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Brain–Computer Interface Integration in Mental Health: Clinician Perspectives on Diagnostic Efficacy and Ethical Implications

Serena D. Sanders
Walden University

Walden University

College of Allied Health

This is to certify that the doctoral dissertation by

Serena Sanders

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Review Committee
Dr. Mark Arcuri, Committee Chairperson, Psychology Faculty
Dr. Leslie Barnes-Young, Committee Member, Psychology Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

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Abstract

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MA, Walden University, 2021

BS, Columbia Southern University, 2020

Dissertation Submitted in Partial Fulfillment

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Abstract

This study explored the integration of brain–computer interface (BCI) technology into mental health care, focusing on clinicians' perceptions, ethical concerns, and the practical challenges associated with its adoption. As technological advancements in healthcare continue to reshape clinical practices, understanding how emerging technologies like BCI can be incorporated into therapeutic settings is essential. The purpose of this research was to examine clinician perspectives on the potential benefits of and barriers to BCI and to explore the ethical implications of its use in therapy. Guided by the technology acceptance model and the ethical decision-making framework, this qualitative study utilized semi structured interviews with six clinicians experienced in mental health care. Data analysis revealed that while these clinicians recognized the potential of BCI to enhance treatment outcomes, they expressed significant concerns regarding privacy, informed consent, and the ease of integration into clinical practice. Despite these concerns, many clinicians also showed cautious optimism about the future role of BCI in personalized mental health care, particularly with ongoing research and development. The findings contribute to the broader literature on the ethical, practical, and theoretical challenges of integrating emerging technologies into mental health services. This researcher’s recommendations emphasize the need for further research, clinician training, and the development of standardized protocols to address the barriers identified. The potential for positive social change lies in BCI's ability to provide personalized, evidence-based interventions for individuals with mental health disorders, improving patient outcomes and advancing the field of mental health care.

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Dedication

This work is dedicated to my son, Atlas. From the moment you were born, just before I graduated from my master's program, you have been my inspiration and my reason for pushing forward. While the time spent away from you in pursuit of this goal has been a sacrifice, every moment has been a reminder of why I'm doing this—to show you that with passion, dedication, and hard work, you can accomplish incredible things.

Atlas, you are my greatest motivation, and everything I've done has been to make sure you see that dreams are worth chasing. Your smile, your laughter, and your boundless energy make every challenge worth it. I hope this accomplishment serves as a reminder to you, as you grow, that you can achieve anything your heart desires. Nothing can stand in your way.

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I would like to express my deepest gratitude to my chair, Dr. Arcuri, for his invaluable feedback, patience, and unwavering guidance throughout the course of this research. His expertise, insight, and thoughtful suggestions have been crucial in shaping the direction of this study. I truly appreciate his dedication to my success and his encouragement during the entire process.

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Both of you have played a pivotal role in the completion of this research, and I am truly fortunate to have had the opportunity to work with such knowledgeable and supportive mentors. Thank you for your dedication and commitment to my academic journey.

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Chapter 1: Introduction to the Study

Introduction

In recent years, advancements in neurotechnology have opened new avenues for mental health treatment, particularly through the integration of brain–computer interface (BCI) technology. This innovative approach allows for direct communication between the brain and external devices, potentially transforming diagnostic and therapeutic practices in clinical psychology. However, as BCI technology gains traction in mental health settings, it also raises a myriad of ethical concerns that require careful consideration. Clinicians are faced with navigating complex dilemmas regarding informed consent, data privacy, and the implications of technology reliance in therapeutic contexts. Through this study, I aimed to explore clinicians' perceptions of these ethical implications and their decision-making processes when integrating BCI technology into their practices. By delving into the lived experiences of mental health professionals, I sought to highlight the nuanced challenges they encounter and the factors influencing their readiness to adopt this cutting-edge technology. The findings from this study are expected to inform policy development, shape ethical guidelines, and ultimately enhance the quality of mental health care.

Background

Recent advancements in neurotechnology, particularly BCI, have sparked considerable interest in their application within mental health care. Research has primarily focused on the technological capabilities of BCI systems, demonstrating their potential for diagnosing and treating various mental health conditions. For example,

studies have shown that BCI can be utilized for therapeutic interventions, such as neurofeedback, which trains individuals to regulate their brain activity. However, while the technical aspects of BCI are well documented, the exploration of clinicians' perspectives regarding the ethical implications of integrating such technology into their practices remains limited.

Existing literature highlights a range of ethical concerns surrounding BCI technology, including issues related to informed consent, data privacy, and the potential for dependency on technology in therapeutic settings. Despite this growing body of knowledge, there is a notable gap in understanding how mental health professionals perceive and address these ethical dilemmas in real-world clinical settings. This study was conducted to fill that gap, providing a nuanced understanding of clinicians' experiences and the factors that influence their readiness to adopt BCI technology.

Given the rapid evolution of neurotechnology and its increasing integration into clinical practice, this study is not only timely, but also critical. As mental health care continues to embrace innovative approaches, understanding the ethical considerations and decision-making processes of clinicians will be essential in ensuring the responsible use of BCI technology.

Problem Statement

The central research problem addressed in this study was the lack of understanding regarding clinicians' perceptions of the ethical implications and decision-making processes related to integrating BCI technology in mental health practices. As neurotechnology advances, mental health professionals encounter new ethical challenges

that have not been adequately explored in contemporary research. A review of literature from the past 5 years reveals a significant focus on the technical capabilities and clinical applications of BCI, yet little attention has been paid to the clinician's role in its integration.

The current relevance of this problem is underscored by the growing prevalence of BCI technologies and their potential impact on mental health care. Clinicians must navigate complex ethical dilemmas, including issues of informed consent, privacy, and the potential for unintended consequences of technology use. Addressing this gap in understanding is crucial, as it will inform both the ethical use of BCI in practice and the development of guidelines and policies that govern its application.

Purpose of the Study

The purpose of this phenomenological study was to explore and describe clinicians' perceptions of the ethical implications, decision-making processes, and readiness to adopt BCI technology in mental health practices. By focusing on the lived experiences of mental health professionals, I aimed to capture the nuanced ways in which they navigate ethical considerations and the factors that influence their acceptance of emerging technologies. Ultimately, I sought to provide valuable insights that can inform training, policy, and practice in mental health care.

Research Questions

This study addressed several key research questions with the aim of exploring the intersection of clinicians' experiences and perceptions regarding BCI technology in clinical psychology. First, the research investigated how clinicians perceive the ethical

implications and decision-making processes associated with integrating BCI technology into their practices for diagnosing and treating mental health disorders. Understanding these perceptions is crucial for identifying potential barriers and facilitators to the ethical implementation of such technologies. Second, the study examined the various factors that influence clinicians' acceptance and readiness to adopt BCI technology in their clinical practice. By exploring these influencing factors, I aimed to shed light on the practical considerations that clinicians face when incorporating innovative technologies into their work. Finally, the study delved into clinicians' personal experiences with the integration of BCI technology in clinical psychology. This exploration provided valuable insights into the real-world application of BCI and the subjective experiences of those working at the forefront of mental health treatment.

Theoretical and/or Conceptual Framework for the Study

The study was grounded in Moustakas's (1994) phenomenological approach, which focuses on understanding the lived experiences of individuals. This approach is particularly suited for exploring the subjective experiences of clinicians as they engage with BCI technology and its ethical implications. The conceptual framework draws upon ethical decision-making models in clinical psychology and integrates concepts from neuroethics, particularly concerning the responsible use of emerging technologies.

This framework guided the development of interview questions, ensuring that they captured both the ethical and practical dimensions of clinicians' experiences. The relationship between the theoretical framework and the research questions will be further elucidated in Chapter 2, where the literature will be reviewed in greater detail.

Nature of the Study

The study employed a qualitative phenomenological design, which allowed for in-depth exploration of clinicians' lived experiences with BCI technology. The data collection involved semistructured interviews with clinicians who had relevant experience or interest in BCI technology, as well as observation notes and document analysis. Thematic analysis was used to analyze the data, identifying key themes and patterns that emerged in response to the research questions.

Definitions

In this section, key terms and concepts relevant to the study are defined to establish a clear understanding of the foundational elements guiding the research. These definitions encompass the technologies, ethical considerations, and psychological frameworks that are integral to exploring the intersection of BCI technology and mental health practices.

Brain–computer interface (BCI): A technology that enables direct communication between the brain and an external device, facilitating the diagnosis and treatment of neurological and psychological conditions. This technology has significant implications for mental health interventions, allowing for more personalized and direct approaches to therapy (Wolpaw et al., 2020).

Ethical decision-making: The process of making informed and morally sound choices in professional practice, especially when new technologies challenge established norms. This process involves evaluating ethical principles and dilemmas in the context of

clinical practice, particularly in the rapidly evolving landscape of neurotechnology (Beauchamp & Childress, 2019).

Neuroethics: A field of study that addresses the ethical, legal, and social implications of neuroscience and neurotechnology. It encompasses discussions about informed consent, privacy, and the moral responsibilities of practitioners using advanced technologies in clinical settings, particularly as they relate to mental health (Ienca & Andorno, 2017).

Neuropsychology: A branch of psychology that focuses on understanding how brain function affects behavior and cognitive processes. It plays a crucial role in diagnosing and treating mental health conditions by integrating knowledge of neurological function with psychological practice (Lezak et al., 2012).

Neurorights: A proposed set of human rights specifically designed to protect individuals' mental privacy, cognitive liberty, personal identity, and equitable access in the context of neurotechnology and brain data (Yuste et al., 2017).

Neurotechnology: Refers to tools and techniques that interact directly with the nervous system to record, monitor, or influence brain activity (Ienca & Andorno, 2017).

Phenomenology: A qualitative research approach that focuses on exploring the lived experiences of individuals. It involves seeking to understand how individuals perceive and interpret their experiences, making it particularly valuable for studying the subjective perspectives of clinicians regarding BCI technology (Moustakas, 1994).

Assumptions

This study operated under several critical assumptions to ensure the validity and relevance of the research findings. First, it was assumed that clinicians would provide honest, reflective, and candid responses regarding their experiences with BCI technology. This openness was vital for gathering rich, authentic qualitative data that accurately reflect their perceptions and experiences. Second, the study involved an assumption that the selected participants possessed a sufficient level of knowledge and familiarity with both the ethical and practical aspects of integrating BCI technology into clinical practice. This assumption was crucial because it ensured that the data collected would be meaningful and applicable to the research questions being explored. Together, these assumptions laid the groundwork for a comprehensive investigation into the integration of BCI technology within mental health settings.

Scope and Delimitations

The scope of this study was specifically concentrated on the experiences of clinicians who had engaged with BCI technology in mental health practices. This focus included professionals who possessed either direct experience with BCI technology or a strong interest in its application in clinical settings. By focusing on this demographic, I aimed to conduct a nuanced exploration of relevant experiences, ethical dilemmas, and decision-making processes. However, this emphasis also implies a limitation regarding the generalizability of the findings; the insights gained may not fully reflect the perspectives of clinicians who operate outside of this specific context. Further, while ethical decision-making models are examined in detail, other theoretical frameworks

related to technology adoption and implementation were not investigated extensively. Thus, while I aimed to provide deep insights, the findings of this study are bounded by the chosen scope.

Limitations

There were several inherent limitations that may impact the results and their interpretation. A notable limitation was the potential for researcher bias, given my professional background in technology and BCI technology. Such biases could inadvertently have influenced the interpretation of data and the overall analysis. Additionally, the sample may not adequately represent the views of all clinicians regarding BCI technology, as it emphasized those who had specific experiences or interests in this area. To address these limitations, I employed reflexive journaling throughout the study. This practice helped in identifying and managing biases, promoting critical self-reflection, and ensuring a balanced analysis of the data. By recognizing these limitations, I aim to provide a transparent and honest account of the findings.

Significance

This study holds the potential to make substantial contributions to both academic discourse and practical applications surrounding BCI technology in mental health care. By delving into clinicians' perceptions and experiences, I aimed to uncover essential insights into the ethical considerations and decision-making processes associated with the adoption of BCI technology. These insights can inform policy recommendations and the development of training programs tailored to prepare mental health professionals for the ethical integration of neurotechnology into their practices. Furthermore, the findings may

facilitate a responsible and informed approach to the implementation of BCI technologies, thereby contributing to broader societal discussions on the ethical use of neurotechnology. As BCI technology becomes increasingly prevalent, the implications of this research extend beyond academic knowledge; they encompass the potential for positive social change within the mental health field and beyond.

Summary

This chapter introduced the qualitative research study investigating clinicians' perceptions of the ethical implications and decision-making processes related to the integration of BCI technology in mental health practices. The study highlights the transformative potential of BCI technology while addressing the ethical dilemmas clinicians face in its adoption. By focusing on clinicians' lived experiences, the research aims to fill a notable gap in the literature, enhancing the understanding of the intersection between technology and mental health care. Furthermore, the study's significance lies in its ability to inform future guidelines and policies, contributing to the responsible and ethical integration of BCI technology into clinical practice.

Transitioning into Chapter 2, the literature review will delve deeper into the existing body of knowledge surrounding BCI technology and its applications in mental health. This review will examine the current state of research, the ethical concerns identified in previous studies, and the frameworks that inform decision-making in clinical settings. By exploring these themes, Chapter 2 will provide the necessary context for understanding the complexities of integrating BCI technology into mental health care, setting the stage for the findings and discussions that follow in this study.

Chapter 2: Literature Review

Introduction

In the realm of contemporary healthcare, the integration of cutting-edge technologies has revolutionized the landscape of diagnosis, treatment, and therapeutic interventions. Among the transformative innovations is BCI technology, a groundbreaking specialty that aims to address the various gaps between neuroscience, clinical applications, and computer science. BCI technology is a system that enables direct communication between the brain and external devices by translating neural signals into commands. This technology allows individuals to control computers, prosthetics, or other devices without using their peripheral muscles, offering new possibilities for treatment and rehabilitation in neurological and mental health conditions (Wolpaw et al., 2020). BCI technological systems facilitate communication between an individual's brain and external devices, thus offering unique and tailored treatment options for individuals with various neurological disorders, cognitive impairments, and other mental health disorders.

The primary research question guiding this study is: How do clinicians perceive the ethical implications and decision-making processes related to the integration of BCI technology within clinical psychology practices for diagnosing and treating mental health disorders? To further frame this question, additional questions investigate the factors influencing clinicians' acceptance and readiness to adopt BCI technology and how clinicians describe their personal experiences with its integration in clinical psychology. These questions are essential for understanding the broader implications of BCI

technology in mental health, particularly from the perspective of those at the forefront of implementation.

Considering these specific research questions and this specific technological advancement, the literature review in this chapter aims to explore the complex relationship between BCI technology and clinical psychology, particularly surrounding mental health practices. In essence, this review acts as a guide through an intricate, multifaceted perspective in which computer science intersects with neuroscience, clinical psychology, and psychiatry. Through a systematic investigation of the existing research, this review aims to disentangle the complexities within the adoption or integration of BCI technology within the mental health fields.

At the center of this investigation is the perspective of mental health clinicians, or the frontline practitioners responsible for navigating the convoluted field of mental health diagnoses, treatment methods, and overall care for clients. Through the interpretation of their viewpoints, insights, and unique experiences, this study aims to show how BCI technology is perceived, understood, and utilized within clinical mental health settings. This study's effort is not only an academic exercise but rather the pursuit of bridging the complex gaps between technological innovation and clinical mental health practices, with the explicit goal of strengthening client care, improving treatment outcomes, and fostering holistic well-being that is tailored specifically to each individual client.

Through an exhaustive review of existing literature encompassing diverse methodologies, theoretical frameworks, and empirical findings, the goal is to depict the

complex promises, pitfalls, and possibilities that exist within the realm of BCI technology and mental healthcare, including the coverage of ethical considerations and practical challenges of implementation and integration into existing clinical mental health practices.

Literature Search Strategy

A systematic literature search strategy was implemented in the inquiry of understanding the intersection of BCI technology and mental health. This search was guided with the acknowledgement of the significant of diverse, relevant sources of information and data; because of such, an exhaustive set of keywords were tailored to capture the depth of this complex interdisciplinary field.

This process began by accessing various databases known for their diverse collection of scholarly articles, research papers, and academic journals. These databases included the following: PubMed, PsycINFO, IEEE Xplore, ScienceDirect, Web of Science, MEDLINE, Cochrane Library, and Google Scholar. Each database provided different strengths and resources to better facilitate a complete search process.

The central point to the search methodology was a distinct set of keywords chosen to cover the divergent dimensions of BCI technology and the associated implications this technology may have on mental health. The keywords selected served as the foundation of the extensive scholarly literature review. Keyword selection for this study was deliberate and reflected not only the diverse aspects if BCI technology but also the intersection of such technology with the mental health field. The fundamental concepts, such as “Brain-Computer Interface, ”Neurotechnology,” “Mental Health,”

“Neurofeedback,” “Clinical Psychology,” “Diagnostic Applications,” “Treatment Interventions,” “Cognitive Enhancement,” and “Technological Advancements in Mental Health." were intermingled with nuanced considerations, such as “Ethical Considerations” and “Cognitive Enhancement.” Each selected keyword or phrase was selected to address a specific component within this multifaceted perspective. The iterative search process allowed for continuous refining and expanding on the scope of the literature review as new insights were discovered.

In summary, the literature search strategy was characterized by its thorough precision and inclusivity. It was guided by a complete set of keywords that invited differing perspectives, fields, and databases.

Theoretical Foundation

The study’s theoretical foundation was dependent upon two frameworks: the biopsychosocial model and the technology acceptance model (TAM). Finding its origins in 1977 with George Engel, the biopsychosocial model merges the biological, psychological, and social aspects of human nature to understand health and illnesses, while offering a clinical lens to explore how BCI technology meshes within mental health practices from various clinician perspectives.

Prior to the biopsychosocial model, the biomedical model was predominantly used. Engel argued that solely addressing biological factors, e.g., genetics, physiology, or pathogens, were inadequate for assessing health and illness. Instead, he proposed an understanding of the biological factors, e.g., genetics, physiology, and neurochemicals, for understanding how the body becomes susceptible and responds to disease;

psychological aspects, e.g., emotions, behaviors, and personality traits, to understand how individuals perceive and respond psychologically to illness; and social factors, e.g., socioeconomic statues, culture, and family dynamics, to understand health outcomes and the individual's overall experience of illness. In clinical practices today, this model encourages a holistic approach when diagnosing and treating illnesses, including mental health disorders and aims to improve individual patient outcomes by addressing the multifaceted aspects health.

