Neurotechnologies and the Right to Mental Health

Giulia Bosi*

ABSTRACT: The relationship between the right to mental health and neurotechnologies has not been properly explored yet. This paper replies to the following research questions: a) Can the right to mental health benefit from neurotechnologies?; and b) How does the right to mental health take shape in the context of this kind of technology? We demonstrate that neurotechnologies can contribute to the realisation of the right to mental health. Techniques such as deep brain stimulation, neuroimaging and mobile apps can help prevent and treat mental disorders. In addition, we examine how the right to mental health applies in the field of neurotechnologies. In so doing, we present concrete obligations of the State in this regard.

KEYWORDS: Neurotechnologies; mental disorders; right to health; right to mental health; human rights

1. Introduction

"At first, I was blown away because the concept of it seems so intense. Like, it's brain surgery. You have wires embedded in your brain. But I also felt like at that point I tried everything, and I was desperate for an answer".[1] These are the words of Emily Hollenbeck during an interview for the Associated Press. Ms Hollen is an American woman suffering from depression who decided to be treated with deep brain stimulation (DBS). DBS is a neurotechnology that delivers electrical stimulation in the brain through a system made of electrodes, wires and a sort of pacemaker device. Although Emily still takes psychiatric drugs for depression, thanks to DBS she made significant progress and is no longer preoccupied that everyday obstacles will trigger a devastating depression.

Emily's experience shows that a connection exists between neurotechnologies and mental health. However, this relationship has not yet been properly explored in human rights terms, and more specifically, from a right-to-mental health perspective. Academic debates on human rights and neurotechnologies commonly concern two main issues. First, they usually examine *how neurotechnologies can*

* *Post doc research fellow in International Law, Sant'Anna School of Advanced Studies, Pisa. Mail: giulia.bosi@santannapisa.it.* *The article was subject to a double-blind peer review process. This publication was realised with the co-financing of the European Union - Next Generation EU-Project PRIN 22 'Health Emergencies and Legal Preparedness - HELP: Global, Regional and National Approaches' cod. MUR 2022MYEW4J - CUP J53D23005710006.*

[1] https://bit.ly/4clJlAD (last visited 10/12/2024).

Call

endanger human rights. They rarely investigate *how neurotechnologies can contribute to the realisation of human rights*. Second, they frequently analyse *whether we need new human rights* to tackle the challenges put forward by these technologies or *whether existing human rights are enough*. Less attention is paid to how specific human rights, especially socio-economic rights, take shape in the context of neurotechnologies. Starting from these premises, this paper aims to reply to the two following research questions:

Can the right to mental health benefit from neurotechnologies?

How does the right to mental health take shape in the context of neurotechnologies?

Being able to access an individual's brain activity, and even to alter it, neurotechnologies pose a series of threats to our identity, privacy, and freedom of thought, among others. For instance, thanks to neurotechnologies, we can reproduce (similar) images of what people see through the analysis of their brain scans.[2] Some of the risks associated with neurotechnologies might seem abstract at the moment, but they might not be in the near future. Through this kind of devices, police officers could monitor the neuronal activity of suspects.[3] Insurance companies could use neural information to evaluate a certain individual predisposition to develop a certain disease or to make inferences about personality traits.[4] Issues related to consent and confidentiality are already concrete risks. [5] An assessment of privacy practices of thirty consumer neurotechnology companies demonstrated "substantial gaps" between those practices and global privacy standards.[6] Unsurprisingly, neurotechnologies are often seen as tools that can imperil human rights,[7] and academic literature has commonly focused on the negative, rather than positive, obligations of the State in this field.[8]

The other main topic of discussion is whether the current international human rights legal framework is adequate to respond to the challenges posed by neurotechnologies or whether new human rights

[2] Y. TAKAGI, S. NISHIMOTO, *High-Resolution Image Reconstruction with Latent Diffusion Models from Human Brain Activity*, in *bioRxiv*, 2, 3, 2023.

[3] https://www.nytimes.com/2023/03/30/technology/police-surveillance-tech-dubai.html (last visited 10/12/2024). For a comprehensive discussion on recent neurotechnology advancements, see UNESCO, *Unveiling the Neurotechnology Landscape: Scientific Advancements Innovations and Major Trends*, 2023, 22.

[4] On this point SEE K. S. ROMMELFANGER, A. PUSTILNIK, A. SALLES, *Mind the Gap: Lessons Learned from Neurorights*, in *Science & Diplomacy*, 2022.

[5] On the threats posed by neurotechnologies and the need to protect mental privacy and integrity see A. LAVAZZA, *Freedom of Thought and Mental Integrity: The Moral Requirements for Any Neural Prosthesis*, in *Frontiers in Neuroscience*, 12, 83, 2018, 2.

[6] Neurorights Foundation, *Safeguarding Brain Data: Assessing the Privacy Practices of Consumer Neurotechnology Companies,* 2024, 4.

[7] Bublitz argues that recent reports by international organizations "highlight a range of *threats to human rights* posed by neurotechnologies", emphasis added (C. BUBLITZ, *Neurotechnologies and Human Rights: Restating and Reaffirming the Multi-Layered Protection of the Person*, in *The International Journal of Human Rights*, 28, 5, 2024, 782). See, for example, the report Unesco, University Of Milan-Bicocca And State University Of New York, *The Risks and Challenges of Neurotechnologies for Human Rights*, 2023. See also Allan McCay's TedTalk *How Neurotechnology Could Endanger Human Rights,* 2023 (https://www.youtube.com/watch?v=bwOHBPNBoiM, last visited 10/12/2024).

