

Research

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Induced Boredom Constrains Mindfulness: An Online Demonstration

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ABSTRACT

Background: Boredom and mindfulness have long been considered to be incompatible psychological states. The latter state has been associated with a variety of psychological benefits, whereas the former has tended to be associated with far less positive outcomes and conditions, such as substance abuse and Attention-Deficit/Hyperactivity Disorder (ADHD).

Method: In an effort to empirically validate the presumed inverse relationship between state boredom and state mindfulness, an online sample (n=95) was recruited via Amazon's Mechanical Turk web-based service and randomly assigned to either an online Vowel Cancellation task condition or an online Reading Task condition (control). An online assessment of state mindfulness was conducted immediately following the assigned task.

Results: As predicted, the boredom-induced individuals were found to report significantly lower levels of mindfulness than participants in the control group. Moreover, even though the entire study was conducted over the internet and involved no face-to-face contact with the study personnel, the online boredom induction procedure appeared to perform as intended. This was confirmed by the results on the standard manipulation check, the significantly higher scores of the boredom-induced individuals on the Multidimensional State Boredom Scale (MSBS),¹ and the significantly higher dropout rate in the boredom induction condition.

Conclusions: This is the first study that the authors are aware of that has been able to provide empirical evidence of a dynamic, inverse relationship between the psychological states of boredom and mindfulness. It is also the first study to report the successful induction of boredom using an online methodology. The clinical and methodological implications are discussed.

KEYWORDS: Boredom; Mindfulness; Online boredom induction.

INTRODUCTION

The concept of mindfulness was codified in the 3rd century BC by Buddhist scholars and meditation teachers. These Theravada Abhidhamma texts define it as, "presence of mind, attentiveness to the present."² More contemporary attempts to characterize mindfulness have provided somewhat more elaborate descriptions but ultimately differ more in terms of emphasis than on substance. For example, Lazar describes mindfulness as a meditative state in which there is an active "exploration of the distractions to concentration, such as sensations, thoughts and feelings,"³ a definition that is not too different from those⁴ who describe mindfulness as open, receptive, undivided awareness and attention to internal and external experience in the present moment.

Minor definitional differences notwithstanding, there is now a substantial body of evidence to suggest that mindfulness is associated with a host of beneficial physical and psychological effects, including measurable reductions in levels of anxiety, depression and even subjective pain.⁵ As a consequence, there has been a corresponding interest among clinicians and researchers in the therapeutic potential of mindfulness in the promotion of psychological

and physical well-being.

Interest in boredom has also increased over the last several years, especially with respect to its growing list of associated liabilities. Indeed, it has not gone unnoticed that boredom, both a trait and state, appears to be the antithesis of mindfulness. Whereas, mindfulness is known to promote subjective well-being and to mitigate a number of negative states, boredom and the propensity to become bored appear to promote the opposite. Moreover, in contrast to the definition of mindfulness, many of the definitions of boredom describe a state in which distractions to concentration are not only unrecognized, they are in fact deliberately and effortfully resisted at the cost of increasing levels of subjective distress.^{6,7-9}

Despite this apparent inverted relationship between the conceptual and empirical corollaries of mindfulness and boredom there has been a surprising lack of interest in empirically examining the presumed relationship between the two. This is unfortunate, especially since the capacity for mindfulness through training and practice can be enhanced in most individuals, thus raising the possibility that mindfulness training might also increase the capacity to cope with boredom and by extension forestall some of its attendant negative consequences. The current study was an attempt to address this oversight using a web-based platform to examine the relationship between state mindfulness and induced boredom in an online sample of participants. Importantly, we are unaware of any reports in the literature of previous attempts to induce boredom in participants in an online study. Thus an additional and secondary goal of the study was to examine the utility and effectiveness of a novel and potentially far more efficient approach to the induction of boredom states.