The biopsychosocial model can be integrated with BCI technology to offer more comprehensive and effective interventions that are tailored to individual needs. From a biological dimension, BCI technology offers neurofeedback, brain stimulation, and biometric monitoring. BCIs can be used in real-time for feedback from brain activity, which can have applications in addressing anxiety, depression, or attention-deficit/hyperactivity disorder (ADHD). This method of self-regulation entails individuals to see their brainwave patterns in response to coping mechanisms or behavioral patterns, thus enabling them to modify the behaviors and improve mental health outcomes.

BCI technology can additionally be integrated with more invasive techniques, e.g., transcranial magnetic stimulation (TMS) or transcranial direct current Stimulation (tDCS), to target specific brain regions for potential symptom relief. Finally, BCIs can provide continuous monitoring of brain activity. This activity can be tracked by mental and physical health clinicians for early detection and extensive monitoring of mental health disorders, thus creating individualized treatment plans.

Within the psychological dimension, BCIs provide assistance with cognitive training and rehabilitation, as well as behavioral interventions. BCI technology can be integrated with virtual reality (VR) environments to create therapeutic experiences for individuals while in a controlled setting. Further, clinicians can review brainwave feedback on mental states during and after sessions to understand the individual's responses to various methods or techniques used, thus offering more precise, effective, tailored interventions.

Finally, from the social dimension, BCI technology can enhance social interactions with individuals with communication difficulties to enhance an individual's support network and interactions. BCIs can be integrated into various telehealth platforms to allow clinicians to actively monitor and interact with individuals remotely, particularly for individuals in more remote regions or those with mobility concerns to ensure continuous care.

The technology acceptance model (TAM) was introduced in 1989 by Fred Davis as a way to predict how individuals accept and use technology. Finding its roots from the Theory of Reasoned Action (TRA), a theory that explains that an individual's behaviors are determined by their intention to perform he behavior and is influenced by their attitude and "norms," Davis designed TAM to address the acceptance and use of technology, from a user acceptance and usage perspective.

TAM has two core components that are tied to an individual's intention for technology use: Perceived Usefulness (PU), what an individual believes the technology will do for them, and Perceived Ease of Use (PEOU), how simple an individual believes

the technology to be. In terms of BCI technology in mental health, there are various factors for consideration regarding PU and PEOU. For example, for an individual to believe that the BCI will enhance their mental health, factors for consideration include the effectiveness of the intervention, e.g., evidence of BCI application use in mental health, personalization of tailored treatment plans, and improvement on daily functioning for cognition, emotional regulation, and quality of life. Further, the simplicity of the user interface design, training and support provided for individuals, and technical consistency and reliability factor into the individual's PEOU.

The biopsychosocial model and the technology acceptance model are integral components to this study. The two frameworks provide a robust and complimentary approach to understanding the integration of BCI technology into the mental health field, particularly from the viewpoint of clinician perspectives of integration into clinical practice. This broad view allows for the exploration of various factors influencing clinician attitudes, decision-making processes, various individual and ethical considerations, and the perceived usefulness and ease of integration into everyday clinical practice.

The biopsychosocial model and TAM are integral to this study, as they both provide a complementary approach to understanding the integration of BCI technology inro mental health care settings, from the clinician's perspective. These frameworks allow for a broad exploration of factors influencing clinician's attitudes, decision-making processes, ethical considerations, and the perceived usefulness and ease of integrating BCI technology into clinical practice.

Specifically, these theories frame the study's research questions by offering insights into how clinicians perceive the ethical implications and decision-making processes related to BCI technology, what factors influence their acceptance and readiness to adopt it, and how their personal experiences shape their views on integrating BCI technology into their practice. By grounding the research in these established models, the study aims to contribute to a deeper understanding of the complex relationship between technology and mental health care, ultimately informing future practices and policies in this ever-evolving field.

Conceptual Framework

The conceptual framework for this study is centered upon the ethical decision-making framework. This framework provides a structured approach for navigating the complexities of moral dilemmas and ethical choices in various fields, including philosophy, psychology, business, or healthcare. This framework has philosophical foundations dating back to Aristotle, an individual that emphasized the development of virtues and aligning decisions with those virtues to achieve a flourishing life, and Plato, an individual that influenced ethical thinking early with his justice and virtue ideals. In the 18th century, Kant proposed that ethical actions are based on an individual's adherence to rules or duties, while in the 19th century, utilitarianism built by Bentham and Mill focused on consequences to actions to ensure an individual's overall happiness.

Over time, this framework has evolved into more modern applications, including bioethics, at the introduction of medicinal research for informed consent, medical experimentation, and patient autonomy. With the rise of technology, and particularly with

the growth and integration of BCI technology, there are new concerns with ethical practice and application. Key ethical considerations around integration of BCI technology into the mental health field include privacy and confidentiality, informed consent, autonomy and control of devices and data, non-maleficence and beneficence, and justice, particularly around the fair access of this technology across various, diverse populations. This framework aims to provide guidance on finding the balance between advancing BCI technologies and maintaining ethical standards, interdisciplinary collaboration of ethicists, healthcare professionals, technologists, and patients, and continuous ethical assessments to ensure the necessary adaptations are made to meet technological and societal needs.

In this study, the ethical decision-making framework will be directly applied to examine the integration of BCI technology within health care practices. By focusing on key aspects of ethical decision-making, such as privacy and confidentiality, informed consent, autonomy, non-maleficence, beneficence, and justice, this study will explore how clinicians navigate these ethical challenges when considering the adoption and use of BCI technology. The study will specifically investigate how clinicians assess and address how these considerations impact their overall acceptance and use of BCI technology in mental health care.

To illustrate the practical application of this framework, the study will draw on examples from similar research in BCI and mental health technologies, where ethical decision-making has played a critical role. For example, previous studies have explored how clinicians manage patient autonomy and informed consent in the use of

neurofeedback and brain stimulation technologies, highlighting the ethical complexities involved in ensuring that patients fully understand the implications of these interventions.

Similarly, research on the equitable access to emerging mental health technologies has underscored the importance of justice in ethical decision-making, particularly in ensuring that marginalized populations are not left behind as new treatments become available. By grounding this study in the ethical decision-making framework, the research aims to contribute to a deeper understanding of how ethical considerations shape the integration of BCI technology into mental health care, ultimately guiding best practices and policy development in this rapidly changing field.

Literature Review Related to Key Variables and/or Concepts

The exploration of BCI technology's intersection with mental health practices comprises a wide array of scholarly investigations, each of which delves into distinct aspects of multifaceted relationships among different practices. Across the selected articles, various key variables and concepts emerge, shedding light onto the multifaceted nature of BCI technology's integration into mental healthcare. Recurring themes and prevalent topics span qualitative studies clarifying user perspectives, discussions on assistive technology applications, considerations of ethical implications, insights into neurotechnology research, examinations of healthcare and rehabilitation applications, interdisciplinary perspectives, discussions on data storage and sharing, focus on cognitive rehabilitation, investigations into human experience and perception, efforts towards inclusive innovation, utilization of machine learning and classification techniques, and explorations of psychological interventions. This literature review aims to synthesize and

analyze diverse perspectives to provide a comprehensive understanding of the current landscape at the intersection of BCI technology and mental health practices.

Diagnosis and Monitoring

BCIs hold significant potential in diagnosing psychiatric disorders by analyzing brain activity. Studies such as those by Chen et al. (2020) and Aci et al. (2019) have explored the use of EEG-based BCIs to classify anxious states and assess mental attention. These technologies allow for the analysis of brain activity patterns, potentially leading to more accurate and objective diagnoses compared to traditional methods. BCIs are also being used to tailor assessments based on individual neural patterns, which may result in more personalized diagnostic outcomes. For example, BCI applications have been explored in diagnosing disorders like depression, schizophrenia, and ADHD by identifying specific neural signatures associated with these conditions (Chen et al., 2020; Aci et al., 2019).

BCIs are particularly promising for diagnosing conditions such as autism spectrum disorder (ASD), where early and accurate diagnosis can significantly improve outcomes. Research by Van Damme et al. (2022) demonstrated the use of BCIs to identify abnormal brainwave patterns in children with ASD, offering an example of how BCIs could potentially transform diagnostic accuracy in complex neurodevelopmental conditions.

However, despite these advancements, significant limitations remain. Chen et al. (2020) noted challenges in achieving high accuracy across diverse individuals and conditions, highlighting the need for more personalized and adaptive systems. Aci et al.

(2019) faced issues with signal variability and noise—common disruptions in EEG studies—which are often inadequately addressed in current BCI implementations. Additionally, Philip et al. (2023) conducted a systematic review that emphasized ongoing issues with artifact removal techniques, revealing that despite technological advancements, practical challenges like signal noise, data processing, and individual variability continue to hinder BCI effectiveness. These studies collectively underscore that while BCIs offer great promise in diagnostic applications, their practical use is still limited by technical and methodological obstacles, necessitating further development into more robust, adaptive, and user-specific approaches.

Diagnosis of Psychiatric Disorders

BCIs present transformative potential in diagnosing psychiatric disorders through the analysis of brain activity. For instance, Chen et al. (2020) and Aci et al. (2019) have demonstrated the use of EEG-based BCIs in classifying anxious states and assessing mental attention. By analyzing brain activity patterns, BCIs could enhance diagnostic accuracy, providing more objective criteria compared to traditional clinical methods. Furthermore, BCIs allow for more personalized diagnoses by tailoring assessments to an individual's unique neural patterns.

However, these advancements highlight significant challenges. Chen et al. (2020) found it difficult to achieve high diagnostic accuracy across diverse populations, underscoring the need for more personalized and adaptable systems. Signal variability and noise, as reported by Aci et al. (2019), continue to be major hurdles, particularly in EEG-based BCIs. These signal disruptions are often inadequately addressed in current

implementations. A systematic review by Philip et al. (2023) pointed to unresolved issues with artifact removal, indicating that despite technological progress, practical challenges remain. Collectively, these findings suggest that while BCIs show promise in the diagnosis of psychiatric disorders, their current application is limited by unresolved technical and methodological issues. Further research into more adaptive and user-centered approaches is required to maximize the potential of BCIs in psychiatric diagnostics.

Monitoring Cognitive Dysfunction

BCIs offer significant advantages for monitoring cognitive dysfunction, especially by providing real-time feedback on brain activity. Martin et al. (2017) emphasized the importance of user-centered design in BCIs for cognitive rehabilitation, which is crucial for effective monitoring. Despite this, practical challenges such as signal interference and data consistency persist. For instance, Risnes et al. (2023) evaluated wearable, non-invasive brain-monitoring devices and noted limitations in long-term effectiveness, suggesting that while these devices offer potential, they often fall short in practical, everyday applications.

A deep learning-based mental health monitoring scheme introduced by Du et al. (2021) showed improvements in accuracy, but still encountered challenges related to individual variability and real-world application. Similarly, Han et al. (2022) highlighted the importance of adapting BCIs to an individual's internal states through user-centered design, which could enhance monitoring outcomes by making the technology more responsive to the user’s unique cognitive patterns. These insights suggest that while BCIs

are advancing in the area of cognitive monitoring, significant challenges in practical implementation and individual variability remain, requiring ongoing refinement to fully realize their potential in real-world settings.

Treatment and Rehabilitation

BCIs are being utilized to develop innovative methods and rehabilitation techniques for various mental health disorders, including neurorehabilitation and treatment-resistant conditions. In neurorehabilitation, BCIs aim to restore an individual's ability to engage with and control different activities and environments, while offering potential breakthroughs for conditions that have been resistant to traditional treatments. However, the limitations reported in many studies highlight the need for further refinement of these technologies.

Neurorehabilitation

In neurorehabilitation, BCIs have shown potential in promoting neural plasticity and recovery through targeted brain training exercises. For stroke patients, BCIs can facilitate motor recovery by training individuals to control robotic devices or virtual reality (VR) environments using their brain signals (Mane et al., 2020). These applications have been shown to improve motor function, coordination, and cognitive skills by promoting neuroplasticity. However, the effectiveness of these interventions can vary, with some patients showing slower or limited progress depending on individual differences, training protocols, and neural plasticity levels.

BCIs can also be utilized in cognitive rehabilitation to address deficits in attention, memory, or executive function (Han et al., 2022). Studies such as those by

Dutta et al. (2021) demonstrated the benefits of BCI-based gaming applications in enhancing cognitive control, but results have varied significantly across individuals. While the BNCI Horizon 2020 roadmap (Brunner et al., 2015) advocated for standardized practices, practical applications often fall short of theoretical expectations. This reflects a broader limitation in BCI technology: its efficacy is often inconsistent, requiring ongoing refinement and better standardization to meet its full potential.

Moreover, theoretical frameworks like the biopsychosocial model and TAM are essential for guiding BCI interventions. The Biopsychosocial Model highlights the importance of integrating biological, psychological, and social factors into treatment, but BCIs can struggle to address all these dimensions. TAM emphasizes user acceptance and perceived usefulness, yet real-world BCI applications may face challenges with user engagement and adherence to protocols. Case studies, such as those by Dutta et al. (2021), illustrate how practical challenges like individual differences and complex BCI training can affect outcomes. These limitations underscore the need for more rigorous alignment between theoretical expectations and practical realities.

Treatment-Resistance Conditions

BCIs offer potential solutions for treatment-resistant conditions such as severe depression and chronic pain. For instance, BCIs can target neural circuits directly, potentially modulating brain activity to influence mood or pain perception, which may offer relief for individuals who have not responded to traditional therapies.

Fernandez-Caballero et al. (2017) explored the potential of combining BCIs with virtual reality/augmented reality (VR/AR) to treat auditory verbal hallucinations in

individuals with schizophrenia. The study proposed a human-avatar symbiosis approach, allowing patients to interact with avatars that represent their hallucinations in a controlled environment, which was shown to reduce the frequency and intensity of the hallucinations. Similarly, Dutta et al. (2021) developed a BCI gaming application designed to improve cognitive control in individuals with mental health disorders, specifically targeting obsessive-compulsive disorder (OCD). The application engaged users in tasks requiring attention and inhibitory control, resulting in improvements in these areas.

However, despite these promising applications, there are notable limitations and challenges. Klein et al. (2022) explored ethical issues associated with personalized language models in BCIs, highlighting concerns around consent, privacy, and autonomy. Ensuring that individuals with severe mental health conditions fully understand and agree to the use of BCIs is critical, especially considering issues like informed consent and data privacy. Furthermore, research by Taherian & Davies (2018) revealed that user acceptance plays a significant role in BCI effectiveness, as skepticism or resistance from patients and caregivers can undermine the benefits of the technology.

In treatment-resistant conditions, the effectiveness of BCIs often hinges on user engagement and acceptance. If users are not fully receptive or engaged, it can hinder the integration of BCIs into treatment plans. Additionally, mental health professionals may also have varying levels of acceptance of this technology, further complicating its implementation. These limitations highlight the importance of addressing both ethical considerations and user engagement to ensure that BCIs can deliver on their potential. As

BCIs continue to evolve, ongoing dialogue and research will be crucial to navigating the practical and ethical challenges that accompany their use in treating resistant conditions.

Assistive Technology

BCIs are increasingly being developed as assistive technologies for individuals with both mental and physical health conditions, offering innovative solutions for managing these conditions more effectively. In the realm of mental health, BCIs can play a crucial role by providing therapeutic interventions for conditions such as depression, schizophrenia, and anxiety disorders. For example, BCIs can be integrated with virtual reality/augmented reality (VR/AR) systems to create immersive environments that help patients manage symptoms of hallucinations, commonly associated with schizophrenia (Fernandez-Caballero et al., 2017). These systems enable patients to interact with avatars or other virtual elements controlled through neural signals, fostering a sense of control and improving their mental health. By helping patients manage symptoms and regain control over their experiences, BCIs directly contribute to better mental health outcomes.

Assistive Devices

BCIs also have the potential to revolutionize assistive technology by translating brain activity into control signals for external devices, allowing individuals to interact with their environment in previously unattainable ways. For instance, BCIs can enable control over robotic limbs, wheelchairs, or computer interfaces purely through thought. This capability is transformative for individuals with motor disabilities, offering improved mobility and independence. For example, a person could use a robotic arm to perform daily tasks like eating or dressing themselves (Casey et al., 2019). Regaining

control over basic functions enhances physical independence and significantly improves quality of life, alleviating the psychological burden of dependency and positively impacting mental well-being.

Moreover, BCIs in assistive devices extend beyond interaction; they hold significant potential for promoting neural reorganization and neuroplasticity. By engaging users in brain training exercises and providing real-time feedback, BCIs stimulate neural pathways and support the recovery of lost functions (Casey et al., 2019). This is particularly important for individuals with severe motor impairments, as it addresses both physical and mental health needs. As motor functions improve, the associated increase in autonomy helps reduce the frustration and helplessness often tied to their conditions, resulting in a more balanced mental state. Thus, BCIs not only enhance physical capabilities but also play a direct role in improving mental health outcomes by reducing emotional distress and fostering a sense of empowerment.

However, practical application faces several challenges. Versalovic et al. (2020) highlighted issues of device comfort and reliability among veterans, underscoring the need for better BCI design. Casey et al. (2019) also demonstrated the benefits of BCI-controlled robotic arms for rehabilitation but pointed out challenges in integration and user training. Chavarriaga et al. (2016) emphasized the importance of addressing design flaws and incorporating user feedback to improve BCI effectiveness.

While BCIs hold great promise for assistive technology, challenges in design and integration must be overcome. Ongoing innovation and a user-centered approach are critical to improving the comfort, reliability, and effectiveness of BCIs in assistive

devices. Addressing these issues will ensure that BCIs continue to deliver both physical and mental health benefits.

Ethical and Safety Considerations

The integration of BCIs in mental health raises several ethical and safety concerns that need to be understood and addressed. Using invasive technologies, e.g., electrocorticogram (ECoG), must be considered, as questions of consent and unfair advantages in human enhancements arise. BCI technologies pose threats to privacy and security, which requires the establishment of standards for data collection methods, access control protocols, and encryption types, as cyberattacks could potentially expose individual brain data or interfere with the device's functionalities.

Ethical Implications

BCIs hold transformative potential for enhancing human capabilities and improving quality of life, making it crucial to address ethical considerations in their development and application. By embedding ethical principles into BCI design and use, developers can ensure that these technologies are employed responsibly, safeguarding user autonomy and promoting equitable access. This responsible approach can prevent misuse and enhance the overall positive impact of BCIs on individuals. For instance, ethical frameworks can guide the development of BCIs to ensure informed consent and protect user privacy, thus fostering trust in the technology.

However, the rapid pace of BCI innovation often presents challenges, as highlighted by Klein et al. (2022) and Rainey et al. (2019). Balancing cutting-edge technological advancements with ethical safeguards can be complex, and there may be

conflicts between pushing technological boundaries and maintaining responsible practices. Implementing robust ethical frameworks is essential to navigate these tensions, ensuring that technological progress aligns with ethical standards and maximizes societal benefits.

