



Annual Report

2022

ROGERS
Research Center

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A message from our vice president of research

This past year has been one of growth and momentum for the Rogers Research Center. Building on Rogers' foundation of clinical excellence, we continued to advance our vision toward improved patient care and clinical outcomes through research. New collaborations with our treatment teams, community leaders, and academic and industry partners opened doors to initiate high-impact studies across multiple service lines and strategic research areas.

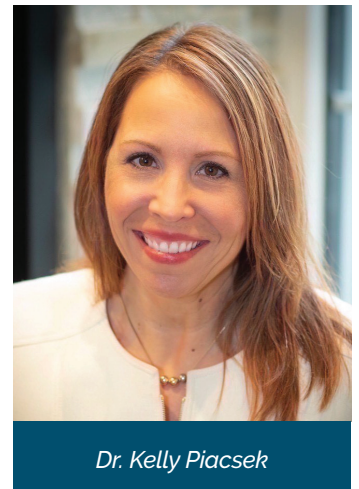
These accomplishments are just a step in the journey toward strategic growth and behavioral health research leadership. We are thankful for the ongoing commitment of the Rogers executive leadership team and Board of Directors, and for the partnership with the Rogers Foundation team. The support and enthusiasm for our work, and our shared goals, has accelerated our progress forward.

Reflecting on his Rogers legacy, Patrick Hammer, president and CEO ex officio pending his upcoming retirement after a decade of leadership, noted the Research Center as one of his greatest accomplishments at Rogers. We are grateful to Pat for being a Research Center champion and we are thankful for the ongoing commitment to research from Rogers' new president and CEO, Dr. John Boyd.

The programs highlighted in this report would not be possible without our generous donors. This support has helped expand our capacity to

pursue innovative research activities and novel studies, many of which will be possible thanks to a new five-year investment in the mental health outcomes of adolescents and young adults that will initiate in 2023. These gifts also enable pilot projects that are critical to testing feasibility of conducting research involving new technologies, treatment methods, and multi-disciplinary collaborations across the organization. We are humbled by the ongoing support and enthusiasm for research from our donors, our leaders, our colleagues, and the Rogers Foundation.

Our dedicated researchers and research support staff continue to advance our work with intellectual curiosity and a deep commitment to improved mental health for all. We look forward to continued growth in 2023 and beyond.



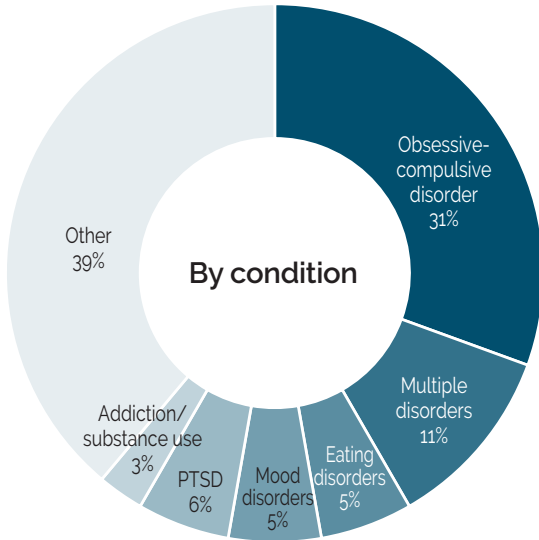
Dr. Kelly Piacsek

A handwritten signature in black ink that reads "Kelly Piacsek".

Kelly Piacsek, PhD
Vice President of Research
Rogers Research Center

Research Center metrics

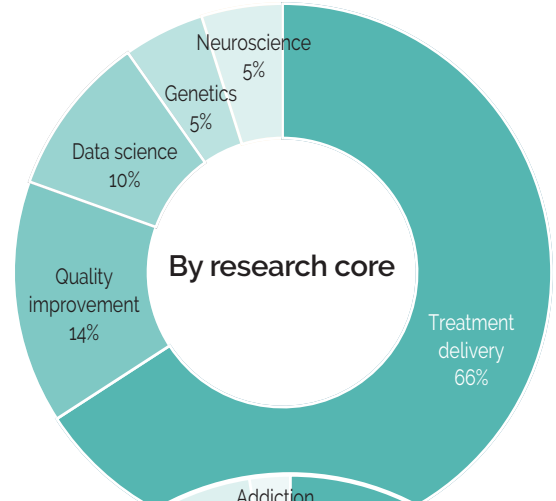
Publications | 36



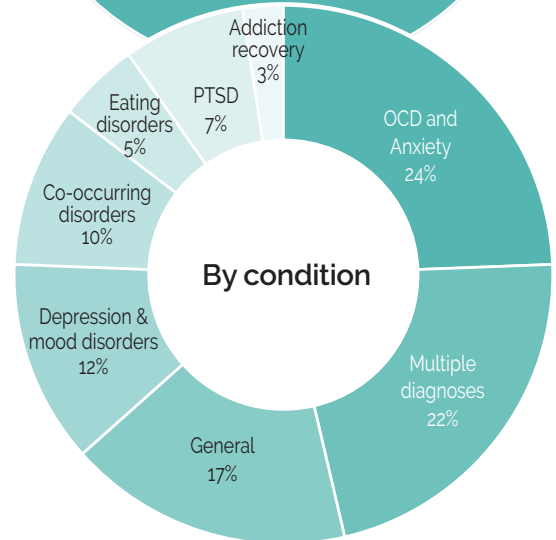
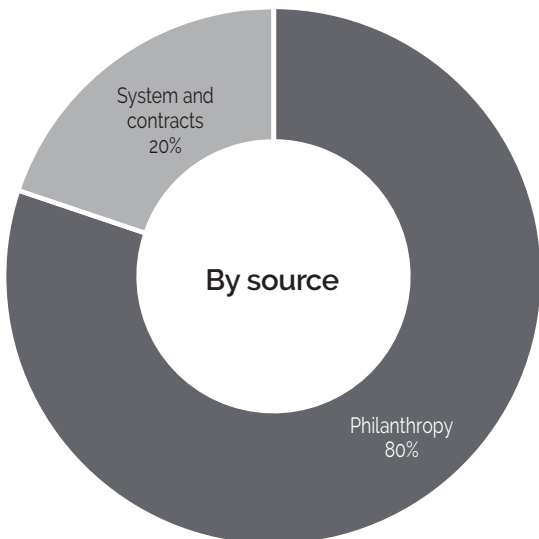
List of publications can be found:

<https://rogersbh.org/research#publications>

Active studies



Funding | \$1.9 M



Total studies by year end | 43
Prospective enrollments | 1,545

Thank you to our donors for their enthusiasm and commitment to mental health research. Special thanks to:

Pisani Family Foundation

Lynn Nicholas

Greater Milwaukee Foundation —
Catherine and Walter Lindsay Fund

And to our donors who wish to remain anonymous.

Treatment delivery

Effectiveness of telehealth treatment in an intensive behavioral healthcare setting

In March of 2020, Rogers rapidly transitioned its partial hospitalization (PHP) and intensive outpatient (IOP) programs from in-person to a virtual setting in response to the COVID-19 safer at home orders. While the transition posed challenges for patients and providers, it also offered an unanticipated opportunity to study the effectiveness of virtual treatment in an acute behavioral health care setting. For traditional outpatient mental health and addiction programs, prior research suggested that virtual therapy was comparable to in-person treatment. However, no prior research addressed whether telehealth was effective for higher levels of care, including partial hospitalization (PHP) and intensive outpatient (IOP).

