

The effects of cell phone usage and guided relaxation on sleep

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Abstract

Sleep has been heavily studied but only a handful have looked at the effects of cell phone usage immediately before sleeping. In previous sleep studies, college students were not usually the population of interest; however, college students show an increased use of cell phones than other populations and often report poor sleep habits. Since previous research indicates the improvement quality of sleep and reduced anxiety through guided relaxation (Aritzeta, Soroa, Balluerka, Muela, Gorostiaga & Aliri, 2017), this study was aimed at finding a difference in sleep quality when preceded by cell phone usage versus guided relaxation. This experiment was a within group design case study in which one participant spent a total of six consecutive nights in the laboratory fitted to resemble a bedroom. Participant would use 3 consecutive days of cell usage and 3 consecutive day for guided relaxation. Results showed some significant differences in EEG data but no major conclusions can be drawn from the data.

Introduction

- One study found that there were temporary EEG changes while female participants were exposed phone radiation (Roggeveen, Viechtbauer & Lousberg, 2015).
- Previous research indicates the improvement quality of sleep and reduced anxiety through guided relaxation (Aritzeta, Soroa, Balluerka, Muela, Gorostiaga & Aliri, 2017).
 - The relaxation activities consisted of deep- breathing guided imagery, and muscle relaxation.
 - These relaxation techniques have shown to be successful in physical therapy. Their results provided in lower of anxiety and increasing levels of performance through 3 exams.
- EEG studies done allows us to determine the different brain during sleep and awake states.
 - Study done by Ramasamy, Estarellas, San-Martin, Fraga & Falk (2018), shows resting EEG states and explains the brain wave differences. The resting state of the EEG does not require the participants to do any activity. Participants can be sitting there with their eyes closed or open in a relaxed state.
 - Lewandowski, Rosipal & Dorffner (2013) focused on the individual characteristics of the EEG during sleep. The authors noted total time in bed, total sleep time, REM, wakefulness after sleep onset, and other characteristics of sleep that could be quantified. Stage 2 and REM sleep resulted to be short in distances while Stage 1 and wake stage were longer in distance. The authors hypothesize that EEG characteristics are unique to the individual. They conclude that sleep characteristics for everyone must be carefully identified and use a baseline for the individual instead of a set standard.
- Hypotheses
 - A significant difference in EEG findings along with quality of sleep through survey when using cell phones and guided relaxation before sleep.
 - Observable difference in EEG findings during when participant use cell phones and guided relaxation

Materials & Methods

Participant

- 1 undergraduate female student
- Age: 19
- Race: European American or White
- Class Status: Second year
- Participant selected from LaGrange College psychology research pool

Materials

- Online survey**
 - Assess the daily sleep quality (qualitative & quantitative) for the participant).
- Pencil survey**
 - Assess the baseline quality (qualitative & quantitative) for the participant).
- iWorx 24 channel EEG system**
- FitBit Alta HR Activity Tracker**
- Laboratory bedroom**
 - Provided necessary items for participant to sleep and wake up

Methods

- Participant met with principal investigator to fill out a survey on quality of sleep, learn about guided relaxation, and schedule days for the lab before beginning the experiment.
- Participant had to spend a total of six consecutive nights in the laboratory bedroom. Participants was be required to wear a Fit Bit to track sleep quality and quantity. The measurements of this study will be from the EEG machine recordings, survey information from participant, and Fit Bit quantitative and qualitative data.
- The first two nights, participant spent using their cell phones before going to sleep for the night. The third night, participant had an EEG machine used on them to read brain activity while using their cell phones. Participant then switch on the fourth and fifth night to using guided relaxation prior to going to sleep for the night. Participant was not be able to use their cell phones on the fourth, fifth, and sixth night. On the sixth night, participant performed guided relaxation while principal investigator uses EEG on the participant.
- Each of the mornings of the experiment, participant was required to fill out an online survey to measure quality of sleep and fatigue immediately upon waking up.
- Participant did not need to sleep the rest of the night on the third and sixth night when the EEG machine is used. Participant needed to fall asleep with the EEG machine cap on; afterwards participant left after waking up.
- The EEG machine was only used twice on participant in this entire experiment. Gel was used for the EEG machine.
- Participant was debriefed after the experiment was over and asked not to discuss their experience until all data was collected.

