

# the stress of perfection.

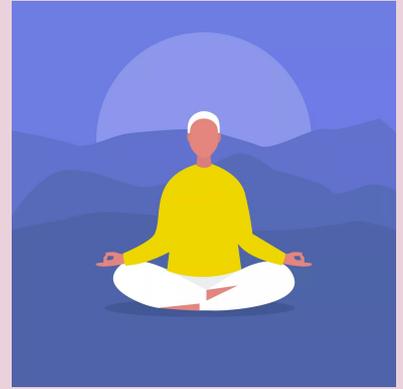
*Can a mindful activity decrease one's level of stress?*



PLTW Biomedical Innovations  
ZK, JN, SL, AS, ER, LP, ES  
Class of 2020



**question.**

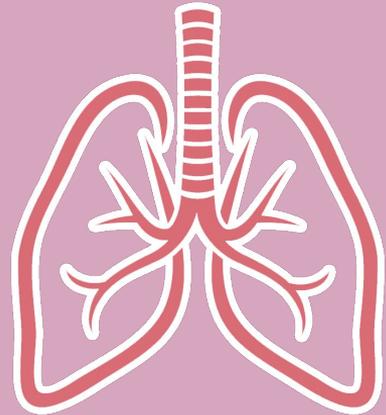
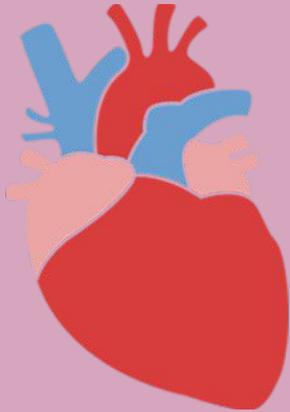


*How does a mindful activity like meditation affect levels of stress?*

*Will uniform meditation cause subjects to have lower heart and respiration rates (levels of stress) when performing stressful activities?*

## hypothesis. 💡

*“If one meditates before participating in a stressful activity (playing the game of Perfection), then their heart rate and breathing rate will increase less than when one participates in a stressful activity without mediation beforehand.”*



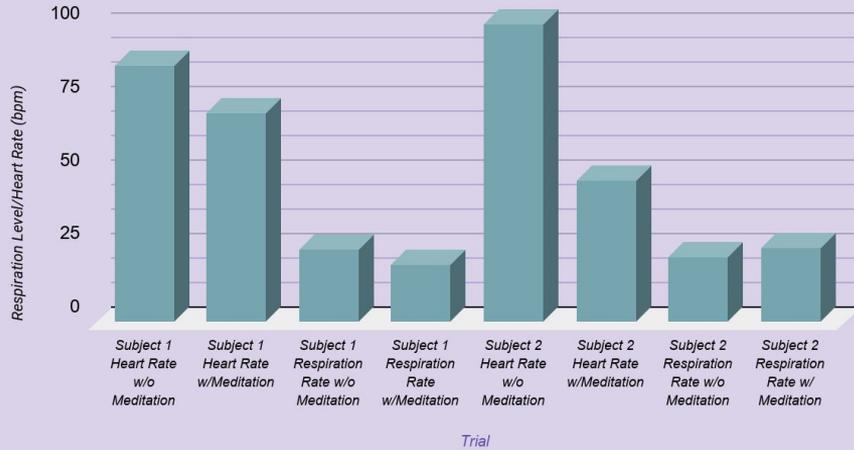
# general procedure.

1. *Hook the subject up to a respiration belt and EKG sensors.*
2. *Record a 60 second baseline of the subject's heart rate and breathing rate before the stressful activity (playing the game Perfection).*
3. *Start collecting trial data when the subject begins the game of Perfection.*
4. *Stop recording data after the round of Perfection is completed and/or pops.*
5. *Have the subject get the same amount of sleep this night and eat the same breakfast the following morning.*
6. *Repeat steps 1 through 4 to collect heart rate and breathing rate data for the mindfulness activity followed by playing Perfection the following day.*

# results.

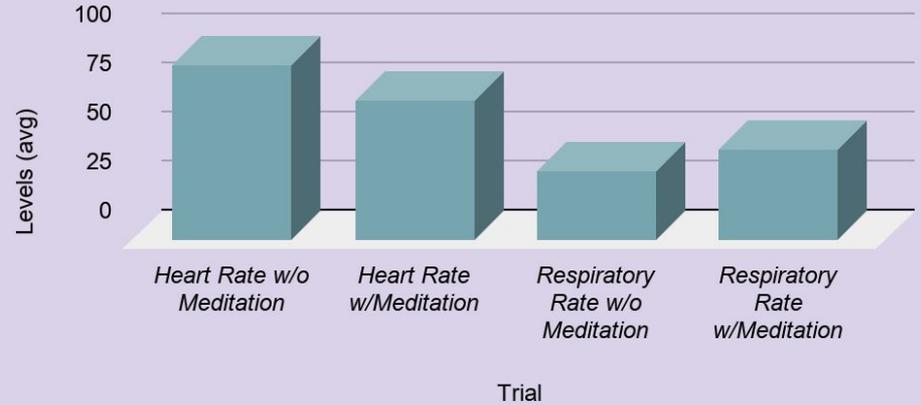
## Can Mindfulness Mitigate Stress?

### Respiration Levels and Heart Rate



## Can Mindfulness Mitigate Stress?

### Respiration Levels and Heart Rate Class Averages



# conclusion.



Although the results are based on a limited number of subjects (7), the **heart rate** of most subjects showed **less** of an increase from baseline after partaking in a mindfulness activity (five-minute meditation video) prior to playing the Perfection game. On average, the participant's **heart rates were 38 beats per minute lower** in the trials with mediation.

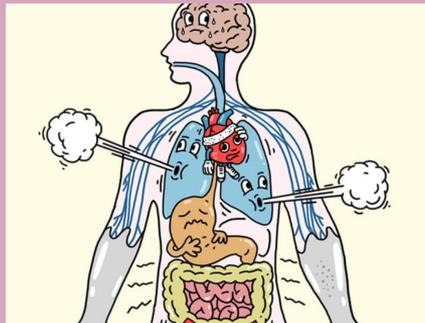
On average, *respiration rate* in participant's *increased* with meditation. These results are *unexpected* and may be the result of a small sample size or data collection probeware malfunction. Performing both parts of this experiment with more subjects for more trials will increase the validity of the results.

Although these results are not definitive, **it is possible that meditation helps to lower stress levels.**

# conclusion.

Other studies have shown that meditation offers significant health benefits, specifically reducing stress and anxiety, while also lowering heart and respiration rates. According to a research study conducted by Harvard, mindfulness activities aid against an array of mental and physical medical conditions including irritable bowel syndrome, fibromyalgia, psoriasis, anxiety, depression, and post-traumatic stress disorder, all of which present with symptoms of increased heart rate, high blood pressure, shallow breathing rate/oxygen consumption, and hormonal imbalance. Therefore, it is foreseeable that one's participation in a mindfulness activity would mitigate these physical variables after an episode of stress.

Powell, A. (2018, August 27). Harvard researchers study how mindfulness may change the brain in depressed patients. Retrieved from <https://news.harvard.edu/gazette/story/2018/04/harvard-researchers-study-how-mindfulness-may-change-the-brain-in-depressed-patients/>



# what does this mean for you?

Give it a try! See if meditation or other mindfulness techniques and see if they help you feel more relaxed throughout your day. Some of them only take a few minutes!

Here are some ideas to try:

- journaling
- coloring or doodling
- mindful breathing
- reciting positive affirmations
- guided meditation



"What's the greatest illusion?"  
"That life should be perfect."