[8] In the words of Ienca, "positive rights such as promoting justice and equality, *e.g.*, through ensuring egalitarian access to neurotechnology for biomedical use […] have so far occupied a secondary role in the neurorights debate" (M. IENCA, *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in the Biomedical Fields*, Strasbourg, 2021, 72).

ISSN 2284-4503

should be elaborated.[9] Simply put, those in favour of creating new human rights argue that the human rights currently provided by international treaties are not able to properly address all the issues raised by neurotechnologies. Human rights conventions do not even explicitly refer to neurotechnologies or neuroscience. A few academics have proposed new rights, such as the right to cognitive liberty, the right to mental privacy, and the right to psychological continuity.[10] Those against the creation of new human rights sustain that the human rights developed so far are sufficient. Through an evolutionary interpretation of the treaties, it is possible to interpret current human rights in light of the challenges derived by neurotechnologies. This perspective presents two main advantages. First, it avoids the risk of human rights proliferation (*i.e.*, the tendency to create new human rights), a phenomenon seen as problematic because "positing too many human rights […] lead[s] to their devaluation".[11] Second, it is more realistic, since the political process to elaborate new rights, such as the adoption of a treaty, is difficult and unlikely.

To fill these gaps, this paper investigates whether and how the right to mental health can benefit from neurotechnologies. Second, instead of concentrating on the debate between pro or against new human rights to address the challenges posed by neurotechnologies, it examines how a specific right, the right to mental health, applies in that context.[12] This paper is organised as follows. Section 2 provides the definitions of neurotechnologies, direct-to-consumer neurotechnologies, mental health and mental disorder. Section 3 analyses the key elements of the right to mental health. Section 4 demonstrates how neurotechnologies can contribute to the realisation of the right to mental health. Section 5 examines how the right to mental health framework applies to neurotechnologies. Section 7 provides some final remarks.

Before delving into the subject matter, a premise is necessary. This paper considers the use of neurotechnologies for therapeutic or auxiliary use and not for enhancement. Human enhancement can be described as "a modification aimed at improving human performance –as opposed to restoring it– that

[9] Against the creation of new human rights to address the challenges posed by neurotechnologies see C. BUBLITZ, *op. cit.*; S. LIGHART, C. BUBLITZ, S. ALEGRE, *Neurotechnology: We Need New Laws, Not New Rights*, in *Nature*, 620, 950, 2023; and T. ISTACE, *Human Rights Law: An Incomplete but Flexible Framework to Protect the Human Mind against Neurotechnological Intrusions*, in *Law, Innovation and Technology*, 16, 1, 2024. In favour of the creation of new human rights (or the reconceptualisation of some of them) see Neurorights Initiative, The Five NeuroRights (https://neurorights-initiative.site.drupaldisttest.cc.columbia.edu/sites/default/files/content/The%20Five%20Ethical%20NeuroRights%20updated%20pdf_0.pdf, last visited 10/12/2024). See also M. IENCA, R. ANDORNO, *Towards New Human Rights in the Age of Neuroscience and Neurotechnology*, in *Life Sciences, Society and Policy*, 13, 5, 2017. Another key article that proposes the adoption of new human rights in the context of neurotechnology is R. YUSTE, J. GENSER, S. HERMANN, *It's Time for Neuro-Rights: New Human Rights for the Age of Neurotechnology*, in *Horizons: Journal of International Relations and Sustainable Development*, 18, 2021.

[10] See M. IENCA, R. ANDORNO, *op. cit.*, and M. IENCA, *Tra cervelli e machine: riflessioni su neurotecnologie e su neurodiritti*, in *notizie di POLITEIA*, XXXV, 133, 2019, 57-59. See also N.A. FARAHANY, *The Battle for your Brain*, New York, 2023, where the author unpacks a new right to cognitive liberty.

[11] J. T. THEILEN, *The Inflation of Human Rights: A Deconstruction*, in *Leiden Journal of International Law*, 34, 4, 2021, 831.

[12] The obligation of the State not to cause mental harm to the individual is out of the scope of this paper. The existence and scope of this obligation, and whether it falls under the realm of the right to mental health or other human rights (such as the right to private and family life or the right to mental integrity) is debated. This paper does not address this discussion but rather concentrates on the obligations of the State in the field of mental healthcare.

is brought about by science-based and/or technology-based interventions in or on the human body".[13] In this sense, it is "often contrasted with therapeutic interventions intended to make someone well, that is, to restore their condition (e.g., from injury), or to return them to good or better health through the diagnosis, prognosis, treatment and prevention of disease, as well as through the promotion of health".[14] One of the most renowned cases of human enhancement is that of Neil Harbisson, an artist with an antenna implanted in his skull that transforms light frequencies, *i.e.* colours, into audio frequencies.[15] Other examples of enhancement are the use by healthy individuals of electrostimulation to increase motivation or the (more common) assumption of psychiatric drugs to improve attention.[16] The distinction between what constitutes treatment and what constitutes enhancement has been the subject of extensive philosophical work.[17] Although this distinction might not always be easy to draw, we consider it a meaningful one, as the situation of an individual taking psychiatric medication to treat a mental disorder differs fundamentally from that of someone using it to enhance cognitive abilities. Moreover, this distinction is commonly accepted in discussions on neurotechnologies as it provides a framework for examining the legal and ethical issues that arise in these two distinct scenarios.[18] For instance, many argue that when medical interventions are used for enhancement rather than treatment, the acceptable level of risk should be lower, since the potential benefits for healthy individuals are far less significant compared to the benefits of treating serious illnesses.[19] Finally, differentiating between treatment and enhancement is particularly relevant to this paper. While there is agreement that the right to mental health includes a right to access mental healthcare, whether it also encompasses a right to enhancement is controversial.[20] Considering the current normative content of the right to mental health, cognitive enhancement appears to fall outside its scope. For this reason, this topic is not addressed in this contribution.