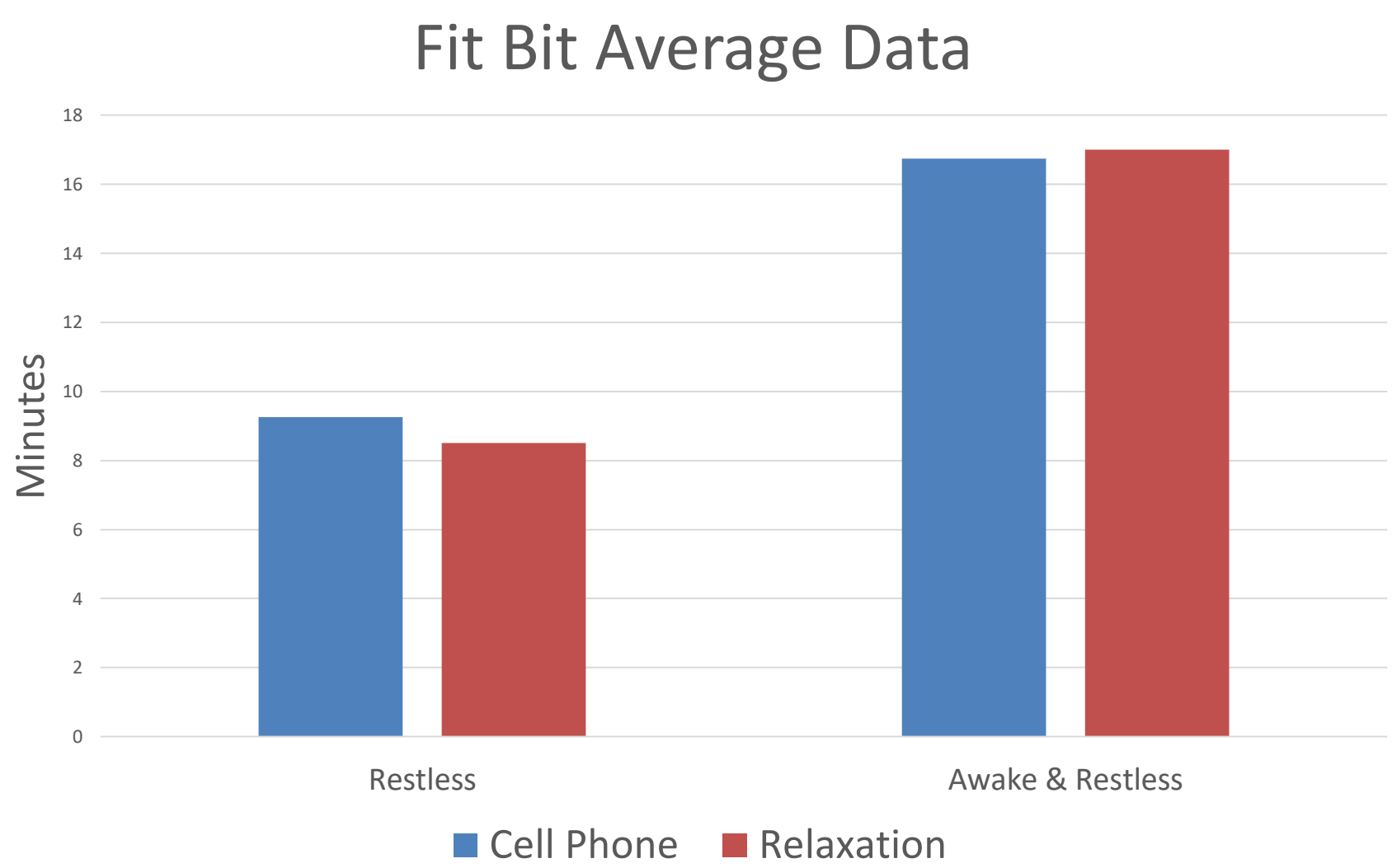
Results

Online Survey

- There was no significant differences between cell phone and guided relaxation usage from online survey