Specific Ethical Challenges in Mental Health

In mental health settings, BCIs could unintentionally exacerbate existing vulnerabilities in patients. For instance, individuals with severe mental health conditions might be more susceptible to coercion or might not fully grasp the implications of BCI use, raising significant concerns about informed consent. Moreover, the enhancement of human cognitive or emotional capabilities through BCIs could lead to ethical dilemmas regarding fairness and equity. For example, if BCIs can enhance cognitive function or emotional regulation, there may be concerns about creating disparities between those who have access to such technologies and those who do not, potentially leading to social and economic inequalities.

Another ethical issue is the potential for over-reliance on BCIs in mental health treatment. While BCIs offer promising interventions for various mental health disorders, there is a risk that they might be used as a substitute for more holistic approaches that consider the social, psychological, and environmental factors contributing to mental health conditions. This could lead to a reductionist approach to mental health care, where the focus shifts from comprehensive treatment to a narrow reliance on technological solutions.

Regulatory Frameworks and Guidelines

Given the complex ethical landscape for BCIs, several regulatory frameworks and guidelines have been developed to ensure the responsible use of these technologies in healthcare settings. For instance, the GDPR's General Data Protection Regulation (GDPR) imposes strict requirements on the processing of personal data, including sensitive brain data captured by BCIs, ensuring that patients' privacy is protected (Naufel & Klein, 2020; Rainey et al., 2020). Similarly, the U.S. Food and Drug Administration (FDA) provides regulatory oversight for medical devices, including BCIs, by evaluating their safety and efficacy before they can be marketed and used in clinical settings (Pflanzer, 2023). These regulations are critical for ensuring that BCIs used in mental health care meet stringent safety and ethical standards.

Safety Concerns

Some BCIs offer significant advantages in terms of safety, particularly due to their non-invasive nature. Unlike surgical interventions, BCIs generally do not require physical penetration, which reduces the risk of direct harm or adverse reactions. This characteristic makes BCIs a safer alternative for interacting with brain-computer systems and facilitates their broader adoption. The potential benefits of non-invasive BCIs are substantial, especially for individuals requiring ongoing brain monitoring or control assistance. However, as noted by Risnes et al. (2023), there are important considerations regarding the long-term effects of BCI use.

While BCIs are generally safe in the short term, their prolonged application could lead to unintended cognitive or neural changes, necessitating further research. Addressing

these safety concerns involves ongoing studies and proactive measures to understand and mitigate potential long-term risks, ensuring that BCIs remain a safe and effective technology over time.

Privacy and Security

BCIs have the potential to revolutionize data management practices through the integration of advanced security protocols, thereby addressing privacy concerns and protecting sensitive brain data. By employing robust encryption and secure data storage methods, BCIs can safeguard against unauthorized access and data breaches, thus maintaining user trust. This potential for enhanced data management is crucial for the broader acceptance and effective deployment of BCIs.

Despite these advantages, Bianchi et al. (2021) highlighted significant challenges related to data management, including the complexities of storing and sharing large volumes of sensitive information. Ensuring that these challenges are addressed through secure data management practices and transparent procedures is essential for protecting user privacy. By focusing on integrating advanced security measures and developing effective data protection strategies, stakeholders can enhance the reliability of BCIs and uphold the privacy of users, paving the way for more widespread and trusted use of the technology.

Summary and Conclusions

This chapter synthesized the literature on BCI technology within the clinical psychology field, revealing several key themes and gaps. The theoretical foundation for this study is grounded in two frameworks: the Biopsychosocial Model, which provides a

comprehensive view of the connections between biological, psychological, and social factors in mental health, and the TAM, which helps understand factors influencing the adoption and use of new technologies. The conceptual framework for this research is centered around the ethical decision-making framework, which guides the examination of ethical considerations in integrating BCI technology into clinical practice.

The literature review highlighted the growing interest in BCI technology's potential to revolutionize mental health diagnostics and treatment. Key themes include the technological promise of enhancing clinical assessments and therapeutic interventions, as well as the ethical considerations related to privacy, consent, and responsible use. However, the review also reveals significant gaps, particularly in understanding clinicians' perspectives on these ethical and practical challenges.

Research extensively explored various aspects of BCI technology, such as its applications in diagnosis and monitoring, treatment and neurorehabilitation, assistive devices, and safety concerns. Despite this, there remains a lack of comprehensive insights into how clinicians perceive and navigate the ethical dilemmas associated with BCI technology. Additionally, practical barriers to its integration into clinical practice are underexplored.

This study will address these gaps by focusing on clinicians' perspectives on the ethical implementation and practical integration of BCI technology. The study aims to inform ethical guidelines, enhance technology acceptance, improve clinical decision-making, support professional development, and contribute to positive social change. By providing a deeper understanding of the ethical and practical dimensions of BCI

technology, the research seeks to advance clinical psychology practices and improve mental health care outcomes.

Chapter 3: Research Method

Introduction

In this chapter, I outlined the research design and methodology for investigating clinicians' experiences with the integration of BCI technology in mental health practices. Utilizing a qualitative, phenomenological approach inspired by Moustakas (1994), the researcher aims to uncover the lived experiences of clinicians as they navigate the complexities associated with incorporating BCI technology into their clinical work. The phenomenological tradition has been selected for its focus on capturing and analyzing the essence of participants' subjective experiences, thereby providing deep insights into both the ethical and practical dimensions of BCI integration. This study was reviewed and approved by the Institutional Review Board (IRB) under approval number 01-13-25-1050674, ensuring that all research procedures met ethical standards for the protection of human participants.

The chapter will begin by defining the research questions and central concepts, concentrating on clinicians' perceptions of the ethical implications and decision-making processes related to BCI technology. It will explain the rationale for choosing phenomenology, highlighting its suitability for exploring under-researched areas involving emerging technologies. The chapter will then describe the participant selection logic, including the criteria for inclusion, the sampling strategy, and the number of participants required to achieve data saturation. Instrumentation and data collection procedures will be detailed, including the use of semistructured interviews, observation notes, and document analysis. These instruments will be chosen to ensure a

comprehensive, multi-layered exploration of clinicians' experiences. The chapter will further elaborate on the data analysis plan, detailing the steps of bracketing, data coding, theme clustering, and the approach for analyzing the data. Ethical considerations will be addressed thoroughly, covering agreements for gaining access to participants, informed consent procedures, and the treatment of confidential data. Strategies for ensuring credibility, transferability, dependability, and confirmability will be discussed, along with measures for protecting human participants and their data. The chapter ends with a summary.

Research Design and Rationale

The qualitative research study adopted a phenomenological approach, drawing on Moustakas's (1994) research methodologies, to explore clinicians' perceptions and experiences with BCI technology in clinical psychology. The study's main research question sought to understand how clinicians perceived the ethical implications and decision-making processes involved in integrating BCI technology into clinical psychology practices for diagnosing and treating mental health disorders. Additionally, the study investigated factors that influenced clinicians' acceptance and readiness to adopt BCI technology within the realm of mental health care. It also examined how clinicians described their personal experiences with the integration of BCI technology. This phenomenological approach enabled a deep exploration of clinicians' lived experiences, providing insight into the ethical and practical considerations surrounding the use of emerging technologies like BCI in mental health treatment.

This design was chosen to capture clinicians' subjective experiences and perspectives regarding the ethical implementation and practical integration of BCI technology within the clinical psychology profession. Phenomenology was well-suited for the study's aim because it focused on understanding and describing the essences of lived experiences from participant viewpoints, offering deeper insights into how clinicians perceived and navigated the complexities of integrating unfamiliar technologies, like BCI, into their practice.

Phenomenology's emphasis on exploring consciousness and individual experience was particularly relevant when studying newer, emerging technologies like BCI, where clinicians' perspectives included both opportunities and ethical dilemmas (Mykhailov & Liberati, 2023). The goal of the study was not merely to document clinicians' surface-level opinions, but to delve deeper into their subjective realities, including how they interpreted, felt about, and considered the ethical implications of using BCI technology in treating mental health disorders. The method allowed for capturing both shared and unique dimensions of these experiences, thus revealing patterns that may not have been visible through more structured research (Mykhailov & Liberati, 2023).

This research approach was particularly appropriate for exploring under-explored areas, such as the use of BCI technology in clinical psychology, where limited empirical knowledge existed. A phenomenological approach allowed the researcher to enter this relatively uncharted territory with an open, exploratory perspective—focusing on clinicians' lived realities, which yielded insights critical for the future ethical integration

of BCI technology into mental health care. The research design and rationale aligned with the study's purpose by providing a structured yet flexible framework for gaining a deep, phenomenologically grounded understanding of how clinicians perceived and engaged with BCI technology, especially in relation to its ethical and practical dimensions.

Role of the Researcher

As the primary instrument in this qualitative phenomenological study, I played a central role in data collection, analysis, and interpretation. I conducted semistructured interviews, took detailed observation notes, and performed document analysis to explore clinicians' perspectives on the ethical implementation and integration of BCI technology in mental health practices. The role extends beyond mere observation to active engagement in the data-gathering process, requiring me to establish rapport with participants while maintaining ethical integrity and objectivity throughout the study.

In this study, I assumed an observer-participant role. While conducting interviews and interacting with participants, I observed and documented their experiences and non-verbal cues without becoming an active member of the group under study. This stance allowed the researcher to collect rich, nuanced data while minimizing the influence on participants' behaviors and responses (Whitehead et al., 2020). Reflexivity will be critical in managing this role, where the researcher continually reflected on how their own assumptions, experiences, and potential biases might affect the research process.

Given my professional background in both mental health and technology, particularly with experience in BCI technology, there are potential inherent biases that could influence my interpretation of the data. These biases may arise from my prior

knowledge of BCI, personal beliefs about its effectiveness, or preconceived ideas about its ethical implications and practical integration in clinical practice. To address and mitigate these biases, I engaged in reflexive practices, such as keeping a reflexive journal throughout the study. This journal helped track my thoughts, reactions, and evolving perspectives during the research process, allowing me to critically examine how my own experiences may influence data collection, analysis, and interpretation. This journal documented thoughts, assumptions, and potential influences on the interpretation of data, helping me to stay aware of their positionality and its impact on the research. Additionally, during data analysis, I assured that emerging themes are grounded in the participants' lived experiences rather than pre-existing beliefs or expectations about BCI technology.

The American Psychological Association's (APA) code of ethics and standards will be a central focus of the researcher's role. Informed consent was obtained from all participants before data collection begins, ensuring that they fully understood the purpose of the study, the voluntary nature of their participation, and the potential risks and benefits involved. To safeguard participant confidentiality, all interview transcripts and observation notes will be anonymized, and personal identifiers will be removed to protect the privacy of the clinicians involved in the study. Data will be securely stored and accessible only to the researcher, following strict ethical guidelines to ensure the protection of sensitive information as outlined by the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979) and more recent regulations established by the U.S. Department of

Health and Human Services (HHS) (2018 revisions) and the International Council for Harmonization (ICH) (2016).

Given my professional background, there is a potential for power differentials or conflicts of interest, particularly if participants view me as an authority figure in technology or BCI technology. Such power imbalances could arise if participants feel obligated to participate or shape their responses due to my expertise or perceived status. To mitigate these concerns, I explicitly clarified my role as a neutral researcher, separate from any supervisory or instructional responsibilities. This ensured that participants understood their involvement is entirely voluntary, without risk of repercussion or undue influence. If participants were drawn from my professional network, additional care was taken to avoid any conflict of interest by excluding direct supervisees or individuals where a power imbalance could arise. This preserved the voluntary nature of participation and avoided ethical concerns related to coercion or influence.

By adhering to these strategies, I aimed to maintain objectivity, minimize bias, and uphold the highest ethical standards throughout the study. This ensured that the data collected reflected the authentic experiences of clinicians regarding the ethical and practical integration of BCI technology in mental health care.

Methodology

The proposed study adopted a qualitative, phenomenological approach to exploring clinicians' experiences with the integration of BCI technology in mental health practice. Guided by Moustakas's (1994) phenomenological framework, this approach sought to understand and analyze the lived experiences of clinicians as they navigate both

the ethical implications and practical challenges of incorporating BCI technology into their clinical work. The phenomenological tradition was particularly suited for this study because it emphasized capturing the essence of participants' experiences, enabling a deep examination of the shared and individual aspects of how these professionals confront and adapt to emerging technologies like BCI.

The use of semistructured interviews, observation notes, and document analysis provided a multi-layered method for understanding how clinicians perceive and experience BCI technology. Semistructured interviews allowed clinicians to articulate their personal viewpoints, revealing nuanced insights into how they interpret the ethical and practical dimensions of BCI within the broader observation of clinical psychology (Whitehead et al., 2020). Observation notes complemented the interviews by offering observational context, capturing non-verbal cues and environmental factors that enrich the analysis (Whitehead et al., 2020). Document analysis, involving professional guidelines and ethical codes, anchored these experiences in the broader regulatory and ethical landscape, enhancing the credibility and depth of the findings (Whitehead et al., 2020).

This design was particularly suited for exploring this under-researched area, as it prioritizes participants' subjective realities and provided a flexible structure to explore an emerging technology with limited existing empirical data. The combination of interviews, observation notes, and document analysis enabled me to probe deeper into clinicians' experiences, offering a comprehensive exploration of how BCI technology is perceived, implemented, and ethically evaluated in mental health practice. This integrated approach

ensured that the study captures both the complexity of the clinicians' experiences and the broader ethical and practical frameworks that guide their work with BCI technology.

Participant Selection Logic

The target population for this study included licensed clinical psychologists and mental health professionals who either have direct experience with or demonstrated an interest in the integration of emerging technologies, specifically BCI technology, in mental health care. These individuals were selected for their potential to provide in-depth insights into both the ethical and practical aspects of BCI technology in clinical settings.

A purposeful sampling strategy was used to recruit participants with relevant experience or interest in BCI technology and mental health. This strategy focused on selecting clinicians who have either integrated BCI technology into their practice, have direct experience with emerging technologies in mental health treatment, or possess a strong interest in exploring the ethical and clinical implications of such technologies. Specific characteristics desired included clinicians working in settings that prioritize innovative treatment methods, those who have attended relevant conferences or training sessions, and professionals actively involved in neurotechnology research or clinical trials. This targeted approach ensured that participants have the necessary expertise and insight to address the research questions effectively.

This strategy was particularly suitable for qualitative research where detailed and specialized information is required (Whitehead et al., 2020). Additionally, snowball sampling was employed to identify and recruit additional participants. Snowball sampling involves leveraging existing participants' professional networks to find other qualified

individuals who meet the study criteria (Whitehead et al., 2020). This method helps in recruiting a diverse range of experiences and perspectives related to BCI technology (Whitehead et al., 2020).

To qualify for participation, individuals must meet the following criteria: They must be licensed clinical psychologists or mental health professionals, have at least one year of clinical experience, and either have direct experience with BCI technology in mental health or show a strong interest in integrating such innovative technologies into their practice. These criteria ensured that participants have the necessary background to provide valuable insights into the ethical and practical considerations of BCI technology. Eligibility was confirmed through a brief screening process prior to the interviews.

I aimed to recruit 8 to 12 participants. This sample size was chosen to align with the phenomenological approach, which emphasizes the depth and richness of data rather than breadth. The justification for the sample size is based on the principle of data saturation. The selected sample size is intended to provide a robust representation of shared themes and diverse perspectives regarding BCI technology. The expected sample size was sufficient to achieve data saturation, the point at which no new themes or insights emerge from the data (Whitehead et al., 2020). Should saturation not be reached with this number, additional participants would be recruited as needed to ensure comprehensive coverage of the topic.

Saturation was monitored throughout the data collection process, and adjustments were made as necessary to ensure a thorough understanding of the research topic.

Instrumentation

The study employed a range of data collection instruments, including semistructured interviews, observation notes, and document analysis to capture a comprehensive understanding of clinicians' experiences with BCI technology. Each instrument was carefully selected to align with the research questions and provide rich, meaningful data.

Interview Guide

The primary data collection instrument for this study was the semistructured interview guide. This guide, developed specifically for this research, consisted of open-ended questions designed to explore key areas that align with the research questions. The interview protocol included questions aimed at understanding (Table 1):

Table 1

Research Questions Mapped to Interview Questions

Research questions	Interview questions
1. How do clinicians perceive the ethical implications and decision-making processes related to the integration of BCI technology within clinical psychology practices for diagnosing and treating mental health disorders?	1. What ethical concerns have arisen for you when considering or using emerging technology such as BCI in mental health care? (e.g., privacy, consent, data security) 2. How do you approach ethical decision-making when integrating emerging technologies like BCI into your clinical practice? 3. Can you share an example of a situation where ethical considerations played a major role in your decision to use (or not use) BCI or other emerging technology?
2. What factors influence clinicians' acceptance and readiness to adopt BCI technology in their clinical practice within the realm of mental health?	4. What factors have influenced your acceptance or readiness to adopt emerging technologies like BCI in your practice? 5. How do you perceive the potential benefits and risks of using BCI or other emerging technologies in mental health care? 6. How do your clients respond to the idea of incorporating BCI or other emerging technology into their treatment? 7. Where do you see the future of BCI and other emerging technologies in mental health care? 8. What additional resources, support, or training do you think clinicians need to better integrate emerging technologies like BCI into their practice? 9. How do you see the ethical and practical challenges evolving as BCI and similar technologies become more prevalent in mental health care?
3. How do clinicians describe their personal experiences with the integration of BCI technology in clinical psychology?	10. Can you describe your personal experiences (if any) with integrating BCI or other emerging technologies in your clinical practice? 11. How has the use of emerging technologies like BCI impacted your approach to diagnosing or treating mental health disorders? 12. What challenges, if any, have you encountered when integrating BCI or similar technologies? 13. How do you measure the effectiveness of emerging technology (BCI) interventions in mental health care? 14. Can you share any examples of how BCI or similar emerging technologies have led to improved clinical outcomes or changes in client behavior? 15. In your opinion, how do ethical considerations shape the overall effectiveness and adoption of BCI or other emerging technologies in clinical psychology?

The semistructured format allowed flexibility in probing emerging themes and deeper insights during the interviews. This adaptability was essential for capturing the nuanced, subjective experiences of clinicians, as phenomenological research requires in-depth exploration of participants' lived experiences.

Expert feedback from professionals with expertise in either mental health or BCI technology was used to further validate the research questions and ensure their alignment with the study's goals. This expert review enhanced the reliability of the instrument and reinforced its capacity to capture meaningful data.

Observation Notes

In addition to interviews, I maintained observation notes. These notes documented non-verbal cues, observational data, and contextual details observed during the interviews. Observation notes provided supplementary information that enhanced the understanding of participants' verbal responses and overall experiences. The systematic recording of these observations was essential for a thorough analysis of the data and for capturing the full spectrum of participants' perspectives (Whitehead et al., 2020). (See Appendix A for observation notes.)

