Cover Page

Cardiovascular Mechanisms of the Occupational Physical Activity Health Paradox: 24-hour Physical Activity, Blood Pressure, and Heart Rate

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School of Education
Physical Activity and Weight Management Research Center

CONSENT TO ACT AS A SUBJECT IN A RESEARCH STUDY

TITLE: Cardiovascular mechanisms of the occupational physical activity health paradox: 24-hour physical activity, blood pressure, and heart rate

PRINCIPAL INVESTIGATOR: Tyler Quinn, MS
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CO-INVESTIGATORS: Christopher E. Kline PhD
Elizabeth Nagle PhD

SOURCE OF SUPPORT: University of Pittsburgh, School of Education

Design of Research Study:

Scientist have found that exercise is good for your health and those who exercise regularly have decreased risk for heart disease, diabetes, and cancer. Exercise stresses the body for a short period of time but after resting and recovering, the body adapts and becomes stronger and healthier as a result.

However, those who report doing physical activity during work may have a different health profile than those who do not. Occupations with high amounts of physical activity include food service, facilities maintenance, and landscaping. Some research suggests that the type and pattern of physical activity (continuous with few breaks) during work may have a different health effect than exercise during free-time.

We are recruiting 20 men aged 35-59 with active full-time jobs who are not taking blood pressure medications or have other serious medical conditions. Participants in the study cannot work a second job or work overnight shifts and they must be able to safely walk two flights of stairs and two city blocks. Participants must also have a measured resting blood pressure measurement of ≥150 mmHg systolic and/or ≥95 mmHg diastolic at the baseline assessment visit to qualify for the study. Finally participants must be able to complete a treadmill exercise test up to 80% of their predicted maximal effort.

Those who participate in the study will be asked to come in to our research laboratory for approximately 90-minutes to undergo baseline measurements and to receive the activity monitors. After that visit, participants will be asked to wear the monitors and complete a diary

about your work, sleep, and stress levels for one week. After that week of monitoring, the participant will be asked to return the monitors to our research laboratory.

Fasting Confirmation:

To be eligible to complete the study assessment procedures, you were asked to avoid food caffeine, exercise, and nicotine for one hour prior to this visit.

Have you had food, caffeine, or nicotine in the past hour?

☐ **Yes** ☐ **No**

Have you exercised in the past hour?

☐ **Yes** ☐ **No**

Detailed Study Procedures:

If you qualify for this study and agree to participate, we will ask you to do the following:

- Measure your resting blood pressure and heart rate
- Measure your height and weight in light clothing.
- Complete questionnaires about your demographics, health history, and workplace.
- Complete a sub maximal exercise test on a treadmill. The treadmill walking will be at a fast walk of 3.0 mph for the duration of the test. This speed is faster than most healthy people walk normally. The test will start out in a flat position but the incline will increase by 1% each minute until you reach 80% of your predicted maximal capacity or if you choose to stop. Throughout the test your heart rate, blood pressure, and perceived exertion will be measured. After the test is finished, you will be asked to walk slowly on the treadmill until you are fully recovered.
- Measure your blood pressure over 24 hours using a portable device on two separate days. This device will automatically measure your blood pressure every 30 minutes during the day and every 60 minutes while you are sleeping. During each 24-hour period, you will be asked to not shower or swim so that the blood pressure monitor does not need to be removed.
- Measure your heart rate by placing a strap around your chest for 24 hours per day for 7 days. This monitor will be removed during water activities such as bathing, swimming, etc.
- Wear two activity monitors for 7 days. We will also ask you to keep a diary about when you wore the monitors. One monitor is worn around your waist on an elastic belt and the other monitor is placed on the front of your upper thigh using medical tape. The waist monitor will be removed during any water activities such as bathing and swimming while the leg monitor will only be removed during swimming, not bathing.
- You will be asked to complete a paper diary throughout the monitoring period that records the time you spend sleeping, working, wearing the monitors, and your stress levels during work. Detailed instructions on how to complete the diary will be explained to you when you receive the monitors and are written inside the diary.
- After the monitoring is complete, you will be asked to return the monitors to our research laboratory.

Risks/Benefits:

Risks and side effects related to the study procedures and the intervention include those which are:

- Likely:

Type of Research Activity	Risk Associated
Answering questionnaires or questions	Boredom, stress, or frustration
Treadmill exercise	Increases in heart rate and blood pressure that may cause general fatigue, shortness of breath and some muscle soreness
Wearing the 24-hour blood pressure monitor and other activity monitors	Discomfort or disruption of normal daily activities and/or sleep while wearing the device that will automatically measure blood pressure every 30 minutes during the day and every 60 minutes while sleeping.
Wearing heart rate chest strap	Skin redness and irritation

- Less Likely:

Type of Research Activity	Risk Associated
Providing personal information	Breach of confidentiality
Wearing the 24-hour blood pressure monitor	Skin irritation where cuff is worn; arm bruising from cuff squeezing tightly
Wearing the other activity monitors	Skin irritation where monitors are worn

- Rare but serious:

Type of Research Activity	Risk Associated
Treadmill exercise	In rare instances the study participant may experience a serious cardiac event requiring immediate medical attention that may include, but is not limited to angina (chest pain), heart attack, or an arrythmia. However, this is rare and occurs in <1% of individuals.

Participants will not experience any direct benefit from study participation. However, the results of the study will help researchers understand how active occupations may influence health. Some research shows that those with active jobs have increased cardiovascular risk but we don't know why that is yet. This study will provide information to understand that further and potentially influence regulations for workplace health down the line.

At the end of the study, we will provide you with a report of your measured activity levels, resting blood pressure, body mass index (BMI), and fitness level.

Compensation:

Neither you nor your insurance provider will be charged for the costs of any of the research procedures. $50 in compensation will be provided for each of the three monitors returned with valid data (activity monitors with completed diary, heart rate monitor, and blood pressure monitor). Data will be considered valid if the following criteria are met: continuous wear of the ActivPAL (leg monitor) and heart rate strap for 7 days, waking time wear of the Actigraph (hip monitor) for 7 days, 24-hour wear of ambulatory blood pressure monitor for one work day and one non-work day, and completed 7-day paper diary. If the data from any of the monitors described above is incomplete due to participant non-compliance with the wear instructions, the participant may be asked to re-wear the monitor prior to completion of the study and compensation is given.

As such, after completion of the in-person assessment visit and the complete 7-day monitoring period, you will receive up to $150.00 as compensation.

Important Information before you join this study:

Voluntary Participation**:** Your participation in this research study is entirely voluntary. You may stop participation in the study at any time. You may want to discuss this study with your family and friends before agreeing to participate. If there are any words you do not understand, feel free to ask us. The investigators will be available to answer your current and future questions. We will notify you if, during the conduct of this study, we obtain new information that may cause you to change your mind about continuing to participate in this study.

If You Are Injured: If you believe that the research procedures have resulted in an injury to you, immediately contact the Principal Investigator who is listed on the first page of this form. Emergency medical treatment for injuries solely and directly related to your participation in this research study will be provided to you by the hospitals of UPMC.

You waive no legal rights by signing this consent form. Your insurance provider may be billed for the costs of this emergency treatment, but none of those costs will be charged directly to you. If your research-related injury requires medical care beyond this emergency treatment, you will be responsible for the costs of this follow-up care. At this time, there is no plan for any additional financial compensation.

Your Privacy: The risk of collecting your protected health information (on paper, websites, via cell phone) is breach of confidentiality. This risk is minimal in this study as you will be identified only by a number, and this will only be available to the study investigators, who are researchers used to maintaining patient confidentiality. The medical information collected will then only be linked to the de-identified number, and will not be associated with any other identifying information. The data will be used only for research purposes. No one except for study investigators will have access to this data. All data will be kept behind firewalls in accordance with institutional security policies. You will not be identified by name in any publication of research results unless you sign a separate form giving your permission (release). Your research results may be shared with other investigators but they will never be provided with information that would allow them to identify you. Per University of Pittsburgh policy, all research records must be maintained for at least 7 years following final reporting or publication of a project.

In addition, privacy will be ensured during of all participants during all baseline assessment procedures (treadmill exercise, biometric measurement, and consent process) by completing all procedures in a private lab room with only study team members present. The treadmill exercise

data will be recorded using research laboratory equipment and stored on a protected University of Pittsburgh server and kept behind firewalls in accordance with institutional security policies. Written data collection forms will use a de-identified participant ID number and be stored in a locked location in a different room from the subject name and ID number key.

