Discrepancies Between Expected and Actual Cochlear Implant–Related Functional Outcomes

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Objective: Previous research has demonstrated that realistic patient expectations are a critical factor in determining cochlear implant (CI) candidacy. The current study uses the validated Cochlear Implant Quality of Life–Expectations (CIQOL-Expectations) instrument to determine expectations of potential CI users and the degree to which their pre-CI expectations are met after implantation.
Study Design: Prospective cohort study.
Setting: Tertiary medical center.
Patients: Sixty adult CI patients.
Interventions/Main Outcome Measures: Pre-CI aided and post-CI consonant-nucleus-consonant word and AzBio sentence scores, pre-CI CIQOL-Expectations, and pre-CI and 3/6/12-month post-CI CIQOL-35 Profile scores.
Results: Mean pre-CI CIQOL-Expectations exceeded 12-month mean CIQOL-35 Profile scores for the global measure and the communication, environment, and listening effort domains (d = 0.65–0.97). The communication and listening effort domain scores had the largest discrepancy between expected and actual post-CI improvement (actual scores, 15.1 and 16.3 points lower than expected [d = 0.93–0.97], respectively). For 42% of patients, pre-CI global expectations exceeded 12-month post-CI CIQOL-35 Profile global scores, 49% met their expectations, and actual scores exceeded expectations for only 10% of patients. Similar patterns were seen for all CIQOL domains except emotional.
Conclusions: Post-CI functional abilities seem to fall short of pre-CI expectations for a substantial percentage of CI users, which was most apparent for the communication and listening effort CIQOL domains. These results may help clinicians direct personalized counseling toward common misconceptions, which can aid shared decision making and potentially minimize the mismatch between expected and realized outcomes.
Level of Evidence: III.
IRB Pro00073019, approved December 20, 2017 (Medical University of South Carolina).
Key Words: Adult—Cochlear implantation—Cochlear implants—Humans—Motivation—Prospective studies—Quality of life—Speech perception—Treatment outcome.

Otol Neurotol **00:**00–00, 2023.

INTRODUCTION

With a progressively aging population worldwide, the prevalence of postlingual, sensorineural hearing loss continues to grow (1), and the number of individuals seeking treatment is increasing (2). Since cochlear implants (CIs) gained Food and Drug Administration approval in 1984, the procedure has become the standard of care for patients with moderate to severe sensorineural hearing loss who do not benefit from hearing aids. Over the years, aspects of cochlear implantation such as its associated technological advancements and improvements in audiologic outcomes have been well studied. However, the role of pre-CI patient expectations and their association with post-CI experienced outcomes is unclear and not adequately studied.

Although the specific numerical criteria for implantation have expanded over the past 30 years, the overall strategies used to determine candidacy have remained static. CI candidacy relies on word or sentence recognition in quiet and/or in background noise with little standardization of measurement procedures across institutions (3). In addition, speech recognition testing does not accurately reflect CI users' real-world experiences, and therefore lacks ecological validity (4–7). Given the uncertainty to which conventional speech recognition tasks reflect the communication and other challenges that CI users encounter in their daily lives, it remains difficult to accurately identify which individuals are most likely to benefit from cochlear implantation, as well as quantify how their quality of life will improve from their device. This challenge is magnified by the potential to implant patients with more residual hearing.

To better understand the patient perspective, patient-reported outcome measures have become increasingly important in

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Sources of support and disclosure of funding: This study was supported by the National Institutes of Health/National Institute on Deafness and Other Communication Disorders (Grant K23 DC016911).

T.R.M. is on the medical advisory board for Envoy Medical. The remaining authors disclose no conflicts of interest.

DOI: 10.1097/MAO.0000000000004018

understanding the impact of medical interventions on patients' lives. Numerous studies have assessed the impact of a CI on patients' quality of life, but preoperative patient expectations have rarely been measured, and the factors that may alter expectations over time have yet to be adequately defined. Studies on other medical interventions have demonstrated the importance of understanding patient expectations, with greater alignment between preintervention expectations and postintervention outcomes resulting in higher patient satisfaction (8,9). However, expectations in CI patients have not been adequately studied to this point.

