NCT05468853

Studying Reward Processing with fMRI, EEG, and TMS

12/14/2022

Permission to Take Part in a Human Research Study

Title of research study: ***Studying Reward Processing with fMRI, EEG, and TMS***

Investigator: ***Derek Nee***

Key Information: Please read this consent information carefully. We provide information about the study that you should think about before deciding whether to take part. We also include special information about steps that we will take to prevent your exposure to Coronavirus when you take part in our face-to-face study activities.

Why am I being invited to take part in a research study?

We invite you to take part in this research study because we are interested in understanding brain activity among individuals who report increased anhedonia (i.e., less enjoyment in daily activities). You were selected because you scored 46 or below on the Dimensional Anhedonia Rating Scale. This study will take place in-person or face-to-face. Doing this in-person will mean that you come to the Nee lab (room 408) in the Psychology Building and/or the Magnetic Resonance Imaging Facility in the College of Medicine.

Volunteers between the ages of 18-55 may participate in this study. Subjects must be able to tolerate small enclosed spaces and have no medical devices or implants on or in their bodies.

Subjects will be excluded from any studies if they have any history of pacemakers or pacer wires, open heart surgery, artificial heart valves, aneurysm clips, cochlear implants, braces or extensive dental work, implanted electrical or mechanical devices, tissue expanders, foreign metallic objects from explosives, shrapnel or metalwork fragments, or artificial limbs. Subjects will also be excluded if they are pregnant, claustrophobic, have tremors or cannot lie still for 1-2 hours, or are not native English speakers.

It is imperative that the metal screening form is filled out fully and accurately to ensure your safety in a strong magnetic field.

What should I know about a research study?

Things you should know:

- The purpose of the study is to understand the impact of brain stimulation on brain activity among individuals who score high on a measure of anhedonia. If you choose to participate, you will undergo magnetic resonance imaging (MRI) while performing a task; we will also collect EEG data while you perform a task. You will have EEG data collected weekly for several weeks; you will be scanned with fMRI 3 times over the same period.
- If you choose to participate, you will receive transcranial magnetic stimulation (TMS). This will take place 5 times within a week, twice. Each week of TMS will be followed by a week that does not involve TMS. There will also be an initial TMS session to determine your sensitivity to TMS.
- EEG/fMRI visits will take approximately 1-2 hours; Visits that include only TMS will take approximately 30 minutes.
- Whether or not you take part is up to you.
- Risks or discomforts for fMRI include dizziness, nausea, or a metallic taste in your mouth, and claustrophobia; some temporary redness or itchiness may occur in reaction to EEG gel. Risks or

discomforts for TMS include hand skin irritation or dryness, scalp discomfort, headache, neck stiffness, and in very rare instances, seizure.
- The study will have no direct benefit to you.
- Taking part in this research project is voluntary. You don't have to participate and you can stop at any time.

Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

Why is this research being done?

The purpose of the study is to the impact of brain stimulation on brain measures among individuals who score high on a measure of anhedonia. We are conducting these experiments so that we can better understand the brain basis of individual differences in enjoyment—and whether brain stimulation might change brain measures associated with enjoyment. To measure brain activity, we are using a procedure called magnetic resonance imaging (MRI). MRI involves using an MRI scanner to observe small changes in magnetic fields produced in your brain and provides a high resolution picture of your brain anatomy as well as pictures of your brain activity over time. We will also do an electroencephalography (EEG) assessment, which involves measuring small changes in the electrical activity of the brain. *To alter brain activity, we are using a procedure called transcranial magnetic stimulation (TMS). TMS involves using a magnetic stimulator to induce changes in brain activity.*

How long will the research last and what will I need to do?

Participation in this study involves multiple lab visits over the course of 4-5 weeks. Your first lab visit will last 1-2 hours, and we will record both EEG and fMRI activity; you will also be interviewed by an experimenter, fill out some self-report measures, and your sensitivity to TMS will be determined. Then, you will be randomized to receive TMS at one of two sites on the scalp, and will receive TMS 5 times over the next week. You will then complete the initial EEG/fMRI assessment again. After that, you will return a week later for EEG and self-report. You will then have one more week of TMS (at the alternative site of stimulation); this will be followed by the EEG/fMRI assessment and self-report. Finally, you will return a week after to complete the EEG and self-report measures one final time. In total, participation involves 5 lab-visits for assessing neural activity (e.g., EEG/fMRI; 1-2 hours each visit), and 10 TMS stimulation visits (5 visits in one week, 5 visits in a different week) that last approximately 30 minutes each.