In addition to the investigators listed on this first page of this consent form and their research staff, the following may have access to identifiable information related to your participation in this research study:

- The University of Pittsburgh Research Conduct and Compliance Office may review your identifiable research information for monitoring the appropriate conduct of this research study. In unusual circumstances, your identifiable information may be inspected by appropriate government agencies or may be released in response to an order from a court of law. If investigators learn that you or someone with whom you are involved is in danger or potential harm, they will need to inform the appropriate agencies, as required by Pennsylvania law.
- Authorized people sponsoring this research study may also have access to information because they need to make sure that the information collected is correct, accurate, and complete, and to determine the results of this research study.
- Your research data may be shared with other investigators conducting similar research; however, this information will be shared in a de-identified manner (without identifiers). These research data may contribute to a new discovery or treatment. In some instances, these discoveries or treatments may be of commercial value and may be sold, patented, or licensed by the investigators and the University of Pittsburgh for use in other research or the development of new products. You will not retain any property rights nor will you share in any money that the investigators, the University of Pittsburgh, or their agents may realize.

A description of this clinical trial will be available on http://www.clinicaltrials.gov, as required by US Law. This website will not include information that can identify you. At most, the website will include a summary of the results. You can search this website at any time.

Discontinuing Participation: After signing this form, you may end your participation at any time by contacting the investigator listed on the first page of this form. Your data provided prior to discontinuing will still be used by the study investigators, but you will no longer be asked to provide further data unless you agree to return to the study for any reason. If you agree to participate in this research study, or whether you end your participation early, will not affect your current or future relationship with the University of Pittsburgh, or with any UPMC hospital or affiliated health care provider or UPMC insurance.

It is possible that you may be removed from the research study by the researchers to protect your safety or if you are unable or unwilling to complete the research protocol. For example, if you become injured and cannot perform your normal work duties, you will no longer be eligible to participate in the study.

VOLUNTARY CONSENT

The above information has been explained to me and all my current questions have been answered. I understand that I am encouraged to ask questions, voice concerns or complaints about any aspect of this research study during this study, and that such future questions, concerns or complaints will be answered by a qualified individual or by the investigator(s) listed on the first page of this consent document at the telephone number(s) given. I understand that I may always request that my questions, concerns or complaints be addressed by a listed investigator. I understand that I may contact the Human Subject Protection Advocate of the IRB Office, University of Pittsburgh (1-866-212-2668) to discuss problems, concerns, and questions; obtain information; offer input; or discuss situations if the research team is unavailable.

By signing this form, I consent to participate in this research study and provide my authorization to share my medical records with the research team.

A copy of this consent form will be given to me.

Participants Signature	Date

Participants Printed Name

CERTIFICATION OF INFORMED CONSENT

I certify that I have explained the nature and purpose of this research study to the above-named individual, and I have discussed the potential benefits and possible risks of study participation. Any questions the individual has about this study have been answered, and we will always be available to address future questions, concerns or complaints as they arise. I further certify that no research component of this protocol was begun until after this consent form was signed.

Printed Name of Person Obtaining Consent	Role in Research Study
Signature of Person Obtaining Consent	Date

PittPRO | Pitt Protocol Review Online

Date: Thursday, July 25, 2019 10:53:34 AM Print Close

View: Pitt SF: Basic Study Information 8.2

Basic Study Information

1. * **Title of study:**
   Cardiovascular mechanisms of the occupational physical activity health paradox: 24-hour physical activity, blood pressure, and heart rate

2. * **Short title:**
   Heart at Work

3. * **Brief description:**
   This is an observational study to examine the cardiovascular mechanisms of increased cardiovascular mortality in those with high activity occupations.

4. * **What kind of study is this?**
   Single-site study

5. * **Will an external IRB act as the IRB of record for this study?**
   ○ Yes ● **No**

6. * **Local principal investigator:**
   Tyler Quinn

7. * **Does the local principal investigator have a financial interest related to this research?**
   ○ Yes ● **No**

8. * **Attach the protocol:**
   - Sponsor/Multicenter/Investigator-initiated protocol
   - Coordinating Center supplement
   - Emergency Use Consent/ Protocol/ FDA Form 3926
   - Exempt Application form

Document	Category	Date Modified	Document History
There are no items to display			

View: Pitt SF: Funding Sources (not integrated with Grants)

Funding Sources

1. * **Indicate all sources of support:**
   External funding

2. * **Identify each organization supplying funding for the study:**

Funding Source	Sponsor's Funding ID	Grants Office ID	Attachments
University of Pittsburgh			Quinn Heart at Work Grant Award Letter

View: Pitt SF: Study Team Members

Study Team Members

1. * Identify each person involved in the design, conduct, or reporting of the research (includes PI):

Name	Roles	Affiliation	Involved in Consent	Qualifications
Bethany Gibbs	Co-investigator Faculty Mentor	Pitt faculty	yes	Dr. Gibbs is the faculty mentor for Tyler Quinn during his PhD program. She holds a PhD in Epidemiology and has completed many observation as well as... view all
Christopher Kline	Co-investigator	Pitt faculty	no	Dr. Kline holds a PhD in Exercise Physiology. His experience working with sleeping time measurement, cardiovascular physiology, and physical activity... view all
Elizabeth Nagle	Co-investigator	Pitt faculty	no	Dr. Nagle has a PhD in Exercise Physiology, serves on the dissertation project committee, and will review research protocols and drafts. As a PhD lev... view all
Tyler Quinn	Principal Investigator	Pitt student/fellow/postdoc	yes	Tyler Quinn is completing his dissertation in Exercise Physiology. His past experience assisting with and conducting research in the areas of physica... view all

2. External team member information: (Address all study team members in item 1. above and leave this section blank)

Name	Description
There are no items to display	

3. Have you, Tyler Quinn, verified that all members of the research team have the appropriate expertise, credentials, training, and if applicable, child clearances and/or hospital privileges to perform those research procedures that are their responsibility as outlined in the IRB application?

* ● **Yes** ○ No

View: Pitt SF: Study Scope 8.1

Study Scope

Check all that apply

1. * Will this study actively recruit any of the following populations?

- [ ] Adults with impaired decision-making capacity
- [ ] Children (under the applicable law of the jurisdiction in which the research will be conducted (<18 years for PA))
- [ ] Children who are Wards of the State
- [ ] Employees of the University of Pittsburgh/UPMC
- [ ] Medical Students of University of Pittsburgh as primary research group
- [ ] Students of the University of Pittsburgh
- [ ] Neonates of uncertain viability
- [ ] Non-viable neonates
- [ ] Non-English speakers
- [ ] Nursing home patients in the state of Pennsylvania
- [ ] Pregnant women
- [ ] Prisoners
- [x] N/A

2. * Will any Waivers be requested?

- [ ] Waiver/Alteration of Consent
- [x] Waiver to Document Consent
- [ ] Waiver/Alteration of HIPAA
- [ ] Exception from consent for emergency research
- [ ] N/A

3. * Will this study involve any of the following?

- [ ] Specimens
- [ ] Honest Broker to provide data/specimens
- [ ] Return of Results to Subjects or Others
- [ ] Fetal tissue
- [x] N/A

4. * Will Protected Health Information be collected?

- [ ] Pitt medical records
- [ ] UPMC medical records
- [ ] Other Institutions' medical records
- [x] N/A

5. * Other Requests?

- [ ] Deception (if not Exempt, also requires Waiver/Alteration of Consent)
- [ ] Emergency Use / Single Patient Expanded Access
- [ ] Placebo Arm
- [ ] Withdraw from usual care
- [x] N/A

6. * Determining Scientific Review:

Department Scientific Review (DOD requires departmental review)

*** Choose the appropriate organization to conduct the scientific review:**

U of Pgh | School of Education | Health Physical and Recreation Education

7. * Has this study (or substantially similar study) been previously disapproved by the Pitt IRB or, to your knowledge, by any other IRB?

○ Yes ● **No**

Review the HRPO policy, if participating in research at the VA Pittsburgh Healthcare System or using funding from the VA

8. * Does the study use an approved drug or biologic, use an unapproved drug or biologic, or use a food or dietary supplement to prevent, diagnose, cure, treat, or mitigate a disease or condition?

○ Yes ● **No**

9. * Does the study evaluate the safety or effectiveness of a device (includes in-vitro laboratory assays)?

○ Yes ● **No**

10. * Is this application being submitted to convert an approved study from OSIRIS to PittPRO? (Tip Sheet)

○ Yes ● **No**

View: Pitt SF: Research Sites

Research Sites

1. **Choose all sites that apply:**
   University of Pittsburgh

   * **Select the University of Pittsburgh sites where research will be conducted:**
   Main Campus – Pittsburgh

   List university owned off-campus research sites if applicable:

2. **Describe the availability of resources and the adequacy of the facilities to conduct this study:**
   This study will be conducted at the Tress Hall Human Energy Laboratory which is equipped to conduct physical activity and exercise physiology research. The laboratory includes a treadmill, anthropometry measurement equipment, and private exam rooms.

