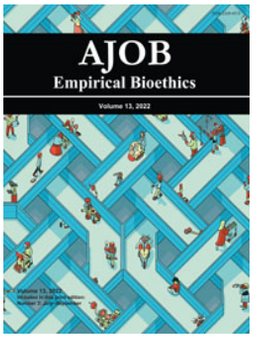

AJOB Empirical Bioethics

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/uabr21

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To cite this article: Ally Peabody Smith, Lauren Taiclet, Hamasa Ebadi, Liliana Levy, Megan Weber, Eugene M. Caruso, Nader Pouratian & Ashley Feinsinger (2022): "They were already inside my head to begin with": Trust, Translational Misconception, and Intraoperative Brain Research, AJOB Empirical Bioethics, DOI: 10.1080/23294515.2022.2123869

To link to this article: https://doi.org/10.1080/23294515.2022.2123869

Published online: 22 Sep 2022.

AJOB EMPIRICAL BIOETHICS
https://doi.org/10.1080/23294515.2022.2123869

"They were already inside my head to begin with": Trust, Translational Misconception, and Intraoperative Brain Research

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ABSTRACT

Background: Patients undergoing invasive neurosurgical procedures offer researchers unique opportunities to study the brain. Deep brain stimulation patients, for example, may participate in research during the surgical implantation of the stimulator device. Although this research raises many ethical concerns, little attention has been paid to basic studies, which offer no therapeutic benefits, and the value of patient-participant perspectives.

Methods: Semi-structured interviews were conducted with fourteen individuals across two studies who participated in basic intraoperative research during their deep brain stimulator surgery. Interviews explored interpretations of risks and benefits, enrollment motivations, and experiences of participating in awake brain research. Reflexive thematic analysis was conducted.

Results: Seven themes were identified from participant narratives, including robust attitudes of trust, high valuations of basic science research, impacts of the surgical context, and mixed experiences of participation.

Conclusion: We argue that these narratives raise the potential for a translational misconception and motivate intraoperative re-consent procedures.

KEYWORDS

Research ethics; neurosurgery; deep brain stimulation; participant perspectives; informed consent; translational misconception

Introduction

Patients undergoing brain surgery for treatment of neurological and psychiatric disorders provide researchers with unique opportunities to study the brain. These patients, including those who are having deep brain stimulator (DBS) implantation surgery for the treatment of diseases such as Parkinson's, epilepsy, and dystonia, may participate in research conducted during their surgical interventions. This intraoperative research is conducted while patients are awake and have their heads fixed in position with a stereotactic frame, granting researchers direct access to their brains. The goal of many of these intraoperative studies is to advance society's understanding of the fundamental workings of the human brain. *Basic brain research*, as we will call it, is thus non-therapeutic. It does not offer any near-term clinical benefits to patient-participants and is guided instead by basic scientific questions.

This research is permitted in part because a large portion of the risks are already assumed in the therapeutic procedure, for example, in the implantation of the DBS device itself. The additional risks of the research are considered low, contributing to the rationale that the knowledge to be gained through intraoperative studies is reasonably balanced against the minor increase in individual risk. Indeed, over the past 10 years, such research has significantly advanced our understanding of human brain function across multiple domains, including language, sensorimotor function, and cognition (Chrabaszcz et al. 2019; Mosher et al. 2021; O'Keeffe et al. 2020). As the number of clinical uses for invasive brain devices expands, so too do the opportunities for intraoperative basic brain research and the ethical implications of these practices (Greely, Ramos, and Grady 2016; Ramos et al. 2018; Richardson et al. 2021; Sullivan and Illes 2018).

This research raises a host of ethical concerns, including those involving patient-participant vulnerabilities, emergent neurotechnologies, the overlap of research and clinical care, and the high prevalence of clinician-investigators who may lead both the surgeries

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and the intraoperative studies. Recently, broader discussions of brain research with neurosurgical patients have spanned both empirical and theoretical territory, highlighting disparate recruitment and consent practices (Mergenthaler et al. 2021), the need for innovative consent approaches (Grady 2019), the need to anticipate special issues having to do with brain disease (Greely et al. 2018), and the need for more deliberate and flexible ethical frameworks altogether (Feinsinger, Pham, and Pouratian 2021; Feinsinger et al. 2022). However, despite the attention research with neurosurgical patients has garnered, two areas remain underexplored: (i) the ethics of *basic* intraoperative research, and (ii) the broad importance of *patient-participant perspectives*.

The current ethical literature often discusses both therapeutic and non-therapeutic research together, centers researcher perspectives, or focuses more broadly on recruitment and informed consent (Cabrera, Evans, and Hamilton 2014; Chiong, Leonard, and Chang 2018; Hendriks et al. 2019, Labuzetta, Burnstein, and Pickard 2011; Muñoz et al. 2020; Wexler et al. 2022). But basic intraoperative research may deserve more focused attention for a few reasons. First, concerns about dual spaces, the temporal proximity of care and research, and the dual roles of both researchers and participants are amplified by the intraoperative context and the non-therapeutic nature of the research. Arguably, research timing, space, and personnel are maximally entangled with care, while at the same time, research goals are maximally distinct from care. The effects of failing to appropriately navigate these dualities may be uniquely consequential. Second, patient-participants experience these dualities and may have unique situational knowledge that broadly impacts the ethics of this research. The absence of a systematic incorporation of patient-participant perspectives into research design may privilege the scientific community's values over those of their research participants (Carel and Kidd 2014) and miss crucial aspects of an already morally complex practice.

Our study is an exploration into these patient-participant perspectives, with a broader focus on perceptions of risks and benefits, valuations of basic science research, and experiential facts about what it's like to participate in intraoperative research. The results emphasize how attitudes of trust, features of the surgical context, and experiences with illness contextualize patient-participants' decision-making and evaluation of basic science research. We will propose that these narratives not only support specific consent practices (e.g., intraoperative re-consent), but also illuminate the salience of other ethical complexities, including optimism and beliefs about translational value.

Methods

Parent studies: Intraoperative basic brain research

Patients from across two clinical sites who were scheduled to undergo deep brain stimulation implantation surgery were recruited to participate in basic intraoperative research studies. One study (R01NS097782) focused on understanding the brain signals that control movements, changes in those brain signals in people with neurological disease, and how treatments such as deep brain stimulation surgery affects those brain signals. The other study investigated mechanisms of suppressing motor actions to gain insights into regulatory mechanisms of motor control (U01NS098961).

Qualitative study: Ethics of non-therapeutic intraoperative research

Patient-participants were eligible to participate in the qualitative study if they had participated in one of the intraoperative studies cited above. Participants were recruited on a rolling basis via email to take part in the "Ethics of Non-Therapeutic Intracranial Research" beginning in December 2020 and provided informed consent, as approved by the UCLA Institutional Review Board. All subjects had engaged in intraoperative basic brain research during their implantation of a DBS for Parkinson's disease ($n = 8$), essential tremor ($n = 5$), or dystonia ($n = 1$) (see Table 1

Table 1. Demographics.