In 2022, clinical leaders across Rogers' treatment specialties partnered with Research Center investigators to examine quantitative patient outcomes data to determine how telehealth treatment delivered during the pandemic compared to in-person treatment prior to or during the pandemic. Outcomes data were analyzed for adult and pediatric patients with obsessive-compulsive disorder (OCD), all patients in the addiction recovery program, and for patients

in adult depression recovery services, across clinic locations nationwide. In all cases, results showed that there were no significant differences in symptom reduction between the telehealth and in-person groups.

Rogers investigators, Drs. Brad Riemann, Michelle Maloney, Rachel Leonard, and Martin Franklin presented their results at the Association for Behavioral and Cognitive Therapy (ABCT) annual convention on November 18, 2022, in New York City. This was the first time that Rogers was solely featured in a symposium at an ABCT conference. Panelists discussed both the study results and the advantages and disadvantages of implementing telehealth in a high-intensity mental health system.

Overall telehealth results were published in the *Journal of Psychiatry Research* and results from the adult OCD and Anxiety program were published in the *Journal of Obsessive-Compulsive and Related Disorders*. Results for pediatric OCD and Anxiety, Mental Health and Addiction Recovery, and Depression Recovery will be submitted to scientific journals during the first quarter of 2023.

Rogers Research Center will continue to study telehealth effectiveness as virtual therapy services continue to be in demand for personal and community health reasons, among others. Patients are now able to choose whether they enroll in telehealth or in-person treatment at select locations across the Rogers system. In the future, we will study whether a patient's preference for in-person or telehealth treatment has an impact on their treatment outcomes. We will also use

(continued)



Telehealth (continued)

advanced machine learning techniques to identify factors that may predict which patients are most-likely to benefit from telehealth or in-person treatment. This research could lead to the development of data-driven decision-making tools to help providers and patients determine the most effective treatment modality at the time of admission.

Study team:

Bradley C. Riemann, PhD, Michelle Maloney, PhD; Rachel Leonard, PhD; Martin E. Franklin, PhD; Jeffrey Engelmann, PhD; Nyssa Bulkes, PhD; Gregor Horvath, MS; Maddie Hartig, BS

Pediatric obsessive compulsive disorder continued research

Thanks to the generosity of the Franklin Street Giving Tree Foundation, Rogers Research Center has continued to advance research in pediatric obsessive-compulsive disorder (OCD). Under the leadership of Dr. Martin Franklin, PhD, this research began by examining the effectiveness of telehealth treatment for pediatric patients seeking intensive treatment for OCD. Involving one of the largest pediatric OCD samples in the field, the results from this research suggested that telehealth was as effective as in-person treatment at reducing OCD symptoms and improving quality of life for patients under the age of 18. These results were presented internally to a virtual Rogers audience in November 2021; the Grand Rounds in Child and Adolescent Psychiatry

at UCLA in March 2022; the International OCD Conference in July 2022; and a meeting of the Association for Behavioral and Cognitive Therapies (ABCT) in November 2022. A manuscript was submitted in September 2022 to the Journal of the American Academy of Child and Adolescent Psychiatry, the flagship journal in the field.

Following the investigation of telehealth effectiveness, the team probed further to examine how prescribed medications among pediatric patients with OCD may impact treatment outcomes. This collaboration between Dr. Franklin, Dr. Matt Boyer, a psychiatrist at the Rogers Philadelphia clinic, and Dr. Jeff Engelmann, a research psychologist at Rogers Research Center, is the first large-scale study on medication optimization for pediatric OCD. Nearly 1,300 patient charts from Rogers' Partial Hospitalization and Intensive Outpatient Programs were examined to determine whether medication dosages were either clinically optimized at a dose that is effective or sub-optimized at a dose that is too low to be effective at admission and discharge. A statistical model used to examine the relationship between variables known as linear regression is used to quantify the effect of medication dosage on patient treatment outcomes. This type of analysis — to retrospectively examine medication optimization for pediatric OCD — is novel in the industry for this population, and the sample size



Pediatric OCD (continued)

is one of the largest pediatric OCD samples in the world to be studied for this purpose. It is hypothesized that patients receiving optimized doses of medication will show quicker symptom reduction and improvement in quality of life. We anticipate that this analysis and the publication

of the results will commence by the end of the second quarter of 2023.

Study team:

Martin E. Franklin, PhD; Jeff Engelmann, PhD; Nyssa Bulkes, PhD; Matthew Boyer, MD

Optimizing dynamic incentives in addiction treatment

The year 2020 marked a record high number of deaths in the United States from preventable opioid overdose. From 2019 through 2021, demand for Rogers' intensive addiction recovery programs increased by 15% nationwide. Despite decades of research, opioid use disorder continues to be linked with alarming relapse rates. Previous studies have reported that incentives can help increase the average duration of abstinence from opioid use compared to medication and counseling alone, but despite this evidence, incentive programs can be complicated to implement and raise important questions about the ethics and sustainability of providing incentives to reward long term behavior change.

Rogers Research Center has partnered with Advocate Aurora Health to conduct the first randomized evaluation of an innovative, scalable incentive program for opioid and cocaine addiction delivered through a mobile application. Developed by DynamiCare Health, the program provides a mobile app solution that makes it easier for providers to implement remote behavior monitoring. For example, saliva drug tests are self-administered in participants' homes, and they submit video of themselves performing the drug tests that are then verified by remote staff. In this way, drug tests or other tasks can be assigned



randomly, and deployed efficiently, and positive incentives can be awarded quickly following the task. This study addresses two key knowledge gaps in the logistics of existing incentive programs: 1) remote monitoring and 2) remote delivery of incentives. After a behavior is verified in the study, the app delivers an incentive to the patient as cash available on a linked debit card. Incentives are delivered almost immediately, which is crucial considering that timing of incentive delivery has proven to be a significant factor for program adherence in past studies.

Rogers' research team coordinated recruitment and delivery of supplies to 45 participants enrolled in this study in 2022. Evaluation of study results will continue into 2023.

(continued)

Optimizing dynamic incentives (continued)

Study team:

Mindy R. Waite, PhD (PI, Advocate Aurora Health);
Michael Fendrich, PhD (PI, Advocate Aurora Health);
Rebecca Dizon-Ross, PhD (University of Chicago);
Ariel Zucker, PhD (UC–Santa Cruz); Michelle

Maloney, PhD (Rogers); Sheldon R. Garrison, PhD
(Rogers); Isaac Siegel, BS (Rogers); Victoria Bonack,
BA (Rogers); Maria Novak, MA (Rogers)

Evaluating the use of the electronic Columbia Suicide Severity Rating Scale in intensive treatment

Suicide, suicidal ideation, and self-harming behaviors continue to be on the rise and represent a global public health crisis. Predicting suicide risk, especially in intensive psychiatric health care facilities, continues to be a top priority for health systems and providers. While healthcare quality improvement enterprises including the Joint Commission have implemented higher standards of care around suicide assessment and reassessment in response to ongoing increased suicide rates, there is still no single gold standard assessment. Additionally, some proprietary clinical assessments are not publicly available without significant subscription or licensing fees.

One of the tools Rogers uses to assess suicide risk is the Columbia Suicide Severity Rating Scale (C-SSRS). As a clinician-administered interview, the C-SSRS is used to measure a patient's suicidal ideation, intent, plan, and past suicidal behavior. Results from the C-SSRS are used to guide appropriate therapeutic interventions and facilitate safety monitoring and planning. The C-SSRS can also be used to measure treatment progress over time and assess continued difficulties with suicidality as targets for treatment.