View: Pitt SF: Local Site Documents

Click **Continue** as this page was intentionally left blank.

View: Pitt SF: Recruitment Methods

Recruitment Methods

*** Will you be recruiting individuals for participation in this study?**

● **Yes** ○ No

1. *** Describe who will be recruiting individuals for participation for this study:**

   Tyler Quinn (PI) will be recruiting individuals for this study.

2. *** Select all methods to be used for recruitment:**

   Directly approaching potential subjects (in-person)
   Email/Listserv/Electronic Mailing List
   Letters sent to potential participants

3. *** Provide details on your recruitment methods:**

   Individual level recruitment will be pursued through distribution and posting of advertisements/flyers in food service establishments in Oakland and the surrounding areas. The advertisements will be placed in the establishments to allow for the food service workers to contact the study directly or to complete the online screening questionnaire.

4. *** Describe all compensation/incentives offered to participants and timing of these offers:**

   Fifty dollars in compensation will be provide for each of the three monitors returned with valid data (activity monitors, heart rate, ambulatory blood pressure) for a total of $150 potential compensation for the study. Data will be considered valid if the following criteria are met: continuous wear of the ActivPAL and heart rate strap for 7 days, waking time wear of the Actigraph for 7 days, and 24-hour wear of ambulatory blood pressure monitor for one work day and one non-work day. As such, participants will be eligible to receive up to $150 dollars upon completion of the baseline assessment and the 7-day study monitoring period.

5. **Recruitment materials:** (attach all material to be seen or heard by subjects, including advertisements and scripts)

	Document	Category	Date Modified	Document History
View	Heart at Work Flyer(1)	Recruitment Materials	7/8/2019	History

View: Pitt SF: Study Aims

Study Aims

1. * **Describe the purpose, specific aims, or objectives and state the hypotheses to be tested:**

The intention of the proposed research is examine the cardiovascular mechanisms driving observed increased cardiovascular mortality risk in individuals with high occupational activity levels (the physical activity health paradox). It seeks to expand understanding of the biological plausibility behind the physical activity health paradox with the long-term goal to inform activity guidelines or occupational regulations for individuals achieving high levels of occupational physical activity.

Specific Aim 1
To characterize activity patterns in individuals with high reported occupational physical activity levels and to describe whether achieved activity levels are consistent with current physical activity and occupational sedentary behavior recommendations on both work days and non-work days.
Specific Aim 2
To compare within-subject differences in 24-hour ambulatory heart rate, ambulatory blood pressure, and nocturnal heart rate variability during work vs. non-work days among individuals with a highly active occupation
Specific Aim 3
To examine potential effect modification of the previous relationships by subjective perceptions of occupational task autonomy (job strain) and cardiorespiratory fitness level.

2. * **Describe the relevant prior experience and gaps in current knowledge including preliminary data. Provide for the scientific or scholarly background for, rationale for, and significance of the research based on existing literature and how it will add to existing knowledge:**

Leisure time physical activity (LTPA) is widely known to have many cardiovascular health promoting effects 3-6 while occupational physical activity (OPA) has been demonstrated to have opposing health effects.7-10 Specifically, moderate and high levels of self-reported OPA are associated with significantly increased risk for cardiovascular disease and all-cause mortality,11 particularly in those with pre-existing hypertension or coronary heart disease12 or those with low cardiorespiratory fitness.8 The conflicting health effects of LTPA and OPA has been labeled the “physical activity health paradox”.13
A potential explanation for the physical activity health paradox is that jobs with high

OPA have different occupational responsibilities and activity levels that may adversely affect cardiovascular health. Indeed, occupation is known to explain much of the overall variation in physical activity accumulation.14,15 While the population average of the energy expenditure of work activities has decreased over the past 50 years,1 Tudor-Locke et al. reported that approximately 21% of the United States population still remains in occupations requiring moderate or vigorous intensity activities regularly.16 Steeves et al. recently used 2005-6 National Health and Nutrition Examination Survey (NHANES) data to report great variation in total uniaxial accelerometry counts per minute (cpm) in high-activity occupations (>400 cpm) compared to low-activity occupations (<300 cpm).15 High-activity occupations include categories such as ‘farming, fishing, forestry’, ‘building & ground cleaning’, ‘construction, extraction’, and ‘food preparation, serving’ while low-activity occupations include categories such as ‘community, social services’, ‘legal’, ‘health care support’, and ‘office, administrative support’.15 Overall, it is known that occupation in a strong determinant of activity pattern across individuals. Although the physical activity health paradox has been attributed to these differences in activity pattern, gaps in the literature remain explaining the health implications of OPA specifically.

Epidemiological research suggests the cardiovascular health implications are different across occupational populations with varying amounts and patterns of OPA and LTPA. Specifically, those with high OPA have increased all-cause mortality risk and those with high LTPA have decreased mortality risk.7,17 Furthermore, the increased mortality risk associated with high OPA seem to be ameliorated by high amounts of LTPA.7 While these relationships have been identified, the literature in this field is greatly limited. Almost all studies use self-reported activity data collected at a single time point, are observational and likely affected by biases such as uncontrolled confounding (e.g., socio-economic status) and selection (e.g., the healthy worker effect), are restricted to mainly male samples, and do not study mechanisms. Even still, the consistency of observational findings may justify a re-evaluation of physical activity recommendations in the presence of high volume OPA accumulation. Moreover, occupational health and safety regulations regarding allowable working times for highly active occupations may need to consider potentially detrimental effects of high OPA accumulation on cardiovascular health. Prior to recommending changes to physical activity recommendations or OPA regulations and standards, better understanding of the mechanisms that explain the physical activity health paradox in workers with high accumulated OPA is needed. Holtermann recently proposed six hypotheses to explain this paradox: 1) OPA does not improve cardiorespiratory fitness because it is of too low intensity or of too long duration18; 2) OPA may increase 24-hour heart rate (HR)19; 3) OPA may increase 24-hour blood pressure (BP); 4) OPA does not allow for adequate recovery time20;

5) workers have limited autonomy over the OPA performed; and 6) OPA increases inflammation.13,21 More specifically for the purposes of this proposal, while acute bouts of physical activity of moderate or vigorous intensity (LTPA) increase HR and BP during exercise, the resulting 24-hour cardiovascular load is decreased due to a compensatory hypotensive response. However, when considering the typical pattern of OPA, it is hypothesized that low intensity activity for a long duration with little recovery results in elevated 24-hour HR and BP which are known to be positively related to all-cause mortality.19 Furthermore, autonomic dysfunction, which is closely related to cardiovascular regulation, has been proposed to occur as a result of high OPA and is may be a pathway by which OPA elevates cardiovascular risk.22 Lastly, low task autonomy and high psychological job strain are commonly found in occupational settings and can result in few recovery breaks or days of rest, negatively impacting cardiovascular health.13 These effects have also been found to potentially differ across individuals with high versus low fitness levels.8 However, these hypothesized deleterious cardiovascular effects of increased 24-hour HR and BP and autonomic dysfunction resulting from high OPA remain untested. Furthermore, effect modification of these proposed mechanisms by fitness level or job strain are largely unexplored in studies designed for this purpose.

The current study aims to address this knowledge gap using an innovative within-subject design and best practice assessments of objective physical activity, sedentary behavior, and field-based cardiovascular testing of HR, BP, and autonomic function. The intention of the proposed research is to expand understanding of the biological plausibility behind the physical activity health paradox with the long-term goal to inform activity guidelines or occupational regulations for individuals achieving high levels of OPA. 7,8,10,13,22,23

View: Pitt SF: Study Design

Study Design

1. **Total number of subjects to be enrolled at this site (enter -1 for chart reviews, banking, registries):**
   20

2. **Describe and explain the study design:**
   The current proposal uses a repeated-measures, within-subject design to address our aims. Twenty male participants will report to the laboratory to provide informed consent, complete baseline assessments, and receive ambulatory monitors. Following this session, each participant will wear physical activity and ambulatory cardiovascular monitors for 7 days, including at least one non-work day and one work day. Characterization of work activity will use physical activity data from self-reported time at work (Specific Aim I). The 24-hour cardiovascular load (HR and BP) and nocturnal HRV will be compared across work and non-work days (Specific Aim II). Lastly, whether fitness level or job strain modify the difference in cardiovascular strain between work vs. non-work days will be evaluated (Specific Aim III).

3. **Describe the primary and secondary study endpoints:**
   We will complete data collection by May 2020. This study is cross-sectional, thus outcomes are only collected at one time.

