OLGA DOBRUSHINA

Counselling psychologist | Researcher
MD, PhD, MSc in Psychology

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KEY SKILLS

mental health, psychotherapy, neurology
fMRI, psychophysiology, biofeedback, EEG, Python, R Project, Matlab

LANGUAGES

English (full professional proficiency, IELTS 8.0), Russian (native), Hebrew (basic)

LICENCES AND CERTIFICATION

HCPC registered counselling psychologist: PYL044166
Israeli medical license 1-178203
Certified Schema Therapist 60360358

BASIC EDUCATION

M.V. Lomonosov Moscow State University, Faculty of Basic Medicine
2002 — 2008
Medical Doctor

Moscow State University of Psychology and Education, Faculty of Counselling and Clinical Psychology
2019 — 2021
M.S. in Psychology

General Reanimatology Research Institute named after V.A. Negovsky
2010 — 2012
Ph.D. in Medicine

First Moscow Medical State University
2011 — 2012
Specialization in Neurology

ADDITIONAL TRAINING

Individual, Couple, and Child and Adolescents ISST accredited courses in Schema Therapy

Cognitive Behavioral Therapy (Beck Institute)

Acceptance and Commitment Therapy (S. Hayes)

Mentalization-Based Treatment: Basic Training (Anna Freud Center)

SCERTS model for autism (Social Communication, Emotional Regulation and Transactional Support) (B. Prizant, A. Wetherby, E. Rubin)

Pediatric Neuropshychology (Lomonosov Moscow State University)

Clinical Electroencephalography (Federal Medical Biophysical Center)

Basic Course in Neurofeedback (EEG Institute, Los Angeles)

PROFESSIONAL EXPERIENCE

University of Strathclyde (Glasgow, Scotland), Laboratory for Innovation in Autism, Visiting Researcher

April 2024 — to date

My research at the University of Strathclyde aims at uncovering the specifics of arousal regulation in autism, with the ultimate goal to develop therapies supporting autistic people's mental well-being. I view arousal regulation as an embodied interpersonal process, and plan to study dyadic coregulation of physiological states in autism. I expect to describe the effective dynamics of arousal coregulation and to use this knowledge for informing psychotherapy practice and technology development.

Reichman University (Israel, www.runi.ac.il/en), Baruch Ivcher Institute for Brain, Cognition & Technology, Postdoctoral Researcher, Lecturer

September 2022 — April 2024

At Reichman University, I developed a real-time haptic sensory supplementation technology for enhancing interoception. Interoception, i.e. the neural process supporting perception and integration of the body's internal state, is crucial for both physical and emotional health. Altered interoception is recognised as a major therapeutic target in anxiety, depression, PTSD, eating disorders, somatic symptom disorder, autism, and personality disorders, which makes this topic highly socially significant. The main approach for enhancing interoception is represented by mindfulness training, which remains challenging for people with low interoceptive abilities, who are often unable to focus on the body. Interoceptive abilities are highly variable within the population, with about a half of people being not able to perceive their heartbeats without special aids.

Our technology aims to broaden the opportunities for interoceptive training with an intuitive technological aid. With a special vibration device fixed on the anterior chest, we provide haptic sensations similar to the ones originating from the beating heart; the vibrations are synchronised with ECG R peaks. This stimulation helps people to focus their attention on the cardiac signals, thus training the core aspect of interoception. During the training, the vibration intensity fades out, thus leaving the person with the natural sensations. This gradual increase in task difficulty allows transfer of the learned skills to the real life.

I led this project and did most of the technical work. I developed the concept and data analysis framework, wrote the code for the setup in Python, did and supervised data collection, analysed the data in R and prepared an article for a scientific journal. The data analysis framework included real-time feature extraction from the ECG and data analysis using Bayesian Monte Carlo mixed modelling, non-parametric tests, signal detection theory. We have proven that interoceptive training with the use of our technology results in improved interoceptive accuracy and confidence, and in a shift of attention toward the inner sensations — indicative of a complex beneficial influence on interoception. The setup was demonstrated at the Israel's Human-Computer Interaction Conference (www.israhci.org), and the scientific results were presented at the European CBT conference (eabct2023.org).

