Psychoneuroimmunology as a framework for studying the effects of chiropractic care in a population with high central adiposity: a feasibility trial

NCT06208163

March 25, 2026

Life University Institutional Review Board (IRB)
Committee for the protection of human participants in research
Application & Protocol form: Full Review, Expedited Review, or "Exempt"

Title of project	Psychoneuroimmunology as a framework for studying the effects of chiropractic care in a population with high central adiposity: a feasibility trial
Intended start date	**6/1/2024**
Name of Principal Investigator (P.I.)	Tyson Perez, DC, PhD
P.I. e-mail address & phone number(s)	tyson.perez@life.edu
Category, [X] as appropriate	Life U employee [ ] administration [ ] faculty [✓] staff Life U student [ ] DC program [ ] CGUS graduate [ ] CGUS undergrad Non-employee / off-campus collaborator [ ]
Faculty or staff PI: campus department	Center for Chiropractic Research (CCR)
Student or non-employee PI: mailing address	
For Life U. student or non-employee: name & contact info of campus faculty or staff sponsor	
Will this project have funding?	[✓] yes [ ] no [ ] maybe / pending
Name of funding source, if applicable	Australian Spinal Research Foundation (ASRF) grant
Funding deadline date, if applicable	[✓] new project [ ] funding continuation
Other funding information	
Do any investigators/study personnel have financial interests in devices, methods, services, or organizations involved in this study?	[✓] no [ ] yes or maybe – please explain:

PRINCIPAL INVESTIGATOR - *My signature below testifies that I pledge to conform to the following:*

- As one engaged in investigation using human participants, I acknowledge the rights and welfare of the participants.
- I acknowledge my responsibility as an investigator to secure the informed consent of the participants by explaining the procedures, in so far as possible, and by describing the risks, as weighed against the potential benefits of the investigation.
- I assure the Committee that all procedures performed under the project will be conducted in accordance with those federal regulations and University policies that govern research involving human participants. Any deviation from the project (e.g., change in principal investigator, research methodology, participant recruitment procedures, etc.) will be submitted to the Committee as an amendment for its approval before implementation.

P.I. Signature	Date	CITI # 51552248
Sponsor signature, if applicable	Date	CITI #

Signatures on this page and the next may be submitted separately from the application and protocol. DocuSign signatures are acceptable. The CITI # is found on your completion certificate for the CITI human research participants protections course.

Will your project involve any "vulnerable populations" listed below? [ ] YES [✓] NO

If yes, mark the appropriate box [X], and explain how you will address the issue.

[ ] persons with physical disabilities		[ ] persons with mental disabilities
[ ] economically or educationally disadvantaged		[ ] minors (under age 18); approximate age: _____
[ ] people who are pregnant	[ ] fetuses	[ ] incarcerated persons
[ ] other vulnerable population – describe:		
Why are you using this group, how are they vulnerable, and how will you address this issue?		

Will your project involve any of the groups listed below? [✓] YES [ ] NO

If **yes**, mark the appropriate box [X], and explain how you will address the issue.

[X] students *(Issue: may perceive pressure to participate (whether real or implied) in research conducted by faculty members or administrators, and may be concerned that non-participation could affect grades or relationships with instructors)*
[X] patients who entered clinic or private practice for non-research purposes *(Issue: may perceive pressure to participate (whether real or implied) in research conducted by treating doctor and may be concerned that non-participation could affect their care or relationships with doctor or clinic personnel)*
[X] employees of the university *(Issue: may perceive pressure to participate (whether real or implied) in research involving employees and may be concerned that non-participation could affect their job or relationships with supervisors)*
Please explain how you will address the issue: If students or employees of Life University meet the study criteria for inclusion in the research study, they may be included in the study population. However, students and employees of Life University will not be specifically recruited for participation in the study. At no point will any participant information be shared with individuals or departments at Life University and participation in the study will be kept confidential. For individuals referred by physicians, it will be made clear that their decision about participation in the study will not affect their care or relationships with doctor or clinic personnel.

Please identify all co-investigators/study personnel and their certificate numbers for the CITI Research, Ethics, Compliance, and Safety Training online training course. Send certificates and scan of signatures separately.

Co-investigators/study personnel	CITI #	Signature (print/sign/scan or electronic insertion)
Phillip Tomporowski	463790	
Stephanie Sullivan	36378700	
Ron Hosek	48654649	

Margaret Sliwka	31524751	
Ahmed Qazi	8594581	
Emily Drake	56274647	
Iti Shah	53903030.	
Daekiara Smith-Ireland	52750412	
Evelyn Grace Sherman (student volunteer)	68078297	
Beth Collier (Research Assistant)	68820777	
Co-investigators'/study personnels' signatures indicate a pledge to conform to the same ethical principles listed for the PI on Page 1		

What roles are individual investigators/study personnel expected to play? Identify by initials (e.g., "AB" or "LMN").	
Organizing experiments, data collection/reporting/processing, participant management, etc.	IS, DSI, EGS, BC
Supervision: provide oversight, responsible for organization and implementation	PT, SS, ED
Analysis/interpretation (statistical analysis, evaluation, and presentation of the results)	TP, RH, AQ
Other, as appropriate: Training the field clinicians & providing chiropractic care	MS

The federal guidelines from the U.S. Office of Human Research Protections (OHRP) assume that research projects will be reviewed by a full committee meeting unless they are (a) exempt from full review or **(b) qualify to have expedited review.** The IRB will make the final decision on the review category. The label "exempt" is misleading – ALL types require some degree of IRB review.

