

**Sacred vs. Secular Mindfulness Meditation:  
The Influence of Presentation Priming on Therapeutic Effectiveness**

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## Abstract

Mindfulness is a traditional, spiritual Buddhist practice that has entered the mainstream of applied psychology and become secularized. This study examined the differential influence of the presentation priming of mindfulness meditation—as either a “sacred Buddhist practice” or a “scientifically proven tool”—on its therapeutic effectiveness in a general sample of college students. ANCOVA were run using outcome pretest scores as the covariates and outcome posttest scores as the dependent variables. Results indicated a main effect of condition on depression, anxiety, stress, negative affect, positive affect, happiness, and optimism—suggesting that both mindfulness conditions were therapeutically effective compared to the control condition. Follow-up pairwise comparisons showed that the secular intervention was significantly more effective than the spiritual intervention for increasing happiness—suggesting differential therapeutic effectiveness as a function of priming. Implications for future research and practice are discussed.

*Keywords:* mindfulness, stress, anxiety, wellbeing, priming effects

### **Spiritual vs. Secular Mindfulness Meditation:**

#### **The Influence of Presentation Priming on Therapeutic Effectiveness**

Mindfulness is the process of bringing one's awareness to the present moment, while encouraging openness, acceptance, and curiosity toward one's experiences in the moment (Edenfield & Saeed, 2012). This practice stems from Buddhist tradition, but has been the subject of considerable modern psychological research, as demonstrated in Hofmann et al.'s (2010) meta-analysis. In order to use such a practice in a modern clinical setting, the mindfulness practice was secularized and legitimized through the methods of applied science. Mindfulness was first introduced to the clinical science world by Jon Kabat-Zinn with the development of the mindfulness-based stress reduction program (MBSR), which was intended as a secular intervention to help patients cope with chronic pain (Kabat-Zinn, 1984).

Mindfulness-based practices in both sacred (or spiritual) and secular (or therapeutic) contexts often include focusing on the breath, yoga, body-scan meditations, and compassion meditations (Kabat-Zinn, 1984). There are several secular therapies that incorporate components of mindfulness-based practice (e.g., Acceptance and Commitment Therapy [Fletcher & Hayes, 2005] and Dialectical Behavior Therapy [Linehan, 1993]) as well as therapies that focus primarily on mindfulness-based practices (e.g., MBSR [Kabat-Zinn, 1984] and Mindfulness-Based Cognitive Therapy [Segal, Williams, & Teasdale, 2002]).

In a secular context, the ultimate goal of practicing mindfulness is reduction of psychological distress and improvements in wellbeing. But in a spiritual context, the ultimate goal is not changing subjective experiences or behavior but rather realizing Anatman, or "no self" (Ostafin et al., 2006). "According to the teaching of the Buddha, the idea of self is an imaginary, false belief which has no corresponding reality, and it produces harmful thoughts. ...

It is the source of all the troubles in the world” (Rahula, 2006, p. 51). From a Buddhist perspective, then, practicing mindfulness is a way to decenter, or change one’s relationship with one’s thoughts and feelings, thereby realizing Anatman. This distancing from emotional states—which is the primary aim of mindfulness meditation in a Buddhist context—disallows rumination and reduces symptoms of psychological distress (Knabb, 2012).

Many Buddhists have practiced mindfulness for thousands of years within a spiritual or sacred context, and yet recently—concurrent with the integration of mindfulness into therapeutic contexts—meditation and related practices (e.g., yoga) have entered the mainstream media and broader popular culture (e.g., Goldberg, 2015; Pickert, 2014). Indeed, meditation has become significantly more popular in recent years, with about 14% of adults reporting having used meditation in the past 12 months (Clarke, Barnes, Black, Stussman, & Nahin, 2018). While use of meditation has increased broadly across adults in the United States, the available data often do not delineate the relative prevalence of different types of practices (e.g., zazen, vipassana, lovingkindness, transcendental meditation) or the broader contexts within which they are practiced (i.e., spiritual vs. secular). It is clear, however, that mindfulness is growing in popularity within the United States, and not only as a therapeutic practice, but also as a spiritual and self-help practice (Purser, 2019).

