

GERIATRIC PSYCHIATRY NEUROIMAGING PROGRAM BULLETIN

WINTER 2024 ISSUE

ABOUT US

As we age, our needs change both with our physical and mental health. Many older persons usually keep a close eye on physical health. Observing changes in mental health is equally as important. The mission of the GPN research team is to better understand and treat mental health conditions in older persons. The GPN team also focuses on a concept of resilience (an ability to adapt positively when you face changes and challenges) in our brain research, so we can identify sources of healthy aging.

We can only pursue this mission with the generosity of our participants. If you are reading this and have participated in our studies, we want to express our heartfelt thanks for your participation! If you are reading this and are interested in getting involved our research, please check the information in this newsletter.



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VIRTUAL STUDY: BI-OASIS

LAB ANNOUNCEMENTS & UPDATES

When was the last time you had a good conversation with someone outside of your family and 30+ years younger? In this modern lifestyle, both younger and older generations do not have an opportunity to talk regularly with someone who is significantly younger or older than them. But scientific studies have shown the benefits of such an “inter-generational interaction” for both younger and older generations.

Retirement or loss of spouse are common life events among older adults. These events could make people become socially isolated and feel lonely. These events could also trigger mental health issues, such as depression. Loneliness and social isolation are similar but have some key differences. Social isolation is a lack of interaction with people, but loneliness is someone’s sad feelings of being alone. Even if someone frequently spends time with friends or family, this person can still suffer from feelings of loneliness.

In our new study, called Behavioral Implications amongst Older Adults in Social Isolation (BI-OASIS), we are interested in studying social isolation/loneliness in older adults. Also, we will look at the impact of relationships between older and younger generations.

If you are interested in being a part of this study, please see the study flyer page 12.



NEED TO TALK TO SOMEONE?

A crisis can be anything- from feeling lonely and needing to talk, to feeling overwhelmed with life. Stress and problems – both large and small – fill each of our lives and we all have moments of crisis.

No matter how big or small these problems seem, it helps to talk with someone.

There’s no need to wait until a problem spirals out of control to reach out for help. All you have to do is pick up the phone and call:

1-888-796-8826

Resolve Crisis Services is a 24-hour, 365-day crisis service. It’s free to all residents of Allegheny County, regardless of your ability to pay.

RECENT POSTERS & PUBLICATIONS

LAB ANNOUNCEMENTS & UPDATES

Age- and Sex-Related Morphological Changes in Cerebral Blood Vessels: a 7T TOF MRA Study

Li Jiatai, a Bioengineering PhD student, and colleagues investigated how the shape of blood vessels in the brain changes with age and sex using advanced imaging techniques.

Researchers scanned the brains of 25 older adults and used computer algorithms to analyze the blood vessel shapes. They found that as people age, the blood vessels become more twisted, especially the smaller ones, and this effect is more pronounced in women. These changes in blood vessel shape might increase the risk of Alzheimer's disease, especially in older women. However, the study had some limitations, such as a small number of participants and only looking at one point in time. Further research with more participants and over a longer time period is needed to confirm these findings.

[Click here to read full article.](#), or see page 16 for more information

Unique Time-Series Patterns of Behavioral and Psychological Factors in Late-Life Depression: A Computational Psychiatry Approach with Hidden Markov Models

Saurab Faruque MPH, a medical student, and colleagues at GPN used a method called Hidden Markov Models (HMM) to study how different psychological and behavioral traits changed in older adults during the first year of the COVID-19 pandemic. Traditional methods focus on how individual traits change over time, but HMM helps understand how these traits relate to each other in a sequence. They found that older adults with depression were more likely to experience increasing or decreasing depression levels, as well as decreasing loneliness levels, compared to those without depression. Interestingly, exercise did not seem to have a significant impact on these patterns. The study suggests that HMM can be a useful tool to understand how different psychological traits are connected and how they change over time. [Click here to read full article](#), or see page 16

[for more information.](#)

Big Five personality characteristics, neuropsychological test performance, and self-rated cognition in older adults.