Document Analysis

The study also involved analyzing relevant documents such as professional guidelines, ethical codes, and other sources related to BCI technology in mental health. These documents, sourced from reputable and established bodies in the observation, provided an important context for understanding the ethical and regulatory frameworks within which clinicians operate, as seen in Appendix C. By integrating document

analysis, the study anchored the clinicians' experiences within broader professional and regulatory standards, enriching the data collected through interviews and observation notes.

Sources and Justification

The interview guide and observation notes were developed by the researcher specifically for this study to ensure they directly address the research questions related to the integration of BCI technology in mental health practices. The interview guide focused on exploring clinicians' experiences, ethical considerations, and factors influencing their acceptance of BCI technology. Observation notes captured non-verbal cues and contextual information during the interviews to provide additional insight into participants' responses.

In addition to interviews and observations, document analysis was conducted using materials from reputable sources such as peer-reviewed academic publications, professional organizations, e.g., APA, and regulatory bodies governing the use of BCI technology in clinical settings e.g., HHS, ICH. These sources were selected for their credibility and relevance, ensuring that the analysis reflects well-established ethical and professional standards in both mental health and neurotechnology fields. This approach ensured that the data collected was grounded in authoritative guidance and best practices within these areas.

Sufficiency of Data Collection Instruments

The combination of semistructured interviews, observation notes, and document analysis provided a comprehensive approach to data collection (Whitehead et al., 2020).

The instruments were designed to capture various dimensions of the clinicians' experiences and perspectives, addressing the research questions effectively. The use of multiple data sources ensured a rich, multi-layered understanding of the ethical and practical considerations associated with BCI technology in mental health care. This integrated approach was sufficient to address the study's aims and to provide a robust analysis of the data.

Procedures for Recruitment, Participation, and Data Collection

Recruitment

Participants in this study were identified and recruited through several targeted channels. Clinicians from my internship site were invited to participate, leveraging my direct professional relationships. Additionally, outreach was made through local and national chapters of the American Psychological Association (APA), particularly those with a focus on neuropsychology, digital psychology, and emerging technology.

Recruitment also extended to health and neurotechnology conferences where mental health professionals were likely to engage with BCI technology. Examples of relevant 2024 conferences included the International Conference on Neurorehabilitation (ICNR), the Society for Neuroscience (SfN) Annual Meeting, and the BCI Conference, all of which provided a platform for clinicians and researchers interested in the intersection of mental health and neurotechnology. These diverse recruitment strategies ensured a well-rounded participant pool, representing a range of perspectives on the integration of BCI technology in clinical practice.

Recruitment efforts involved sending personalized email invitations to eligible candidates and posting recruitment announcements on relevant professional social media platforms. These communications clearly outlined the study's purpose, eligibility criteria, and participation process. Additionally, the recruitment materials provided contact information for potential participants to reach out with any questions or to express their interest in participating. (See Appendix B for recruitment communications.)

Participation

Upon confirmation of eligibility, participants were provided with informed consent forms detailing the study's objectives, procedures, and ethical considerations. The consent forms emphasized the voluntary nature of participation, the confidentiality of personal data, and participants' right to withdraw from the study at any time without penalty. The informed consent process ensured that participants fully understand their involvement in the study before proceeding.

Data Collection

Data collection was conducted using multiple instruments to ensure comprehensive coverage of the research questions. The primary data collection method was semistructured interviews. These interviews were conducted either via a secure video conferencing platform, e.g., Google Meet.

Each interview was scheduled for approximately 60 to 90 minutes. The estimated duration of 60 to 90 minutes for the interview was based on established norms in qualitative research for semistructured, in-depth interviews. Creswell (2013) explained that interviews of this length are ideal for exploring complex topics, allowing participants

to provide rich and reflective responses. In this study, each open-ended question was anticipated to take approximately 5-10 minutes to answer, including follow-up probes and clarifications, given the complex nature of ethical decision-making, practical considerations, and personal experiences with BCI technology.

The interview guide included 15 to 18 questions, based on the participants' experiences and responses, which balanced the depth required for exploring BCI's integration in mental health care without overwhelming and fatiguing the participants. The interviews were audio-recorded with participants' consent and transcribed verbatim to facilitate detailed analysis.

In addition to the interviews, I maintained observation notes to document non-verbal cues, contextual details, and observational data. These notes were recorded immediately after each interview to ensure accuracy and were reviewed alongside the interview transcripts. I also analyzed relevant professional documents, such as guidelines and ethical codes related to BCI technology, to provide additional context and depth to the findings.

Data collection occurred over a period of several weeks to accommodate participant availability and ensure thorough engagement. When recruitment resulted in fewer participants than anticipated, additional outreach efforts were made through extended professional networks and further engagement with mental health associations and conferences.

Follow-Up Procedures

Upon completion of the study, participants were debriefed about the research findings and the study's outcomes. Debriefing provided participants with a summary of their interview and address any questions or concerns they may have had, though the results of the study were not yet processed or available. Participants were also provided the opportunity to provide feedback on their experience with the study.

Though unnecessary, if additional insights were needed or if initial interviews reveal areas required further exploration, participants were invited for follow-up interviews. These follow-up sessions were scheduled based on mutual availability and focused on clarifying or expanding upon issues that emerged during the initial interviews. All follow-up procedures were conducted with the same level of rigor and ethical considerations as the initial data collection.

By outlining these procedures in detail, the study ensured transparency and replicability, providing other researchers with a clear framework for conducting similar research and addressing the research questions effectively.

Data Analysis Plan

Data was collected through semistructured interviews, observation notes, and document analysis, each tailored to address the study's research questions. The semistructured interviews, which focus on clinicians' ethical decision-making processes concerning BCI technology, were analyzed using coding methods based on Saldaña's approach in The Coding Manual for Qualitative Researchers (2013).

The analysis began with first-cycle coding, as outlined by Saldaña (2015), where interview transcripts were examined to identify significant statements and phrases that reflected the participants' experiences with BCI technology. This stage involved the use of descriptive coding and in vivo coding to capture participants' language and perceptions directly, ensuring the authenticity of their responses. This was in-line with the Miles et al. (2014) emphasis on maintaining close ties to the data in early coding stages.

Following this, second-cycle coding was employed, utilizing pattern coding to consolidate first-cycle codes into larger, more abstract themes (Miles et al., 2014). During this phase, connections between codes were explored to form categories that represent clinicians' shared experiences and concerns about BCI, including ethical challenges, technology adoption, and practical integration into mental health care.

Observation notes, which captured non-verbal cues and contextual information during interviews, were analyzed using process coding, as recommended by Saldaña (2015), to document the clinicians' behaviors and actions related to their use of or consideration for BCI technology. This helped supplement the interview data and offered deeper insights into their decision-making processes. In cases where discrepancies existed between verbal responses and observed behaviors, these differences were carefully analyzed, consistent with the triangulation techniques described by Miles, Huberman, and Saldaña (2014), to provide a more comprehensive view of the data.

Additionally, document analysis was conducted to examine ethical guidelines, professional codes, and clinical standards related to BCI technology. Themes emerging from this analysis were cross-referenced with interview and observational data, ensuring

a coherent understanding of how BCI technologies are viewed from an ethical and practical standpoint. Thematic coding guided this process, as recommended by both Saldaña (2015) and Miles et al. (2014).

Throughout the analysis, bracketing was utilized to minimize personal biases, following Moustakas's phenomenological principles. This technique, discussed by Miles, Huberman, and Saldaña (2014), involved setting aside preconceived notions about BCI technology to ensure that the analysis remained centered on participants' perspectives.

The final stage of analysis involved synthesizing the data into textural and structural descriptions (Moustakas, 1994). Textural descriptions focused on what the participants experienced regarding BCI integration, while structural descriptions explored how these experiences unfolded in relation to their ethical decision-making and clinical practice. This layered approach, aligned with Miles, Huberman, and Saldaña's (2014) framework for qualitative data analysis, allowed for a comprehensive understanding of clinicians' perspectives on BCI technology.

By following this structured data analysis process, incorporating both first- and second-cycle coding techniques, the study generated a thorough and nuanced understanding of how clinicians perceive and engage with BCI technology in mental health care. The methodical approach, grounded in Saldaña's coding principles (2015) and the broader qualitative framework by Miles, Huberman, and Saldaña (2014), ensured that the findings will be rich, detailed, and insightful.

Issues of Trustworthiness

To ensure the credibility of the research study, a range of strategies were employed to enhance the internal validity of the findings. Triangulation was used to cross-verify data from multiple sources, including semistructured interviews, observation notes, and document analysis. This approach allowed for a more comprehensive understanding of clinicians' experiences with BCI technology by integrating diverse perspectives and reducing the potential for bias. Prolonged contact was established through in-depth interviews with participants to build rapport and ensure that their perspectives are thoroughly understood.

Member checks involved providing participants with a summary of the findings to confirm the accuracy of the interpretations and to validate that their views have been represented correctly (Whitehead et al., 2020). Member checks involved providing participants with a summary of the findings to confirm the accuracy of the interpretations and ensure their views were accurately represented (Whitehead et al., 2020). Each participant was allotted approximately 20 minutes to review the summary and provide feedback, which allowed time for them to validate the findings and suggest any clarifications or corrections as needed.

Saturation was monitored by continually assessing the data to ensure that no new themes or insights emerged and that a comprehensive understanding of the phenomenon was achieved (Whitehead et al., 2020). Reflexivity was practiced by the researcher who regularly reflected on their own biases and preconceptions, acknowledging how these may have influenced the analysis (Whitehead et al., 2020). Peer review involved

colleagues reviewing the findings and analytical processes to ensure objectivity and validity (Whitehead et al., 2020).

For establishing transferability, the study provided a thick description of the research context, participants, and findings, enabling readers to assess the applicability of the results to other settings or populations (Whitehead et al., 2020). Detailed descriptions of the participants' experiences and the research environment allowed for comparisons with other studies (Whitehead et al., 2020). Variation in participant selection was ensured by including a diverse range of clinicians with different levels of experience and familiarity with BCI technology, thereby enhancing the generalizability of the findings within similar contexts.

To address dependability, the study used audit trails to document the research process, including data collection, analysis, and decision-making procedures (Whitehead et al., 2020). This transparency allowed others to follow the research steps and assess the consistency of the study's findings (Whitehead et al., 2020). Triangulation also supported dependability by providing multiple data sources for cross-validation, further ensuring that the findings were reliable and consistent (Whitehead et al., 2020).

Confirmability was supported through reflexivity, where I continuously examined biases and how these may influence the research process and outcomes (Whitehead et al., 2020). I maintained a reflexive journal to document their thoughts and reflections throughout the study, which aided in ensuring that the findings were grounded in the participants' perspectives rather than researcher preconceptions.

In terms of intra- and intercoder reliability, although qualitative research does not always employ these traditional measures, maintaining consistency in coding was a priority (Whitehead et al., 2020). I used clear coding procedures and regularly reviewed coding decisions to ensure coherence within the analysis. If applicable, cross-checking between multiple coders was considered to enhance reliability and ensure that the coding process was rigorous and systematic (Whitehead et al., 2020). By integrating these strategies, the study aimed to produce credible, transferable, dependable, and confirmable results that offered a robust and nuanced understanding of clinicians' experiences with BCI technology in mental health practice.

Ethical Procedures

Agreements and Treatment of Human Participants

For this study, securing access to participants involved the use of formal agreements and permissions. Participants were recruited through professional networks and mental health associations, and the recruitment process was detailed in the Institutional Review Board (IRB) application. The study included copies of recruitment emails, consent forms, and any other relevant documents to demonstrate adherence to ethical guidelines. (See the appendices for the listed documents.) Institutional permissions, including IRB approvals, were necessary for conducting research involving human subjects. The study included an IRB proposal for a completed dissertation.

Ethical Considerations in Recruitment and Consent

Ethical concerns in recruitment were addressed by ensuring that participation was voluntary and based on informed consent. Recruitment materials clearly stated the study's

purpose, the voluntary nature of participation, and the rights of participants. Consent forms were provided to participants, detailing the study's objectives, procedures, potential risks, and benefits, and emphasizing their right to withdraw at any time without penalty. The informed consent process ensured that participants fully understand what participation entails before agreeing to take part.

Ethical Concerns in Data Collection

During data collection, the study addressed several ethical concerns, including privacy and power dynamics. Participants' privacy was safeguarded through confidentiality measures, and I was aware of and managed any power imbalances inherent in the research setting. To mitigate these concerns, data collection was conducted in a respectful and non-intrusive manner. Secure, encrypted platforms were used for interviews, and participants were assured of their privacy and the confidentiality of their responses.

Treatment of Data

Data confidentiality was rigorously maintained. Data was stored in secure, password-protected systems accessible only to the researcher. Identifiable information was removed or anonymized to protect participants' privacy. Data was used solely for research purposes and was disseminated in aggregate form to avoid revealing individual identities. A clear plan for data destruction is in place: all research data will be securely deleted or shredded after the study's completion or at the end of the data retention period, as stipulated by institutional policies.

Additional Ethical Issues

Additional ethical considerations included managing potential conflicts of interest and addressing any power differentials that may arise due to my role. Incentives, though not used, were justified and provided in a manner that did not coerce or unduly influence participants. The study adhered to ethical standards to ensure that the research was conducted with integrity and respect for all participants. By adhering to these ethical guidelines and protocols, the study aimed to ensure that participants were treated with respect, and their rights and privacy are protected throughout the research process.

Summary

This chapter addressed the research methodology used to study clinicians' experiences with BCI technology in mental health practice. The study employed a phenomenological approach to explore the ethical and practical challenges associated with BCI integration, guided by Moustakas's (1994) phenomenological methodologies.

The research questions focused on clinicians' perceptions of the ethical implications of BCI technology and their decision-making processes. The chapter outlined a purposeful sampling strategy combined with snowball sampling to recruit licensed clinical psychologists and mental health professionals with relevant experience or interest in BCI technology. The selection criteria and sample size were designed to ensure depth and richness of data, targeting 8-12 participants to achieve data saturation.

Instrumentation included semistructured interviews, observation notes, and document analysis. These methods were chosen to capture a comprehensive view of clinicians' experiences and were described in detail, including procedures for data

collection, recording, and transcription. The analysis plan involved bracketing, thematic coding, and the synthesis of textural and structural descriptions, with data analyzed manually without software.

Ethical considerations were thoroughly addressed, including obtaining necessary institutional permissions, informed consent procedures, and measures to protect participant privacy and confidentiality. Strategies to ensure credibility, transferability, dependability, and confirmability were also detailed, providing a robust framework for conducting the study ethically and producing valid, insightful results. Overall, this chapter set the foundation for a rigorous examination of how clinicians engage with BCI technology, aiming to contribute valuable knowledge to the observation of mental health care and inform future practices in integrating emerging technologies.

Chapter 4: Results

Introduction

This chapter presents the findings of the study, providing an in-depth exploration of clinicians' perceptions of BCI technology in mental health practice. The purpose of this research was to better understand how clinicians perceive both the ethical implications and the practical considerations of integrating BCI technology into their work. Specifically, the study addressed three research questions: (a) How do clinicians perceive the ethical implications and decision-making processes involved in using BCI for diagnosing and treating mental health disorders? (b) What factors influence clinicians' acceptance of and readiness to adopt BCI in clinical practice? (c) What insights can be drawn from clinicians' personal experiences with BCI integration in the field of psychology? Addressing these questions provides insight into both the opportunities and challenges surrounding the adoption of BCI in therapeutic contexts. The results are organized to offer a clear understanding of the research setting, participant demographics, data collection and analysis methods, and the key themes that emerged from the study.

The chapter begins by describing the study's setting, including relevant contextual factors that may have influenced participants' responses. Next, participant demographics are outlined to provide insight into the backgrounds and professional experiences of the clinicians involved. The data collection process is then detailed, explaining how interviews, observations, and document reviews were conducted. Following this, the data

analysis methods are described, highlighting the coding techniques and thematic categorization used to interpret the findings.

Finally, the chapter presents the study's results, organized around the primary and secondary research questions. These findings offer a comprehensive view of clinicians' decision-making processes, ethical considerations, and readiness to adopt BCI technology. Direct quotes and observational insights are included to illustrate key themes, ensuring that the voices and experiences of participants are accurately represented.

Setting

This study was conducted during a time of heightened professional discourse around the integration of advanced technologies, particularly BCI technology, into clinical mental health care. Participants were recruited through LinkedIn and professional networks, with an intentional focus on licensed psychologists actively engaged in mental health practice. All interviews took place virtually via Google Meet, which allowed participants from a variety of geographical regions to take part in the study without the constraints of travel.

Several shared conditions influenced participants' perspectives at the time of the study. Many were actively working in clinical settings adapting to post-pandemic shifts in telehealth service delivery, encountering new ethical questions around digital care, and responding to increased client interest in emerging technologies. These contextual factors—combined with each clinician's level of exposure to BCI-related research and tools—formed a backdrop that shaped how participants engaged with the study's

questions, particularly those relating to ethical concerns, clinical feasibility, and personal readiness for technology adoption.

These definitive environmental and professional conditions are essential to understanding the context within which clinicians' responses were generated and provide important framing for the interpretation of findings in the following sections.

Demographics

The study included licensed psychologists who met the eligibility criteria of having at least one year of clinical experience in therapy, assessments, or related mental health services. Participants also demonstrated an interest in emerging technology, particularly the integration of BCI technology in clinical practice.

During recruitment, I observed a high level of interest from pre-licensed psychologists, psychology students, and early-career professionals who did not meet the experience requirement. While I found their enthusiasm encouraging and reflective of a broader curiosity about BCI technology, I limited participation to those who met the established clinical experience criteria.

The participants represented diverse professional backgrounds and global locations, reflecting a range of clinical experiences. Their practice settings varied, including community mental health, private practice, and hospital-based care, e.g., inpatient or outpatient care. This diversity provided a broad perspective on how clinicians across different environments perceive and engage with emerging technologies in mental health care.

Data Collection

The data collection process for this study involved multiple steps to ensure comprehensive, accurate, and reliable data. A total of six participants were included in the study, although the original participant requirement was 8-12. The decision to conclude data collection of six participants was based on the difficulty in recruiting individuals who met the study's criteria and demonstrated genuine interest in emerging technologies, including BCIs. Many potential participants expressed reluctance for engaging with BCI-related topics, and despite extended recruitment efforts, further suitable candidates could not be secured within the project's timeframe.

Participant Recruitment and Scheduling

Participants were screened and scheduled for interviews via the Motion app, an AI productivity tool for managing time, tasks, projects, and meetings, which streamlined the process. This app ensured that participants met the study's inclusion criteria and facilitated interview scheduling. Once a participant was confirmed, the app automatically sent the consent form for signature and a confirmation email. A reminder was sent 24 hours before the scheduled interview and another 30 minutes prior to the session.