CORRELATES OF BOREDOM

Though long ignored, research of the last twenty years suggests that boredom and the propensity to become bored are associated with a number of social and psychological problems. For example, boredom proneness has been positively associated with measures of hopelessness,¹⁰ loneliness,¹⁰ hostility and anger,¹¹ anxiety,¹² somatization complaints¹³ decreased sexual satisfaction¹⁴ poorly developed interpersonal relationships,¹⁵ impulsiveness,¹⁶ lowered motivational orientation,¹⁰ lowered academic achievement,¹⁷⁻²⁰ poor performance in the workplace,^{21,22} job dissatisfaction^{21,22} increased levels of alcohol abuse,^{23,24} overeating,²⁵ pathological gambling,²⁶ drug use,¹⁹ psychotic symptoms,⁷⁻⁹ physical symptoms,¹¹ and depression.^{10,12,27}

Less clear, however, is the reason why boredom has proven to be such a powerful predictor of psychosocial dysfunction. One plausible explanation that has been frequently put forward is that attentional failure is a defining and necessary feature of the experience of boredom,²⁸⁻³¹ and it is this loss of attentional control that is at the core of many of the problems that have been found to be associated with boredom prone individuals.

ATTENTIONAL THEORIES OF BOREDOM

Attentional theories of boredom suggest that a disruption of attentional regulation is at the root of the experience of boredom.²⁸⁻³¹ Eastwood et al. for example, have proposed that boredom depends on three conditions: (1) An inability to successfully engage attention with internal or external environments in a sufficiently stimulating way; (2) awareness of that failure of attention, and; (3) the attribution of the aversive experience to the external environment. Todman^{7,9} has also emphasized the important role of attentional dyscontrol, but has argued that a more precise characterization must give prominence to the feelings of attentional constraint that are invariably experienced when the impulse to shift attention is persistently frustrated by an external or internal injunction that prohibits the desired shift.

It also seems that the attentional options matter when trying to cope with boredom. Even when the individual does not feel an obligation to remain attentive to an uninteresting task or stimulus, feelings of attentional constraint might obtain if the alternative attentional targets available to the individual are experienced as unappealing or unrewarding. In a compelling demonstration of this point, Critcher and Gilovich³² conducted a series of studies in which they manipulated the content of the mind-wanderings of the study participants and found that they were significantly more likely to report boredom with an ongoing task when their daydreams were about negative events, than when their minds wandered to positive or rewarding narratives. This finding underscores not only the importance of the broadened notion of attentional constraint but also the contention that boredom is an evolutionarily prepared signal that indicates that valuable attentional resources are being squandered on an activity or environment in which the potential for positive reinforcement has been depleted below a certain threshold.^{7,9} In short, for the feelings of boredom to be reduced or avoided, it is necessary that the shift in attention be directed to an alternative source of reinforcement that is construed as being potentially more positive in nature; something that can be accomplished by one of two strategies: (1) Changing the actual environment to one that is richer in potential positive reinforcement or; (2) Engaging the same environment differently in order to expose hitherto undiscovered sources of reinforcement. If this conjecture is accurate, then it makes sense that an experiential strategy that is described as being a mode of positively engaging the environment (i.e., mindfulness) is probably a desirable resource to have at ones disposal.

MINDFULNESS AND BOREDOM

Although the need for further research on the apparent association between the constructs of boredom and mindfulness has been proposed by a number of researchers,^{33,34} we have been able to identify only two such studies in a review of the recent literature. In the earlier of the two studies, Trunnell, et al³⁵ measured the effects of a mindfulness training class for college students registered for recreation and leisure classes such as kayaking, camping, and back packing skills. The authors reported

finding a greater decrease in boredom in the experimental group, which received a 10-minute mindfulness didactic, followed by 15-minutes of guided meditation, than in the control group, which received no mindfulness training. However, the authors did not measure boredom directly. Instead, they inferred its existence on the basis of a discriminant function analysis of the participants' responses on a modified version of Russell and McAuley's Causal Dimension Scale,³⁶ which contained a list 14 positive and 14 negative affects but made no reference to boredom. The authors conjectured that the constellation of affects contained in the predictive function could be reasonably construed as boredom.

