

Effectiveness of Mindfulness Meditation for Marginalized Groups

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Abstract

We need more randomized controlled trials (RCTs) that examine the effectiveness of mindfulness for marginalized groups. Our study is correlational, and explores whether marginalized groups benefit as much as non-marginalized groups from a 20-minute mindfulness meditation. We found preliminary evidence that mindfulness is equally effective for marginalized groups as non-marginalized groups. Additionally, three aspects of marginalized identity—higher general life stress, higher vigilance to discrimination, and non-heterosexual identity—predict a little bit more benefit from our meditation. We recommend that future mindfulness RCTs confirm the effects of general life stress, vigilance to discrimination, and sexual orientation on improvement from meditation.

Introduction

Imagine you are Mariela. You are a charismatic, 25-year-old Latina, proud mother of a corgi, and a soon-to-be graduate from the firefighter academy.

These past few months, a dull ache has crept into your day-to-day life. You feel pulled in all directions: Your mom needs help with medical bills, rent-day is creeping closer, and you've had to carefully ration groceries since losing your part-time EMT job. As your stress piles up, small things that didn't used to startle have started to make you jump, and sometimes your heart pounds alarmingly against your chest.

Since you don't have health insurance, you have been waiting for two months for a mental health visit at a community clinic. When your appointment finally arrives, your therapist—a warm, empathetic white woman—diagnoses you with generalized anxiety disorder and recommends some mindfulness exercises to help you cope with your stress.

Mindfulness, she explains, is the act of attending to the present moment without judgement (Good et al., 2016). Practicing it can range from just taking a few, mindful breaths, to having a regular meditation practice.

Your therapist is not alone in recommending mindfulness. These practices, which originated in the Indian Buddhist tradition and spread across Eastern and Southern Asia, have become increasingly popular in the clinical world (Davis, 2020). The number of publications on mindfulness has increased exponentially since the 1990's (Mark et al., 2011) including studies recommending it for anxiety, depression, substance use disorders and suicidal behaviors (Evans et al., 2008, Piet et al., 2011, Bowen et al. 2009, Mark et al., 2010)

Despite the rising popularity of mindfulness, will these exercises actually help Mariela—a low-income, woman of color? With the current state of mindfulness research, we simply cannot say conclusively.

Many of the treatments that therapists recommend come from research that underrepresents low socioeconomic status (SES) and minority populations (Miranda et al., 2003). Mindfulness research is no exception. In 2018, a meta-analysis found that US-based randomized controlled trials (RCTs) of mindfulness interventions oversample white people and college graduates, and undersample all minority racial groups (Figure 1). Mindfulness RCTs similarly undersample those with less formal education, and low-income individuals. In fact, out of the sixty-nine papers included in the meta-analysis, only one study specifically asked whether mindfulness is effective for a low-SES individuals and racial minorities (Waldron et al., 2018).

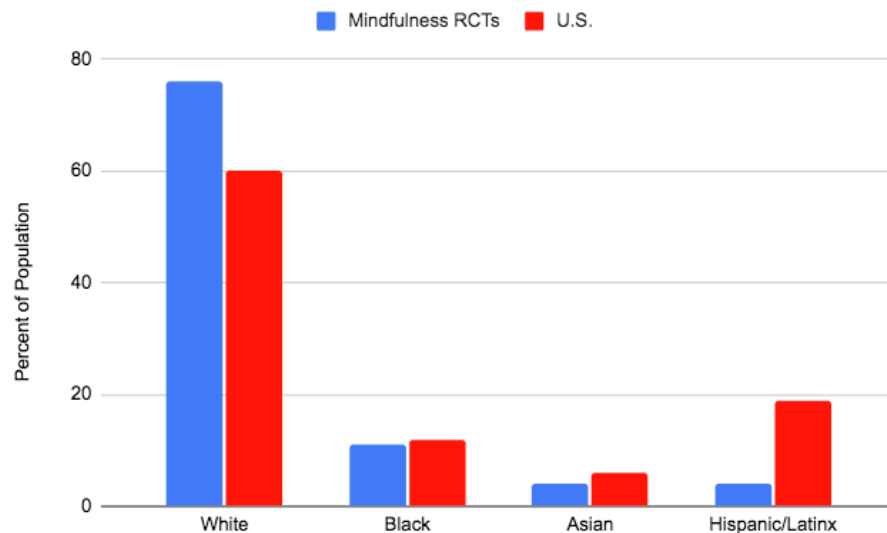


Figure 1. Mindfulness RCTs oversample white participants compared to national demographics, and undersample all other major ethno-racial groups. Hispanic/Latinx participants are undersampled the most.

Undersampling of marginalized groups in mindfulness RCTs is a problem for four main reasons.

Firstly, RCTs are the gold standard for testing if a mental health intervention works. If marginalized groups are undersampled in mindfulness RCTs, it is very hard to prove that the interventions are effective for them.

Secondly, marginalized groups already face numerous barriers to receiving appropriate mental health care, among them misdiagnosis, lack of insurance coverage, culture-based stigma on seeking professional help, and challenges finding culturally-knowledgeable therapists

(Merino et al., 2018, Sue et al., 2012, Office of the Surgeon General (US), 2001). One crucial step in repairing inequity in mental healthcare is ensuring that when marginalized clients finally access care, the treatment they receive actually works for them.