Patient ID	Age	Gender	Diagnosis	Time between surgery and interview
P1	74	Male	Parkinson's disease	1.8 years
P2	75	Male	Essential tremor	2.5 years
P3	60	Female	Dystonia	4 years
P4	74	Female	Essential tremor	3 years
P5	59	Female	Essential tremor	3 years
P6	77	Female	Parkinson's disease	5 years
P7	47	Female	Parkinson's disease	1 year
P8	64	Female	Parkinson's disease	1 year
P9	58	Male	Parkinson's disease	1 year
P10	69	Male	Parkinson's disease	3 years
P11	61	Male	Parkinson's disease	1 year
P12	57	Female	Essential tremor	1 year
P13	60	Male	Parkinson's disease	8 months
P14	58	Male	Essential tremor	4 months

for demographic information). Patient-participants were offered a $15 Amazon e-gift card for participation in the interview.

The interview guide was developed via multiple iterations with all members of the team. The guide invited participants to consider their motivations to participate in intraoperative research, their assessments of risks and benefits, the importance of basic brain research, and the role of patient-participant engagement. Questions were often open-ended with subsequent probes to allow participants to control the narrative.

Interviews themselves were 60-minutes long and were conducted by a member of the research team (MP, APS, AF) between 12/22/2020 and 7/14/2021, corresponding to between 4 months and 5 years following their participation in the parent study (Table 1). All patient-participant interviews were audio-recorded via Zoom with participants' consent and were transcribed using Rev Speech-to-Text Services.

Utilizing sample participant interviews, an interview codebook was developed iteratively. Interviews were initially coded independently by at least two team members, who then held one-on-one meetings to resolve any coding discrepancies. Team members then engaged in a reflexive thematic analysis (Braun and Clarke 2006, 2012, 2019; Braun et al. 2019). The analysis process proceeded via an inductive and semantic approach, focusing on what participants said during their interviews as the guiding grounds for both the initial code development and the analysis of themes.

Reflexive thematic analysis captures theoretically sensitive virtues, such as openness to narratives, fluidity and flexibility in interpreting data, and a "reflexive engagement with theory, data and interpretation" (Braun and Clarke 2021). Of note, it also admits the influence of investigator training on the identification of themes (ibid.). By acknowledging that researchers' backgrounds inevitably play a role in this reflexiveness, it leaves open for further inquiry whether and how this shapes the presentation of data. To this end, our research team's backgrounds in philosophical analysis and critical disability studies shaped the reflexive process.

Results

Themes

Seven themes were identified from the analysis of patient-participant interviews. The first four are labeled *direct themes*, identified in response to specific question stems. For question stems with additional exemplary responses, see Appendix A. The *direct themes* and their explanations are numbers 1–4 in the list that follows. The latter three *integrated themes* emerged more commonly during the interviews and were identified across question stems and interview topics. Themes and their explanations are as follows:

1. Ease of decision to join: immediacy of decision-making to participate intraoperatively in basic brain research; discussion with others, if any.
2. Motivation to help others: desire to help others from four distinct groups:
    a. those with brain disease diagnoses similar to their own
    b. participants' relatives perceived as potential future patients
    c. patients' surgeon and research team
    d. other, future beneficiaries
5. Valuing of basic brain research: various ways participants evaluated non-therapeutic brain research, including:
    a. views about the brain
    b. optimism about translation
    c. participant role
4. Minimal concerns with study risk: perception that intraoperative study was not in-itself risky (a) physically or (b) in terms of data sharing.
5. Trust: Any answer that mentioned the word "trust" fell under the scope of Theme 5. Sub-themes include variations in the object of trust (trust in surgeon and the research team) and the various ways trust impacted other considerations (notably, concern with risk, views about scientific progress, and participants' limited comprehension of study goals).
6. Impact of surgical context: Answers that compared or explicitly mentioned the surgery's impact on the study were grouped under this theme. Additionally, implicit comparisons were considered; this was defined as replies to questions regarding the intraoperative study in which participants gave responses referring to the DBS implantation surgery. Sub-themes included (i) uniqueness of research opportunity; (ii) assessment of study risks in comparison to surgery risks; and (iii) merging of study and surgery narratives.

7. Mixed experiences of participation: Theme 7 encompasses participants' experiential narratives, descriptions of what the surgery and study were like, and feelings about participation.

Direct themes

Ease of decision to join

"Ease of decision to join" was defined as straightforward and/or immediate decision-making, as described by patient-participants. When asked about their decision to join the intraoperative research study, almost all patient-participants ($n = 12$) cited that their decision was straightforward, immediate upon initial presentation of the option to participate, or both. Half ($n = 7$) of the interviewees indicated that they did not discuss the study with anyone other than the researcher and consenter presenting the study. Five patient-participants indicated having brief discussions with their spouse. One interviewee did not elaborate on their decision-making process, and one interviewee recalled talking with an ethical specialist before making their decision.

Motivation to help others

When asked about their motivations to participate, all ($n = 14$) interviewees indicated that helping others was a primary motivation in their decision. Narratives reveal a wide range of intended and hoped for beneficiaries.

Similar illness experience. Several interviewees ($n = 5$) indicated a sense of responsibility to participate in basic research to help other patients with similar diagnoses to their own. Involvement in a community of individuals with similar diseases also factored in as a motivation to participate:

> Well, I belong to the Parkinson's Association of [my local area]. And, in the last year… half the people I was dealing with over the years passed away, which is a little depressing… And so, I guess I'm doing it in their memory. (P1)

Intimates and potential future patients. Participants also expressed an awareness of the genetic implications of neurodegenerative diseases. Some expressed fears that they would pass down traits related to their own brain diseases:

> I feel that anything that we can do to get rid of this horrible illness… I literally feel like my life has been stocked by Parkinson's, I have so many friends who've had it… And I'm also worried that one of my [children] or one of my grandchildren may inherit Parkinson's from me. (P8)

Other responses linked the knowledge gained from basic brain research to their families' experiences with brain diseases:

> We have family members who are dealing with MS and Parkinson's, so of course anything that can be done to further that knowledge, I think is just incredibly important. (P4)

Surgeon and research team. When asked whom they hoped the study might benefit, many patient-participants ($n = 10$) cited feelings of gratitude toward and/or a desire to help their clinician-researchers and the research team:

> I guess the answer would be, I wanted to help the doctors involved, because they made such a large difference in my life. (P4)

Unknown future beneficiaries. Finally, interviewees discussed the potential for their participation in the basic brain research to aid unspecified future beneficiaries:

> I think it's important to help in the advancement of human knowledge and to support other researchers and scientists. (P13)