### **Effectiveness of Mindfulness-Based Interventions**

Following the effectiveness and popularity of MBSR, several programs were developed that were modeled explicitly after its format, such as MBCT (Segal, Williams, & Teasdale, 2002) and mindfulness-based relapse prevention (MBRP; Bowen, Chawla, & Marlatt, 2011). These programs are typically delivered in a group format over a series of several weeks and involve training in a variety of mindfulness-based exercises including yoga, deep breathing, and

compassion meditations. Meta-analyses of these and other mindfulness training programs demonstrate that they effectively reduce psychological distress while also improving a variety of psychological and physical wellbeing indicators. For example, participation in these programs reduces anxiety, chronic pain, levels of stress, and depression while increasing quality of life (e.g., Eberth & Sedlmeier, 2012; Goldberg et al., 2018). Such encouraging outcomes have been observed in meta-analyses with clinical, healthy, and general samples of adults and youth, within a variety of service provision settings (e.g., Khoury et al., 2013; Klingbeil et al., 2017a; Klingbeil et al., 2017b; Klingbeil & Renshaw, 2018). These reviews suggest that mindfulness-based interventions largely display small to moderate effects on a variety of therapeutic outcomes (e.g., depression, anxiety), as well as trait mindfulness.

We do not yet understand all factors that may moderate mindfulness' effectiveness as a treatment or self-help practice. Some of the most commonly considered potential moderators of mindfulness training include treatment dosage, implementation fidelity, interventionist training, and client characteristics (Renshaw & Cook, 2017). Regarding client characteristics, one of the most frequently raised issues is the congruence or goodness-of-fit between mindfulness-based practices and client's cultural backgrounds and values (e.g., Watson et al., 2016). Because mindfulness meditation originated as a sacred (or spiritual) practice, and because its connection with Buddhism is well-known within the broader popular culture of the United States (Khazan, 2019), it may be perceived by clients in a therapeutic context as either spiritually significant or sacrilegious—and this perception may moderate the therapeutic effects of the practice on client outcomes.

### **Potential for Priming Effects in Mindfulness-Based Interventions**

If there are differences in the effectiveness of mindfulness treatments based on how they

are presented, this phenomenon may be explained by implicating priming or expectancy effects. The priming effect, which refers to how initial exposure to information influences (or “primes”) the occurrence of a later behavior, is typically thought of in conjunction with cognitive or social psychology (Molden, 2014). However, examining the potential importance of priming effects in therapeutic applications has been recently encouraged (Shalev & Bargh, 2011). Preliminary research looking at the use of priming effects in psychological treatment has been promising (e.g., Crum, 2016; Meerman, Broschot, & Verkuil, 2013; Zidani et al., 2017). Studies from the field of social psychology have found that priming interventions can produce meaningful and durable effects across a variety of outcomes that have therapeutic value, including enhanced educational achievement, reduced bias and stigma, improved mood, and desirable behavior change (e.g., Wilson, 2011). Although priming research regarding specific clinical interventions is still in its infancy, the available research underscores the value of examining how priming might enhance—or inadvertently hamper—the effects of psychological treatments.

One kind of priming effect that may be particularly relevant to therapists and other interventionists is primes that activate expectancy effects related to outcomes. For example, one study investigated how expectancy effects (i.e., when an individual believes their participation could lead to a reward) may improve psychological outcomes in a deep-breathing intervention (Szabo & Kocsis, 2017). The group that was primed about the benefits of the intervention improved on more psychological outcome measures than the other intervention group, despite both having received the same treatment (Szabo & Kocsis, 2017). This study provides proof-of-concept evidence suggesting that the way in which a treatment is presented to (and, thus, perceived by) the client can influence its effectiveness. Although this line of work has yet to be extended to mindfulness-based interventions, these proof-of-concept studies suggest it is feasible

to do so.