Thirdly, it is possible that mindfulness interventions are *not* helpful for marginalized groups. In some qualitative studies with low-SES and racial minority samples, participants say they struggle with, or dislike mindfulness for a number of reasons. For example, one study recorded the reactions of low-SES, majority-Black participants over the course of an 8-session mindfulness program. Participants' negative feedback included:

- Having more pressing concerns of survival, and too little time to adopt a regular mindfulness practice.
- Wishing they had been prepared for the physical and emotional pain that arose from paying attention to their present experience (Spears et al., 2017).

Similarly, a mindfulness study at University of Southern California's Substance Use Disorder Program found that the cohort of primarily Black and Latina women felt the language used in the intervention was not accessible, and that the practice was triggering for their trauma. Hortensia Amaro, who implemented and later re-adapted the program, especially emphasized the need for addressing "cultural-specific stressors" in mindfulness interventions, such as the stress generated by "familismo," or pressure on Latina women to fulfil familial duties (Amaro, 2014). Taken together, mindfulness interventions may need more culture and trauma sensitivity before they are helpful for marginalized groups.

On the other hand, mindfulness could be a very powerful tool for the mental health of marginalized groups. In similar qualitative studies, low-SES and minority participants report benefits from practicing mindfulness including increased self-efficacy, nonreactivity, compassion, and acceptance of self and others. Some also report decreased arousal and distress, and improved anger management (Spears et al., 2017). Additionally, as one study notes, mindfulness is a cost-free practice. And, it is easy to deliver in community settings instead of just at mental health care facilities. These factors might make mindfulness an ideal intervention for those facing barriers of cost, transportation, and stigma around seeking mental health care (Dutton et al., 2011).

Could mindfulness be a helpful tool for marginalized groups? Or is it a poor fit for some communities? Is there anything we can change about mindfulness interventions to make them more useful for these groups? We cannot answer these questions conclusively without conducting more inclusive mindfulness RCTs.

Our study is an exploratory, correlational study that aims to lay the groundwork for future inclusive mindfulness RCTs. In it, we ask two main questions:

1. Does a 20-minute mindfulness meditation benefit marginalized participants as much as it benefits non-marginalized participants?

2. If one group benefited more than another, why?

What might we glean by exploring these questions?

We may find that participants with a particular identity—say, low-SES women—seem to benefit *less* from our intervention than other groups. In this case, low-SES women might be good candidates for future mindfulness RCT to confirm whether gender and SES have an effect on the effectiveness of mindfulness interventions.

Furthermore, we may find that there was a particular reason why low-SES women benefited less from our intervention. Maybe low-SES women were more likely to feel emotionally uncomfortable during the meditation, which led them to dislike the meditation and get less out of it. In this case, we could recommend that future studies create and test adapted mindfulness interventions that support low-SES women through the emotional discomfort that arises while meditating.

Or, we may find the opposite: Perhaps low-SES women benefit *more* from our intervention than other groups. In this case, we would identify what low-SES women *liked* about the meditation. Perhaps low-SES women felt more emotionally connected with the language used in the meditation. In this case, we might recommend a mindfulness RCT that confirms whether “emotionally-connected language” mediates the relationship between SES, gender, and improvement score.

Finally, we may find that participants’ identity does not predict how much they benefit from our meditation intervention. This may be preliminary evidence that our mindfulness intervention is effective across groups.

Methods

Participants and Recruitment

Our participants are recruited through UCSD SONA, an online platform where UC San Diego students participate in research studies in exchange for course credit. To eliminate self-selection bias, participants were unable to see the content of the study before electing to participate.

Study Design Overview

Once consenting to participate in our study, our participants completed a 35- to 50-minute online survey. The survey consisted of:

- A 20-minute, guided audio recording of a mindfulness meditation
- A pre- and post-test measure of stress and anxiety
- An exit questionnaire on participants’ thoughts and feelings about the meditation

- Measures of marginalized identity
- Attention and effort checks

Meditation Intervention

Participants followed a 20-minute audio recording of a Vipassana-style, mindfulness meditation. Subjects were not allowed to access the next page of the study until 20 minutes had passed on the page that contained the audio recording.

Vipassana is a style of meditation that asks participants to pay attention to the sensation of their breath, and gently return their mind to their breath when they notice thoughts arise. Vipassana meditation is often used in randomized control trials with novice meditators. This makes it an appropriate fit for our participants, who may not have practiced meditation before. Vipassana meditation is also popular in Western culture, making our intervention more comparable to mindfulness interventions used in US clinical settings (Bondi, 2020).

Since we collected our data online, we chose a single-session meditation to best ensure participants would complete the whole intervention. Past studies have identified benefits of a single session meditation, so we had reason to believe that our intervention would also produce an effect (Fennell et al., 2016, Johnson et al., 2019).

Stress and Anxiety Outcome Score

We measured participants' state anxiety, trait anxiety, and stress before and after the intervention to see how much they improved.