In the second and more recent study, using two psychometrically valid measures-the Mindfulness Attention Awareness Scale (MAAS)⁴ and the Boredom Proneness Scale (BPS)³⁷, LePera found that the traits of boredom proneness (the propensity to become bored) and mindfulness are negatively correlated³⁸. However, the study focused exclusively on traits, rather than the actual states of boredom and mindfulness. Thus it remains unclear whether feelings of boredom can actually be mitigated by a state of mindfulness and *vice versa*. In order to more directly address this relationship, the present study examined the question of whether individuals subjected to a boring task would show lower state mindfulness scores compared to individuals in a control task.

METHODS

Participants

One hundred and sixteen participants were recruited from Amazon Mechanical Turk, a web based recruitment interface, to participate in "online research on the influence of different types of visual stimuli on learning styles." Participants were compensated with a payment of 60 cents. While Mechanical Turk is largely considered to be a reliable and, in many ways, an advantageous source of data for social science research, precautionary exclusion criteria have been recommended to ensure the quality of data.³⁹ In the present study, data was excluded from analyses if the participant finished the study unusually quickly (time<20 mins, n=1), took an unusually long amount of time to complete the study (time>80 mins, n=3), or failed to correctly answer any of the four validation items¹ that were hidden among the scales and demographic questionnaire (validation score<26, n=17).

¹The validations items included prompts such as "are you using the internet right now?" and "what is 3+3?" which were scaled in such a way as to blend in with the items around them. A validation composite score was based on the four items with a maximum of 28 and a minimum of 4.

After these exclusions (n=21), ninety-five participants (53 female, 42 male) were included in the analyses. The mean age was 38.9 years (SD=12.62). The majority of the participants were "Non-Hispanic White/Euro American" (44%, n=42), "Asian/Asian American or Pacific Islander" (41%, n=39), and "Black/African-American" (5%, n=4). Seventy-two percent were employed (n=68), and seventy-nine percent had attained an associates degree or higher (n=69). See table 1, for a detailed summary of the sample characteristics.

Characteristic	N (%)	Mean (SD)
Age		38.89 (12.62)
Gender		
Male	42(44.2)	
Female	53(55.8)	
Ethnicity/Race		
Non-Hispanic White/Euro-American/Caucasian	42(44.2)	
Black/African-American/Afro Caribbean	4(4.2)	
Asian/Asian-American or Pacific Islander	39(41.1)	
Latino/a, Hispanic-American, Chicano/a	2(2.1)	
Native American/Alaskan Native	1(1.1)	
Middle Eastern/Arab American	2(2.1)	
Multi-Racial/Multi Ethnic	2(2.1)	
Other/ Prefer not to say	3(3.2)	
Marital Status		
Single/dating casually	30(31)	
Dating seriously/not living together	1(1)	
Living with partner but not married	10(11)	
Married or in marriage relationship	54(57)	
Number of children		1.02(1.25)
Sexual Orientation		
Heterosexual	85(90)	
Gay/Lesbian	3(3)	
Bisexual	2(2)	
Queer	1(1)	
Transgender	4(4)	
Highest Level of Education		
High school diploma/GED	9(10)	
BA/BS	22(23)	
Some college	17(18)	
Associates degree	7(7)	
BA/BS	32(34)	
Some graduate school	3(3)	
MA/MBA/JD	22(23)	
PhD/MD	5 (5)	