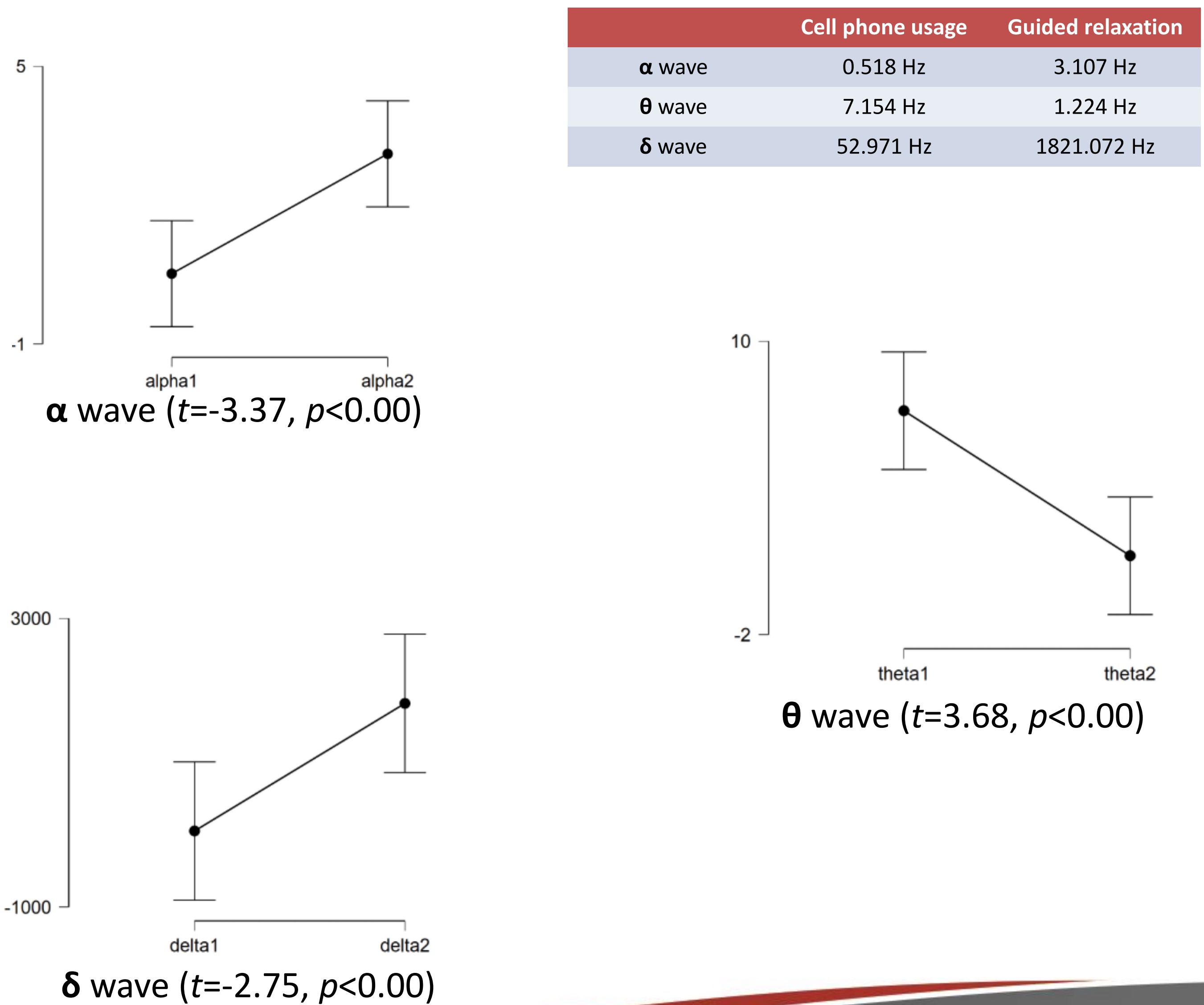
FitBit Alta HR Activity Tracker

- There was no significant differences between cell phone and guided relaxation usage from FitBit data