[13] Y. ERDEN, P. BREY, *Ethics Guidelines for Human Enhancement R&D*, in *Science*, 378, 6622, 2022, 835.
[14] *Ibidem*.
[15] https://www.bbc.com/news/av/technology-29992577 (last visited 10/12/2024).
[16] A. NISCO, *La tutela penale dell'integrità psichica*, Torino, 2012, 140.
[17] In fact, human enhancement raises several philosophical and legal questions. To mention a few, to what extent should the State regulate the use of neurotechnology for enhancement by healthy individuals? Is the presence of enhanced and unenhanced persons likely to increase social inequalities? The first question is discussed in detail in N.A. FARAHANY, *op. cit*. The second one is thoroughly examined in L. LO SAPIO, *Transumanesimo e potenziamento dell'uomo: Limiti e punti di forza di un movimento controverso*, in *Ethics & Politics*, XX, 3, 2018, 503; A. D'ALOIA, *Eguaglianza. Paradigmi e adattamenti di un principio 'sconfinato'*, in *Rivista Associazione Italiana dei Constituzionalisti*, 4, 2021, 95, and G. DE MINICO, *Nuova tecnica per nuove disuguaglianze*, in *Federalismi.it*, 6, 2024, 20.
[18] On the difficulty of distinguishing between treatment and enhancement see R. FATTIBENE, *La tensione delle garanzie di libertà e diritti là dove il potenziamento cognitivo incontra l'intelligenza artificiale*, in *Federalismi.it*, 25, 2022, 4 and B. DAN, *Human Enhancement: From Disability to Superability*, *in Developmental Medicine & Child Neurology*, 2019, 500.
[19] J. CLAUSEN, *Ethical Brain Stimulation – Neuroethics of Deep Brain Stimulation in Research and Clinical Practice*, in *European Journal of Neuroscience*, 32, 1152-1162, 2019, 1159.
[20] The expression "mental healthcare" in this sentence broadly refers to access to mental health promotion, prevention and treatment.

2. Definitions

Neurotechnologies. Neurotechnologies can be defined as "the broad and heterogeneous spectrum of methods, systems and instruments that establish a connection pathway to the human brain through which neuronal activity can be recorded and/or altered".[21] Neurotechnologies that record brain activity are, for example, the electroencephalogram (EEG) and the functional magnetic resonance imaging (fMRI). A neurotechnology that can alter the brain is deep brain stimulation (DBS). The functioning of these three techniques will be explained in detail in Section 5. Furthermore, certain neurotechnologies not only read brain activity but can transform it into action. It is the case of brain-computer interfaces (BCI). BCI is "a computer-based system that acquires brain signals, analyzes them, and translates them into commands that are relayed to an output device to carry out a desired action".[22] For instance, a desired action could be the movement of an artificial limb.[23]

Direct-to-consumer neurotechnologies. In the past decade, another concept related to neurotechnologies has been developed in the literature: direct-to-consumer (DTC) neurotechnologies.[24] DTC neurotechnologies are characterised by the fact that they "can be purchased directly by a consumer, without any involvement of a researcher or treating clinician".[25] An example of DTC neurotechnology would be the *Muse*, an EEG headband that transforms EEG signals into audio feedback that the user listens to through headphones.[26] There is a debate on whether certain technologies, such as mobile apps, should be considered DTC neurotechnologies. Kreitmair includes them in the definition. In her view, despite not reading or altering neuronal activity, they may nevertheless be employed to monitor and return findings related to neurological and psychological functions.[27] On the contrary, other academics, such as Ienca and Vayena, maintain that a narrowed definition would be preferable. According to them, if we enlarge the scope of DTC devices and include technologies such as mobile apps, which do not create an interface with a person's nervous system, the definition of DTC neurotechnologies becomes "semantically and pragmatically vacuous".[28]

Mental health and mental disorder. Mental health is defined by the World Health Organization (WHO) as "a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community".[29] Mental health is "an integral

[21] M. IENCA, *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in the Biomedical Fields*, cit., 3.

[22] J. J. SHIH, D. J. KRUSIENSKI, J. R. WOLPAW, *Brain-Computer Interfaces in Medicine*, in *Mayo Clinic Proceedings*, 87, 3, 2012, 268.

[23] This neurotechnology is particularly used by persons with neuromuscular disorders or injuries to the spinal cord.

[24] See A. WEXLER, P. B. REINER, *Oversight of Direct-to-consumer Neurotechnologies*, in *Science,* 363, 6424, 2019.

[25] K. KREITMAIR, *Dimensions of Ethical Direct-to-Consumer Neurotechnologies*, in *AJOB Neuroscience*, 10, 4, 2019, 153.

[26] https://choosemuse.com/ (last visited 10/12/2024).

[27] K. KREITMAIR, *op. cit.*, 154.

[28] M. IENCA, E. VAYENA, *Direct-to-Consumer Neurotechnology: What Is It and What Is It for?*, in *AJOB Neuroscience*, 10, 4, 2019, 149.