State and Trait Anxiety

Our state anxiety and trait anxiety measures come from the State-Trait Anxiety Inventory (Spielberger et al., 1983). The state anxiety scale asks about current feelings of tension, nervousness, and apprehension. The trait anxiety scale measures more stable tendencies toward anxiety. Each scale has 20 items, each on a 4-point Likert- scale from 1 ("Not at All") to 4 ("Very Much So"). Participants' raw pre- and post-scores range from 20 to 80 points.

Since the trait anxiety scale has high test-retest reliability, trait anxiety scores are not expected to change before and after the intervention. Instead of acting as a measure of improvement, the trait anxiety scale functions in our study as a check on demand effects.

Stress

Our stress measure consists of three questions.

1. *Stress*: "How stressed do you feel right now?"
Responses range on a ten-point slider scale from 1 = not stressed at all to 10 = extremely stressed.
2. *Relax*: "How relaxed do you feel right now?"
(1 = not at all relaxed, 10 = extremely relaxed).

3. *Feel*: “How are you feeling right now?”

Participants selected which “smiley face” best represented how they were feeling on a five-point sliding scale.

(1= full frown, 2 = slight frown, 3 = neutral face, 4 = slight smile, 5 = full smile).

We calculated a composite stress score with the following equation. Higher scores indicate higher stress.

$$(stress) + (11 - relax) + (2 * (6 - feel)) / 30.$$

We calculated improvement scores for both stress and anxiety by subtracting each participants’ pre-score from their post-score, and dividing by the highest potential score. Therefore, improvement scores represent a percent change. More positive scores represent lessened anxiety or stress, and more negative scores represent worsened anxiety or stress.

Exit Questionnaire

We included an exit questionnaire on participants’ thoughts, feelings, and opinions about the meditation. The exit questionnaire is meant to help us answer the question: “If one group benefited more than another, why?” The questionnaire has four sections.

Table 1. How much do you agree or disagree with the following statements regarding the meditation you just participated in?

- It helped me to relax.
- It does not feel like something I could practice in my daily life.
- It felt like something that could help me with my greatest stressors.
- It felt “in touch” with my personal experience.
- The language used did not connect with me emotionally.
- The language used made sense to me.
- The language used did not feel relevant to my identity, culture, or background.
- I felt emotionally comfortable during this meditation.
- I felt physically comfortable during this meditation.
- I did not like this meditation.

Table 2. How much do you agree or disagree with the following statements regarding the meditation you just participated in?

- It felt like something that was created with someone of my identity, culture, or background in mind.
- I felt like the person who guided me through the meditation *shared* my identity, culture, or background.
- I felt like the person who guided me through the meditation had an *understanding for people of* my identity, culture, or background.
- It matters to me that the person guiding me through the meditation shares my identity, culture, or background.
- It matters to me that the person guiding me through the meditation has an *understanding for people of* my identity, culture, or background.

Affinity and Relevance

Participants rated on a 7-point scale the extent to which they agree with a number of statements. Some of the statements have to do with participants' *affinity* for the meditation, and others deal with how *relevant* the meditation felt to them (Table 1).

Cultural Fit

Participants answered questions about how well the meditation aligned with their identity, culture, or background. They also indicated whether they felt the speaker guiding the meditation *shared* or *had an understanding for* their identity (Table 2).

Table 3. How much did you like or dislike the following aspects of the meditation you just participated in?

- Being instructed to close my eyes.
- Being instructed to remain seated in my chair.
- Being instructed to relax.
- Being instructed to take deep breaths.
- Being instructed to pay attention to my breath.
- The metaphor of thoughts as clouds passing over a clear sky.
- Being instructed to acknowledge my thoughts with compassion.
- Moments when the person guiding the meditation was speaking.
- Moments when the person guiding the meditation was quiet.

Affinity for Aspects of the Meditation

The third section lists various aspects of the meditation, like “Being instructed to close my eyes,” and asks participants to rate how much they liked or disliked them (Table 3).

Free Response

The last section consisted of two free response questions. The first asked participants to list any additional aspects about the meditation that they liked, and the second asked them to list any additional aspects that they disliked.

Measures of Marginalized Identity

Ethnoracial Background

Participants selected from the following list which category best described their ethnoracial background: Asian, White or Caucasian, Hispanic/Latino, Black or African American, Middle Eastern or North African, Native Hawaiian or Other Pacific Islander, Native American/Alaskan Native, Mixed, or Prefer not to answer.

Country of Origin and Immigrant Identity

Participants selected their country of birth from a dropdown menu, as well as the age they immigrated to the United States, if applicable. They also indicate their generational status, if they were an American citizen (First, Second, or Third generation, Fourth generation or more, or Prefer not to answer).

Gender Identity, Sex Assigned at Birth, and Sexual Orientation

Participants selected their current gender identity from the following list: Male, Female, Queergender/non-binary/gender fluid, A gender not listed here, or Prefer not to answer. They additionally indicated their sex assigned at birth (Male, Female, or Prefer not to answer).

