridge,2014).

A priori sample size calculations were performed in G*Power, as can be seen in Figure A5, in Appendix A. Based on the literature, a medium effect size is expected (Sun et al.,2015). According to power calculation, the required sample size for linear regression is 166 observations, therefore because for the current research panel data are used by thinking of the

8 different dictator games as 8 different times, the required sample size is 166 divided by 8, ending up with a required sample size of 20,75 observations.

Data analysis

Descriptive statistics

The descriptive statistics of the sample are provided in Tables 1a and 1b, in Appendix B, for the categorical and continuous variables respectively. Table 1a, for the variables *Finished* and *Consent,* indicates whether respondents finished the experiment and if they consented to participate in the experiment, from 276 respondents only 138 finished the experiment and all 276 participants agreed to participate. From Table 1c, in Appendix B, the variable *progress* indicates, for the participants who did not finish the experiment, at what part they stopped. Looking at the mean, it seems that the average part that participants stopped the experiment was 16.15217 out of 100. This is translated as the part right after participants saw the 3-minute videos. From Table 1b, in Appendix B, for the variable *age,* it can be observed that all respondents are above 18 years old, therefore a sample of 138 participants was used for the data analysis.

Table 1a, in Appendix B, provides all the information regarding the categorical variables. To begin with, from the variable *Group*, indicating in which group respondents were allocated, 72 of the respondents were in the group with the mindfulness meditation intervention whereas 66 had the Stroop task intervention. From the demographic variables, 69 participants were males, 68 were females and 1 preferred not to say (*Gender* variable). From the variable *Education,* indicating the education level, 11 of the subjects have High school as the highest successfully finished education, 72 have Bachelor's degrees, 51 Master's degrees, and 4 Ph.D. As for the *nationality* variable, meaning whether participants are European or non-European, 133 appeared to be European and 5 non-European. Furthermore, information regarding the sample's occupation and financial situation is given from the variables *Occupation* and *Income*, respectively. Looking at the sample, 88 subjects are working, 28 are working and studying at the same time, 5 are unemployed and 17 are studying. When it comes to the financial situation, 94 have €0 to €20.000 as annual wage, 24 have €20.001 to €40.000, 11 have €40.001 to €70.000, and 9 have €70.001 or more. In the end, 53 of the respondents seemed to have practiced meditation before and 85 did not have (*Meditation before* variable).

As for the continuous variables, Table 1b, in Appendix B, includes the details. From the variable *age,* seems that the sample has an average of 31 years old age. The variable *SMS scale*, is the average score of the three questions of the State Mindfulness Scale, measuring

mindfulness state. The average score of the whole sample was 3.52657 out of 5. Continuously, it can be observed that the group with the mindfulness meditation video had an average score of 3.37963 (*SMS scale Mindfulness*), while the group with the Stroop task video had an average score of 3.68686 (*SMS scale Stroop*). It appears that the manipulation did not have the desired effect as it was expected that the group with the mindfulness meditation video would have a higher average score than the group with the Stroop task video. Lastly, the variable *Pass tokens average* stands for the tokens passed across the 8 budget decisions. The average passed tokens of the whole sample was 25.55661, whereas individuals in the treatment group (mindfulness treatment) passed on average 26.96441 and individuals in the control group (Stroop task) passed on average 26.11174.

Randomization check

In the methodology section, it was mentioned that the subjects were randomly allocated to two intervention groups, mindfulness meditation (treatment group) and Stroop task (control group). In order to assess whether participants were randomly allocated into the two groups at first a binomial test was conducted in order to evaluate whether the proportion of the participants in the treatment group is 0.5. The null hypothesis is that the treatment group is not significantly different from 50 percent. Table 2a, in Appendix C, shows that the two groups are evenly distributed as the p-values are statistically insignificant at a 5% significance level.

Secondly, several balance tests are conducted so to evaluate whether the variables namely, *gender, education, income, occupation, nationality,* and *meditation before* are similarly distributed through the treatment and the control group. For the balance check a Fisher-exact test was chosen. As Kim (2017), mentions the chi-squared test applies an approximation as has the assumption that the sample is large, whereas the Fisher exact is an exact test that is applied in the analysis of small samples. Thus, for the current study that is considered to have a small sample a Fisher exact test seems more suitable. The null hypothesis in a Fisher exact test is that two variables are independent. From Tables 2b-2f in Appendix C, it can be concluded that there is not enough evidence that there is a significant association between the variables *gender, education, occupation, nationality, and meditation before* and the *group condition* at a 5% significance level as the p-values are not less than 0.05, suggesting that the variables aforementioned were randomly distributed in the two group conditions, namely treatment, and control. However, for the variable *income,* it can be observed in Table 2g, in Appendix C, that the p-value is 0.027, indicating that the random allocation of the variable income between the two group conditions was not successful.

Manipulation check

Subsequently, a manipulation check is conducted in order to assess whether mindfulness meditation was effective as a treatment. As mentioned in the methodology, an overall State Mindfulness Scale was created with the average of the 3 questions of the SMS scale. For the manipulation check a Mann-Whitney U test, two-sided, was conducted to evaluate whether the treatment (Mindfulness meditation) group and the control (Stroop task) group, come from the same population. The null hypothesis is that the two samples come from the same population.

The results can be found in Table 3a, in Appendix C. The p-value is 0.0230. Thus, the result suggests that the null hypothesis can be rejected at a 5% significance level. That is, the distributions are statistically different at a 5% significance level and there is evidence that the samples are not coming from the same population. Nevertheless, from what was observed in Table 1b, in Appendix B, the group with the Stroop task video appeared to have a higher average score on the SMS scale, suggesting that the intervention of mindfulness meditation did not have the desired effect as it was expected that the treatment group (mindfulness meditation), would have a higher average score on the SMS scale than the control group (Stroop task).

In order to further explore a potential scenario reason that the control group appeared to have a higher score on the SMS scale, Table 1d in Appendix B demonstrates the duration in seconds each group devoted to the experiment. The control group (Stroop task), seems to devote less time than the treatment group (mindfulness meditation), as the control group had an average of 8623.667 seconds, whereas the treatment group had an average of 14734.53 seconds. Thus, it could be the case that individuals in the control group did not take so seriously the experiment as people in the treatment group and answered the questions quicker.