On its own, the C-SSRS does not predict future suicide attempts well, and it can also be limited by clinician and patient relationship barriers that may lead to inconsistent interpretation and assessment of risk. At Rogers, we are evaluating an electronic version of the C-SSRS (eC-SSRS)



<https://rogersbh.org/resources/suicide-risk-assessment-implications-practice>

that is integrated with our electronic health record and delivered through a research collaboration with Meret Solutions, LLC. In a pilot study, patients in residential addiction recovery services will complete the eC-SSRS as a part of their scheduled battery of self-assessments. The eC-SSRS will be tested alongside clinician-rated suicide evaluation (Suicide Assessment Five-Step Evaluation and Triage Protocol with C-SSRS; SAFE-T) to assess interrater reliability and operational feasibility. The electronic self-assessment model has the potential to provide more efficient and consistent suicide risk evaluation. Results from the pilot study will be evaluated in 2023.

Study team:

John Greist, PhD (Meret Solutions); Brian Kay, PhD
(PI); Nathan Valentine, MD; Hanjoo Lee, PhD; Brianna
Weibye, MS

Sleep disturbance in adults with eating disorders

It is well known that diet can impact sleep patterns and that sleep disruption can impact both mental and physical health, so it's no surprise that patients with an eating disorder (ED) like anorexia nervosa or bulimia nervosa regularly report problems related to sleep. Understanding the relationship between ED and sleep disturbance and how sleep problems can impact ED recovery remain important, understudied questions.

Prior research in this area originates primarily from outpatient settings and shows that as many as half of patients clinically diagnosed with an ED report a co-occurring sleep problem. In addition, patients who report sleep problems also reported higher ED symptom severity. In response to these trends, we set out to replicate these results in an intensive treatment setting. In a sample of 371 adult inpatients (Rogers' highest level of care), a retrospective analysis was conducted to evaluate whether past Rogers patients' ED symptom severity might predict the prevalence and types of sleep problems, and if there were notable differences in sleep disturbance across ED diagnoses (anorexia nervosa, bulimia nervosa, or other specified feeding or eating disorders).

Study results revealed that 82% of patients admitted to our inpatient ED care reported some form of sleep disturbance upon admission (80% for patients with anorexia nervosa, 92% for bulimia nervosa, and 81% for other specified feeding or eating disorders). Discharge assessments revealed improved but ongoing sleep disturbance (70% for anorexia nervosa, 60% for bulimia nervosa, and 63% for other specified feeding or eating disorders). Two areas of sleep disturbance — mid-night wakefulness and sleeping too much (as measured by the Quick Inventory of Depression Symptomatology) — were significant predictors of higher EDEQ (Eating Disorder Examination Questionnaire) scores at both admission and

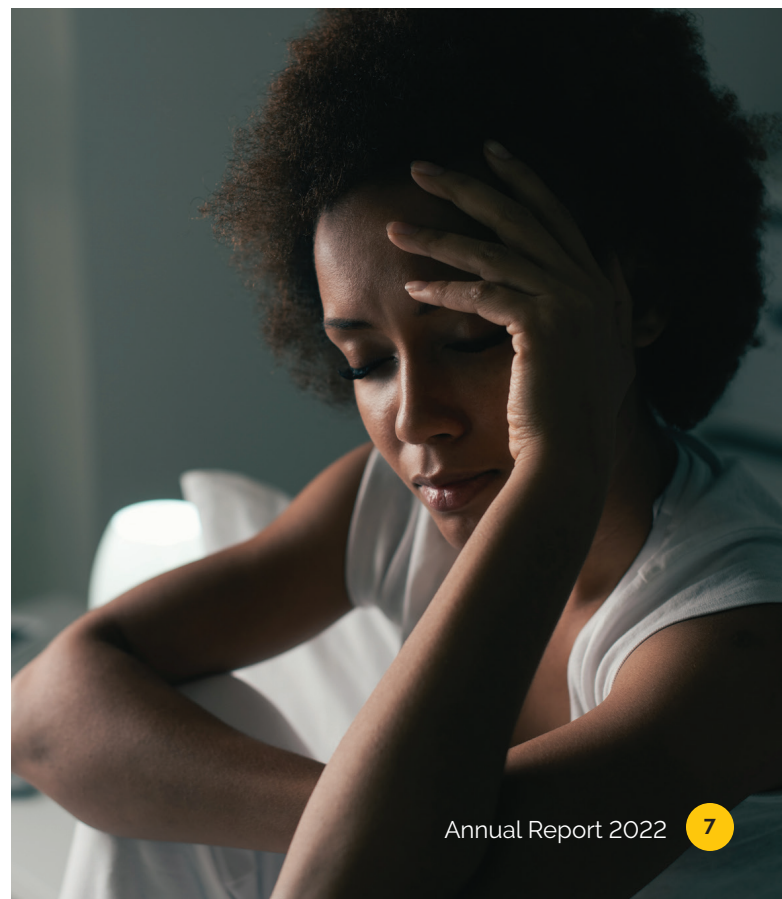
discharge, suggesting a correlation between sleep problems and more severe eating disorder symptoms. In addition, sleep disturbance reported at admission was predictive of higher symptom severity throughout a patient's intensive treatment.

Results from this study were [presented*](#) at the Academy of Eating Disorders' International Conference for Eating Disorders in June 2022. Future research in this area will involve examining lower levels of care for Eating Disorder Recovery at Rogers to further examine if sleep disturbance prevalence correlates to eating disorder symptom severity, as well as leveraging biometric data to understand how this relationship changes throughout treatment.

Study team:

Nyssa Bulkes, PhD (PI); Andrew Krystal, MD, MS (UCSF); Kelly Piacsek, PhD; Bradley C. Riemann, PhD

* <https://youtu.be/GJ7JvoSonWQ>



Genetics and Biobank

Rogers Research Center Biobank

Human genetics have the potential to give us a glimpse into the biological origins of complex mental health disorders that may lead to more personalized medicine strategies for future mental health treatments. With the support of a generous donor, Rogers Research Center Biobank opened in 2022 and the first biospecimens were collected. These samples are the first step toward Rogers' goal to advance our knowledge of the genetic underpinnings of behavioral health and substance use disorders to help inform more individualized treatment. The Biobank provides a unique opportunity for collaborative research in the areas of:

- Mental health genetic risk factor identification
- Predicted response to behavioral therapy, medications, and other treatments and interventions
- Understanding how other genetic disorders may help explain symptoms similar to behavioral health conditions

In 2022, the team equipped the laboratory and completed regulatory and research plans. Advanced equipment was purchased and installed to enable high-quality biospecimen collection, DNA, and other cellular extraction, as well as long-term storage of donated samples. Robotic technology is used to ensure that sample processing is automated and human error is reduced. In addition, state-of-the-art bar coding and scanning equipment is now part of the biobank to support a lab environment free of any identifiable protected health information (or PHI).

The Rogers Biobank can store up to 100,000 samples that will be collected through Rogers' system protocols as well as national collaborations. Rogers' research team developed a four-phase



Drs. Piacsek and Garrison inside the Research Center Biobank.

biospecimen collection plan that will roll out in 2023 and will span all Rogers' locations and treatment areas nationwide. This broad plan is especially important considering that of the four largest biobanks in the world, there are few genetic samples from patients with high acuity behavioral health and substance use disorders that also contain treatment outcomes and quantitative clinical assessments throughout the treatment process.

In 2022, the research team began two external genetics research collaborations and launched two internal studies in the areas of pharmacogenomics and rare genetic diseases in mental health treatment-seeking populations. Rogers' genetics projects will leverage nearly one billion patient data points that link historical patient responses from batteries of self-report treatment assessments, as well as other electronic medical record data. With access to sizeable participant populations with acute mental health disorders in combination with Rogers' robust data collection systems, the potential to contribute to the field is substantial.