We also asked participants to select an expression that best described their sexual orientation from the following list: Heterosexual or straight, Bisexual, Pansexual, Gay or lesbian or homosexual, Bi-curious or hetero-flexible, Asexual, I refuse to use labels to describe my sexual orientation, A sexual orientation not listed here, or Prefer not to answer.

Housing and Food Insecurity

Participants responded to the following prompts about their experience with housing and food insecurity.

Housing Insecurity: “Which statement best reflects your experience with *housing insecurity*? Examples include homelessness, difficulty paying rent, living in an overcrowded place to save money, living in an unsafe environment to save money, or being forced to move.”

Food Insecurity: “Which statement best reflects your experience with *food insecurity*? Examples include running out of food and not having money for more, not having money for nutritious, balanced meals, and eating smaller meals or skipping meals to save money.”

Participants indicated if they were currently experiencing housing and/or food insecurity, if they had in the past, if they had never experienced housing and/or food insecurity, or that they preferred not to answer.

Socioeconomic Status

Participants responded to the following prompt about their socioeconomic status: “Relative to your peers, how do you feel about your financial situation?” Responses were on a sliding scale from 1-100 with five, evenly spaced labels:

- 0: I struggle with or worry about finances daily.
It’s tough, but I mostly get by.
I only worry if/when large unexpected expenses come up.
I don’t often worry about finances.
- 100: I never worry about my financial security.

Harvard Everyday Discrimination and Heightened Vigilance Scales

The Harvard Everyday Discrimination Scale asks participants to indicate how often they experience common instances of discrimination, such as being treated with less courtesy than others, or being assumed to be less intelligent than others.

The Heightened Vigilance Scale is an addition to the Everyday Discrimination Scale. It measures how often participants feel heightened arousal in anticipation of discrimination, or

take extra precautions to avoid it. Examples include preparing for possible insults before leaving home, or trying to avoid certain social situations and places.

Both scales have six points (Almost every day, At least once a week, A few times a month, A few times a year, Less than once a year, Never). Participants' final scores are the sum of their responses (Williams, 1997).

Holmes Rahe Stress Test for Youth

To measure participants' general stress, we included the Holmes Rahe Stress Test for Youth. The test asks participants to select from a list of 48 stressors which ones they have experienced in the past 12 months. Stressors range from high intensity (death of spouse, parent, boyfriend/girlfriend) to low intensity (minor violation of the law). Each item is assigned a point value from 5-100 based on how stressful it is. Participants' final general stress score is the sum of their points (Holmes, 1967).

Other Demographics

We also asked about participants' age, major, year in college, and whether or not they are a transfer student.

Inclusion Criteria

Participants had to pass three criteria to be included in our analysis.

First, they had to pass 5 out of 6 “attention checks,” which were spaced evenly throughout the survey. Each attention check was disguised as a regular question, but instead asked participants to select a particular answer (Ex. “Strongly agree”) if they were paying attention. This ensured that participants were not selecting random responses without reading the questions.

Next, at the end of the survey participants answered two multiple-choice questions about their level of effort in completing the questionnaire and the meditation intervention. We informed participants that their answer was anonymous and could not disqualify them from receiving credit. We asked them to answer honestly to help us maintain accurate data. To be included in analysis, participants had to choose the following responses, which represent the highest possible effort:

- “While filling out my responses (before and after the exercise) I read all instructions and questions carefully, and answered honestly to the best of my ability.”
- “While listening to the 20-minute meditation audio, I listened to all instructions carefully, and participated the entire time to the best of my ability.”

Analysis

Variable Recoding

We recoded responses for housing insecurity, food insecurity, and ethnoracial background, and sexual orientation, because some categories for these variables did not receive enough respondents.

We collapsed housing and food insecurity into two categories: Insecure, and non-insecure. Participants who responded, “I have never experienced housing/food insecurity,” were recoded as “non-insecure.” Participants who responded, “I am currently experiencing housing/food insecurity,” or “I experienced housing/food insecurity in the past,” were recoded as “insecure.”

We also collapsed ethnoracial background into four levels: Latinx, Asian, White, and Other. We made this choice because we did not receive enough respondents who identify as Black or African American, Middle Eastern or North African, Native Hawaiian or Other Pacific Islander, Native American/Alaskan Native, or Mixed.

Additionally, we collapsed sexual orientation into two levels: non-heterosexual, and heterosexual.

For our analyses on gender, we used the binary variable “sex assigned at birth” instead of “gender identity,” because we did not receive enough participants who identified as transgender, queergender, non-binary, fluid, or other.

Our final variables and codes are listed below:

Dependent Variables

- *stress_diff*: Change in stress, measured before and after the meditation intervention
- *SA_diff*: Change in anxiety, measured before and after the meditation intervention

Predictor Variables

- *AGE*: age
- *SES*: Socio-economic status
- *gen_stress_score*: Holmes Rahe general life stress score, or “general stress”
- *EDD_score*: Harvard Every Day Discrimination score, or “perceived discrimination”
- *VIG_score*: Harvard Heightened Vigilance to Discrimination score, or “vigilance to discrimination”
- *SAAB*: Sex assigned at birth
- *SO*: Sexual orientation
- *HI*: Experience with housing insecurity
- *FI*: Experience with food insecurity
- *ETH_LWA*: Ethnoracial background, collapsed to Latinx, Asian, White, and Other.
- *MED_EX*: Experience with meditation

Multiple Linear Regression Model

We generated a linear regression model to identify which predictor variables contributed significantly to change in stress and anxiety. We used a stepwise method: running our model, removing the least significant predictor variable, then re-running the model, and repeating until all remaining variables were significant.

