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Brief Mindfulness Meditation and Individual Contribution to Public Goods

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Abstract

Despite the popularity of brief mindfulness meditation (BMM) and the emerging literature on BMM, no consensus has been reached on how it affects individual prosocial behaviors. This study extends the growing literature on BMM and answers the research question of how a single brief mindfulness meditation affects people's decisions of public goods contribution via different facets of mindfulness measurements. We conduct a laboratory experiment using 125 undergraduate students and implement a 15-minute breathing meditation prior to the public goods contribution game for the treatment group. We also collect data on subjects' mindfulness levels and personal characteristics in the post-experiment survey. Although we did not find this brief mindfulness meditation influences subjects' contributions, our results show that the observing factor, one of the five facets of mindfulness that refers to the acceptance and acknowledgment of one's internal cognitions, emotions, and external experiences and sensations, has a positive influence on the individuals' contribution to the public good. This study offers empirical evidence on how mindfulness affects individuals' economic behaviors. It also provides practical implications for fundraisers to consider using mindfulness meditation, especially practices that enhance one's observing aspect, to promote collaboration and individual contribution to public goods.

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1. Introduction

Mindfulness is an umbrella term including many forms of practice to raise one's attention, awareness, and acceptance of the present moment in a non-judgmental way (Kabat-Zinn, 1994; Langer and Moldoveanu, 2000; Van Dam and van Vugt, 2017). Previous theoretical and empirical studies show that a person's mindfulness level is positively related to one's psychological well-being, such as increased life satisfaction and decreased perceived stress and mental distress (Brown and Ryan, 2003; Finkelstein-Fox, Park, and Riley, 2019; Ryan and Deci, 2000; Weng et al., 2013; Young and Baime, 2010). Research also shows that one's mindfulness level is associated with the individual's prosocial emotions, such as empathy and compassion (Chambers, Gullone, and Allen, 2009; Luberto et al., 2018; Wallmark, Safarzadeh, Daukantaitė, and Maddux, 2013), and prosocial behaviors, such as altruism (Berry, 2020; Berry et al., 2018; Ilies, Egan, and Mantzios, 2019; Leiberg, Klimecki, and Singer, 2011). The positive impact of mindfulness training on prosocial behavior is also found in Condon, Desbordes, Miller, and DeSteno (2013) and Lim, Condon, and DeSteno (2015).

Brief mindfulness meditation (BMM) has recently gained its popularity due to the rapid expansion of online platforms and apps (Chen and Jordan, 2020). Although there is an emerging literature on BMM (for example, Arch and Craske, 2006; Erisman and Roemer, 2011; Johnson, David, and Currier, 2015; Larson, Steffen, and Primosch, 2013; Wenk-Sormaz, 2005; Wu, 2019), no consensus has been reached on how BMM affects individual prosocial behaviors. For example, Berry et al. (2018) found that BMM promotes the individual prosocial response to ostracized strangers. Nevertheless, Ridderinkhof, de Bruin, Brummelman, and Bögels (2017) found that BMM did not increase subjects' empathy levels. Moreover, previous studies show that the impacts of mindfulness practice vary among individuals due to their personal heterogeneities (Ashar et al. 2016; Baer, Smith, Hopkins, Krietemeyer, and Toney, 2006; Boellinghaus, Jones, and Hutton, 2014; Brown and Ryan, 2003; Chen and Jordan, 2020).

This study extends the growing literature on BMM and answers the research question of how a single brief mindfulness meditation affects people's contribution to public goods via different facets of mindfulness measurements. Many studies on individual contribution to public goods have used external factors, such as communication, reward, punishment, and the group size to promote individual contribution (e.g., Drouvelis, Metcalfe, and Powdthavee, 2015; Gächter, Renner, and Sefton, 2008; Isaac, Walker, and Williams, 1994; Stoddard, 2015). Others have explored internal factors of the individuals' psychological attributes, such as the Big Five personality traits (DeAngelo, Lang, and McCannon, 2016; Kurzban and Houser, 2001; Perugini, Tan, and Zizzo, 2005; Volk, Thöni, and Ruigrok, 2011, 2012). In this study, we extend the research scope to include the five mindfulness facets to further explore the how mindfulness practice affects individual contributions to public goods. Contrary to some psychology studies (e.g., Chen and Jordan, 2020; Condon, Desbordes, Miller, and DeSteno, 2013; Lim, Condon, and DeSteno, 2015) we incentivized our experiment since previous research shows that hypothetical payoffs may not elicit truthful responses from subjects (e.g., Harrison and Rutström, 2008; Murphy, Allen, Stevens, and Weatherhead, 2005; Vlaev, 2012). Our study also has a larger sample size compared with these studies.