Taylor Lazzari, a research specialist at GPN, recently won the Best Poster Award at the University of Pittsburgh's Aging Research Day in the Clinical and Translational Research – Research Staff category. Taylor presented her research for her honors thesis project with Dr. Kirk Erickson and Dr. Briana Sprague studying the relationship between the Big Five personality characteristics, neuropsychological test performance, and self-rated cognition in older adults. Lazzari et al. found certain personality traits, specifically extroversion and openness, may be important personality traits to consider for older adult cognitive function. Future research should examine whether these traits are associated with future cognitive decline or impairment. [Click here to view poster](#), or see

[page 16 for more information](#)

CONGRATUATIONS ANTONIJA KOLOBARIC LAB ANNOUCEMENTS & UPDATES

Congratulations to Antonija Kolobaric, for completing her Neuroscience PhD from the University of Pittsburgh School of Medicine. Antonija successfully defended her dissertation in December 2023, the final step in completing all her program requirements and be conferred her PhD. A dissertation is a written compilation of the candidate's academic research and provides a detailed description of their project (typically a five-chapter document).

Here is a summary of Antonija's dissertation:

Dementia, known as Major Neurocognitive Disorder (MNCD), affects over 50 million people, causing memory loss and communication challenges. Late Life Depression (LLD) worsens these symptoms, putting a heavy burden on society and healthcare. Effective treatments for MNCD and LLD are limited, and efforts focus on understanding the relationship between clinical symptoms and neural networks, as well as exploring the gut-brain axis.

The first chapter of Antonija's dissertation investigates the intricate connection between gut microbiota, brain function, cognitive abilities, and depressive symptoms in those with Mild Cognitive Impairment (MCI) or MNCD, aiming to offer insights and interventions for individuals facing these conditions and reduce their impact on society.



*Pictured: Dr. Antonija Kolobaric
at graduation from the Unveristy of Pittsburgh*

CONGRATUATIONS ANTONIJA KOLOBARIC LAB ANNOUCEMENTS & UPDATES

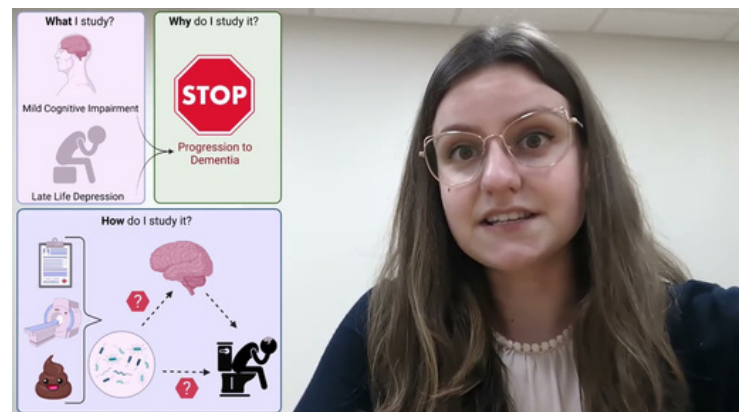
Chapter 2 of the dissertation looks at how the variety of microorganisms in the gut (gut microbiome diversity) is connected to how well we think (cognitive function) and our feelings of sadness (depressive symptoms). It specifically checks if the richness and evenness of the gut microbiota, known as alpha diversity, have anything to do with our thinking ability or mood. This chapter also explores if feeling sad and how well we think work together to affect alpha diversity.

In Chapters 3 and 4, these sections aim to uncover the connections between brain functional connectivity, cognitive function, depressive symptoms, and alpha diversity. Chapter 3 specifically explores which features of the brain's resting state are most strongly linked to cognitive function or depressive symptoms. In Chapter 4, the investigation extends to whether specific features of brain functional connectivity partially mediate the relationship between alpha diversity, cognitive function, and depressive symptoms.

In conclusion, this dissertation presents a thorough exploration of the microbiota-gut-brain axis and its implications for cognitive function and depressive symptoms in older adults. The findings have the potential to provide valuable insights and innovative interventions for individuals dealing with these conditions, ultimately reducing the societal burden of MNCDD and related disorders.