[29] https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response (last visited 10/12/2024).

component of health and well-being that underpins our individual and collective abilities to make decisions, build relationships and shape the world we live in".[30] A mental disorder is "a syndrome characterized by clinically significant disturbance in an individual's cognition, emotion regulation, or behavior that reflects a dysfunction in the psychological, biological, or development processes underlying mental functioning".[31] Mental disorders include depression, anxiety, mood disorders, bipolar disorders, schizophrenia, and eating disorders, to mention a few. "Mental disorders"; "mental illness", "mental health problems"; and "mental health conditions" are used as synonyms in this contribution.

3. The right to mental health

The right to health, recognised by several International Human Rights Law (IHRL) instruments, includes physical and mental health. Although not all treaties refer expressly to mental health in their right-to-health provisions, this is how the right has always been interpreted. This is probably because the International Covenant on Economic, Social and Cultural Rights (ICESCR), which contains the most authoritative provision on the right to health, considers mental health as an integral component of this right.[32] In addition, the Constitution of the WHO provides a definition of health which includes mental health.[33] The most relevant document concerning the interpretation of the right to health is General Comment 14, adopted by the Committee on Economic, Social and Cultural Rights, the treaty body of the ICESCR, in 2000.[34] This document defines the normative content of the right to health and the obligations of the State under this right. Since the right to mental health is a component of the right to health, the key elements of the right to health (thoroughly described in General Comment 14) also apply to the right to mental health. General Comment 14 itself supports this conclusion by making it clear from the beginning that the right to health encompasses physical and mental health.

The key elements of the right to health as presented in General Comment 14 if applied to the right to mental health turn out to be the following:

a) Mental healthcare and underlying determinants

The right to mental health includes both the right to mental healthcare and the right to underlying determinants of mental health. In other words, it contains both the right to access mental healthcare and receive treatment but also extends to the determinants of health. The latter are "food and nutrition, housing, access to safe and potable water and adequate sanitation, safe and healthy working conditions, and a healthy environment".[35] However, the right to mental health is not a right to be

[30] *Ibidem*.

[31] American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders (5th ed.)*, 2013, 104.

[32] International Covenant on Economic, Social and Cultural Rights [hereinafter ICESCR], Dec. 16, 1966, 993 U.N.T.S. 3, Art. 12.

[33] The WHO Constitution defines health as health as "a state of complete physical, mental and social well-being and not merely the absence of disease of infirmity" (Constitution of the World Health Organization, Jul. 22, 1946, 14 U.N.T.S. 185, Preamble).

[34] Committee on Economic, Social and Cultural Rights, General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12), (Aug. 11, 2000).

[35] *Ibidem*, para. 4.

mentally healthy. This is because our health is influenced by various factors, some of which, such as a person's genetic makeup, are beyond the State's control.

b) Availability, accessibility, acceptability and quality

Services, goods and facilities for mental health must be available, accessible, acceptable and of good quality ("AAAQ framework"). Availability requires that health facilities, goods and services for mental health are available in sufficient quantity within the State. Accessibility contains the following sub-dimensions: non-discrimination, physical accessibility, and economic accessibility. Non-discrimination implies that mental health facilities, goods and services are accessible without discrimination. Physical accessibility requires that persons with physical disabilities are able to access mental health facilities. Economic accessibility entails that mental health services are affordable. Acceptability requires that services, goods and facilities for mental health respect medical ethics and are culturally appropriate. Quality entails that services, goods and facilities for mental health respect medical and scientific standards and are of good quality.

c) Protect, respect and fulfil

States are under the obligation to protect, respect and fulfil the right to mental health. Under the obligation to protect, the State must not interfere with the right. For instance, respecting the right to mental health requires the State to refrain from denying or limiting access to mental health services to certain categories of people. Under the obligation to protect, the State must prevent third parties from interfering with the enjoyment of the right. For instance, the State must ensure non-discriminatory access to mental healthcare provided by third parties. Finally, under the obligation to fulfil, the State must take positive action to facilitate the enjoyment of the right. For instance, the State must adopt a national health policy or plan for the realisation of the right to mental health.

d) Progressive realisation

States must take steps to the maximum of their available resources to achieve progressively the full realisation of the right to mental health. This is the so-called principle of progressive realisation, which is valid for all social and economic rights. In other words, IHRL recognises that the implementation of human rights is dependent on the resources the State has at its disposal. However, the State has some core minimum obligations. This means minimum essential levels of the right to mental health must always be respected. Core obligations include, among others, the obligation to ensure non-discriminatory access to mental healthcare; access to minimum essential food, water and shelter; and provide essential drugs. The concept of available resources comprises not only the resources present within a State, but also those that the State could obtain through international cooperation and assistance.

e) Participation

The realisation of the right to mental health requires the participation of the population in mental health-related decision-making. Participation could take different shapes, such as democratic elections and public consultations regarding the development of mental health policies. Although participation is one of the most disregarded elements of the right to health, it is key because it contributes to making a certain decision effective and sustainable in practice.[36] In particular, in the context of mental health, the experience of those who receive mental healthcare could provide useful insights on how to carry

[36] H. POTTS, *Participation and the Right to the Highest Attainable Standard of Health*, Human Rights Centre – University of Essex, 2008, 8.

out interventions, on what works and what does not. In this sense, participation creates efficient healthcare systems and services.

f) Accountability

If the State violates the right to mental health, it must be held accountable. Paul Hunt, ex-Special Rapporteur on the right to health defined accountability as something that "provides individuals and communities with an opportunity to understand how those with human rights responsibilities have discharged their duties".[37] As a result, "where mistakes have been made, accountability requires redress".[38] Accountability might be administrative, political or judicial. Administrative accountability includes mechanisms such as reviews of how public funds are used. Political accountability is obtained through democratic elections and processes. Judicial accountability consists of going to court to adjudicate violations of the right to mental health.