To answer our research question, we conduct a laboratory experiment using 125 undergraduate students and implement a 15-minute breathing meditation prior to the public goods contribution game in the treatment group. We collect data on subjects' mindfulness levels and personal characteristics in the post-experiment survey. Our study results show that the *observing* factor, one of the five facets of mindfulness that refers to the acceptance and acknowledgment of one's internal cognitions, emotions, and external experiences and sensations, increases individual contribution to the public good. Our results also indicate that the impact of mindfulness on people's decisions in the public goods game may change over time.

To the best of our knowledge, this is the first study examining how a one-time BMM affects individual prosocial behaviors in the context of public goods contribution. This study offers empirical evidence on how mindfulness affects individuals' economic behaviors. It also provides practical implications for decision-makers for considering using mindfulness meditation, especially the practices promoting one's observing aspect, to encourage collaboration and individual contribution to public goods.

2. Experiment design and procedure

We conducted the experiment in Spring 2016. Our subjects are undergraduate students at The University of North Carolina at Pembroke. We send an invitation email to all the undergraduate students in the subject pool and recruit 125 participants on a first-come-first-serve basis. We randomly assign subjects into either the control group or the treatment group and pair them into groups of five to play a public goods contribution (PGC) game. The groups stay fixed during the entire experiment. Subjects do not know the identities of their group members. There is no communication within or between groups. Each participant receives an endowment of 20 tokens at the beginning of each round of the game and allocates the tokens between a private good and a public good. Each token contributed to the private good yields one token to the contributor exclusively. Each token contributed to the public good by any group member will be multiplied by 1.6 and equally shared among all group members. A subject's earning in a particular round of the game is

$$(20 - Xi) + 1.6*(Xi + \sum_{j=1}^{4} Xj)/5,\ Xi,\ Xj \in Z\ [0,20]$$

Xi is the subject's contribution to the public good, and *Xj (j=1, 2, 3, 4)* is the contribution to the public good made by the other four group members.

We run the computerized experiment using ztree (Fischbacher 2007). Subjects play two practice rounds before the game starts. There are ten rounds of the game. Subjects observe the group's total contribution to the public good in the previous round before making their decisions of how many tokens to invest in the next round. Each subject's computer screen also displays his/her earning in the current round and the cumulative earning. We pay all rounds with an exchange rate of 1 token = $.02. All this information is common knowledge.

Subjects in the control group and the treatment group follow exactly the same experiment procedure, except that those in the treatment group receive a single brief mindfulness intervention prior to the PGC game. The intervention is a 15-minute guided breathing meditation (Collier and Shi, 2020) derived from a meditation poem by Thich Nhat Hanh, read by a lifelong meditation practitioner. All subjects fill out the Five Facet

of Mindfulness Questionnaire (FFMQ, Baer, Smith, Hopkins, Krietemeyer, and Toney, 2006. See the online appendix for the questionnaire) and answer basic demographic questions after the game. All the FFQM items are rated on a 5-point Likert-scale ranging from 1 (almost never) to 5 (always true). The sum of the items is used to evaluate subjects' scores received for each facet. We debrief subjects at the end of the experiment and pay them immediately. The entire experiment last about 45 minutes for the control group and an hour for the meditation treatment group. The average payments are $10.3 and $10.2 in the control and the treatment group, respectively, both including a $5 participating fee. Subjects of the treatment group did not receive extra compensation for the longer experiment period.

3. Results

We are interested in understanding how a single brief mindfulness meditation affects people's contributions to the public good, and if there is any dynamic change in the relationship between their mindfulness level and contribution. Table 1 presents subjects' contribution to the public good. Although giving zero is the dominant strategy in the subgame perfect equilibrium, subjects still contribute about 50% of their endowment in each round. This observation is in line with the findings of previous studies (e.g., Chaudhuri, 2011). Contrary to the results of previous research (e.g., Dawes and Thaler, 1988; Fischbacher and Gachter, 2010), we did not find a decline in the subjects' contribution over time. We also observe that the average contributions of the treatment group are lower than those of the control group in each round except for the second and the ninth round, but the differences between these mean values are not statistically significant.