Are you currently a student?			Atheist	11(11.6)	
No	81(85.3)		Spiritual	5(5.3)	
Part-time	8(8.4)		Other	7(7.4)	
Full-time	6(6.3)		No response	18(55)	
Annual Household Income			Do you meditate or practice mindful- ness?		
\$0 – \$20,000	25(26.3)		No/never	32(33.7)	
\$20,000 – \$30,000	19(20)		I've tried it and liked it	12(12.6)	
\$30,000 – \$50,000	20(21.1)		I've tried it and didn't like it	6 (6.3)	
\$50,000 – \$100,000	18(18.9)		I practice sometimes	26(27.4)	
\$100,000 – \$150,000	9(9.5)		I practice about once a week or more	9 (9.5)	
50,000 – \$200,000	1(1)		I practice every day or nearly every day	10(10.5)	
Prefer not to say	3(3.2)		Political Orientation		
Country of Origin			Liberal	32(33.7)	
USA	41(43.2)		Moderate	46(48.6)	
India	34(35.8)		Conservative	17(17.9)	
UK	3(3.2)		Current Health Status		
Canada	3(3.2)		Excellent	21(22.1)	
Ethiopia	1(1.1)		Good	56(58.9)	
Jordan	1(1.1)		Fair	17(17.9)	
Peru	1(1.1)		Poor	1(1.1)	
South Korea	1(1.1)		In my child hood I grew up with		
Brazil	1(1.1)		Two biological parents	76 (80)	
Vietnam	1(1.1)		A single biological parent	8 (8.4)	
Trinidad and Tobago	1(1.1)		One biological parent and one step parent	6 (6.3)	
Primary/Native Language			In shared custody between two parents	2 (2.1)	
English	59(62.1)		Two adoptive parents	2 (2.1)	
Other than English	18(18.9)		Under the care of relatives	1 (1.1)	
Bi-lingual	18(18.9)		Culture values communicating emotions?		
How serious are you about faith/ spirituality?			Yes	50 (52.6)	
Not at all	16(16.8)		No	30 (31.6)	
Somewhat	26(27.4)		I don't know	15 (15.8)	
Quite	22(23.2)		Currently live in		
Very	31(32.6)		My home city	32 (33.7)	
Religious Tradition			My home state	25 (26.3)	
Christian	26(27.4)		My home country	33 (34.7)	
Catholic	12(12.6)		Not my home country	5 (5.3)	
Protestant	3(3.2)				
Mormon/Latter Day Saints	1(1.1)				
Muslim	3(3.2)				
Hindu	20(21.1)				
Agnostic	6(6.3)				

Table 1: Sample characteristics

Because Mechanical Turk is a web-based platform, the sample constituted a multinational population, with 50 percent living outside the United States ($n=48$), and most of those individuals residing in India (36%, $n=34$). Also of note, thirty-two percent reported that they practiced mindfulness-like activities “sometimes,” “once a week,” or “almost every day.”

MATERIALS

The Vowel Cancellation Task (VCT) was used to induce boredom. The VCT, which has been used extensively in the laboratory of the second author to rapidly induce feelings of boredom, is conceptually similar to vigilance tasks that require the participants to maintain attention on uninteresting stimuli for a sustained period of time. On the VCT, participants are presented with a moderately interesting short story² about 20 pages in length. The story is divided into 16 roughly equal sections and each section is followed by a text box in which participants are instructed to record the number of vowels counted (i.e., cancelled) in that section. The task lasts 15 minutes after which a researcher notifies the subject that the task is over. When the task is presented on a computer, as was the case in the present study, the task ends automatically after 15 minutes. Because the current study utilized a computer-based presentation mode, an “incorrect total” warning was added to the VCT protocol, which appeared whenever a participant entered an erroneous vowel count, something that is not possible with the paper and pencil version of the VCT. It was thought that this addendum would increase attendance to the already boring task and therefore increase boredom even further. Participants in the control condition simply read the short story for 15 minutes.

As a manipulation check participants were asked to indicate on a likert-type scale ranging from 1 (not at all) to 5 (extremely) the degree to which they would describe the task that they performed (i.e., reading or vowel cancelation) as being anxiety-provoking, amusing, boring, tedious, or enjoyable, and also the degree to which they currently felt anxious, amused, bored, annoyed or joyful. The expectation was that in comparison to participants in the control condition, participants in the vowel cancelation condition would be more likely to describe the task as being boring and/or tedious and to describe themselves as being bored.

