

## ORIGINAL ARTICLE

# Patient perceptions of genetic counselors' role and emotional support needs in adults with Parkinson's disease

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## Abstract

One of the roles of a genetic counselor, when returning genetic test results for Parkinson's disease (PD), is to provide emotional support to the patient. However, whether or not these needs are being met in the genetic counseling setting is unknown. In this cross-sectional qualitative study, semi-structured interviews with 15 PD research participants were conducted to evaluate their emotional needs and expectations throughout the genetic counseling process. Interview questions assessed participants' background understanding of genetic counseling, informational and emotional expectations prior to the genetic counseling session, and experience with emotional support throughout the genetic counseling process. Through reflexive thematic analysis, we defined four major themes: (1) knowledge of genetic counselors' role in education but not in emotional support, (2) limited expectations for emotional support, (3) emotional support is not sought from genetic counselors, and (4) emotional support from genetic counselors was viewed ambivalently. One of the most important findings from this study was that regardless of whether participants had previously heard of genetic counseling, none of the participants knew that the provision of emotional support was an aspect of the genetic counselor's role. Although the majority of participants did not expect emotional support from their genetic counselor, over 60% of participants recognized that receiving emotional support is or could be important to them. Collectively, these findings highlight the necessity for enhanced patient education pertaining to the informational and emotional support that genetic counselors are trained to provide. We suggest that clarifying the role of emotional support with patients may increase comfort in disclosing their emotional needs with genetic counselors, improving patient-centered care overall.

## KEYWORDS

emotional support, genetic counseling, Parkinson's disease, patient expectations, psychosocial, thematic analysis

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## 1 | INTRODUCTION

Parkinson's disease (PD) is a neurodegenerative disease affecting around 6.1 million individuals worldwide and is associated with symptoms such as bradykinesia, rigidity, and tremors (Bloem et al., 2021). Outside of these motor-related symptoms, patients may also experience depression, anxiety, sleep disturbances, and cognitive decline (Hayes, 2019). Generally characterized as a multifactorial condition, PD is often due to a combination of genetic and environmental factors. Research investigating genetic variants associated with PD has shown that there are several genes either directly responsible for PD (monogenic) or that increase one's risk for development of the condition (Jia et al., 2022). Currently, genetic testing and genetic counseling are not consistently offered to patients diagnosed with PD, despite an estimated 5%–10% of adults of European descent who are diagnosed with PD having a major pathogenic variant associated with their diagnosis (Cook et al., 2021). This rate of PD-associated pathogenic variants increases to around 40% of adults diagnosed with PD from Ashkenazi Jewish or North African Berber descent (Cook et al., 2021).

Although no clear guidelines yet exist regarding genetic testing for PD patients and their first-degree relatives, there have been reported interest in and positive attitudes toward genetic testing from this population (Hackl et al., 2023; Maloney et al., 2018). Enhancing general scientific knowledge, improving personal treatment options, identifying risks for other family members, and eligibility to enroll in gene-targeted clinical trials are just some reasons that PD patients may have interest in genetic testing (Maloney et al., 2018). As genetic testing for PD has become more prevalent, studies have emerged assessing whether patients are satisfied following a genetic counseling session (Cook et al., 2023; Verbrugge et al., 2021). For instance, over 80% of PD participants enrolled in an exploratory study reported being satisfied with their genetic testing and genetic counseling experience (Cook et al., 2023). However, what has not been assessed are the specific factors leading participants to feel satisfied, including informational and emotional needs being met.

Studies have shown that PD patients have emotional needs that are currently insufficiently addressed in the general healthcare setting. Despite the fact that providing emotional support is a core principle of the genetic counseling practice (Biesecker, 2020), few studies have assessed the emotional needs of patients when going through the genetic testing process (Lee et al., 2019). In a cross-sectional study in Asia-Pacific regions exploring the unmet needs of PD patients in the healthcare setting, the most common unmet need was psychosocial support (Kwok et al., 2021). Participants reported resistance to sharing their emotions with those around them and struggled with anxiety and depression. Given that a large portion of the genetic counseling session involves psychosocial assessment and emotional support, it is essential to investigate how best to incorporate this support into genetic counseling appointments to improve patient care outcomes.

