

Eastern Oregon University

Consent to Participate in Research

Title of Study: Environmental Physiology Learning Module for 2018 Cottonwood Crossing Summer Institute, and the Comparison of a Traditional High School Setting compared to Outdoor Learning Environment on measures of Activities and Attitudes.

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Faculty Sponsor: Kyle Pfaffenbach, Ph.D.

Brief Description of Procedure:

The purpose of this project is to guide high school students through a number of basic experiments regarding how the human body adapts to different environmental and behavioral challenges. These include measurement of heat regulation, perceptions of effort, heart rate measurement during different activities, and the effect of nutrition on physical performance. The learning modules for these experiments have been designed for the 2018 Cottonwood Crossing Summer Institute (CCSI). High school students will participate in conducting these experiments, and their results will be presented on the final day of the CCSI.

Study Protocol:

There are 5 main physiologic themes that will be taught in the learning modules throughout the CCSI. Participants will engage in the following experiments based on the 5 learning themes:

1. Hydration:

Procedures will include consuming different commercially available drinks before and during various light exercise activities such as hiking, in a variety of conditions such as early morning cool temps vs afternoon hotter temperatures. To measure hydration status we will be using urine specific gravity. Briefly, urine samples will be collected at various time points throughout testing in collection cups. Then, a small drop of the urine sample will be used in a urine refractometer to measure the relative weight of urine compared to gravity. This is a gold standard measure for hydration status.

2. Nutrition:

For the nutrition experiments. Students will consume foods containing different compositions of fat, protein, and carbohydrate, and then engage in physical activity at different intensities. During these experiments they will measure HR using non-invasive pulse oximeters, and record Rate of Perceived Exertion on a scale of 1-10.

3. Heart Rate during Activity:

For this module, students will engage in various moderate physical activities, like hiking on flat ground, hiking uphill, hiking downhill, and light jogging. Heart rate will be measured using fingers, stopwatch, and pulse. Heart rate will also be measured using heart rate monitors and pulse oximeters.

4. Thermoregulation:

Students will take surface body temperature using a skin thermometer as well as core body temperature using an under the tongue or forehead thermometer. We will measure the changes in core and surface temperatures by altering environmental conditions, such as immersion of a body part in cool water, running water vs. standing water, or air temperature. We will also measure temperature changes (or lack of temperature changes) in response to exercising in different conditions. For example, exercise in a warm environment will cause an increase in skin surface temperature, as the body attempts to shed heat through radiation and convective heat loss, in order to maintain core temperature. These adaptations to changing conditions to maintain core temperature can be captured by measuring and comparing core and skin surface temperatures.

5. Heart Rate Variability:

Heart rate variability is defined as the differences in time from heartbeat to heartbeat. Under resting and non-stressed conditions, there is considerable variability in the time between heart beats. However, when stressed, exercising, or other conditions where the sympathetic (fight or flight) system is activated, there is considerably less variability from beat to beat. Thus, more heart rate variability is associated with calmness and rest, whereas less variability is associated with stress or exercise. We can measure heart rate variability using a non-invasive, real time, heart rate variability sensor attached to the lobe of a subject's ear. Subjects will measure and monitor heart rate variability at rest, post exercise, post heat exposure, and in response to meditation and mindfulness. In the case of mindfulness, it is well established that meditative practices and guided meditations can increase heart rate variability, indicating a calming effect and a less stressed physiologic state.

Activity Tracking:

During the week of the CCSI, students will wear fitness trackers (fitbits) to track their activity level while participating in an outdoor education setting. Students will also be asked to wear fitbits during a week of traditional high school. This information will be used to compare the average activity levels in different learning environments.

Potential Risks:

The present study requires participation in physical activity and functional testing. There is a small risk that subjects may experience physical discomfort including:

- Delayed onset muscle soreness due to aquatic exercise and functional testing.
- Fatigue due to resisted exercise
- Dizziness
- Feeling of instability

Subjects will be closely monitored throughout the testing protocol. Any adverse physical reactions observed by the investigators or expressed by the subjects will result in immediate termination of the test.

In the event of physical and or mental injury resulting from participation in this project, Eastern Oregon University does not provide insurance to participants in this research study, nor with Eastern Oregon University provide any medical treatment or compensation for any injury sustained as a result of participation in this research study, except as required by law. Student Teachers and Staff at the CCSI will be trained in First Aid and CPR.

Benefit to Subjects:

Subjects will gain insight into health and fitness by learning about the physiologic adaptations that occur in response to changing environmental and work demands. They will gain insights into relative heart rate and heart rate variability, as well as thermoregulation, nutrition, and hydration.

Confidentiality:

Materials containing participants names can remain confidential. Each participant will be assigned a random subject ID which will be used on study data sheets. All items containing personal information can be kept separate from data containing subject ID. It should be noted that as part of the CCSI, students participating in these learning modules will compile and present their data from conducted experiments throughout the week, and their names will be attached to that work, but will not be attached to particular data points that were collected during the learning module activities.

Right to Refuse or Withdraw:

Participation of subjects in this study is completely voluntary, and the subjects have the option of not participating in activities. Additionally, investigators will also work with subjects to alter any aspect of the program that may be uncomfortable for the participants, to accommodate participation.

Compensation:

Subjects will receive no monetary compensation for their participation in this study.

Emergency Contact and Medical Provider:

Please provide names and phone numbers for a personal emergency contact, and a medical provider who can be reached in the event that you are medically compromised during the study procedures.

Emergency Contact _____ Phone number _____

Medical Provider _____ Phone number _____

Consent: Your signature below indicates that you have agreed to volunteer as a participant in this study, and that you understand your rights for withdrawal, and that you will notify the investigator in advance if you are unable to participate for any reason.

Participant Signature _____ Date _____

Signature of Parent

Or Guardian of participant _____ Date _____

EOU Student Investigator _____ Date _____

EOU Student Investigator _____ Date _____

Faculty Supervisor _____ Date _____