> I decided to join it so that hopefully I can help somebody else in the same situation or similar circumstances… to benefit the research and keep things moving up and up. (P12)

Valuing of basic brain research

Views about the brain. Interviewees valued increasing society's understanding of the brain, some viewing the brain as unique due to its multifaceted functional roles and how little is known about it:

> The thing is, it's the brain. Nobody really knows what's going on in the brain… I was amazed that they were able to basically figure out where to go to even be able to do the surgery for this. That was, to me, amazing. (P9)

Moreover, some patient-participants identified the importance of basic brain research with a live brain:

> Well, I think getting in there and actually seeing it and seeing how it works is [of] the utmost importance. It's like no other research could be because you're actually in there in the brain and seeing. (P12)

Optimism about translation. Almost all interviewees ($n = 12$) explicitly indicated that they hoped basic brain

research would eventually contribute to therapeutic interventions. Some interviewees expressed a specific hope for therapeutic translation connected to their diagnosis:

> And so my hope was, well maybe this study will help with the development of that surgery and that implant. (P5)

Some also expressed optimism that increases in understanding of brain functionality would benefit humans more broadly:

> The more we understand about how our brains work, the more we're going to understand how intelligence and cognition works, that's going to lead to all kinds of important advancements in technology that will be beneficial to the human race. (P13)

Participant role. Patient-participants viewed their participation as significant to their research team and to the advancement of our understanding of the brain. Regarding the research team, interviewees flagged the importance of their role as the research subject:

> I was obviously important for their research because they wouldn't be able to conduct it if I hadn't said yes. So obviously I was of prime importance because they were learning from me. (P2)

One interviewee viewed their role as a basic brain research participant as analogous to the role of an organ donor. The sentiment captured was that participation would, in a sense, create a legacy that could help others in the future:

> The thing is, you never know with the way research is, they could find the cure tomorrow or 10 years down the road, or they could never find the cure. But I feel, as myself, as being like a donor, when my body goes on. If anything, a part of my body can help save somebody else, that's great. (P9)

Other participants derived a sense of personal fulfillment from participating:

> [The most rewarding part was] knowing that I was part of a research study that could maybe help in some way. I don't know how the data is going to be used really. It's just any way I could help. (P5)

Minimal concerns about study risk

Physical risks. Concerns with intraoperative research risks did not appear to significantly affect participants' decisions to join the study. When asked about the risks of participation, most interviewees ($n = 11$) indicated that they felt there was no or minimal additional risk related to the research.

> No, [concerns about the study's risks] didn't occur to me. I personally don't feel that I had any increased risk in participating. (P4)

Data. Additionally, patient-participants had little concern about data or privacy related to their participation in basic brain research. Almost all ($n = 13$) cited no concerns. Several interviewees pointed to the necessity of sharing the anonymized data to contribute to research progress:

> In fact why do a study if you're not going to share the data. (P5)

> Well, they can share it with anybody that needs it, or wants it, or is interested in it. If you can move research forward I'm all for it… That's what people should do, share the info. (P1)

Integrated themes

Trust

The concept of trust was raised throughout patient-participant narratives. Both the target of trusting attitudes and the import of those attitudes were varied. This sense of trust extended to the surgeon, the research team, and the research institution. Patient-participants discussed trust when asked about their understanding and evaluations of risks and benefits and their reflections on the importance of the research being done (Table 2).

Trusting attitudes affected participants' assessments of risks. This was exemplified by participants' beliefs that the research team would not expose them to excessive risk, that they would mitigate risks that arose, or that they would stop research altogether if adverse events occurred. In some cases, trust contributed to the perspective that there were no additional risks in participation in the intraoperative study:

> They assured me there was no risks in [the study] itself. So, I didn't really have to think about that… If there was a risk, they would have stopped it or they would've done something like that. I mean, they wouldn't just keep asking me questions if there were risks. (P11)

Several interviewees explicitly brought up trust as a parameter affecting risk assessment. Even when participants acknowledged the presence of additional research related risks, they often were unconcerned with them, again citing trust in clinicians and institutions:

> Interviewer: Can you say a little bit about why you weren't concerned at all [with the risks]?

Table 2. The many roles of trust.

Theme		Representative quote
Trust in:	Physician	I felt confident in the doctor and his capabilities. (P13) Even if it wasn't [Dr. X leading the study], if there was somebody he trusted, that was good enough for me… I mean, I might have asked one more question. Like, "If this is your kid, would you recommend this person?" But, I don't think he would have had somebody in there that he didn't trust. (P3)
	Research team	There's a lot of people involved that know a lot more than I do, they can help make up those decisions and I just be presented with the option. And if I trust who's talking to me about it then I can trust that they're giving me the truth about risks, rewards, other options. (P3) Well, I figured if they were good enough to be working in that department they should be good enough to talk to me and ask me some questions and put me through some tasks. (P1)
Trust regarding:	Mitigation of risk	I don't think there's any risk or harm. I just, I just fully trust. (P7)
	Scientific progress	Just because you miss the dart board when you throw a dart, doesn't mean that you're not going to hit the bulls eye eventually down the road because you got to take a stab at it. You've got to throw it once in a while. (P9)
	Patient-participant's comprehension of study goals	I don't know the purpose of the study really, like what they're expecting to find, or what they're hoping to find, I don't know how it will affect the surgery…but that's okay. (P11)

> Speaker: Because I trust [Dr. X], I trust [institution Y], and having gone through it when I was working on my doctorate, it was very fascinating when I was doing my research. (P5)

> I knew the risk going in as far as the physical aspects of it and stuff. I wasn't too concerned, I figure with many doctors that were going to be there. If something should happen, I'd be okay. And so I really never gave that part much thought. (P14)

Importantly, no interviewees suggested any concerns of coercion or pressure to participate given their upcoming surgery.

When asked about the benefits of the non-therapeutic study, patient-participants described attitudes of trust toward scientific progress. Trust in scientific progress also included confidence in the research programs developed by the research team:

> The study is good because, like I say, the questions or whatever they needed to do or the tests of what they needed, there's a reason for that, that they did that. I'm sure they have a reason why they did certain things or whatever they did. (P9)

Sentiments of trust and expressions of deference arose in patient-participants' responses when asked about the purpose of the non-therapeutic brain research:

> I have no idea. I don't know what they were doing at all. Maybe they're mapping the brain, maybe they're just training somebody how to apply an electrode. I have no idea. I just trust that it was, somebody's getting something out of it. (P3)

To that end, patient-participants indicated that they felt comfortable not understanding the research. Instead, they expressed confidence in the long-term benefits of basic brain research:

> I just know regardless, it's going to benefit somebody down the road. For me personally, I don't think I need to know [how]. (P9)