4. **Provide a description of the following study timelines:**

   Duration of an individual subject's active participation:
   8 days
   Duration anticipated to enroll all subjects:
   6 months
   Estimated date for the investigator to complete this study (complete primary analyses):
   4/15/2020

5. **List the inclusion criteria:**
   • middle age (35-59 years)
   • male
   • self-report working full-time in the food service industry (≥30 hours/week)

• self-report predominantly completing light intensity activity job responsibilities (≥75% work time walking, light movement, or standing)

6. List the exclusion criteria:

• Resting blood pressure of ≥150 mmHg systolic and/or ≥95 mmHg diastolic
• currently taking medications that are known to affect blood pressure or heart rate (e.g. Beta-blockers, ACE inhibitors, etc.)
• greater than low risk to participate in physical activity as determined by PAR-Q (answer of yes to any of the 7 physical activity readiness questionnaire questions)
• report working a second job in addition to their primary full-time job
• report working overnight shifts (10pm–6am)
• reported physical dysfunction (inability to walk 2 city blocks or climb 2 flights of stairs)
• inability to complete the sub-maximal exercise test to completion (80% age-predicted heart rate maximum)

7. Will children or any gender, racial or ethnic subgroups be explicitly excluded from participation?

● **Yes** ○ No

*** Identify the subgroups and provide a justification:**

Woman and children will be excluded from this study due to the magnitude of effect in this proposed hypothesis is thought to be the highest in men. Furthermore, women seem to have a different or opposing effect. Therefore, the pilot nature of the study requires exclusion of women and children to allow for adequate power to test the hypothesis of interest.

8. Describe the power analysis used and cite your method of statistical analysis. If a power analysis is not possible, thoroughly justify the sample size required for the study, including appropriate literature citation (alternatively provide page reference in attached protocol):

Sample size was determined using Stata 14 and with the primary outcome of 24-hour systolic BP. Based upon a previous ambulatory BP study, the standard deviation was 12.4 mmHg in systolic BP. A clinically meaningful difference in systolic BP is 5 mmHg, resulting in a target effect size of 0.4. Using the effect size of .4, with power set at .8, an alpha of .05, and a modest correlation within subject of .5, it was determined that 18 subjects will be needed. To account for potential incomplete data, we will recruit 20 subjects for this analysis.

View: Pitt SF: Research Activities

Research Activities

1. * **Provide a detailed description of all research activities (including screening and follow-up procedures) that will be performed for the purpose of this research study. This description of activities should be complete and of sufficient detail to permit an assessment of associated risks.**

The current proposal uses a repeated-measures, within-subject design to address our aims. Twenty male participants will report to the laboratory to provide informed consent, complete baseline assessments, and receive ambulatory monitors. Following this session, each participant will wear physical activity and ambulatory cardiovascular monitors for 7 days, including at least one non-work day and one work day.

Baseline Assessment

All participants will report to the Human Energy Laboratory at Trees Hall on the University of Pittsburgh campus for a consent process, baseline assessment, and a submaximal exercise test on a treadmill prior to beginning the monitor wear protocol. At the time of scheduling, all participants will be asked to avoid food, caffeine, exercise, and nicotine for at least 1 hour prior to the visit to ensure all participants abstain at least 30 minutes prior to the visit as recommended by the American Heart Association to limit variability in the resting BP and HR measurements. (125) This will be verbally confirmed. Pre-visit instructions including attire and fasting instructions and a copy of the consent form will also be sent via email prior to the baseline assessment visit. After providing informed consent, the following will be measured during the baseline assessment (in order):

1. Physical Activity Readiness Questionnaire (PAR-Q) (124)

2. Resting HR and BP will be measured on the non-dominant arm following a ten-minute rest period and a 1-hour fast from caffeine, food, and nicotine using a validated oscillometric device (HEM-907XL, Omron, Lake Forest, IL) in an exam chair with feet supported and arms supported at heart level by the arm rests of the chair. An appropriately sized cuff will be used so that the bladder encircles 80% of the arm circumference measured by a Gulick measuring tape (125). Two measurements will be taken 1 minute apart and a third measurement will be taken will systolic BP differs by ≥10 mmHg or diastolic BP differs by ≥6 mmHg (125). An average of all measurements taken will be used as the resting BP measurement. Resting HR measured on each of the BP measurements will be averaged and used as the resting HR value. If the resting blood pressure value obtained during this

measurement is ≥150 mmHg systolic or ≥95 mmHg diastolic, the participant will be determined to be ineligible for the study and the assessment will be discontinued. If average systolic BP is >140 mmHg or diastolic BP >90, we will provide a safety alert letter encouraging participants to follow up with their primary care provider. If average systolic BP is >180 mmHg or diastolic BP is >110 mmHg, we will provide an urgent alert letter encouraging participants to follow up with their primary care provider immediately. BP >180/110 mmHg with symptoms will prompt emergency response procedures. (See attachments)

3. Medical history (medications, smoking status, known disease, physical limitations using a standard medical history form)

4. Demographics (age, race/ethnicity, sex) and occupational status/history.

5. Measurements of anthropometry (height and weight) will be completed using a calibrated digital scale (WB-110A, Tanita Corporation of America, Arlington Heights, Illinois) to the nearest 0.1 kg and stadiometer (HM200P, Charder, Tiachung City, Tiawan) measured to the nearest 0.1 cm. Each participant will be asked to remove their shoes and anything in their pockets prior to the anthropometry measurements. Two measurements of each will be taken and a third measurement will be taken if the two measurements differ by >0.2 kg and >0.5 cm in weight and height, respectively. The average of all measurements will be used for both anthropometric measurements and will be used to calculate BMI as kg/m2.

6. Each participant will complete a submaximal treadmill test using the Balke protocol up to 80% age-predicted HRmax (80% age-predicted HRmax = 0.80 x (208 – (0.7 x age)) to estimate cardiorespiratory fitness level (25, 126). Each test will be completed with a constant speed of 3.3 mph and increasing incline by 1% each minute, starting at 0% for the first minute. During the exercise test, heart rate will be recorded from the polar heart rate strap/watch during the last 10 seconds of each minute and blood pressure will be recorded during the last 45 seconds of every 2nd minute (e.g. 2, 4, 6, etc.). Ratings of Perceived Exertion (RPE) will be measured using the Borg Rating of Perceived Exertion Scale (6=No exertion at all to 20=Maximal exertion) every two minutes during the exercise test and immediately after the last stage of the test to rate the final perceived effort of the individual. HR will be measured continuously throughout the submaximal exercise test using a Polar HR strap (H7 Bluetooth, Polar). When the participant's HR reaches their 80% age-predicted HRmax, the test will be terminated and the participant will be asked to walk slowly on the treadmill (1.0-2.0 mph and 0% grade) until their HR returns to below 100 beats per minute. The final test duration, final test heart rate, and final

test RPE will be recorded following the test termination. The observed HR trajectory will be used to estimate each participant's work rate at their age-predicted maximal HR which will then be used to predict maximal oxygen uptake (VO2max). Estimated VO2max will be used as estimated fitness level in the analytical analyses.

If at any point throughout the exercise test, any of the following criteria are met, the exercise test will be terminated to ensure participant safety:
1. Onset of angina-like symptoms
2. Drop in SBP of 10 mm Hg with an increase in work rate or if SBP decreases below the value obtained in the same position prior to testing
3. Excessive rise in BP: systolic pressure ≥220 mm Hg and/or diastolic pressure ≥100 mm Hg
4. Shortness of breath, wheezing, leg cramps, or claudication
5. Signs of poor perfusion: light-headedness, confusion, ataxia, pallor, cyanosis, nausea, or cold and clammy skin
6. Subject requests to stop
7. Physical or verbal manifestations of severe fatigue
8. Failure of the testing equipment

The staff who will be performing the exercise test and blood pressure measurements will hold a master's degree or greater in exercise physiology and have prior experience and training in taking exercising blood pressures.

If the exercise test is terminated prior to the participant achieving 80% of the predicted maximal heart rate, the participant will be considered ineligible for further participation in the study and all research activities will be discontinued.