Main results

Hypothesis 1

From the results obtained, in Figure 4a, it can be observed that people in the treatment group (mindfulness meditation) passed on average 26.96 tokens, across the 8 budget decisions, while people in the control group (Stroop task), passed on average 26.11 tokens, across the 8 budget decisions. Nonetheless, as can be seen from Table 4a, in Appendix C, this difference is not significant at a 5% significance level.
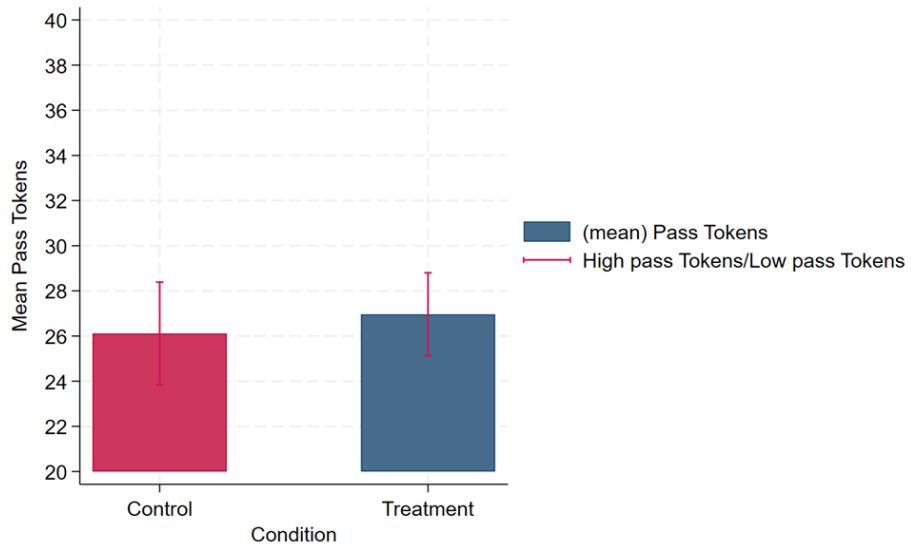
Figure 4a: Mean Passing Tokens for the average of 8 budget decisions by Group condition

Table 4b includes all the information from the regressions. By pooling the data together, the data set of 138 observations becomes 1104 records. A choice was made to investigate the biological gender, therefore a binary gender was created and included, thus the records are 1096.

Table 4b: Pooled OLS regression results for the relationship between passing tokens and the two group conditions

Variable	Passing Tokens	Passing Tokens with interaction term 1	Passing Tokens with interaction term 2
Mindfulness treatment	0.129 (1.068)		
		Base: No efficiency with Stroop	**Base: No efficiency with mindfulness**
Mindfulness		2.323 (1.654)	-2.323 (1.654)
Efficiency (Mindfulness treatment for interaction 1, Stroop task for interaction 2)		2.223 (1.456)	-1.286 (1.404)

Age	0.128	0.128	0.128
	(0.077)	(0.076)	(0.076)
Binary gender	0.404	0.404	0.404
	(1.033)	(1.032)	(1.032)
Education			
Bachelor's degree	-1.266	-1.266	-1.266
	(2.008)	(2.007)	(2.007)
Master's degree	-0.702	-0.702	-0.702
	(2.068)	(2.066)	(2.066)
PhD	-3.622	-3.622	-3.622
	(3.640)	(3.637)	(3.637)
Occupation			
Working and studying	-1.179	-1.179	-1.179
	(1.459)	(1.458)	(1.458)
Unemployed	-0.851	-0.851	-0.851
	(2.794)	(2.791)	(2.791)
Studying	-4.307*	-4.307*	-4.307*
	(1.834)	(1.832)	(1.832)
Income			
€ 20.001 to € 40.000	-0.750	-0.750	-0.750
	(1.502)	(1.501)	(1.501)
€ 40.001 to € 70.000	-9.863**	-9.863**	-9.863**
	(2.104)	(2.102)	(2.102)
€ 70.001 or more	-2.446	-2.446	-2.446
	(2.487)	(2.485)	(2.485)
Meditation before	-2.578*	-2.578*	-2.578*
	(1.103)	(1.101)	(1.101)
SMS scale	0.643	0.643	0.643
	(0.620)	(0.619)	(0.619)
Efficiency	0.404		
	(1.011)		
Constant	23.741**	22.604**	24.927**
	(4.327)	(4.372)	(4.359)
Observations	1096	1096	1096
R^2	0.041	0.044	0.044

Note Standard errors are in parentheses; *$p < 0.05$, **$p < 0.01$

Interaction term 1 base category: No efficiency with Stroop task
Interaction term 2 base category: No efficiency with mindfulness meditation
Mindfulness treatment reference category: control group, Stroop task
Binary gender reference category: Female
Education reference category: High school
Occupation reference category: Working
Income reference category: €0 to €20.000
Meditation before reference category: No meditation before
Efficiency reference category: Relative price < 1

From the first column of Table 4b, results of the Pooled OLS regression appear. The results indicate that being in the mindfulness meditation group increases the passing tokens by 0.129 tokens compared to being in the Stroop task group, ceteris paribus. However, this effect is not statistically significant at a 5% significance level. From the variable efficiency, can be observed that having as a budget decision one with a relative price equal to or greater than 1, compared to having one with a relative price less than 1, increases the passing tokens by 0.404 tokens, ceteris paribus, however, this effect is not significant at a 5% significance level.

Subsequently, further investigating the results, from the demographic variables, there are some interesting results. Initially, regarding the financial situation of the subjects, namely the *income* variable. In Table 4b, a significant result is presented at a 1% significance level. More precisely, having an annual income range from € 40.001 to € 70.000, decreases the passing tokens by 9.863 tokens, compared to having an annual income range from €0 to €20.000, ceteris paribus, and this effect is statistically significant at a 1% significance level. Secondly, regarding the occupation situation of the subjects, namely the *occupation* variable, the results indicate that studying, compared to working, decreases the passing tokens by 4.307 tokens, ceteris paribus, and this effect is statistically significant at a 5% significance level.

Lastly, a significant result is demonstrated regarding the variable *meditation before*, referring to whether the subject had practice meditation before. More precisely, having practice meditation before decreases the passing tokens by 2.578 tokens, compared to not having practice meditation before, ceteris paribus, and this effect is statistically significant at a 5% significance level.

Continuously, looking at columns 2 and 3 of Table 4b, in those regressions, the interpretation of the *efficient (under being in the control or treatment group)* variable coefficient, is the partial effect of having as a relative price in the budget decision a value equal to or greater than 1, when having as an intervention the Stroop task for the first interaction and the partial effect when having as an intervention the mindfulness meditation, in the second interaction (Wooldridge,2014). From column 2, it can be interpreted that having a budget decision with a relative price equal to or above value 1, compared to having a budget decision with a relative price below 1 increases the passing tokens by 2.223 tokens, when having the Stroop task but this effect is not significant at a 5% significance level. On the contrary column 3, it can be interpreted as having a budget decision with a relative price equal to or above value 1, compared to having a budget decision with a relative price below 1 decreases the passing tokens by 1.286 tokens, when having the mindfulness meditation but this effect is not significant at a 5% significance level.

Overall, the first hypothesis, that individuals after having a mindfulness meditation pass more tokens in dictator games, cannot be supported.

Hypothesis 2

As examined in column 1 of Table 4b above, being a male increases the passing tokens compared to being a female, by 0.404 tokens, ceteris paribus. However, this effect is not significant at a 5% significance level.