Impact of surgical context

Uniqueness of research opportunity. Several patients acknowledged the unique opportunity presented by their brain surgery, recognizing that there may not be many opportunities to conduct research that grants access to the surface of the brain or deep areas of the brain with awake patients. Others saw the surgical context itself as sufficient reason to extend the time spent in the operating room. That they were already there seemed to motivate participation in the intraoperative study:

> They were already inside my head, to begin with. (P2)

Finally, given the rarity of the opportunity for basic brain research or their own indebtedness to past research participants, some interviewees expressed a sense of responsibility to participate:

> Well, everybody who's benefited from deep brain surgery, I think has a responsibility morally to come forward and help. (P8)

Comparative risks of surgery and intraoperative study. Many interviewees did not discuss the absolute risk of the research procedure, but instead assessed the research risks in relation to the already accepted neurosurgical risk. The added risk of participating in basic brain research seemed to play a marginal role for these interviewees:

> It didn't sound like it was something that was really risky. It was maybe extending the risk a little of what was already happening but, I don't know. At the point where you're going in for brain surgery you throw

> your cards to the wind and let happen what happens and just trust the right thing will work out. (P3)

Notably, one interviewee cited the distinction between worries they had as a *patient* versus their lack of concern as a *research participant*. The sentiment captured had to do with the clinical outcome versus the lack of direct effects of basic brain research:

> Well, the experience as a patient, certainly there's always the concern of the outcome and the results, that sort of thing. There was no concern about the research because I didn't see it having any kind of direct effect on me as far as anything goes. (P2)

Merging of surgery and study narratives. Another finding was the merging of surgical and research narratives: as one participant put it, "It blended together" (P14). Importantly, despite this blending, no narratives suggested that participants were under a therapeutic misconception regarding the benefits of the study (Appelbaum et al. 2012). More specifically, interviewees accurately reported understanding that the intraoperative research would not provide them with a clinical benefit. However, interviewees sometimes responded to questions about the research with responses about the therapeutic portion of the procedure. For example, when asked specifically about their motivations for participation, some patient-participants discussed the clinical benefits of the surgery, such as decreased tremors:

> Interviewer: Can you tell us a little bit about why you joined the research study with [Dr. X], which took place during your surgery?
>
> Participant: I've had an essential tremor since I was approximately 14. I'm now 74, and it has progressed to the point that it was… I was very restricted on the things I could do. That's why I took advantage of the opportunity to have the surgery. (P4)

The merging of surgery and study experiences within narratives did not seem to result from a misunderstanding, as patient-participants corrected to discussing the study exclusively when prompted. P4 (above) was redirected as follows:

> Interviewer: Mm-hmm (affirmative). And what about the study that happened during the surgery? Do you remember why you decided to do that in addition to surgery?
>
> Participant: I just thought if it would be helpful, I wanted to participate. (P4)

The similarities between the surgery calibration procedures and the tasks performed in the intraoperative research provide one possible explanation for this convergence. Although the procedures specific to the intraoperative research were discussed during informed consent, the actions involved in the surgery and study felt similar to some patient-participants. For some, the study protocols seemed to serve as an extension of the DBS calibration procedures rather than a separate experience:

> I don't even feel like I was really in a study…I just felt like that was stuff I would expect to do during a surgery of this type anyway. (P5)
>
> I wasn't sure which questions were which to be honest. (P11)

Mixed experiences of participation

Patient-participants gave ranged responses to questions regarding the experience of participating in the non-therapeutic research during an ongoing surgery, the scope of which are captured in Table 3. Significantly, when patient-participants were asked whether, in hindsight, they had any regrets in participating, all asked responded in the negative ("no," "no, never," "nope, zero," etc.). Further, several participants recalled being given the opportunity, intraoperatively, to reconsider participation in the research:

> I remember when I woke up and they said, "Well, we got to do part of the study now." They were very good about saying "Do you still want to do it?" Now at that point I was almost going like, "Oh man." But, I said yeah. But they give you the outs that are necessary if you don't want to do it. (P11)

Some patient-participants seemed to derive value from the opportunity to contribute to research. This sentiment extended to personal pride:

> I was awake to a certain extent but once again, I just didn't want to fail. Not that you can't pass or fail. I just didn't want to look like an idiot to a certain extent. The thing is, I did great they said. You just do what you do. It didn't bother me one bit. I wasn't scared or hesitant or, almost kind of joyful because I was glad that I was able to do it I guess, I don't know. (P9)

Other interviewees presented more negative responses, such as P13 and P14 in Table 3. Some noted pain during the research, fatigue, and that they had considered 'giving up' mid-research. Still other responses seemed mostly neutral:

> It was very comfortable, it also happened in the middle of my surgery. They just woke me and kept doing that so I couldn't feel any other things. They just

Table 3. Varied experiences of participation.

Patient ID	Representative quotes
P5	I don't remember much except, I'm a bit of a jokester, so I'm sitting there carrying on this conversation with Dr. [X] and he and I were just laughing and talking. And to me that's what it was. I'm just talking to my doctor and we're laughing and talking and I'm pushing buttons and doing things. That's about all I remember. It was not intrusive, it wasn't scary, it was nothing.
P3	I don't remember it being really anything different than the surgery. Because the surgery you're already awake, they're already asking you questions. They're already asking you to do things. I think I remember him saying, "We're done with the major surgery now we're going to do this."… really being indifferent. I find the whole thing is so fascinating. I was in a good mood most of the surgery. I just think it's just so interesting. So it was just more of the same. Just, it was fine. It could have gone longer that would have been okay.
P13	Toward the end, as my neck was getting tired and stuff like that, and it had been a long time, yeah, I started to say, "Okay. Well, maybe this wasn't the best idea." But overall, I was still fine with the idea… I didn't feel very good. You know, just kind of out of it, maybe no lie, I just vaguely remember they were asking me questions, I was answering them, and they're doing things with my hands. I felt that it was kind of difficult to do, but again, I thought, "Oh, I said I'd do it, and I feel a responsibility to future surgeries, that this can help them with whatever I could."
P14	Because no matter how you look at it, it is a traumatic experience. It did happen. How often does something like that happen [inaudible 01:06:30], people need to know that before you get into this. To me, did I go in there blindly? Some of it was blindly, yeah. Did I read up on it? Yeah, I did. I learned the mechanical way about how the surgeon was going to go? What about the emotional part? Not so much.

> woke me up and put this computer in my side and did the thing so it was okay. (P7)

Of particular interest were two interviewees who recalled both negative and positive aspects of the same experience, indicated in Figure 1:

These varied recollections demonstrate the diverse experiences of participation in awake intraoperative brain research, both across patient-participants as well as within a single narrative.