Outside of my working hours, I provided a creative workshop "Overcoming scriptophobia with graduated exposure. Basics of Python and Psychopy" for postgraduate scientists from various backgrounds, including technical and psychological. This workshop served to provide motivated people with the essential skills for developing new technologies and represents a part of my social mission for supporting interdisciplinary collaboration in neurotechnology.

As a lecturer, I teach physiology in the preparatory program for medical studies. Knowing the challenges of studying medicine from my personal experience, I aim to build a connection between basic physiology knowledge and its further clinical application, to make the learning process meaningful and engaging.

Remepy (Israel, www.remepy.com), Scientific Expert

February — August 2023

Remepy is a high-tech startup company developing tailored software applications that trigger specific brain mechanisms, positively influence the immune system, and increase drug efficacy and safety. As a scientific expert, I analyzed the existing neuroscientific data and consulted the team to support development of effective evidence-based digital technology.

Private Practice (www.dobrushina.care), Psychotherapist

July 2021 — to date

As a therapist, I mainly work with neurodivergent adults, people with complex trauma and personality disorders. My main modality is contextual schema therapy, which is an integration of schema therapy and acceptance and commitment therapy (ACT). I am also using the classical CBT techniques, DBT skills and principles of mentalization-based treatment. Being trained in couple therapy and child and adolescent schema therapy, I pay major attention to the family relationships and provide couple and family sessions as well as consultations on parenting.

I work under supervision and I have an experience of long-term personal therapy.

Moscow Institute of Schema Therapy (mistherapy.ru), Psychologist

November 2024 — to date

Moscow Institute of Schema Therapy (MIST) is the leading Russian institution in the field of schema therapy, providing evidence-based psychotherapy for people with severe chronic conditions, training professionals in schema therapy, including both certification training and continuing education, and developing schema therapy in Russia through scientific and publicistic activities. I work at the MIST therapy center as a therapist for individuals and couples and provide a 3-day workshop on schema therapy for neurodivergent adults.

Research Center of Neurology (Russia, neurology.ru), Senior Researcher

2017 — to date (currently remotely)

I led an interdisciplinary project aimed at developing methods for preventing age-related cognitive decline. A major cause of age-related cognitive decline is represented by the small vessel disease (SVD), which is a cardiovascular disorder affecting the brain. I investigated the role of emotional regulation, interoception and neural networks integrity as protective factors against SVD. The research included developing targeted neuromodulation strategy and testing its efficacy. I developed the concepts and data analysis framework, wrote code for the setups, analyzed the data, and supervised a team of 10 professionals involved in data collection. This project required analyzing cross-sectional and longitudinal behavioral, physiological (EEG and ECG), and fMRI data.

Firstly, we adopted the fMRI-based heartbeat detection task for older people with low cognitive reserves. Neuroimaging with the heartbeat detection task is the main technology used for revealing the brain areas supporting interoception, but previously

it has not been used in older people and required adaptations due to high fatigability typical for this group. I scripted and piloted the task, supervised the MRI data collection, and analyzed the data in Matlab and R. The technology allowed to reveal the insular area which activation serves as a mediator between interoceptive accuracy and emotional intelligence and thus represents a clinically significant target for neuromodulation. This work resulted in a patent (RU2750837C1) and in a scientific publications (doi: 10.1007/s11055-020-01003-z, 10.1111/psyp.13537).

Secondly, I revealed the brain connectivity patterns underlying emotional and interoceptive dysregulation and tested the possibilities of modulating these patterns with neurofeedback. I used methods of fMRI data analysis in Matlab and Python to find the relevant connectivity patterns. Next, I demonstrated the possibility of correcting these patterns with neurofeedback technology. The results of this work have been implemented in clinical practice within the international neurofeedback community and resulted in several publications in scientific journals (doi: 10.3389/fnhum.2020.00192, 10.3389/fnhum.2022.891547, 10.1016/j.cortex.2021.08.009, 10.15540/nr.6.1.3). The 2020 article in Frontiers received major attention in the community—8849 views and downloads, which corresponds to 89% view rank of all Frontiers articles.