With a goal of better quantifying patient expectations before implantation, we developed and validated the Cochlear Implant Quality of Life (CIQOL) Expectations instrument based on the established CIQOL framework (4,10,11). The CIQOL-Expectations instrument measures patients' anticipated outcomes among six domains and a global score, which can be used to compare preoperative expectations to post-CI normative data (12). This comparison provides a metric to assess whether patients have realistic expectations, which has been identified as a key factor for audiologists when deciding whether to recommend patients move forward with a CI (13). Moreover, the application of the CIQOL Functional Staging System provides real-world clinical vignettes for CIQOL domain scores. The staging system was designed to transform psychometrically derived CIQOL scores into detailed descriptions of patients' self-reported abilities, thereby enabling more straightforward interpretation and incorporation into CI counseling. Importantly, patients prefer outcome discussions based on such real-world examples over discussions centered on speech recognition scores (14). By incorporating data-driven functional outcome counseling into the preoperative evaluation, providers can reduce misconceptions regarding potential CI outcomes and ultimately improve shared decision-making.

The alignment of pre-CI expectations and postoperative performance is also important as it may yield increased satisfaction with CI performance and influence end-user behavior (such as motivation, hours of CI use, and adherence to auditory training and rehabilitation) (15). In fact, our previous research has also observed that patients with lower preoperative expectations had higher post-CI patient-reported outcome scores, further illustrating the importance of expectations as a modifiable factor. Therefore, to expand upon previous research, the goal of the current study is to determine if and when patients meet their preoperative expectations during the first year of clinical follow-up.

MATERIALS AND METHODS

A retrospective review of a prospectively maintained adult CI database was performed to include patients undergoing cochlear implantation at (the Medical University of South Carolina) from March 2019 to November 2022. Patients 18 years or older who were fluent in English and with postlingual deafness were eligible for inclusion. Exclusion criteria included patients with single-sided deafness, patients receiving a revision CI surgery, and patients with incomplete speech recognition, CIQOL-Expectation, or CIQOL-35 Profile data.

The following data were extracted from our database: age at implantation, sex, preoperative hearing aid use, duration of hearing loss before implantation, preoperative and postoperative audiometric and speech recognition data, preoperative patient CIQOL-Expectation scores, and preoperative and postoperative CIQOL-35 Profile scores. Duration of hearing loss before CI was defined by self-reported number of years with hearing loss before implantation. Hearing aid use before CI was defined as the patient's self-reported active hearing aid use for most of the day at the time of the CI evaluation (yes/no). Consonant-nucleus-consonant word scores (CNC-W) were measured with earphones (headphone or insert). Earphone CNC-W scores for each ear were obtained at 5 dB below uncomfortable loudness level (determined with speech signals). Pre-CI CNC-W, CNC phoneme scores, Arizona Biomedical sentences recognition test in quiet (AzBio), and Arizona Biomedical sentences presented in noise (multitalker speech babble) at +10 dB SNR (AzBio +10) scores were measured under aided conditions (16). Aided AzBio +10 measures were obtained when individuals scored >50% on AzBio quiet. Aided speech recognition was measured with speech presented at 0 degrees azimuth at 60 dB SPL in the sound field in a sound treated room. Hearing aid users were tested with their personal hearing aids when they appropriately matched NAL-NL2 fitting targets; otherwise, patients were provided properly fitted clinic owned hearing aids. All hearing aids (personal or clinic-owned aids) were programmed to meet NAL-NL2 targets, which were verified using real ear measurements (17).

In addition to the standard CI evaluation and postoperative testing, patients completed the Cochlear Implant Quality of Life-35 Profile (CIQOL-35 Profile) instrument (11) before their CI evaluation visit and at 3, 6, and 12 months after CI activation. To assess patients' expectations of their potential CI-related outcomes, patients also completed the CIQOL-Expectations instrument. Each item in the expectation instrument has a corresponding item in the CIQOL-35 Profile. Therefore, outcomes from the CIQOL-Expectations can be compared with CIQOL-35 Profile scores to determine the degree in which patients' expectations were met. Every item for both instruments uses the same five response choices. Both the CIQOL-35 Profile and the CIQOL-Expectations include six domains (communication, emotional, entertainment, environment, listening effort, and social) and a global measure. Each is scored on a 0- to 100-point scale, with 0 indicating the lowest expectation/ability and 100 marking the highest expectation/ability. Based on established instrument measurement error (standard error; SE) for CIQOL-35 Profile scores, patients with global and domain CIQOL-35 Profile scores 12 months after activation within one SE were defined as having met their outcome expectations (12). Those with scores outside one SE were defined as exceeding or failing to meet expectations.