Discussion

These results raise questions about how patient-participants make enrollment decisions in research that offers them no clinical benefit, including whether risks are under-appreciated and whether decisions to enroll are obscured by the co-occurring surgery (e.g., Wexler et al. 2022). However, the narratives from this study offer broader insight into the nuanced ways patient-participants think about basic brain research, their own role in its progression, and their attitudes of trust. These insights go beyond appreciation and understanding of risk and study details. Although there are many important features of this data, our discussion focuses on two: (1) patient-participants' perspectives of the value of basic brain research and (2) the import of relational factors like trust for informed consent. These topics may be especially visible and ethically consequential in intraoperative brain research. The surgical context (which minimizes research risks) taken together with the non-therapeutic nature of the research (which removes clinical benefit) may uniquely augment the role that perceptions of value play in decision to enroll. Furthermore, the vulnerability of enduring an awake brain surgery may intensify the role of trusting relationships in research activities. Both of these possibilities are underappreciated in current ethical discussions and research practices.

Sources of value, optimism, and translational misconception?

Many patient-participants reported not knowing any study details beyond that the study might help others, but also, that they did not need to know. Instead, when asked about the study purpose, many offered answers that centered why they found the study to be valuable. These explanations, including longer-term hopes for translation, the importance of furthering knowledge about the brain, and views of their own treatment as the result of previous research, offer a contextualized picture of how patient-participants conceive of their enrollment as contributing to something they value.

First-hand experiences of brain disease also contribute to the value patient-participants found in basic research. Even when research was described as exploratory, with its translational benefits unknown or distant, patient-participants expressed beliefs that the study was worth joining, referencing their own experiences with brain disease. For some, these experiences seemed to foster a sense of moral obligation to volunteer, as well as an appreciation for the ability to provide a unique opportunity for others. These sources of value may stem from the fact that *participants* are neurosurgery *patients*. These perspectives may not be readily available to individuals without brain disorders, or more specifically, to individuals without the need for invasive brain surgery.

The significance of these findings may impact how researchers ought to approach patients to participate (as explored in other domains by Outram et al. 2021). Discussions with potential participants, including consent discussions, should proceed with an awareness of

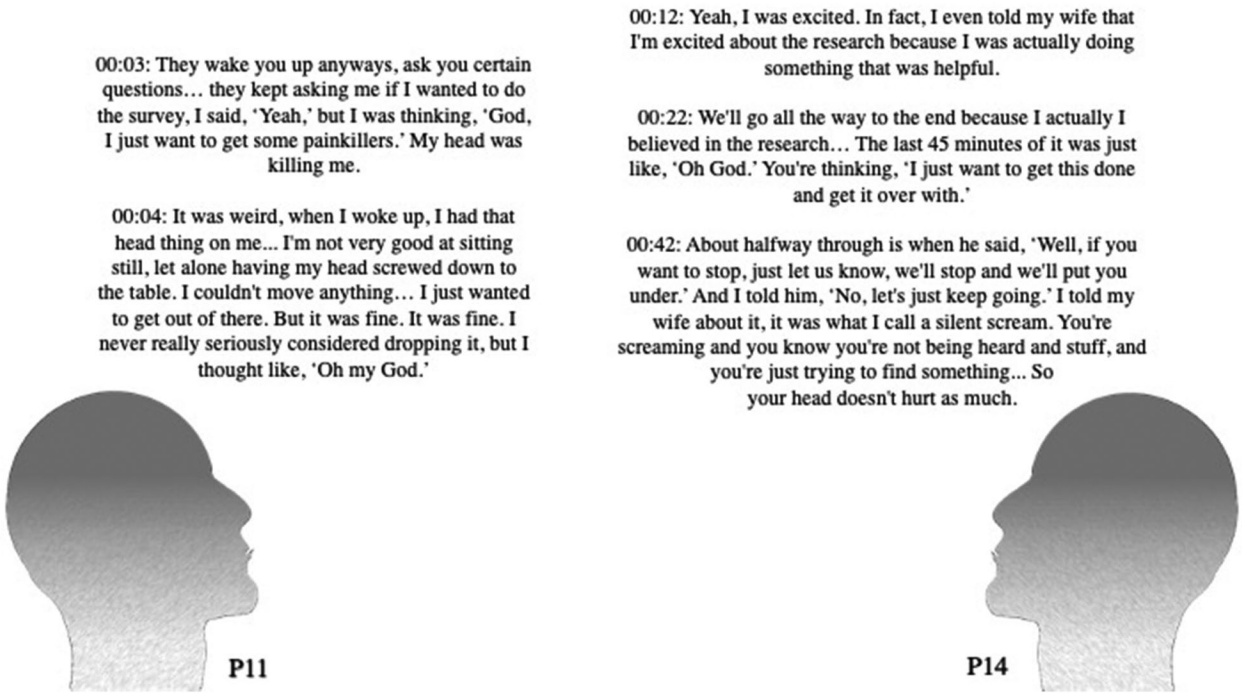

Figure 1. Using P11 and P14's narratives, this figure shows representative examples of the range of experiences and emotions within subjects.

these potential sources of value, the impact of those values on enrollment decisions, and the potential beliefs that those values are based upon. Crucially, discussions with potential participants should be oriented around an awareness that those beliefs may or may not be justified by the nature of the research, the implications of which we discuss in what follows. But at a minimum, positive assessments of study value coupled with little concern for study risks might mean that patients approached to enroll in this type of research will simply consent. This possibility should influence the shape of recruitment and consent practices, and it suggests that researchers have stricter obligations to explore patient-participants' reasoning about benefits and value. It also suggests that researchers ought to more carefully scrutinize the study design itself before approaching patient-participants, as patient-participants may inherently trust not only the researchers, but the entire translational process.

Importantly, as indicated in our results, none of these narratives revealed a therapeutic misconception. No interview suggested that patient-participants (1) falsely believed that treatment received in the research would be individualized to their own situation, or (2) falsely believed that the primary purpose of the research was to provide therapeutic benefit to them, rather than to promote generalizable scientific knowledge (Jansen 2011, 2020; Jansen et al. 2017). Additionally, none of the narratives described a so-called "unrealistic optimism bias." This has been described as an event-specific bias, whereby participants believe that they are more likely to benefit or less likely to experience adverse consequences from trial participation than similar others (Jansen 2011). No patient-participant reported self-regarding benefits as a hope or aim of the research.

But, patient-participants' narratives do describe hopes and beliefs about the translational likelihood of the research, which, although not a form of the two biases mentioned above, have the potential to be misguided. Some beliefs about the potential translational nature of a study may not be warranted, and participants may overestimate the nature or likelihood of a translational path from the research's findings. For example, participants may mistakenly think that the translational path is aimed at benefitting others *with their own disease*, or that translational benefit *is more likely or more tightly connected to their participation than it is*. Furthermore, it may be that these judgments influence enrollment and color how patient-participants think about benefits and risks.

