AbSPORU
Alberta SPOR SUPPORT Unit

Garazi Casillas Martinez - University of Calgary

Project: Investigating structural and functional properties of the brain in children with severe behaviors

Background:

Neurodevelopmental disorders (NDDs) affect between 8-18% of all children in developed countries. Children with NDDs suffer from behaviors of concern (BoCs), such as violence against others. Magnetic resonance imaging (MRI) has been used to improve our understanding of brain differences that may be associated with behavioral issues in adults. However, little is known about differences in pediatric neurodivergent patients with BoCs. This is largely because MRI requires participants to lie still for a long time in a small space, which is extremely challenging for many children with NDDs without sedation. Moreover, symptoms often overlap between different NDD types, and, in many cases, a child's diagnosis may not accurately reflect the true condition. Therefore, it is important to investigate how BoCs are associated with brain changes to develop early and

CIHR IRSC ALBERTA INNOVATES

personalized interventions. In our innovative project, we will develop a comprehensive protocol for imaging children with NDDs with a special focus on severe BoCs. One-on-one sessions with each child in a MRI mock scanner will be completed to familiarize them with the scanner environment and identify child-specific approaches to calm them so that no sedation is needed in real scans. After achieving this goal, we will schedule children for real MRI acquisition. We will develop a MRI protocol to collect detailed information about the structural and functional properties of their brains. Finally, we will develop dedicated data science methods that will enable us to identify important patterns related to specific BoCs. Overall, this project aims to obtain imaging information for children with NDDs and BoCs for the first time, enhancing our understanding of brain changes, which can help us develop tailored interventions, thereby improving the quality of life of these children and reducing healthcare costs. Moreover, this project will provide preliminary data for a larger clinical study. Indeed, the collected neuroimaging data will afterwards be combined with other data modalities (e.g. genetics, transcriptomics, demographics...), and machine learning algorithms will be developed to uncover hidden NDD subtypes, as well as to identify precise treatment outcomes for this patient cohort. We believe that the shift towards precision medicine promises more effective and personalized treatments. In this project, we actively involve patients and families as vital partners throughout the entire research process. Central to this commitment is the collaboration with two researchers of neurodivergent children. This collaboration ensures the integration of lived experiences and diverse perspectives into the project's design and execution, authentically resonating with the daily realities of families affected by NDDs.

Bio

My name is Garazi Casillas Martinez and I am from San Sebastian (Basque Country, Spain). I studied Biomedical Engineering at the University of Mondragon. During my degree, I have been involved in six multidisciplinary projects, which have been crucial for developing my teamwork, communication and fast problem-solving skills. I completed my thesis at the University of Padova in Italy, where I studied the gait of children with Fragile X Syndrome. I am a curious woman who is always eager to learn new things. I am interested in developing products that can contribute to improving the quality of life of human beings. My main topics of interest are neuroscience, nanotechnology, and artificial intelligence. I am a very active person, and, during my free time, I love painting and practicing sports while being surrounded by nature. I love traveling, and I think that exposing ourselves to different cultures, languages, and people, as well as to different ways of working and facing life, is the best way to evolve as human beings.


CIHR IRSC

ALBERTA
INNOVATES