### **The Present Study**

Although there is extensive research on the therapeutic effects of mindfulness-based interventions, much is still unknown regarding potential moderating factors for these interventions. One potential moderating factor that is especially relevant to therapists and other interventionists is priming effects. As discussed above, pre-conceived notions about the nature of mindfulness may influence whether an individual wants to participate in a mindfulness-based intervention, and thus priming or expectations, either conscious or not, may influence the effectiveness of these interventions. Thus, the primary aim of this study was to investigate the potential influence of how mindfulness meditation is primed for clients—as either a “sacred Buddhist practice” or as a “scientifically proven tool”—on its effectiveness to reduce psychological distress and improve subjective wellbeing. Given the consistent literature regarding the benefit of mindfulness-based practices for improving mental health, we hypothesized (i.e., Hypothesis 1) that participants in both mindfulness conditions would demonstrate better outcomes following treatment than those in a passive (measurement-only) control condition. However, considering that the spiritual or sacred frame might hinder the potency of expectancy effects for some participants, we further hypothesized (i.e., Hypothesis 2) that participants in the secular condition would demonstrate superior outcomes (i.e., greater decreases in psychological distress and larger increases in subjective wellbeing) compared to those in the sacred mindfulness condition.

## **Method**

### **Participants**

Participants were recruited via the university's online research participation system, which sampled undergraduate students enrolled in psychology courses. They received a portion of their course credit by participating in research. A total of 137 participants were split into three conditions: the sacred presentation ( $n = 51$ ), the secular presentation ( $n = 49$ ), and the passive control condition ( $n = 37$ ). Due to the logistical requirements of conducting research through the university's online participation system, the control group was required to sign up to participate in the study separately from the two intervention groups, as they would be receiving less course credit for participation because they spent less time involved in research overall (given they did not participate in a treatment). Thus, although the intervention conditions were comprised of randomly-assigned groups, the control condition was a non-randomly-assigned group.

The study participants were 81% female, with a mean age of 20.18 years ( $SD = 1.38$ ) and a range of 18 to 24 years. The mean number of years that the participants had spent at the university was 2.60 ( $SD = 1.11$ ). The participants were 70.1% White, 17.5% Black or African-American, 9.5% Asian/Pacific Islander, and 0.7% of each of the following ethnicities: Hispanic/Latinx, Native American, Indian, and "other." Regarding religious affiliation, 84.0% of participants identified as religious and 16.0% identified as non-religious. The religious participants consisted of 46.0% Catholic, 33.6% Protestant (12.4% Baptist, 13.1% non-denominational, 5.1% Methodist, and 2.9% others), 1.5% Muslims, 0.7% Hindu, and 2.2% Buddhist. The non-religious participants consisted of 2.9% Atheists, 0.7% Humanists, 4.4% Agnostics, and 8.0% not-religious.

## Measures

The pre-experiment questionnaire included a survey consisting of demographic information, measures of psychological distress (described below), and measures of subjective

wellbeing (also described below). The post-experiment questionnaire consisted of all distress and wellbeing measures.

**Depression, anxiety, and stress.** Levels of psychological distress were measured using the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). The DASS is a 21-item self-report scale that measures depression, anxiety, and stress over the past week. It is a frequently used measure of depression, anxiety, and stress in clinical and research settings (e.g., Newby, McKinnon, Kuyken, Gilbody, & Dalgleish, 2015). The version used in this study is a shortened version of the original 42-item version and demonstrated good internal consistency with the present sample (depression: pretest  $\alpha = .89$ , posttest  $\alpha = .89$ ; anxiety: pretest  $\alpha = .85$ , posttest  $\alpha = .85$ ; stress: pretest  $\alpha = .84$ , posttest  $\alpha = .85$ ). Example items include, “I couldn’t seem to experience any positive feeling at all” (depression), “I tended to over-react to situation” (stress), and “I felt scared without any good reason” (anxiety). Participants respond to all items on a 4-point Likert-type scale (e.g., 0 = *did not apply to me at all* to 3 = *applied to me very much or most of the time*).

**Positive and negative affect.** Levels of positive and negative affect were measured using the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). The PANAS is a widely used 20-item self-report scale that demonstrated good internal consistency with the present sample (positive affect: pretest  $\alpha = .87$ , posttest  $\alpha = .89$ ; negative affect: pretest  $\alpha = .86$ , posttest  $\alpha = .90$  at post-test). Example items include “excited” and “interested” (positive affect) as well as “irritable” and “ashamed” (negative affect). Participants rate their subjective present experience of different moods on a 5-point Likert-type scale (e.g., 1 = *very slightly or not at all* to 5 = *extremely*).