These *translational misconceptions*, as we might call them, are different from both therapeutic misconceptions and unrealistic optimism. They have to do with misperceptions about the likelihood that research will have clinical benefits for *others*, not *oneself*, and who might receive those benefits. For example, some patient-participants in this study connected the

potential benefits of basic brain research to others undergoing their same brain surgery or to those who might develop similar brain disorders in the future, while at the same time, understanding that they themselves would not benefit. Yet, neither of the basic studies these patient-participants were a part of aimed directly at improving DBS surgery or offering therapeutic translation. And, although one of the basic studies may have nearer term translational implications for closed-loop DBS, this translation is likely still further off than patient-participants seemed to think.

Given the central role that helping others played in patient-participants' motivations and their appraisal of the research itself, further work may be warranted on this potential misconception and whether it reflects attitudes that could be mitigated by more deliberate attention paid to participant-researcher interactions. To put the worry more concretely: the value patient-participants place in basic brain research may play a central role in their decisions to join. If this value is in part grounded in views about the translational nature and likelihood of research that are inaccurate or misguided, then this may threaten valid consent. While many scholars have noted the prevalence of altruistic enrollment motivations—from pediatric cancer trials (Truong et al. 2011) to environmental health research (Carrera et al. 2018)—what we raise is the potential for these motivations to be rooted in specific misconceptions. Researchers may have obligations to explore whether these hopes and beliefs exist, on what basis, and to what extent. If these expectations are in part created or encouraged by current research practices, including the language used to discuss non-therapeutic benefit or the mere fact that surgery and research happen together, then ethical considerations may require revisions of those practices.

Trust, informed consent, and re-consent

Consider the following quote from P8, which was given when discussing the study benefits: "I think that what I accomplished is that hopefully I helped other people and I know that it helps me, I mean it has changed my whole life." In this quote, the participant links together thoughts about helping other people by participating in the study with the impact of the surgery on their own life, exemplifying how narratives about the study and the surgery where often discussed together. While this may not amount to a therapeutic misconception, it raises other worries about the extent to which patient-participants grasp the distinction between clinical care and research activities.

Scholars have raised concerns about inadequate understanding of study purpose, benefits, and risks, and the potential for patient-participants to confuse care with research. In response, targeted improvements to informed consent processes have been suggested, such as teach-backs and in-depth one-on-one conversations (Chiong, Leonard, and Chang 2018; Feinsinger et al. 2022; Wexler et al. 2022). Our interviews found similar themes, including little concern with risk and low recall of study purpose, and reports that discuss the study and the surgery together. But, our interviews further revealed how patient-participants perceive, value, and interpret this research in the context of their surgery. Of particular interest is recurrent discussions of trust, which may encourage widening the lens through which researchers approach improving informed consent.

Recall that trust was ubiquitous in patient-participant narratives, appearing in response to question stems regarding motives to participate, risk, the researcher and their team, the decision to join, the benefits of the study, the value of basic brain research, and interviewees' perspectives on their own role in the study. Recourse to the surgical context also appeared frequently, both in discussing risks, but also benefits, motivations to join, and in describing their own surgery as a tangible result of previous science.

These results may point toward underexplored approaches to initial consent. First, researchers should be aware of the trust patients place in them both initially and intraoperatively, and the effect this might have on their decisions to participate. Initial consent practices might aim not only to maximize understanding (perhaps through teach-backs, for example) but also at cultivating trusting relationships, so that existing trust is not exploited and future trust could be built. These practices may look different from those aimed at increasing understanding. For example, more time might be allotted to conversations between the surgeon and the patient-participant to communicate about the details and complexities the dual space, dual roles, and dual activities.

Additionally, data documenting patient-participants' mixed experiences of participation may lend support to more robust intraoperative re-consent practices. These narratives, which sometimes described both the desire to continue and the stress or physical discomfort in doing so, may demonstrate the importance for researchers to assess whether they are providing meaningful opportunities to withdraw in the operating room and to consider whether re-consent is required.

Reports of difficulty distinguishing clinical tasks from research tasks likewise offer insight into the importance of pursuing re-consent: if patients can't tell the difference between implantation procedures and research, they may not know which activities they can opt out of without clinical significance. Perhaps more concentrated effort at marking this distinction with re-consent would be impactful.

Intraoperative verbal re-consent would give patient-participants the explicit opportunity to change their minds, reconsider their participation and discuss their concerns. This need not be a lengthy process, as additional operating time extends risks. But it may need to be a formal, standardized opportunity, that goes beyond merely seeking reaffirmation of a previous commitment to research (Resnik 2009). Mixed experiences of participation highlight that participants' understanding and attitudes may change, requiring a genuine re-consent discussion.

But it may also be difficult to provide meaningful opportunities to withdraw and re-consent. Intraoperative research is sometimes conducted in the middle of the surgical implantation itself (e.g., clinical activities are paused while the study is initiated, and then resumed after). In other cases, experiments are initiated after implantation is complete, just before the surgical wounds would otherwise be closed. While patient-participants are lucid by the time they are participating in research (they have been off anesthetic for at least 30 minutes and have been actively participating in intraoperative testing, including following instructions and performing tasks), it may be that researchers should still attempt, whenever possible, to design studies that occur only after the therapeutic portion of the procedure is complete. This would further decouple patient outcomes from research. It may also highlight a salient time to legitimately reconsider participation and promote a noticeable distinction between care and research. During initial consent conversations, consenters could discuss how and why re-consent would occur intraoperatively, and the significance of completing the implant before beginning the research.

Finally, the question of who should obtain consent remains for both initial consent and re-consent. While involving the clinician-researcher in consent (what is called 'dual-role consent') risks undue influence, non-clinician researchers may not be as well-informed about the details of the study (Chiong, Leonard, and Chang 2018; Morain, Joffe, and Largent 2019). Grady (2019) suggests a hybrid approach consent with explicit responsibilities for the physician-investigator (e.g., to accurately convey information) and an additional member of the research team (e.g., to make sure the decision is made voluntarily and without undue influence).

While other models broadly consider the role of the "virtuous investigator" in safeguarding human research subjects (Grady and Fauci 2016), none of the traditional consent frameworks center trust or consider whether the benefits of facilitating participant-researcher communication go beyond maximizing understanding. Exploration of other models, including those which ground consent practices in the value of building relationships and grounding trust, might make new consent practices possible. For example, relational considerations may motivate giving patient-participants a choice as to *who* should approach them for intraoperative re-consent. This could better promote the right to withdraw in an otherwise vulnerable position, and to develop trust that others will act in response.

Limitations

Although patient-participants with various clinical etiologies and across multiple institutions and studies were interviewed, this study left out many other voices with valuable contributions. Only patients who consented to intraoperative research were interviewed, to the exclusion of patients who were approached to participate but declined. Those patients may have significantly different views and experiences. Furthermore, although patient-participants were from different intraoperative studies with distinct research goals, they did not include the wider variety of intraoperative studies currently being conducted. Patient-participants' values, perspectives, and experiences may differ across diagnoses (e.g., psychiatric diagnoses) and the nature of the study (e.g., the topics addressed, questions asked, and tasks completed).