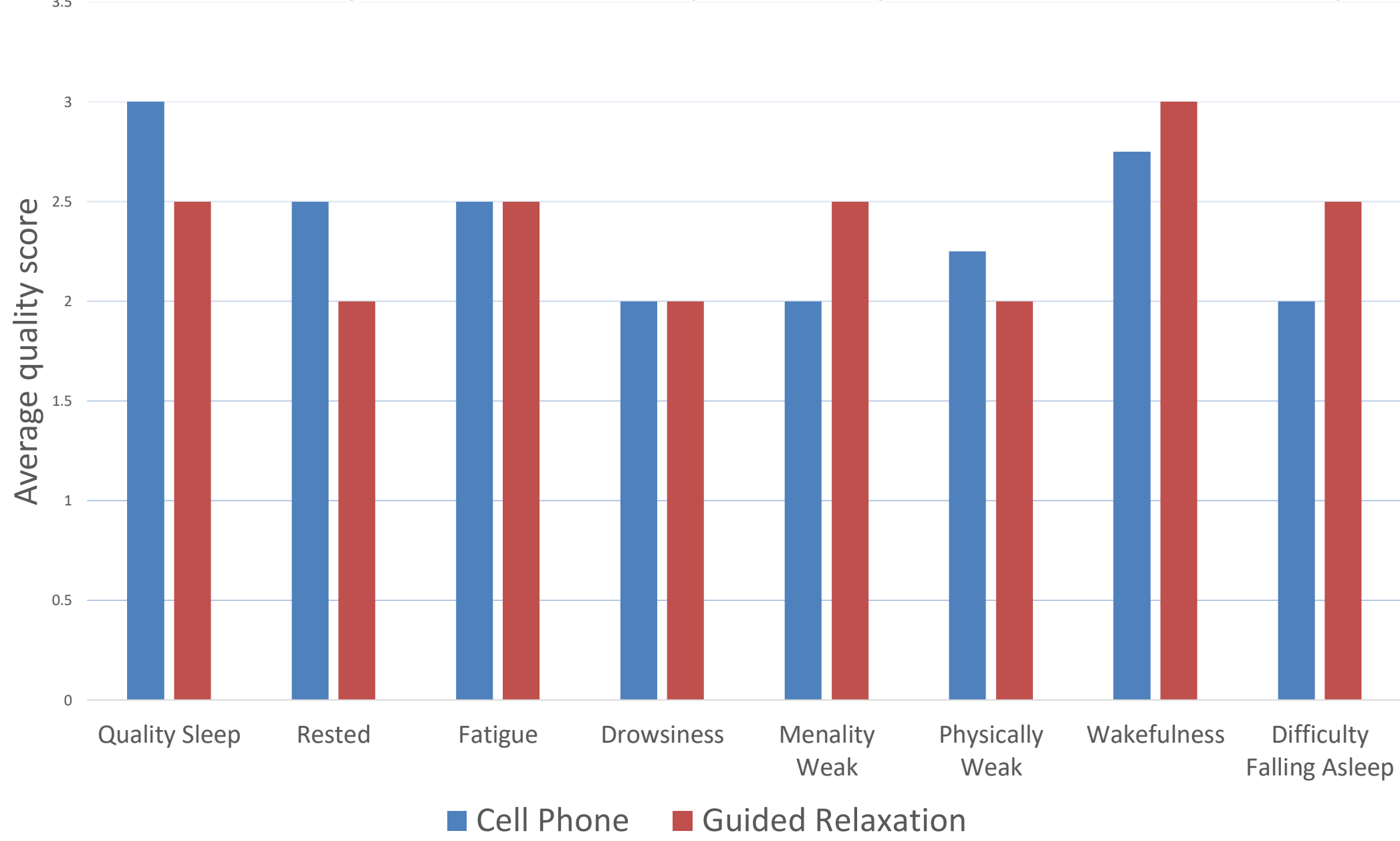


iWorx 24 channel EEG system

- There was a significant difference found between cell phone and guided relaxation usage in α (alpha), θ (theta), and δ (delta) waves, but not difference in β (beta) waves



Comparison of Sleep Quality from Online Survey



Conclusion

- Results showed significant difference in α (alpha), θ (theta), and δ (delta) waves.
 - α waves increase indicate more focus and attention (Benedek, 2014).
 - Studies show θ waves increase when there is motor activity present (Ryu, Choi, Kim, Kim, Chio, 2016).
 - δ waves are the highest when NREM sleep cycle begin (Robert, 2014).
- There is an observable difference in EEG findings when participant uses cell phone and guided relaxation; however, it is not certain that participant's quality of sleep is affected by cell phone and guided relaxation usage. There was no significant difference found in sleep quality between cell phone and guided relaxation usage.

Limitations

- One participant study
- Limited space for laboratory bedroom
- Study done from small, private college

Future Research

- EEG machine knowledge for future students
- Examine possible perceptions on cell phone usage
- Examine possible perceptions on guided relaxation