*Pictured: Dr. Antonija
Kolobaric presenting at
2022 BOSNIA & HERZEGOVINA
3- MINUTE THESIS
COMPETITION*

[Click here to watch video](#)
or see page 16 for more
information



HEALTHY BRAIN AGING INFO SESSION GPN COMMUNITY EVENTS

Would you be interested in having GPN staff give an informative presentation at your local church, senior center, or other group about aging and memory? Dr. Howard J. Aizenstein, MD, PhD is a Geriatric Psychiatrist and the director of the University of Pittsburgh Geriatric Psychiatry Neuroimaging (GPN) program. Dr. Akiko Mizuno, PhD is a Research Instructor in Psychiatry, also within the GPN lab.

They will be discussing healthy brain aging along with mental health challenges faced by the elderly population. These topics will include treatment and prevention of brain diseases such as dementia, late life depression and other cognitive challenges. They will also provide information about resources to help with these challenges within Pittsburgh's older adult community. Lastly, they will present information about the research that is being conducted within this group (using magnetic resonance imaging (MRI) and positron emission tomography (PET) studies to learn more about these conditions and how to effectively treat them.

And a special thank you to Monroeville United Methodist Church for hosting a talk with Howard and Akiko in September 2022.

**If you're interested, please reach out to
Jaclyn Toboz (tobozjm2@upmc.edu)
for more information!**



BEST LOW-IMPACT EXERCISES FOR THE YOUNG HEART HEALTH & WELLNESS

In the world of fitness, many older adults need paths with fewer hurdles to still stay active – low-impact exercises are the answer, because life's tough enough!

WHAT IS LOW IMPACT?

LOW-IMPACT EXERCISE INVOLVES **MOVEMENT IN YOUR BODY WITHOUT SLAMMING, JUMPING, AND JARRING.**

IN LOW-IMPACT EXERCISES, **ONE OR BOTH FEET WILL ALWAYS BE IN CONTACT WITH THE GROUND** FOR STANDING EXERCISES, OR IF YOU ARE SITTING OR SWIMMING, **NO JARRING OR IMPACT WILL OCCUR ANYWHERE IN THE BODY.**



PAINS AND GAINS

IN TODAY'S ERA OF LONG LIFE EXPECTANCY, MANY PEOPLE EXPERIENCE **CHRONIC OR LONG-TERM PAIN.** THIS PAIN MAKES STAYING ACTIVE CHALLENGING, ESPECIALLY SINCE IT APPEARS LIKE MOST OPTIONS CATER TO THOSE WITH HIGH MOBILITY.

BUT, IT IS IMPORTANT TO KEEP MOVING FOR AS LONG AS POSSIBLE. TAKING CARE OF JOINTS AND MUSCLES THROUGH **LOW-IMPACT EXERCISES CAN PRESERVE PHYSICAL ABILITY FOR AS LONG AS POSSIBLE.**

EXERCISING WHEN IN PAIN, ESPECIALLY CHRONIC PAIN, MIGHT SEEM COUNTERINTUITIVE, BUT IT IS BENEFICIAL. EXERCISE ELEVATES YOUR HEART RATE AND **PROVIDES CARDIOVASCULAR AND AEROBIC BENEFITS.** WITH LOW IMPACT EXERCISES, MUSCLES AND JOINTS WILL STILL BE CHALLENGED, **IMPROVING STRENGTH AND MOBILITY.**

HIGH IMPACT WORKOUTS RISK:

- **LIMITED MOBILITY:** HIGH-IMPACT WORKOUTS MAY BE UNDOABLE FOR THOSE WITH LIMITED MOBILITY.
- **FEAR OF INJURY OR WORSENING PAIN:** THERE'S A RISK OF INJURY OR EXACERBATING EXISTING PAIN WITH HIGH-IMPACT EXERCISES.
- **CARDIOVASCULAR STRAIN:** HIGH-IMPACT WORKOUTS CAN PUT SIGNIFICANT STRAIN ON THE CARDIOVASCULAR SYSTEM.