Future research on this topic should include patients undergoing DBS surgery who choose not to participate in basic science research, the general population of patients that are eligible to receive DBS surgery, and patient-participants from basic intraoperative studies that differ in kind. Furthermore, these interviews were conducted at various times after patient-participants' surgery, which may impact attitudes and retrospective reports of the events that took place.

Conclusion

The findings of this study are among the earliest to close an existing gap in the literature surrounding intraoperative basic brain research – an area due to

expand significantly in the coming years. This work highlights what some patient-participants value about basic brain research: its connection to the brain, its potential to increase knowledge, and the hope that it will help others in the future. The connections between these narratives and their ethical implications are varied, but may include the potential for a translational misconception, the impact of trust, and the need for intraoperative re-consent.

While these issues may be present in other research contexts, especially when care and research overlap, they may take on increased significance in the context of intraoperative brain research. Further work seeking and responding to the perspectives and experiences of patient-participants is needed in this research context and in others, with the goals of translating narrative data into normative guidelines. Without this work, researchers risk over-privileging the values of the scientific community in research design, consent practices, and normative judgments of permissibility.

Acknowledgments

The authors would like to acknowledge the attendees at the 2021 International Neuroethics Society Meeting, the 2022 NIH BRAIN Initiative Neuroethics Working Group Meeting, and the UCLA TNT Faculty Seminar series for insightful discussion of the data presented in this paper. Special thanks to Michelle Pham, who assisted with data collection, two anonymous reviewers for this journal, and the participants who offered their time.

Disclosure statement

The authors do not have any financial conflicts of interest with this project. NP is a consultant for Abbot Laboratories, and NP, AF, and EC receive grant support from NIH BRAIN Initiative RF1MH121373. Funders had no role in the development of this study.

Ethical approval

This ethics study was approved by the Institutional Review Board at the University of California, Los Angeles.

Funding

This project was funded by NIH BRAIN Initiative grant RF1MH121373.

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References

Appelbaum, P. S., M. Anatchkova, K. Albert, L. B. Dunn, and C. W. Lidz. 2012. Therapeutic misconception in research subjects: Development and validation of a measure. *Clinical Trials* 9 (6):748–61. doi: 10.1177/1740774512456455.

Braun, V., and V. Clarke. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3 (2):77–101. doi: 10.1191/1478088706qp063oa.

Braun, V., and V. Clarke. 2012. Thematic analysis. In *APA handbook of research methods in psychology. Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological. APA handbooks in psychology*, ed. H. Cooper, 57–71. Washington, DC: American Psychological Association.

Braun, V., and V. Clarke. 2019. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health* 11 (4):589–97. doi: 10.1080/2159676X.2019.1628806.

Braun, V., and V. Clarke. 2021. One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology* 18 (3):328–52. doi: 10.1080/14780887.2020.1769238.

Braun, V., V. Clarke, N. Hayfield, and G. Terry. 2019. Thematic analysis. In *Handbook of research methods in health social sciences*, ed. P. Liamputtong, 843–60. Singapore: Springer Singapore.

Cabrera, L. Y., E. L. Evans, and R. H. Hamilton. 2014. Ethics of the electrified mind: Defining issues and perspectives on the principled use of brain stimulation in medical research and clinical care. *Brain Topography* 27 (1):33–45. doi: 10.1007/s10548-013-0296-8.

Carel, H., and I. J. Kidd. 2014. Epistemic injustice in healthcare: A philosophical analysis. *Medicine, Health Care, and Philosophy* 17 (4):529–40. doi: 10.1007/s11019-014-9560-2.

Carrera, J. S., P. Brown, J. G. Brody, and R. Morello-Frosch. 2018. Research altruism as a motivation for participant in community-centered environmental health research. *Social Science & Medicine* 196:175–81. doi: 10.1016/j.socscimed.2017.11.028.

Chiong, W., M. K. Leonard, and E. F. Chang. 2018. Neurosurgical patients as human research subjects: Ethical considerations in intracranial electrophysiology research. *Neurosurgery* 83 (1):29–37. doi: 10.1093/neuros/nyx361.

Chrabaszcz, A., W.-J. Neumann, O. Stretcu, W. J. Lipski, A. Bush, C. A. Dastolfo-Hromack, D. Wang, D. J. Crammond, S. Shaiman, M. W. Dickey, et al. 2019. Subthalamic nucleus and sensorimotor cortex activity during speech production. *The Journal of Neuroscience* 39 (14):2698–708. doi: 10.1523/JNEUROSCI.2842-18.2019.

Feinsinger, A., M. Pham, and N. Pouratian. 2021. The value of heterogeneity in practices to promote ethical research. *AJOB Neuroscience* 12 (1):80–82. doi: 10.1080/21507740.2020.1866116.

Feinsinger, A., N. Pouratian, H. Ebadi, R. Adolphs, R. Andersen, M. S. Beauchamp, E. F. Chang, N. E. Crone, J. L. Collinger, I. Fried, et al. 2022. "Ethical commitments, principles, and practices guiding intracranial neuroscientific research in humans. *Neuron* 110 (2):188–94. doi: 10.1016/j.neuron.2021.11.011.

Grady, C. 2019. A hybrid approach to obtaining research consent. *The American Journal of Bioethics: AJOB* 19 (4):28–30. doi: 10.1080/15265161.2019.1574493.

Grady, C., and A. Fauci. 2016. The role of the virtuous investigator in protecting human research subjects. *Perspectives in Biology and Medicine* 59 (1):122–31. doi: 10.1353/pbm.2016.0021.

Greely, H. T., C. Grady, K. M. Ramos, W. Chiong, J. Eberwine, N. A. Farahany, L. S. M. Johnson, B. T. Hyman, S. E. Hyman, K. S. Rommelfanger, et al. 2018. Neuroethics guiding principles for the NIH BRAIN Initiative. *The Journal of Neuroscience* 38 (50):10586–88. doi: 10.1523/JNEUROSCI.2077-18.2018.

Greely, H. T., K. M. Ramos, and C. Grady. 2016. Neuroethics in the age of brain projects. *Neuron* 92 (3):637–41. doi: 10.1016/j.neuron.2016.10.048.

Hendriks, S., C. Grady, K. M. Ramos, W. Chiong, J. J. Fins, P. Ford, S. Goering, H. T. Greely, K. Hutchison, M. L. Kelly, et al. 2019. Ethical challenges of risk, informed consent, and posttrial responsibilities in human research with neural devices: A review. *JAMA Neurology* 76 (12):1506–14. doi: 10.1001/jamaneurol.2019.3523.