Table 4c: Pooled OLS regression results with passing tokens as a dependent variable with the 2 interaction terms for gender

Variable	Passing Tokens with interaction term 3	Passing Tokens with interaction term 4
	Base: Stroop and being a male	**Base: Stroop and being a female**
Mindfulness treatment (Male for interaction term 3, female for interaction term 4)	2.174 (1.567)	-1.595 (1.441)
Age	0.126 (0.076)	0.126 (0.076)
Binary gender	1.537 (1.501)	-1.537 (1.501)
Education		
Bachelor's degree	-2.006 (2.049)	-2.006 (2.049)
Master's degree	-1.416 (2.104)	-1.416 (2.104)
PhD	-4.020 (3.643)	-4.020 (3.643)
Occupation		
Working and studying	-1.140 (1.458)	-1.140 (1.458)
Unemployed	-1.507 (2.815)	-1.507 (2.815)
Studying	-4.430* (1.833)	-4.430* (1.833)
Income		
€ 20.001 to € 40.000	-0.808 (1.501)	-0.808 (1.501)
€ 40.001 to € 70.000	- 9.947** (2.102)	- 9.947** (2.102)

€ 70.001 or more	-3.118	-3.118
	(2.513)	(2.513)
Meditation before	-2.469*	-2.469*
	(1.103)	(1.103)
SMS scale	0.924	0.924
	(0.639)	(0.639)
Efficiency	0.404	0.404
	(1.010)	(1.010)
Constant	22.817**	24.354**
	(4.443)	(4.336)
Observations	1096	1096
R^2	0.044	0.044

Note Standard errors are in parentheses; *p < 0.05, **p < 0.01

Interaction term 3 base category: Stroop task and being a male
Interaction term 4 base category: Stroop task and being a female
Mindfulness treatment reference category: control group, Stroop task
Binary gender reference category: Female
Education reference category: High school
Occupation reference category: Working
Income reference category: €0 to €20.000
Meditation before reference category: No meditation before
Efficiency reference category: Relative price < 1

Looking at column 1 of Table 4c, the results indicate that being in the mindfulness group, compared to being in the Stroop task condition, when the biological gender is male, increases the passing tokens by 2.174 tokens ceteris paribus. Whereas in column 2 of Table 4c, results suggest that being in the mindfulness group, compared to being in the Stroop task condition, when the biological gender is female, decreases the passing tokens by 1.595 tokens ceteris paribus. Nevertheless, neither of those effects is statistically significant at a 5% significance level. Therefore, the second hypothesis, that there is a differential effect on fairness concerns between the biological genders is not supported.

Robustness checks

Analysis for individuals that spent the estimated time in the experiment

The estimated time to finish the experiment, including having seen the entire 3 minutes of each manipulation video was 12 minutes. Stanley et al. (2011), found that more spent time engaging in mindfulness practice corresponded with greater self-reported mindfulness. Therefore, this research examines additionally the results for people that spent at least 720 seconds in the experiment. The pooled sample now consists of 448 records or 56 participants.

In Tables 1e and 1f, in Appendix B, descriptive statistics are provided for the categorical and continuous variables respectively of the sample consisting of individuals that spent at least 720 seconds in the entire experiment. Initially, looking at Table 1e, in Appendix B, the percentages of educational level, income, gender, nationality, occupation, and whether respondents had meditation experience before, are very similar to those of the whole sample in Table 1a, in Appendix B. In detail, most of the participants have a Bachelor's degree or a Master's degree, have an income level of 0€ to €20.000, have not done meditation before, they are European, and they are working. As for gender, the percentages are almost equal again with 48.21% males and 51.79% females. Regarding the variable *Group,* indicating the intervention condition, there is a bigger percentage of 64.29% of individuals in the Mindfulness meditation group, compared to a percentage of 35.71% of individuals in the Stroop task group. An expected result, as it was demonstrated also in Table 1d for the whole sample, in Appendix B, respondents in the Stroop task group spent less time in the entire experiment.

Continuously, observing Table 1f, in Appendix B, the sample has an average of 31 years old age, whereas this is also a case in which the Stroop task group has higher scores of self-reported mindfulness (*SMS Scale*) with a mean of 4.1, compared to the Mindfulness treatment group with a number of 3.222222. From the *Pass Tokens Average*, meaning the tokens passed across the 8 budget decisions, can be seen that for the overall sample of individuals that spent at least 720 seconds in the experiment, there was an average of 27.36161 passing tokens.

Table 5a: Pooled OLS regression results for respondents that spent at least 720 seconds in the experiment

Variable	Passing Tokens	Passing Tokens with interaction term 1	Passing Tokens with interaction term 2
Mindfulness treatment	4.129 (2.262)		
		Base: No efficiency with Stroop	**Base: No efficiency with mindfulness**
Mindfulness		9.405** (3.052)	-9.405** (3.052)
Efficiency (Mindfulness treatment for interaction 1, Stroop		6.576* (2.648)	-1.864 (1.974)

task for interaction 2)

Age	-0.018	-0.018	-0.018
	(0.122)	(0.121)	(0.121)
Binary gender	0.914	0.914	0.914
	(1.664)	(1.653)	(1.653)
Education			
Bachelor's degree	6.367	6.367	6.367
	(4.697)	(4.667)	(4.667)
Master's degree	6.514	6.514	6.514
	(4.887)	(4.856)	(4.856)
PhD	7.410	7.410	7.410
	(7.743)	(7.694)	(7.694)
Occupation			
Working and studying	2.108	2.108	2.108
	(2.431)	(2.416)	(2.416)
Unemployed	-5.729	-5.729	-5.729
	(6.293)	(6.253)	(6.253)
Studying	-3.294	-3.294	-3.294
	(2.959)	(2.940)	(2.940)
Income			
€ 20.001 to € 40.000	-1.339	-1.339	-1.339
	(2.462)	(2.446)	(2.446)
€ 40.001 to € 70.000	-10.595**	-10.595**	-10.595**
	(3.486)	(3.464)	(3.464)
€ 70.001 or more	5.277	5.277	5.277
	(3.935)	(3.910)	(3.910)
Meditation before	-5.522**	-5.522**	-5.522**
	(1.863)	(1.851)	(1.851)
SMS scale	0.623	0.623	0.623
	(1.225)	(1.218)	(1.218)
Efficiency	1.15		
	(1.593)		
Constant	18.433*	15.041	24.447**
	(9.356)	(9.391)	(8.486)
Observations	448	448	448
R^2	0.087	0.100	0.100

Note Standard errors are in parentheses; $*p < 0.05$, $**p < 0.01$

Interaction term 1 base category: No efficiency with Stroop task

Interaction term 2 base category: No efficiency with mindfulness meditation

Mindfulness treatment reference category: control group, Stroop task

Binary gender reference category: Female

Education reference category: High school

Occupation reference category: Working

Income reference category: €0 to €20.000

Meditation before reference category: No meditation before

Efficiency reference category: Relative price < 1

As for the first hypothesis, if people after meditation practice give more in dictator games, it can be seen from the results in Table 5a that there are different results and more significant effects. To begin with, from column 1 in Table 5a, the magnitude of the effect of the *mindfulness treatment* variable is bigger than it was in Table 4b, as it seems that for the sample where respondents spent at least 720 seconds in the experiment, being in the mindfulness treatment group, compared to being in the Stroop task group increases the passing tokens by 4.129 tokens ceteris paribus, however, this effect is not significant at a 5% significance level as well.