Objective Physical Activity Monitoring
Following all baseline measurements, each participant will be fitted with physical activity (inclinometer and tri-axial accelerometer) and ambulatory cardiovascular monitors (heart rate strap and ambulatory blood pressure monitor) to wear for 7 complete days. After 7 days, monitors will be returned by the participant to the research laboratory at a pre-scheduled return time. Physical activity will be monitored for 7 days using gold standard, research grade methods: 1) inclinometer (activPAL, PAL Technologies, Glasgow) and 2) tri-axial accelerometer (GT3X-BT, Actigraph, Pensacola, Fl). These two measurements have been validated and used extensively to measure physical activity patterns in a free-living environment (127, 128). In addition to the physical activity monitoring, each participant will be asked to complete a paper diary of their working times, sleeping times, monitor wear, and daily job strain. This diary will be used to characterize all activity categories into total

time, work time, non-work time, or sleep.
The activPAL will be affixed to the right thigh using a transparent adhesive dressing (Tegaderm, 3M) for 7 days to measure 24-hour activity, posture (sitting or standing), and stepping throughout the day. Participants will be asked to wear the ActivPAL for 7 days to estimate weekly, habitual activity. The participants will be encouraged to wear the ActivPAL monitor for 24 hours per day from 7 days and only asked to remove the device prior to swimming and placing it back on immediately after. ActivPal data will exported as event-type data and will be classified as sedentary behavior, stepping, and standing based on proprietary algorithms. Time spent in sedentary behavior, standing, and stepping will be averaged across all wear days as well as averaged work time and non-work time. All self-reported nap and sleep periods will be coded as sleep and will be removed from the calculation of sedentary time. Self-reported non-wear will also be removed from the sedentary time calculation. Further data reduction will estimate time spent in prolonged bouts of sedentary behavior (e.g., <30 consecutive minutes: SED<30 and ≥30 consecutive minutes: SED≥30) or standing (e.g., ≥60 minutes) and averaged across all valid wear days. Averages will also be calculated during work and non-work days.
The Actigraph GT3X-BT will be worn over the right hip using an elastic belt to measure pattern and intensity of activity (light, moderate, or vigorous) for 7 days. Each participant will be instructed to take the monitor off only for water activities (e.g., showering, swimming). They will also be asked to record the corresponding times of monitor removal and application in their paper diary each day. Accelerometry counts will be calculated as sedentary time, light activity, or moderate to vigorous activity using previously described algorithms across all valid wear time as well as for work time and non-work time. Data will be collected as 1-minute epochs, downloaded using ActiLife software (Actigraph, Pensacola, Fl) and considered valid if data is collected for ≥4 days of ≥10 hours per day. Wear time will be defined as 24 hours minus non-wear time, defined using the Choi algorithm. Daily mean activity counts (cpm) and duration of all activity intensity categories (minutes/day) will be averaged across all valid wear days. Moderate to vigorous physical activity will be derived from the triaxial vector magnitude data using Freedson vector magnitude cutpoints. Moderate to vigorous physical activity will be further separated into long bouts (≥10 consecutive minutes with allowance for 2 consecutive minutes below the 100 cpm, MVPA≥10) and then short bout moderate to vigorous physical activity (<10 minutes, MVPA<10) (129, 130).
Combining activPAL and Actigraph data, we will calculate time spent in five clinically relevant activity categories: SED≥30, SED<30, light activity, MVPA<10, and MVPA≥10. These categories reflect the recent expert call for research examining the health impacts of light physical activity and prolonged versus sporadic sedentary time and moderate to vigorous physical activity (4).

Ambulatory Cardiovascular Measurement

24-hour heart rate measurement

A Bluetooth enabled HR monitor strap (H7 Bluetooth, Polar) will continuously measure HR for 7 days and provide a measurement of average 24-hour HR for every day during the 7-day period. Each participant will be instructed to wear the HR strap directly below their nipple line for the duration of the 7-day monitoring period, only removing it during bathing or during water activities (e.g., swimming). Any time the monitor is removed, the participants will be instructed to record the time and reason in the provided paper diary. The HR monitor will be paired via Bluetooth with the Actigraph accelerometer upon activation so that the continuously measured HR data at a beat to beat resolution of 1 millisecond and will be stored on the Actigraph device throughout the monitoring period. HR data will be downloaded as interbeat R-R intervals using ActiLife software (Actigraph, Pensacola, Fl). Average 24-hour HR will be calculated for all wear days where the beginning and end of each 24-hour day is defined as the average reported wake-up time for each participant. Average 24-hour HR will then be calculated for work days or non-work days separately.

Heart rate variability measurement

Nocturnal heart rate variability (HRV) will be measured on every night of the 7-day monitoring period using the Bluetooth HR strap described above to examine autonomic function. A previous systematic review concluded that telemetric-derived measures (Polar heart rate monitor) of HRV provide a valid alternative to electrocardiogram measurement. Data collection will be done at a sampling beat to beat resolution of 1 millisecond. HR data will be downloaded as interbeat R-R intervals using ActiLife software (Actigraph, Pensacola, Fl) which will then be imported into Kubios HRV software version 3.2 (Kubios HRV v.3.2, Kubios, Kuopio, Eastern Finland) for HRV data analysis. The entire reported sleep duration will be separated into valid 5-minute periods. Nocturnal HRV will be defined in two ways. 1) All valid 5-minute segments will be averaged across the whole self-reported nights sleep, resulting in a 5-minute average of all HRV metrics 2) Three 5-minutes periods with the highest R-R intervals (lowest HR) will be determined for each sleep interval and averaged. Both of these selection methods have been previously used to evaluate nocturnal HRV. For each sleep interval detected, mean HRV values will be determined using both methods and averaged across the night for each work day and non-work day. HRV values that will be calculated for these time periods are: root mean square successive difference (RMSSD), high frequency (0.15 – 0.4 Hz) (HF), low frequency (0.04 – 0.15 Hz) (LF), very low frequency (0.003 – 0.04 Hz) (VLF), and low frequency to high frequency ratio (LF/HF). Both time (RMSSD) and

frequency (LF/HF) HRV domains will be used in statistical comparisons (134, 135). All HRV values will be calculated using Kubios HRV software version 3.2.

Ambulatory blood pressure measurement

Each participant will be asked to wear the ambulatory BP monitor (ABPM) (Oscar 2, SunTech Medical, Morrisville, NC) on their non-dominant arm for 24-hours on two occasions throughout the monitoring period (one work day and one non-work day). The participants will only be asked to wear the ABPM on two days during the 7-day monitoring period to limit participant burden. These two days will be determined with the participant and study staff on the day of the baseline assessment. Ideally, the work day monitoring will be done with one work day prior and at least 48 hours after the baseline assessment to limit any influence from the sub-maximal fitness test (i.e. ABPM on a Wednesday when Tuesday was a work day and baseline assessment was on a Monday). Similarly, the non-work day monitoring is ideally done with one non-work day prior and at least 48 hours after the baseline assessment visit (i.e. ABPM on Sunday if Saturday is a non-work day and baseline assessment was on a Monday). Ambulatory BP will be measured using established protocols including every 30 minutes during the day and every 60 minutes during sleep using self-reported sleep and wake times (136). Participants will be given the ABPM upon completion of the baseline assessment and be shown how to properly wear the monitor. They will also be given standardized instructions on monitor wear, how to start/end the monitoring, and when to wear the monitor (137). The participants will be required to start and stop the monitor on their prescribed ABPM wear days. However, phone call and email reminders will additionally encourage proper wear time per protocol. ABPM data will be downloaded using Accuwin Pro software (Suntech Medical, Morrisville, NC) and edited using the Verdecchia criteria for physiologic BP readings and notable error codes (e.g., artifact or erratic oscillotertic signal) given in the AccuWin pro software (138). Daily averages of BP and HR to be compared across work and non-work days will be computed as 24-hour, daytime, and nocturnal based on diary reported sleep and wake time.

Job Strain Measurement

Job strain will be measured once daily to quantify the level of psychological stress that the participant is burdened with each day across the entire work day. This measurement will be used to examine potential differences in cardiovascular responses in participants with high versus low average job strain (Specific Aim III). A previous study mentioned above found job strain to be associated with increased HR and BP during work (116). Measurement of job strain will be completed at the end of each work day in the provided paper dairy using the 8-item Stress in General scale which has been extensively validated to measure work related stress (139).

This scale has additionally been found to be related to BP reactivity as a result from acute stress (139).

2. Upload a copy of all materials used to collect data about subjects: (Attach all surveys, interview/focus group scripts, and data collection forms except for case report forms, SCID or KSADS):

	Document	Category	Date Modified	Document History
View	Assessment Packet(1)	Data Collection	6/14/2019	History
View	Exercise Test Protocol(1)	Data Collection	6/14/2019	History
View	Activity Monitor Log(1)	Data Collection	5/20/2019	History

3. * Will blood samples be obtained for research purposes?

○ Yes ● **No**

View: Pitt SF: Consent Process

Consent Process

Enter N/A in response to the following questions if a Waiver of Consent is requested for all research activities or if no subjects are being enrolled.

1. * **Indicate where the consent process will take place and at what point consent will be obtained:**
   Prior to the baseline assessment, all participants will provide verbal or electronic consent to undergo a telephone/online screening process to determine if they appear to be eligible for the study prior to being invited to a baseline assessment visit. Informed consent will be completed in-person, by the study Principle Investigator, Tyler Quinn, at the beginning of the baseline assessment visit in the Human Energy Laboratory in Trees Hall prior to the any research interactions.