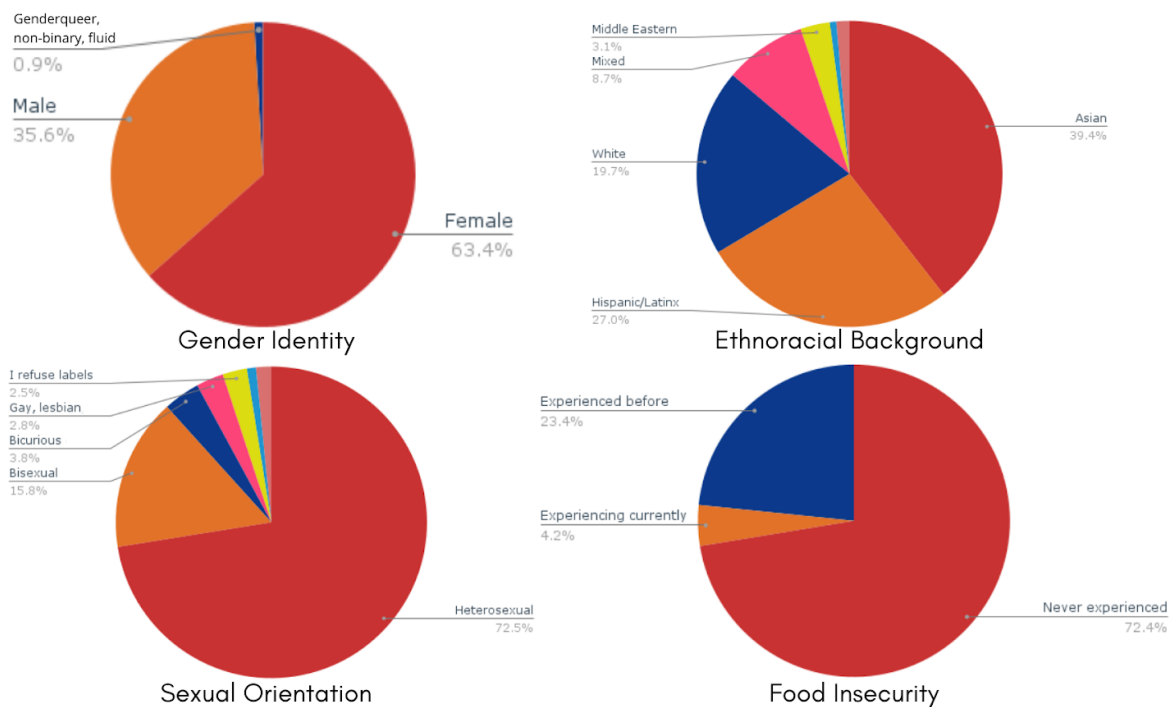
Results

Who were our participants?

We received a total of 614 respondents. 52.12% of participants passed our inclusion criteria for a final N-value of 320 (Table 4). See Figure 2 for basic demographic information about our participants.

How many participants passed inclusion criteria?		
	Number	% of Total
Total respondents	614	
5 out of 6 attention checks	557	90.72%
Best participation in survey	486	79.15%
Best participation in meditation	359	58.47%
Final N-value	320	52.12%

Table 4. Percentage of participants who passed each of our three inclusion criteria.



Who actually did the meditation?

We were curious whether any group was more likely to participate in our meditation than another. Since our study was conducted online, we had no way of enforcing participation. Instead, we asked participants to report how well they followed along with our meditation. A chi-squared analysis on our demographic variables against “participation level” yielded no significant results. All groups were equally likely to participate in our meditation.

Who benefited most from our meditation?

To see which demographic variables contributed uniquely to improvement from our meditation, we generated a linear regression model for both our measures of improvement: change in anxiety, and change in stress.

Here, we detail how we generated our model for change in anxiety.

In the first iteration of our model, we decided to only include predictor variables that were significantly correlated with change in anxiety. We generated a Pearson’s correlation coefficient matrix, and found that of our 11 predictor variables, 7 were significantly correlated with change in anxiety ($p < 0.05$) (Figure 3). We included these 7 variables in the first iteration of our model, as follows:

Change in anxiety ~ general stress + vigilance to discrimination + perceived discrimination + sex assigned at birth + sexual orientation + housing insecurity + Latinx identity