Given that each item on the CIQOL-Expectations instrument directly corresponds to a similar item on the CIQOL-35 Profile, we performed an additional analysis to determine the specific outcome expectations that were and were not met. We then compared individual patients' pre-CI Expectation to 12-month post-CI CIQOL-35 Profile individual item

TABLE 1. *Demographics of patients included in the study*

Factor	
Age at implantation, mean ± SD, yr	65.0 ± 15.9
Sex	
Male, n (%)	26 (43.0)
Female, n (%)	34 (57.0)
Duration of hearing loss before CI, mean ± SD, yr	24.2 ± 14.9
Current hearing aid user before CI, n (%)	49 (81.7)
Duration of current hearing aid use, mean ± SD, yr	3.5 ± 3.2
Listening modality	
CI in one ear, no hearing aid in other ear, n (%)	17 (28.3)
CI in one ear, hearing aid in other ear, n (%)	40 (66.7)
Bilateral CI, n (%)	3 (5.0)

CI indicates cochlear implant; SD, standard deviation.

responses, and the differences were averaged for the cohort. Effect sizes were then calculated for each pair (as described hereinafter). Large effect size differences ($d \geq 0.8$) were used as a cutoff for items with greatest discrepancy between expectation and actual outcome.

Statistical Methods

Descriptive statistics such as frequency, percentage, mean, standard deviation, minimum, and maximum were calculated for all outcome variables where appropriate. Difference between patient expectations and postoperative CIQOL was assessed with paired *t* tests. Correlation coefficients <0.19 were considered very weak; 0.20 to 0.39, weak; 0.40 to 0.59, moderate; 0.60 to 0.79 strong; and >0.80, very strong (18). Cohen *d* was used to measure the effect size for all analyses. An effect size of 0.2 to 0.49 is considered small; 0.5 to 0.79, medium; 0.8 to 1.29, large; and greater than 1.3, very large (19). Descriptive statistics were performed using SPSS version 28 (IBM Corp., Armonk, NY).

RESULTS

A total of 60 patients who completed the CIQOL-Expectations instrument before implantation were followed through 1 year after CI activation. The demographics of the study sample are summarized in Table 1 and were generally representative of the broader adult CI population (20). The average age at CI implantation was 65 years with a mean duration of hearing loss of 24 years. At the time of CI evaluation, 82% of patients were hearing aid users. Of the 60-patient cohort, 67% used a unilateral implant and a hearing aid in the contralateral ear, 28% used only a unilateral CI, and 5% used bilateral CIs (mean time between implants, 5.3 ± 2.3 mo). Sex, age, duration of hearing loss, preoperative hearing aid use, and listening condition during testing were not found to correlate with patient expectations.

Preoperative and postoperative word recognition scores as well as preoperative Expectations and CIQOL outcomes for the CI user cohort with 1-year follow-up data are described in Table 2. When comparing preoperative aided to 12-month postactivation speech recognition scores, there were substantial improvements in CNC word scores ($d = 2.22$), AzBio quiet scores ($d = 2.62$), and AzBio +10 scores ($d = 2.75$). CIQOL-35 Profile domain scores also increased from pre-CI to 12 months after CI activation ($d = 0.69$–1.30), with the majority of improvement realized within 3 months of implant activation (Table 2, Fig. 1).

To determine the degree to which CI users' pre-CI expectations were met, pre-CI CIQOL-Expectation scores were compared with 12-month post-CI CIQOL scores. Mean pre-CI CIQOL-Expectations exceeded 12-month mean CIQOL-35 Profile scores for the global measure and the communication, environment, and listening effort domains ($d = 0.65$–0.97; Table 2, Fig. 1. The communication and listening effort domain scores had the largest discrepancy between expected and actual post-CI improvement (actual scores, 15.1 and 16.3 points lower than expected [$d = 0.93$–0.97], respectively). However, patients' outcomes were quite close to their expectations for the emotional, entertainment, and social domains ($d = 0.12$–0.36). The emotional and social domain scores had the smallest discrepancies (actual scores, 2.3 and 6.0 points lower than expected [$d = 0.12$–0.31], respectively). For 42% of patients, pre-CI global expectations

TABLE 2. *Pre–cochlear implant and 3-, 6-, and 12-month post-Cochlear implant means of word recognition, sentence recognition, and CIQOL-35 Profile (individual domains and global) scores as well as the effect size of the comparison between expectations scores and actual 12-month post–cochlear implant CIQOL scores (individual domains and global)*