If you believe your project may qualify for exempt or expedited review provide at least one qualifying Research Category, input the major category and any applicable subcategories in the text box below. The categories may be accessed via the OHRP's URLs below or on the Life University IRB's Blackboard site (Bboard: *Start here >> Types of Review >> Current Federal guidelines for expedited and "exempt" review categories*.)

Expedited: https://www.hhs.gov/ohrp/regulations-and-policy/guidance/categories-of-research-expedited-review-procedure-1998/

Exempt: https://www.hhs.gov/ohrp/regulations-and-policy/regulations/45-cfr-46/common-rule-subpart-a-46104/

Section A: Purpose and overview

- *Briefly describe the general nature and purpose of the proposed research. Use plain language, avoiding technical jargon whenever possible. Write in a way understandable to readers who do not have a background in your area of study.*
- *Also, indicate whether this is student research for a course, a thesis, a dissertation, or independent research.*

Psychoneuroimmunology (PNI) is a relatively recent field of study which integrates the disciplines of psychology, neuroscience, and immunology to probe the interactions between behavior, the nervous system, and the immune system. Opposing a reductionist design that limits the observation of effects to a single paradigm, the PNI approach respects the multi-system evolutionary development of the organism [1]. Thus, insight relative to the mechanisms of action and effects of an intervention are expanded. Importantly, aberrations in all three PNI domains (i.e., psychological, neurological, immunological) are known to be associated with numerous health-related conditions [2].

The first key aspect of the PNI framework involves psychology. The psychological domain can be conceptualized as a combination of several interrelated components including mental health, emotional health, and beliefs & expectations [3]. Importantly, a recently published clinical trial on military service members suggests that chiropractic may have a positive impact on various aspects of psychological functioning including depression and anxiety [4]. To date, however, robust evidence for chiropractic's effects on psychology-related outcomes is lacking in other populations.

The second integral aspect of the PNI paradigm is the neurological domain. Within this domain lies the autonomic nervous system (ANS). The ANS governs internal physiological processes such as heart rate and has two primary branches that have direct neural connections to the central nervous system (CNS): the parasympathetic nervous system (PSNS) and the sympathetic nervous system (SNS) [5]. Generally, the PSNS is associated with "rest & digest" functions while the SNS is associated with a state of stress-induced "fight-or-flight" responses [6]. Notably, increasing evidence suggests that chiropractic adjustments may modulate the activity of the ANS [7,8]. Relatedly, there is some evidence that chiropractic may influence lower extremity muscle/motor function [9] which has implications for gait and fall risk. Further, limited data suggests spinal adjustments may modulate the activity of the brain's prefrontal cortex[10] hinting at the potential for effects on other clinically relevant, neurologically mediated processes such as executive functioning. All that said, chiropractic's neurological impact has yet to be investigated in most clinical populations.

The third PNI domain is immunological functioning. The immune system's primary role is in defense of the organism against a broad array of microbes and other potential pathogens [11]. There are a handful of studies in relatively healthy populations that have evaluated chiropractic's impact on immune-related biomarkers [12] including a recently published observational study performed on 5 volunteers that suggest that chiropractic may modulate the levels of secretory immunoglobulin A (sIgA), an antibody released by the mucosa providing nonspecific, first-line defense against pathogens [13]. To our knowledge, the immunomodulatory potential of chiropractic adjustments has yet to be rigorously evaluated in clinical populations.

Since 1980, the global prevalence of obesity, commonly defined as a body mass index (BMI) of 30 or higher, has doubled [14]. Importantly, obesity is associated with numerous PNI-related sequelae, including increased levels of psychological distress [15], cognitive deficits [16], ANS dysfunction [17], and immune marker abnormalities [18]. To our knowledge, rigorous investigation of chiropractic's impact on PNI-related outcomes in people with obesity is lacking. Based on evidence to date, it is plausible that clinically important PNI-related dysfunctions (e.g., heightened stress levels, executive function impairments, dysautonomia, immune dysregulation) common in this population could be ameliorated via chiropractic care.

Note: our study targeted an obese population because they have a much greater burden of PNI-related abnormalities, [19-21] and our secondary aims are to assess the impact of chiropractic on PNI outcomes. Further, this is the first time our lab will be enrolling this population & asking them to undergo our comprehensive PNI testing protocol, therefore we want to ensure that key implementation outcomes (e.g., recruitment, compliance, tolerability, retention) are feasible before initiating a larger and more complex pilot RCT which will have a greater focus on effectiveness outcomes.

Phil Tomporowski, PhD is the Director of the Cognition and Skill Acquisition Laboratory in the Department of Kinesiology at the University of Georgia (UGA).

Ahmed Qazi is a research scientist at Life University's Center for Chiropractic Research (CCR) and a PhD candidate in the Department of Kinesiology at the University of Georgia (UGA).