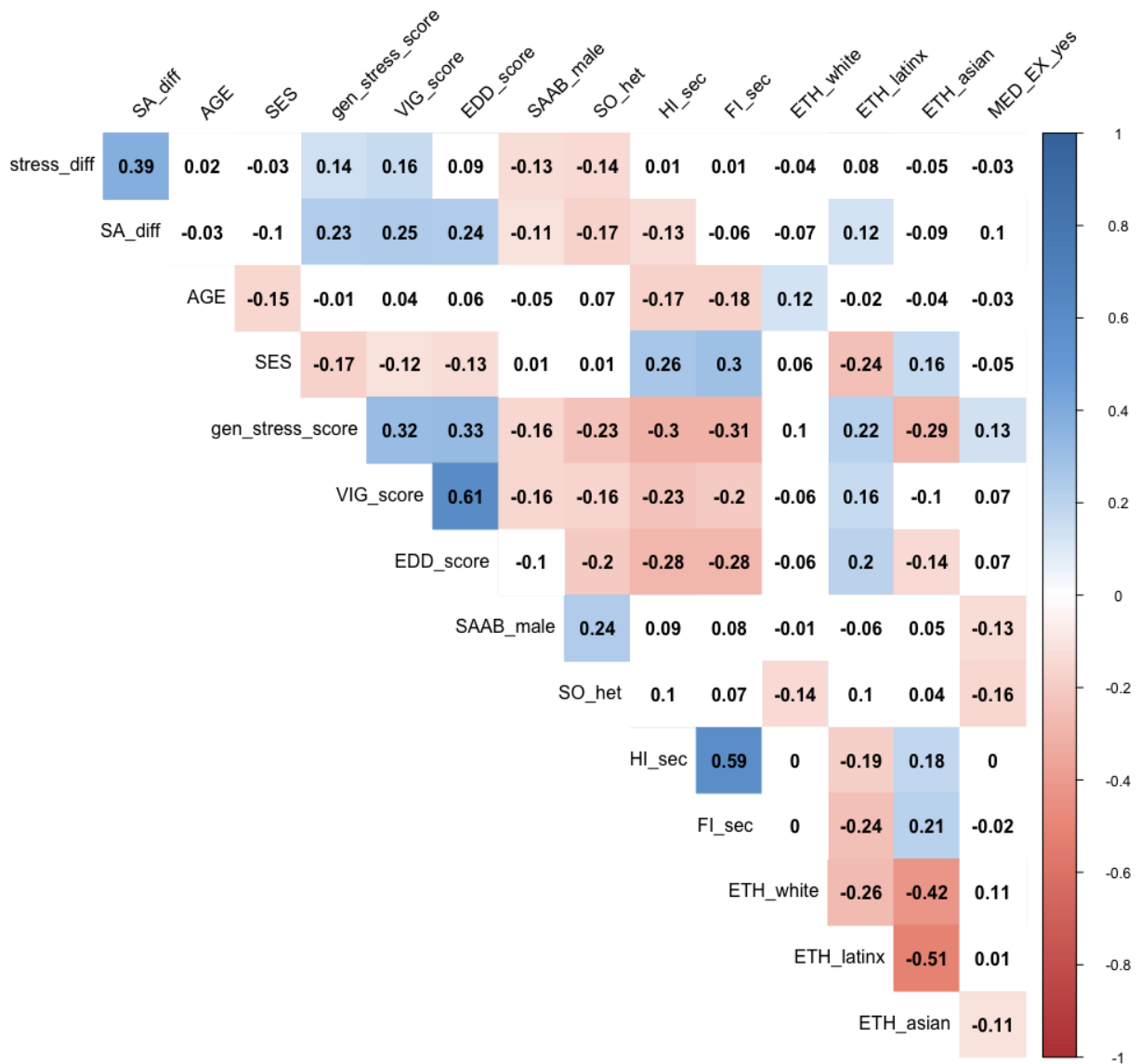


Figure 3. Correlation matrix between all 11 predictor variables, and improvement score (measured by change in stress, and change in anxiety). Numbers in black indicate the Pearson's R-value between each variable. Colored squares indicate significant correlation ($p < 0.05$). White squares indicate insignificant correlation.

Next, we removed the variable with the lowest absolute T-value—in this case, housing insecurity—and re-ran our model. We repeated this process, removing each least significant variable and re-running, until all remaining variables had significant p-values. In our final model, 3 variables appeared to have a significant effect on change in anxiety, as follows (see Table 5 for full results):

Change in Anxiety			
	S.E.	R ²	p-value
General life stress	0.00004	0.0208	0.0100
Vigilance to disc.	0.0012	0.0325	0.0012
Sexual orientation	0.0131	0.0121	0.0499
Total R-squared		0.0992	

*Change in anxiety ~
general stress +*

*vigilance to discrimination +
sexual orientation*

Table 5. Results of linear regression model for change in anxiety. Note that partial R-squared values sum to 0.0654, which is less than the total R-squared value of 0.0992. This reflects the fact there is shared variance between our three predictor variables (see Figure 3).

We used the same stepwise approach to generate a model for change in stress. Two variables appeared to have a significant effect on change in stress, as follows (see Table 6 for final results):

Change in Stress			
	S.E.	R ²	p-value
Vigilance to disc.	0.0437	0.0210	0.0096
Sexual orientation	0.4776	0.0136	0.0377
Total R-squared	0.0402		

*Change in stress ~
vigilance to discrimination +
sexual orientation*

Table 6. Results of linear regression model for change in stress. Compare to Table 5, and note that “vigilance to discrimination” and “sexual orientation” contribute to variance in both “change in anxiety,” and “change in stress.” This reflects the fact that change in anxiety and change in stress are correlated (R = 0.39, see Figure 3).