Continuously in column 2 of Table 5a, more significant results can be found compared to Table 4b. More specifically, the results indicate that having a budget decision with a relative price equal to or above value 1, compared to having a budget decision with a relative price below 1 increases the passing tokens by 6.576 tokens, when having the Stroop task and this effect is statistically significant at a 5% significance level. Similarly, in column 2 of Table 5a, results show that being in mindfulness treatment, compared to being in the Stroop Task, increases the passing tokens by 9.405 tokens, when there is no efficiency, meaning when the budget decision has a relative price below 1, and this effect is statistically significant at a 1% significance level. Although significant effects were found in the sample of individuals who spent at least 720 seconds in the experiment, neither group (mindfulness treatment or Stroop task) was found to be uniformly more altruistic than the other, therefore, hypothesis 1 cannot be supported.

Table 5b: Pooled OLS regression results with passing tokens as a dependent variable with the 2 interaction terms for gender for respondents who spent at least 720 seconds in the experiment

Variable	Passing Tokens with interaction term 3	Passing Tokens with interaction term 4
	Base: Stroop and being a male	**Base: Stroop and being a female**
Mindfulness treatment (Male for interaction term 3, female for interaction term 4)	4.057 (3.098)	4.175 (2.635)
Age	-0.018 (0.123)	-0.018 (0.123)
Binary gender	-0.987 (2.702)	0.987 (2.702)
Education		

Bachelor's degree	6.385	6.385
	(4.732)	(4.732)
Master's degree	6.537	6.537
	(4.940)	(4.940)
PhD	7.459	7.459
	(7.881)	(7.881)
Occupation		
Working and studying	2.115	2.115
	(2.443)	(2.443)
Unemployed	-5.720	-5.720
	(6.306)	(6.306)
Studying	-3.290	-3.290
	(2.964)	(2.964)
Income		
€ 20.001 to € 40.000	-1.343	-1.343
	(2.467)	(2.467)
€ 40.001 to € 70.000	-10.601**	-10.601**
	(3.493)	(3.493)
€ 70.001 or more	5.277	5.277
	(3.940)	(3.940)
Meditation before	-5.531**	-5.531**
	(1.886)	(1.886)
SMS scale	0.614	0.614
	(1.254)	(1.254)
Efficiency	1.15	1.15
	(1.594)	(1.594)
Constant	19.389*	18.402
	(9.715)	(9.411)
Observations	448	448
R^2	0.087	0.087

Note Standard errors are in parentheses; *$p < 0.05$, **$p < 0.01$
Interaction term 3 base category: Stroop task and being a male
Interaction term 4 base category: Stroop task and being a female
Mindfulness treatment reference category: control group, Stroop task
Binary gender reference category: Female
Education reference category: High school
Occupation reference category: Working
Income reference category: €0 to €20.000
Meditation before reference category: No meditation before
Efficiency reference category: Relative price < 1

Lastly, results regarding the second hypothesis meaning whether there is a differential effect based on gender results for the sample of people who spent at least 720 seconds in the experiment, can be found in Table 5b. It can be observed that there are some different results compared to Table 4c of the whole sample. Firstly, in column 2 of Table 5b seems that being in the mindfulness treatment, compared to being in the Stroop task when the biological gender

is female increases the passing tokens by 4.175 tokens, indicating a different sign and magnitude than Table 4c, however, this effect is not significant at a 5% significant level as well. Similarly, it can be observed from column 1 of Table 5b that there is a different magnitude than in Table 4c for the effect of being in the mindfulness treatment, compared to being in the Stroop one, when the biological gender is male however this effect is not significant at a 5% significance level. Overall, it can be concluded that the second hypothesis cannot be supported for this sample either.

Analysis for individuals with prior meditation experience

As seen from the analysis, results indicated that the intervention (mindfulness meditation) did not have the desired effect based on the mindfulness measurement used. Additionally, Hölzel et al. (2011), suggested that people with more meditation experience had greater activation on brain regions connected with body awareness and empathetic responses. Therefore, further exploration of the results is done for individuals who had prior meditation experience.

To begin with, looking at Table 1a, in Appendix B, individuals that had meditation experience before are 53. Additionally, in Table 1g, in Appendix B, results regarding the *SMS scale* (mindfulness measurement) can be found for the sample of individuals who had prior meditation experience, and in Table 1h, in Appendix B, results can be found for the sample of individuals without prior meditation experience. The results show that individuals who had prior meditation experience and they were in the treatment group (mindfulness meditation), had higher self-report mindfulness scores with an average of 3.477778 compared to individuals without prior meditation experience who were in the treatment group with an average score of 3.309524. Additionally, the results of Table 1g, in Appendix B, indicate that, for individuals who had prior meditation experience, those who were in the treatment group (mindfulness meditation) had a higher average score of self-reported mindfulness of 3.477778 compared to people in the control group (Stroop task), who had an average of 3.376812. The *Pass Tokens Average*, meaning the tokens passed across the 8 budget decisions, can be seen from Table 1g, in Appendix B, showing that for the overall sample of individuals who had prior meditation experience, there was an average of 24.48467 passing tokens, which is lower compared to the result of the sample of individuals without prior meditation experience with an average of 27.84853, as can be seen in Table 1h, in Appendix B. A similar result was found also in the data analysis above, in Table 4b, suggesting that people who had meditation before gave less than people who had not meditation before.

By pooling the data together for the sample of individuals with a prior meditation experience, the 53 observations become 424 records, and with the choice of picking the biological gender, the sample ended up with 416 records.

Table 5c: Pooled OLS regression results for respondents with prior meditation experience

Variable	Passing Tokens	Passing Tokens with interaction term 1	Passing Tokens with interaction term 2
Mindfulness treatment	-4.207* (1.966)		
		Base: No efficiency with Stroop	**Base: No efficiency with mindfulness**
Mindfulness		-2.589 (2.851)	2.589 (2.851)
Efficiency (Mindfulness treatment for interaction 1, Stroop task for interaction 2)		4.924* (2.466)	2.336 (2.196)
Age	0.118 (0.145)	0.118 (0.145)	0.118 (0.145)
Binary gender	4.683* (1.892)	4.683* (1.893)	4.683* (1.893)
Education			
Bachelor's degree	4.120 (4.579)	4.120 (4.581)	4.120 (4.581)
Master's degree	3.888 (4.620)	3.888 (4.622)	3.888 (4.622)
PhD	-30.875** (8.122)	-30.875** (8.126)	-30.875** (8.126)
Occupation			
Working and studying	-5.409* (2.611)	-5.409* (2.612)	-5.409* (2.612)
Unemployed	3.891 (7.784)	3.891 (7.788)	3.891 (7.788)
Studying	-9.441** (3.029)	-9.441** (3.030)	-9.441** (3.030)
Income			
€ 20.001 to € 40.000	-1.753 (3.372)	-1.753 (3.374)	-1.753 (3.374)

€ 40.001 to € 70.000	-16.702**	-16.702**	-16.702**
	(4.072)	(4.074)	(4.074)
€ 70.001 or more	0.317	0.317	0.317
	(3.695)	(3.697)	(3.697)
SMS scale	-1.644	-1.644	-1.644
	(1.035)	(1.036)	(1.036)
Efficiency	3.481*		
	(1.639)		
Constant	25.888**	24.986**	22.396**
	(7.379)	(7.472)	(7.591)
Observations	416	416	416
R^2	0.138	0.139	0.139