Section B: Recruitment

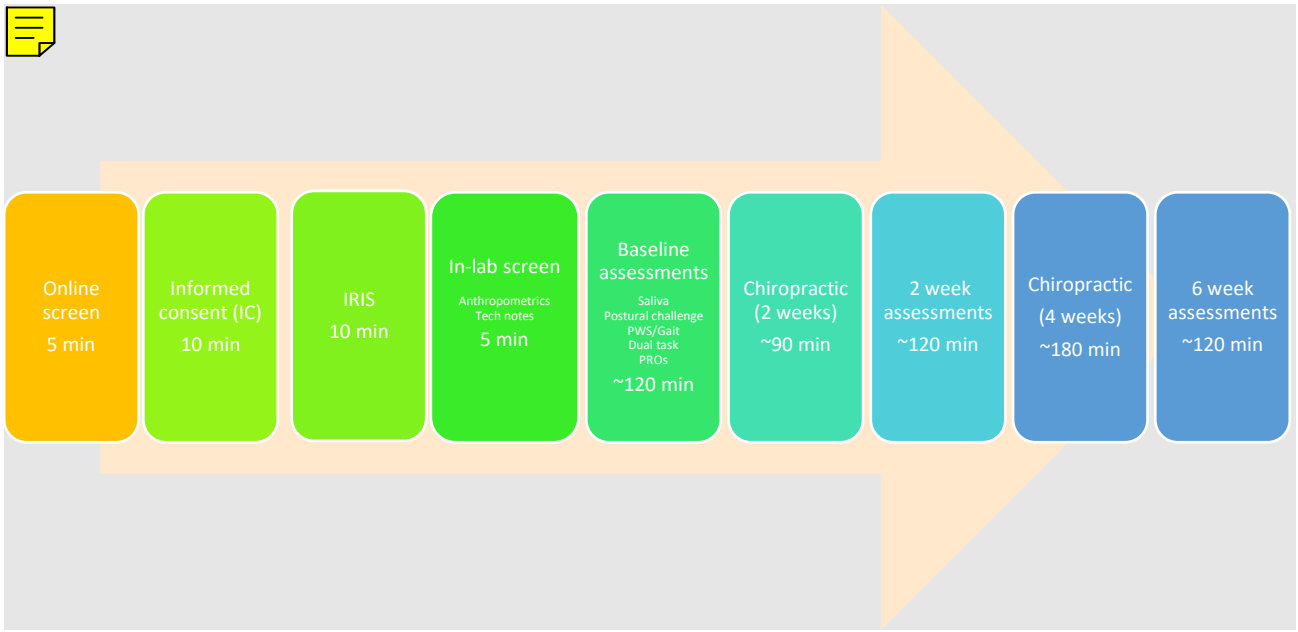
- *Describe how participants will be recruited, state how many participants will be involved in the research (realistic estimate is acceptable), and how much time will be required of them.*
- *If minors are to be included, indicate the age range.*
- *Describe screening procedures. List specific eligibility requirements for participants – inclusion and exclusion criteria. If your study uses only male or female subjects, explain why.*
- *Disclose any relationship between researcher and subjects - such as teacher/student, doctor/patient, superintendent/principal/teacher, employ**er**/employ**ee**.*

have established a recruitment window of up to 6 months to enroll up to twenty (20) obese individuals. Participants will be recruited via word of mouth, flyers, social media posts, trial registries, newspapers, and a microsite (Attachment A). Following review by the marketing department, each form of media will be forwarded to the IRB chair for review.

If someone is interested in participating in this study, recruitment materials will contain a link/QR code to a HIPPA protected Jotform online screening survey that will assess their eligibility (Attachment B). They are also invited to email research.studies@life.edu or call the study line at 770-426-2639 and a researcher will either email those individuals a HIPAA approved Jotform link to the online screening survey or perform the survey by phone. Individuals who meet the criteria for participation will be scheduled for their first CCR lab assessment & chiropractic visit and receive welcome emails (Attachment C) with attachments/links to the following information:

Pre-session info video	Attachment E

The total estimated time required for participation in the study will be ~10.5 hours. The following table outlines each study task, the location of the task, and estimated time required.



The following eligibility criteria have been established for this study:

- 18-65 years of age.
- Body mass index (BMI) ≥ 30.
- Waist circumference ≥ 35 inches for women or ≥ 40 inches for men.
- Has not had chiropractic care within the past 30 days.
- Not prescribed short-acting benzodiazepines which include midazolam & triazolam.
- If taking prescription medications other than short-acting benzos, must be on a stable dose for a minimum of ~~12~~ 6 weeks with no plans to change medications or doses during the study.
- Able to walk unassisted on a treadmill.
- No known disorder resulting in syncope/fainting during postural changes (e.g., POTS, orthostatic hypotension).
- No pacemakers or known heart conditions that influence the electrical or mechanical function of the heart (e.g., severe heart valve disease).
- Not diagnosed with any externalizing (e.g., substance use, antisocial disorder) or thought (e.g., schizophrenia, paranoid personality, bipolar) disorders that are uncontrolled or untreated.
- Not diagnosed with rheumatoid arthritis, osteoporosis, or cervical spine instability.
- No hearing impairments (cognitive task uses auditory stimuli).
- Not currently pregnant.
- No current litigation related to a physical, health-related injury.
- No whiplash injury in the past 3 months.
- No oral injuries, inflammation, or disease that cause their mouth or gums to bleed easily.