Outcome, mean ± SD	Preimplantation CIQOL-Expectations	Preimplantation	3 mo Postimplantation	6 mo Postimplantation	12 mo Postimplantation	Expectations vs. 12-mo Outcomes, *d* (95% CI)
CNC-P %		25.7 ± 22.7	64.8 ± 24.3	71.1 ± 22.2	72.7 ± 20.8	
CNC-W %		12.2 ± 15.2	49.2 ± 26.2	55.4 ± 24.8	56.1 ± 23.6	
AzBio %		13.2 ± 17.3	62.5 ± 30.1	63.2 ± 30.0	71.1 ± 26.0	
AzBio +10%		6.3 ± 8.6	39.8 ± 30.3	49.9 ± 26.5	57.3 ± 23.3	
CIQOL-Global	59.7 ± 14.0	35.3 ± 9.5	48.5 ± 10.0	49.4 ± 10.1	49.8 ± 13.2	**0.73 (0.36 to 1.10)**
CIQOL-Communication	61.65 ± 17.18	28.1 ± 14.3	44.9 ± 11.0	46.5 ± 10.9	46.5 ± 14.0	**0.97 (0.59 to 1.3)**
CIQOL-Emotional	61.9 ± 18.9	43.7 ± 13.4	59.6 ± 14.7	60.2 ± 15.6	59.6 ± 19.4	0.12 (−0.24 to 0.48)
CIQOL-Entertainment	64.6 ± 19.5	35.0 ± 14.5	55.0 ± 23.4	53.2 ± 23.0	56.5 ± 25.5	0.36 (−0.01 to 0.72)
CIQOL-Environment	67.8 ± 22.0	34.2 ± 21.2	52.8 ± 16.5	53.7 ± 17.6	54.5 ± 18.6	**0.65 (0.29 to 1.02)**
CIQOL-Listening Effort	53.5 ± 19.0	20.2 ± 14.6	37.6 ± 13.7	38.8 ± 12.0	37.1 ± 16.1	**0.93 (0.55 to 1.30)**
CIQOL-Social	68.4 ± 18.5	48.0 ± 20.8	59.3 ± 20.6	63.2 ± 19.8	62.4 ± 21.1	0.31 (−0.05 to 0.67)

Bold indicates significant effect size.

AzBio, Arizona Biomedical sentences recognition test in quiet; AzBio +10, Arizona Biomedical sentences recognition test in noise with signal-to-noise ratio of +10 dB; CI, confidence interval; CIQOL, Cochlear Implant Quality of Life; CNC-P, consonant-nucleus-consonant phoneme scores; CNC-W, consonant-nucleus-consonant word scores; *d*, effect size; SD, standard deviation.

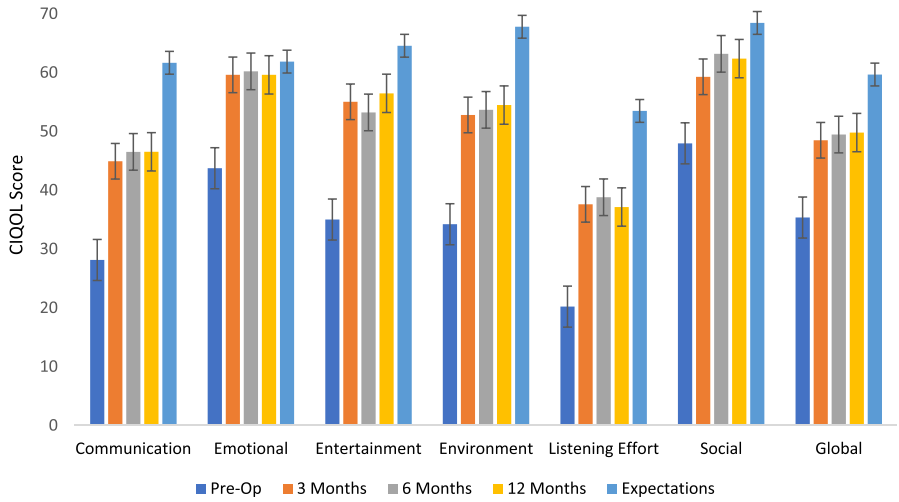

FIG. 1. Means for all domain and global scores of both preoperative CIQOL-Expectations and CIQOL-35 at pre-CI assessment and post-CI at 3-, 6-, and 12-month visits. Error bars represent standard errors for means. CI indicates cochlear implant; CIQOL, Cochlear Implant Quality of Life.

exceeded 12-month post-CI CIQOL-35 Profile global scores, 49% met their expectations, and actual scores exceeded expectations for only 10% of patients. The number of patients failing to meet or exceed their pre-CIQOL-Expectations 12 months after activation varied by domain: 30 (50%) for communication domain, 15 (25%) for emotional domain, 20 (33%) for entertainment domain, 27 (45%) for environment domain, 28 (47%) for listening effort, and 17 (28%) for social domain (Table 2, Fig. 2).