The present study enrolled participants from the PD GENERation (PD GENE) study sponsored by the Parkinson's Foundation (Cook

### What is known about this topic

People with Parkinson's disease have an interest in genetic testing and a positive attitude toward genetic counseling. However, there are emotional needs not currently being met in their healthcare as a whole.

### What this paper adds to the topic

This study highlights that people with Parkinson's disease may not recognize emotional support as part of the genetic counselor's role, which may contribute to their unmet emotional needs. Defining the emotional support aspects of the genetic counselor role to patients may aid patients in disclosing their emotional needs.

et al., 2023) to explore their emotional needs, and their expectations of the genetic counseling session to meet these needs. The PD GENE study aims to provide widespread access to CLIA-certified PD genetic testing and genetic counseling for people with PD. The pilot portion of the study was launched at seven academic hospitals in the United States. Follow-up surveys assessed the knowledge, impact, and satisfaction associated with the genetic testing and genetic counseling through the pilot stage of the PD GENE study, showing high levels of satisfaction with the genetic testing and counseling process (Cook et al., 2023). The present qualitative study aimed to use guided interviews to support and further develop those findings by assessing the emotional needs of participants involved with the PD GENE project.

## 2 | METHODS

### 2.1 | Research team

The research team in this study was composed of four members. Author MR completed this research as a genetic counseling student to fulfill the requirements of the Indiana University Genetic Counseling Graduate Program. She was supervised by a female certified genetic counselor (MM) specializing in PD research, a male medical anthropologist and bioethicist (CH) with a focus in qualitative research methods, and a female assistant scientist (LW) skilled in statistical genetics.

### 2.2 | Study design

A cross-sectional qualitative approach with semi-structured interviews was conducted for the present study. This allowed for identification of individual needs that were then compared systematically through reflexive thematic analysis (RTA) to

identify various themes among responses (Braun & Clarke, 2006; Wainstein et al., 2023). RTA is constructivist and interpretivist in its theoretical commitments; it recognizes that meaning and experience are subjective, that participants can and will have saliently different experiences of similar phenomena, and that neither data collection nor analysis can be completely evacuated of personal influences. Rather than abhor these features of qualitative work, RTA stresses reflection, in which the researchers keep an awareness of their positionality centered as they engage with both their participants and their data and attend to their active—rather than passive—role in knowledge production.

An interview guide was created in collaboration with the PD GENE genetic counseling team at Indiana University and was approved and deemed exempt by the Indiana University Institutional Review Board (IRB #19122). The approved interview guide was pilot tested with genetic counseling students. No changes were made to the interview guide following the pilot testing. Interview questions focused on characterizing the informational and emotional needs of PD GENE research participants and what factors may influence these needs. Interviews with PD GENE study participants were conducted over Zoom following their PD GENE genetic test results disclosure and genetic counseling session and transcribed using Zoom's automatic transcription services, as has become standard in much qualitative research (Gray et al., 2020; Varma et al., 2021). The full list of interview questions is available in Data S1. In line with the reflexive approach, the interviewer took notes during the conversations to record her impressions, and nuanced group discussions aided the transparency of the interpretive process.

### 2.3 | Sample and recruitment under the PD GENE protocol

All candidates for our qualitative study were participants in the PD GENE study through the Parkinson Foundation, consistent with a purposeful convenience sample. All PD GENE participants underwent next-generation sequencing and duplication/deletion analysis of seven well-established genes linked to PD, including *LRRK2*, *GBA1*, *SNCA*, *PRKN*, *PARK7*, *VPS35*, and *PINK1*. All participants received a genetic test results disclosure and genetic counseling session with a certified genetic counselor or other healthcare professional as part of the PD GENE study. Participants recruited through the centralized PD GENE supersite at Indiana University, received their genetic test results disclosure and counseling by a certified genetic counselor through the genetic counseling core at Indiana University, and were comfortable speaking English were eligible for our study. All genetic counseling sessions adhered to a standardized outline for the information provided. Candidates were contacted via email by a PD GENE study coordinator at Indiana University about participation in our study one business day after having their genetic test results disclosure and counseling session. None of the participants had a prior relationship

established with members of this research team. Recruitment began on May 22, 2023, and ended on August 1, 2023.