Attachments:

Attachment A	Recruitment materials
Attachment B	Online screening survey
Attachment C	Emails
Attachment D	IRIS
Attachment E	Pre-session info video
Attachment F	Reminder text message
Attachment G	Infographic
Attachment H	Informed consent
Attachment K	Tech notes
Attachment L	PROs
Attachment M	Patient Acceptability survey
Attachment N	Clinician Acceptability survey
Attachment O	CART worksheet

Section C: Methods

- *Describe all procedures to be used on human participants and describe what you'll be asking participants to do.*
- *State where the study will take place.*
    - *Note that if your project will involve the Life University chiropractic clinic system in any way, approval must be obtained from the clinic administration (see the IRB's Blackboard site >> The IRB Process >> Research involving the Life U clinics).*
    - *Consider that the IRB ascertains whether your project meets federal standards for ethical conduct of research. Use Life University resources, such as reservations of classroom or other space, may need separate approval by a department or Dean.*

Prior to baseline assessments, individuals will have been emailed a trial info video (Attachment E) that explains what to expect (e.g., where the sensors will be placed on their torso) and how to prepare (e.g., wear a loose fitting or button-up shirt, shave chest, no wire bras). The info video also outlines lifestyle restrictions including abstaining from heavy exercise, alcohol, & non-prescription drug use within 24 hours of the appointment and abstaining from ingesting caffeine, nicotine, food, brushing, alcohol-based mouthwash, and ingestion of large quantities of liquid (e.g., chugging a 16 oz bottle of water) within the 3 hours of the appointment. Reminder texts (Attachment F) will be sent to each participant ~24 hrs and ~3 hrs prior to their appointment time which will include a link to an infographic (Attachment G) reminding them of how to prepare for their appointment.

Informed consent & in-lab screening

This study will take place at the CCR's Marietta lab (1429 Lucille Ave, Bldg 900, Ste 910, Marietta, GA 30067). Upon presentation to the lab, a member of the research staff will provide participants with a detailed description of the trial, advise them of their rights, & ask them to sign the informed consent (Attachment H). They will have their anthropometric measurements (i.e., height, weight, waist circumference) recorded to assess if they meet the obesity-related eligibility criteria (i.e., BMI ≥ 30, waist circumference ≥ 35 inches for women or ≥ 40 inches for men). Participants not meeting eligibility requirements will be thanked for their time and provided with a $10 gas card.

Eligible participants will be provided with a quiet room and a tablet to allow time for completion of the IRIS (Attachment D) and asked a series of questions prior to baseline testing (Attachment K). If answers to any of the queries indicate that the individual may not be in a proper state to perform the assessments (e.g., consumed caffeine or nicotine within 3 hours of testing, took over-the-counter meds within 24 hours of testing; then the individual may be rescheduled. These queries will be repeated at all reassessment time-points (i.e., 2 weeks and 6 weeks).

ASSESSMENTS

Height, weight, blood pressure

Participants will have their height, weight, and blood pressure assessed at each lab visit.

Saliva collection

Participants will be asked to rinse their mouth with water to ensure any food debris is cleared. Saliva will be collected via passive drool according to Salimetric's lab instructions: 1) researcher opens pouch and removes the Saliva Collection Aid (SCA), 2) researcher places ribbed-end of the SCA securely into a pre-labeled (i.e., alphanumeric designation indicating the participant & sample number) collection vial, 3) researcher gives the vial to the participants, asks the participant to allow saliva to pool in mouth, tilt their head forward, and gently guide saliva through the SCA into the vial ensuring they do not blow or spit into the vial, 4) researcher caps and immediately stores the specimen in a deep freezer at a temperature of ≤-4°F.

At the trial's completion, all samples will be shipped in dry ice to Salimetric's lab to assess [illegible]cipants' sIgA levels. Saliva collections will occur at baseline, 2 weeks, and 6 weeks.

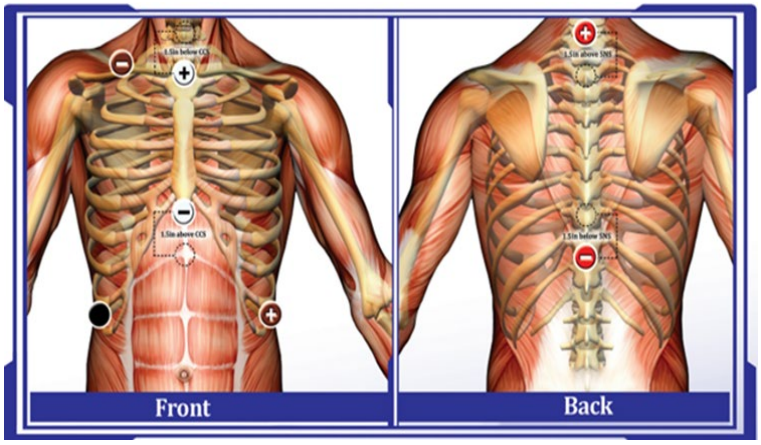
As eating was restricted for 3 hours prior to the exam, participants will be offered a small snack prior to set up. Participants will be asked to remove and turn off any electronic devices (e.g., cell phones, smart watches) and use the toilet immediately prior to set-up and testing to ensure an empty bladder.

Electrocardiography (ECG) & Impedance Cardiography (ICG)

If needed, participants will then be given a disposable razor & shaving gel and asked to go to the restroom to shave. Assistance will be provided if they are unable to reach any areas.