2. * **Describe the steps that will be taken to minimize coercion and undue influence, including assurance that there is sufficient time for subjects to make an informed decision:**
   Individuals who have been determined initially eligible from the phone screening will be invited to a baseline assessment session. At the that session, these individuals will be provided with a written description of the study protocol, along with details of the informed consent. The details of the study will be described to them and they will be given adequate
   time to review the consent form and ask any questions they have. The principal investigator will let every interested participant know that they do not have to participate and their baseline assessment visit attendance is not a commitment to participate. If comfortable with proceeding,
   the individual will be asked to complete the consent form without any pressure or manipulation from the research team. If not prepared to give informed consent at that time, they will be allowed to take a copy of the consent form to further review. They will be instructed to contact the research team if willing to participate at a later time and will be
   invited to participate in the study if participants are still needed. Consent process will be documented by the research personnel obtaining consent.

3. **For studies that involve multiple visits, describe the process to ensure ongoing consent:**
   N/A

4. * **Steps to be taken to ensure the subjects' understanding:**

Study procedures will be presented in both writing and verbally during the baseline assessment. Following these descriptions, participants will be asked if they have any questions about the protocol or want any procedures to be repeated or clarified.

5. * **Are you requesting an exception to the IRB policy related to the informed consent process:**

○ Yes ● **No**

View: Pitt SF: Consent Forms

Consent Forms

1. Consent Forms:

	Document	Category	Date Modified	Document History
View	Heart at Work - Consent(3)	Consent Form	7/8/2019	History

Refer to the following templates and instructional documents:

- Guidance - Consent Wording
- Template - Consent Document - Short Form
- HRP-090 - SOP - Informed Consent Process for Research
- HRP-091 - SOP - Written Documentation of Consent

View: Pitt SF: Waiver to Document Informed Consent

Waiver to Document Informed Consent

This waiver to document informed consent can be requested for any or all participants, for any or all procedures (e.g., a verbal or computerized consent script will be used, but the subjects will not be required to sign a written informed consent document, such as with phone screening).

1. * **Identify the specific research procedures and/or the specific subject populations for which you are requesting a waiver of the requirement to obtain a signed consent form:**

Participants will undergo a phone screening and/or an online screening prior to providing informed consent. This will reduce participant and researcher burden.

2. * **Select the regulatory criteria applicable to your request:**

- ○ 45 CFR 46.117(c)(1) That the only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality. Each subject will be asked whether the subject wants documentation linking the subject with the research, and the subject's wishes will govern.
- ● 45 CFR 46.117(c)(2) That the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context
- ○ 45 CFR 46.117(c)(3) If the subjects or legally authorized representatives are members of a distinct cultural group or community in which signing forms is not the norm.

* **Address why the specific research procedures for which you are requesting a waiver of the requirement to obtain a signed consent form presents no more than minimal risk of harm to the research subjects:**

The only procedures performed prior to informed consent will be a phone screening and/or online screening (see recruitment script) that will assess initial eligibility. The participant will be read/read a brief description of the study, and then will be asked to if the provide verbal consent to answer questions about their demographic, health, and work history to see if they meet basic eligibility criteria by self report. These procedures are minimal risk because the questions are similar to those that might be asked before a medical appointment. Also, no identifiable information will be collected from potential participants unless they appear to be eligible based on the phone screening. All screening forms will be kept in a secured location (locked file cabinet).

* **Justify why the research involves no procedures for which written informed consent is normally required outside of the research context:**

These questions are similar to what would be asked prior to a medical appointment. To protect participants, no identifiable information (e.g., name, phone number, address) will be collected unless the participant appears to be initially eligible based

on the phone screening/or without their prior permission. Also, all screening forms will be kept in a locked file cabinet to protect confidentiality.

All participants will provide verbal consent after being read/reading a brief description of the study. This will be documented by the staff performing the phone screening or in the online survey files. A participant's willingness/unwillingness to provide/not provide verbal consent is built into the first question of the online survey.

3. * Upload Scripts:

	Document	Category	Date Modified	Document History
View	Qualtrics Screening Form(2)	Waiver Script	7/3/2019	History
View	Phone Screening(2)	Waiver Script	7/3/2019	History

View: Pitt SF: Electronic Data Management

Electronic Data Management

1. * **Will only anonymous data be collected (select NO if identifiers will be recorded at anytime during the conduct of the study)?**

○ Yes ● No

Select all identifiers to be collected during any phase of the research including screening:

Name:	☑	**Internet Protocol (IP) Address:**	☐
E-mail address:	☑	**Web Universal Resource Locators (URLs):**	☐
Social security #:	☐	**Social security # (for Vincent payment only):**	☑
Phone/Fax #:	☑	**Full face photo images or comparable images:**	☐
Account #:	☐	**Health plan beneficiary #:**	☐
Medical record #:	☐	**Device identifiers/serial numbers:**	☐
Certificate/license #:	☐	**Vehicle identifiers/serial #/license plate #:**	☐
		Biometric identifiers, finger and voice prints:	☐

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* **a: Will you be collecting any of the following location data: geographic subdivisions smaller than a State such as street address, city, county, precinct, zip, geocodes, etc.?** ● Yes ○ No

* **b: Will you be collecting any date information such as birth date, death, admission, discharge, date of surgery/service?** ● Yes ○ No

c: List any other unique

identifying numbers, characteristics or codes related to an individual that are to be collected:	
* **d: Provide a justification for recording Social Security numbers including why it's required, where it's stored, how it's protected and who will have access:**	Social Security numbers will be collected from participants who choose to receive a study payment on a Vincent card and who choose not to have taxes taken out of their total amount owed. Participants who choose to receive the sit/stand desk as their compensation will not be asked to provide their SS#. Vincent payees will write their SS# on a Payment Certification Form. An authorized research staff member will enter the SS# into the Vincent system and then will immediately black it out with a permanent marker. After the SS# is entered into the Vincent payment system at study completion, it will not be legible on the paper form that will be retained in the study's ongoing files. The Payment Certification Form is stored in the participant's "name" folder in a locked file cabinet where only authorized research team members will have access to it until the end of the study.

* **For ALL identifiable data collected, will you be coding the data by removing the identifiers and assigning a unique study ID/code to protect the identity of the participant?**	● **Yes** ○ **No**
* **Will the data be** HIPAA de-identified**?**	● **Yes** ○ **No**
* **Briefly describe your plan to store coded data separately from the identifiable data:**	A study data folder and a personal contact information (name) folder will be created for each participant and will be stored in two separate locked file cabinets. The key to matching the ID numbers and the participant names will be password protected and kept on a secured Pitt server which is separate from the physical filing cabinets housing the study data.

2. * **Will sensitive data be collected (e.g., protected health information, mental health, medications, drug/alcohol use, illegal behaviors)?**

● **Yes** ○ No

3. * **Select all locations where data will be stored or accessed (including e.g.,** personal / employer laptop or desktop**):**

Storage Device	Description	Identifiable Data	Sensitive Data	De-Identified/Anonymous Data

	Storage Device	Description	Identifiable Data	Sensitive Data	De-Identified/Anonymous Data
View	Server: Pitt Department Managed Server	Health and Physical Activity Department / School of Education Protected Server	yes	yes	yes
View	Pitt owned desktop, laptop or other device	Desktop computer owned and managed by Pitt located at the Physical Activity and Weight Management Research Center	no	no	no

4. * **Select all technologies being used to collect data or interact with subjects:**

Wearable device (also select mobile app if it will be used with the device)

Web-based site, survey, or other tool

5. * **Wearable Device - identify all wearable devices used to collect data during any phase of the research:**

	name	Identifiable
View	Actigraph GT3X-BT	no
View	ActivPAL	no
View	Oscar 2 Ambulatory Blood Pressure Monitor	no

6. * **Web Based Technologies – identify all web based technologies to be used to collect data during any phase of the research:**

	name	Identifiable
View	Pitt Licensed Qualtrics	
View	Pitt Redcap Version	

View: Pitt SF: Data Safety and Monitoring

Data Safety and Monitoring

1. * **Describe your plan to periodically evaluate the data collected regarding both harms and benefits to determine whether subjects remain safe. The plan might include establishing a data monitoring committee and a plan for reporting data monitoring committee findings to the IRB and the sponsor:**

1. Tyler Quinn and his mentor (Dr. Bethany Gibbs) will be responsible for the oversight of the data and safety monitoring plan.