All interviews were conducted virtually via Google Meet, allowing for flexible, remote participation. Each interview session lasted between 60 and 75 minutes, depending on the depth of the conversation and responses provided by the participants. In total, one interview was conducted per participant. However, due to unforeseen circumstances such as rescheduling and re-coordination of interview times, conducting the interviews was somewhat delayed. Several participants required rescheduling,

necessitating additional coordination to ensure availability. Participant no-shows were a significant challenge, requiring frequent reminders and follow-up communication to secure attendance.

Data Recording and Transcription

Interviews were recorded using Google Meet's built-in recording feature. The audio and video recordings were securely stored on Google Drive for easy access and organization. Manual transcription was conducted to ensure accuracy and to capture verbal and non-verbal responses. This process included transcribing conversations verbatim, noting participant pauses, fillers, and clarifications. Transcriptions were reviewed for consistency and completeness.

To validate the data, participants were given the opportunity to review their transcripts through a member-checking process. They were invited to verify whether the transcriptions accurately reflected their responses. However, only one participant responded, confirming that the data accurately represented their recollections of the interview.

Variations From the Plan

While the initial data collection plan outlined in Chapter 3 projected a sample size of 8-12 participants, the actual recruitment resulted in six participants. This deviation was primarily due to challenges in recruiting individuals who met the eligibility criteria and demonstrated interest in the study, particularly those open to emerging technologies like BCI. The final decision to conclude data collection of six participants was made not because thematic saturation was reached, but due to insufficient participation to fully

meet the study's inclusion criteria. As a result, the findings reflect valuable insights from the participants who contributed but may not capture the full range of perspectives that could have emerged with broader participation.

Additionally, while the initial plan anticipated interviews lasting between 60-90 minutes, the actual duration of interviews typically ranged from 60-75 minutes. This variance was due to the conversational nature of the interviews, with some participants requiring less time than initially expected to fully articulate their thoughts.

Member checking also deviated from the original plan. As noted in chapter 3, I intended that multiple participants would review the transcripts to validate the findings. However, only one participant responded to the member-checking request, confirming the accuracy of the data.

Data Analysis

The data analysis process for this study was conducted using a systematic, inductive approach to move from raw data to broader categories and themes. Following the Saldaña method for qualitative data analysis, the coding process was carried out in two cycles: first-cycle coding and second-cycle coding (Saldaña, 2015). The first cycle focused on initial coding of the raw data to identify discrete units of meaning, and the second cycle involved organizing these units into more abstract categories and themes that encapsulated the participants' experiences and perspectives.

First-Cycle Coding

In the first cycle, the data were broken down into smaller units of meaning, known as coded units (Saldaña, 2015). Each interview transcript was reviewed line-by-

line, and segments of the text that conveyed specific meanings or insights were assigned preliminary codes (Saldaña, 2015). The codes were chosen to capture specific phenomena or aspects of the data related to the participants' experiences with emerging technologies, particularly BCI. At this stage, the focus was on remaining as close to the original data as possible, allowing for the emergence of initial ideas and categories.

For example, some initial codes included "ethical concerns," "accessibility challenges," and "client hesitation." These codes were applied to segments of data where participants discussed their uncertainties and reservations about adopting new technology, the difficulties related to making BCI technology accessible, and the hesitancy clients expressed about engaging with such technologies. These initial codes represented discrete units of meaning directly reflecting participants' experiences and viewpoints (Saldaña, 2015).

Second-Cycle Coding

After completing the first cycle of coding, a second cycle of coding was performed to group the initial codes into broader, more abstract categories (Saldaña, 2015). This process was inductive, as the goal was to allow patterns and themes to emerge from the data rather than imposing preconceived categories (Saldaña, 2015). The second cycle of coding involved reviewing the first-cycle codes and consolidating them into larger categories based on shared meanings or ideas (Saldaña, 2015). Through this process, more complex representations of participants' perspectives were constructed (Saldaña, 2015).

For example, the code "ethical concerns" was grouped with other codes such as "privacy," "informed consent," and "misuse" under the larger category of "Ethical Considerations." Similarly, codes like "accessibility challenges" and "financial concerns" were grouped under the category "Practical Concerns." These larger categories provided a more comprehensive understanding of the themes that emerged from the data (Saldaña, 2015).

Evidence of Trustworthiness

In this study, several strategies were implemented to ensure the trustworthiness of the data and findings. These strategies focused on enhancing credibility, transferability, dependability, and confirmability of the research process and results. Below is a detailed explanation of the strategies employed, as well as adjustments made during the data collection and analysis process.

Credibility

To establish credibility, the strategies outlined in Chapter 3 were closely followed with some adjustments due to challenges encountered during the study. Triangulation was a key approach, as multiple data sources were used, including semistructured interviews, observation notes, and document analysis. The interviews were the primary data source, but the inclusion of observation notes helped capture contextual nuances during the interviews, particularly regarding participant body language and environmental cues. Document analysis also supplemented the interview data, offering further insights into participants' experiences and attitudes toward BCI technology.

However, one notable adjustment was that the original plan for prolonged engagement with participants was not feasible due to the constraints on participant availability. As only one round of interviews was conducted per participant, prolonged engagement was limited. Despite this, member checking was implemented after the interviews were concluded. Participants were provided with a summary of the findings and asked to verify the accuracy of the interpretations. Of the six participants, only one responded, confirming that the findings appeared accurate. This limited feedback, however, still offered some degree of verification, supporting the credibility of the findings.

Transferability

Transferability refers to the extent to which the findings can be applied to other settings or populations (Whitehead et al., 2020). In this study, strategies to enhance transferability included providing a thick description, or a detailed, rich, and contextually grounded account of the research setting, participant characteristics, and findings (Whitehead et al., 2020). Thick description goes beyond surface-level reporting to convey the participants' experiences, social and cultural context, and the nuances of meaning-making (Whitehead et al., 2020). This level of detail, as outlined in Chapter 3, enables readers to determine whether the study's insights are applicable to their own contexts or populations.

A detailed account of the participants' experiences with BCI technology, including their varying levels of knowledge and engagement with emerging technologies, was included in the analysis. This information was critical in allowing readers to assess

the relevance and applicability of the findings to other similar contexts or populations. The study's focus on diversity within the group, particularly in terms of participant familiarity with BCI, helps provide insight into the broader experiences of clinicians with new technologies.

Dependability

Dependability concerns the consistency of the research process, ensuring that the findings are reliable and can be traced back to data (Whitehead et al., 2020). To ensure dependability, strategies such as maintaining an audit trail and triangulation were employed. The audit trail included comprehensive documentation of the data collection process, including how participants were recruited, how interviews were conducted, and how data were transcribed and analyzed. These steps ensured transparency and allowed for an external review of the research process.

A key adjustment to the dependability strategy was that the interviews were transcribed before the coding process began. This was done intentionally to avoid biases that could arise from preemptively coding individual interviews, ensuring that the data was fully reviewed before the analysis started. The transparent documentation of the research process and data analysis decisions served to strengthen the dependability of the findings. Triangulation further supported dependability by cross-validating data from multiple sources (e.g., interviews, observation notes, and document analysis), ensuring consistency across the different data streams.

Confirmability

Confirmability focuses on ensuring that the findings are grounded in the participants' perspectives rather than the researcher's assumptions (Whitehead et al., 2020). One key strategy I used to support this was maintaining a reflexive journal throughout the research process. This journal became a space to critically reflect on my assumptions and evolving thoughts—particularly as I encountered findings that challenged my expectations. For instance, I was surprised by the degree of uncertainty clinicians expressed around the timeline for integrating BCI into practice. I had initially assumed that professionals who were aware of the technology would be more future-oriented or optimistic about its role, but many remained hesitant or ambivalent. This prompted me to re-examine my coding lens to avoid overemphasizing enthusiasm that wasn't truly present in the data.

Reflexivity also helped me remain mindful of how my own interests in emerging technologies could unintentionally shape the interpretation of participant responses. For example, when I encountered responses that seemed overly cautious or skeptical, I revisited them to ensure I wasn't underrepresenting or minimizing those concerns in my analysis.

In addition, member checking was conducted following the interviews, though participants provided limited feedback. To supplement this, I integrated observation notes and document analysis to triangulate and validate the findings. A systematic coding process, using Saldaña's (2015) approach to first- and second-cycle coding, further

supported confirmability by maintaining analytic rigor and consistency throughout the data analysis.

Results

Figure 1

Theme Word Cloud

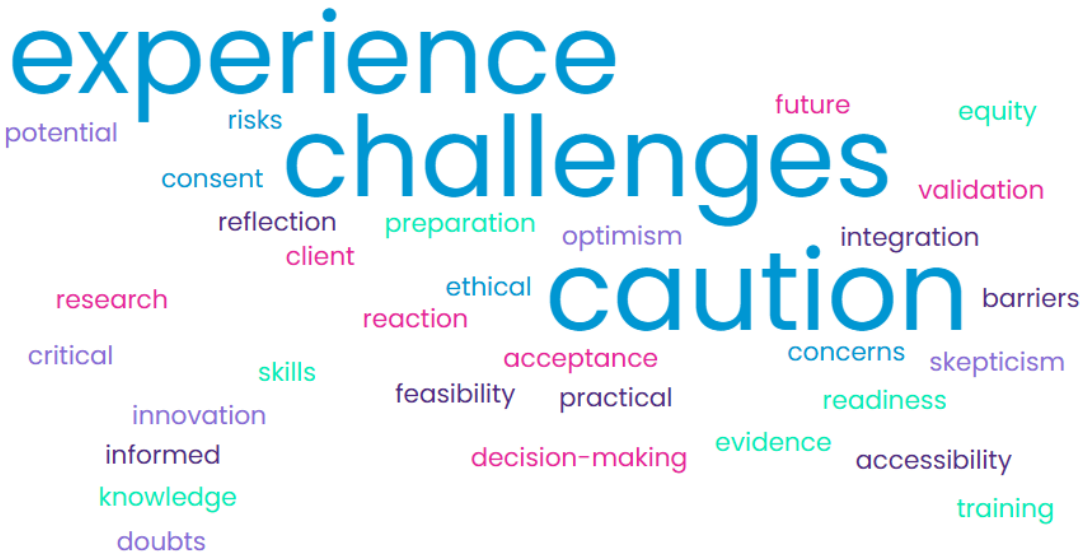

Table 2

Themes, Subthemes, and Definitions on BCI Integration in Mental Health

Main theme	Subtheme	Definition
Ethical concerns	Privacy and data security	Concerns about how BCI technology may compromise client confidentiality and how data may be misused or mishandled.
	Informed consent	Challenges related to ensuring clients fully understand BCI applications and give truly informed consent.
	Ethical risk and complexity	Ethical dilemmas, such as balancing risks and benefits, corporate influence, autonomy, and overpromising outcomes.
	Ethical decision-making frameworks	Use of established models (e.g., Beauchamp & Childress) to guide ethical integration and decision-making around BCI.
Practical barriers	Cost and accessibility	Concerns over financial burdens, accessibility of BCI across diverse populations, and potential inequity in implementation.
	Lack of standardization	Absence of clear protocols, guidelines, or infrastructure to support effective BCI integration.
	Training and competence	Need for clinician education in neuroscience, ethical application, and technical aspects of BCI use.
	Feasibility in clinical settings	Perceived difficulty of adopting BCI within the realities of therapy practice due to logistical and resource limitations.
Clinician and client attitudes	Caution and skepticism	Hesitancy around adopting emerging technology due to limited evidence, fear of over-medicalization, or past ethical dilemmas.
	Emotional reactions	Clinicians' and clients' initial emotional responses to BCI—including excitement, fear, novelty, and optimism.
	Perceived lack of demand	Observation that clients may not yet be asking for BCI or aware of its potential, contributing to clinician ambivalence.
Evidence and research needs	Evidence-based decision-making	Clinicians' emphasis on integrating BCI only when it is supported by credible, peer-reviewed research.
	Research limitations	Recognition that the current evidence base is insufficient, and that BCI is more suited for research than for immediate clinical adoption.

Main theme	Subtheme	Definition
Implementation challenges	Integration into existing practice	Issues around how BCI could be incorporated into therapy workflows, including diagnosis-specific applications and measuring outcomes.
	Gradual adoption	The expectation that BCI integration will be incremental, requiring phased piloting and long-term infrastructure development.
Training and Readiness	Professional development needs	Recognition of the need for continued education in neuroscience, technology ethics, and regulatory understanding for effective BCI use.
	Suggested implementation supports	Calls for CE modules, ethics-focused training, and organizational policies modeled on existing tech competency frameworks like APA telepsychology.
Future outlook	Cautious optimism	While cautious, clinicians express hope that BCI could eventually support personalized treatments for complex conditions like PTSD and depression.
	Predictions for use	Mixed views on whether BCI will remain in research or expand into therapy, depending on how practical, ethical, and research challenges are met.

Ethical Implications and Decision-Making in BCI Integration

Across interviews and document reviews, ethical concerns emerged as a defining factor in clinicians' attitudes toward BCI integration. These concerns were both practical and philosophical in nature and largely centered on legal ambiguity, consent, data security, and the emerging concept of "neurorights." Participants consistently expressed a deep awareness of the profound ethical stakes involved in using technology that interfaces directly with the brain.

Regulatory Gaps in Neural Data

A dominant concern among clinicians centered on the absence of robust legal frameworks to govern the use and protection of neural data. Participants frequently

identified existing legislation, particularly HIPAA in the United States and the GDPR in Europe, as ill-equipped to handle the complexities of brain-derived information. As Clinician 1 (C1) expressed, “We’re talking about a different class of data here. Brain activity isn’t just health information…it could be predictive of emotion, thought, even intent. Our laws aren’t ready for that.”

For Clinician 5 (C5), this uncertainty was personal. In describing their reluctance to engage in early-stage BCI discussions at their clinic, they recalled being asked to weigh in on a vendor’s proposal: “They wanted to collect neural data for mood prediction. I had to ask: who’s liable if that data leaks? Or worse, if it’s wrong and influences care decisions?” That moment, C5 explained, made clear to them how underprepared existing policies were. “There wasn’t even a place in our consent forms for that kind of data. It’s like we’re walking into a legal blind spot.”

Several clinicians, including C5, raised regulatory accountability as a central issue, with one noting, “Who’s overseeing this? How do we ensure it’s being used ethically?” This uncertainty contributed to a broader sense of risk and hesitancy around BCI implementation.

However, not all clinicians viewed this gap with equal concern. A minority adopted a more adaptive stance, citing the typical lag between technological innovation and legal reform. Clinician 3 (C3) remarked, “The law always lags behind tech. That’s not new. It’ll catch up eventually, and in the meantime, we can lean on ethics and existing consent processes.” For C3, their comfort came from years of navigating similarly ambiguous situations with emerging digital tools in telehealth: “We were flying

blind at first there too. What helped was sticking to the core: client autonomy, clear communication, and documentation."

This more tolerant view of regulatory delay suggests a pragmatic approach among some clinicians, who may prioritize innovation and ethical discretion over formal legal certainty in the short term.

Neurorights and Mental Privacy

The protection of mental privacy emerged as a significant ethical theme, with many clinicians identifying the ability to safeguard one's inner thoughts as a fundamental right. Participants commonly described this as the "right not to be read," expressing anxiety about the implications of technologies capable of accessing neural patterns. As C3 articulated, "Thoughts should be the last sanctuary of privacy. Once we start reading signals from the brain, we're inching toward decoding the self. That's sacred."

One of the more vivid narratives came from Clinician 4 (C4), who recounted a time they trialed a new therapeutic app marketed with AI-enabled emotion detection. "It was supposed to help analyze tone and content of speech in real time," they explained, "but it felt invasive. I had a client in trauma recovery with very high mistrust levels. The idea that their emotional state might be 'scored' or misread by a machine…it didn't sit right with me." After one session, C4 noticed the client's affect change. "They asked if I was recording them or if a 'robot' was watching. That was it for me. I stopped using it immediately."

This story, shared with visible discomfort by C4, encapsulated the tension many participants felt: even well-intentioned tools could damage trust, especially in vulnerable

populations. C1 echoed this, stating, “Privacy is huge. I mean, we’re talking about... the brain, right? There’s a lot of sensitive data there.”

Nonetheless, a more technically grounded view emerged from C1, who cautioned against alarmism: “It’s still just surface-level brain signals, like brainwaves or biofeedback. We’re nowhere near mind-reading. The fear is a little premature.” C1’s perspective highlighted a growing split among clinicians: some grounded in psychotherapeutic practice and others informed by systems-level or biomedical knowledge. While the majority advocated for neurorights as an ethical imperative, this dissenting view pointed to the importance of scientific literacy in shaping perceptions of risk.

Informed Consent and User Control

Informed consent was cited by nearly all clinicians as a critical, yet deeply complicated, requirement for BCI implementation. Participants questioned whether clients could meaningfully understand what it means to have their neural signals recorded and analyzed. As C6 asked, “Even if you tell a client, ‘This device will record your brain signals,’ what does that mean to them? How do they visualize risk or consent when they don’t understand what’s being collected?”

This concern was especially pronounced among those practicing trauma-informed care, where client agency and safety are foundational. For C6, the issue of consent was not just about information delivery but about the emotional and psychological context in which clients are asked to agree. They described a client population with histories of coercion and institutional betrayal, where the act of giving permission, particularly for

something as abstract as neural data, could feel less like empowerment and more like compliance. C6 noted: “There’s already so much power imbalance in therapy. If we introduce tools that clients don’t understand, even with a signature, is it really consent? I worry about that, especially with folks who have a trauma history.”

This narrative reflects a deeper layer of ethical reflection: where informed consent becomes more than a procedural hurdle and enters the domain of relational ethics and trauma sensitivity.

Others, like C2, raised related concerns from a broader socio-technical perspective. Drawing comparisons to common digital devices, C2 remarked, “If clients aren’t fully informed... it feels risky.” They described a growing unease with the normalization of passive consent in consumer tech…where individuals agree to data sharing via dense user agreements they rarely read or understand. This, in their view, sets a dangerous precedent for therapeutic contexts where vulnerability is amplified and trust is central.

Yet, C2 also offered a nuanced perspective on the imperfect nature of all clinical consent, noting that uncertainty and incomplete understanding are often present across modalities. “Clients sign off on treatment modalities and medications they don’t fully understand all the time. BCI isn’t unique in that regard…it’s just newer.” This dual stance highlighted a tension between idealistic standards of fully informed consent and the practical realities of clinical care. For C2, the solution lies not in eliminating complexity but in building consent processes that prioritize ongoing communication, reassurance, and relational transparency.

Privacy by Design and Data Minimization

Clinicians widely supported the principle of "privacy by design," which involves embedding ethical considerations, user control, and data security features directly into BCI systems from the outset. This was framed not as a technical preference but as an ethical necessity. As one participant noted, "If developers and therapists aren't building in privacy protections from the start, we're going to lose client trust…and potentially do harm."