If you consent, we may contact you for related studies.

In all of the testing sessions, you will be given a break approximately every 5-10 minutes. You can take more breaks if you want.

In the proposed research, we will use computer-based tasks that require making guesses and receiving feedback about whether you win or lose money on each trial. We are interested in brain activity as you make decisions, anticipate outcomes, and process outcomes in this task.

While performing this task, MRI and EEG data will be collected. You will be screened by trained personnel and excluded if you meet any exclusion criteria. You will be given instructions about the task and the MRI scanning environment. If there is any concern about claustrophobia, you will be encouraged to try the mock scanner before entering the MRI scanner. The mock scanner is located next door to the MRI scanner and provides a simulated MRI environment. If you are uncomfortable with

the enclosed environment (at any time), you can exit the study and receive compensation for your time. Otherwise, you will then be given a short practice session on the task either before entering the scanner, or during collection of preliminary and/or structural images. After being positioned in the scanner, we will acquire initial calibration scans. A structural image of the head and brain may be acquired before or after the functional imaging data. We will collect fMRI and EEG data while you perform the task.

More detailed information about the study procedures can be found under ***"What happens if I say yes, I want to be in this research?"***

Is there any way being in this study could be bad for me?

Risks for the study include:

A) Frustration from poor performance on the task, fatigue, or eye-strain.
B) Probing for personal or sensitive information in surveys, interviews, or questionnaires.
C) Potential distress related to answering questions about depressive symptoms, including suicidality.

Risks from MRI:

A) Magnetic field attracting ferromagnetic objects. There is a potential risk of the main magnet field attracting ferromagnetic/metallic objects towards the magnet.
B) Claustrophobia. The magnet is a small enclosed space that can induce feelings of claustrophobia.
C) Noise. The scanner makes a bothersome/loud noise during the course of data collection. This can damage hearing if measures are not taken to protect the ears.

Risks from EEG:

A) You may experience mild, temporary itching or tingling sensations in response to the electrode cap or electrode gel, and mild skin irritation (redness) where the electrode contacts the skin.

Risks from TMS:

A) Headache, neck stiffness, and in very rare instances, seizure.

More detailed information about the risks of this study can be found under ***"Is there any way being in this study could be bad for me? (Detailed Risks)"***

Will being in this study help me in any way?

There are no direct benefits for you from taking part in this research. This research is not related to any medical treatment you may be receiving. We hope that the knowledge gained from this research will be useful in the future diagnosis and/or treatment of patients with psychiatric or neurological disorders.

What happens if I do not want to be in this research?

Participation in research is completely voluntary. You can decide to participate or not to participate. Your alternative to participating in this research study is to not participate.

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Detailed Information: The following is more detailed information about this study in addition to the information listed above.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at nee@psy.fsu.edu

This research has been reviewed and approved by an Institutional Review Board ("IRB"). You may talk to them at 850-644-7900 or humansubjects@fsu.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

How many people will be studied?

We expect about 80 people to complete the study.

What happens if I say "yes" to being in this research?

If you agree and are eligible to participate in this study, we would ask you to do the following:

For fMRI:

A) You will be outfitted with earplugs before beginning the experiment due to the loud noise of the MRI scanner.

B) You will be asked to lie down on a narrow table/platform, which is then slid into the scanner that is about 6 feet long by 2 feet wide and open at each end.

C) Before you are placed in the scanner, an MRI coil covered in plastic will be placed around your head. Foam pads will be placed around your head to limit head movement during the session.

D) Once you are moved into the scanner, you will be asked to lie still for anywhere between 10 to 120 minutes. While MRI data are collected, the scanner will make loud noises. Some scans will acquire anatomical MRI images during which times you will be asked to lie still with no further requirements. Some scans will acquire functional MRI, during which times you may be asked to perform a task. During such times, watch the computer screen and/or listen to stimuli over headphones and limit your movements to the fingers and hands. You will be provided breaks every 5-10 minutes.

E) You will be provided oral or electronically guided instruction to perform tasks either in the scanner and/or before being placed in the scanner.

For EEG:

F) We will record your brain activity using EEG either at rest or while you complete tasks on the computer. To do this, you will wear an elastic cap that holds recording sensors on your head. These sensors need to be filled with a gel, which helps the sensors accurately record brain

activity at the scalp. Therefore, your hair may need to be cleaned after the task, but the gel washes out easily. The EEG recording is completely painless, nonintrusive, and safe. It is similar to EMG recording — the only exception is that EEG records electrical activity generated by the brain rather than muscles.