BEST LOW-IMPACT EXERCISES FOR THE YOUNG HEART HEALTH & WELLNESS

LOW-IMPACT EXERCISES



CARDIOVASCULAR HEALTH: PROVIDE HEART BENEFITS WITHOUT STRAINING THE CARDIOVASCULAR SYSTEM.

EXAMPLE: STANDING CRUNCHES

LEVEL OF ACTIVITY: LOW

WHY IT HELPS: ENGAGES THE CORE, IMPROVING CARDIOVASCULAR HEALTH BY INCREASING HEART RATE WITHOUT PUTTING TOO MUCH STRAIN ON THE CARDIOVASCULAR SYSTEM.

BETTER SLEEP: CONTRIBUTES TO IMPROVED SLEEP QUALITY.

EXAMPLE: YOGA

LEVEL OF ACTIVITY: LOW

WHY IT HELPS: YOGA CAN HELP REDUCE STRESS AND ANXIETY, PROMOTING RELAXATION AND BETTER SLEEP QUALITY.



CHRONIC DISEASE MANAGEMENT: SUPPORTS MANAGING CONDITIONS LIKE DIABETES AND HYPERTENSION.

EXAMPLE: SWIMMING

LEVEL OF ACTIVITY: LOW TO MODERATE

WHY IT HELPS: SWIMMING CAN HELP IMPROVE CARDIOVASCULAR HEALTH, WHICH IS BENEFICIAL FOR MANAGING CONDITIONS LIKE DIABETES AND HYPERTENSION. IT'S ALSO GENTLE ON THE JOINTS, MAKING IT A GOOD OPTION FOR THOSE WITH CHRONIC PAIN.



JOINT HEALTH: EXERCISES ARE GENTLE, REDUCING JOINT STRESS AND MINIMIZING INJURY RISK.

EXAMPLE: TAI CHI

LEVEL OF ACTIVITY: LOW TO MODERATE

WHY IT HELPS: IMPROVES BODY AWARENESS, BALANCE, AND JOINT FUNCTIONALITY



BONE HEALTH: HELPS MAINTAIN BONE DENSITY, REDUCING OSTEOPOROSIS RISK

EXAMPLE: WALKING

LEVEL OF ACTIVITY: LOW

WHY IT HELPS: WALKING IS A WEIGHT-BEARING EXERCISE THAT APPLIES FORCE TO YOUR BONES, WHICH HELPS MAINTAIN BONE DENSITY AND REDUCES THE RISK OF OSTEOPOROSIS.



IMPROVED MOBILITY: ENHANCES FLEXIBILITY, BALANCE, AND RANGE OF MOTION FOR BETTER MOBILITY.

EXAMPLE: STRETCHING EXERCISES

LEVEL OF ACTIVITY: LOW

WHY IT HELPS: STRETCHING CAN HELP IMPROVE FLEXIBILITY, INCREASE RANGE OF MOTION, AND ENHANCE MOBILITY. IT CAN HELP PREVENT INJURIES AND STIFFNESS.



MUSCLE STRENGTH: CONTRIBUTES TO MUSCLE STRENGTH, SUPPORTING DAILY ACTIVITIES.

EXAMPLE: RESISTANCE BAND EXERCISES

LEVEL OF ACTIVITY: LOW

WHY IT HELPS: BUILDS STRENGTH WITHOUT PUTTING TOO MUCH STRAIN ON THE JOINTS. THEY CAN BE ADAPTED TO SUIT DIFFERENT FITNESS LEVELS AND CAN TARGET VARIOUS MUSCLE GROUPS.