Table 1: Subjects' contributions to the public good

	Tokens contributed to the public good (mean)	
Round	Control: No Meditation (n=70)	Treatment: Meditation (n=55)
1	8.90 (5.588)	8.64 (5.559)
2	9.61 (5.757)	9.69 (6.185)
3	10.40 (5.701)	9.60 (6.537)
4	11.03 (6.370)	10.64 (6.505)
5	11.00 (6.169)	9.96 (6.301)
6	11.97 (6.096)	10.89 (6.540)
7	12.10 (6.132)	10.95 (6.276)
8	11.61 (6.463)	10.18 (6.295)
9	10.97 (6.679)	11.25 (6.331)
10	11.83 (6.720)	10.56 (6.423)

Standard errors in parentheses.

Moreover, we compared subjects' personal characteristics of the control and the treatment group, including age, gender, race, and school year. We do not find any statistical difference in the personal characteristics between these two groups. We use the Five Facet Mindfulness Scores (Baer, Smith, Hopkins, Krietemeyer, and Toney, 2006; Baer et al., 2008) to measure subjects' mindfulness levels, including observing, describing, acting with

awareness, non-reactivity to inner experience, and non-judging of inner experience. *Observing* refers to recognizing and honoring one's internal and external emotions, experiences, and sensations. *Describing* refers to using words to describe feelings, thoughts, and experiences. *Acting with awareness (acting)* refers to being aware of one's actions and attending to the present moment, which is the opposite of "automatic pilot" behaviors. *Non-judging of inner experience (non-judging)* refers to accepting one's internal thoughts and feelings in a non-judgmental way. *Non-reactivity to inner experience (non-reactivity)* refers to letting one's internal emotions and experiences come and go without being overtaken by them. There is no statistical difference in the five facet mindfulness scores between the two groups, except that the mean value of the acting factor of the control group is slightly higher than that of the treatment group (26.73-24.56=2.17, $p<0.1$). These statistics are reported in the online appendix.

To better understand how mindfulness dynamically influences individual decisions in the public goods contribution game, we run Tobit regressions to examine the effects of the five mindfulness factors on subjects' contributions in the first and last round of the game. Table 2 presents the regression results of various model specifications with and without subject characteristics as the control variables. Model 1 and 2 use the first round's contribution as the dependent variable. Model 3 and 4 use the last round's contribution as the dependent variable, with the standard errors clustered at the group level. Our results show that the *observing* facet plays a positive role in increasing subjects' contributions at the beginning of the game. Holding everything else constant, each unit of increase in the observing facet leads to a 0.263-0.267 increase in one's contribution to the public good in the first round of the game. These coefficients are significant at the 5% level. We do not observe any other mindfulness factors or personal characteristics has a significant influence on one's contribution in the first round. We observe that the channel of how mindfulness affects the individuals' contribution changes over time as the experiment proceeds. In the last round of the game, only the *non-reactivity* factor weakly influences subjects' contributions in the regression model controlling for all personal characteristics. Each unit of increase in the *non-reactivity* facet causes a 0.407 decrease in the contribution to public good, holding everything else equal. We do not observe any personal characteristics has a significant impact on the individuals' decisions in the last round. We also conducted Tobit regressions with an interaction term of the *treatment* and *observing* variables. We did not find any statistically significant coefficient of this interaction term. We report these regression results in the online appendix.

One possible explanation of the positive relationship between individuals' *observing* facet and their contribution is that people increase their contributions out of an augmented awareness of the positive externalities associated with the public good. The seemingly counterintuitive negative relationship between the *non-reactivity* facet and subjects' contribution may result from the subjects' increased understanding of the game. According to Andreoni (1995), an improved comprehension of the public goods game decreases the individual contribution level since people's contributions are partially linked to confusion. A higher score of the non-reactivity facet implies a higher ability to obtain the clarity of mind and detach from negative thoughts and emotions, which leads to a better understanding of the game.