Genetics of OCD: Rogers Research Center Biobank academic collaborations

Latino Trans-Ancestry Initiative for OCD Genomics

Historically, clinical trials have suffered from an underrepresentation of racial and ethnic minorities. For example, Latinos account for only 6 to 7% of clinical trial participants despite representing nearly 18% of the U.S. population. The rate of underrepresentation is similar for Black Americans. Conducting genomic research in diverse populations has led to numerous advances in our understanding of human history, biology, and health disparities, in addition to discoveries of vital clinical significance, and should be an imperative for mental health genetic research.

Rogers Research Center has joined Baylor College of Medicine, and an international team of obsessive-compulsive disorder (OCD) investigators to collaborate on the Latino Trans-Ancestry Initiative for OCD Genomics. An estimated 5,000 individuals of Latin American, Hispanic, and Brazilian descent, ages 7 through 89, will be recruited from Rogers Behavioral Health and other participating sites for this study. Eligible participants will be asked to provide a saliva sample from which DNA will be extracted and an individual's genetic code extensively analyzed to attempt to identify genes that may be associated with an increased risk of developing OCD symptoms. Previous OCD genetics studies have primarily analyzed DNA from individuals of European descent. The goal of this study is to understand how genetic factors influence the risk of developing OCD in Latin American individuals, as well as expand the genome-wide association study (GWAS) for OCD to better identify genomic

variants across populations. This study will continue through 2026.

Study team:

Eric Storch, PhD (PI, Baylor) et al.; Bradley C. Riemann, PhD (Rogers); Sheldon R. Garrison, PhD (Rogers)

Breaking through OCD genetics

To date, research aiming to uncover the genes linked to risk of developing symptoms of obsessive-compulsive disorder has been inconclusive. Recent advances in genetic research, including higher throughput and lower cost whole-genome sequencing capabilities, have opened new pathways with the potential to identify specific pathogenic mutations that may previously have been too difficult to find. Rogers Research Center and University of California–San Francisco (UCSF) have engaged in a three-year collaboration that includes Rutgers University and its National Institute of Mental Health (NIMH) Center for Collaborative Genomics Research on Mental Disorders to identify genes that provide molecular clues to the origins of OCD symptoms and that offer important pathways for the development of new and more effective treatments.

The methodology for this study has been successfully applied to uncover the genetic basis for a range of neurodevelopmental disorders including autism spectrum disorder, Tourette syndrome, epilepsy, intellectual disability, and attention-deficit/hyperactivity disorder. The specifics of this approach are now well established: recruiting families with simplex OCD (unaffected

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Genetics of OCD (continued)

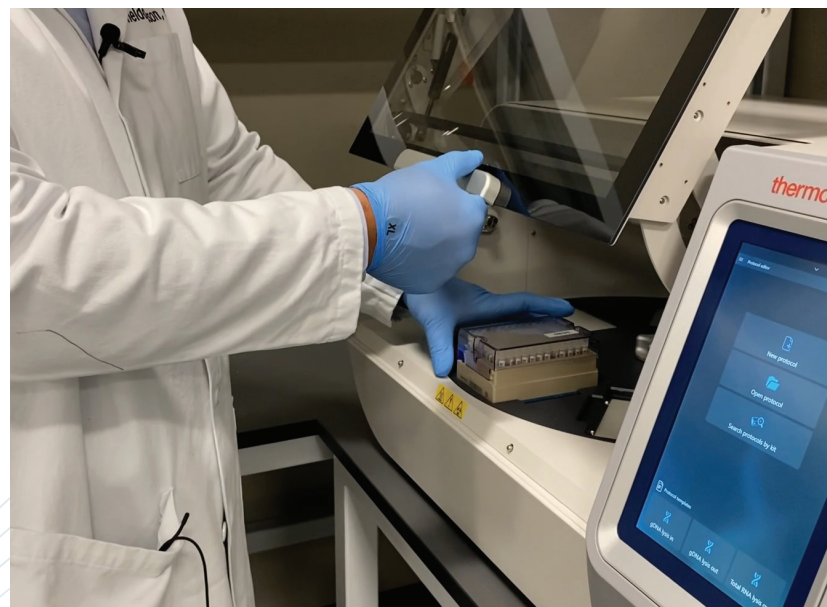
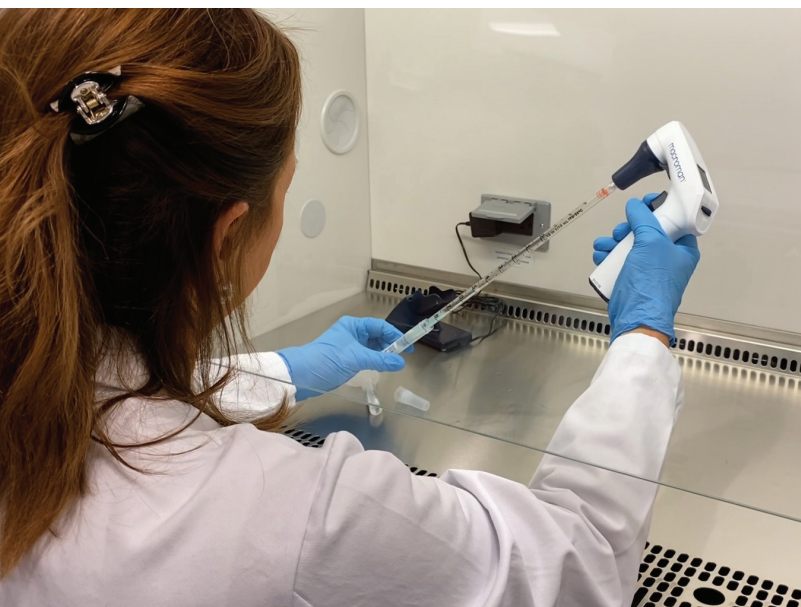
parents and only one child diagnosed with OCD) and then identifying “de novo” genetic mutations, meaning the genetic factor was not inherited from the parents. These mutations are then studied to identify large-effect risk genes and potential biomarkers, providing a direct opportunity to observe the genetic pathophysiology of OCD. The project will recruit 1,000 participants with clinically diagnosed OCD. Each participant will contribute a clinical history and a blood sample from which researchers will attempt to identify de novo mutations in the coding portion of the genome and leverage them to discover OCD risk genes. The study team will also be searching for de novo copy number variants (large deletions or duplications of DNA) and any additional genomic regions that carry risk. Patterns in these identified mutations and copy number variants will be

shared to the field with the attempt to catalyze gene discovery in OCD and promote broader clinical implementation.

This collaboration will also allow us to pursue important scientific questions regarding the genetic similarities and differences between often co-occurring conditions, including Tourette syndrome, OCD, and attention-deficit/hyperactivity disorder. This research will continue into 2025.

