Beyond the Streetlight in Hearing Aid Research

Examining the socio-cultural effects of smartphone-connected hearing aids

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Imagine it’s late at night, you’re walking in a parking lot and you drop your keys as you approach your car. In the distance you see a streetlight, so you move away from your car toward the light to search for your keys. It’s easier to see over there.

Seems silly, right? The streetlight effect describes an observational bias that finds people searching for that which they seek only where it is easiest to look. In audiology, a crucial opportunity exists to move beyond the streetlight effect to broaden our research questions and approaches. In this current study, we shift our gaze into the hard-to-see, and thus often overlooked area of sociocultural effects of technology.

This article summarizes the Journal of the American Academy of Audiology article: “A qualitative case study of smartphone-connected hearing aids: Influences on patients, clinicians, and patient–clinician interactions.”

Consider the innovation of smartphone-connected hearing aids. As the innovation grows, studies in this domain will likely focus on the usual suspects: important outcomes like speech recognition, quality of life, psychoacoustics. Meanwhile, popular hearing health websites and magazines reveal many fascinating assertions about other potential effects of this innovation. For example, might the features and functions born of smartphone connectivity influence the social acceptability of hearing aids? Might there be concerns about privacy, given that many hearing health providers are bound by health information laws, and smartphone connectivity involves information tracking? Might the demographic interested in hearing aids shift? Under the streetlight, we might not ask all of these questions, or we might try to answer them using familiar theories and methods.

Smartphone-connected hearing aids have introduced a range of new capabilities, including: stereo audio transmission directly to hearing aids, real-time internet connectivity, graphical user interfaces, and real-time access to coordinates from global positioning systems. With no relay device, hearing aid users can control their hearing aids and make location-specific program adjustments by using the iPhone® interface. For example, through the mobile device feature of “geotagging” (attaching a geographic location to a particular media object on one’s phone), hearing aid program preferences can be associated with and automatically activated at specific geotagged locations.

Beyond the streetlight, we can dig deeper, though we need to draw from other scientific concepts and disciplines to do so. Technology itself may often be seen as value-neutral — only as beneficial or harmful as intended by its creators and users. Hearing healthcare as we know it could not exist without technology, which the field continually advances through research and development. However, rarely do we pause to examine the underlying assumptions of the field’s intents, instead operating safely under the assumption...
that our field aims to help people hear, and therefore innovations in the field are born of these intents and are inherently positive. But as a scientific field, hearing health research has an imperative to test its assumptions, all of its assumptions! While we often test assumptions about the behavior of digital signal processing (DSP) innovations, we rarely test assumptions about the social and cultural effects of an innovation on individuals and society.

**Research questions**

This study thus used sociological theories and research methods to pose and answer two research questions:

1. How do patients and clinicians experience smartphone-connected hearing aids?
2. What are some of the sociocultural and ethical implications of smartphone-connected hearing aids?

The smartphone-connected hearing aids in this study were Starkey Halo™ and the associated TruLink® application, although some participants also had experience with other manufacturers’ connected devices.

**Methodology**

A qualitative research design, specifically collective case study drawing upon grounded theory analytic techniques, [Ng, Lingard, & Kennedy, 2013; Meston & Ng, 2012] was most appropriate to answer these research questions. For a detailed description of this rigorous, sociological methodology, see the full version of Ng and colleagues’ [2016] paper. Data collection entailed semi-structured interviews with 19 people, framed as two cases – 11 patients (the patient case) and eight clinicians (the clinician case) – and identification of 10 “grey literature” documents – news and popular media articles – related to the study topic and published during the study time frame. All but one of the patient and one of the clinician participants had tried Halo hearing aids; these two participants were considering, but had not yet tried, smartphone-connected hearing aids. The constant comparative method [Ng, Lingard, & Kennedy, 2013; Meston & Ng, 2012] was conducted within and between individual interview transcripts, and within, between, and across the clinicians and patients. Therefore, we are able to present findings in terms of:

- Clinician experiences with smartphone-connected hearing aids
- Patient experiences with smartphone-connected hearing aids
- Differential experiences of the same sociocultural effects, between clinicians and patients
- Pervasive experiences of sociocultural effects, across clinicians and patients