Table 2: Subject's contribution in the first and last round

Dependent variable (Y)	First round		Last round	
	(1)	(2)	(3)	(4)
Treatment	-0.667	-0.683	-1.542	-1.180
	(1.107)	(1.087)	(1.721)	(1.797)
Observing	0.263**	0.267**	0.268	0.181
	(0.127)	(0.126)	(0.188)	(0.166)
Describing	0.0846	0.0723	0.154	0.133
	(0.122)	(0.121)	(0.171)	(0.144)
Acting	-0.145	-0.0911	-0.0809	0.0753
	(0.114)	(0.117)	(0.177)	(0.195)
Non-judging	-0.0251	-0.0610	0.0930	0.0372
	(0.0857)	(0.0845)	(0.133)	(0.131)
Non-reactivity	0.0758	-0.0902	-0.306	-0.407*
	(0.140)	(0.149)	(0.208)	(0.236)
White	No	Yes	No	Yes
Male	No	Yes	No	Yes
Age	No	Yes	No	Yes
School year	No	Yes	No	Yes
Constant	2.188	3.691	7.657	0.849
	(4.259)	(4.230)	(5.584)	(1.616)
Sigma	5.897***	5.614***	8.377***	8.123***
	(0.405)	(0.386)	(0.629)	(0.630)
Observations	125	124	125	124

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Furthermore, we analyze how each of the five mindfulness factors affects people's overall contributions to the public good. We run Tobit regressions using subject's total contribution in all ten rounds as the dependent variable. For robustness check, we categorize the contributions into quartiles and conduct ordered-logit regressions. We cluster the standard errors at the group level in all regressions. Model 1 and 2 in Table 3 present the Tobit regression results, and Model 3 and 4 present the marginal effects of the ordered-logit regression. Our results show that the *observing* facet is positively related to one's contribution to the public good. A one-point increase in one's *observing* facet score is associated with 1.771 more tokens contributed to the public good. This coefficient is statistically significant at the 10% level. However, once we factor in personal characteristics, all the coefficients become insignificant. We discover similar results when using quartiles of the overall contribution as the dependent variable. The *observing* facet is positively associated with the likelihood of an individual's contribution placing in a higher quantile, but this result is statistically insignificant in Model 3 and 4. We also find personal

characteristics such as race and gender influence subjects' contributions in Model 4. We included an interaction term of the *treatment* and *observing* variables in all the model specifications. We did not find any statistically significant coefficients of this interaction term. These regression results are presented in the online appendix.

Table 3: Subject's total contribution to the public good

Dependent variable (Y)	Amount		Quantile	
	(1)	(2)	(3)	(4)
Treatment	-9.424	-9.761	-0.274	-0.393
	(11.28)	(12.41)	(0.428)	(0.547)
Observing	1.771*	1.573	0.0682	0.0647
	(1.031)	(1.069)	(0.0439)	(0.0499)
Describing	0.554	0.534	0.00336	0.00433
	(0.958)	(0.821)	(0.0377)	(0.0363)
Acting	-0.861	-0.0195	-0.0112	0.0359
	(0.919)	(0.940)	(0.0377)	(0.0393)
Non-judging	-0.190	-0.533	0.00361	-0.0152
	(0.737)	(0.646)	(0.0345)	(0.0309)
Non-reactivity	0.623	-0.286	0.0114	-0.0420
	(1.045)	(1.269)	(0.0458)	(0.0595)
White	No	-16.05**	No	-0.874***
		(6.841)		(0.335)
Male	No	16.10	No	0.910*
		(9.733)		(0.487)
Age	No	Yes	No	Yes
School year	No	Yes	No	Yes
Constant	58.84	75.23**		
	(39.58)	(37.31)		
Sigma	45.88***	44.25***	2.966*	2.265
	(3.095)	(3.412)	(1.543)	(1.601)
Observations	125	124	125	124

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4. Concluding remarks

The focus of this study is to examine the impact of a single brief mindfulness practice on the individuals' contribution to public goods. Further research is needed to investigate the effects of mid and long-term mindfulness practices on individuals' meta-cognitive skills associated with their economic decisions. Future research should also incorporate other measurements of individual heterogeneity such as personality traits, altruism levels, and ability/competence levels in order to produce a complete picture of how mindfulness interacts with other psychological features in influencing people's economic behaviors.

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