Jansen, L. 2011. Two concepts of therapeutic optimism. *Journal of Medical Ethics* 37 (9):563–66. doi: 10.1136/jme.2010.038943.

Jansen, L. A. 2020. Informed consent, therapeutic misconception, and unrealistic optimism. *Perspectives in Biology and Medicine* 63 (2):359–73. doi: 10.1353/pbm.2020.0024.

Jansen, L. A., D. Mahadevan, P. S. Appelbaum, W. M. P. Klein, N. D. Weinstein, M. Mori, C. Degnin, and D. P. Sulmasy. 2017. Variations in unrealistic optimism between acceptors and decliners of early phase cancer trials. *Journal of Empirical Research on Human Research Ethics* 12 (4):280–88. doi: 10.1177/1556264617720433.

Labuzetta, J. N., R. Burnstein, and J. Pickard. 2011. Ethical issues in consenting vulnerable patients for neuroscience research. *Journal of Psychopharmacology* 25 (2):205–10. doi: 10.1177/0269881109349838.

Mergenthaler, J. V., W. Chiong, D. Dohan, J. Feler, C. R. Lechner, P. Starr, and J. J. Arias. 2021. A qualitative analysis of ethical perspectives on recruitment and consent for human intracranial electrophysiology studies. *AJOB Neuroscience* 12 (1):57–67. doi: 10.1080/21507740.2020.1866098.

Morain, S. R., S. Joffe, and E. A. Largent. 2019. When is it ethical for physician-investigators to seek consent from their own patients? *The American Journal of Bioethics: AJOB* 19 (4):11–18. doi: 10.1080/15265161.2019.1572811.

Mosher, C. P., A. N. Mamelak, M. Malekmohammadi, N. Pouratian, and U. Rutishauser. 2021. Distinct roles of dorsal and ventral subthalamic neurons in action selection and cancellation. *Neuron* 109 (5):869–81.e6. doi: 10.1016/j.neuron.2020.12.025.

Muñoz, K. A., K. Kostick, C. Sanchez, L. Kalwani, L. Torgerson, R. Hsu, D. Sierra-Mercado, J. O. Robinson, S. Outram, B. A. Koenig, et al. 2020. Researcher perspectives on ethical considerations in adaptive deep brain stimulation trials. *Frontiers in Human Neuroscience* 14:578695. doi: 10.3389/fnhum.2020.578695.

O'Keeffe, A. B., M. Malekmohammadi, H. Sparks, and N. Pouratian. 2020. Synchrony drives motor cortex beta bursting, waveform dynamics, and phase-amplitude coupling in Parkinson's disease. *The Journal of Neuroscience* 40 (30):5833–46. doi: 10.1523/jneurosci.1996-19.2020.

Outram, S., K. A. Muñoz, K. Kostick-Quenet, C. E. Sanchez, L. Kalwani, R. Lavingia, L. Torgerson, D. Sierra-Mercado, J. O. Robinson, S. Pereira, et al. 2021. Patient, caregiver, and decliner perspectives on whether to enroll in adaptive deep brain stimulation research. *Frontiers in Neuroscience* 15:734182. doi: 10.3389/fnins.2021.734182.

Ramos, K. M., K. S. Rommelfanger, H. T. Greely, and W. J. Koroshetz. 2018. Neuroethics and the NIH BRAIN Initiative. *Journal of Responsible Innovation* 5 (1):122–30. doi: 10.1080/23299460.2017.1319035.

Resnik, D. B. 2009. Re-consenting human subjects: Ethical, legal and practical issues. *Journal of Medical Ethics* 35 (11):656–57. doi: 10.1136/jme.2009.030338.

Richardson, J. P., I. Balzekas, B. N. Lundstrom, G. A. Worrell, and R. R. Sharp. 2021. The value of patient perspectives in an ethical analysis of recruitment and consent for intracranial electrophysiology research. *AJOB Neuroscience* 12 (1):75–77. doi: 10.1080/21507740.2020.1866114.

Sullivan, L., and J. Illes. 2018. Ethics in published brain computer interface Research. *Journal of Neural Engineering* 15 (1):013001. doi: 10.1088/1741-2552/aa8e05.

Truong, T. H., J. C. Weeks, E. F. Cook, and S. Joffe. 2011. Altruism among participants in cancer clinical trials. *Clinical Trials* 8 (5):616–23. doi: 10.1177/1740774511414444.

Wexler, A., R. J. Choi, A. G. Ramayya, N. Sharma, B. J. McShane, L. Y. Buch, M. P. Donley-Fletcher, J. I. Gold, G. H. Baltuch, S. Goering, et al. 2022. Ethical issues in intraoperative neuroscience research: Assessing subjects' recall of informed consent and motivations for participation. *AJOB Empirical Bioethics* 13 (1):57–66. doi: 10.1080/23294515.2021.1941415.

Appendix A: Question stems with illustrative responses of direct themes

Sample question stem	Representative responses	Direct theme
Was the decision to join the research study difficult?	It was just something they asked if I'd be willing to do, and I said, "Sure, what the hell?" (P3) It was like, "Would you be interested?" [I said] "Yeah. Not a problem." And he's like, "Take your time to think about it," [to which I replied] "don't need to." (P5) I did, of course, trust [my surgeon]. But I didn't give it a great deal of thought. I just made the decision to participate. (P4) It was an easy decision for me. I was just like, yeah, that's going to help someone else. Absolutely I'll go for it. (P12)	Ease of decision to join
Can you tell us why you joined this study?	Hoping the research gets better, so for my next generation, they don't get any disease like this. (P7) It might [help] down the road. You never know what kind of small detail can be connected…in my mind it's like you never quite know what little, tiny thought is going to help something else down the road. (P5) Just a way to give back…I guess [to help] the doctor first, he's the face of whatever it is… if it's something that'd be helpful to him, he's doing something so big to help me. (P3)	Motivation to help others
Do you think it's important that scientists pursue research that aims to understand how the brain works? Probe: Why or why not? Do you consider it a benefit that you are able to participate by participating in this type of research?	Yeah, I think the brain is a very fascinating thing that we don't know as much about and other things. (P12) [The brain is] the root… the base [of] the tree, and then the rest is the branches. (P12) If we have a better understanding of the brain, how it works and what it does, then that just moves us one step to providing perhaps new techniques or more success. (P2) Yeah, if I participate in the research study and then make the research gets better even the zero point one percent. I don't know. (P7) For me I think that the benefit was just emotional or psychological that I was potentially helping someone else. (P2)	Valuing of basic brain research
How concerned were you with the risks of the study? Do you feel that the research study posed additional risk?	Maybe just taking on a little bit of extra risk might seem, if something had gone wrong, maybe you'd feel stupid for extending the risk, but it really didn't seem like taking on that much risk. (P3) No, I don't think so [it added risk]. I felt comfortable. (P10)	Minimal concerns with study risk