An illustration of the ECG & ICG electrode positions is shown below. For ECG and ICG, the skin of each area will be prepared by rubbing an alcohol wipe a circular motion until the skin is slightly abraded and red. A ground electrode will then be attached below the 12th rib on the participant's right side. ECG electrodes will be attached to the right clavicle

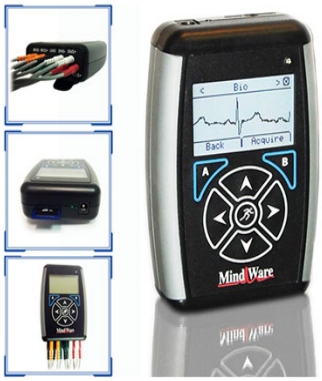
and on the 12th rib on the participant's left side. For ICG, 2 electrodes will be attached on the participant's sternum while 2 additional electrodes will be attached on the participant's spine. The distance between the 2 front electrodes will be measured and recorded. To track cardiac impedance, a safe and unrecognizable low-voltage, high-amplitude current is passed from the electrodes on the spine to the electrodes on sternum. Each electrode patch contains a small amount of conductive gel pre-applied on the skin-facing side and a lead wire secured to the metal electrode connector on the outer side. A small strip of medical tape will be used to secure each wire to the skin to create slack in the wire at the electrode end and reduce movement of the electrode during data acquisition. Once properly secured, the 7 electrode leads will be plugged into the Mindware mobile device (see below). These electrodes will be attached at baseline, 2 weeks, and 6 weeks.



Respiration Belt

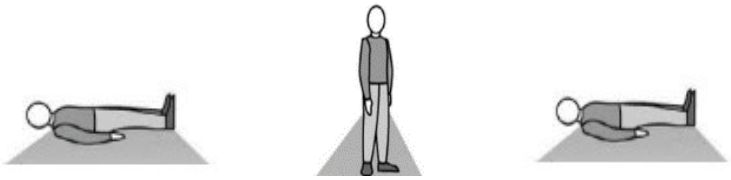
An illustration of the respiration belt placement is shown below. Participants will be asked to raise their arms and the respiration belt will be wrapped around their torso around the level of the diaphragm. The belt will be tightened to the point where there is just enough room for two fingers to fit between the participant and the belt. Once the belt is properly secured, the positive and negative ends of the connector cable will be plugged into the Mindware mobile device (see below). The respiration belt will be attached at baseline, 2 weeks, and 6 weeks.

The Mindware mobile device (shown below) will then be secured to the participant's waistband. For respiration, ECG, and ICG signal monitoring, the Mindware mobile device will be connected to software on a laptop computer via a secure, router-enabled Wi-Fi connection. There is no risk of shock from the electrodes or the Mindware mobile.



Postural Challenge

Participants will be asked to lie supine on a chiropractic table for a period of 8 min. After an 8 min supine period, participants will be asked to quickly assume a standing position for 3 min. After the 3 min standing period, participants will be asked to quickly re-assume a supine position for a final 3 min. The postural challenge will be performed at baseline, 2 weeks, and 6 weeks.



Preferred walking speed (PWS)

The participant will be fitted with a pair of slip resistant socks. They will then be asked to step onto a non-moving treadmill. Participants will be blinded to the digital speed display while on the treadmill. The participants start by walking on the treadmill at a speed of 0.5 mph and the investigator will increase the speed by 0.1 mph increments every 2-4 seconds until the subject reports that they are walking at their preferred walking speed (PWS). Then, in 0.1 mph increments, 1 mph is added to the current speed followed by a decrease at a rate of 0.1 mph every 2-4 sec until they reestablish their PWS. This procedure is repeated three times and speeds are then averaged to determine their PWS. The PWS assessment is performed at baseline only.

Gait assessment

The participant will be asked to walk on the treadmill for up to 5 minutes at their pre-determined PWS. The treadmill will be used to measure forces during walking and several traditional gait parameters (e.g., stride length, step width). The gait assessment will be performed at baseline, 2 weeks, and 6 weeks.

Cognitive testing

The cognitive task is an auditory switch task consisting of 40 computer-generated numbers and letters using a commercial software program and headphones. Initially, the task will be explained to the participant with printed sheets of paper, and the instructions will be available throughout the experiment to provide clarity. Next, the participant will sit at a desk, put on headphones, and perform 3 practice blocks of the switch task. During this task, participants will be asked to differentiate between stimuli (numbers or letters) presented to them. Once a stimulus is presented to the participant, they will respond by clicking the left or right mouse button with their right hand. After performing the three practice blocks, the participant will transition to the treadmill where they will perform 3 more practice blocks of the switch task while walking on the treadmill at their PWS. A mouse will be affixed to the right hand using elastic wrapping. This affixation will allow the participant to walk normally on the treadmill, while also holding the mouse comfortably to provide responses during the task. After the 3 practice blocks, the participant will have a 90 second break. During this break, the participant will have an opportunity to sit before continuing to the final block of tests. The participant then performs the final ~~4~~ blocks of

the switching task on the treadmill at their PWS. Response times and response accuracy will be recorded for each trial. The cognitive task will be performed at baseline, 2 weeks, and 6 weeks.

Upon completion of the cognitive testing, participants will exit the treadmill and all equipment (headphones, electrodes, socks, etc.) will be removed.