We then analyzed differences between patient expectations and 12-month outcomes for each of the 35 paired items in the CIQOL-Expectations and CIQOL-35 Profile instruments. Looking at calculated effect sizes, the majority of items with the greatest discrepancy between expectations and outcomes were in the communication domain. Patients expected greater improvement in the ability to communicate in noisy environments, communicate with multiple speakers, and expected to rely less on lipreading or speakers repeating themselves after implantation than actual improvement (items 3, 4, 7–10; $d = 0.91–1.10$). Similarly, in the listening effort domain, patients had to concentrate more than they had anticipated when using their implant in adverse listening environments (items 27 and 28; $d = 0.94–0.97$). In addition, patients also expected better sound localization with their CI than actual improvement (item 25; $d = 0.95$; Table 3).

DISCUSSION

Previous research has investigated preoperative patient expectations across various medical interventions, where higher expectations often correspond with improved postoperative patient-reported outcome (8). Interestingly, the inverse relationship has been observed in CI recipients, where patients with lower CI performance expectations reported higher postoperative CIQOL (15). However, there are limited validated methods to measure patient pretreatment expectations for all medical interventions, and associations with posttreatment outcomes vary considerably based on the instruments used to measure expectations outcomes as well as the intervention being studied (8). The present study enhances the rigor of such research through the application of a validated instrument specifically designed to measure

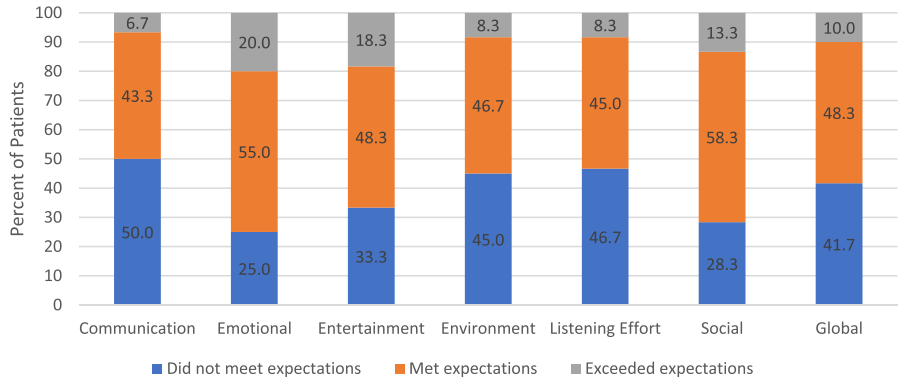

FIG. 2. Percent of patients failing to meet, meeting, and exceeding pre-CI expectations based on 12-month post-CI CIQOL. CI indicates cochlear implant; CIQOL, Cochlear Implant Quality of Life.

TABLE 3. *Comparison of expectations and 12-month post-CI CIQOL-35 scores—individual items*