SOURCES:
[HTTPS://WWW.IRT.ORG.AU/THE-GOOD-OR-BAD-OF-LOW-IMPACT-EXERCISES-FOR-SENIORS/](https://www.irt.org.au/the-good-or-bad-of-low-impact-exercises-for-seniors/)
[HTTPS://WWW.HUMANAGOOD.ORG/RESOURCES/SENIOR-LIVING-BLOG/LOW-IMPACT-EXERCISES-FOR-OLDER-ADULTS](https://www.humanagood.org/resources/senior-living-blog/low-impact-exercises-for-older-adults/)
[HTTPS://WWW.LIFELINE.COM/BLOG/LOW-IMPACT-EXERCISE-FOR-SENIOR-HEALTH-AND-HAPPINESS/](https://www.lifeline.com/blog/low-impact-exercise-for-senior-health-and-happiness/)
[HTTPS://WWW.CIGNA.COM/KNOWLEDGE-CENTER/WHAT-IS-LOW-IMPACT-EXERCISE](https://www.cigna.com/knowledge-center/what-is-low-impact-exercise/)
[HTTPS://WWW.EVERYDAYHEALTH.COM/FITNESS/LOW-IMPACT-WORKOUTS/GUIDE/](https://www.everydayhealth.com/fitness/low-impact-workouts/guide/)
[HTTPS://WWW.VERYWELLHEALTH.COM/LOW-IMPACT-EXERCISE-5216089/](https://www.verywellhealth.com/low-impact-exercise-5216089/)
[HTTPS://WWW.AEGISLIVING.COM/RESOURCE-CENTER/OVERCOMING-BARRIERS-TO-EXERCISE-AMONG-THE-ELDERLY/](https://www.aegisliving.com/resource-center/overcoming-barriers-to-exercise-among-the-elderly/)

HOWARD AIZENSTEIN:

RESEARCH SPOTLIGHT

Dr. Aizenstein (MD, PhD), is a geriatric psychiatrist and director of the GPN program. He earned both his PhD in Computer Science and MD at the University of Illinois. He is an expert in studying how the brain changes as people age and in understanding disorders related to aging, with a focus on MRI analysis methods for aging research. His research group has developed methods to analyze MRI data, studying how brain networks involved in emotions and thinking evolve over time. He's experienced in using MRI to study various mood and cognitive disorders. Dr. Aizenstein is also known for his mentoring skills, having received awards for his guidance of students and fellow researchers.



In a recent review paper, Dr. Aizenstein and colleagues discussed deep learning and geriatric mental health. This overview introduces clinicians to deep learning, a powerful tool in understanding complex data patterns, especially in geriatric psychiatry. It explains machine learning and deep learning basics and how they apply to mental health care for older adults, highlighting the complexity of factors influencing late-life mental health. The review emphasizes the importance of incorporating diverse data streams into clinical decision-making processes and the potential of deep learning to simplify this complexity. It discusses the ethical considerations surrounding the use of deep learning and the need for interdisciplinary collaboration to address these challenges. While recognizing the potential of deep learning to revolutionize medical science, the review stresses the importance of using these tools to augment rather than replace human care. Overall, the aim is to provide clinicians with a foundational understanding of deep learning and its early applications in clinical practice.

[Click here to read the full article](#), or see page 16 for more information.

NOAH SCHWEITZER: GRADUATE STUDENT SPOTLIGHT

Noah Schweitzer is a graduate student studying in the GPN Lab. He's in his fourth year of doctoral studies in Bioengineering under the supervision of Dr. Bistra Jordanova, Dr. Minjie Wu, and Dr. Howard Aizenstein. Noah earned his bachelor's degree in Nuclear Engineering - Radiation Sciences with a minor in physics from the University of Wisconsin-Madison in 2020. His PhD dissertation project focuses on how APOE4 and the female sex contribute to vascular dysfunction in aging. He utilizes mouse models of Alzheimer's Disease to investigate the cellular mechanisms of this question and translate his findings into human neuroimaging data for clinical applications. During his PhD tenure so far, he has published two first author papers in Alzheimer's & Dementia and Diabetes, along with one second author paper. He has presented some of his work as a presentation at Brain & Brain PET 2022 in Glasgow, Scotland and as a poster in 2021 and 2023 Alzheimer's Association International Conference, and 2023 Society for Neuroscience Conference.