The State Mindfulness Scale (SMS):⁴⁰ was used in the present study to assess state mindfulness. It operationalizes mindfulness defined as a meta cognitive state that is characterized by what one is paying attention to (body sensations and mental events occurring in the present moment) and how one is paying attention (deliberately in the present, with awareness, sensitivity, intimacy with subjective experience, and curiosity). The scale consists of 21 items to which respondents indicate how well each statement describes what they just experienced

by utilizing a likert-type scale ranging from 1 (not at all) to 5 (very well). Total scores range from 21 to 105 with higher scores indicating a greater degree of state mindfulness. The internal consistency coefficient reported was $\alpha=.95$.

The Boredom Proneness Scale (BPS):¹⁰ is a 28-item questionnaire that measures an individual’s susceptibility to the experience of boredom. Sample items include “Much of the time I just sit around doing nothing,” and “When I was young, I was often in monotonous and tire some situations.” Responses are scored on a 7-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (7). Responses are summed to form a boredom proneness score ranging from 28 to 196, with higher scores indicating a higher susceptibility to the experience of boredom. The BPS is considered to be a trait measure and to be psychometrically sound ($\alpha=.79$, test-retest correlation=.83).

The Multidimensional State Boredom Scale (MSBS):¹ is a 29-item questionnaire that measures the current experience of boredom. Sample items include “Time is moving very slowly” and “I seem to be forced to do things that have no value to me.” Responses are scored on a 7-point Likert like scale ranging from “strongly disagree” (1) to “strongly agree” (7). The MSBS assesses boredom across five dimensions (i.e. attention, disengagement, agitation, dysphoria, and sense of time passing). Responses are summed to produce a total score ranging from 29 to 203 with higher scores indicating a higher level of state boredom. The scale is internally consistent, $\alpha=.95$. The internal consistency of each factor ranges from .80 to .92.

Demographics Questionnaire: A demographics questionnaire was administered, which asked about age, sex, race/ethnicity, relationship status, sexual orientation, gender identity, education, country of origin, religious identification, and other common demographic categories. Also included was an item, “Do you meditate or practice mindfulness?” This item was included because of the likelihood that meditation experience might affect response patterns to the primary measures. For example, the validity of the experiment would be strengthened if meditation exposure were positively related to state mindfulness. Response options were, “No/never,” “I’ve tried it and liked it,” “I’ve tried it and didn’t like it,” “I practice sometimes,” “I practice about once a week or more,” “I practice every day or nearly every day.”

PROCEDURE

The posting on Amazon Mechanical Turk included a link to the study, which was built using Qualtrics software for web-based data collection. After formally consenting to participate in the study, participants were randomly assigned, using the Qualtrics randomization feature, to either the Vowel Cancellation Task ($n=46$) or the Reading Task ($n=49$). Based on pilot data, which suggested that the drop-out rate would be substantially higher during the VCT than during the less aversive Reading Task, the randomization feature was set to assign participants to the VCT at a rate roughly twice that of the rate of assignment to

²Dahl R. Beware of the Dog. In: Over to you: Ten Stories of Flyers and Flying. New York, NY: Reynal and Hitchcock; 1946.

the control condition, thus ensuring a relatively equal number of study completers in both conditions.

In both conditions, participants were instructed to set aside distractions, give their full attention to the focal task, and try to be as accurate as possible while working quickly. The duration of the task was not specified, which likely accounts for drop-out rates across both conditions, as most dropouts occurred during this task phase.

After 15 minutes of working on the assigned task, all participants were automatically advanced to the questionnaire section of the study. The manipulation check was administered immediately after completion of the induction or reading task. Next, the MSBS and the SMS were administered and the order of presentation was counterbalanced, followed by the BPS and the demographics questionnaire. Lastly, participants were debriefed and the purpose of the study explained. Compensation was delayed because each participant's work had to be formally "approved" within the Mechanical Turk system but for no more than 72 hours.