**Happiness.** Happiness was measured using the Subjective Happiness Scale (SHS; Lyubomirsky & Lepper, 1999). The SHS is a 4-item self-report measure that demonstrated good internal consistency with the present sample (pretest  $\alpha = .89$ , posttest  $\alpha = .89$ ). This measure has previously been used to measure happiness as an outcome in mindfulness-based intervention studies (e.g., Crego, Yela, Gomez-Martinez, & Karim, 2020; Wilson, Weiss & Shook, 2020). Sample items include “In general, I consider myself . . .” and “Compared with most of my peers I consider myself . . .” Participants respond to these items using a 7-point Likert-type scale (e.g., 1 = *less happy* to 7 = *more happy*).

**Gratitude.** Gratitude was measured using the Gratitude Questionnaire (GQ; McCullough, Emmons, & Tsang, 2002). The GQ is a 6-item measure that demonstrated good internal consistency with the present sample (pretest  $\alpha = .75$ , posttest  $\alpha = .70$ ) and has demonstrated sensitivity to mindfulness interventions (e.g., Rao & Kemper, 2017). Sample items include “I have so much in life to be thankful for” and “I am grateful to a wide variety of people.” Participants respond to all items on a 7-point Likert-type scale (e.g., 1 = *strongly disagree* to 7 = *strongly agree*).

**Optimism.** Optimism was measured using the Revised Life Orientation Test (LOT-R; Scheier, Carver, & Bridges, 1994). Optimism has been shown to be associated with increased levels of trait mindfulness (e.g., Smeets, Neff, Alberts, & Peters, 2014). The LOT-R is a 6-item measure that demonstrated adequate internal consistency with the present sample (pretest  $\alpha = .74$ , posttest  $\alpha = .74$ ). Sample items include “In uncertain times, I usually expect the best” and “Overall, I expect more good things to happen to me than bad.” Participants respond to all items on a 5-point Likert-type scale (e.g., 1 = *I agree a lot* to 5 = *I disagree a lot*).

## **Procedure**

After being introduced to the study and providing informed consent, all participants filled out the pre-experiment questionnaire. Participants who were recruited for the treatment group were then randomly assigned to either the spiritual (sacred) or secular condition. The two groups that participated in the mindfulness meditation were then given a sheet of paper that provided a link to a five-minute guided (audio-only) mindfulness meditation that was available online via the UCLA Mindful Awareness Research Center (see “Breathing Meditation (5 min)” available at <https://www.uclahealth.org/marc/mindful-meditations>), as well as a written description containing either the “sacred prime” or the “secular prime.” All participants in the treatment conditions received the same link to the same mindfulness meditation audio, but their description of the intervention varied depending on the result of their random condition assignment. They were also instructed to listen to the audio twice a day (once in the morning, and again in the afternoon) for two weeks, and then to return to complete the remainder of the experiment. Two weeks of daily practice was considered an adequate dosage to achieve the desired therapeutic effects, given that several previous studies of self-administered mindfulness interventions had achieved desirable effects across a variety of outcomes using similar two-week dosages (e.g., Cavanagh et al., 2013; O’Leary & Dockray, 2015; Lacaille et al., 2014).

Below is the verbatim description of the mindfulness intervention provided to participants in the “sacred prime” group:

Mindfulness *meditation* is a *sacred Buddhist practice*, through which one may reduce stress and anxiety, while improving overall wellbeing. *Buddhism teaches* that impermanence, decentering, and acceptance are key to the effectiveness of this *practice*.

And following is the verbatim description of the mindfulness intervention provided to participants in the “secular prime” group:

Mindfulness *intervention* is a *scientifically proven tool*, through which one may reduce stress and anxiety, while improving overall wellbeing. *Research suggests* that impermanence, decentering, and acceptance are key to the effectiveness of this *intervention*.

The italics in the descriptions above are used to denote differences in the key terms used in the presentation primes, but these terms were not actually italicized when presented in writing to participants. Participants involved in the control group also received a sheet of paper consisting only of instructions to return in two weeks to complete the remainder of the experiment.