Note Standard errors are in parentheses; *p < 0.05, **p < 0.01

Interaction term 1 base category: No efficiency with Stroop task
Interaction term 2 base category: No efficiency with mindfulness meditation
Mindfulness treatment reference category: control group, Stroop task
Binary gender reference category: Female
Education reference category: High school
Occupation reference category: Working
Income reference category: €0 to €20.000
Efficiency reference category: Relative price < 1

The results in column 1 of Table 5c, suggest that for the sample of individuals who have prior meditation experience, being in the mindfulness treatment group, compared to being in the control group (Stroop task), decreases the passing tokens by 4.207 tokens, ceteris paribus, and this effect is statistically significant at a 5% significance level. Furthermore, results from column 2 of Table 5c, confirm the previous results suggesting that for the sample of people with prior meditation experience, having a budget decision with a relative price equal to or above value 1, compared to having a budget decision with a relative price below 1 increases the passing tokens by 4.924 tokens, when having the Stroop task and this effect is statistically significant at a 5% significance level. Taking all the aforementioned into consideration, the first hypothesis, meaning that individuals after mindfulness meditation practice give more in dictator games, cannot be supported.

Continuously, from the demographic and control variables there are some additional significant results, different from those in the main analysis for the entire sample, presented in Table 4b. More specifically, at first, for the sample of individuals with prior meditation experience, individuals with Ph.D. as highest finished education were found to give less in the modified dictator games, compared to those who had high school as highest finished education, by 30.875 tokens, ceteris paribus, and this effect is significant at a 1% significance level. Secondly, results show that for individuals with prior meditation experience, working and studying, compared to working, decreases the passing tokens by 5.409 tokens and this effect is

significant at a 5% significance level. Lastly, for this sample, was found that having as a budget decision an efficient one, meaning with a relative price equal to or above value 1, compared to having a budget decision with a relative price below 1, increases the passing tokens by 3.481 tokens and this effect is statistically significant at a 5% significance level.

Finally, in column 1 of Table 5c, the results show that for the sample of individuals who have prior meditation experience, being a male, compared to being a female, increases the passing tokens by 4.683 tokens, ceteris paribus, and this effect is statistically significant a 5% significance level. Results of further investigation of the second hypothesis, meaning that there is a differential effect of mindfulness meditation on giving behaviour between the biological gender, can be found in Table 5d.

Table 5d: Pooled OLS regression results with passing tokens as a dependent variable with the 2 interaction terms for gender for respondents with prior meditation experience

Variable	Passing Tokens with interaction term 3	Passing Tokens with interaction term 4
	Base: Stroop and being a male	**Base: Stroop and being a female**
Mindfulness treatment (Male for interaction term 3, female for interaction term 4)	-1.101 (2.798)	-7.337** (2.810)
Age	0.116 (0.145)	0.116 (0.145)
Binary gender	-0.453 (3.309)	0.453 (3.309)
Education		
Bachelor's degree	2.229 (4.730)	2.229 (4.730)
Master's degree	2.056 (4.759)	2.056 (4.759)
PhD	-31.448** (8.116)	-31.448** (8.116)
Occupation		
Working and studying	-5.780* (2.617)	-5.780* (2.617)
Unemployed	-0.628 (8.295)	-0.628 (8.295)
Studying	-10.035**	-10.035**

	(3.048)	(3.048)
Income		
€ 20.001 to € 40.000	-2.121	-2.121
	(3.374)	(3.374)
€ 40.001 to € 70.000	-17.561 **	-17.561 **
	(4.102)	(4.102)
€ 70.001 or more	-0.564	-0.564
	(3.732)	(3.732)
SMS scale	-0.660	-0.660
	(1.211)	(1.211)
Efficiency	3.481*	3.481*
	(1.636)	(1.636)
Constant	27.384**	26.931**
	(7.407)	(7.396)
Observations	416	416
R^2	0.143	0.143

Note Standard errors are in parentheses; *$p < 0.05$, **$p < 0.01$
Interaction term 3 base category: Stroop task and being a male
Interaction term 4 base category: Stroop task and being a female
Mindfulness treatment reference category: control group, Stroop task
Binary gender reference category: Female
Education reference category: High school
Occupation reference category: Working
Income reference category: €0 to €20.000
Efficiency reference category: Relative price < 1

The results of column 2 in Table 5d, indicate that for the sample of individuals with a prior meditation experience, being in the mindfulness treatment group, compared to being in the control group (Stroop task), decreases the passing tokens by 7.337 tokens, when the biological gender is female, and this effect is statistically significant at a 1% significance level. This result suggests that, for the sample of individuals with meditation experience, there is a differential effect of mindfulness meditation on the giving behaviour, or fairness preferences, between the biological genders, thus the second hypothesis is supported.

Discussion

Summary

The current research tried to explore the effect of mindfulness on decision-making. More specifically, by using an intervention of mindfulness meditation on participants, the research aimed to investigate the results on the preferences of respondents regarding fairness. The reference was participants that had as intervention a cognitive task, namely the Stroop task. The fairness preferences were measured by looking at the giving behaviour of respondents in 8 different modified dictator games.

By using a randomized experiment in order to collect the data, multiple data analyses were conducted. A causal relationship between mindfulness treatment and individuals' decision to give more in dictator games did not find. Therefore, the first hypothesis, suggesting that individuals after a mindfulness meditation give more in dictator games, is not supported by the results. Additionally, the interaction term used to see the partial effect of having an efficient budget decision, under both mindfulness treatment and Stroop task intervention, and found that there is no statistically significant effect. For the second hypothesis, the interaction term was used to investigate whether there is a differential effect of mindfulness treatment between the two biological genders on the outcome, but no statistically significant effect was found, so the second hypothesis is not supported.

Regarding the demographic variables, results showed that individuals who study are giving less, compared to individuals who are working, and this effect was significant. Additionally, the financial situation was found to influence giving behaviour as individuals who had an income level of €40.001 to €70.000 were found to give less in dictator games compared to individuals that have an income level of €0 to €20.000. Lastly, results suggested that people who had done meditation before gave less in the dictator games compared to people who had not done meditation before.

Two robustness checks were conducted for further exploration. The first one found that even for participants who spent more than 720 seconds in the experiment there was no uniform behaviour of the two groups (treatment and control) regarding the giving behaviour in the decisions. However, the second robustness check for individuals with prior meditation experience, suggested that being in the mindfulness treatment decreased the passing tokens, compared to being in the Stroop task group. This result was the opposite of what was expected, as it was expected after people had mindfulness meditation to give more in dictator games (Iwamoto et al., 2020). As for the second hypothesis, whether there is a differential effect of mindfulness between the biological gender on the outcome, no significant effect was found in the first robustness check, confirming the results of the study by Bowen and Marlatt (2009), which did not find a differential effect of mindfulness manipulation among biological gender, whereas in the second robustness check, for individuals with prior meditation experience, a differential effect was found between the biological gender.