Study team:

Matthew W. State, MD, PhD (Co-PI, UCSF); A. Jeremy Willsey, PhD (Co-PI, UCSF); Andrew Moses Lee, MD, PhD (UCSF); Bradley C. Riemann, PhD (Rogers); Sheldon R. Garrison, PhD (Rogers); Margaret E. Anderson, BS (Rogers); Isaac Siegel, BS (Rogers); My Le Tran, BS (Rogers)

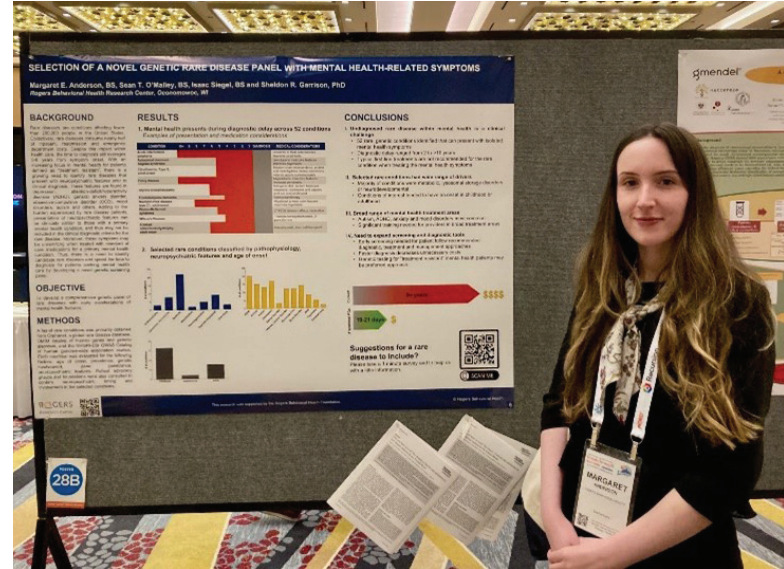


Novel genetic rare disease panel with mental health-related symptoms

Rare diseases are defined as conditions that affect fewer than 200,000 people in the United States. Nearly 10,000 rare diseases have been identified, many with complex etiologies and genetic involvement. Collectively, these rare diseases make up nearly half of inpatient, readmission, and emergency department costs. Despite this impact within healthcare, the time it takes to diagnosis rare diseases still averages five to eight years from symptom onset.

Many rare diseases present with neuropsychiatric characteristics. These features can appear as depression, attention-deficit/hyperactivity disorder (ADHD), general anxiety disorder, obsessive-compulsive disorder (OCD), mood disorders, autism, or others, which can often lead to misdiagnosis or prolonged treatment. In Rogers' intensive treatment programs, we see our patients when their mental health symptoms become debilitating, and many of them have tried numerous treatments without relief. Ruling out rare diseases, or identifying rare diseases that may be impeding treatment, is especially critical for our patients who may be resistant to traditional treatments.

Over the last year, the Rogers Research Center team worked to develop a novel genetic rare disease panel to help clinicians identify rare diseases that may be impacting patient treatment. An extensive investigation was completed to identify and select candidate conditions that would be incorporated into the genetic screening panel. A focused list of 222 candidate rare diseases were evaluated for the following factors: age of onset, prevalence, genetic involvement, gene penetrance, and neuropsychiatric characteristics. Over 50 patient advocacy groups, key opinion leaders, and foundations were



Margaret Anderson, Research Associate, presenting at the 2022 National Organization of Rare Disorders' Breakthrough Summit in Washington, DC.

consulted to confirm neuropsychiatric timing and involvement in the selected conditions. Fifty-two rare diseases were selected to be included in the final genetic screening panel. The list was further categorized by treatment areas aligned to Rogers' service lines, where 36% of candidate conditions included ADHD features, 34% depression, 30% anxiety, 29% autism, 21% mood disorders, 20% OCD, and 5% with an eating disorder. Nearly half of the rare diseases had two or more core neuropsychiatric features.

The Rogers research team presented these study results at the 2022 National Organization of Rare Disorders' Breakthrough Summit in Washington, DC. Rogers Research Center will pilot implementation of the panel in 2023.

Study team:

Sheldon R. Garrison, PhD; Margaret E. Anderson, BS; Isaac Siegel, BS; Sean T. O'Malley, BS

Neuroscience

Transcranial Direct Current Stimulation as treatment enhancement for obsessive-compulsive disorder

At Rogers, we treat some of the most severe cases of obsessive-compulsive disorder (OCD), typically in people who have tried and failed many behavioral and medication treatments. Without effective treatment, compulsions can become more pronounced and cause physical and other mental health problems. Rogers Research Center is investigating effective enhancements to Cognitive Behavioral Therapy (CBT) and Exposure and Response Prevention (ERP) therapies, especially for our patients with treatment-resistant OCD.

Transcranial Direct Current Stimulation (tDCS) is a non-invasive brain stimulation method involving a constant, low-intensity current that passes through electrodes placed on the head to modulate brain activity. tDCS has several advantages over other brain stimulation techniques. It is inexpensive, non-invasive, painless, and safe. It is also easily administered, and the equipment is portable allowing the technology to be introduced in the therapeutic environment. For individuals with treatment-resistant OCD, tDCS has already shown promising results as a tool to reduce OCD symptom severity, as well as comorbid depression and anxiety symptoms.

With a generous donation from the Catherine and Walter Lindsay Foundation, Rogers Research Center has initiated a pilot study investigating the effectiveness of tDCS for patients with OCD in conjunction with treatment as usual (CBT and ERP). These tDCS sessions are intended to target activation of the medial prefrontal cortex, an area of the brain involved in fear extinction learning, the learning that occurs during ERP treatment that helps reduce OCD symptoms. Since the immediate

effects of tDCS on the brain can last up to 90 minutes, research participants will receive tDCS immediately prior to their treatment. By increasing medial prefrontal cortex activation before treatment, the theory is that ERP treatment can be even more effective. Participants will receive tDCS once per day over the course of two weeks and their treatment outcomes will be compared to participants who receive placebo tDCS sessions.



Neuroelectrics StarStim 32 system



Dr. Engelmann in the Neuroscience Lab

Transcranial Direct Current Stimulation (continued)

Participant recruitment will begin for this study in early 2023.

It is not currently understood how tDCS creates longer-lasting changes in the brain. Understanding these changes is critical as they are responsible for long-term recovery from OCD. For future studies, Rogers Research Center will leverage electroencephalogram (EEG) data collected throughout the treatment process to measure these effects of tDCS on brain activity. EEG is a reliable, valid, and non-invasive measure of the brain's electrical activity. Participants in tDCS research will be invited to have EEG data collected

prior to their first tDCS session, after their final tDCS session, and upon their discharge from Rogers' treatment. Rogers Research Center houses the Neuroelectronics StarStim 32 system which can measure EEG and deliver tDCS. We will use this system to better understand brain systems involved in OCD and to develop tDCS protocols that are optimal for treating OCD.

Study team:

Jeff Engelmann, PhD (PI-EEG); Bradley C. Riemann, PhD (PI-tDCS), and collaborator Dr. Thomas G. Adams, PhD, Assistant Professor in the Department of Psychology at the University of Kentucky

Study 1: Frontopolar tDCS and Therapeutic Safety Learning in OCD



In 2022, Dr. Thomas G. Adams presented his tDCS work to the Rogers Behavioral Health system. A recording of this webinar can be viewed at: https://youtu.be/AVnyll3Z_gA

Using Functional Magnetic Resonance Imaging (fMRI) to examine cue reactivity across racial groups — a community study

Smoking continues to be the leading cause of preventable deaths in the United States. Among these statistics, smoking-related deaths disproportionately impact racial groups, particularly Black Americans. While Black Americans smoke at a similar rate to White Americans, research shows that Black individuals experience higher mortality from smoking, including lower cancer survival rates. Studies also suggest that Black Americans are less likely to quit smoking despite similar motivation and more attempts to quit. Additional research addresses compounding social factors for Black Americans including greater exposure to smoking, as well as limited access to evidence-based smoking cessation treatments. To develop more effective smoking interventions, a better understanding of the neurological processes underlying smoking behavior and further examination of differences in responses between racial groups are needed.