After two weeks, all participants across each of the three conditions returned to complete the post-experiment questionnaire and debriefing. Additionally, participants in the control group were provided the link to the mindful breathing audio file used by the intervention groups during the experiment, sans priming texts.

## **Results**

### **Preliminary Data Analyses**

Descriptive statistics were run on the pre-test and post-test data (see Table 1). All study variables were relatively normally distributed and characterized by adequate internal consistency at both time points. Bivariate correlations among all the outcome variables were also run on the pre-test and post-test data to examine convergent and discriminant validity. As reported in Table 2, each of the psychological distress measures (i.e., depression, anxiety, stress, and negative affect) demonstrated significant positive correlations with each other, and significant negative correlations with the wellbeing measures (i.e., positive affect, happiness, optimism, and gratitude) at pre-test. Additionally, the psychological distress measures displayed significant negative correlations with the wellbeing measures, and even stronger positive correlations with

each other at post-test (see Table 2). Overall, the strength and directionality of these correlations indicated that the eight outcome variables represented distinct constructs that were related to each other in theoretically congruent ways and, thus, were deemed appropriate for use as outcome measures in the primary analyses.

Independent t-tests were conducted to determine whether randomization between the two treatment groups was effective at preventing systematic differences in baseline performance. At pre-test, there was no significant difference between the two treatment groups for levels of depression ( $p = 0.20$ ), anxiety ( $p = 0.31$ ), stress ( $p = 0.09$ ), positive affect ( $p = 0.17$ ), negative affect ( $p = 0.55$ ), happiness ( $p = 0.14$ ), and optimism ( $p = 0.55$ ). There was, however, a significant difference at pre-test for the two treatment groups on the measure of gratitude ( $p = 0.03$ ). Taken together, this suggests that the randomization to treatment groups was largely successful at minimizing performance biases. Finally, given the lack of random assignment for the control group, potential systematic differences at baseline were tested by conducting a series of analyses of variance (ANOVA) using the experimental condition variable (0 = control, 1 = sacred mindfulness intervention, 2 = secular mindfulness intervention) as the factor of interest and the pretest scores for all psychological distress and subjective wellbeing outcomes as the dependent variables. Results from these ANOVA showed that condition assignment had a significant main effect across baseline scores for all outcomes (see Table 3), and that these effects were characterized by universally large effect sizes. Thus, analyses of covariance (ANCOVA), using these baseline scores as covariates, were deemed necessary for the primary analyses.

### **Primary Data Analyses**

To examine the main effects of the experimental conditions on the outcome variables, eight separate ANCOVA were conducted. For each ANCOVA, the independent variable was based upon condition and had three levels (0 = control, 1 = sacred mindfulness intervention, 2 = secular mindfulness intervention), while the pre-test score was used as the covariate and the post-test score was used as the dependent variable. This same analytic approach was used to test between-group differences for all psychological distress outcomes and all subjective wellbeing outcomes. Results from this series of ANCOVA indicated that experimental condition had a statistically significant main effect for all outcomes except gratitude, with effect sizes ranging from small to moderate (see Table 4).

Estimated marginal means resulting from the ANCOVA were evaluated to determine the directionality of the main effects (see Table 5). Adjusted means were observed to be higher on psychological distress measures in the control group at post-test than for each of the experimental groups. Adjusted means for most of the subjective wellbeing measures were observed to be higher for each of the experimental groups than for the control group, except for happiness. For happiness, the adjusted mean for the control group ( $M = 20.44$ ) was slightly higher than the adjusted mean for the sacred intervention group ( $M = 20.39$ ), while the adjusted mean for the secular intervention group ( $M = 21.77$ ) was higher than both the control and the sacred groups. These descriptive results confirm the directionality of the inferential results, showing that the mindfulness-based intervention groups generally had lower psychological distress and greater subjective wellbeing at post-test compared to the control condition.

