

Ethical Considerations for Neurotechnologies Targeting Autism

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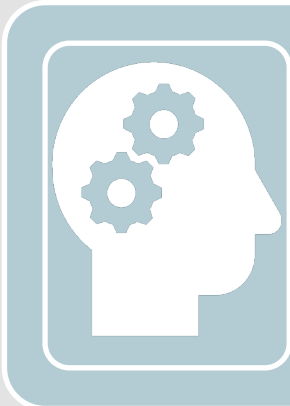
Abstract

The global prevalence of autism spectrum disorder (ASD) has reached record-breaking numbers in recent years, likely reflecting improvements in diagnostic and identifying tools for ASD. Due to advancements in diagnostic capability, a concurrent increase in demand has emerged for the development of new therapies for autism. Innovators have sought to address this demand by creating a new avenue for targeted therapies through neurotechnology, particularly neuromodulation, neurofeedback, and transcranial magnetic stimulation. Though these technologies are being rapidly developed and are already available for user consumption, innovators have neglected to give proper consideration for the ethical concerns raised by offering neurotechnology for individuals with autism. While many concerns are not unique to autism, it still presents a nuanced case of complexity requiring direct acknowledgement.

The ethical dilemmas surrounding neurotechnology development for individuals with autism can be uniquely explored through the lens of the ongoing global neuro-rights movement. Despite the intense debate regarding the validity of neuro-rights, stakeholders agree that rapid developments in neurotechnology and innovation have created an urgent need to protect and preserve the ethical principles underpinning neuro-rights from external harms. Given these concerns, it is imperative to examine the ethicality of offering neurotechnologies for individuals with autism and provide a nuanced, careful exploration of the relevant ethical principles. Neurotechnologies for autism offer promising interventions that directly impact the brain rather than mitigating symptoms, like most currently available therapies. However, we must be sure to consider all relevant stakeholders and urge innovators to develop neurotechnologies responsibly to secure and protect the ethical principles purported by the neuro-rights movement as fundamental to human rights.

Methods

- Review of current neurotechnologies** available for people with autism: **neuromodulation, neurofeedback, transcranial magnetic stimulation**
- Comparison to current standard of care**



Neurotechnology

- Neuromodulation
- Neurofeedback
- Transcranial Magnetic Stimulation



Current Standard of Care

- Applied Behavioral Analysis
- Cognitive Behavior Therapy
- Speech & Language Therapy
- Occupational Therapy

- Analysis** of how the neurotechnologies **adequately consider the three families of shared principles** supported by various neuro-rights discussions

The need for neuroethics & neuro-rights in the autism space

Neurotechnology & how it impacts the brain

Potential of neurotechnology

Neurotechnology has the capacity to fundamentally change what it means to be human because the brain is not simply another organ; it is the epicenter of our mental and cognitive activity. Neurotechnology that has the potential to impact and alter our brains raises a multitude of known and unknown concerns to both individuals and society as we know it.

Autism & the population being studied

Scarcity in the understanding of neuropathology

Even with decades of research, we still do not possess a full understanding of the neuropathology of autism. Presentations of autism are widely varied and there is no standard of reference that developers can follow. Thus, potential repercussions from modulating brain activity with neurotechnology are yet to be elucidated.

Lack of literature and dedicated discussion

There is scarcely any dedicated literature or discussion that analyzes potential ethical concerns for developing neurotechnology for *autism*. This paucity is in contrast to the abundance of discussion focused on other applications of neurotechnology devices. Though many of the relevant considerations are not unique to autism and have been thoroughly explored in other fields, particularly with the utilization of brain-computer interface (BCI) devices, autism presents a nuanced set of challenges that we must begin to address.

Nonmaleficence & potential to advance injustice

By failing to address potential threats from neurotechnology, we can advance injustices against individuals with autism and send a harmful message that ethical considerations are not necessary. Since individuals with autism are vulnerable to exploitation and paternalism, disregarding them from the conversation even when such neurotechnology is already available for testing and consumption through public and private domains deprives them of protections that we assign and are eager to promote for other, more “neuro-capable” individuals.

Global shift towards neuro-rights

There has been a growing demand across the world to establish a new kind of human rights: neuro-rights. Neuro-rights are a set of fundamental normative rules designed to protect and preserve the human brain, the mind, and its outputs. They extend the ethical, legal, and natural principles of freedom and entitlement originally developed for an individual's physical body to their cerebral and mental domain (Ienca 2021). The need to discuss potential avenues of securing neuro-rights has become paramount due to the rapid development and advancement of neurotechnology in recent decades. We can no longer ignore the potential ethical impacts and implications that these neurotechnologies may have on not only our independent minds and bodies, but also on society as a whole. A global movement has been ignited in response to these needs through ambitious legislative efforts. One of the most notable is Chile's constitutional reform bill, which seeks to “protect the integrity and mental indemnity of the brain from the advances and capacities developed by neurotechnologies” by establishing five new human rights (Guzmán 2022).

Since its inception, the bill has received both praise and criticism and has sparked intense debate. Some have lauded the bill as revolutionary and highly anticipatory of potential challenges that we will all grapple within the near future. Others, on the other hand, argue that the bill is premature, given that the “brain-altering” capacity of the technology is still limited. The push for neuro-rights has also been coupled with discussion surrounding regulation of neurotechnologies, which should be taken as two fundamentally distinct conversations since the establishment of neuro-rights this early may actually hinder innovation. Despite the contention regarding the relevance of the Chile bill as it stands in today's society, we argue that before we can establish neuro-rights, we should give greater considerations for the fundamental philosophy and epistemology behind relevant definitions and questions.

Open Questions:

Which principles or neuro-rights we should prioritize in the research/development or regulatory process?

Is it therapeutically appropriate for people with autism to interact with this neurotechnology, given the current regulatory landscape?

Is neurotechnology for autism an ethically justified application?

References

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- Ienca, Marcello. “On Neurorights.” [In English]. Review. Frontiers in Human Neuroscience 15 (2021-September-24 2021). <https://doi.org/10.3389/fnhum.2021.701258>. <https://www.frontiersin.org/article/10.3389/fnhum.2021.701258>.
- Ienca, Marcello, and Roberto Andorno. “Towards New Human Rights in the Age of Neuroscience and Neurotechnology.” Life Sciences, Society and Policy 13, no. 1 (2017/04/26 2017): 5. <https://doi.org/10.1186/s40504-017-0050-1>. <https://doi.org/10.1186/s40504-017-0050-1>.

	3 Families of Shared Principles		
Neuro-rights Frameworks	Mental Integrity	Mental Privacy	Preservation & Promotion of Freedom of the Human Mind
Chile (2021)	<ul style="list-style-type: none">• Free will & self-determination• Equal access	<ul style="list-style-type: none">• Mental privacy	<ul style="list-style-type: none">• Personal identity & autonomy• Protection against biases
Ienca & Andorno (2021)	<ul style="list-style-type: none">• Mental integrity	<ul style="list-style-type: none">• Mental privacy	<ul style="list-style-type: none">• Cognitive liberty• Psychological continuity