Patient Reported Outcomes (PROs)

PROs (English versions) will be re-created in digital form via Jotform which will allow participants to complete them using a tablet. The PROs include the COMPASS-31, PROMIS-29, PROMIS-Cog 8, and Perceived Stress Scale (Attachment L). To prevent missing data, a visual alert will be generated if any queries on a given form have missing responses. If subjects are uncomfortable answering a query, they will be asked to inform a researcher and data collection for that PRO will be halted. PROs will be captured at baseline, 2 weeks, and 6 weeks.

Acceptability Surveys

A survey assessing the acceptability of the testing and intervention will be given to participants (Attachment M). The clinicians will also be surveyed about the acceptability of various aspects of the trial (Attachment N). These will be captured at 6 weeks only.

Chiropractic Care

Once baseline assessments are complete, the participant will be assigned a field clinician and provided the contact information for the office. The field clinician will be selected based on availability and proximity to the participant's home, which may be Dr. Margaret Sliwka at CCR's Marietta lab. This is to minimize travel time for the participant. The participant will be responsible for coordinating appointment times with their field chiropractor. The field chiropractors are doctors in the field who have agreed to volunteer their time to care for study participants. Field clinicians must meet the following criteria, and prior to providing care to any participant, the clinicians' CITI training certificate and Georgia chiropractic licenses will be forward to the IRB chair for archive and review.

- Licensed and practicing chiropractic for a minimum of 1 year.
- Practice in the Atlanta metro area.
- CITI training
- Evidence of research qualified malpractice insurance either through their carrier or through Life U's malpractice provider.
- Copy of Georgia chiropractic license

Field clinicians will be provided with the opportunity to determine whether they would like to accept the participant or not. Once the participant has been assigned to the clinician, a copy of the research participant intake sheet will be forwarded to the clinician. The clinician will perform their normal and customary physical exam procedures including X-rays (if necessary). If the clinician does not have X-rays in house, the participants may be referred to the Life University C-HOP for X-rays. The CCR will compensate C-HOP for the X-rays or the clinician for any disposable costs related to the X-rays. If upon completion of the physical exam or X-rays the clinician encounters a contraindication for chiropractic care or red flags, the participant will be excluded from study participation and be referred, as needed, to an appropriate medical provider based on any red flags. Per guidance by the U.S. Department of Health and Human Services (HHS),[22] data collected up to the point of termination may be used in the final analyses. In the event a field clinician is not comfortable providing care to the participant, but no red flags or contraindications are present, a new clinician will be found.

Once the participant has completed their physical exam and X-rays (as needed) with the field clinician, 6 calendar weeks of chiropractic care can begin (note: care may be extended up to a maximum of 1-week if the clinician/patient is temporarily unable to provide/receive care due to extenuating circumstances such as an illness or family emergency). The frequency of care will be determined by the field clinician. At each visit, participants will have their spine assessed for the presence of vertebral subluxations per the clinician's normal and customary procedures. The presence of vertebral subluxations is generally indicated by the loss of normal intersegmental end feel, palpable restricted intersegmental range of motion in lateral flexion and/or tenderness to palpation of the joint although the criteria may vary by clinician. The adjustment technique(s) utilized by the field clinician will be at their discretion. The clinician will also be asked to complete a short worksheet about the visit at the end of each session (Attachment O). All documentation performed by the clinician will be forwarded to the researchers.

If at any point the attending chiropractor has any concerns about the ability of the participant to tolerate care, the chiropractor will have the authority to remove the participant from the study. Additionally, if at any point during the intervention, the participant expresses concern regarding their clinician, these will be discussed amongst the research team & a consensus decision will be reached leading to one of 3 directions: 1) Dr. Sullivan will speak with the clinician and participant to see if an understanding can be reached, and the participant will continue with the initially assigned clinician, 2) the participant will be transferred to another local clinician, or 3) the participant will be released from the study.

Note: Clinicians will be provided with a unique, private channel in a password protected Microsoft Teams. Through this channel, CCR investigators will share protected information and communicate directly with the clinician.

Section D: Risks

- *State the potential risks - for example, physical, psychological, financial, social, legal or other - connected with the proposed procedures.*
- *Briefly describe how risks to subjects are reasonable in relation to anticipated benefits. Describe procedures for protecting against, or minimizing, potential risks. Assess their likely effectiveness.*
- *If you are using an electrical device that is attached directly to subjects explain how the subjects will be protected from shock.*

Lifestyle restrictions
Participants may find certain lifestyle restrictions uncomfortable (e.g., not eating for 3 hours). If they are unwilling to abide by these restrictions, they may discontinue the study.

Body measurements
Participants may find it uncomfortable to have their height, weight, and/or waist circumference measured. If so, they may discontinue the study.

Electrodes
The participant may have an allergic reaction to the alcohol swab or electrode adhesive. If irritation occurs, the electrode will be removed, and the participant's skin will be washed with clean water. If this occurs, the participant will be excluded from the study. The electrodes pose no risk of electric shock.

Postural challenge

There is a small risk of the participant becoming lightheaded when going from a supine to a standing position. A researcher will always be standing next to the participants to ensure their safety. If a participant feels lightheaded or distressed, they will be asked to stop the test and sit down and they will be excluded from the study. The eligibility criteria help to mitigate this risk.