Our approach to recruitment was not guided by fixed saturation concepts. Given the relatively narrow aim of our study, the specificity of our population, and the experience and background of the senior researchers, a reflection on information power suggested that relatively fewer participants would be necessary for our analysis (Malterud et al., 2016). A sample size of 15 participants was thereby chosen as a flexible and contextually driven goal, as appropriate for qualitative research (Braun & Clarke, 2021; Sim et al., 2018). All participants who completed an interview were compensated with a \$20 Walmart gift card.

### 2.4 | Informed consent

Written and oral consent was obtained from all participants prior to Zoom interviews. Once eligible candidates agreed to participate, they were emailed a link to a REDCap consent survey that explained the study in more detail and requested them to sign and date it if they agreed to participate. Candidates were provided a description of the project, inclusion criteria, any potential risks and benefits associated with the study, a reminder that participation in the study is voluntary, plans for storing collected data and means for maintaining confidentiality, and contact information of the researchers in case the participants wished to reach out with questions or concerns. Informed consent was verbally confirmed at the beginning of the interview prior to starting any recordings.

### 2.5 | Instrumentation

Qualitative interviews were conducted and audio-recorded using HIPAA-compliant Zoom through Indiana University and a redundant recording was collected with a physical recorder. The interviews were completed by one researcher (MR) in their private home office. Using Zoom transcription services, the interviews were transcribed and manually checked for accuracy prior to data analysis. Transcripts were encrypted in a Microsoft Word document, checked for accuracy, stored on a password protected laptop, and uploaded to REDCap for storage. All documents saved on the laptop were subsequently destroyed. Participants were assigned a number to be used with de-identified data.

### 2.6 | Data analysis

For data analysis, RTA was adapted as described by Braun and Clarke (2006). Considering its balance between rigor and adaptability, this methodology was appropriate for this qualitative study as its goal was to explore and identify participant perceptions of their genetic counseling experience through interviews (Braun & Clarke, 2023; Wainstein et al., 2023).

The Dedoose version 7.0.23 coding platform was used to further analyze the data in the following way: After familiarization and thoughtful engagement with the data, a coding tree was developed. While traditionally not required for RTA, we have found that the structure of codebooks can be useful grounding in approaching sometimes overwhelmingly rich data. Rather than take a positivistic approach to coding trees as objectively accurate and reliable, we used them as starting points for the creative, interpretive process of our analysis. Team members primarily adopted an inductive or data-driven approach to coding while acknowledging reflexively that they would never completely excise the “background of multiple existing sociological theories” that all analysts bring to their data (Timmermans & Tavory, 2012). Codes were both semantic and latent, mirroring both the surface meanings of the transcripts as well as analysts' interpretations of deeper assumptions held by the participants. Thematic coding and analysis were done in collaboration between three team members (MR, CH, MM). They met several times throughout the coding process, discussing codes to inspire conversations about their interpretations of the rich data. All team members reviewed consistent findings and discussed results and implications for analysis.

### 3 | RESULTS

#### 3.1 | Response rate and demographics

Of the 105 PD GENE participants contacted for this study, 37 (35%) provided written consent prior to scheduling an interview. Of those 37, 15 (41%) scheduled and completed an interview. At that time, team members agreed that data were sufficiently rich and deep, and we closed recruitment for the study (Braun & Clarke, 2021). The average length of the interviews was 17 min, ranging from 9 to 27 min. All participants confirmed a diagnosis of Parkinson's disease, with an average age of onset of 63 years (standard deviation (SD)=6.9) and average age at interview of 67 years (SD=6.5). Twelve of the participants were non-Hispanic white (80%), and three participants were Hispanic white (20%). The average length of time between awareness of symptoms and diagnosis was 4.1 years (range 4 months to 15 years). Six participants (40%) had at least one other family member with Parkinson's disease. Three participants (20%) had positive genetic test results, which included heterozygous pathogenic variants in *PRKN*, *LRRK2*, or *GBA1* genes. For more detailed demographic information, see Table 1.

Team members decided as a group to focus for this manuscript on the genetic counselor's role and how it pertains to emotional support for research participants with PD. The four major themes within this focus included: (1) knowledge of genetic counselors' role in education but not in emotional support, (2) limited expectations for emotional support, (3) emotional support is not sought from genetic counselors, and (4) emotional support from genetic counselors was viewed ambivalently. Exemplary quotations

TABLE 1 Participant demographics.