To further locate the effects of experimental condition, pairwise comparisons were run for all outcomes (see Table 6). To account for potential inflation of familywise error resulting from multiple comparisons, we interpreted inferential test results in light of the more

conservative threshold of  $p = 0.01$ . Although, as reported above, a non-significant main effect was observed for the gratitude outcome, pairwise comparisons were still conducted for this outcome given that the non-significant effect was characterized by a small effect size—suggesting some variability among groups (see Table 4). Results from these comparisons indicated that the secular group experienced significantly lower depression, anxiety, stress, and negative affect at post-test compared to the control group. Additionally, the secular group experienced significantly greater positive affect, happiness, and optimism at posttest compared to the control group. Furthermore, the sacred group experienced significantly lower depression, anxiety, stress, and negative affect at post-test compared to the control group. The sacred intervention group did not, however, show any statistically significant differences from the control group on the posttest subjective wellbeing measures. Yet the secular intervention group did show significantly greater happiness at posttest compared to the sacred intervention group. Examination of the effect sizes (Hedges'  $g$ ) resulting from these comparisons showed that the differences between the control and sacred groups ranged from negligible to moderate ( $-.02$  to  $.64$ ), while the differences between the control and secular groups ranged from moderate to large ( $.52$  to  $.87$ ), and the differences between the two mindfulness-based interventions groups ranged from negligible to moderate ( $-.03$  to  $.58$ ) and generally favored the secular condition (see Table 6). It is noteworthy that meaningful effect sizes were observed for various comparisons where the inferential statistics were not-significant, suggesting some of the inferential analyses may have been underpowered (see Table 6).

### **Discussion**

Previous research has shown that mindfulness-based interventions are effective at improving psychological outcomes in a variety of samples (e.g., Ebert & Sedlmeier, 2012;

Khoury et al., 2013; Klingbeil et al., 2017a; Klingbeil et al., 2017b); however, little is known about the factors that might moderate its therapeutic effectiveness, including the congruence of mindfulness exercises with clients' cultural backgrounds and values. The primary aim of this study was to investigate the potential influence of how mindfulness meditation is presented or “primed” for clients—as either a “sacred Buddhist practice” or as a secular “scientifically proven tool”—on its effectiveness to reduce psychological distress and improve subjective wellbeing.

We hypothesized that both the secular and sacred intervention conditions would yield better outcomes than the passive control condition, showing that mindfulness training—no matter how it was presented—was more beneficial for one's mental health than no intervention. We also hypothesized that secular-primed mindfulness meditation would more effectively reduce distress and improve wellbeing for participants, as the secular prime may be less likely to trigger negative expectancy effects that might be incongruent with client's cultural backgrounds and values.

Findings partially supported our first hypothesis, as both mindfulness intervention groups showed significantly better posttest scores compared to the passive control group across all psychological distress outcomes (i.e., depression, anxiety, stress, and negative affect; see Table 6). Regarding subjective wellbeing outcomes, however, results showed that differences between the sacred intervention group and the control group were not significantly different across any domains. Thus, although the sacred intervention seemed to reduce psychological distress, it did not appear to improve subjective wellbeing. Interestingly, the differences between the secular intervention group and the control group were significantly different across three of the four subjective wellbeing outcomes (i.e., positive affect, happiness, and optimism; see Table 6)—

suggesting that priming the intervention as a “scientifically proven tool” not only reduced psychological distress, but also improved subjective wellbeing.

Results also provided partial support for our second hypothesis (i.e., secular-primed mindfulness meditation group would more effectively reduce distress and improve wellbeing than the secular-primed group), indicating that the secular group showed significant improvements over and above the sacred group only on levels of happiness. That said, examination of estimated marginal means (see Table 5) and standardized mean differences (see Table 6) at post-test show additional descriptive differences in anxiety, positive affect, and optimism that appear to favor the secular intervention group over the sacred group with at least small effect sizes (Hedges’  $g > .20$ ). Taken together, these results confirm that mindfulness is an effective therapeutic practice and provide initial evidence suggesting that the way a mindfulness meditation is “primed” to clients—as either a “sacred Buddhist practice” or as a “scientifically proven tool”—may contribute to differential therapeutic effects.