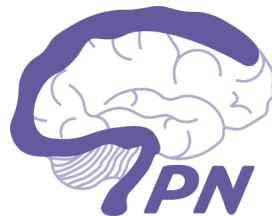
He recently published findings in which he was lead author and Dr. Minjie Wu as senior author in Alzheimer's & Dementia Journal. Him and colleagues looked at how small vessel disease (SVD) and a substance commonly found in Alzheimer's Disease, called amyloid-beta affect the connections in the part of the brain called the hippocampus differently based on sex. They found that women had stronger connections between the hippocampus on each side of the brain, and that this was linked to higher SVD burden. In contrast, men had increased connections between the hippocampus and another part of the brain called the prefrontal cortex. Sex is an important factor when studying Alzheimer's disease, as roughly two-thirds of individuals with the disease in the United States are female, and sex differences have been observed in the trajectories of cognitive decline and disease progression. These findings suggest sex-dependent alterations in the memory network in the presence of SVD and Alzheimer's disease pathologies and highlight the role of cerebrovascular disease in women's risk for Alzheimer's disease, potentially explaining the accelerated trajectory of cognitive decline in women.

[Click here to read full article, or see page 16 for more information.](#)

WOULD YOU LIKE TO PARTICIPATE IN OUR RESEARCH?

The following pages list information for our studies that are currently recruiting new participants!

Please read the information on the flyer, and use the contact information if you're interested participating or if you would like more information.



MEET OUR DIRECTOR:



HOWARD AIZENSTEIN, MD, PhD

Dr. Howard Aizenstein is a Professor of Psychiatry at the University of Pittsburgh School of Medicine in the Department of Psychiatry. Howard is also involved in different centers around Pittsburgh, including the Alzheimer's Disease Research Center (ADRC) & the Benedum Geriatric Center.

BI-OASIS FLYER



ISOLATION OR LONELINESS IN OLDER ADULTS RESEARCH STUDY

Study Purpose

- To examine social isolation/loneliness and wellbeing over time among older adults
- To understand the impact of the relationships between an older and younger generations on social isolation/loneliness

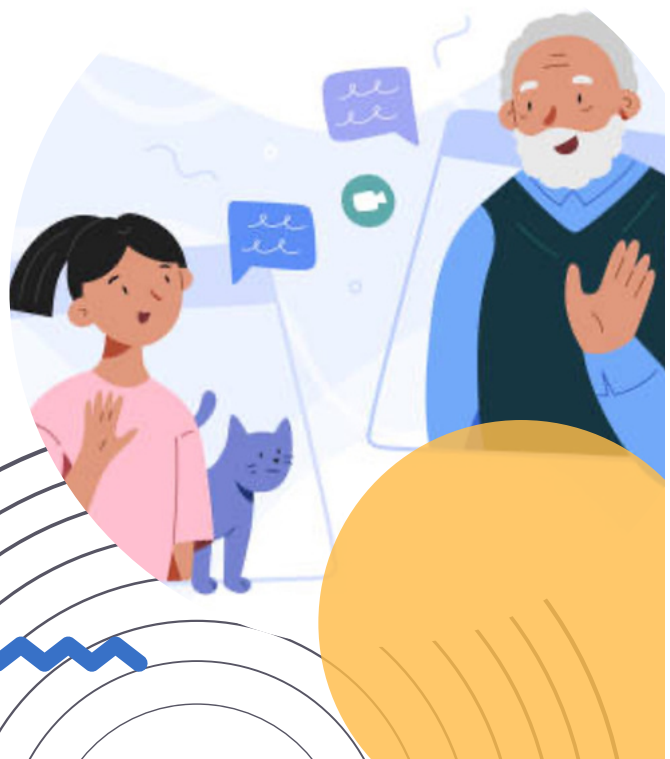
Who is Eligible?

Individuals aged 60 years and older who live alone and/or experience feelings of loneliness

What is involved?