Finally, the manipulation check, found that the intervention did not have the desired effect as the group which had the Stroop task intervention (control group) was found to have a higher score on the State Mindfulness Scale compared to the group that had the mindfulness meditation intervention (treatment group). After conducting a Mann-Whitney U test found that

the two groups (control and treatment) did not come from the same population, and looking at the means of the two groups, the control group was found to have higher scores on the State Mindfulness Scale. Nevertheless, in the robustness check, looking at the sample of people who had prior meditation experience, those who were in the mindfulness treatment group had a higher average of self-reported mindfulness compared to those who were in the control group (Stroop task).

Overall, regarding the first hypothesis, that individuals after a mindfulness meditation give more in dictator games, although the results showed that is not supported, it has to be taken into account that the manipulation did not have the desired effect. That is, participants did not have the effect in order to affect their decision-making and their fairness preferences, meaning to give more in the modified dictator games. For further research, a more intensive manipulation is needed in order to increase the mindfulness state of participants. Additionally, by looking at the sample of people who had meditation experience, the opposite results were found with being in the mindfulness treatment decreasing the passing tokens. Those results are not consistent with previous literature, which suggested that people after a mindfulness intervention appeared to be more cooperative (Masters-Waage et al., 2021) and give more in dictator games (Iwamoto et al., 2020).

Limitations

This research found to have some limitations. To begin with, it was a limitation of the experiment that the mindfulness meditation was in an online form, not in-person, and conducted only one time. Most studies in relevant literature did the mindfulness intervention several times in the participants. Some for a month-long retreat (Donald et al., 2019) or an 8-week study (Wallmark et al., 2013; Condon et al., 2013).

Furthermore, as mentioned in the descriptive statistics part in Table 1a, in Appendix A, although 276 respondents started the experiment only 138 finished the whole experiment. In further research, it was found that individuals that did not finish the whole experiment stopped the experiment, on average, right after the manipulation, meaning the videos, as can be seen in Table 1c, in Appendix A. It can be assumed that the 3-minute video for both groups (mindfulness treatment and Stroop task) was long enough for participants to stop the experiment. Even though similar 5-minute video manipulation was used in previous literature (Iwamoto et al., 2020) for mindfulness meditation research, for this study seemed to be an obstacle.

Continuously, a robustness check was conducted for individuals that spent at least 720 seconds in the experiment, which was the expected time for someone to finish the whole experiment. After diminishing, the sample ended up being 448 records, or 56 participants out of 138. Out of this, it can be concluded that most of the participants were not focused during the experiment. This could have consequences at first for the manipulation as Stanley et al. (2011) suggest that more time spent in mindfulness practice increases self-reported mindfulness, but also could have consequences in participants' decisions during the experiment. Subsequently, it was a restriction of the research that Qualtrics was not programmed to count the seconds each individual spent on the manipulation page, so it could be assessed whether respondents practiced the entire mindfulness meditation or not.

Finally, a Pooled OLS regression was chosen for the data analysis. Although it was picked because it is the best linear unbiased estimator and exploits all data variation, it demands that several assumptions hold. At first, both unit heterogeneity and idiosyncratic error have to be uncorrelated with the explanatory variables and there has to be no serial correlation, meaning that the error terms in different periods are uncorrelated (Wooldridge, 2014). It is very difficult for those assumptions to hold, therefore for future research, it is better for another estimator for panel data to be used or cluster standard errors at the unit of observation level.

Suggestions

For further research, a laboratory experiment in which participants would have in-person mindfulness meditation under guidance, for several weeks, could ensure that individuals would have the entire mindfulness manipulation, and probably the manipulation would have an effect on individuals' decision-making regarding fairness preferences. This way could additionally ensure that participants would be more focused on the entire experiment. However, in such a setting of a lab experiment, it might be an issue regarding external validity as the fact that participants would not be anonymous and would know that are being watched could affect their decision-making in the modified dictator games. Therefore, ideally, a field experiment could control also this issue and ensure external validity.

Conclusion

The current study investigated the relationship between mindfulness meditation on decision-making. The results suggested that there is no causal effect indicating that individuals after practiced mindfulness meditation give more in dictator games. Nevertheless, further exploration of individuals with a prior meditation experience, found that being in the mindfulness treatment decreased the passing tokens in dictator games, whereas focused on participants that spent at least 720 seconds on the experiment, an effect was found between giving behaviour in dictator games that are efficient, for people who had a Stroop task intervention. In addition, although no differential effect was found of mindfulness meditation in giving behaviour between the biological genders when looking the entire sample, by looking only the individuals with a prior meditation experience, the results suggest that there is evidence of a differential effect of mindfulness between the genders. Finally, individuals who had meditation experience were found to give less than people who had not. Similar results were found for respondents who were studying, compared to those who were working, as well as for people who had an income level of 40.001 to €70.000, compared to those who had €0 to €20.000.

Further research can be conducted in order to replicate the results aforementioned taking all the limitations into consideration. Overall, this study suggests that mindfulness was not found to affect individuals' decision-making in the direction of giving more, as shown also by the results of individuals that had meditation experience. Financial situation and occupation seemed to be important regarding giving behaviour, individuals in better financial situations were found to give less than people in worse financial situations, contrary to the finding of occupation in which students were found to give less than working people.

Thinking of the implications of the results, for policy-making decisions further research could take place regarding individuals' fairness preferences and explore different treatments, taking into account the effect of financial situation and occupation of individuals.

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Appendix

Appendix A

Figure A1 – Information Sheet

Dear Participant,

Welcome and thank you in advance for participating in this experiment!

Your participation is completely anonymous, and your answers will only be used for this research. You will be asked to watch a short video, after which some questions will be asked. These include questions regarding how you feel, as well as some economic questions. Lastly, a few demographic questions will be asked.

The experiment is divided into 3 sections and will take roughly 12 minutes.

In case of any questions please contact:

654196ek@eur.nl

Question 1

- I agree to participate in the experiment

- I do not wish to participate in the experiment

Figure A2 – Mindfulness meditation introduction

Underneath you can find a link to a 3-minute video with a meditation practice. Meditation practices can help reduce negative emotions, increase your well-being, and cultivate positive qualities. It is important to follow the meditation for the entire 3 minutes. After you successfully follow the meditation practice, we kindly ask you to go back to the experiment and click on the next page in order to answer the follow-up questions.

3 Minute Breathing Space Mindfulness Meditation – New Mindful Life

If participants click submit before the 180 seconds have passed, the following reminder pops up:

It is very important to follow the entire 3 minutes practice, if you did not, please consider continuing the video to the point where you left off. You can also continue with the follow-up questions.

Figure A3 – Stroop task introduction

Underneath you can find a link to a 3-minute video with a task called Stroop task. In this task, you have to name the colour of the words that are presented to you. More details will be given in the video. After watching the video, we kindly ask you to go back to the experiment and click on the next page in order to answer the follow-up questions.

Here's how the Stroop test works:
I will give you a word, like this one

Red

and you will say the color of the word.

0:18 / 3:02

How Fast Is Your Brain? The Stroop Test

Figure A4 – Questions asked during the experiment

Manipulation check (SMS scale) Questions 2-4

For the next 3 questions, please indicate how well each statement describes your experiences in the past 5 minutes.