	N	%
Race		
Non-Hispanic white	12	80%
Hispanic white	3	20%
Gender		
Female	8	53%
Male	7	47%
Age at diagnosis (years)		
Range	54–78	
Average	63	
Standard deviation	6.9	
Age at interview (years)		
Range	57–84	
Average	67	
Standard deviation	6.5	
Time to diagnosis (years)		
Range	0.3–15	
Average	4.1	
Standard deviation	4.2	
Positive family history for PD	6	40%
Positive genetic test results	3	20%

Abbreviation: PD, Parkinson's disease.

collected from the interviews were used to support these themes as reported below.

#### 3.2 | Knowledge of genetic counselors' role in education but not in emotional support

Several participants reported that they had heard of genetic counseling prior to the PD GENE study. Many of these participants recognized the informational role of genetic counseling and described that genetic testing would help someone learn of disease or illnesses they may have. When describing the role of a genetic counselor, one participant said they “would help you understand the results of your test” (10). Another participant said genetic counseling helped people to see “what type of illness or diseases might be hereditary” (5). Of these participants, however, none expressed an awareness that genetic counselors provide emotional support.

#### 3.3 | Limited expectations for emotional support

The second major theme that was developed from our interview data was whether participants had expectations for receiving emotional support from their genetic counselor. All but a single participant explained that prior to their appointment with the genetic

counselor, they had not expected to receive emotional support. One participant said, “no, I didn't have those expectations” (8). Another said, “I really didn't [...] I don't think I expected it to be as thorough as it was” (10).

Some participants believed providing such support was not even part of the genetic counselor's professional role. For example, Participant 9 mentioned that genetic counselors are “just there to give me mainly the results, not to have a counseling session” and “I didn't really anticipate support from her.” Participant 15 said, “I just knew she was going over the results” and “had no further expectations for the session.” Additional comments regarding expectations included participants having other means of emotional support or not being emotionally impacted by the results disclosure session. However, some explained that they had simply not considered this aspect of genetic counseling beforehand. One participant reflected, “You know, I wasn't thinking about it, and I can see how it would be important” (14). Another participant said, “Oh, I really didn't think about that” (13) when asked about their expectations for emotional support.

### 3.4 | Emotional support is not sought from genetic counselors

A minority of participants discussed their feelings with their genetic counselor during their results disclosure and genetic counseling session. These participants all felt as though their genetic counselor provided emotional support. Participant 2 said, “I did not feel those emotions discounted ever once” after sharing their feelings. When asked whether the genetic counselor supported the participant's feelings, another participant said, “Absolutely. I just think [the genetic counselor] was wonderful” (4). Other participants described that the genetic counselor was caring within their conversation and simply listened to them, showing the participants emotional support. Participant 14 said, “Listen to that person. Listen to what they say. Repeat it back. It is so validating. And that is what I got out of the [genetic counseling session].”

The majority, however, reported not discussing their emotions with their genetic counselor during the results disclosure and genetic counseling appointment. When asked to explain their decision not to do so, participants mentioned not feeling emotionally impacted or not wishing to discuss emotions. For example, Participant 12 said, “I just don't go discussing feelings with strangers,” and, “I do with my doctor, but not with a genetic counselor.” Another participant (6) said, “I'm a guy; I don't share feelings.” That said, none of the participants reported feeling as though they shouldn't discuss their emotions with their genetic counselor.

While only a minority discussed their feelings or emotions with their genetic counselor, all participants felt as though they would have received emotional support if they had needed it. One participant said, “I know the genetic counselor I had would have helped me out” (6). Another reported, “There was an opening that if something came up, I could reach out” (2). Similarly, all participants expressed

they trusted that the genetic counselor had their best interest in mind and felt comfortable asking questions. Participant 2 said, “This is not some cold clinician that has a second agenda going here. This is a fellow human being.” Another participant (7) said the genetic counselor “listened very well [...] when we had questions. She listened, and she would address the questions.” When describing the genetic counselor, Participant 6 said she was “obviously caring and had somewhat of an empathetic tone in her voice.” Whether they sought out emotional support or not, participants described being able to develop trusting and comforting relationships with their genetic counselors.