G) After scanning you will again perform the same task while EEG is recorded. We will use a non-invasive method called electromyography (EMG) to measure the electrical activity in your hand muscles. This involves lightly swabbing your skin with finegrain sandpaper and alcohol, and then pasting small electrodes to the surface of your skin. (Electrodes are small, thin metal discs, about the size of a dime, that detect tiny charges resulting from electrical activity).

For TMS:

H) A magnetic stimulator will be placed on your head and used to determine the region of the brain that directly controls the fingers (motor cortex).

I) An electrical field will be generated by the coil that will stimulate the brain. We will move the coil around different parts of your scalp in order to locate the motor cortex. You will likely feel a gentle flick and hear an audible click. This pulse is not painful, but it can cause a twitch of your hand or face muscles. Locating the motor cortex is the first step in determining your sensitivity to stimulation so that stimulation can be tailored to you.

J) We will repeat the pulse during this initial phase to determine the strength of the magnetic stimulation required to activate hand muscles.

K) For the main part of the experiment, the coil will be located over different parts of the brain. We are comparing the effects of stimulation over these different regions to examine how the affect cognitive function. Depending on your assigned study procedures, TMS may be delivered before or during the behavioral task.

For Tasks and Self-report:

L) You will perform a guessing task multiple times; this involves making decisions and finding out if you win or lose money on each trial. Other than mild frustration, there are no known risks associated with this task.

M) You will also fill out a short battery of self-report measures that assess how you feel – including how much you enjoy a variety of day to day activities. Other than boredom, there are no known risks associated with answering these questions.

Interview:

N) You will be asked to participate in a clinical interview during which an experimenter asks you about your emotional states.

What happens if I say "yes," but I change my mind later?

You can leave the research at any time it will not be held against you.

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Is there any way being in this study could be bad for me? (Detailed Risks)

While there are no known permanent negative effects from exposure to a strong magnetic field, there may be some temporary effects. These temporary effects may include dizziness, nausea or a metallic taste in your mouth. Some pulse sequences can cause temporary peripheral nerve stimulation which causes mild discomfort but is not harmful. Some pulse sequences can cause heating of your body. If you experience any discomfort that you cannot tolerate, you will be given an alarm bell to notify researchers that you would like to discontinue the study. Participation in this study is voluntary and you may choose to discontinue your participation at any time.

MRI produces very loud pulsating sounds. You will be required to wear earplugs or a headset to protect your hearing.

Participation in this study may involve some additional risks or discomforts. Being in the MRI scanner where the anatomical MRI and functional MRI procedures occur can be risky for people with pacemakers or metal in their body. You will be excluded from participation in these procedures if you have a pacemaker or any metal in your body that cannot be easily removed. Some people get claustrophobic in the MRI scanner. If you have a history of claustrophobia, we will not ask you to participate in the MRI or fMRI studies. If you do not like being in the scanner for any reason, we will immediately stop the experiment. Because the MRI scanner makes loud noises, we will give you ear plugs to dampen the sound.

Risks to a fetus from MRI are unknown. You should not participate in this study if you are pregnant, if you think you might be pregnant, or if there has been a lapse in your birth control procedures.

Many people have been studied using EEG/EMG instruments without reported harm. There is a chance of skin irritation or redness or dryness due to the sandpaper and alcohol pretreatment. If this occurs, we will provide you with an ointment to reduce skin irritation. You may experience mild, temporary itching or tingling sensations in response to the electrode cap or electrode gel, and mild skin irritation (redness) where the electrode contacts the skin.

TMS makes a clicking sound and may cause a twitch of muscles in the hand or face when applied on the motor cortex. It is often not painful, although in some subjects it can produce a slightly painful scalp sensation, or discomfort from muscle tension.

While the Magnetic Stimulators are deemed electronically safe, TMS has been reported to induce neurological seizures in rare occasions. In neurologically healthy individuals, seizures are extremely rare and typically only occur with stimulation parameters more intense and rapid than will be used in our study.

The physical risks for single pulse, and repetitive TMS are very low. The risk would be greater for someone with an undetected brain tumor or abnormality. Based on the rates at which seizures occur in people with known brain abnormalities, we would estimate the risk to be around 1% for someone with an undetected abnormality. The researchers in the TMS laboratory have been trained to recognize signs of seizure and how to respond in such an event.