C1, who had experience implementing digital tools in high-acuity clinical settings, expressed ambivalence about overly restrictive approaches to data collection. They acknowledged the growing policy push toward data minimization but questioned whether such constraints might hinder meaningful clinical insight. They recalled an instance in which limited behavioral data from a digital intervention failed to capture a client's escalating distress: "We were only collecting mood check-ins and a few passive data points, and we missed the fact that one of our clients was dissociating almost every night. It wasn't until she brought it up in session that we realized how blind we were. More data could've helped." This example captured the core dilemma C1 wrestled with: how to balance privacy with precision, and how to prevent ethical safeguards from unintentionally limiting therapeutic responsiveness.

Their reflection stood in contrast to other participants who advocated for conservative data practices aligned with frameworks like GDPR. C2 emphasized the importance of transparency over volume: "It's not about how much data we collect; it's about whether clients know what's being collected and why. That clarity builds trust."

While perspectives varied, there was a broad consensus that ethical design cannot be an afterthought. Participants stressed the need for clinicians to be involved in the development and vetting of tools, not just as end-users but as stewards of client safety and trust.

Factors Influencing Acceptance and Readiness to Adopt BCI Technology

The second research question addressed the factors that influence clinicians' acceptance and readiness to adopt BCI technology. Clinicians identified several barriers to adoption, including the lack of research supporting the effectiveness of BCI in mental health care and the practical challenges of integrating it into therapy. Many clinicians cited concerns about the feasibility of implementing BCI in a real-world clinical setting, given the high costs and lack of accessibility for some clients. Clinicians' willingness to integrate BCI into practice was shaped by multiple intersecting factors, including scientific evidence, logistical feasibility, and alignment with therapeutic philosophy. Most clinicians expressed cautious interest but emphasized that the technology is not yet ready for widespread clinical use.

Evidence and Decision-Making

A dominant theme was the need for validated evidence and clinical trials to support BCI efficacy. Many clinicians expressed concern that current research is overly experimental, small-scale, and not generalizable to clinical populations. As C5 put it: "We're not going to use a new therapy just because it's cool. We need controlled studies, outcome measures, and some kind of guideline to show that it actually works for people with depression, anxiety, trauma, etc." This cautious stance aligns with clinicians'

training in evidence-based practice, where empirical validation is a prerequisite for adoption.

For C4, this caution came from experience. They described being approached to pilot an emerging digital therapy tool that, like BCI, lacked clinical validation. “It looked promising,” C4 recalled, “but when I started asking about the data—how many clients it had been tested on, what the outcomes were—they didn’t really have answers. That was a red flag.” C4 explained that the decision not to proceed wasn’t about fear of innovation, but about ethical due diligence. “I couldn’t justify bringing something into a session that I couldn’t stand behind clinically. It’s not just about trying new things…it’s about responsibility.”

Policy documents and white papers reviewed during the study supported this clinician perspective, noting that few BCI systems have met the rigorous standards required for therapeutic certification.

Nonetheless, a few clinicians were more permissive, advocating for limited use of BCI tools in parallel with research efforts. C5, for example, articulated a balanced stance: “We won’t know if it works until we start using it in real-world settings. That doesn’t mean recklessness…it means starting with oversight, pilot programs, and collaboration with researchers.” For C5, the comparison was to early trauma protocols that were once unfamiliar but eventually validated: “I remember when EMDR was controversial. Now it’s in guidelines. That didn’t happen by waiting…it happened because people tested it in safe, structured ways.”

This position reflected a more innovative-forward approach, viewing clinical experimentation not as a risk but as a necessary and ethical component of emerging practice, so long as safeguards were in place.

Practical Barriers to BCI Integration

Across the sample, clinicians consistently cited practical limitations that would hinder the integration of BCI technologies in therapeutic settings. These concerns fell broadly into four categories: infrastructure constraints, cost, training and knowledge gaps, and questions of day-to-day applicability.

Clinicians practicing in community or under-resourced environments described significant infrastructural deficits that made BCI adoption appear untenable. C1 explained the reality of their setting: “We don’t even have up-to-date computers in our office. You’re telling me we’re going to set up BCI systems? That’s just not realistic.” For C1, this wasn't a rejection of the concept, but an acknowledgment of systemic gaps that would need to be addressed first. “We’re still fighting for paper charts to be digitized in some clinics,” they added, “so BCI just feels like science fiction right now.”

Similarly, C6 noted the intersection of cost and access: “Cost, accessibility, training. It’s…it’s just not feasible for most people.” They recalled a grant-funded program that had introduced digital tablets for remote therapy. “Even that was a stretch for some places. So imagining neural tech…it feels like a luxury, not a tool.”

Training and clinical preparedness were also highlighted as key challenges. C5 described the type of training they would need to feel ready: “We’d need training on ethical considerations, data security, even how to explain it to clients in simple terms.”

For them, it wasn't just about using the tool, but about integrating it into a framework of trust and transparency with clients. "It can't be something we stumble through. It has to be deliberate."

C4 echoed this need for preparedness and support. "I'd need training, supervision, maybe a certification before I'd feel comfortable." They drew parallels to when telehealth first rolled out during the pandemic: "We didn't just get handed laptops. We had to learn the platforms, the documentation rules, how to handle crisis care virtually—it was a learning curve. This would be, too."

Several participants also questioned the logistical integration of BCI into existing therapeutic models. As C3 asked, "How would something like BCI actually work on a day-to-day basis in, like, individual therapy?" Their uncertainty was not dismissal, but grounded in a desire to protect the therapeutic container. "The pace of a session, the rapport, the spontaneity—what happens when you introduce a machine into that space? I don't know if we have the answers yet."

This uncertainty extended to concerns about regulatory oversight, with participants expressing skepticism about the governance and standardization of BCI tools. C5 asked pointedly, "Who's overseeing this? How do we ensure it's being used ethically?" Their concern was not hypothetical; they described an experience where the lack of oversight in digital tool development led to client harm and no clear accountability: "We had no real chain of command when something went wrong. I don't want to see that happen again."

Despite these barriers, some clinicians articulated cautious optimism. Drawing on comparisons to earlier innovations such as telehealth, C3 reflected, “Every technology starts out inaccessible... BCI could follow the same path.” They described their own shift in mindset over time: “I was completely against virtual therapy at first. Now, it’s second nature. If the right supports are in place, maybe BCI can get there too.”

These perspectives suggest that while current implementation is limited, some clinicians anticipate a shift as BCI becomes more user-friendly, regulated, and integrated into existing care infrastructures.

Ethical Risk Versus Innovation Potential

The potential of BCI to address treatment-resistant conditions such as PTSD, depression, or OCD was acknowledged by several clinicians; however, this interest was frequently accompanied by concerns about ethical risks, data privacy, and client autonomy.

Some clinicians expressed enthusiasm about BCI’s therapeutic promise, particularly in contexts where traditional modalities have shown limited efficacy. C2 described this frustration in their own work: “We’re stuck with the same tools…CBT, meds, mindfulness. Some of those work great, but not for everyone. If BCI can give us another option, we owe it to our clients to explore it.” For C2, the draw wasn’t the technology itself; it was the desire to help clients who weren’t responding to standard care. “You get tired of saying, ‘let’s try another SSRI,’ when you know it probably won’t change anything,” they added. “If there’s something else out there, something that might work, we should at least look at it.”

Nonetheless, most participants emphasized that innovation must be tempered with caution. Many raised questions about informed consent, especially given the complexity of neural data collection. C2 also reflected on this tension, stating, “If clients aren’t fully informed... it feels risky.” The tone shifted from hope to hesitation as they considered how to explain such tools to clients. “Even I don’t fully understand how it works,” C2 admitted. “So how can I help my client make an informed choice?”

Others, like C4, highlighted the ethical implications of agency and autonomy: “Does this technology actually empower the client, or does it take something away from their agency?” C4 expanded on this during the interview, recalling a situation with another digital tool marketed as client-centered: “It sounded great…personalized mood tracking and feedback…but it ended up making the client feel observed, not supported. They shut down. It taught me that just because something is ‘smart’ doesn’t mean it helps.”

Concerns about data privacy were also prevalent. Several clinicians questioned the security and potential misuse of neural data, particularly given its intimate nature. C1 remarked, “Privacy is huge. I mean, we’re talking about... the brain, right? There’s a lot of sensitive data there.” C4 connected this worry to a past decision they made: “There was this app that claimed to use AI to analyze client emotions… I decided not to use it because I couldn’t guarantee my clients’ privacy.” The memory clearly left an impression; they recalled the discomfort of not being able to answer a client’s question about where the data was stored. “That moment stuck with me. If I can’t explain where their voice goes, I shouldn’t be using it.”

A smaller subset of participants adopted a values-based lens, expressing concerns about the over-medicalization of therapy through neurotechnologies. C6 stated, “Therapy isn’t just about brain activity; it’s about thoughts, emotions, relationships.” They spoke of their worry that BCI might reduce the complexity of human experience to data points: “If we’re not careful, we’ll start chasing symptoms in the brain and forget to ask about what’s going on at home, or in someone’s story.”

Others expressed a more philosophical hesitation, with C4 asking, “Just because we can, should we?” For C4, technology without purpose (or worse, without compassion) was ethically hollow. “I’m not against tech,” they clarified. “But I’m against forgetting the human being sitting in front of us.”

While the promise of BCI was recognized, participants emphasized the need for ethical clarity, client-centered design, and rigorous validation before the technology could be responsibly integrated into clinical practice.

Personal Experiences and Challenges With BCI Integration

The third research question explored clinicians' personal experiences with the integration of BCI technology in clinical psychology. Many participants reported little or no direct experience using BCI in clinical settings. This lack of exposure influenced their perceptions of feasibility, safety, and readiness—underscoring the need for education, training, and trial opportunities.

No Direct Experience and Professional Hesitation

Most clinicians reported little to no direct experience using BCI in therapy, which influenced their level of confidence and curiosity. For many, the absence of exposure in

training programs or clinical supervision environments created a significant readiness gap.

C4 was particularly candid about their position: “I’ve never used BCI, and I wouldn’t even know where to start.” During the interview, they described a moment when they encountered a research opportunity involving BCI. “It sounded interesting, but I just stared at the email,” C4 recalled. “I didn’t know what half of the terms meant. And I definitely didn’t feel equipped to even ask the right questions, let alone participate.”

C1 commented on this uncertainty more abstractly, describing how difficult it is to mentally picture BCI within the therapeutic space. “It’s a bit... difficult to picture how it fits in with the very human element of therapy,” they explained. For C1, the struggle wasn’t skepticism; it was a lack of familiarity. “We’re trained to build relationships, listen deeply, watch for subtle cues. I don’t know how a neural device fits into that. Does it sit in the background? Does it interrupt? I honestly have no idea.”

Without hands-on exposure or formal training, clinicians generally expressed a preference to observe further development before considering implementation. C4 described their ideal path to adoption: “I’d need structured training, supervision, maybe even a pilot with real support. Otherwise, I’m just guessing…and that’s not fair to the client.” Their tone revealed more concern than resistance: a desire to do right by their clients, not an unwillingness to explore new tools.

These reflections suggest that the gap is not merely technological but experiential. Clinicians need structured opportunities to explore BCI within ethical, relational, and practical frameworks before it can become part of their therapeutic toolkit.

Measuring Effectiveness

Among those with some research or academic familiarity with BCI, concerns centered around the lack of clearly defined outcome metrics. Clinicians were unsure how to assess progress using brainwave data or neurofeedback. C6 articulated the dilemma succinctly: “With traditional therapy, we have client self-reports, behavioral changes, even biological markers. With BCI, we don’t yet know what success looks like.”

While a few clinicians offered potential frameworks, these were often speculative or provisional. C2, who had some prior exposure to neurofeedback tools, suggested a blended model: “I’d probably look at a mix of client self-reports and, uh, objective measures, like brain scans or other neurofeedback data.”

This ambivalence reflects a broader hesitation rooted in both practical and epistemological concerns: what outcomes to measure, how to measure them, and whether those outcomes reflect meaningful therapeutic change.

Willingness to Pilot

Despite widespread caution, a subset of clinicians expressed tentative openness to engaging with BCI tools under specific conditions. C6 exemplifies this nuanced stance. Initially expressing discomfort with the ambiguity surrounding both ethical protocols and clinical outcomes, C6 nevertheless described a shift in thinking when reflecting on structured, research-based applications: “I’d be open to using it as part of a research study…if it was structured, ethical, and had some sort of debrief process built in.”

For C6, the willingness to pilot BCI was not a wholesale endorsement, but a cautiously bounded openness, a “yes, but only if” grounded in ethical oversight, client

autonomy, and built-in support structures. This stance contrasts with clinicians who expressed more rigid resistance, yet it also reinforces the sense that meaningful adoption is most feasible within controlled environments such as academic research settings or advanced clinical training centers.

These findings suggest that while general readiness for full integration remains low, early-stage implementation efforts, particularly those framed within ethically guided pilot studies, may serve as pragmatic entry points into broader clinical exploration.

Summary

This chapter presented the results of a qualitative exploration into clinicians' perspectives on the integration of BCI technology into mental health care. Through in-depth interviews and document analysis, key themes emerged around ethical decision-making, factors influencing adoption, and personal experiences with BCI. Clinicians voiced a complex mix of enthusiasm, caution, and concern—highlighting ethical risks, practical limitations, and a pressing need for regulatory clarity and empirical support.

The findings revealed regulatory gaps specific to neural data protection, limited direct experience with BCI, and strong emphasis on the importance of evidence-based and ethically guided integration. While some clinicians were hesitant due to the lack of clear implementation frameworks, others expressed cautious optimism about BCI's potential to personalize and enhance treatment. These varied perspectives illustrate the nuanced realities clinicians face as neurotechnologies begin to intersect more directly with mental health practice.

To fully understand the implications of these findings, they must be examined in the broader context of existing literature, emerging legal frameworks (such as neurorights), and practical considerations for implementation. Chapter 5 will synthesize these results through a critical discussion, offer conclusions grounded in both participant data and theory, and provide recommendations for practice, policy, and future research. This discussion aims to bridge the gap between clinicians' lived realities and the advancing frontier of neurotechnological innovation in mental health.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to explore clinicians' perspectives on the integration of BCI technology into clinical psychology practices. Specifically, in this study I aimed to understand the ethical, practical, and experiential challenges and benefits of adopting BCI in mental health care. By gathering qualitative data from clinicians, the study sought to inform the potential future application of this emerging technology in therapeutic settings.

Key findings from the study revealed that while clinicians expressed optimism about the potential of BCI, they also identified several significant barriers to its adoption. Ethical concerns regarding privacy, informed consent, and the risk of data misuse were prevalent. Practical challenges, such as high costs, lack of clear regulatory frameworks, and insufficient client demand, were significant factors limiting BCI adoption. Additionally, the study highlighted that clinicians had limited personal experience with BCI, with those who had used the technology reporting mixed feelings about its effectiveness and integration into existing therapeutic practices. Many clinicians acknowledged BCI’s potential for future use despite these challenges, especially in specialized research or treatment contexts, if they address its ethical and practical hurdles.

This chapter discusses the findings in the context of existing literature, focusing on the interpretations of the study, limitations, recommendations for future research, and implications for clinical practice.

Interpretation of the Findings

The findings of this study both challenged and extended current understandings of how emerging technologies, particularly brain-computer interfaces (BCIs), may be incorporated into mental health care. Consistent with the ethical concerns theme, clinicians highlighted privacy, informed consent, and data security as persistent areas of unease. These concerns echo the established neuroethics literature, which warns that neurotechnologies may compromise client autonomy, confidentiality, and control over neural data (Ienca & Andorno, 2017; Beauchamp & Childress, 2019; Klein et al., 2022; Yuste et al., 2017).

Informed Consent

Participants emphasized the practical and ethical challenges of obtaining truly informed consent when clients lacked foundational understanding of neural data collection, algorithmic interpretation, or the broader implications of BCI use. This gap between client comprehension and technological complexity revealed a persistent tension between theoretical ethical standards and real-world implementation, particularly in balancing client autonomy with clinician responsibility. These insights align with prior research highlighting the ethical ambiguities surrounding neurotechnological consent and the need for greater standardization and transparency in practice (Brunner et al., 2015).

Clinicians' reflections revealed that ethical principles (autonomy, beneficence, nonmaleficence, and justice) functioned not as abstract ideals but as operational anchors within a structured ethical decision-making framework (APA, 2016; Beauchamp & Childress, 2019). In navigating informed consent for BCIs, participants described

engaging in iterative reasoning processes that mirrored established ethical models: identifying potential ethical issues, consulting professional codes, evaluating risks and benefits, exploring client comprehension and values, considering cultural and contextual variables, and documenting decisions for accountability. For instance, clinicians reported pausing to assess whether clients' consent reflected genuine understanding or deference to perceived technological authority, thereby operationalizing both autonomy (ensuring voluntary, informed participation) and beneficence (promoting client welfare).

These clinician practices closely align with international data protection and neuroethics frameworks. The General Data Protection Regulation (GDPR), for example, emphasizes privacy by design, informed consent, and the right to be forgotten, principles that directly parallel clinicians' calls for transparent and revocable consent structures in BCI use (GDPR, 2016). Similarly, the Neurorights Foundation Guidelines stress mental privacy, informed consent, and cognitive autonomy as essential for protecting individuals in neurotechnological contexts (Neurorights Foundation, 2025). At the U.S. level, the California Neurorights Act and Colorado Neurorights Act expand these protections by classifying neural data as sensitive personal information and granting consumers explicit control over their biological and cognitive data (California Legislature, 2024; Colorado Neurorights Act, 2024). However, clinicians noted that existing frameworks like HIPAA fail to offer clear or comprehensive protections for neural data within clinical mental health settings, illustrating the current policy lag behind technological advancement (U.S. Department of Health & Human Services, 1996).

The application of an ethical decision-making framework thus provided clinicians with a structured yet flexible scaffold to manage the moral uncertainty introduced by emerging neurotechnologies. Rather than relying solely on prescriptive rules, participants approached consent as an evolving, relational dialogue, one requiring empathy, transparency, and reflection to ensure that the introduction of BCI tools remained consistent with both ethical principles and the biopsychosocial integrity of clinical care.

Biopsychosocial Framework

The application of a biopsychosocial framework further illuminated clinicians' perspectives, offering a multidimensional understanding of both the promise and pitfalls of BCI integration in mental health contexts. On the biological axis, participants acknowledged the potential for BCIs to enhance the detection of emotional or attentional states through neurofeedback, real-time monitoring, and adaptive intervention mechanisms (Alexander et al., 2024; Dai, 2024; Enechukwu et al., 2025). Such capabilities were viewed as transformative for conditions involving impaired self-regulation or attentional control, including ADHD, PTSD, and affective disorders.