We suggest that there are a couple plausible explanations for the observed differences in outcomes between priming groups. One possibility is that engaging in an intervention that is primed with spiritual overtones may make participants uncomfortable if the practice does not originate from within their own faith tradition. A total of 81.8% of participants in this study—the majority across all conditions—considered themselves religious but did not identify as Buddhist. For these individuals, the sacred prime may have facilitated a stigma of mindfulness meditation as being incongruent with their cultural backgrounds or values, which resulted in diminished expectations regarding the potential for desirable therapeutic outcomes. Another possibility is that participants in the secular group may have been more likely to believe the intervention was going to help them, thus increasing expectancy effects for desirable therapeutic outcomes,

analogous to those observed in Szabo and Kocsis (2017). That said, given this study did not include explicit measures of outcome expectations, we cannot empirically validate either of these possibilities. Future research may also benefit from measuring both initial outcome expectations as well as changes in expectations over the duration of the intervention.

Despite the promising findings reported above, the present study is limited by a few notable methodological limitations. First, as indicated by the large and imprecise confidence intervals for the effect sizes (see Table 6), this study is limited by its relatively small number of participants across conditions. Although positive effects were observed in this study, replication using larger sample sizes that are adequately powered is necessary to lend greater credence to the claim that a secular presentation of mindfulness leads to better psychological outcomes than a sacred presentation. Moreover, future studies should include measures of treatment adherence to determine any mediating effects. This study is also limited in its range of participant demographics due to the sampling pool of college students from which participants were selected (i.e., majority white, female, and Christian). Further research should include more diverse participants, with more varied ages, gender identities, and professions, as well as from other geographic regions and with differing spiritual backgrounds. Reproducibility of the effects observed herein with diverse samples would establish evidence in favor of the generalizability of these findings.

Another limitation is that this sample was non-clinical in nature, and therefore findings can only be interpreted in light of conducting mindfulness-based interventions with healthy or general populations. Future research is thus warranted to examine how priming and expectancy effects may influence the outcomes of mindfulness-based interventions in individuals presenting with clinical levels of psychological distress. Moreover, in order to refine or optimize priming

techniques for clinical purposes, future research may wish to conduct component analyses to determine what words or phrases from the sacred and secular primes determined their differential therapeutic effectiveness. Overall, then, we conclude that much more research is needed to explore these questions and further understand the influence of priming and expectancy effects on the mindfulness-based interventions.

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Table 1

*Descriptive Statistics for Study Variables*

Outcome	Pre-test			Post-test		
	<i>M (SD)</i>	Skewness	Kurtosis	<i>M (SD)</i>	Skewness	Kurtosis
Depression	4.27 (4.40)	1.49	1.90	2.85 (3.73)	2.10	4.14
Anxiety	4.90 (4.69)	1.23	0.93	2.97 (3.86)	1.97	4.12
Stress	8.40 (4.75)	0.42	-0.24	5.74 (4.23)	1.02	0.87
Negative Affect	21.43 (7.22)	0.96	0.83	18.06 (6.90)	1.57	2.88
Positive Affect	31.19 (7.42)	-0.31	-0.38	32.95 (7.44)	-0.57	-0.18
Happiness	19.56 (4.96)	-0.78	0.09	20.97 (4.57)	-1.05	1.13
Optimism	14.49 (4.61)	-0.48	-0.52	16.01 (4.38)	-0.54	-0.04
Gratitude	36.67 (4.42)	-1.50	3.19	37.43 (3.90)	-1.25	1.77

Table 2

*Bivariate Correlations for Study Variables at Pre-test (below the diagonal) and Post-test (above the diagonal)*

	Depression	Anxiety	Stress	Neg. Affect	Pos. Affect	Happiness	Optimism	Gratitude
Depression	1	.69**	.74**	.76**	-.50**	-.50**	-.53**	-.26**
Anxiety	.67**	1	.68**	.74**	-.32**	-.42**	-.42**	-.21*
Stress	.65**	.66**	1	.76**	-.37**	-.39**	-.40**	-.15
Neg. Affect	.69**	.70**	.69**	1	-.32**	-.43**	-.45**	-.19*
Pos. Affect	-.45**	-.24**	-.38**	-.38**	1	.44**	.49**	.27**
Happiness	-.58**	-.42**	-.49**	-.48**	.56**	1	.64**	.50**
Optimism	-.49**	-.37**	-.38**	-.49**	.50**	.60**	1	.48**
Gratitude	-.42**	-.26**	-.32**	-.33**	.34**	.52**	.45**	1