RESULTS

The SMS, MSBS and BPS all showed good to excellent internal consistency ($\alpha = .81-.96$) and each alpha was within 2 hundredths of a point of the respective scale's published alpha coefficients. Despite the small sample, the within group distributions for the SMS, MSBS, and BPS did not violate the assumption of normality, even when the data was factored by gender. Independent sample T-tests confirmed that neither boredom proneness nor any demographic variables significantly differed across conditions.

A comparison of the mean scores of the experimental and control group on each item of the manipulation check confirmed that participants in the vowel cancellation condition were significantly more annoyed and enjoyed themselves less. Moreover, participants in the vowel cancellation condition rated the

vowel counting task as significantly more anxiety-provoking, more boring, more tedious and less enjoyable, compared to the control group's ratings of the reading task. In other words, the boredom task accomplished what it was intended to do; which was to affect an aversive state characterized by feelings of boredom, tedium and annoyance attributed to the focal task (Table 2).

As predicted, participants in the boredom condition ($M=105.7$, $SD=32.3$) also scored significantly higher on the MSBS than their counterparts in the control condition ($M=90.4$, $SD=32.9$), $t(93)=2.295$, $p=.024$, and dropped out at significantly higher rates (roughly 45% more frequently) than participants in the control condition (Tables 3 and 4). Together with the manipulation check results, these findings are similar to the results that have been observed with the VCT in laboratory settings and suggest that with the proper safeguards the online version of the VCT might be viable option for studies involving boredom induction.

T-tests were used to analyze group differences with regard to state mindfulness. Effect size is reported with Cohen's d . Compared with controls participants in the boredom condition ($M=64.02$, $SD=21.18$) scored significantly lower on the SMS than their counterparts ($M=72.02$, $SD=16.96$), supporting the main hypothesis that state boredom constrains the experience of state mindfulness, $t(86.119) = -2.024$, $p=.044$, $d=.418$ (Table 3).

In the sample as a whole, and also consistent with the study predictions, self-reported meditation exposure was found to be correlated with SMS scores, $r(93) = .271$, $p=.008$. Moreover, participants who reported that they practiced meditation "weekly" or "almost every day" displayed higher SMS scores ($M=73.30$, $SD=17.06$) compared those who practiced "sometimes," had only "tried" meditation, or had never practiced ($M=63.30$, $SD=20.32$), $t(93) = 2.643$, $p=.010$, $d=.543$. Also, the BPS was correlated with the MSBS, $r(74) = .683$, $p<.001$, a finding that is in line with the results that have been reported in the construct validation studies of the MSBS.¹

Condition							
Items	Vowel Cancellation Task (boredom)			Reading Task (control)			t
	Mean	SD	N	Mean	SD	N	
I am anxious	3.07	1.25	46	2.61	1.22	49	ns
I am amused	2.09	1.28	46	2.24	1.28	49	ns
I am bored	2.30	1.36	46	1.82	1.17	49	ns
I am enjoying myself	2.41	1.39	46	3.06	1.07	49	-2.53*
I am annoyed	2.89	1.35	46	1.96	1.22	49	3.52***
The task is anxiety-provoking	3.22	1.21	46	2.71	1.14	49	2.09*
The task is amusing	2.04	1.26	46	2.20	1.29	49	ns
The task is boring	2.65	1.42	46	1.78	1.23	49	3.21*
The task is enjoyable	2.26	1.41	46	3.08	1.15	49	-3.12*
The task is tedious	3.65	1.43	46	2.35	1.18	49	4.85***

Note. * = $p < .05$, *** = $p < .001$.

Table 2: Means and Standard Deviations for Manipulation Check items by Experimental Condition.

Condition							
Items	Boredom Induction Task			Reading Task (control)			t
	Mean	SD	N	Mean	SD	N	
MSBS	105.74	32.29	46	90.39	32.86	49	2.30*
SMS	64.02	21.18	46	72.02	16.96	49	2.02*

Note. * = $p < .05$, *** = $p < .001$.