However, this optimism was tempered by concerns about the reliability and interpretability of neural data, particularly given the current limitations in signal fidelity, cross-individual variability, and algorithmic transparency. Clinicians cautioned that overreliance on these systems could inadvertently privilege the "machine's reading" of a client's internal state over the client's subjective experience, potentially reinforcing a reductionist biomedical paradigm. These apprehensions align with Risnes et al.'s (2023) findings regarding practical device limitations, such as sensitivity to environmental noise,

inconsistent calibration, and user fatigue, that constrain real-world usability and confidence in BCI-derived data.

From a regulatory and ethical standpoint, these biological concerns intersect with emerging neurorights legislation. The Minnesota Neurorights Bill and Chile's Constitutional Amendment both underscore the right to *cognitive liberty* and government oversight to prevent misuse of neural data (Minnesota Legislature, 2024; Government of Chile, 2021). These frameworks reflect clinicians' anxieties about potential overreach, data misuse, and loss of mental privacy in clinical BCI deployment.

On the psychological axis, clinicians reflected on the potential for BCI integration to either augment or erode the therapeutic process itself. While some participants viewed BCIs as tools that could empower clients through increased self-awareness and biofeedback-informed insight, others feared that reliance on quantifiable neural metrics could displace the empathic, narrative-based dimensions of therapy. Concerns emerged that clients might internalize neural readouts as definitive representations of their mental state, thereby undermining autonomy, self-efficacy, and the authenticity of the therapeutic alliance. This echoes the ethical caution expressed in the Future of Privacy Forum's neurotechnology principles, which advocate for data literacy and non-negotiable informed consent to ensure individuals maintain interpretive control over their neural information (Future of Privacy Forum, 2023). Clinicians emphasized that data alone cannot substitute for relational trust and that BCI data must remain secondary to, and contextualized within, the human dialogue that constitutes therapy.

On the social axis, clinicians consistently underscored systemic and structural challenges, including cost, access, digital literacy, and cultural readiness, that would likely shape who benefits from BCI-enabled interventions. Participants anticipated that early adopters would likely be urban or research-affiliated institutions, leaving community clinics and low-income populations behind. This disparity risked creating a two-tiered system of care, reinforcing inequities already present in mental health treatment. Clinicians' concerns mirror the equity and fairness issues highlighted in the Colorado Neurorights Act and GDPR, both of which emphasize user control and proportionality in access to sensitive data technologies (Colorado Neurorights Act, 2024; GDPR, 2016). Moreover, clinicians voiced concerns about the sociocultural framing of "brain optimization," warning that such narratives could prioritize performance-based conceptions of wellness over culturally grounded or holistic mental health models. These observations corroborate Chavarriaga et al.'s (2016) caution that design, accessibility, and contextual adaptation are ethical imperatives to ensure that BCI technologies serve diverse populations without amplifying existing healthcare disparities.

Taken together, this biopsychosocial analysis reveals that clinicians' enthusiasm for BCI integration is coupled with critical awareness of its ethical, practical, and relational implications. Their insights emphasize that future BCI development must balance scientific innovation with human-centered values, ensuring that technology enhances rather than eclipses the relational, contextual, and ethical dimensions of psychological healing.

Conditional Optimism

A particularly compelling finding was the emergence of conditional optimism, a theme that nuanced prior depictions of clinician skepticism toward BCIs. Whereas earlier studies often portrayed mental health professionals as resistant to neurotechnological integration due to ethical ambiguity or clinical uncertainty (Martin et al., 2017), participants in the present study demonstrated a more cautiously open stance, particularly regarding applications for treatment-resistant depression, PTSD, and other conditions refractory to conventional interventions. This shift may signal a contextual evolution in professional attitudes, shaped by increased digital fluency among newer clinicians, accelerated technological adoption following the COVID-19 pandemic, and the growing expectation that practitioners integrate innovative modalities to meet escalating clinical complexity and demand.

This emerging openness reflected not uncritical enthusiasm, but a conditional receptivity grounded in pragmatic and ethical discernment. Participants emphasized that their willingness to engage with BCI technology depended on demonstrable clinical benefit, empirical validation, and robust safeguards around data privacy, informed consent, and client autonomy. These concerns are consistent with principles outlined in the General Data Protection Regulation (GDPR), particularly the emphasis on "privacy by design," data minimization, and explicit consent for processing special category data such as neural information (GDPR, 2016). The growing influence of "neurorights" frameworks, exemplified by the California Neurorights Act and Neurorights Foundation Guidelines, further contextualizes this cautious optimism, as clinicians increasingly

recognize neural data as a uniquely sensitive extension of personal identity, requiring stronger protections for cognitive liberty and mental privacy (California Neurorights Act, 2023; Neurorights Foundation, 2025).

In this way, participants' perspectives also resonate with the Technology Acceptance Model (TAM), which posits that perceived usefulness and perceived ease of use predict technology adoption (Davis, 1989; Venkatesh & Bala, 2008). However, clinicians in this study extended the TAM framework by integrating relational, ethical, and biopsychosocial variables not traditionally captured in utilitarian models. For example, participants linked perceived usefulness not only to outcome efficacy but also to the technology's compatibility with therapeutic empathy, rapport, and emotional attunement. This suggests that adoption decisions are influenced as much by the perceived ability of a technology to support human connection as by its clinical functionality.

From a biopsychosocial perspective, conditional optimism can be understood as a process of balancing innovation with holistic integrity. Biologically, clinicians expressed curiosity about BCI's potential to enhance neuroregulation and treatment precision. Psychologically, they wrestled with its implications for meaning-making and self-understanding. Socially, they situated their views within broader systems of access, equity, and regulation, acknowledging that frameworks like the Colorado Neurorights Act (2024) and Chile's Constitutional Amendment (2022) advance public discourse around fairness, consumer control, and state oversight in neurodata use. This multidimensional framing underscores that openness to BCI is not merely a technological

or ethical judgment but an ethical–biopsychosocial negotiation, reflecting clinicians' efforts to reconcile emerging neurotechnologies with enduring humanistic values.

Ultimately, this theme suggested that clinicians are navigating an evolving professional culture in which innovation, ethical responsibility, and human connection intersect. Their conditional optimism highlighted both a readiness to explore new frontiers in treatment and a deliberate caution rooted in the understanding that mental health care must remain anchored in relational trust, contextual sensitivity, and respect for cognitive and emotional autonomy.

Practical and Ethical Barriers

The presence of practical barriers further illuminated the multifaceted challenges clinicians faced when considering the integration of BCIs into mental health practice. Among the most salient were cost and accessibility, both of which emerged as critical determinants of ethical feasibility. Participants emphasized that current BCI systems remain prohibitively expensive and technically demanding, requiring specialized hardware, software, and maintenance. Consequently, early adoption would likely be confined to well-resourced clinics, reinforcing inequities in access to care. This concern directly echoed Chavarriaga et al. (2016), who warned that design pitfalls in neurotechnology often exacerbate social and economic disparities. From an ethical standpoint, this aligns with the principle of justice outlined in the APA Ethics Code (2016) and with global calls for fairness and inclusivity in neurodata governance (Neurorights Foundation, 2025; Future of Privacy Forum, 2025).

Another significant concern centered on the lack of standardization in protocols and data protection frameworks. Participants described uncertainty about how BCIs could be ethically and securely deployed across clinical contexts without clear operational standards. The absence of established guidelines parallels the current gaps in regulatory frameworks like HIPAA, which protects health information but lacks BCI-specific provisions (HIPAA, 1996) and underscores the need for new guidance that classifies neural data as sensitive health information, as seen in the California Neurorights Act. Without such clarity, clinicians risked inconsistent implementation and uneven client experiences, a problem compounded by algorithmic opacity and data interpretability challenges noted in prior research (Brunner et al., 2015).

The training and competence subtheme also emerged prominently. Clinicians expressed apprehension about their preparedness to interpret neural data responsibly, often feeling underqualified to translate neurophysiological signals into therapeutic meaning. They emphasized the need for interdisciplinary collaboration, bringing together clinicians, neuroscientists, engineers, and ethicists, to ensure ethical integration. Within an ethical decision-making framework, this gap speaks directly to the principle of nonmaleficence, the obligation to avoid harm by ensuring adequate competence before implementation (APA, 2016). It also aligns with policy initiatives like the Neurorights Foundation Guidelines, which advocate for transparency, education, and informed consent literacy in neurotechnology use (Neurorights Foundation, 2025).

Finally, the feasibility in clinical settings subtheme highlighted the tension between therapeutic flow and technological integration. Clinicians noted that

incorporating BCI devices could disrupt the emotional rhythm of therapy, shifting focus from empathic attunement to device management. These concerns resonate with Yuste et al. (2017) and with the ethical imperatives codified in the GDPR's "privacy by design" approach and Future of Privacy Forum's advocacy for data literacy and informed consent. Together, these frameworks emphasize that neurotechnology must serve the therapeutic relationship, not redefine it.

Taken together, these findings depict a field positioned at the intersection of innovation, regulation, and human care. Clinicians recognized the transformative potential of BCIs but underscored that sustainable integration requires equitable access, standardized practice guidelines, interdisciplinary education, and workflow-sensitive design. Without these supports, BCI implementation risks widening disparities, eroding trust, and undermining the ethical and relational coherence of mental health care.

Clinician Attitudes

The theme of clinician attitudes revealed a nuanced spectrum of reactions, reflecting the profession's ambivalence toward the integration of brain–computer interfaces (BCIs) into therapeutic contexts. While skepticism and caution remained dominant, participants articulated a range of emotional and cognitive responses, from excitement about potential innovation to apprehension that BCI could medicalize, mechanize, or depersonalize therapy. This duality illustrated clinicians' awareness that while BCIs might offer novel tools for therapeutic intervention, they also carry the risk of redefining core therapeutic dynamics.

Participants frequently cited a lack of client demand as a moderating influence on their attitudes. Many noted that clients had not begun requesting or inquiring about BCI-based treatments, reducing the perceived urgency for adoption. This finding reflects the early-stage diffusion of innovation typically in health technology adoption cycles (Rogers, 2003), where clinician motivation often depends on perceived client need and demonstrated efficacy. It also aligns with Chavarriaga et al. (2016), who cautioned that user-centered design and contextual relevance are essential for adoption; without alignment between technological capabilities and real-world clinical or client priorities, BCIs risk remaining theoretical rather than practical tools.

However, within this overall climate of skepticism, a subtle but significant trend toward cautious optimism emerged. Several clinicians expressed openness to exploring BCI applications for clients with treatment-resistant depression, PTSD, or cognitive impairments, contexts in which traditional modalities may have limited efficacy. This conditional acceptance contrasts with earlier research portraying clinicians as uniformly resistant to neurotechnological integration (Martin et al., 2017) and suggests a possible cultural shift in professional attitudes. Younger clinicians or those trained in digital health environments described greater comfort with technology-mediated care, attributing this to increased digital fluency and the normalization of telehealth during and after the COVID-19 pandemic. These observations echo into broader trends in the TAM (Davis, 1989; Venkatesh & Bala, 2008), where PU, credibility, and ethical alignment drive willingness to adopt new tools.

This emerging openness was tempered by ethical unease. Clinicians repeatedly emphasized concerns about client autonomy, informed consent, and the potential erosion of relational trust, themes strongly resonant with Yuste et al. (2017) and the growing neurorights discourse, which argues that neurotechnological applications must safeguard mental privacy, identity, and agency. Participants feared that introducing BCIs without clear ethical and policy protections could expose both clients and practitioners to new forms of vulnerability, including algorithmic bias or data misuse.

Beyond ethical considerations, clinicians highlighted practical and relational dimensions that shaped their attitudes. Some expressed fear that reliance on neural data could shift therapy toward a "technocratic" model, where emotional attunement is second to physiological metrics. This apprehension is consistent with Brunner et al. (2015), who emphasized that without standardization and interpretive safeguards, BCIs may produce inconsistent results that undermine clinical confidence. Similarly, Risnes et al. (2023) identified the sensitivity of neural devices to environmental factors, underscoring the potential for false readings or misinterpretation, an issue that clinicians in this study echoed when discussing their hesitation to trust BCI data without rigorous validation.

The biopsychosocial context of these attitudes was equally evident. Biologically, clinicians acknowledged the promise of BCIs in detecting affective states and neural markers associated with mental health conditions. Psychologically, however, they worried that overreliance on neurofeedback could erode clients' sense of agency or self-understanding, while socially, they warned that inequitable access could further marginalize underserved populations. These overlapping concerns highlight an evolving

balance of ethical, biological, psychological, and social factors. Decisions about whether to adopt BCI technology depend not only on how well the technology works, but also on the level of trust in the therapeutic relationship, fairness in access and impact, and commitment to professional ethical standards (APA, 2016).

Evidence and Research

The theme of evidence and research needs underscored clinicians' strong desire to base decisions about BCI adoption on rigorous scientific validation, ethical reasoning, and regulatory alignment. Participants consistently emphasized that BCIs should not be implemented in clinical settings without peer-reviewed studies demonstrating clear, replicable, and clinically meaningful outcomes. This position reflects the principles of evidence-based practice, which prioritize integrating empirical research, clinical expertise, and ethical safeguards before adopting innovative interventions.

Clinicians voiced particular concern that the current BCI evidence base remains limited, with most existing research conducted under controlled laboratory conditions rather than in ecologically valid, applied clinical environments. These observations were consistent with prior literature identifying the fragility and variability of neural data across contexts (Risnes et al., 2023) and with findings by Chavarriaga et al. (2016), who cautioned that device design limitations and algorithmic sensitivity can undermine both usability and reliability. This skepticism reflected a broader professional culture of caution, clinicians preferred to see standardized, transparent, and peer-reviewed validation before introducing neural interfaces into therapy rooms, where

misinterpretation or overreliance on algorithmic feedback could compromise client safety and trust.

Participants also highlighted the need for standardization and methodological rigor to ensure consistent outcomes across settings. They expressed concern that without agreed-upon procedures for data collection, interpretation, and reporting, BCI results could vary significantly between clinicians, clinics, and systems. This concern aligns with Brunner et al. (2015), who stressed that reliable and reproducible protocols are essential to maintaining both scientific validity and clinical integrity in neurotechnology research.

In addition to scientific gaps, clinicians expressed awareness of emerging policy and governance frameworks that are beginning to address the unique risks posed by neural data. For example, the General Data Protection Regulation (GDPR) establishes the principle of "privacy by design" and explicitly classifies neural data as special category data, requiring explicit informed consent and strict data minimization (GDPR, 2016). Likewise, the California Neurorights Act (2023) represents the first U.S. legislation to define neural information as sensitive personal data, setting a precedent for safeguarding mental privacy and autonomy. These developments were seen by participants as essential precursors to research credibility, ensuring that BCI studies comply with ethical and legal standards surrounding data protection and informed consent.

Several clinicians also referenced the lack of HIPAA (1996) guidance specific to neural data, noting that current U.S. health privacy laws protect only conventional medical records and biometric identifiers, not the high-resolution brain signals captured by BCIs. This gap amplifies concerns about confidentiality and data security in clinical

research. Internationally, participants viewed the Neurorights Foundation Guidelines (2025) and Chile's Constitutional Amendment (2022), which legally recognize neurorights at the constitutional level, as critical steps toward establishing globally consistent ethical standards for brain data protection and cognitive liberty.

Collectively, these reflections reveal that clinicians' emphasis on evidence extends beyond scientific validation to include ethical, legal, and governance evidence. The call for rigor, transparency, and standardization mirrors an evolving understanding that "research integrity" must encompass not only methodological soundness but also neuroethical alignment with emerging frameworks that protect cognitive freedom, informed consent, and mental privacy in the age of neurotechnology.

Training and Readiness

The theme of training and readiness highlighted clinicians' recognition that responsible adoption of BCIs depends on structured education, interdisciplinary support, and clear ethical frameworks. Participants emphasized that successful integration requires far more than access to technology; it demands foundational competence in neuroscience, algorithmic reasoning, and ethical decision-making. Without this preparation, clinicians feared that BCI implementation could outpace practitioners' ability to manage the accompanying interpretive and relational complexities.

Clinicians repeatedly described significant professional development needs, including training on neural signal interpretation, device calibration, and limitations of algorithmic outputs. These concerns echo Risnes et al. (2023), who emphasized that BCI devices require sophisticated understanding to avoid misinterpretation, and Chavarriaga

et al. (2016), who warned that inadequate training could lead to misuse and clinical harm. Participants also linked readiness to standardized operational guidance, expressing uncertainty about how to ethically interpret neural data without shared protocols or regulatory alignment. This aligns with Brunner et al. (2015), who underscored that standardized frameworks are essential for maintaining consistency, reliability, and accountability across contexts.

Ethical training was identified as equally essential. Participants emphasized that clinicians must be equipped to navigate complex issues surrounding informed consent, client autonomy, and mental privacy. This emphasis aligns with Yuste et al. (2017), who advocate for integrating neurorights, or the rights to mental integrity, identity, and cognitive liberty, into neurotechnology research and practice. Clinicians noted that such ethical preparation should be embedded into continuing education (CE) modules, supervision, and professional policy development, particularly as emerging privacy laws such as the Colorado Neurorights Act (2024) and Minnesota Neurorights Bill (2025) advance consumer control and cognitive autonomy protections in the U.S. context.

The Neurorights Foundation Guidelines (2025) and Future of Privacy Forum (2025) further reinforce these priorities by emphasizing non-negotiable informed consent, data literacy, and user education as cornerstones of ethical neurotechnology use. Participants' calls for CE-based ethics workshops and institutional scaffolding reflect the same commitment, ensuring that practitioners can uphold the principles of autonomy, beneficence, and nonmaleficence while engaging with technologies that interface directly with the brain.

Clinicians also noted that readiness extends beyond technical proficiency to encompass relational competence. They stressed that training should cultivate the ability to integrate BCI feedback without undermining therapeutic alliance or client trust, a particularly salient concern given the sensitive nature of neural data. In this way, training was viewed as a critical ethical safeguard that bridges technological innovation and human-centered care, ensuring that advances in neurotechnology remain consistent with the biopsychosocial foundations of psychotherapy.

Overall, the findings suggest that BCI readiness must be conceptualized as a multidimensional construct, one that integrates technical skill, ethical literacy, and relational sensitivity. The convergence of professional, legal, and policy frameworks such as GDPR (2016), HIPAA (1996), the Neurorights Acts, and emerging ethical standards provides an essential blueprint for developing clinician competencies that honor both innovation and human dignity in the evolving neurotechnological landscape.