4. Neurotechnologies can contribute to the realisation of the right to mental health

Human rights are commonly seen as tools that can protect us from the negative effects of neurotechnologies. Human rights often cited in this regard are the right to freedom of thought, the right to privacy and the right to security. However, neurotechnologies are not only a threat to human rights but can also be an instrument to realise them. In particular, this section demonstrates that neurotechnologies can contribute to ensuring the right to mental health. It does so by describing three main ways neurotechnologies can support the prevention and treatment of mental health conditions. These are 1) deep brain stimulation; 2) neuroimaging; and 3) mobile mental health apps.

Deep brain stimulation

DBS involves "the placement of electrodes adjacent to deep structures in the brain", "[t]hese electrodes are then connected, by a wire, to a pulse generator which is subcutaneously implanted into the chest wall", and "[t]he pulse generator is controlled by a computer that ultimately gives instructions to the electrodes to fire".[39] Thus, the DBS system is composed of three main parts: the electrodes, which are inserted in the brain; the wire, which is located under the skin from the head to the shoulder and links the electrodes to the pulse generator; and the pulse generator, which is commonly situated in the upper portion of the chest. The impulses created by the electrodes impact brain activity and can also regulate chemical imbalances within the brain. DBS is commonly applied to reduce symptoms of certain health conditions such as Parkinson's disease.

[37] Special Rapporteur on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health, Report of the Special Rapporteur on the Right of Everyone to the Enjoyment of the Highest Attainable Standard of Physical and Mental Health, Paul Hunt A/HRC/7/11, (Jan. 31, 2008), para. 99.

[38] *Ibidem*.

[39] K. FARIBA, V. GUPTA, *Deep Brain Stimulation*, in *StatPearls Publishing*, 2023, 1.

However, DBS is used not only for neurological disorders but also psychiatric conditions. For example, DBS is employed to treat depression and obsessive-compulsive disorder (OCD) with encouraging results.[40] As an invasive technique, DBS is not without risks. Unsurprisingly, it has been argued that "exploring DBS for psychiatric disorders at this stage should be limited to being a 'last option'", that is, it should be used only for patients not responding to psychotherapy and medication.[41] A careful assessment of the risks and therapeutic advantages of DBS, and the possible treatment alternatives, must be carried out. Nonetheless, although further research on DBS and its effectiveness is needed, and although several ethical issues related to it are still being explored, this neurotechnology is emerging as an increasingly promising therapy for certain mental disorders.

Neuroimaging

Neuroimaging is "a class of technology that provides an array of directly or indirectly derived visual representations of structural anatomy, physiologic and/or metabolic capacities, or functions within the central or peripheral nervous system".[42] Neuroimaging includes techniques such as Functional Magnetic Resonance Imaging (fMRI) and Electroencephalography (EEG). Both fMRI and EEG are non-invasive methods. The fMRI creates images of the brain by utilising radio waves and magnetic fields. The EEG measures the electrical activity of the brain through the application of small sensors that are positioned on the scalp. Neuroimaging is key for the diagnosis and treatment of neurological disorders like Alzheimer's.[43] It also helps neurosurgeons to remove brain tumours without damaging non-affected parts.[44]

Neuroimaging is becoming more and more relevant even in the psychiatric field. In recent years, it has been used to discover the biological cause of mental health conditions. For instance, it has been employed to detect correlates of depression and schizophrenia.[45] Although this area of investigation is relatively new and much more research is necessary before obtaining substantial findings, neuroimaging techniques show significant potential in assisting doctors in identifying the underlying biological

[40] K. SCANGOS et al., *Closed-loop Neuromodulation in an Individual with Treatment-resistant Depression*, in *Nature Medicine*, 27/1696-1700, 2021; and L. MAR-BARRUTIA et al., *Deep Brain Stimulation for Obsessive-Compulsive Disorder: A Systematic Review of Worldwide Experience after 20 Years*, in *World Journal of Psychiatry*, 11/9, 2021.

[41] J. CLAUSEN, *op. cit.,* 1158. Desmoulin-Canselier argues that even "the last resort" argument implies complex ethical evaluations, sustaining that this argument "must be used conservatively, to avoid presenting DBS as a 'wild card' treatment, to be played when all else fails" (S. DESMOULIN-CANSELIER, *Ethical and Legal Issues in Deep Brain Stimulation: An Overview*, in *Neurological Disorders & Epilepsy Journal*, *½*, 2018, 4).

[42] A. SHARMA, A. WEINTRAUB, *Neuroimaging*, in J. KREUTZER et al. (eds.), *Encyclopedia of Clinical Neuropsychology*, 2016, 1.

[43] S. RISACHER, A. J. SAYKIN, *Neuroimaging Advances in Neurological and Neurodegenerative Diseases*, in *Neurotherapeutics*, 18, 2, 2021.

[44] S. NARASIMHAN, H. F. J. GONZALEZ, *Survey of Neuroimaging in Neurological Surgery, Current State, and Emerging Research*, in *Frontiers in Neuroimaging*, 2:1022680, 2023, 2.