CIQOL Domain	Item No.	Item Stem	Expectations, Mean (SD)	12-mo CIQOL, Mean (SD)	Effect Size, *d* (95% CI)
Communication	1	Conversation in quiet without asking for repeat	4.28 (0.66)	3.77 (0.87)	0.65 (0.29 to 1.02)
	2	Other people's voices sound clear and natural	4.06 (0.89)	3.56 (0.95)	0.54 (0.18 to 0.90)
	3	Conversation with 3+ people	3.96 (0.86)	3.10 (0.97)	**0.94 (0.57 to 1.33)**
	4	Conversation without asking for repeat	4.08 (0.92)	3.22 (0.94)	**0.91 (0.54 to 1.30)**
	5	Hear and understand without looking	3.83 (0.99)	3.17 (1.09)	0.63 (0.27 to 1.00)
	6	Ask a lot of questions about what is being said	3.35 (0.95)	2.97 (0.86)	0.42 (0.06 to 0.78)
	7	Understand conversation in a crowded room	3.50 (0.99)	2.52 (0.91)	**1.10 (0.72 to 1.49)**
	8	Conversation in a noisy place without asking for repeat	3.46 (1.24)	2.40 (0.96)	**0.96 (0.59 to 1.34)**
	9	Understand strangers without lipreading in a noisy space	3.58 (1.12)	2.53 (1.03)	**0.97 (0.60 to 1.35)**
	10	Follow conversation in a group of five	3.28 (1.15)	2.25 (1.04)	**0.93 (0.56 to 1.31)**
Emotional	11	Feel comfortable being myself	4.35 (0.79)	3.93 (0.99)	0.46 (0.10 to 0.83)
	12	Hearing loss makes me feel inadequate	3.26 (1.31)	3.43 (1.05)	0.13 (−0.22 to 0.49)
	13	Hearing loss makes me irritable	3.41 (1.16)	3.57 (1.01)	0.14 (−0.22 to 0.50)
	14	Keep quiet in conversation to avoid saying wrong things	3.16 (1.16)	3.15 (1.19)	0.02 (−0.34 to 0.38)
	15	Frustrated when cannot follow conversation	3.25 (1.15)	2.92 (1.14)	0.29 (−0.07 to 0.65)
Entertainment	16	Due to hearing loss, listen to TV less often than I like	3.53 (1.18)	3.65 (1.26)	0.10 (−0.26 to 0.46)
	17	Able to enjoy listening to radio and TV	4.13 (0.87)	3.70 (1.29)	0.39 (0.03 to 0.75)
	18	Able to enjoy music	4.06 (1.00)	3.45 (1.36)	0.51 (0.15 to 0.88)
	19	Recognize melodies in music	3.83 (1.09)	3.35 (1.13)	0.43 (0.07 to 0.79)
	20	Music sounds clear and natural	3.76 (1.14)	3.12 (1.32)	0.52 (0.16 to 0.89)
Environment	21	Everyday sounds are clear	3.93 (0.97)	3.60 (0.98)	0.34 (−0.02 to 0.70)
	22	Everyday sounds sound natural	3.86 (1.00)	3.65 (0.99)	0.22 (−0.14 to 0.58)
	23	Distinguish sounds in nature	3.83 (0.96)	3.57 (0.89)	0.28 (−0.08 to 0.64)
	24	Hear cars approaching in traffic	4.08 (0.85)	3.37 (0.94)	0.79 (0.42 to 1.16)
	25	Hear someone approach from behind	3.85 (0.90)	2.92 (1.05)	**0.95 (0.57 to 1.33)**
Listening effort	26	Takes minimal effort to follow conversation	3.93 (0.94)	3.20 (1.05)	0.73 (0.36 to 1.10)
	27	Ignore competing sounds and focus on who is speaking	3.88 (1.03)	2.93 (0.97)	**0.94 (0.57 to 1.33)**
	28	Easily have conversation in noisy place	3.48 (1.14)	2.40 (1.08)	**0.97 (0.59 to 1.35)**
	29	Have to concentrate during conversation	2.75 (1.16)	2.40 (1.03)	0.32 (−0.04 to 0.68)
	30	Have to concentrate during conversation with strangers in noisy place	2.73 (1.16)	1.92 (0.98)	0.75 (0.38 to 1.12)
Social	31	If interested will join family/friends for social event	4.28 (0.83)	4.00 (0.90)	0.32 (−0.04 to 0.68)
	32	Have confidence to socialize	4.06 (0.97)	3.67 (1.14)	0.38 (0.02 to 0.74)
	33	Hearing loss keeps me from socializing	3.86 (1.08)	3.73 (1.08)	0.14 (−0.22 to 0.50)
	34	Avoid social situations	3.85 (1.02)	3.45 (1.14)	0.37 (0.01 to 0.73)
	35	Feel left out in a group	3.40 (1.17)	3.18 (1.17)	0.19 (−0.17 to 0.55)

Comparison of preoperative Expectations to post-CI 12-month CIQOL scores for all individual items. Item values displayed represent mean responses on 1-to-5 Likert scale. Bold indicates large effect size. More detailed information associated with individual item numbers of the CIQOL-35 instrument may be found at https://education.musc.edu/CIQOL.