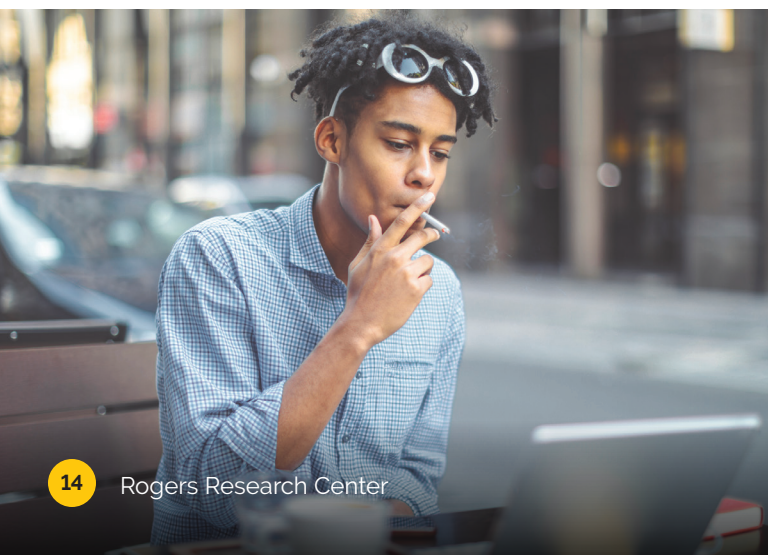
Smoking is understood to be initiated and maintained through several neurobiological processes: increasing positive emotions, reducing negative emotions or stress, and avoiding nicotine withdrawal. However, there is very little known about how these processes differ across racial groups. One area of neuroscientific research that is associated with addiction intensity and can be predictive of cessation is cue reactivity. Cue

reactivity is the idea that a person associates specific moods, situations, or environmental factors (smoking-related cues) with the rewarding effects of nicotine. These cues are what often trigger relapse.

University of Wisconsin–Milwaukee's D. Phuong Do, PhD (PI) has partnered with Rogers Research Center's Research Psychologist, Jeff Engelmann, PhD, and the Medical College of Wisconsin on a community study to examine the impact of individual- and neighborhood-level risk factors on brain responses to smoking cues. Dr. Engelmann has a broad background in cognitive psychology, neuroscience, and cancer prevention, with specific training and expertise in the use of functional magnetic resonance imaging (fMRI), especially in brain systems and processes that contribute to addictive behaviors. In Dr. Engelmann's previous research with fMRI and cue reactivity, results revealed that Black Americans have stronger brain responses to smoking cues than neutral ones, compared to non-Hispanic White Americans. Higher cue reactivity is closely associated with more severe addiction. This study builds on that work and takes it a step further to examine the neighborhood-level factors like poverty, exposure to violence and crime, and neighborhood disorder as significant influencers in these disparities with cue reactivity. The study has two primary aims: 1) to investigate the association between individual- and neighborhood-level stressors among African American menthol and non-menthol smokers, and 2) to assess the association between race, individual, and neighborhood factors and cue reactivity. Community members will be recruited to participate in this study in early 2023. This study is funded by the National Institute on Drug Abuse (NIDA).

Study team:

D. Phuong Do, PhD (UWM, PI); Jeff Engelmann, PhD (Rogers, Co-PI)



Data science

Treatment data and predictive analytics at Rogers

Predictive analytics in healthcare utilizes advanced data analysis to recognize patterns that may help predict patient outcomes, response to treatment, or future health-related events. Although the use of data to understand and address mental health conditions has lagged behind other areas of healthcare, the quantity of patient outcomes data collected, and access to advanced analytic techniques offer enormous potential for data-driven research and solutions across programs at Rogers.

In 2012, our proprietary Rogers Online Assessment System (ROAS) was developed and integrated with Rogers' electronic medical record to assign, manage, and track self-report clinical assessments for patients. This system currently holds over one billion clinical data points from past patients, as well as more than 60,000 patient records containing both admission and discharge assessment batteries.

Retrospective analyses of this large database have already offered insights into the effectiveness of our treatment programs (i.e., how effective telehealth treatment was for youth during the pandemic compared to in-person treatment prior to the pandemic), as well as insights to co-occurring symptoms and conditions that may affect treatment response (i.e. sleep problems among patients being treated for eating disorders). We continue to use this growing database for predictive analytics: using machine learning and mathematical models to probe a number of questions such as which treatments are most effective for which patients, which patients are most at risk for suicidality, how long a particular patient may spend in treatment, or how different subgroups of patients respond to treatment compared to their peers.



Prospectively, by pairing this vast database of self-report measures with patient vital signs and biomarkers, we can develop a more complete picture of our patients' overall health and response to treatment, for even greater individualized care. For example, advancements in wearable technology allow for more portable and less invasive options to collect patient biometric data. Biometric data is essential to assess how an individual's activity, sleep, and vital signs change alongside symptom severity. While we have a large body of self-report data available to understand how patients feel over time, the ability to connect symptoms with direct physiological measures may help identify early direct measures of progress or relapse. The same can be said for collecting EEG, fMRI, or genetic data from patients.

By integrating biometric, biological, and neurological data with patient self-report assessments throughout treatment, predictive analytics can

(continued)

Treatment data and predictive analytics (continued)

become essential to informing treatment strategies. This is referred to as Prescriptive Analytics. By taking all relevant observations and measurements into consideration, science can assist clinicians in utilizing data to optimize treatment plans to achieve the most beneficial result in the shortest length of stay. Prescriptive analytics not only has the potential to improve individual patient outcomes and gain treatment efficiency, but also promises to help mitigate risks of readmission and increases confidence that a patient is on the best possible path to recovery.

These data analytics strategies are being used to help us better understand suicidal ideation and the role of social media and other environmental factors contributing to mood disorders in adolescents and young adults. Providing multidisciplinary mental health services to thousands of adolescents and young adults across the country every year, Rogers has a unique opportunity to help identify predictive factors and early warning signs in young adult mental health, and to bring insights and expertise to the broader field to help combat the emerging mental health epidemic among today's American youth.

Using machine learning to examine obsessive-compulsive disorder ritual clusters

Obsessive-compulsive disorder (OCD) involves both obsessions (repeated, persistent, and unwanted thoughts, urges, or images) and compulsions (behaviors that occur in an attempt to ignore or be rid of the obsessions). Engagement in compulsions, or rituals, is what can make OCD a debilitating condition. People may spend hours in a bathroom performing cleaning rituals or find themselves continuously late leaving the house performing rechecking rituals. Current screening assessments and symptom inventories for OCD tend to group compulsions into certain themes, which can be limiting when examining what rituals may be associated with worsened symptoms, which ones are harder to resist, or which rituals may lead to worsened treatment outcomes.

At Rogers, we treat patients with the highest acuity of OCD symptoms — people who have the greatest functional impairments related to their compulsions. Throughout treatment, patients and clinicians work together to decide which

rituals — typically those that are the most severe and impairing — to work on during exposure and ritual prevention therapy. This list is compiled to create an exposure hierarchy, or a treatment plan intended to address the behaviors of concern. In a study with 641 adult patients diagnosed with OCD, Rogers' investigators examined treatment records to determine which rituals (or "bans") occurred at the highest frequency, which ones were most likely to happen together, and if any were predictive of overall symptom severity or treatment outcome.