Our data suggest that those with high general life stress, those who are more vigilant to discrimination, and those who identify as non-heterosexual experience a significantly greater benefit from our meditation. However, the effect of these three predictor variables on improvement score is weak. No variable accounts for more than 2% of the variance in either anxiety or stress. Altogether, general life stress, vigilance to discrimination, and sexual orientation account for 10% for the variance in anxiety. Vigilance to discrimination and sexual orientation account for 4% of the variance in stress.

Testing for Floor Effects

Those with higher general life stress, higher vigilance to discrimination, and those who identify as non-heterosexual seem to benefit a little more than others from our meditation. However, it is possible that these groups’ higher improvement scores were driven by a floor effect. That is, maybe our non-marginalized participants (low-stress, low-vigilance, heterosexual) would have had higher improvement scores, but our anxiety measure did not go low enough to capture it. This would be the case if our non-marginalized participants started out with anxiety scores close to zero, and had no room to improve.

We tested for floor effects by looking at the anxiety pre-scores and post-scores for each non-marginalized group, and comparing them to the pre-scores and post-scores for each marginalized group. We found no floor effects. Our three non-marginalized groups had enough room to improve. They could have improved just as much as marginalized participants, but they

did not. There must be another reason why high-stress, high-vigilance, non-heterosexual participants got more out of our intervention.

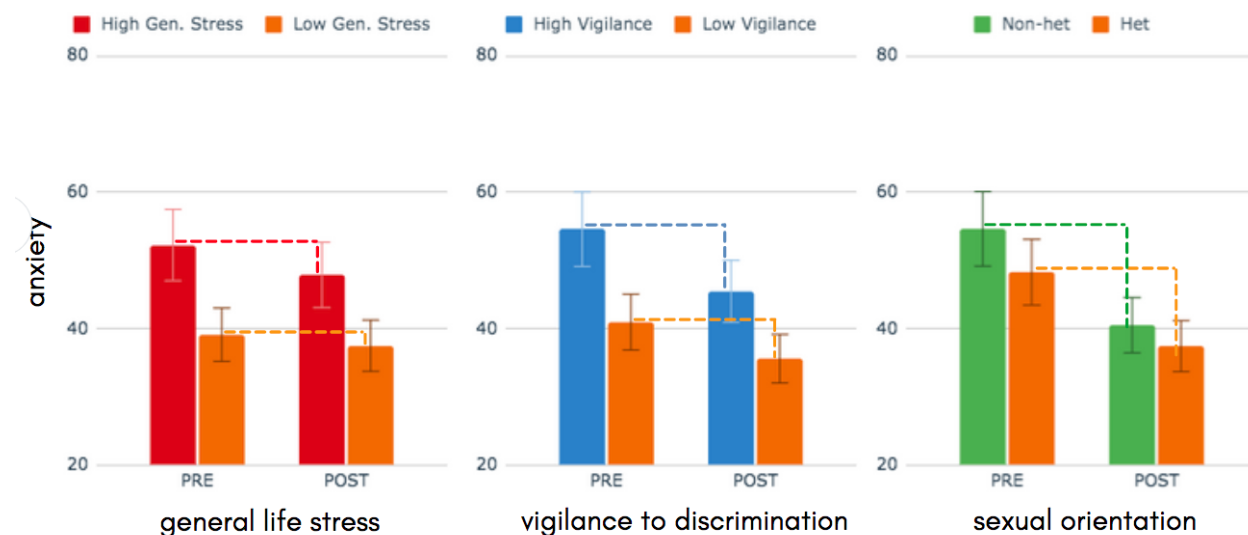


Figure 5. The left-most figure compares anxiety pre- and post-scores between those with higher-than-median general stress, and lower-than-median general stress. Those with low general stress do not hit a “floor.” A similar effect occurs for those with low vigilant to discrimination, and those who identify as heterosexual.

Discussion

Our results offer preliminary evidence that mindfulness is equally effective for marginalized groups as it is for non-marginalized groups. Additionally, three aspects of marginalized identity—higher general life stress, higher vigilance to discrimination, and non-heterosexual identity—actually predict a little bit more benefit from our meditation. Given these results, what are the next steps to making sure under-served community members like Mariela receive mental health interventions that actually work for them?

Limitations

Firstly, we must qualify our findings for two reasons. One, our study does not account for all marginalized experiences. And two, our intervention only represents one style of mindfulness.

Our study undersampled certain marginalized groups. This included those who identify as Black, Middle Eastern, North African, Native Hawaiian, Pacific Islander, Native American/Alaskan Native, or mixed-race, those who identify as genderqueer or transgender, and those with specific non-heterosexual identities such as gay, lesbian, and asexual individuals.