International Institute of Psychosomatic Health (Russia, mipz.ru), Chief of the Department of Psychosocial Rehabilitation

2015 — July 2022

In a private clinical and research institute, I combined leadership, mentoring, and direct clinical work as a neurologist and psychologist. As a clinician, I offered holistic outpatient care for neurodivergent adults and children (ADHD, autism, dyslexia, dysgraphia, traumatic brain injury and brain tumours), people with affective and psychosomatic disorders (anxiety, depression, somatic symptom disorder, chronic pain), older adults with mild cognitive impairment and stroke. I also worked with healthy people of all ages providing psychological counselling. I used the following methods.

- Rational pharmacotherapy. I prescribed medications to treat anxiety, depression, chronic pain, movement disorders and behavioral problems in neurotypical and neurodivergent patients.
- Psychotherapy: schema therapy, CBT, acceptance and commitment therapy (ACT), mindfulness.
- Psychotherapeutic groups for adults with brain injury.
- Neurofeedback and biofeedback.
- Cognitive assessment and training, including body-based approaches.
- Routine and quantitative EEG analysis (QEEG).

As a team leader, I served as a clinical director of an interdisciplinary program for adults and children with mental difficulties related to neurodivergence. I organised the department in a start-up clinic, assembled the team (25 professionals), and established the practices. I supported the development of a cohesive professional team with traditions of mutual support. The team has worked with more than a thousand clients, including projects conducted in collaboration with the Moscow City Department of Social Protection and Konstantin Khabenskiy's Charity Fund, a leading Russian non-profit organisation in neuro-oncology. The contracts with the founding organisations were regularly renewed over the last 5 years due to the high clients' satisfaction and the ability of the team to achieve results even in a setting limited by time and funding.

In the same clinic, I founded a cross-department neurophysiological group consisting of eleven professionals, whom I trained and supervised. We developed and implemented neurotechnological approaches, including QEEG, neurofeedback, and biofeedback for integrative understanding and treatment of mental and neurological diseases. We completed a research project on the use of the infra-low frequency neurofeedback in headaches published as an article (doi: 10.3389/fnhum.2022.891323). This project required analyzing complex longitudinal datasets including patients' diaries and examinations.

My double competence as scientist and clinican allowed me to promote interdisciplinary collaboration within the field of neurotechnologies. Starting from 2016, I provided annual schools "From neuroscience to neurotherapy" focused on the conceptual and practical aspects of quantitative EEG, neurofeedback, and biofeedback. These schools attracted both clinicians and tech specialists from Russian and former Soviet republics. I also gave presentations at relevant national and international meetings, for diverse groups of professionals.

Treatment and Rehabilitation Center of the Ministry of Health (Russia, med-rf.ru)

2012 — 2015 **Neurologist in the Neurorehabilitation Department**

Treatment and Rehabilitation Center of the Ministry of Health is a large multidisciplinary hospital providing planned and emergency medical care. I worked in an inpatient setting as a neurologist responsible for diagnostics, pharmacological treatment, and rehabilitation. My responsibilities included clinical management of adults with cerebrovascular diseases, mild cognitive impairment and dementia, affective disorders, somatoform disorders, chronic pain, traumatic brain injury, brain tumours, and spinal trauma. As a treating physician, I was responsible for all the diagnostic and therapeutic processes, including the treatment of concomitant somatic diseases. I also managed the rehabilitation programs, including medical and psychological diagnostics, identification of the goals, and the optimal methods to be used for their achievement.

My major personal interest was in the field of the mental consequences of brain injury. I used psychological methods of assessment as well as functional MRI to diagnose changes in cognition and personality and developed neuromodulation approaches for restoration of these functions. I developed a navigated fMRI-guided TMS technique for the treatment of frontal lobe syndrome. After my training at the EEG Institute in Los Angeles, I started using infra-low frequency neurofeedback in neurorehabilitation of patients with cognitive and emotional consequences of brain injury, chronic pain, and functional neurological disorders. I pioneered the use of this method in the hospital and taught other professionals.

2010 — 2012 Intensive Care Physician

I worked as an intensive care physician in the neurointensive care unit with patients with stroke, TBI, neuro-oncological diseases, spinal cord injury, sepsis, ARDS, venous thromboembolism and concomitant conditions. My responsibilities included pharmacological management and intensive care procedures. While working in the ICU, I developed an interest in the long-term mental consequences of brain injury and critical disease. I participated in the implementation of a very early rehabilitation program.