2. A review of all monitoring will be completed once month at a meeting with Typer Quinn and Dr. Bethany Gibbs. Monitoring will include: a) all adverse events and serious adverse events, b) adherence to the protocol for recruitment, screening, and data collection, c) any unexpected problems reported by participants, and d) participant retention and withdrawals (if applicable). Tyler Quinn and Dr. Gibbs will also be responsible for implementing procedures that protect subject privacy and confidentiality and adhering to the IRB's policies for reporting unanticipated problems and adverse events.

In addition, Tyler and Dr. Gibbs will monitor the literature to determine if there is any change to the risk-benefit ratio.

3) Research staff will be instructed to inform Tyler or Dr. Gibbs within 24 hours about any adverse or serious adverse events or unanticipated problems. Tyler Quinn and Dr. Gibbs will report adverse events to the human research protections office per its Policies and Procedures Manual.

Monthly reports will be generated to informally assess adherence to protocol, quality of data collection, and recruitment and retention. A formal review of all the data will occur annually prior to IRB renewal.

4) On an annual basis, Tyler and Dr. Gibbs will prepare a report for the IRB including: 1) frequency of monitoring, 2) rates of subject accrual and retention, 3) summary of unanticipated problems and adverse events, determination of causality, and whether these affect the risk/benefit ratio, 4) summary of related literature, 5) summary of review of procedures to
ensure privacy and confidentiality, and 6) final conclusions about whether the study should continue, be modified, or end.

5) Tyler Quinn's faculty mentor, Dr. Bethany Gibbs, will meet with Tyler on a monthly basis to ensure the data monitoring plan is going well. Outside of these schedule meetings, Dr. Gibbs will be available for guidance in the event of any unforeseen circumstance.

2. * **Describe your plan for sharing data and/or specimens:**

Upon completion of all data collection, data will be analyzed and conclusions will be published in a peer reviewed scientific journal. De-identified information may be shared with other investigators for use in authorship of publications however no identifiable information will be shared outside of this projects research staff and investigators.

We will keep al files in a locked cabinet or on a secured server and will label questionnaires with an ID number only accessible to study staff and investigators. The link between ID number and names/other personal information will be kept by the principal investigator in a secure location (password protected document on our secured server).

3. **If any research data is collected, stored, or shared in a paper format, address what precautions will be used to maintain the confidentiality of the data:**

All data used for analysis and publication will be de-identified as to ensure participant confidentiality.

View: Pitt SF: Risk and Benefits

Risk and Benefits

1. * Enter all reasonably foreseeable risks, discomforts, hazards, or inconveniences to the subjects related to subjects' participation in the research:

View

Research Activity	**Providing personal information via the internet**
Common Risks	***No Value Entered***
Infrequent Risks	**Breach of confidentiality via internet transmission of data**
Other Risks	***No Value Entered***

View

Research Activity	**Wearing ambulatory blood pressure and activity monitors**
Common Risks	**Participants may find wearing the monitors uncomfortable or disruptive to normal daily activities or sleep during the monitoring periods.**
Infrequent Risks	**Participants may develop a skin irritation where the activity monitors are worn and/or arm bruising where the 24-hour ambulatory monitor blood pressure cuff is worn.**
Other Risks	***No Value Entered***

View

Research Activity	**Providing personal information**
Common Risks	***No Value Entered***
Infrequent Risks	**breach of confidentiality**
Other Risks	***No Value Entered***

View

Research Activity	**Treadmill Exercise**
Common Risks	**Increases in heart rate and blood pressure that may cause general fatigue, shortness of breath and some muscle soreness**
Infrequent Risks	**In rare instances the study participant may experience a serious cardiac event requiring immediate medical attention that may include, but is not limited to angina (chest pain), heart attack, or an arrythmia. However, this is rare and occurs in <1% of individuals.**
Other Risks	***No Value Entered***

View

Research Activity	**Heart rate variability measurement**
Common Risks	**Skin redness around the chest after wearing the strap**
Infrequent Risks	***No Value Entered***
Other Risks	***No Value Entered***

View

Research Activity	**Answering questions/completing questionnaires**
Common Risks	**Participants experience nonphysical risks such as boredom, stress, or frustration when answering questionnaires or questions.**
Infrequent Risks	***No Value Entered***
Other Risks	***No Value Entered***

2. * Describe the steps that will be taken to prevent or to minimize risks:

1) Personal information provided via the internet: An approved Pitt software (Qualtrics) will be used where data is secured and downloaded directly from the online portal.

2) Risks of wearing ambulatory blood pressure and activity monitors: participants will be instructed on proper, hygienic wear of ambulatory blood pressure and activity monitors at the visit, prior to wear. For the ActivPAL monitor which is attached to the upper thigh using high grade medical tape (hypafix), participants will be allowed to alternate legs to relieve discomfort if needed. For the ambulatory blood pressure monitor, participants will be instructed to stay still and move arm slightly away from body during inflations to reduce the chance of missed readings and reinflations. For those who experience discomfort to the point of arm bruising from the tight squeezing of the arm cuff will be instructed to remove the cuff and discontinue.

3) Providing personal information: To minimize this risk, we will keep al files in a locked cabinet or on a secured server and will label questionnaires with an ID number. The link between ID number and names/other personal information will be kept by the principal investigator in a secure location (password protected document on our secured server).

4) The measurement of heart rate variability has limited risks to participants. To reduce the chance of experiencing skin redness, participants will be instructed to remove the strap during bathing or during water activities.

5) Answering questions/questionnaires: questionnaires are limited to those that provide essential scientific information for this study, and this will reduce the time requirements for completing these questionnaires.

6) Treadmill exercise will be limited to only those qualified for the study and therefore are considered at low risk for a cardiovascular event. Specifically, any individual with measured resting blood pressure of ≥150 mmHg systolic or ≥95 mmHg diastolic during the baseline assessment will be considered ineligible for participation in the study. This method follows the American College of Sports Medicine recommendations for safe exercise in those who do not report exercising regularly. Heart rate, blood pressure, rating of perceived exertion, and participant reported signs and symptoms of cardiovascular abnormality will be monitored throughout the test. If any abnormal cardiovascular responses are observed by the trained staff member running the exercise test, the test will be discontinued. Furthermore, the exercise test will be prematurely terminated if any of the following indications are met:
1. Onset of angina-like symptoms
2. Drop in SBP of 10 mm Hg with an increase in work rate or if SBP decreases below the value obtained in the same position prior to testing
3. Excessive rise in BP: systolic pressure ≥220 mm Hg and/or diastolic pressure ≥100 mm Hg
4. Shortness of breath, wheezing, leg cramps, or claudication
5. Signs of poor perfusion: light-headedness, confusion, ataxia, pallor, cyanosis, nausea, or cold and clammy skin
6. Subject requests to stop
7. Physical or verbal manifestations of severe fatigue
8. Failure of the testing equipment

The exercise test will also be conducted by an exercise physiologist trained to recognize and respond to any emergencies. This individual is holds a master's degree in exercise physiology as well as is trained in American Heart Association Advanced Cardiac Life Support (ACLS) to ensure appropriate response qualifications in the case of an emergency. Furthermore, during all exercise tests, a second person will be present in the room to assist as needed in the case of a response. Finally, a faculty member of the department of health and physical activity will be present in the building during the exercise test to assist in case of any emergency situation.

3. Financial risks - will the subject or insurer be charged for any research required procedures?

○ Yes ● **No**

4. **Describe the steps that will be taken to protect subjects' privacy:**
All procedures are conducted in a private room within the Human energy Laboratory. These procedures only collect information to determine study eligibility or to collect data for experimental purposes. No unnecessary information will be collected. All study related materials will be stored in locked rooms and file cabinets only accessible to the research team. All electronic data are password protected and saved on a secure server.

5. **What steps will be taken in the event that a clinically significant, unexpected disease or condition is identified during the conduct of the study:**
In the event that an unexpected condition arises on experimental sessions, general health and well-being of the subjects will be prioritized over research procedures. The subject would be excused from the remaining of the experimental procedures and receive no penalty whatsoever. In the event that a clinically significant or unexpected disease/condition is identified during the study, all experimental procedures will be immediately stopped. Referral to a primary care physician or appropriate specialist will be carried out at this time. If the event is requiring immediate medical attention, emergency procedures will be initiated, to include contact of emergency medical services.

In the event that resting blood pressure measurements result in systolic blood pressure over ≥150 mmHg and/or diastolic blood pressure over ≥95 mmHg, all experimental procedures will be immediately stopped and the participant will become ineligible. In addition, the participant will be referred to their primary care physician and be provided with a letter informing them that they were found to have a blood pressure reading in the hypertensive range (see Research Activities section).