Our analyses on race are further limited because we did not account for national origin. In particular, past studies at UCSD have found that Asian international students and Asian

American students respond differently to wellness interventions. We will conduct follow-up analyses to see if improvement scores from our meditation vary between Asian Nationals and Asian Americans.

In addition, our questionnaire was not exhaustive of all aspects of marginalized identity. For example, we did not include questions on ability status, or parents' education level.

Most problematically, our sample was made up entirely of those with some college education. Those with some college education are over 4 times more likely to have experience with meditation than people with less than a high school education (Olano et al., 2015). Compounded by the fact that over half of our participants major in Psychology or Cognitive Science, our participants are quite likely more familiar with mindfulness than the general public. Even though our data suggest that having meditated before did not affect how much participants benefited from our intervention, our participants still may have been more receptive to our meditation by mere exposure to a college culture of meditation.

Additionally, participants' socioeconomic status may be higher than captured by our measure. To measure SES, we asked participants, "Relative to your peers, how do you feel about your financial situation?" Since the UCSD undergraduates are wealthier on average than the rest of the nation (Buchanan et al., 2017), participants who would be considered well off outside of the "UCSD bubble" might consider themselves as "struggling" compared to their even wealthier peers. In our data, we found no effect of SES on improvement from our intervention, but it is possible that if we captured lower ranges of SES, an effect may have emerged.

Finally, findings on our 20-minute mindfulness meditation intervention cannot generalize to all forms of mindfulness. Styles of mindfulness used in clinical settings are diverse, including mindfulness-based stress reduction, acceptance and commitment therapy, mindfulness-based cognitive therapy, and dialectical behavioral therapy. It is possible some of these forms of mindfulness are more effective for marginalized groups than others.

These limitations reflect the fact that our study is not meant to be an end in itself. It is meant to inspire, guide, and add direction to future randomized controlled trials (RCTs) on mindfulness.

Recommendations for Inclusive Mindfulness Randomized Controlled Trials

We recommend that future mindfulness RCTs confirm the effects of general life stress, vigilance to discrimination, and sexual orientation on improvement from meditation.

Unlike our exploratory study, RCTs should take care to recruit a representative sample of participants, and to over-recruit the population of interest. For example, RCTs confirming the effect of sexual orientation on improvement from meditation should recruit enough gay, lesbian, pansexual, bisexual and asexual participants to compare benefits between groups, as well as to compare non-heterosexual and heterosexual participants.

Additionally, we recommend that projects on specific aspects of marginalized identity enlist the expertise of researchers who identify with the marginalized group in question. Researchers who identify with participants are more likely to interpret their data accurately, with less cultural bias or cultural ignorance.

Future Directions for our Project

Why do some groups benefit more?

We know that high-life-stress, high-vigilance, and non-heterosexual participants benefited a little more from our meditation. But the question still remains, why? Were there particular aspects of our intervention that resonated with these groups? In future analyses, we will examine whether participants' thoughts and feelings about the meditation mediate the relationship between marginalized identity and improvement score.

Some examples of mediation we may investigate include:

- Is “enjoying being asked to acknowledge thoughts with compassion” one reason why those with higher general life stress have higher improvement score?
- Is feeling “emotionally connected to the language used in the meditation” one reason why non-heterosexual participants have higher improvement score?

These analyses may indicate that certain aspects of our mindfulness intervention really “made a difference” for marginalized participants. Knowing what participants liked will tell us what “ingredients” to include when testing and recommending more effective interventions.

If Marginalized Groups Benefit from Meditation, Why Don't They Meditate?

If mindfulness is an effective intervention for marginalized groups, why are certain marginalized groups less likely to meditate? Meditation rates vary between ethnoracial groups: Black individuals are 6% less likely to meditate than Whites, and Hispanics are 43% less likely to meditate than Whites. Conversely, Asians were 10% more likely to meditate than Whites. Those with less formal education, those with lower income, and males of all demographics also tend to meditate less (Clarke et al., 2018, Olano et al., 2015).

Why do some marginalized groups meditate less? Possible explanations fall into two categories: 1) Maybe marginalized groups don't have access to meditation resources, such as classes, online resources, or peers to talk about meditation with. 2) Maybe marginalized groups perceive meditation as unhelpful, and this makes them less likely to seek it out. Some reasons marginalized groups could see meditation as unhelpful include:

- “Sitting still and focusing on my breath isn't going to pay my bills—that's what's really stressing me out.”
- “Meditation is like yoga—it's for privileged white people, not people like me.”
- “Meditation isn't relaxing for me because it just brings my attention to all my physical and emotional stress.”
- “The language used in meditations just doesn't resonate with me. Ex. It's too abstract, or too ‘floofy.’”

In future analyses we will look to see if any marginalized groups perceived our meditation as unhelpful. We may explore questions like, “Did Latinx participants feel that our meditation is ‘out of touch’ with their personal experience?” or, “Did participants who are experiencing housing or food insecurity feel like meditation just doesn’t address their greatest stressors?”

It may be that some marginalized groups had reservations about our meditation, even if they experienced benefits from it. By discovering these reservations, we can help mental health care providers market mindfulness more effectively to marginalized clients, and adapt mindfulness practices to make them more appealing to a wider audience.

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