### 3.5 | Emotional support from genetic counselors was viewed ambivalently

Participants were asked whether emotional support was important to them in the context of a genetic counseling session. About half reported that emotional support was important to them. One participant said, “I think it would be important for anyone going through this journey” (2). Another reported that, “It's always important [...] I just think it's good when people care” (7). Participant 14 agreed that emotional support was important, but stated, “I kind of don't pay attention to that often.”

A minority were more ambivalent about the importance of emotional support. For instance, Participant 10 said, “Well, it could have been [important], you know. But I mean the availability of it, I think, is important. But I didn't feel like I needed it.” Some participants felt like emotional support may have been necessary if their results or health status were worse. One participant said they had not found such support important, stating, “I think that's because I feel pretty good” (10). Another participant reported, “in my situation, it's not like I got dreadful news. [...] Another person might feel, you know, differently” (5). Other participants described that while emotional support may be important to them, they have other means for getting that support, such as through a therapist or spouse. One participant said, “My daughter was with me, so I had that support” (9). Another mentioned, “I have some support elements in my life. So, you know, I knew if I needed that, I could reach out and ask her. But I wasn't expecting that [from a genetic counselor]” (2). Participant 4 said, “I also have a therapist who is fully aware of this whole thing [...] so, it wasn't like I needed it.”

Finally, several other participants explicitly mentioned that emotional support during the genetic counseling session was not important to them. Participant 11 said, “I just wanted information,” dismissing a desire for anything else from the visit. Another participant (12) stated that, “[genetic counselors are] trained in medicine, and I'm not an emotionally dependent person.” For this participant, the provision of emotional care was not a responsibility for the medical professional. Other participants either stated they were mostly interested in information from the genetic counselor or were not able to provide an exact reason for finding emotional support unimportant.

## 4 | DISCUSSION

One of the most striking findings of the present study was that regardless of whether a participant had heard of genetic counseling prior to their results disclosure appointment, none reported that providing emotional support was part of the genetic counselor's professional role. In contrast, nearly half of the participants indicated that emotional support was important. These findings could account for the result of a previous study that reported the most common unmet need for patients with PD in the healthcare setting is emotional or psychosocial support (Kwok et al., 2021). It is possible that the majority of patients did not share their feelings with their genetic counselor due to a lack of understanding of the role of genetic counselors, as indicated by the fact that only a little more than a quarter of these participants shared their feelings with their genetic counselor. If patients are unaware that emotional support is within the scope of practice for genetic counselors, they may not feel comfortable sharing their emotional needs.

Considering none of the participants were aware that genetic counselors provided emotional support, it is not surprising that only one participant expected such support during their session with these providers. For many participants, the session was anticipated to be a discussion regarding their genetic test results, and the potential impact of the results on their medical care or the risk for other family members to develop PD. This suggests that participants see the genetic counseling session solely as educational and do not expect emotional support as part of standard care, as was found by a previous study (Hudson et al., 2019). Several participants relied on other sources for emotional support, such as discussing their emotions with therapists or spouses regarding their diagnosis. However, some patients lacked these resources. While having a support system outside of the healthcare system is important, a crucial role of the genetic counseling profession is to provide both informational and emotional support (Schaaf, 2021). Our findings indicate the need for proper education regarding the role of genetic counselors to patients.

An important goal of this study was to explore whether participants were provided the emotional support they needed from their genetic counselor. Many participants acknowledged that receiving a PD diagnosis and going through the genetic testing process was emotionally challenging, and 40% felt that emotional support was important to them. However, very few participants decided to disclose their emotions during the genetic counseling session and did not view emotional support as an aspect of the appointment. It is important to note, however, that many participants felt as though they might have needed emotional support had their medical situation been worse. For example, some participants with negative genetic testing reported they could understand needing emotional support if their results had been positive. Additionally, many participants were optimistic about their health status and felt as though emotional support would be more beneficial to them if they were not physically doing as well. These findings suggest that patients may not feel deserving of emotional support given their status or even

recognize their need for emotional support in a healthcare setting, confirming previous research (Gask et al., 2003; Parker et al., 2020). Therefore, it is important that genetic counselors emphasize their role in providing emotional support to patients with PD, to improve patient expectations for better empathetic and compassionate care.