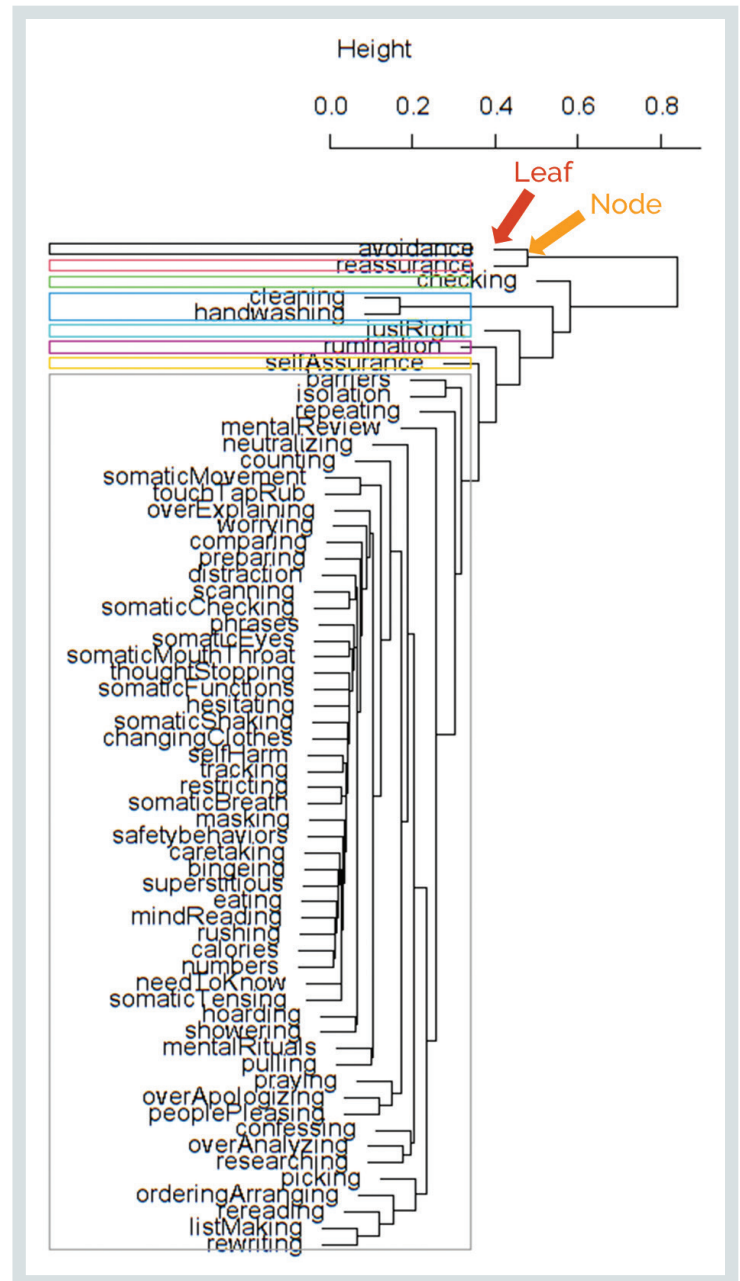
The bans were categorized into 62 themes, and machine learning techniques were used to investigate the patterns of occurrence and patient outcomes. Using a technique referred to as agglomerative clustering, each ritual begins as its own cluster (leaf), and clusters are merged based on a distance metric until all the rituals have been agglomerated. Distance in this case is based on frequency of cooccurrence; clusters within

Using machine learning to examine OCD (continued)

the hierarchy generally indicate greater similarity relative to rituals several nodes away from each other. In the resulting tree [image], we can see that *list making* and *rewriting* join the hierarchy quickly, suggesting they tend to co-occur, whereas *checking* was the last ritual to join, suggesting it had the highest dissimilarity to other rituals. The *cleaning* and *handwashing* cluster is the node with the longest branch away from the hierarchy, meaning these rituals have the highest similarity in terms of cooccurrence but the highest dissimilarity from other rituals, often existing on their own and very different from the others.

When examining which clusters may predict symptom severity or treatment outcomes, notable study results revealed that patients with reassurance bans had greater intolerance for uncertainty (IUS-12) scores at both admission and discharge. Also, individuals with just right bans had greater intolerance for uncertainty scores at discharge, as well as considerably longer lengths of stay with seven more days of treatment on average.

In the Research Center, machine learning techniques are used to glean insights into the vast amount of patient data that exists in our outcomes database and electronic medical record. In addition to sharing these findings with the broader field through peer-reviewed publication, these insights are also rapidly disseminated internally via virtual symposium to Rogers clinicians and care teams across the System, especially when the results reveal treatment disparities or opportunities for treatment enhancement. This ability to rapidly translate research findings across the Rogers system underscores the value of research at Rogers and its positive impact on our patients.



OCD bans

Study team:

Caitlin Pinciotti, PhD (PI); Nyssa Bulkes, PhD; Brenda Bailey, PhD; Eric Storch, PhD (Baylor); Jonathan Abramowitz, PhD (UNC); Leonardo Fontenelle, PhD (IPUB/UFRJ); and Bradley C. Riemann, PhD.

Partner in research highlight

Rogers Institutional Review Board

The highest priority in clinical research is protecting the safety and privacy of research participants through an unwavering commitment to transparency and integrity in the conduct of research. To achieve this, the partnership between the Rogers Research Center and the Rogers Institutional Review Board (IRB), is critically important for ensuring safe, compliant research operations. An Institutional Review Board (IRB) is a committee of individuals that are authorized to review and monitor all research involving human subjects. They help to ensure that research participant rights, welfare, and safety are protected. At Rogers, our IRB has grown with our Research Center and has achieved several key milestones that demonstrate its competency in serving this very important function. None of which would have been possible without the commitment and expertise of the team of individuals behind Rogers IRB.

Dr. Joshua M. Nadeau, PhD – Co-Chair



Dr. Joshua M. Nadeau

Dr. Nadeau is a licensed psychologist and senior clinical director with Rogers. He received his doctorate in school psychology and completed his post-doctoral research fellowship in clinical psychology from the University of South Florida. He has authored numerous peer-reviewed manuscripts

and book chapters on the assessment, evaluation, and treatment of mental health conditions across all age groups. An active research-practitioner, his work focuses on adapting evidence-based techniques to address the unique needs of neurodiverse youth and adults, including those related to autism, tics, and body-focused repetitive

behaviors, as well as other neurodevelopmental disorders.

Dr. Nadeau has served as chair for the Rogers IRB since 2019 while also working as a clinician in Tampa, FL and as a national clinical director. His work has been vital to the successes of Rogers IRB, including implementing process improvements, helping develop IRB forms and guidance, and policy review to obtain Federal Wide Assurance (FWA).

Dr. Ajeng Puspitasari, PhD, LP, ABPP – Co-Chair

Dr. Puspitasari is senior clinical director of Rogers' Northern Service Area and a board-certified psychologist through the American Board of Professional Psychology (ABPP) with a specialty in Behavioral and Cognitive Psychotherapy.



Dr. Ajeng Puspitasari

Dr. Puspitasari received her Bachelor of Science in sociology, anthropology, and human services at the University of Minnesota-Morris. She then earned her Master of Science in clinical psychology at the University of Wisconsin-Milwaukee, where she also earned her PhD in clinical psychology. As a scientist practitioner, Dr. Puspitasari's research focuses on the dissemination and implementation of evidence-based psychotherapies (EBPs) in diverse behavioral health settings. She has co-authored peer-review articles and presented at conferences on the dissemination and implementation of EBPs. She has provided EBPs training, supervision, and consultation for clinicians both in the United States and internationally.