- A Consent Call
- 12 weekly video calls with a student researcher
- A Wrap Up Call
- Participants can earn up to \$140 for completing the study

Interested? For more information, contact Taylor:
412-246-5685
lazzari@pitt.edu



NORMAL AGING PROGRAM FLYER

PITT+ME TITLE

Normal Aging Study

STUDY BASICS *(400 character limit)*

Are you age 65 or older and generally healthy? If so, you may be able to participate in a brain imaging research study that examines the effect of normal aging on mental and physical abilities. Participation involves questionnaires, tests, and MRI and PET scanning. Compensation and paid parking provided.

STUDY PURPOSE

As a person ages, the brain changes. While many changes are normal, others may be signs of potential health problems. The purpose of this study is to help researchers better understand how certain types of brain changes may be related to changes in mental performance that often occur with increasing age. Researchers hope their findings will lead to a better understanding of brain changes and mental performance in older adults.

COULD THIS STUDY BE RIGHT FOR YOU?

- Ages 65 or up
- Are generally healthy
- Have 12 or more years of education
- Fluent in English
 - No history of psychiatric or neurological disorders (e.g., bipolar disorder, current major depression, stroke, Parkinson's disease, substance use disorder)
- Able and willing to undergo MRI scanning (not claustrophobic)

AGE: 65 and up

VISITS: Up to 5

DURATION: Up to 32 months

LOCATION:

Western Psychiatric Institute and Clinic of UPMC and MR Research Center - Oakland

COMPENSATION:

Up to \$1000+ paid parking/transportation costs

PLEASE CALL 412-246-5314 IF INTERESTED!

DAVIS RESEARCH STUDY

MRI Sequence Testing

Research Study Details

The purpose of this research study is to streamline appropriate parameters for MR imaging and spectroscopy for other studies using the MR scanner.



What's involved?

- Completing questionnaires
- MRI scan measuring brain activity during some computer tasks

Who is eligible?

10 year olds and older

Interested?

Compensation is provided

For more information:

Call: 412-246-6136

Email: DAVSTUDY@PITT.EDU

MORE INFORMATION...

**Want to read articles & other work published by our lab?
This list will help you find them!**

**Please search the title and journal name
OR type out the URL into your
preferred search engine**

On page 4:

Title: Age- and Sex-Related Morphological Changes in Cerebral Blood Vessels: a 7T TOF MRA Study

Journal/Website: Alzheimer's Association Journals

Link: <https://alz-journals.onlinelibrary.wiley.com/doi/full/10.1002/alz.080087>

Title: Unique Time-Series Patterns of Behavioral and Psychological Factors in Late-Life Depression: A Computational Psychiatry Approach with Hidden Markov Models

Journal/Website: The American Journal of Geriatric Psychiatry/Science Direct

Link: <https://www.sciencedirect.com/science/article/abs/pii/S1064748124001337>

Title: Big Five Personality Characteristics, Neuropsychological Performance, & Subjective Cognitive Functioning in Older Adults

Link: https://www.adrc.pitt.edu/wp-content/uploads/2023/11/22_Lazzari.pdf

On page 6:

Title: Antonija Kolobarić - Human Microbiome-Gut-Brain Axis in Cognitive Impairment and Depression

Website: YouTube

On page 10:

Title: Deep Learning and Geriatric Mental Health

Journal/Website: The American Journal of Geriatric Psychiatry/Science Direct

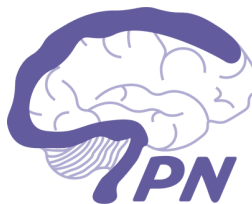
Link: <https://www.sciencedirect.com/science/article/pii/S1064748123004876>

On page 11:

Title: Sex-dependent alterations in hippocampal connectivity are linked to cerebrovascular and amyloid pathologies in normal aging

Journal/Website: Alzheimer's Association Journals

Link: <https://alz-journals.onlinelibrary.wiley.com/doi/10.1002/alz.13503>



THANK YOU!

**We appreciate your support of
our research at GPN!**

**For more information about studies, refer to
the flyers throughout this bulletin:**

Normal Aging Program - Page 15

BI-OASIS - Page 13

DAVIS - Page 16

Our Location

3501 Forbes Avenue, Pittsburgh, PA 15213