\* $p < .05$  \*\* $p < .01$

Table 3

*ANOVA Results for Condition Main Effects Across Study Variables at Pre-test*

Outcome	<i>df</i>	<i>F</i>	<i>p</i>	$\eta_p^2$
Depression	1, 132	72.47	< .001	.35
Anxiety	1, 133	62.78	< .001	.32
Stress	1, 133	36.78	< .001	.22
Negative Affect	1, 133	73.59	< .001	.36
Positive Affect	1, 133	83.35	< .001	.39
Happiness	1, 133	353.58	< .001	.73
Optimism	1, 133	223.47	< .001	.63
Gratitude	1, 133	156.98	< .001	.54

Table 4

*ANCOVA Results for Condition Main Effects Across Study Variables at Post-test*

Outcome	df	F	<i>p</i>	$\eta_p^2$
Depression	2, 132	3.66	.03	.05
Anxiety	2, 133	8.51	.00	.11
Stress	2, 133	8.43	.00	.11
Negative Affect	2, 133	6.89	.00	.09
Positive Affect	2, 133	3.27	.04	.05
Happiness	2, 133	5.18	.01	.07
Optimism	2, 133	3.56	.03	.05
Gratitude	2, 133	.71	.49	.01

Table 5

*Estimated Marginal Means for All Outcomes Across Conditions*

Outcome	Passive Control			Sacred Presentation			Secular Presentation		
	Adjusted Mean	SE	SD	Adjusted Mean	SE	SD	Adjusted Mean	SE	SD
Depression	3.95	0.49	2.94	2.59	0.40	2.89	2.28	0.42	2.94
Anxiety	4.61	0.50	3.04	2.64	0.43	3.07	1.92	0.44	3.08
Stress	7.77	0.58	3.53	5.13	0.50	3.54	4.81	0.51	3.57
Negative Affect	20.78	0.89	5.41	16.85	0.76	5.43	17.03	0.77	5.39
Positive Affect	31.56	0.93	5.66	32.38	0.80	5.71	34.55	0.81	5.67
Happiness	20.44	0.39	2.37	20.39	0.33	2.36	21.77	0.34	2.38
Optimism	15.29	0.43	2.62	15.76	0.37	2.64	16.75	0.38	2.66
Gratitude	37.01	0.43	2.62	37.65	0.37	2.64	37.58	0.38	2.66

Table 6

*Pairwise Comparisons*

Outcome	Control vs. Sacred			Control vs. Secular			Sacred vs. Secular		
	Mean Dif.	SE	g [95% CI]	Mean Dif.	SE	g [95% CI]	Mean Dif.	SE	g [95% CI]
Depression	1.36*	0.63	.46 [-.15, 1.08]	1.67*	0.65	.56 [-.06, 1.19]	0.30	0.58	.11 [-.47, .68]
Anxiety	1.97**	0.66	.64 [.00, 1.28]	2.69**	0.67	.87 [.22, 1.52]	0.72	0.61	.23 [-.37, .84]
Stress	2.64**	0.77	.74 [.00, 1.48]	2.96**	0.78	.83 [.08, 1.58]	0.32	0.72	.09 [-.61, .79]
Neg. Affect	3.93**	1.16	.72 [-.41, 1.85]	3.76**	1.17	.69 [-.45, 1.83]	-0.18	1.08	-.03 [-1.03, 1.09]
Pos. Affect	-0.82	1.23	.14 [-1.05, 1.33]	-2.99*	1.24	.52 [-.67, 1.72]	-2.17	1.14	.38 [-.74, 1.49]
Happiness	0.05	0.51	-.02 [-.52, .47]	-1.30*	0.51	.56 [.05, 1.06]	-1.38**	0.47	.58 [.11, 1.04]
Optimism	-0.47	0.57	.18 [-.37, .73]	-1.46*	0.57	.55 [-.01, 1.11]	-0.99	0.53	.37 [-.15, .89]
Gratitude	-0.63	0.57	.24 [-.31, .79]	-0.57	0.57	.21 [-.35, .77]	0.06	0.54	.03 [-.49, .55]

\* $p < .05$  \*\* $p < .01$