Question 2

I was aware of different emotions that arose in me

- Not at all
- A little
- Somewhat
- Well
- Very well

Question 3

 I was aware of what was going on in my mind

- Not at all
- A little
- Somewhat
- Well
- Very well

Question 4

I felt that I was experiencing the present moment fully

- Not at all
- A little
- Somewhat
- Well
- Very well

Decision questions (dictator games):

This section is about decision-making. In those questions, you are asked to make a series of choices about how to divide a set of tokens between yourself and another anonymous person. As you divide the tokens, you and the other person will each earn points.

Every point that someone earns will be worth **0.10 euros**, hypothetically. For example, if you earn 58 points you will make 5.80€ in the experiment.

Each choice you make is similar to the following:

Example: Divide 40 tokens: Hold ____ tokens and pass _____ tokens. The token is worth 1 point to you, but it is worth 3 points if you pass it to the other person.

In this choice, you must divide 40 tokens. In this example, you will receive 1 point for every token you hold and the other person will receive 3 points for every token you pass.

Option 1: You can keep all the tokens:

Hold: 40 | Pass: 0

	Tokens	Points	Euros (€)
Hold	40	40	4.00
Pass	0	0	0.00

You will receive 40 points, or 4.00€ (40 × 0.10), and the other person will receive no points, or 0€.

Option 2: Pass all the tokens

Hold: 0 | Pass: 40

	Tokens	Points	Euros (€)
Hold	0	0	0.00
Pass	40	120	12.00

You will receive 0€ and the other person will receive 40 × 3 = 120 points, or 12€ (120 × 0.10).

Option 3: Keep some and pass some

Hold: 22 | Pass: 18

	Tokens	Points	Euros (€)
Hold	22	22	2.20
Pass	18	54	5.40

You would earn 22 points, or 2.2€ (22 × 0.10), and the other person would receive 18 × 3 = 54 points, or 5.4€ (54 × 0.10).

Important Note:

In all cases, you can choose any number to hold and any number to pass, but the number of tokens you hold plus the number of tokens you pass **must** be equal to the total number of tokens to divide.

Questions:

5) Divide 40 tokens:

Hold ____ tokens, and pass _____ tokens. The token is worth 1 point to you, but it is worth 3 points if you pass it to the other person.

6) Divide 40 tokens:

Hold ____ tokens, and pass _____ tokens. The token is worth 3 points to you, but it is worth 1 point if you pass it to the other person.

7) Divide 60 tokens:

Hold ____ tokens, and pass _____ tokens. The token is worth 1 point to you, but it is worth 2 points if you pass it to the other person.

8) Divide 60 tokens:

Hold ____ tokens, and pass _____ tokens. The token is worth 2 points to you, but it is worth 1 point if you pass it to the other person.

9) Divide 75 tokens:

Hold ____ tokens, and pass _____ tokens. The token is worth 1 point to you, but it is worth 2 points if you pass it to the other person.

10) Divide 75 tokens:

Hold ____ tokens, and pass _____ tokens. The token is worth 2 points to you, but it is worth 1 point if you pass it to the other person.

11) Divide 60 tokens:

Hold ___ tokens, and pass ____ tokens. The token is worth 1 point to you, and it is also worth 1 point if you pass it to the other person.

12) Divide 100 tokens:

Hold ___ tokens, and pass ____ tokens. The token is worth 1 point to you, and it is also worth 1 point if you pass it to the other person.

Socio-demographic- control questions

Question 13

What is your age?

For this question participants' answers that are under 18 years old, do not take into account.

Question 14

What is your gender?

- Male

- Female

- Non-binary/third gender

- Prefer not to say

Question 15

What is the highest education that you have successfully finished?

- Primary school

- High school

- Bachelor's degree

- Master's degree

- PhD

Question 16

Are you…?

- European

- Non – European

More specifically:

Question 17

What is your current situation?

- Working
- Working and studying at the same time
- Unemployed
- Studying

Question 18

What is your annual wage? If you are not working, please choose the option: € 0 to 20.000

- € 0 to € 20.000
- € 20.001 to € 40.000
- € 40.001 to € 70.000
- € 70.001 or more

Question 19

Have you practiced meditation before?

- Yes
- No

Figure A5 - Sample size calculation (G-Power) (Faul et al., 2009)

F tests – Linear multiple regression: Fixed model, R^2 deviation from zero

Type of power analysis: A priori – compute required sample size

Input parameters:

Effect size: 0.15 (Sun et al.,2015)
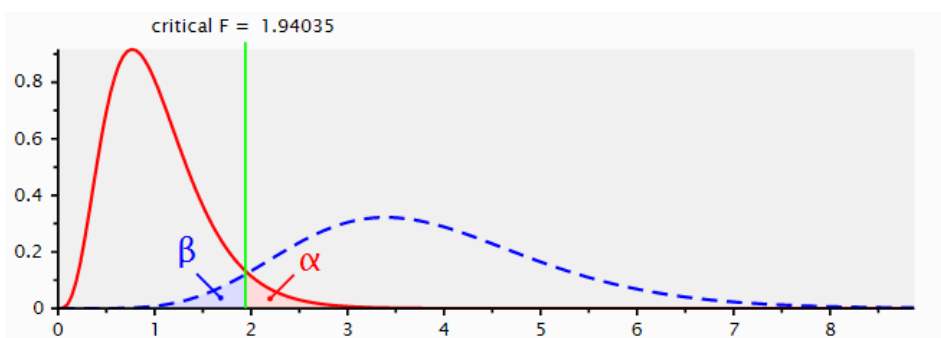
a error prob: 0.05

Power (1-β error prob): 0.95

Number of predictors: 9

Output:

Critical F: 1.9403478

Total sample size: 166

Actual Power: 0.9500973

Table 1a: Descriptive Statistics Categorical Variables

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Finished	276	100.00	**Group**	138	100.00
Yes	138	50.00	Mindfulness meditation group	72	52.17
No	138	50.00	Stroop task group	66	47.83
Consent	276	100.00	**Meditation before**	138	100.00
Yes	276	100.00	Yes	53	38.41
No	0	0	No	85	61.59
Education	138	100.00	**Occupation**	138	100.00
High School	11	7.97	Working	88	63.77
Bachelor's degree	72	52.17	Working and studying	28	20.29
Master's degree	51	36.96	Unemployed	5	3.62
PhD	4	2.90	Studying	17	12.32
Income	138	100.00	**Nationality**	138	100.00
€0 to €20.000	94	68.12	European	133	96.38
€20.001 to €40.000	24	17.39	Non-European	5	3.62
€40.001 to €70.000	11	7.97			
€70.001 or more	9	6.52			
Gender	138	100.00			
Male	69	50.00			
Female	68	49.28			
Prefer not to say	1	0.72			

Table 1b: Descriptive Statistics Continuous Variables

Variable	Observations	Mean	Std. dev.	Min	Max
Age	138	31.11594	8.43011	20	61
SMS Scale					
Overall sample	138	3.52657	0.85417	1.33333	5
Mindfulness group	72	3.37963	0.76566	1.33333	5
Stroop group	66	3.68686	0.92056	1.33333	5
Pass Tokens Average					
Overall sample	138	26.55661	8.513474	0	45
Mindfulness group	72	26.96441	7.817705	0	40
Stroop group	66	26.11174	9.253147	0	45