Treadmill
It is possible that a participant could be injured by falling from the treadmill. Considering that most people regularly negotiate stairs, curbs, and objects on the ground, it is unlikely that such an injury is any more likely than what is possible during the normal course of the participant's day. A researcher will always stand next to the treadmill. If an individual feels unsteady, the treadmill will be shut off by the participant or the researcher. The treadmill safety clip that automatically shuts off the treadmill if an individual falls will also be attached to the participant's shirt or pants. The researcher administering the test will be trained in CPR. In case of emergency, emergency personnel will be summoned with a 911 call.

Chiropractic adjustments
The risks of chiropractic adjustments are low. Participants may feel sore or tender following their adjustment which should dissipate in a day or two. A participant may experience lightheadedness or dizziness with an upper cervical adjustment; however, this is rare. If lightheadedness or dizziness is uncomfortable, the participant can choose to discontinue participation. There have been reported cases of fracture, strokes, and nerve and disc injury from chiropractic care; however, serious side effects are extremely rare. The eligibility criteria & chiropractic exam serve to mitigate the risks of serious side effects from the chiropractic adjustments.

X-rays
If X-rays are needed, there is some radiation exposure. The total amount of x-ray radiation is less than that of a transcontinental air flight. If the clinician feels X-rays are necessary but the participant is unwilling to get them, they will be excluded from the study.

Data & safety monitoring plan (DSMP)
The PI will be responsible for ensuring participants' safety and for reporting anticipated adverse events (AAEs), unanticipated adverse events (UAEs), unanticipated problems (UPs), and serious adverse events (SAEs) to the IRB. All documentation and reporting will align with the AEs/UPs SOP for the CCR dated 6/10/24. Once the PI is made aware of any SAEs or UAEs/UPs by study personnel, he/she will prepare and send a report to the IRB within 5 business days. AAEs will be reported in the annual continuing review application. In response to AEs or UPs, the PI may choose to incorporate addendums to the study protocol to mitigate risks. If the monitoring team determines that there is imminent danger to study participants, the monitoring team may suspend or terminate the study. The PI's decision to suspend or terminate will only be done following consultation with co-investigators, the CCR director, and the senior manager for grant and clinical trials. The IRB and trial participants will be immediately notified of the suspension/termination, and all data collected up to the point of suspension/termination may be used in the final analyses.

Per the CCR's standard operating procedures (SOPs) developed to ensure good clinical practices and identify emerging trends, the PI will perform interim data checks for safety and integrity one time per month. For safety, the monitoring team will review the AEs and UPs, assess participants' progress (e.g., participant adherence to the protocol and overall retention), and perform interim data analysis of outcome measures associated with participant safety. Clinician notes and research staff concerns will also be discussed. To ensure data integrity, the monitoring team will review the quality of the data collected as well as ensure the procedures for storing and sharing data are being followed.

Section E: Confidentiality

- *Describe methods for preserving confidentiality.*
- *How will data be recorded and stored, with any identifiers attached?*
- *How will reports be written, in aggregate terms, or will individual responses be described?*
- *If applicable, what will happen to paper records, audio recordings, and video recordings at the end of the study?*

Data for the study will be reported in aggregate, and participant numbers will be used to protect the participant's identity. All testing forms and software will only utilize participant numbers. Computer files recorded during this study will only utilize participant numbers, exempting the HIPAA compliant JotForm screen and IRIS. Hard copy files of the informed consent include the participant's name and participant number; however, these files will remain locked in a secure file room within the CCR. The only individuals with access shall be the investigators. Oversight officials like the IRB may also be given access to the files upon request.

Field clinicians providing care will store participant information in their office following their standard clinic protocols. Information provided to the CCR research team from the field clinics will have Safe Harbor identifiers removed (e.g., name, month and day of birth, address) and be identified through the assigned participant number.

This study involves the collection of biospecimens (saliva). The collected saliva samples will be de-identified and sent in bulk to an outside lab (i.e., Salimetrics) to assess immune system-related markers (i.e., secretory IgA). Salimetrics will destroy (i.e., incinerate) all samples 30 days after completing their assessments.

Section F: Benefits & compensation

- *What direct benefits, if any, are to be gained by the participants? Examples of direct benefits include potential improvements in physical, psychological or emotional health, learning or knowledge benefits, or diagnostic information. If there are no direct benefits to participants, clearly state this.*
- *Will the participant receive any form of compensation? If they will receive money, gift cards, merchandise, services, complimentary health care visits or bloodwork analysis, or other compensation with financial value – describe all payment arrangements (amount of payment or value of other receivable, and the proposed method of disbursement), including reimbursement of expenses. Explain if there will be any partial payment if the subject withdraws prior to completion of the study.*
- *For Life University student participants: If class credit will be given, state the amount. State alternative ways to earn the same amount of credit if those exist.*

Although previous results observed in the chiropractic literature suggest an improvement in general health following chiropractic care, there is no guarantee of improvement or benefit to the patient following care. In addition to the satisfaction associated with contributing to the scientific body of knowledge and receiving complimentary chiropractic care, participants will be given a $50 gift card at their baseline and 2-week assessments and a $75 gift card at their 6-week assessment. They will also be reimbursed for travel expenses with a $10 gas gift card at each assessment.