Table 3: Means and Standard deviations for the Multidimensional State Boredom Scale and the State Mindfulness Scale by Experimental Condition.

Condition			
	Vowel Cancellation Task (boredom)	Reading Task (control)	Total
Total Recruited	268	132	400
Drop-out ¹	212	72	284
Drop-out rate	79.1%	54.5%	71%
Excluded due to time or reliability ²	10	11	21
Sample used for analysis	46	49	95

¹Dropout refers to participants who discontinued participation before completing the reading task or the vowel counting exercise.

²Participants were excluded if they took longer than 80 minutes or less than 20 minutes to complete the survey, or if they failed to correctly answer more than one of four validation items ("What does 3+3 = ?").

Table 4: Participants Recruited, Drop-out Rates and Exclusions Due to Time or Reliability by Experimental Condition.

SUMMARY AND DISCUSSION

As predicted, the boredom-induction manipulation had a moderate but significant effect on self-reported state mindfulness, thus supporting the central hypothesis of the study, which is that state boredom constrains the capacity to experience mindfulness. This finding also extends the findings from the earlier study,³⁶ which focused exclusively on the trait forms of boredom (boredom proneness) and mindfulness. By demonstrating that the state forms of the two constructs have a similarly inverse relationship, the present study provides further support for the widely held notion that one of the important potential benefits of mindfulness training is an enhancement in the capacity to cope with boredom. It is also consistent with the growing evidence that mindfulness-based interventions may be particularly effective in high risk populations in which boredom, distractibility and impulsiveness are especially prominent - the most obvious example being individuals diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD).^{41,42}

Basic support for the effectiveness of the electronic on-line version of Vowel Cancellation Task was provided by the manipulation check items, the MSBS, which showed a significant elevation in boredom following the vowel cancellation task, and the differential drop-out rates across groups. However, replication is needed before any firm conclusions can be made about the soundness of the approach, despite its apparent promise.

The differential drop-out rates across conditions is consistent with previous research that supports the association of boredom with decreased vigilance and sustained attention,^{43,28} and is also consistent with the conceptualization of boredom as

a cue to reallocate attentional resources toward more rewarding activity.⁸ Apparently, in this case, the VCT was experienced as being boring enough to send substantially more participants in search of something else to do, while the participants in the Reading Task were more likely to maintain their interest.

One questions that remains is whether participants in the boredom condition were more likely to drop out because they were initially or temperamentally more mindful, thus biasing the results. Unfortunately, however, due to the constraints of the study design it was not possible address this question by directly comparing the levels of mindfulness among completers vs. dropouts. In addition to the fact that the study did not include a measure of trait mindfulness, all of the dropouts in the current study occurred during the VCT or reading task, and thus before the administration of the outcome measures. However, there are good reasons to believe that it is unlikely that the results are attributable to higher rates of attrition among individuals with higher mindfulness scores. For example, findings from earlier research on the impact of mindfulness on the capacity to sustain attention and persist on aversive tasks suggests that mindful participants would be expected to be less, not more, likely to dropout from tasks like the VCT.⁴⁴ Furthermore, as previously mentioned, Lepera³⁸ was able to show in her study that individuals with higher levels of trait mindfulness tend to be less susceptible to boredom, and thus less likely to discontinue intrinsically boring tasks like the VCT.

Finally, although the present study establishes support for state boredom's dampening effect on the experience of mindfulness, it does not address the more clinically relevant question of whether induced mindfulness inoculates against or mitigates

feelings of boredom. Clearly this is a direction that future studies should pursue. For example, previous studies interested in the effects of mindfulness have induced mindfulness using a 15-minute guided meditation.⁴⁵ Utilizing such a methodology would not only address the important question of whether the relationship between states of boredom and mindfulness are truly bidirectional and symmetrical, but also whether it is possible to deliver mindfulness training in an online format.

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