Future Outlook

The theme of future outlook captured the evolving and nuanced perspectives of clinicians regarding the long-term integration of BCIs into mental health care. While skepticism persisted among many participants, a notable subset expressed cautious optimism, particularly for applications in treatment-resistant depression, PTSD, and other complex clinical conditions (Enechukwu et al., 2025). This conditional optimism reflects a recognition that BCIs may offer unique opportunities where traditional interventions have limited efficacy, yet adoption remains contingent on addressing practical, ethical, and evidentiary concerns highlighted throughout this study.

Participants anticipated that BCI use would likely remain concentrated in research or experimental contexts for the foreseeable future, echoing concerns about the limited evidence base, practical device constraints, and standardization challenges (Risnes et al., 2023; Brunner et al., 2015). However, some envisioned a gradual expansion into therapeutic settings, contingent upon the resolution of key barriers, including reliable device performance, training readiness, ethical safeguards, and clear policy guidance. These expectations align with warnings from Chavarriaga et al. (2016) regarding design pitfalls that may restrict real-world applicability and reinforce the importance of user-centered approaches in scaling neurotechnologies safely.

Ethical and policy considerations emerged as particularly salient in shaping clinicians' future-oriented perspectives. Several participants referenced the lack of unified regulatory standards governing neural data, echoing concerns reflected in existing frameworks such as the General Data Protection Regulation (GDPR), which emphasizes privacy-by-design, data minimization, and informed consent as foundational principles for the ethical use of sensitive data, including neural information (GDPR, 2016). Similarly, the Health Insurance Portability and Accountability Act (HIPAA) provides protection for health data but was noted by participants as insufficiently comprehensive for the novel category of neural data, highlighting an emerging regulatory gap in U.S. mental health contexts involving BCI (HIPAA, 1996).

In contrast, more recent neurorights-oriented legislation and proposals, such as the California Neurorights Act (2023) and Colorado Neurorights Act (2024), were viewed by participants as promising models for expanding protections to explicitly include neural

data as sensitive personal information. These frameworks underscore the growing recognition of cognitive liberty and mental privacy as fundamental rights in the era of neurotechnology. Internationally, legal precedents such as Chile's Constitutional Amendment on Neurorights (2021) and guidelines from the Neurorights Foundation (2025) have begun to establish mental privacy, autonomy, and identity protection as ethical imperatives in neurotechnology development and deployment. Participants suggested that embedding similar neurorights protections into U.S. policy would be critical to ensuring ethical and equitable implementation in clinical settings.

Additionally, the Future of Privacy Forum has argued for non-negotiable informed consent and enhanced data literacy in neurotechnology applications (Future of Privacy Forum, 2023), which resonates strongly with clinicians' expressed desire for transparency and education as preconditions for client safety and trust. These evolving frameworks collectively point toward a future in which BCI integration will depend not only on technological refinement but also on a robust ethical infrastructure that safeguards mental autonomy and equity of access.

Taken together, these themes suggest that clinicians' relationship with BCI cannot be reduced to simple "acceptance versus rejection." Instead, adoption is an ongoing negotiation mediated by ethical frameworks, biopsychosocial considerations, practical barriers, client attitudes, research evidence, implementation challenges, training readiness, and future outlooks. The data affirmed the relevance of both TAM and ethical decision-making principles, while extending them to include relational, contextual, and biopsychosocial dimensions. Specifically, this study revealed that usability must be

understood not only in terms of perceived ease of use but also in terms of relational trust, ethical safeguards, and contextual feasibility; that ethical conflicts are experienced not only abstractly but in the daily struggles of therapy; and that optimism and skepticism may coexist, reflecting a profession in transition.

In sum, this study both confirmed many of the challenges highlighted in earlier research and enriched them by illustrating how clinicians actively wrestle with these challenges through biopsychosocial and ethical decision-making frameworks. The emergence of cautious optimism signals that attitudes may be shifting, but full integration will require parallel advances in technology, ethics, evidence, training, and regulatory infrastructure aligned with neurorights and data protection principles (GDPR, 2016; California Neurorights Act, 2023; Neurorights Foundation, 2025).

Limitations of the Study

Several limitations may affect the trustworthiness and generalizability of the findings. The virtual interview setting, while offering flexibility and increased accessibility for participants across diverse geographic regions, introduced potential disruptions. Environmental factors such as inconsistent internet connectivity, background noise, or unanticipated interruptions influenced the pacing and flow of conversations. In some interviews, these conditions necessitated pauses, repetition, or revisiting questions, which may have affected conversational fluidity and participant comfort. Consequently, the quality and depth of some responses may have been indirectly influenced by the virtual medium.

A key limitation involves potential researcher bias. The researcher's background in technology and BCI research may have influenced the framing of interview questions, interpretation of participant responses, and coding of themes. For example, a predisposition toward viewing technological innovation favorably may have led to greater attention to potential benefits, whereas prior awareness of ethical challenges may have heightened sensitivity to concerns about privacy, informed consent, or data security. While reflexive journaling was systematically employed to identify and monitor these biases, the possibility of subtle influence remains inherent to qualitative research.

Another significant limitation concerns the study's sample composition. The number of participants was insufficient to achieve data saturation, and the perspectives captured may not fully reflect the range of clinician attitudes toward BCI technology. Additionally, the sample was primarily composed of clinicians with preexisting knowledge or interest in technology and BCIs, potentially skewing the findings toward more favorable or informed viewpoints. This narrow scope limits the transferability of results across broader mental health care settings and specialties. Future research should involve larger, more diverse samples encompassing clinicians with varying levels of technological exposure and expertise to enhance representativeness.

The self-report nature of the data also presents a limitation. Clinicians' responses were influenced by their personal experiences, beliefs, and perceptions, which may not fully represent broader clinical realities or actual BCI implementation in routine practice. This subjectivity is compounded by the cross-sectional design of the study, which captures clinicians' attitudes at a single point in time. As such, the findings provide

preliminary insights into initial perceptions but cannot account for how attitudes may evolve as BCIs become more widely integrated, more evidence emerges, or professional norms around neurotechnology shift.

Finally, the interpretative nature of qualitative research introduces inherent limitations in terms of generalizability and objectivity. Decisions regarding theme categorization, emphasis on ethical versus practical concerns, and interpretation of nuanced clinician language were shaped by the researcher's analytic lens. Although methodological rigor, including iterative coding, triangulation with literature, and reflexive journaling, was applied to mitigate these effects, the conclusions remain provisional and influenced by interpretative subjectivity

In summary, these limitations underscore that the study's findings should be interpreted as preliminary and exploratory. While they provide valuable insight into clinicians' perspectives on BCI integration, caution is warranted when generalizing to broader clinical populations or settings. BCI adoption in mental health care is a complex ethical–biopsychosocial decision, where usability encompasses not only technical ease but also relational trust, informed consent, and clinical feasibility.

Recommendations

Based on the findings of this study and insights from the literature, several recommendations can guide future research and support the integration of BCI technology into clinical mental health care.

Expand the Diversity and Scope of Clinician Perspectives

Future studies should intentionally sample a broader and more representative range of clinicians across mental health disciplines (e.g., social workers, psychiatric nurse practitioners, LMFTs), levels of experience, and demographic backgrounds (Zhang et al., 2025). Including clinicians who were not previously engaged with BCI will provide a fuller understanding of barriers to adoption, including initial skepticism, ethical reservations, and practical limitations encountered by typical providers outside of research-intensive environments.

Develop Longitudinal Research to Track Shifting Attitudes and Competencies

Given the novelty of BCI in mental health, longitudinal studies are critical to monitor how clinicians' perceptions evolve, particularly with increased exposure, piloting, or organizational training (Zhang et al., 2025). For example, researchers might follow a cohort of clinicians who undergo a supervised BCI pilot (e.g., a 6-month clinical trial using BCI-based neurofeedback for PTSD) to examine how trust, ethical concerns, and clinical confidence change as they gain hands-on experience.

Establish Targeted Ethical and Clinical Training Modules

Professional organizations (e.g., APA, NASW) should consider developing BCI-specific continuing education (CE) modules modeled after existing telepsychology or digital mental health competencies (APA, 2025). These should cover topics such as informed consent procedures in BCI, client autonomy when interfacing with machine-mediated treatment, and data security practices for neurodata. Such training could also

integrate ethical vignettes or case-based learning to help clinicians develop confidence in navigating nuanced BCI scenarios.

Pilot Organizational Policies and Supervised BCI Integration

To address practical and regulatory barriers, healthcare organizations can initiate BCI pilot programs under close clinical supervision, ideally in collaboration with research institutions or technology vendors (Neurorights Foundation, 2025). Organizations, such as APA, should establish policies to govern data handling, consent protocols, staff training, and clinical appropriateness criteria (APA, 2025). This "sandbox" approach allows organizations to test integration strategies while mitigating risk and evaluating client outcomes before broader implementation.

Address Cost and Infrastructure Barriers With Scalable Implementation Strategies

To overcome financial and logistical barriers, future research should explore scalable, cost-effective BCI applications suitable for outpatient settings (Neurorights Foundation, 2025). For instance, comparing clinic-based versus home-based EEG neurofeedback models could clarify the feasibility of low-cost BCI tools. Researchers and policy experts should also evaluate reimbursement models and investigate public-private partnerships that could fund BCI integration into underserved or high-need clinical populations.

Center Client Experience and Ethical Implications in Future Research

Further research should examine how clients perceive BCI technologies, especially how factors such as cultural identity, trauma history, or neurodiversity influence reactions to interfacing with these tools (Zhang et al., 2024)). Areas of focus

should include consent fatigue, fear of surveillance, and the potential empowerment that can come from non-verbal feedback mechanisms. Researchers could develop and validate informed consent protocols tailored to BCI interventions to ensure clarity and psychological safety.

Implications

The findings from this study can potentially contribute to positive social change at various levels, including individual, organizational, and societal/policy levels. At the individual level, this research can directly impact clients by promoting the adoption of BCI technology in mental health treatment, especially for individuals with complex psychological conditions such as PTSD and depression. When clinicians increase their awareness of and openness to BCI technology, clients may benefit from more personalized and effective interventions tailored to their specific needs. As BCI technology evolves and becomes more integrated into therapeutic practices, it may lead to improved treatment outcomes, enhanced engagement, and a better quality of life for patients, particularly those who have not found sufficient relief through traditional therapeutic methods.

On an organizational level, the study highlights the need for mental health organizations to understand better and address the integration of emerging technologies like BCI. Such efforts may foster more progressive and forward-thinking practices that embrace innovative solutions for mental health treatment. Additionally, the study emphasizes the importance of creating a supportive infrastructure that facilitates the

adoption of new technologies and equips clinicians with the tools and knowledge needed to incorporate BCI into their therapeutic approaches.

At the societal and policy level, the research could have significant implications for mental health policies and the regulation of emerging technologies in clinical settings. By exploring the ethical concerns, implementation barriers, and potential benefits of BCI, the study advances the ongoing dialogue on how stakeholders should govern these technologies. Policymakers could use the insights from this study to develop guidelines or regulations that ensure BCI technology is used responsibly, ethically, and equitably, particularly concerning privacy, informed consent, and data security. Implementing such guidelines may promote broader societal acceptance of new mental health interventions and encourage policy frameworks that support innovation in the field.

Methodologically, the study provides a basis for future research that further explores how emerging technologies, like BCI, can be incorporated into clinical practice. By emphasizing the importance of clinician perceptions and practical barriers to integration, the study suggests that future research should focus on longitudinal studies to assess the long-term impacts of BCI on treatment outcomes. Theoretically, this study adds to the body of knowledge regarding the integration of technology into mental health treatment, offering insights into how clinicians can balance the potential benefits of technology with the ethical and practical challenges it presents.

Finally, the study offers several practice recommendations. Clinicians are encouraged to engage in ongoing education and training to become more familiar with BCI technology and its potential applications. Additionally, mental health organizations

should develop supportive policies and training programs that guide clinicians in the ethical and practical use of BCI in clinical settings. Such initiatives may involve collaborations among technology developers, clinicians, and policymakers to integrate BCI into mental health care in ways that benefit practitioners and patients, ultimately contributing to positive social change in mental health treatment.

Conclusion

This study highlights the promising potential of BCI technology to transform mental health care by enhancing therapeutic practices and improving patient outcomes. By examining clinician perceptions, integration barriers, and ethical considerations, the research underscores the importance of understanding both the opportunities and challenges of innovation in clinical settings. While BCI offers clear benefits, particularly for patients with complex psychological conditions, its successful adoption depends on more than technical capability. Ethical, clinical, and relational factors, alongside clinician training and organizational support, are critical to responsible implementation. BCI should be understood not merely as a tool but as a complex intervention that intersects human judgment, therapeutic relationships, and patient well-being. Thoughtful planning, ongoing research, and stakeholder engagement are essential to maximize its potential. Ultimately, this study reinforces that BCI represents a critical frontier in mental health care, and careful, ethically grounded integration can help advance personalized, effective, and equitable treatment for diverse patient populations.

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Appendix A: Observation Notes

Observation Notes

Observation Context

1. **Date and Time of Observation:** Record the date and time of the session.
2. **General Setting:** Note the environment and surroundings.
3. **Participants Present:** Identify who is involved, focusing on the clinician and their role.

Clinician's Engagement with the Interview

1. **Initial Reactions:** Observe the clinician's demeanor and overall behavior as the interview begins. Are there any notable reactions?
2. **Flow of Communication:** Pay attention to how the clinician communicates during the session. Does their interaction seem natural or guided?
3. **Approach to Discussion:** Notice how the clinician engages with the questions. Are they open, reserved, or somewhere in between?

Ethical Reflections and Technology Integration

1. **Mentions of Ethical Considerations:** Observe how the clinician talks about or reflects on any ethical issues related to the discussion.
2. **References to Emerging Technology:** Take note of any mentions of using or thinking about technology in their practice. Are there recurring themes or topics?
3. **Decision-Making Processes:** Pay attention to how the clinician describes their decision-making in relation to the technology or ethical dilemmas, if at all.

Clinician's Comfort and Adaptability

1. **Confidence in Discussion:** Observe the clinician's level of comfort when discussing the interview topics. Are they at ease or hesitant?
2. **Willingness to Explore New Ideas:** Take note of any openness or reluctance toward adopting new perspectives or technologies discussed.
3. **Possible Challenges or Support:** Identify any vague mentions of obstacles or enablers that might influence their views or practices.

Subtle Patterns and Behaviors

1. **Emerging Themes:** Watch for any themes that seem to come up naturally, even if not directly prompted by the interview questions.
2. **Recurrent Statements or Behaviors:** Take note of anything the clinician repeatedly mentions or does throughout the session.

Final Reflections

1. **Overall Impressions:** Write down any broad impressions or thoughts based on the clinician's responses and behavior.
2. **Potential Follow-Up Considerations:** Based on the session, note any areas that may need further exploration or deeper inquiry in future discussions.

Appendix B: Recruitment Content

Email Invitation

Subject: Participate in Groundbreaking Research on Emerging Technology in Mental Health

Dear [Name],

I would like to invite mental health clinicians like yourself to participate in an exciting research study on the integration of Brain-Computer Interface (BCI) technology in clinical psychology practices. This Walden dissertation study aims to explore the unique perspectives on how emerging technology can impact diagnosing and treating mental health disorders, as well as the ethical considerations that come with it.

Who can participate?

- Licensed clinical psychologists with at least 1 year of experience.
- Individuals currently using, or interested in using, BCI or other emerging technologies in their clinical work.

What does participation involve?

- A 60–90-minute interview to share your insights and experiences.
- Contributing to the growing understanding of how technology can enhance mental health treatment.

Your participation will help shape the future of mental health care and technology integration. If you are interested or have any questions, please reply to this email to sign up!

Thank you for considering this opportunity!

Warm Regards,

Serena Sanders

Serena Sanders, M.S., CISSP
Walden University

Social Media Invitation

Calling All Mental Health Clinicians!

Are you interested in exploring the integration of emerging technology in mental health ? I am conducting a Walden dissertation research study on how Brain-Computer Interface (BCI) technology is shaping clinical psychology practices, and I need your expertise! If you've been in the mental health field for at least 1 year and are curious about / interested in BCI, I want to hear from you!

Participate in a 60-90 minute interview and contribute to advancing mental health practices.

Interested? Learn more and sign up via email:
serena.sanders1@waldenu.edu

#MentalHealthResearch #EmergingTech #BCITechnology #CliniciansNeeded #PsychologyResearch #InnovationInMentalHealth #MentalHealth #ClinicalPsychology #Psychology #EthicalPractice #Technology

RESEARCH STUDY PARTICIPANTS NEEDED!!

Exploring the Integration of Emerging Technology in Mental Health Practices

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Are You a Mental Health Clinician Interested in Emerging Technology?

Join my Walden dissertation research study on how Brain-Computer Interface (BCI) technology is transforming clinical psychology! I am seeking mental health professionals with at least 1 year of experience to share their perspectives on integrating cutting-edge technology in mental health.

Who Can Participate?

- Licensed clinical psychologists
- At least 1 year of experience in the field
- Interested in emerging technologies like BCI

What's Involved?

- A 60–90-minute interview to share your views and experiences

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Why Participate?

Contribute to groundbreaking research that could shape the future of mental health practices and technology. Your insights are valuable to this important conversation!

Sign up or learn more:

For questions, contact: **serena.sanders1@waldenu.edu or (360)710-6018**

Help Contribute to Understanding the Future of Mental Health and Technology!

Appendix C: Document Analysis

Document	*Focus Area*	*Themes*	*Relevance to BCI*
GDPR (EU)	Data Protection & Privacy	Privacy by design, informed consent, special category data, data minimization, right to be forgotten	Sets foundational privacy principles for neural data in BCI applications, especially around consent and sensitive data handling.
HIPAA (US)	Health Information Privacy	Protected Health Information (PHI), sector-limited coverage, lack of BCI-specific guidance	Highlights gaps in protecting neural data as health information in mental health contexts involving BCI.
California Neurorights Act	State Privacy Law	Defines neural data as sensitive personal information	First U.S. legislation to classify neural data explicitly, pushing for neurorights frameworks.
Minnesota Neurorights Bill	Proposed State Bill	Cognitive liberty, neurodata rights	Addresses individual rights to mental privacy and autonomy over brain data in BCI use.
Colorado Neurorights Act	Comprehensive Privacy law	Consumer control over biological/neural data	Advances user-centric data protection models relevant to mental health BCIs.
Neurorights Foundation Guidelines	Ethical Framework	Mental privacy, informed consent, autonomy, cognitive enhancement concerns	Proposes global ethical standards for safe and respectful use of BCI technology.
Future of Privacy Forum	Policy and Industry Ethics	Non-negotiable informed consent, data literacy	Advocates for clear and enforceable consent practices in neurotechnology applications.
Chile's Constitutional Amendment	*International Human Rights Law*	*Legal recognition of neurorights, government oversight*	*Pioneers legal framing of neural data and BCI protections at the constitutional level.*