6. **Describe the potential benefit that individual subjects may experience from taking part in the research or indicate if there is no direct benefit. Do not include benefits to society or others:**
The study will not have direct benefit to the participants. However, this study will provide data to inform whether occupational physical activity has differing cardiovascular health effects than leisure-time physical activity. This information could be used to develop occupational health and safety regulations in the future for those who have high occupational physical activity.

7. Do you anticipate any circumstances under which subjects might be withdrawn from the research without their consent?

○ Yes ● **No**

8. Describe procedures that will be followed when subjects withdraw from the research, including partial withdrawal from procedures with continued data collection and data already collected:

Data collected from the subject after they provide informed consent and until they withdrew will continue to be used for research purposes.

View: Pitt SF: Conflict of Interest

Conflict of Interest

1. * Is this an FDA Covered Clinical Study?

○ Yes ● **No**

*Answer **YES** if it is:*

- *A study of a drug or device in humans to be submitted in a marketing application or reclassification petition that the applicant or FDA relies on to establish that the product is effective (including studies that show equivalence to an effective product); or*
- *A study in which a single investigator makes a significant contribution to the demonstration of safety.*

*Do **NOT** include:*

- *phase I tolerance studies or pharmacokinetic studies;*
- *clinical pharmacology studies (unless they are critical to an efficacy determination);*
- *large open safety studies conducted at multiple sites;*
- *treatment protocols; or*
- *parallel track protocols.*

2. * Does this study involve a Non-Significant Risk Device and you anticipate including the results as part of any type of submission to the FDA for approval of this device?

○ Yes ● **No**

3. * Is this study funded in part or whole by a PHS Agency?

○ Yes ● **No**

4. * Does any investigator involved in this study (select all that apply):

- [ ] A. Have a financial interest (aggregated value of equity and remuneration during the past or next twelve months) in a publicly-traded entity that either sponsors this research or owns the technology being evaluated or developed that exceeds a 5% ownership interest or a current value of $10,000?
- [ ] B. Receive remuneration (during the past or next twelve months) from a non-publicly traded entity that either sponsors this research or owns the technology being evaluated or developed that exceeds $10,000?
- [ ] C. Have equity in a non-publicly traded entity that either sponsors this research or owns the technology being evaluated or developed?
- [ ] D. Have rights as either the author or inventor of intellectual property being evaluated or developed in this research and for which you are receiving royalties, milestone fees, or other proceeds that have or will exceed $10,000 in any 12-month period (include payments through the University of Pittsburgh, the Veterans Administration Pittsburgh Healthcare System, UPMC, and University of Pittsburgh Physicians)?
- [ ] E. Have an officer or management position with a company that either sponsors this research or owns the technology being evaluated or developed?
- [ ] F. Receive compensation of any amount when the value of the compensation would be affected by the outcome of this research, such as compensation that is explicitly greater for a favorable outcome than for an unfavorable outcome or compensation in the form of an equity interest in the entity that either sponsors this research or owns the technology being evaluated or developed?
- [x] None of the above options apply and there are no other financial conflicts of interest in the conduct of this research.

5. Provide the name of the investigator(s) and describe the nature of the Significant Financial Interest(s):

Dr. Barone Gibbs discloses grant funding from the Agency for Healthcare Quality Research, the American Heart Association, the National Institutes of Health, and the Tomayko Fund.

View: Pitt SF: Ancillary Reviews

Ancillary Reviews

1. **Ancillary reviews or notifications selected below are required based on previous answers to questions. If a selection is incorrect, return to the appropriate page and adjust the answers to questions on that page:**

- [ ] Conflict of Interest (**COI**)
- [ ] Clinical and Translational Research Center (**CTRC**)
- [x] Data Security
- [ ] Honest Broker
- [ ] UPMC Investigational Drug Service
- [ ] Pitt Medical School Review
- [ ] Office of Investigator-Sponsored IND & IDE Support (**O3IS**)
- [ ] RCCO Business **Manager** (required for industry sponsored studies)
- [ ] Religious Directives
- [x] Scientific Review
- [ ] Health Record Research Request (**R3**) (required if using UPMC clinical data and authorization for other UPMC data sources for research)
- [ ] UPMC Office of Sponsored Programs and Research **Support** (using UPMC facilities and/or UPMC patients during the conduct of the study)

2. **Additional ancillary reviews the PI may choose to include as needed for the research:**

- [ ] Human Stem Cell Oversight (**hSCRO**)
- [ ] Institutional Biosafety Committee (**IBC**)(study involves deliberate transfer of recombinant or synthetic nucleic acid molecules)
- [ ] Radioactive Drug Research Committee (**RDRC**)(study involves the evaluation or use of procedures that emit ionizing radiation)

View: Pitt SF: Clinical Trials

Good Clinical Practice (GCP) Training

1. * **Regardless of funding source, is this study a clinical trial (as defined by the NIH)?**

   ○ Yes ● **No**

ClinicalTrials.gov Information

Visit the University of Pittsburgh Office for ClinicalTrials.gov website or contact ctgov@pitt.edu for further information.

2. * **Was this study registered, or will it be registered, on ClinicalTrials.gov?**

   ● **Yes** ○ No

3. * **Is the University of Pittsburgh or UPMC the Sponsor Organization for this study record?**

   ● **Yes** ○ No

   * **Who will be the Responsible Party for this study record?**

   Principal Investigator of this IRB application

View: Pitt SF: Supporting Documents

Supporting Documents

1. **Attach any additional supporting documents not previously uploaded. Name the documents as you want them to appear in the approval letter:**

	Document	Category	Date Modified	Document History
View	References(1)	Other	7/3/2019	History
View	Urgent BP Alert Letter(1)	Data Collection	7/2/2019	History
View	BP Alert Letter(1)	Data Collection	7/2/2019	History

View: Pitt Create

Add Storage Information

1. * **Select a Storage Type:**
   Server: Pitt Department Managed Server

2. **Description:**
   Health and Physical Activity Department / School of Education Protected Server

3. * **Will identifiable data be stored in this location?**
   ● **Yes** ○ No

4. * **Will sensitive data be stored in this location?**
   ● **Yes** ○ No

5. **Will de-Identified or anonymous data be stored in this location?**
   ● **Yes** ○ No

6. **Provide additional information as needed:**

View: Pitt Create

Add Storage Information

1. * **Select a Storage Type:**
   Pitt owned desktop, laptop or other device

2. **Description:**
   Desktop computer owned and managed by Pitt located at the Physical Activity and Weight Management Research Center

3. * **Will identifiable data be stored in this location?**
   ○ Yes ● **No**

4. * **Will sensitive data be stored in this location?**
   ○ Yes ● **No**

5. **Will de-Identified or anonymous data be stored in this location?**
   ○ Yes ● **No**

6. * **Is anti-virus software installed and up to date on all devices and are the operating systems kept up-to-date on all devices?**
   ● **Yes** ○ No

7. **Provide additional information as needed:**
   No data will be stored on this computer. This computer will be only used to access the data from the secure server.

View: Pitt Risk

Risk

1. * **Research Activity:**
   Providing personal information via the internet

2. **Common Risks:**

3. **Infrequent Risks:**
   Breach of confidentiality via internet transmission of data

4. **Other Risks:**

View: Pitt Risk

Risk

1. * **Research Activity:**
   Wearing ambulatory blood pressure and activity monitors

2. **Common Risks:**
   Participants may find wearing the monitors uncomfortable or disruptive to normal daily activities or sleep during the monitoring periods.

3. **Infrequent Risks:**
   Participants may develop a skin irritation where the activity monitors are worn and/or arm bruising where the 24-hour ambulatory monitor blood pressure cuff is worn.

4. **Other Risks:**

View: Pitt Risk

Risk

1. * **Research Activity:**
   Providing personal information

2. **Common Risks:**

3. **Infrequent Risks:**
   breach of confidentiality

4. **Other Risks:**

View: Pitt Risk

Risk

1. * **Research Activity:**
   Treadmill Exercise

2. **Common Risks:**
   Increases in heart rate and blood pressure that may cause general fatigue, shortness of breath and some muscle soreness

3. **Infrequent Risks:**
   In rare instances the study participant may experience a serious cardiac event requiring immediate medical attention that may include, but is not limited to angina (chest pain), heart attack, or an arrythmia. However, this is rare and occurs in <1% of individuals.

4. **Other Risks:**

View: Pitt Risk

Risk

1. * **Research Activity:**
   Heart rate variability measurement

2. **Common Risks:**
   Skin redness around the chest after wearing the strap

3. **Infrequent Risks:**

4. **Other Risks:**

View: Pitt Risk

Risk

1. * **Research Activity:**
   Answering questions/completing questionnaires

2. **Common Risks:**
   Participants experience nonphysical risks such as boredom, stress, or frustration when answering questionnaires or questions.

3. **Infrequent Risks:**

4. **Other Risks:**