[45] See L. CASTANHEIRA et al., *Neuroimaging Correlates of Depression-Implications to Clinical Practice*, in *Frontiers in Psychiatry*, 1, 10, 2019; D. SCHEEPENS et al., *The Link Between Structural and Functional Brain Abnormalities in Depression: A Systematic Review of Multimodal Neuroimaging Studies*, in *Frontiers in Psychiatry*, 11, 485, 2020; O. D. HOWES et al., *Neuroimaging in Schizophrenia: an Overview of Findings and Their Implications for Synaptic Changes*, in *Neuropsychopharmacology*, 46, 151-167, 2023; and M. DABIRI et al., *Neuroimaging in schizophrenia: A Review Article*, in *Frontiers in Neuroscience*, 16, 1042814, 2022.

basis of mental illnesses.[46] In addition, neuroimaging contributes to differentiating between mental health conditions and neurological diseases/brain tumours. Psychotic symptoms might be caused by structural lesions of the brain and not schizophrenia.[47] Apathy might be provoked by a tumour in the frontal lobe, and not by depression.[48]

Mobile mental health apps

As seen above, whether mobile mental health apps fall within the notion of neurotechnologies is debated. A narrow definition of neurotechnologies, according to which the latter should be characterised by "a meaningful interface with someone's nervous system", would exclude them.[49] However, other academics sustain that certain mobile apps should be included because of the functions they carry out. For the purposes of this section, we take mobile apps into account. It must be noted that even those who are in favour of a more limited definition of neurotechnologies might still find this section useful. At least certain mobile apps fall anyway within the narrower notion of neurotechnologies. It is the case of those mobile apps connected to devices that monitor brain functions, such as an EEG headset.[50]

Mobile mental health apps can contribute to diagnosing a mental illness or to treat/manage it. For example, the app *MoodRhythm* supports persons with bipolar disorder in tracking their mood and their clinicians in making more informed decisions on treatment on the basis of the data collected by the app.[51] The app *PTSD Coach*, originally developed for US Veterans, contains useful information on PTSD, a system to track the symptoms and methods on how to deal with them. [52] *What's My M3* is an app for screening mental health problems such as mood disorders.[53] Several apps are concerned with mental health prevention and promotion. For instance, *MoodGym* aims to prevent symptoms of depression and anxiety.[54] In short, the main functions of mobile mental health apps are commonly tracking certain aspects of life, such as sleep patterns or social interactions; collecting data that the individual provides, such as data concerning mood; and providing information, such as advice on how to handle stressful events.[55] Mobile mental health apps clearly pose significant ethical and legal challenges, notably serious privacy concerns. Nevertheless, as this paragraph has demonstrated, their positive impact on mental health should not be underestimated.

To conclude, although neurotechnologies are often associated with mental health in negative terms because of the risks they entail, it is necessary to highlight that they are already used in the field of

[46] On the point see C. MARTINELLI, S. S. SHERGILL, *Everything You Wanted to Know about Neuroimaging and Psychiatry, but Were Afraid to Ask*, in *BJPsych Advances*, 21, 4, 2015.
[47] J. C. MASDEU, *Neuroimaging in Psychiatric Disorders*, in *Neurotherapeutics*, 8, 1, 2011, 93.
[48] *Ibidem.*
[49] M. IENCA, E. VAYENA, *op. cit.*, 150.
[50] E. POSTAN, *Narrative Devices: Neurotechnologies, Information, and Self-Constitution*, in *Neuroethics*, 14, 2, 2021, 233.
[51] https://ec.europa.eu/newsroom/horizon2020/items/15417/en (last visited 10/12/2024).
[52] https://mobile.va.gov/app/ptsd-coach (last visited 10/12/2024).
[53] https://www.psychologytoday.com/intl/blog/shrink-rap-today/201206/whatsmym3-app-mental-health-screening-and-symptom-tracking (last visited 10/12/2024).
[54] https://www.moodgym.com.au/ (last visited 10/12/2024).
[55] For a more detailed investigation of the functionalities of wearable and mobile health technology see K. KREITMAIR, M. K. CHO, *The Neuroethical Future of Wearable and Mobile Health Technology*, in J. ILLES (ed.), *Neuroethics: Anticipating the Future*, Oxford, 2017, 84-86.

psychology and psychiatry to prevent and treat mental health problems.[56] Neurotechnologies improve the diagnostic process, can lead to more tailored treatments, and are starting to provide deeper insights into the biological foundations of mental illnesses. Furthermore, certain neurotechnologies, such as mobile apps, are particularly effective for those who fear the social stigma associated with mental disorders. They are also more accessible and less costly than therapy. For all these reasons, neurotechnologies can contribute to the realisation of the right to mental health. With the words of the 2024 study by the Human Rights Council Advisory Committee, "the development of neurotechnology applications holds great prospects in protecting mental health (International Covenant on Economic, Social and Cultural Rights, art. 12; and the Convention on the Rights of Persons with Disabilities, art. 25)".[57]

5. The right-to-mental health framework applied to neurotechnologies

This section moves to the second research question by addressing how the right to mental health applies in the context of neurotechnologies. More precisely, we concentrate on the following features: the right to mental healthcare; the AAAQ framework; the obligations to respect, protect and fulfil; progressive realisation; and participation. These features of the right to mental health are the ones that, in our view, are the most relevant in guiding the State when developing policies on this topic. As described in the introduction, the academic debate often concentrates on whether we need new human rights or whether current human rights are enough to deal with the challenges posed by neurotechnologies. Less attention is paid to how specific rights, such as the right to mental health, take shape when applied to neurotechnologies. This section partially fills this gap, investigating how the right to mental health imposes certain obligations on the State in this field.