As mentioned above, the main risk from high-frequency repetitive TMS is causing an epileptic seizure. However, only 7 cases of convulsions induced by repetitive TMS in subjects without risk-factors for epilepsy have been reported, despite the fact that many thousands of subjects have been studied in the past decade world-wide. It is of note that these seizures occurred with stimulation of higher intensity

and frequency than our proposed study. Nevertheless, if you experience dizziness, nausea, or feel lightheaded, please let us know and we will cease TMS.

Risks associated with TMS may be increased in the presence of drug and alcohol abuse and/or dependence. Furthermore, there may be additional risks associated with depression. Risks are also increased in those with a neurological condition, and those suffering from sleep deprivation. For your safety, we ask that you disclose such risks to us and excuse yourself from participation if such circumstances apply to you.

Because the sound emitted by the stimulator is so brief, it is not perceived as being loud. This sound, however, is loud enough that it could potentially cause hearing damage. Thus, we will require that you wear ear protection during the experiment. The use of ear protection eliminates risk of hearing impairment.

There is a possibility of an onset of a headache after the study in susceptible individuals. These have been reported only rarely, and are mild and of short duration when they do occur. However, you should not participate if you have a history or migraine or other types of severe or frequent headaches. If you experience a headache at any point during the experiment, please report this immediately.

It is also possible that you will experience some neck stiffness or neck pain. This is believed to be due to the straight posture of the head and neck we will require during the experiment. If you experience neck stiffness or discomfort at any point during the experiment, please report this immediately.

If you feel any discomfort or pain at any time during the experiment, let us know and the procedures will be adjusted to alleviate your discomfort/pain or stopped altogether.

Risks to a fetus from TMS are unknown. You should not participate in this study if you are pregnant, if you think you might be pregnant, or if there has been a lapse in your birth control procedures.

During the EEG recording, there is a small possibility of mild skin irritation (redness) where the electrode contacts the skin. However, this is rare and only temporary.

Because this is a research study, there may be additional risks that we cannot identify at this time.

What happens to the information collected for the research?

All identifying information will be stored securely. Hardcopies of written forms will be kept in a locked drawer in a laboratory that remains locked with restricted access. Electronic records will be maintained in password-protected accounts. No identifying information will be publicly disseminated. Identifying information will be deleted or destroyed within 2 years of study completion.

Non-personally identifying information including, but not limited to, age, gender, ethnicity, and task performance will be kept indefinitely. Such data may be included in publicly released datasets so that other researchers can perform replication or extension analyses. If brain imaging data are publicly shared, facial anatomical features will be removed from the data to preserve anonymity.

Data from this study may be submitted to the National Institute of Mental Health Data Archive (NDA) at the National Institutes of Health (NIH). NDA is a large database where deidentified study data from many National Institute of Mental Health (NIMH) studies is stored and managed. Deidentified study data means that all personal information about you (such as name, address, birthdate and phone number) is removed and replaced with a code number. Sharing your deidentified study data helps

researchers learn new and important things about mental health and substance use more quickly than before.

During and after the study, the study researchers may send deidentified study data about your health and behavior to the NDA. Other researchers across the world can then request your deidentified study data for other research. Every researcher (and institutions to which they belong) who requests your deidentified study data must promise to keep your data safe and promise not to try to learn your identity. Experts at the NIH who know how to keep your data safe will review each request carefully to reduce risks to your privacy. Sharing your study data does have some risks, although these risks are rare. Your study data could be accidentally shared with an unauthorized person who may attempt to learn your identity. The study researchers will make every attempt to protect your identity.

You may not benefit directly from allowing your study data to be shared with NDA. The study data provided to NDA may help researchers around the world learn more about mental health and substance use and how to help others who have problems with mental health and substance use.
NIMH will also report to Congress and on its website about the different studies using NDA data.
You will not be contacted directly about the study data you contributed to NDA.

You may decide now or later that you do not want your study data to be added to the NDA. You can still participate in this research study even if you decide that you do not want your data to be added to the NDA. If you know now that you do not want your data in the NDA, please tell the study researcher before leaving the lab today. If you decide any time after today that you do not want your data to be added to the NDA, call or email the study staff who conducted this study, and they will tell NDA to stop sharing your study data. Once your data is part of the NDA, the study researchers cannot take back the study data that was shared before they were notified that you changed your mind. If you would like more information about NDA, this is available on-line at http://nda.nih.gov.