PUBLICATIONS

ORCID: 0000-0002-9493-4212, Scopus Author ID: 56955629300, WoS Researcher ID: E-7182-2019

Publications selected out of a total of 28 articles, 5 books, 39 conference presentations.

Dobrushina, O. R., Dobrynina, L. A., Arina, G. A., et al. (2024) Age-Related Changes of Interoceptive Brain Networks: Implications for Interoception and Alexithymia. Emotion. http://dx.doi.org/10.1037/emo0001366

(Preprint) Dobrushina, O., Tamim, Y., Wald, I. Y., Maimon, A., & Amedi, A. (2024). Training Interoceptive Awareness with Real-Time Haptic vs. Visual Heartbeat Feedback. *BioRxiv*, 2024.01.12.575196. https://doi.org/10.1101/2024.01.12.575196

(Preprint) Dobrushina, O. R., Dobrynina, L. A., Arina, G. A., et al. (2023) Psychosomatic Aspects of Cerebral Small Vessel Disease: Emotional Dysregulation and Network Dysfunction. http://doi.org/10.13140/RG.2.2.21161.98404

(Preprint, accepted for publication) Dobrushina, O. R. (2023) Contemporary Neuroscientific Concepts and Psychotherapy: Possibilities for Integration. http://doi.org/10.13140/RG.2.2.11239.01441

Dobrushina, O. R., Dobrynina, L. A., Arina, G. A., et al. (2022). Enhancing Brain Connectivity with Infra-Low Frequency Neurofeedback During Aging: A Pilot Study. Frontiers in Human Neuroscience, 16. https://doi.org/10.3389/fnhum.2022.891547

Arina, G. A., Dobrushina, O. R., Shvetsova E.M., et al. (2022). Infra-Low Frequency Neurofeedback in Tension-Type Headache: A Cross-Over Sham-Controlled Study. Frontiers in Human Neuroscience, 16, 323. https://doi.org/10.3389/fnhum.2022.891323

Dobrushina, O. R., Arina, G.A., Dobrynina, L.A., et al. (2021). Sensory Integration in Interoception: Interplay between Top-down and Bottom-up Processing. *Cortex* 144 (November): 185–97. https://doi.org/10.1016/j.cortex.2021.08.009

Dobrushina, O. R., Arina, G.A., Dobrynina, L.A., et al. (2020). The Ability to Understand Emotions is Associated with Interoception-related Insular Activation and White Matter Integrity during Ageing. *Psychophysiology* 57 (3): e13537. https://doi.org/10.1111/psyp.13537

Dobrushina, O. R., Vlasova, R. M., Rumshiskaya, A. D., et al. (2020). Modulation of Intrinsic Brain Connectivity by Implicit Electroencephalographic Neurofeedback. *Frontiers in Human Neuroscience* 14: 192. https://doi.org/10.3389/fnhum.2020.00192

Dobrushina, O. R., L. A. Dobrynina, G. A. Arina, et al. (2020). Interaction of Interoceptive Perception and Emotional Intelligence: A Functional Neuroimaging Study. *Neuroscience and Behavioral Physiology 2020 50:8* 50 (8): 1043–50. https://doi.org/10.1007/S11055-020-01003-Z

Dobrushina, O. R., Gadzhieva, Z. S., Morozovam S. N., et al. (2019). The Compensatory Role of the Frontal Cortex in Mild Cognitive Impairment: Identifying the Target for Neuromodulation. *NeuroRegulation* 6 (1): 3-3. https://doi.org/10.15540/nr.6.1.3

Sidyakina, I.V., O.R. Dobrushina, K.V. Lyadov, et al. (2015). The Role of Evidence-Based Medicine in Neurorehabilitation: Innovative Technologies. (In Russian) *Voprosy Kurortologii, Fizioterapii, i Lechebnoǐ Fizicheskoǐ Kultury* 92 (3). https://doi.org/10.17116/kurort2015353-56

Dobrushina, Olga R., Irina V Sidyakina, Konstantin V Lyadov, et al. (2014). Navigated Transcranial Magnetic Stimulation in Rehabilitation of Traumatic Frontal Lobes Injury. (In Russian) *Annaly Nevrologii* 8: 49–56. https://annaly-nevrologii.com/journal/pathID/article/view/171

Research Funding