Only 27% of participants reported sharing their emotions with their genetic counselor during the results disclosure. However, all participants reported that they believed the genetic counselor had their best interest in mind and felt as though they would have received emotional support if they needed it. Many participants shared that they enjoyed speaking with their genetic counselor, had the freedom to ask any questions, and felt like they were truly cared for during their genetic counseling session, regardless of provision of emotional support. A previous study showed that the majority of patients participating in the PD GENE study were satisfied with their experience throughout the genetic testing process (Cook et al., 2023). Patients may therefore refrain from sharing their emotional needs with genetic counselors not due to a lack of trust or rapport, but rather, due to a gap in knowledge for what support a genetic counselor can provide.

### 4.1 | Practice implications

This study demonstrates that patients may lack knowledge regarding the full scope of the genetic counselor's role in their care. While some participants may have heard of genetic testing or genetic counselors prior to their visit, many of our participants' conceptualizations focused on the informational or educational roles of genetic counselors. Even though the term "counselor" is included in the genetic counselor's title, many of the participants of this study were not aware that emotional support was an aspect of the genetic counseling role, and therefore, were not expecting it to be provided during their session. To address this, genetic counselors may consider setting the stage to discuss psychosocial wellbeing by disclosing at the beginning of the appointment that they understand receiving PD genetic testing results—positive or negative—can be emotionally challenging and they are trained and ready to provide emotional support.

### 4.2 | Study limitations

The majority of our participants were self-reported to be non-Hispanic white, with the remainder identifying as Hispanic white. While our demographics are similar to those of the general PD population (Aamodt et al., 2023), future studies could include participants from a greater diversity of populations, including in terms of race and ethnicity, as their experiences and expectations may differ. Anxiety and depression are common symptoms in individuals with PD (Hayes, 2019), which could have affected patient responses regarding emotional support. However, this study did not assess the degree of anxiety or depression before beginning the interviews. Including questions

inquiring about anxiety or depression in future studies could help tailor questions regarding emotional support within a genetic counseling session. Additionally, only three of our participants had a positive genetic test result, and several participants with negative results suggested that receiving a positive result may have increased their need of emotional support. Lastly, our participants received genetic counseling in a research setting from various genetic counselors. Although a standardized protocol for information was used, difference in style and personal approach were unavoidable. Future research examining experiences within the clinical setting, or experiences using only one genetic counselor, may offer valuable insights.

A strength of this study was the qualitative study design. Focusing on a smaller group of individuals allowed us to gain in-depth insights on a variety of topics related to needs of patients with PD during the genetic counseling session. While appropriate when compared with other similar qualitative studies interested in understanding the depth of patient experience (Ang et al., 2015; Damron et al., 2021), there are certainly other voices and experiences we were unable to capture.

## 5 | CONCLUSIONS

These results demonstrate that research participants may not reveal their emotional needs due to a lack of understanding of the role of genetic counselors, rather than a lack of trust between participant and counselor. Despite some participants having heard of genetic counselors prior to the PD GENE study, no participants reported knowing that emotional support was a part of the genetic counselor's role. However, all participants had positive relationships with their genetic counselor and felt as though they would have received emotional support if they needed it. By improving patient education of the genetic counselor role, we may be able to better meet the emotional support needs of patients. In turn, this may increase patient comfort with disclosing emotional needs to genetic counselors, enhancing overall patient-centered care.

### AUTHOR CONTRIBUTIONS

Authors Myka Radecki, Mandy Miller, and Colin Halverson confirm that they had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All of the authors assisted in writing and revising this manuscript, gave final approval of this version to be published, and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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of Medical and Molecular Genetics at Indiana University. This research study was performed to complete the requirements for Myka Radecki while in training in the Indiana University Genetic Counseling Graduate Program.

### CONFLICT OF INTEREST STATEMENT

Myka Radecki, Colin Halverson, and Leah Wetherill, declare no conflicts of interest. Mandy Miller received partial funding of salaries from the Michael J. Fox Foundation (MJFF) and Parkinson's Foundation.

### DATA AVAILABILITY STATEMENT

The data that support this study's findings are not publicly available. Please contact the corresponding author, Mandy Miller, to request access.

### ETHICS STATEMENT

Human studies and informed consent: This study was reviewed and granted exemption by the Indiana University Institutional Review Board. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all participants for being included in the study.

Animal studies: No non-human animal studies were carried out by the authors for this article.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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