Section G:

- *What information may accrue to science or society in general as a result of this work?*

The primary aims of the proposed proof-of-concept trial are centered around examining the feasibility of conducting a prospective, chiropractic intervention study on an obese population living in and around Atlanta, Georgia. This includes evaluating various implementation outcomes including recruitment, adherence, tolerability, retention, acceptability, and data fidelity. The results of this trial will inform the design of a future pilot randomized controlled trial (RCT) that has an increased focus on the efficacy/effectiveness of chiropractic care in obese populations.

References:

1. Boojari MA. Investigating the Evolution and Development of Biological Systems from the Perspective of Thermo-Kinetics and Systems Theory. *Origins of Life and Evolution of Biospheres*. 2020/12/01 2020;50(3):121-143. doi:10.1007/s11084-020-09601-0
2. Zachariae R. Psychoneuroimmunology: a bio-psycho-social approach to health and disease. *Scand J Psychol*. Dec 2009;50(6):645-51. doi:10.1111/j.1467-9450.2009.00779.x
3. !!! INVALID CITATION !!! [3];
4. !!! INVALID CITATION !!! [4];
5. Goldberger JJ, Arora R, Buckley U, Shivkumar K. Autonomic Nervous System Dysfunction: JACC Focus Seminar. *J Am Coll Cardiol*. Mar 19 2019;73(10):1189-1206. doi:10.1016/j.jacc.2018.12.064
6. McCorry LK. Physiology of the autonomic nervous system. *Am J Pharm Educ*. Aug 15 2007;71(4):78. doi:10.5688/aj710478
7. Kiani AK, Maltese PE, Dautaj A, et al. Neurobiological basis of chiropractic manipulative treatment of the spine in the care of major depression. *Acta Biomed*. Nov 9 2020;91(13-s):e2020006. doi:10.23750/abm.v91i13-S.10536
8. Welch A, Boone R. Sympathetic and parasympathetic responses to specific diversified adjustments to chiropractic vertebral subluxations of the cervical and thoracic spine. *J Chiropr Med*. Sep 2008;7(3):86-93. doi:10.1016/j.jcm.2008.04.001
9. Holt K, Niazi IK, Nedergaard RW, et al. The effects of a single session of chiropractic care on strength, cortical drive, and spinal excitability in stroke patients. *Scientific Reports*. 2019/02/25 2019;9(1):2673. doi:10.1038/s41598-019-39577-5
10. Lelic D, Niazi IK, Holt K, et al. Manipulation of Dysfunctional Spinal Joints Affects Sensorimotor Integration in the Prefrontal Cortex: A Brain Source Localization Study. *Neural Plast*. 2016;2016:3704964. doi:10.1155/2016/3704964
11. Chaplin DD. Overview of the immune response. *J Allergy Clin Immunol*. Feb 2010;125(2 Suppl 2):S3-23. doi:10.1016/j.jaci.2009.12.980
12. Colombi A, Testa M. The Effects Induced by Spinal Manipulative Therapy on the Immune and Endocrine Systems. *Medicina (Kaunas)*. Aug 7 2019;55(8)doi:10.3390/medicina55080448
13. Schalow PR, Kimball KA, Schurger FT, et al. Secretory Immunoglobulin A and Upper Cervical Chiropractic: A Preliminary Prospective, Multicenter, Observational Study. *J Chiropr Med*. Sep 2021;20(3):121-127. doi:10.1016/j.jcm.2021.10.003
14. Lin X, Li H. Obesity: Epidemiology, Pathophysiology, and Therapeutics. *Front Endocrinol (Lausanne)*. 2021;12:706978. doi:10.3389/fendo.2021.706978
15. Roy SK, Jahan K, Alam N, et al. Perceived stress, eating behavior, and overweight and obesity among urban adolescents. *J Health Popul Nutr*. Dec 17 2021;40(1):54. doi:10.1186/s41043-021-00279-2
16. Hartanto A, Yong JC. Measurement matters: higher waist-to-hip ratio but not body mass index is associated with deficits in executive functions and episodic memory. *PeerJ*. 2018;6:e5624.
17. Fidan-Yaylali G, Yaylali YT, Erdogan Ç, et al. The Association between Central Adiposity and Autonomic Dysfunction in Obesity. *Medical Principles and Practice*. 2016;25(5):442-448. doi:10.1159/000446915
18. Starzak DE, Konkol KF, McKune AJ. Effects of Cardiorespiratory Fitness and Obesity on Salivary Secretory IgA and Alpha-Amylase in South African Children. *Children*. 2016;3(3). doi:10.3390/children3030012
19. Fulton S, Décarie-Spain L, Fioramonti X, Guiard B, Nakajima S. The menace of obesity to depression and anxiety prevalence. *Trends in Endocrinology & Metabolism*. 2022;33(1):18-35.
20. O'Brien PD, Hinder LM, Callaghan BC, Feldman EL. Neurological consequences of obesity. *Lancet Neurol*. Jun 2017;16(6):465-477. doi:10.1016/s1474-4422(17)30084-4

21. Ray A, Bonorden MJL, Pandit R, Nkhata KJ, Bishayee A. Infections and immunity: associations with obesity and related metabolic disorders. *J Pathol Transl Med*. Jan 2023;57(1):28-42. doi:10.4132/jptm.2022.11.14
22. Health USDo, Human S. Withdrawal of subjects from research guidance. *Policy & Guidance*. 2010;