If you choose to withdraw from the study, data collected up until the point of withdrawal will be subject to the policies described above.

The records of this study will be kept private and confidential, to the extent allowed by law. In any publications or presentations, we will not include any information that will make it possible to identify you as a subject.

If your responses indicate that you may be at imminent risk for suicide or for harming yourself or others, one of the trainee clinicians working as research staff on this study will be notified and will contact you in order to provide beneficial information and further resources. Resources include self-help plans, crisis line numbers, referral information to mental health clinics, and if necessary for your safety, notification of emergency services.

The study you are participating in may be considered a clinical trial by the definition of the National Institute of Health. Clinical trials supported by the National Institute of Health and its related branches are subject to the posting of clinical trial information at ClinicalTrials.gov. As per the above, all posted information will be non-personally identifying.

Your name will never be directly associated with your study information, **UNLESS** you agree to have your scan reviewed by a radiologist, at no cost to you. (See section on Incidental Findings).

Your protected health information (PHI) created or received for the purposes of this study is protected under the federal regulations known as HIPAA. Refer to the HIPAA authorization for details concerning the use of this information. We will do our best to be sure that the personal health

information you provide for this study will be kept private. However, we cannot guarantee total privacy. Organizations that may look at and/or copy your records for research, quality assurance and data analysis include:

- Certain government agencies (FDA, OHRP)
- The FSU Institutional Review Board

Can I be removed from the research without my OK?

The person in charge of the research study or the sponsor can remove you from the research study without your approval. Possible reasons for removal include behavior that is disruptive to the research environment and failure to perform the tasks to the best of your ability (e.g. using your phone instead of performing the task).

What else do I need to know?

In the event of an injury, experimenters are not responsible for the administration of first aid or emergency treatment. If licensed medical professionals are required, care for injuries will be billed in the ordinary manner to the research subject or their insurance company. In signing this form, you are not waiving any legal rights.

If you agree to take part in this research study, we will pay you $20 per hour. If you do not complete the study, you will be compensated a prorated amount in accordance with the time that you participated. If you complete all sessions, you will receive a $50 completion bonus. You may also receive bonuses for task performance for up to $10 per session.

Incidental and Secondary Findings

The MRI scan is being done to answer research questions, not to examine your brain for medical reasons. This MRI scan is not a substitute for a clinical scan (the type a doctor would order). The research scan might not show problems that may be picked up by a clinical MRI scan. However, all research MRI scans will be read by a neuroradiologist (a doctor with experience reading MRI scans) unless you have been scanned at FSU in the previous six months.

Incidental findings are potential health problems that are discovered during the course of conducting research. At Florida State University Magnetic Resonance Imaging Facility, we have all neurological research MRI scans evaluated for incidental findings, **UNLESS YOU DO NOT CONSENT TO THIS EVALUATION**.

If you consent to having your scans reviewed for incidental findings, your data will be transferred using secure encrypted methods to password-protected servers. As with all such data transfer, this ensures integrity, authenticity and confidentiality of the data in transit.

To permit the generation of your incidental findings report, your name and date of birth will be supplied to the provider of neuroradiological review services. This will also be transferred via secure encrypted methods which ensures integrity, authenticity and confidentiality of the data in transit.

The provider of neuroradiological review services may maintain your data indefinitely and may use deidentified and aggregate incidental findings data with existing and future data for statistical analysis. When your scan is read, we will mail a copy of the report to you, or contact you (with your permission) by phone to help answer questions.

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Due to the very high sensitivity of MRI in detecting abnormalities, there is a risk of false-positive findings, identifying something on imaging studies that may or may not be important. This may result in anxiety and additional testing, possibly including a recommendation for clinical scans at your cost. The radiology report or other study data will not be put into your medical record unless you provide it to your physician. If the radiology report becomes part of your personal medical record, it may or may not have an effect on getting health insurance or life insurance in the future.

Please check the appropriate box regarding your decision to have your scan reviewed for incidental findings.

☐ **I DO** consent to have my MRI scan reviewed for incidental findings.

☐ **I DO NOT** consent to have my MRI scan reviewed for incidental findings.

Permission to Take Part in a Human Research Study

Signature Block for Capable Adult

Your signature documents your permission to take part in this research.

Signature of subject	Date
Printed name of subject	
Signature of person obtaining consent	Date
Printed name of person obtaining consent	