The right to mental healthcare. The right to mental health includes the right to access mental healthcare. This, in turn, entails receiving appropriate diagnostic exams and treatment. Since exams and treatment could be provided through neurotechnology devices, such as fMRI and DBS, the right to mental health includes the right to access neurotechnologies for medical purposes. To make an example, the right to mental healthcare entails that a person who necessitates an fMRI to exclude that their psychotic symptoms are caused by a brain tumour receives it. In a similar vein, a person who has been prescribed DBS to treat their depression should have access to it. However, it must be borne in mind that, as further described below, the principle of progressive realisation applies. As a result, in practice, the right to mental health does not necessarily require that if you need a neurotechnology, you should access it. The point we want to make here is that neurotechnologies should be considered an integral part of mental healthcare, and thus, also of the right to mental health.

[56] On the positive implications of neurotechnologies for mental health see UNESCO, *op. cit*., 22: "[N]eurotechnology is opening up new possibilities to help diagnose, treat, and prevent […] mental health disorders". Similarly, Eaton and Illes argue that "cognitive neurotechnologies […] promise to improve the treatment of […] psychiatric disorders" (M. EATON and J. ILLES, *Commercializing Cognitive Neurotechnology – The Ethical Terrain*, in *Nature Biotechnology*, 25/393-397, 2007, 393).

[57] Human Rights Council Advisory Committee, *Impact, Opportunities and Challenges of Neurotechnology with regard to the Promotion and Protection of all Human Rights*, A/HRC/57/61, 2024, para. 31.

AAAQ framework. The right to mental health requires that services, goods and facilities for mental health must be available, acceptable, accessible and of good quality. Since neurotechnologies can be considered to fall under the notion of "goods", they must also have these features. This paragraph focuses on the acceptability and quality requirements, since availability and accessibility are highly resource-dependent, and their discussion better falls within the paragraph below on progressive realisation. Acceptability entails that neurotechnologies should respect medical ethics.[58] Consequently, the use of neurotechnologies must respect principles such as consent to intervention and confidentiality.[59] In addition, neurotechnologies must aim to improve the health status of the person. More widely, medical research in this field should respect internationally recognised ethical guidelines, such as the Declaration of Helsinki by the World Medical Association.[60] Finally, the quality requirement entails that medical professionals working with neurotechnologies are properly trained and that neurotechnologies respect certain quality parameters.

Obligation to respect, protect and fulfil. We propose a few examples of what the obligation to protect, respect and fulfil the right to mental health could mean in practice in the field of neurotechnologies. They are an adaptation of the more general right-to-health obligations included in General Comment 14 to this specific area. In the context of neurotechnologies, the obligation to respect implies that the State refrains from marketing unsafe neurotechnologies and applying them in a coercive manner. The obligation to protect requires ensuring that health professionals meet appropriate standards of education and skills related to the use of this type of tool. The obligation to fulfil entails supporting people in making informed choices on this matter and making them aware of related risks and benefits.[61]

Progressive realisation. The positive realisation of the right to mental health, including receiving mental healthcare, is subject to the principle of progressive realisation. Therefore, the fact that the State does not provide DBS treatment to a person with depression who necessitates it (to follow the example made at the beginning of this section) does not necessarily amount to a violation of the right to mental health. As D'Aloia notes, while modern neuroscientific technologies should, in theory, be accessible to all, their widespread implementation may be unsustainable for current healthcare systems.[62] He also

[58] On the notion of medical ethics and the right to health see J. ASHER, *The Right to Health: A Resource Manual for NGOs*, London, 2004, 144-149. See also B. TOEBES, *Human Rights and Health Sector Corruption*, in J. HARRINGTON, M. STUTTAFORD (eds.), *Global Health and Human Rights: Legal and Philosophical Perspectives*, Abingdon, 2010.

[59] On the various challenges related to informed consent in the case of techniques such as DBS see J. CLAUSEN, *op. cit*., 1155.

[60] World Medical Association, Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects, first adopted in 1964 and last revised in 2013.

[61] Committee on Economic, Social and Cultural Rights, General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12), E/C.12/2000/4 (Aug. 11, 2000), paras. 34-37. The first example of obligation provided is related to the more general obligation included in General Comment 14 according to which "obligations to respect include a State's obligation to refrain […] from marketing unsafe drugs and from applying coercive medical treatments" (para. 34). The second example is connected to the following passage of General Comment 14: "Obligations to protect include, inter alia, the duties of States to […] ensure that medical practitioners and other health professionals meet appropriate standards of education, skill and ethical codes of conduct" (para. 35). The third example is related to this part: "The obligation to fulfil […] include […] supporting people in making informed choices about their health" (para. 37).

[62] A. D'ALOIA, *op. cit*., 90 and 94.

highlights that the modalities for accessing them (who can access them, in which quantity, etc.) have profound implications on the principle of equality.[63] Although IHRL does not specify the exact amount or type of healthcare a person should have access to, its value lies in providing criteria on how the allocation process should be carried out.[64] According to IHRL, this process should respect the principles of non-discrimination and participation. Decisions in this area should be based on evidence, and their effectiveness should be monitored. Therefore, the choices of financing or not exams or treatment based on neurotechnological devices should respect these criteria.

Participation. Participation is one of the procedural elements of the right to mental health. In the field of neurotechnologies, participation would entail the involvement of the public in policymaking related to this matter. One way the State could do that is by holding public consultations with the persons who are the most affected by neurotechnologies: patients. Although directly reaching out to patients might be challenging, there are several patient associations that the State could contact to ask their perspective on this topic. At the international level, organizations that could be involved include the World Federation for Mental Health and United for Global Mental Health. There are also NGOs operating at the regional and national levels. In Europe, leading NGOs include Mental Health Europe and Gamian-Europe. In the US, there is the National Alliance on Mental Illness (NAMI). Finally, this kind of debate should also engage the companies that develop neurotechnologies and the health professionals who use them in their clinical practice.