CI indicates confidence interval; CIQOL, Cochlear Implant Quality of Life; SD, standard deviation.

potential CI patient outcome expectations. Moreover, given that the CIQOL-Expectations instrument was developed using the CIQOL framework, CI users' pre-CI expectations can be directly compared with post-CI CIQOL-35 Profile outcomes. Thus, the degree to which CI users' expectations were met can be directly measured.

In the present study, post-CI functional abilities fell short of pre-CI expectations for a substantial portion of CI recipients for the global measure and the communication, environment, and listening effort CIQOL domains. The largest discrepancies were observed for communication and listening effort. However, CI user outcomes for the emotional and social domains were quite close to patient expectations. Using an individual item analysis, we also identified the greatest expectation to functional outcome discrepancies. Here, the greatest shortcomings of their CIs reported by patients included challenges communicating in a group setting, especially with competing background noise, and continued reliance on visual cues and speakers having to repeat themselves. In addition, patients expected better ability to localize environmental sounds after implantation than actual improvement.

Previous research has shown that CI users ranked communication and the ability to detect more environmental sounds as their top outcome priority (21). In addition, patients' perception if their CI had been a success is related to the extent that their preimplantation expectations were met (21). Key areas where patients reported unfulfilled expectations included the ability to have a conversation in public with background noise, communicate on the phone, and appreciate music (21,22). Our results similarly demonstrate that patients expected better functional abilities when communicating in a group setting especially in complex listening environments based on individual CIQOL item effect sizes. Expectations related to the ability and confidence to socialize with others and increased emotional well-being were most often met for patients after implantation. Patients in previous research similarly reported a richer social life after implantation and less perceived isolation (22). However, previous expectations research has been limited by retrospective study designs. In these previous studies, patients were asked to think back to their pre-CI expectations over a year after surgery, as expectations were not measured before surgery. In

the present study, data were collected prospectively, which eliminates this recall bias.

Results from our study emphasize the importance of measuring individual patient expectations and how these can be applied for evidence-based counseling. The use of the CIQOL-Expectations instrument and corresponding published normative CIQOL outcome data (12) provides the framework to ensure patients have realistic expectations. Outcome discussions based on real-world examples as used in the CIQOL Functional Staging System are favored by patients over reviewing speech recognition scores (14). Future research by our group aims to explore changes in patient expectations after preoperative counseling during the CI evaluation. By incorporating evidence-based counseling approaches, misconceptions regarding potential CI outcomes can be reduced, leading to improved shared decision making throughout the CI process.

A recent study from our research program underscores the importance of improving pre-CI counseling. We found that CI users have higher outcome satisfaction and less regret about their decision to undergo cochlear implantation when there is greater congruence between pre-CI expectations and post-CI outcomes (23). In the present cohort, 75% of patients had preoperative communication expectations that exceeded normative CIQOL scores for CI-users. Although it may be impossible to precisely predict outcomes for each patient, addressing patient expectations during the CI evaluation process may help ensure they have realistic and achievable goals based on known post-CI data for CI users. It may not be necessary for expectations to exactly match normative data, but patients should have a clear understanding of which outcomes are most likely based on available evidence. Moreover, these data may help motivate patients to work toward maximizing functional abilities with their implant through increased device use, challenging themselves to engage in conversation in adverse listening conditions, and placing higher stake in auditory training resources to potentially reach these goals (24–26). For patients with low expectations, evidence-based pre-CI counseling may assure them that they are likely to meet their expected outcomes, while also illustrating that even more improvement is possible.

This research demonstrates that there is likely substantial capacity to improve the CI counseling process, but the framework for improvement is provided and should be examined in future studies. The use of a single institution is a limitation of the current study, which we plan to address in future research. Moreover, the use of additional outcome measures to further examine the association between expectation-outcome mismatch and patient satisfaction with their treatment decision will also require additional research.

Conclusion

The present study demonstrates the first prospective investigation into the degree to which patient pre-CI expectations are met after cochlear implantation. Up to half of CI users fail to meet their preoperative expectations for multiple domains. The main reason for the expectation-outcome mismatch seems to be related to patients' anticipation of greater improvement in the ability to communicate in a group setting. Patients also reported needing accommodations from other speakers and more reliance on visual cues than they expected to communicate effectively in complex listening environments using their implant. In contrast, CI users' outcomes regarding emotional wellbeing and the ability to socialize with others were close to their expectations. Measuring patient expectations may help clinicians direct individualized counseling, which can facilitate shared decision making and potentially reduce the mismatch between expected and realized outcomes.

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