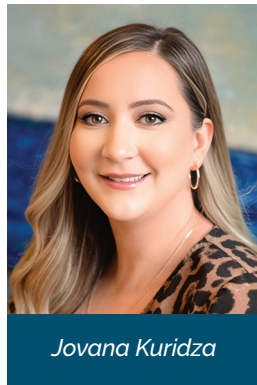
Dr. Puspitasari joined the Rogers IRB as co-chair in 2022. Her clinical and research experiences

Rogers Institutional Review Board (continued)

have strengthened the proficiency of the IRB. Also balancing her time as a clinician and clinical director, Dr. Puspitasari's approachability and graciousness are especially appreciated in her IRB leadership role.

Jovana Kuridza, MHA – IRB Coordinator

As the Rogers IRB Coordinator, Jovana oversees the day-to-day operations, procedures, and workflow of the IRB. Jovana holds a master's degree in health care administration from the University of Wisconsin-Milwaukee and has 10 years of experience working in health care with a heavy focus in clinical research.

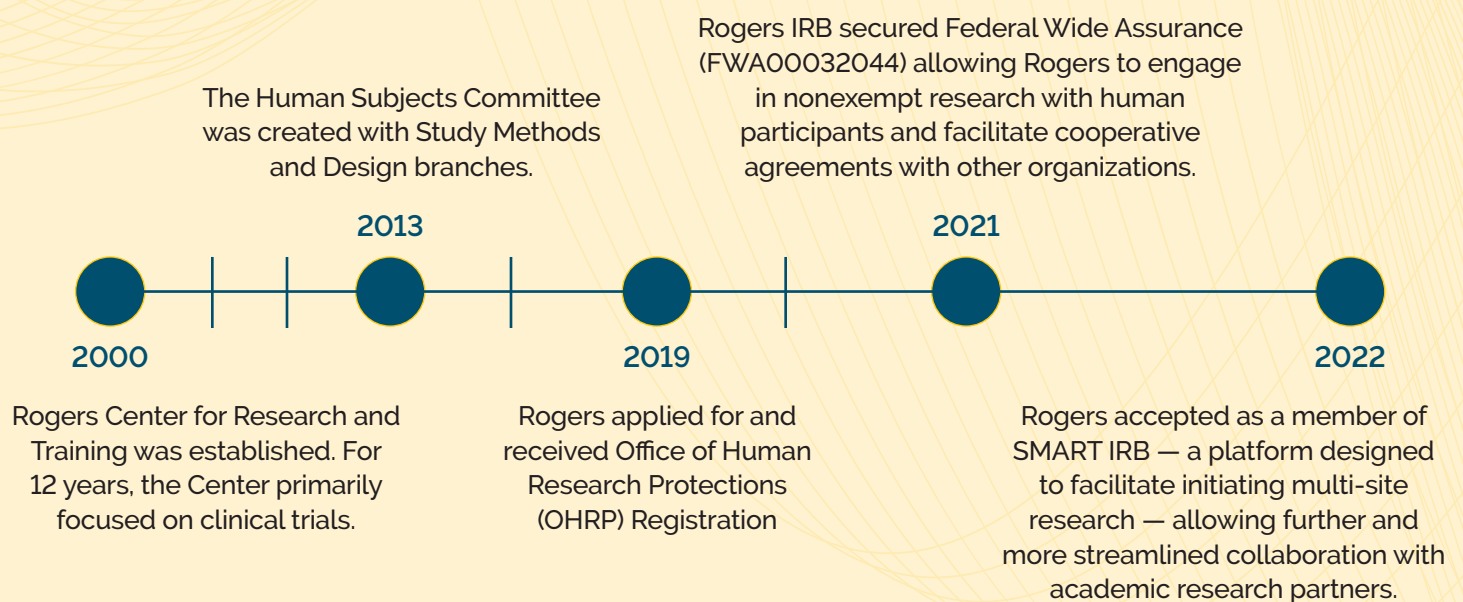


Jovana joined the Rogers Research Center team in 2021. In addition to managing IRB administration

and coordinating organization-wide IRB activities, Jovana also provides guidance on human subjects research procedures for all principal investigators throughout Rogers. Jovana's IRB expertise, organizational skills, and cooperative nature were the catalyst to many of the IRB's successes over the last few years. Her contributions were pivotal in IRB policy development, tracking and completing requirements for securing Rogers' Federal Wide Assurance, and ensuring success with joining SMART IRB. Jovana was instrumental in helping the Research Center initiate its first clinical trial this past year. Her efforts earned her a 2022 Research Center award for her commitment to quality.

Thank you to all our IRB members, Marty Franklin, PhD, Rachel Leonard, PhD, Nathan Valentine, MD, Jennifer Park, PhD, Amaya Ramos, MD, Sim Yin Tan, PhD, Sheldon Garrison, PhD, Patrick Michaels, PhD, and Sloan Butler, as well as our Institutional Official, Brian Kay, PhD.

History of Rogers IRB



Community partner highlight

Professional Firefighters of Wisconsin Charitable Foundation

The critical work of first responders places them at an elevated risk of exposure to various forms of mental and physical stress. Repeated critical stress experiences may lead to chronic behavioral health concerns like anxiety, depression, burnout, post-traumatic stress disorder, substance use, and others. Over the past five years, substantial progress has been made in raising awareness and reducing the stigma of addressing mental health needs of first responders. In Wisconsin, like many other states, professional associations and elected officials are working toward regulatory changes that will drive greater urgency and expanded coverage for mental health support for first responders. Additionally, peer-support networks and employee assistance programs are evolving to help provide early and ongoing support for first responder mental health needs. As untreated mental health disorders may worsen over time, early intervention and effective treatments are important to reduce symptoms, and to avoid long-term complications from complex mental health problems.

In 2020, Rogers Research Center began partnering with the Professional Fire Fighters of Wisconsin Charitable Foundation (PFFWCF) on a mental health initiative. The PFFWCF's mission is to champion community risk reduction initiatives; promote fire safety and prevention; and deliver meaningful support to burn survivors, fire fighters, and communities. This year, PFFWCF and Rogers completed the third year of a state-wide mental health needs and support survey for professional and volunteer Fire and EMS professionals across the state. The survey examines how Fire and EMS staff experience and respond to on-the-job critical stress and the potential behavioral health concerns experienced as a result. The anonymous survey considers county, role, professional status, work schedule, sex, years of service, critical incidents or traumatic events experienced, thoughts of self-harm or suicide, sleep issues, substance use, utilization of mental health services, and perceptions about mental health stigma within the field.

There were 777 individuals that responded to the 2020 baseline survey, followed by 1,022 respondents in 2021. These surveys revealed that firefighters may have lower rates of anxiety but screened higher for possible depression compared to the general population. In addition, a majority of firefighters reported sleep concerns. The survey also revealed that perceived stigma around seeking help for behavioral health problems may limit treatment-seeking, but that peer-support programs may be the most attractive options.



The survey was enhanced in 2022 to include an optional, validated measure of professional quality of life, addressing compassion satisfaction of one's job, potential burnout, and the impact of secondary traumatic stress as a result of helping others in critical situations. The 2022 survey will inform opportunities for future prospective research that would be aimed at addressing the potential effects and improvement of various support and intervention strategies. The 2022 survey closed with 1,515 participants, and results will be analyzed in 2023 including year-over-year comparisons with plans to publish the findings. These annual surveys are expected to continue in the future.



Rogers Research Center is honored to be a part of this important work and shares the vision of the PFFWCF for all those who serve others to be healthy, safe, and supported in their lives and communities.



Learn more about the Professional Firefighters of Wisconsin Charitable Foundation at <https://pffwcf.org/about-professional-fire-fighters-charitable-foundation/>



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