Table 1c: Descriptive Statistic for the progress of the unfinished observations

Variable	Observations	Mean	Std. dev.	Min	Max
Progress	138	16.15217	8.43011	20	61

Table 1d: Duration in seconds spent in the experiment by each group

Variable	Observations	Mean	Std. dev.	Min	Max
Duration in seconds					
Mindfulness group	72	14734.53	48859.96	135	328768
Stroop group	66	8623.667	31276.21	95	164865

Table 1e: Descriptive Statistics Categorical Variables for the sample of individuals that spent at least 720 seconds in the experiment

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Education	56	100.00	**Group**	56	100.00
High School	2	3.57	Mindfulness meditation group	36	64.29
Bachelor's degree	32	57.14	Stroop task group	20	35.71
Master's degree	21	37.50	**Meditation before**	56	100.00
PhD	1	1.79	Yes	19	33.93
Income	56	100.00	No	37	66.07
€0 to €20.000	39	69.64	**Occupation**	56	100.00
€20.001 to €40.000	9	16.07	Working	38	67.86
€40.001 to €70.000	4	7.14	Working and studying	9	16.07
€70.001 or more	4	7.14	Unemployed	1	1.79
Gender	56	100.00	Studying	8	14.29
Male	27	48.21	**Nationality**	56	100.00
Female	29	51.79	European	54	96.43
			Non-European	2	3.57

Table 1f: Descriptive Statistics Continuous Variables for the sample of individuals that spent at least 720 seconds in the experiment

Variable	Observations	Mean	Std. dev.	Min	Max
Age	56	31.92857	9.045053	22	61
SMS Scale					
Overall sample	56	3.535714	0. 8448981	1.33333	5
Mindfulness group	36	3.222222	0. 7259367	1.33333	5
Stroop group	20	4.1	0. 7578054	2.33333	5
Pass Tokens Average					
Overall sample	56	27.36161	7.615425	0	37.5
Mindfulness group	36	29.14931	4.555297	19.375	37.5
Stroop group	20	24.14375	10.616	0	33.375

Table 1g: Descriptive Statistics Continuous Variables for individuals with prior meditation experience

Variable	Observations	Mean	Std. dev.	Min	Max
SMS Scale					
Overall sample	53	3.433962	0.9072003	1.33333	5
Mindfulness group	30	3.477778	0.7514142	1.33333	5
Stroop group	23	3.376812	1.093158	1.33333	5
Pass Tokens Average					
Overall sample	53	24.48467	9.242565	0	34.375
Mindfulness group	30	23.88542	8.710101	0	33.125
Stroop group	23	25.2663	10.03894	0	34.375

Table 1h: Descriptive Statistics Continuous Variables for individuals without prior meditation experience

Variable	Observations	Mean	Std. dev.	Min	Max
SMS Scale					
Overall sample	85	3.584314	0.8195784	1.33333	5
Mindfulness group	42	3.309524	0.7770169	1.33333	5
Stroop group	43	3.852713	0.7776723	2	5
Pass Tokens Average					
Overall sample	85	27.84853	7.805797	0	45
Mindfulness group	42	29.16369	6.346901	0	40
Stroop group	43	26.56395	8.894821	0	45

Appendix C

Table 2a: Binomial Probability test

Binomial Probability test					
Variable	N	Observed k	Expected k	Assumed p	Observed p
Group	**138**	**72**	**69**	**0.50000**	**0.52174**

Pr (k>=**72**)	= **0.335267**	(one-sided test)
Pr (k<=**72**)	= **0.724293**	(one-sided test)
Pr (k<=**66** or k>=**72**)	= **0.670534**	(one-sided test)

Table 2b: Fisher's exact test – Group Condition and Education

Enumerating   sample-space combinations:

stage 4:   enumerations = 1

stage 3:   enumerations = 3

stage 2:   enumerations = 12

stage   1:   enumerations = 0   Group

Education	Stroop	Mindfulness	Total
High School	**7**	**4**	**11**
Bachelor's degree	**36**	**36**	**72**
Master's degree	**21**	**30**	**51**
PhD	**2**	**2**	**4**
Total	**66**	**72**	**138**

Fisher's exact   =   **0.519**

Table 2c: Fisher's exact test – Group Condition and Gender

Enumerating   sample-space combinations:

stage 3:   enumerations = 1

stage 2:   enumerations = 1

stage   1:   enumerations = 0   Group

Gender	Stroop	Mindfulness	Total
Male	**32**	**37**	**69**
Female	**34**	**34**	**68**
Prefer not to say	**0**	**1**	**1**
Total	**66**	**72**	**138**

Fisher's exact   =   **0.861**

Table 2d: Fisher's exact test – Group Condition and Occupation

Enumerating sample-space combinations:
stage 4:   enumerations = 1
stage 3:   enumerations = 6
stage 2:   enumerations = 35
stage 1:   enumerations = 0

Group

Occupation	Stroop	Mindfulness	Total
Working	36	52	88
Working and studying	15	13	28
Unemployed	3	2	5
Studying	12	5	17
Total	66	72	138

Fisher's exact   =   **0.113**

Table 2e: Fisher's exact test – Group Condition and Meditation Before

Group

Meditation before	Stroop	Mindfulness	Total
No	43	42	85
Yes	23	30	53
Total	66	72	138

Fisher's exact   =   **0.484**
1 -sided Fisher's exact =   **0.259**

Table 2f: Fisher's exact test – Group Condition and Nationality

Group

Meditation before	Stroop	Mindfulness	Total
Non - European	4	1	5
European	62	71	133
Total	66	72	138

Fisher's exact   =   **0.193**
1 -sided Fisher's exact =   **0.157**

Table 2g: Fisher's exact test – Group Condition and Income

Enumerating sample-space combinations:
stage 4: enumerations = 1
stage 3: enumerations = 3
stage 2: enumerations = 12
stage 1: enumerations = 0   Group

Income	Stroop	Mindfulness	Total
€0 to €20.000	50	44	94
€20.001 to €40.000	8	16	24
€40.001 to €70.000	7	4	11
€70.001 or more	1	8	9
Total	66	72	138

Fisher's exact   =   **0.027**

Table 3a: Mann – Whitney U test for manipulation check in SMS scale between the groups

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

Group	Obs	Rank sum	Expected
Stroop	66	5115	4587
Mindfulness	72	4476	5004
Combined	138	9591	9591

Unadjusted variance	**55044.00**
Adjustment for ties	**-866.15**
Adjusted variance	**54177.85**

H0: SMS_scale (Group~n==0) = SMS_scale (Group~n==1)

z = **2.268**

Prob > |z| = **0.0233**

Exact prob = **0.0230**

Table 4a: Mann – Whitney U test for differences in Pass values across 8 budgets decisions between the groups

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

Group	Obs	Rank sum	Expected
Stroop	66	4521.5	4587
Mindfulness	72	5069.5	5004
Combined	138	9591	9591

Unadjusted variance	55044.00
Adjustment for ties	-1460.96
Adjusted variance	53583.04

H0: Total Pass (Group~n==0) =   Total Pass (Group~n==1)

$z = -0.283$

Prob > |z| = 0.7772

Exact prob = 0.7787