In the end, it is worth mentioning that the Convention on the Rights of Persons with Disabilities (CRPD) contains various references to positive obligations of the State in the context of technologies (and, thus, also neurotechnologies).[65] These obligations are relevant for this paper because persons with mental disorders are commonly considered persons with psychosocial disabilities and, as such, protected by the CRPD. The most relevant CRPD provision in this regard is Article 4(g).[66] According to it, State Parties have to "undertake or promote research and development of, and to promote the availability and use of *new technologies*, including information and communications technologies, mobility aids, devices and assistive technologies".[67] Although this provision makes us immediately think of a person with a physical disability and thus technologies that enable speaking or walking, assistive technologies are also used by persons with mental disorders. Watches, electronic calendars, and mobile

[63] *Ibidem*.

[64] J. TOBIN, *The Right to Health in International Law*, 2012, 236–37.

[65] Convention on the Rights of Persons with Disabilities [hereinafter CRPD], Dec. 13, 2006, 2515 U.N.T.S. 3. The CRPD refers to technologies in Artt. 4(g); 4(h); 9(1); 9(2)(g); 9(2)(h); 20(b); 20(d), 21(a); 26(3); 29(a)(ii); and 32(1)(d). It must be noted that these references are not made in relation to the right to (mental) health but mainly in the context of general obligations that the State must undertake to ensure the realisation of all human rights of persons with disabilities.

[66] For a detailed discussion on this article see V. DELLA FINA, R. CERA, G. PALMISANO, *The United Nations Convention on the Rights of Persons with Disabilities: A Commentary*, 2017, 137-156.

[67] CRPD, Art. 4(g), emphasis added. On positive obligations under the CRPD regarding technologies see C. BUBLITZ, *op. cit.*, 796.

apps support persons with mental disorders in activities such as "scheduling assistance, task management, calming and comforting, mindfulness, and distraction".[68] As a result, IHRL already explicitly recognises that the State should take positive actions in the field of technology for persons with mental disorders.

6. Conclusions

Although neurotechnologies constitute a threat to our identity, privacy and freedom of thought, they are also powerful instruments that can improve our lives. As human rights experts, we should not only wonder how human rights can protect us from neurotechnologies but also how neurotechnologies can help us realise human rights. In addition, we should stop exclusively discussing the necessity of creating new human rights to address the challenges posed by these technologies. Rather, we should also investigate how specific human rights, such as the right to health, apply in this context. Starting from these considerations, this paper has examined: 1) how neurotechnologies can contribute to the realisation of the right to mental health, and 2) how the right to mental health applies in the context of neurotechnologies.

The right to mental health is recognised in several IHRL instruments. The most relevant one is the International Covenant on Economic, Social and Cultural Rights, whose Article 12 protects the right of every individual to the highest attainable standard of physical and mental health. The right to mental health is not a stand-alone right but an integral component of the right to health. It includes a right to mental healthcare and a right to underlying determinants of mental health. Services, goods and facilities for mental health must be available, accessible, acceptable and of good quality. The State must protect, respect, and fulfil the right to mental health. As other socio-economic rights, this right is subject to the principle of progressive realisation. The population should be able to participate in decision-making related to this right. If the State violates this right, it must be held accountable.

Neurotechnologies can contribute to ensuring the right to mental health. Several studies demonstrate that they play a key role in preventing and treating mental health conditions. DBS is providing positive results in persons who experience depression and OCD. The field of neuroimaging (and thus, techniques such as EEG and fMRI) helps clinicians to differentiate between mental disorders and neurological diseases/brain tumours. Neuroimaging is also more and more used to identify the biological causes of mental health conditions. Mental health apps support clinicians in the diagnostic process and treatment decisions. Some of them even aim to avoid the insurgence of mental disorders, proposing mental health prevention and promotion activities.

Finally, the right to mental health framework requires the State to respect certain obligations in the context of neurotechnologies. Neurotechnologies fall within the notion of "goods" in General Comment 14 by the Committee on Economic, Social and Cultural Rights. As such, they must be available, accessible, acceptable and of quality. Examples of obligations of the State in this area include the fol-

[68] I.D. EBUENYI et al., *Use of Assistive Technology for Persons with Psychosocial Disability: Systematic Review* in *JMRI Rehabilitation and Assistive Technologies*, 2023, 10:e49750, 2. Some of these technologies could fit within the definition of neurotechnologies.

lowing. Under the obligation to respect, the State should refrain from marketing unsafe neurotechnologies. Under the obligation to protect, it should ensure that health professionals meet appropriate standards of education and skills to use these technologies. Under the obligation to fulfil, it should support people in making informed choices on this topic. The allocation of resources, including for neurotechnologies, should be based on the principle of non-discrimination and should be evidence-based. According to the element of participation, the population should be involved in policymaking regarding neurotechnologies. The State could engage patient associations and listen to their perspective.

"If I hadn't had DBS, I'm pretty sure I would not be alive today. […] Just being able to experience spontaneity, to be able to look forward to things. These things wouldn't be on my radar with depression, they wouldn't be possibilities. Now it's like, not only am I doing these things, but I am looking forward to them, and I am planning them, and I am enjoying them".[69] Emily Hollenbeck concludes her interview for the Associated Press with these words. They are a powerful reminder that neurotechnologies have the potential to advance the right to mental health. At the same time, as this paper has demonstrated, the international legal framework concerning this right imposes certain obligations on the States in this field.

[69] https://bit.ly/4clJlAD (last visited 10/12/2024).