**Findings**

<table>
<thead>
<tr>
<th>Between-Case Findings (compare between columns, within rows)</th>
<th>Within-Case Findings CLINICIANS (look within column)</th>
<th>Within-Case Findings PATIENTS (look within column)</th>
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<tr>
<td>Candidacy profiles (and thus caseloads) shifted and clinicians developed and used heuristics to determine who might benefit from these devices.</td>
<td>Patients reflected upon their technological competence and defined their identity as a technology user and learner.</td>
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<td>Changes to the clinical encounter/experience</td>
<td>Longer appointments meant increased time spent getting to know the patient, necessary to best fit and educate around the device.</td>
<td>Increased workload as a technology user and “troubleshooter,” which was met with both positivity and frustration.</td>
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Across-Case Findings: The smartphone-connected hearing aids were perceived as “normal” technology, privacy concerns were acknowledged with resignation/denial, and opportunities for meaningful activities were perceived as increased.
Clinicians used heuristics to make candidacy decisions

Clinicians described heuristic-based judgments when deciding which patients would be good candidates to try the smartphone-connected hearing aids. These judgements were labelled “heuristic-based” to contrast them from evidence-based protocols. Heuristics, in clinical decision-making, derive from experiential knowledge, forming quick “rules of thumb” that practitioners run through to make a clinical decision (Wieringa & Greenhalgh, 2015; Marewski & Gigerenzer, 2012). Remarkably similar across practitioners in our study, elements of these heuristics included:

- Patient experience with and usage of smartphone technology, as gathered from the clinician’s observation of the patient, and case history
- Patient lifestyle (i.e. activity level and type) and goals (e.g. being able to hear better on the phone) as determined both informally and through more formal assessment
- Cost versus patient budget

Patients described themselves in terms of technological (in)competence

Patients’ described themselves in terms of technologically competent or incompetent. Those who perceived themselves as tech-savvy tended to take pride in being able to use the smartphone-connected hearing aids. Those who perceived themselves as technological neophytes tended to see the smartphone-connected hearing aids as a learning opportunity. Importantly here, technological competence was tied to participants’ sense of identity, with one patient even “studying” the smartphone application prior to his appointment, for fear of presenting an incompetent image of himself.

The clinician-patient relationship and roles changed; but this change was experienced differently

A common effect – greater effort and time spent working with the smartphone-connected hearing aids relative to non-connected hearing aids – resulted in different experiences between clinicians and patients. Clinicians identified increased time spent talking to patients, about their lives and teaching them how to use the device and app, as an implication of the smartphone-connected hearing aids. Clinicians valued the increased time and effort they spent “getting to know” their patients. Patients also identified considerable effort related to using and troubleshooting the smartphone-connected hearing aids. Many were frustrated by this additional effort, while the more technologically-savvy patients seemed more willing to adopt a “troubleshooter” identity with one even joining online discussion forums to take matters into his own hands.

The smartphone-connected hearing aids had a ‘normalizing’ effect

Across patients and clinicians, there was a resounding theme of “normalization” of hearing aids via their integration with a “normal” technology [mobile phones]. Participants appreciated the inconspicuous nature of the connected devices, allowing discreet volume control. One patient specifically remarked on how much “cooler” his hearing aids were than his mother’s, and specifically noted that he was glad his hearing aids did not resemble hers. One clinician remarked on how the link to the smartphone meant that Halo users would not “look old” while controlling a device from a smartphone, whereas another specifically promoted Halo based on how discreet they are. Along with this normalization trend was a perception of an expanded caseload. Both patients and clinicians suggested that this innovation would result in younger demographics and skeptical patients increasing their willingness to
try hearing aids. Some clinicians perceived this as a trend in their practice. As one clinician said, “They have completely changed the way that we fit hearing aids, and honestly, they’ve helped change my entire client database.”

**Information privacy was considered a lost cause**

Clinicians and patients alike seemed indifferent regarding the geotagging and other forms of surveillance embedded in the smartphone application. Overall, participants in our study seemed resigned to a loss of control with respect to digital data in general. Perhaps since all but one clinician and one patient participant had already adopted Halo hearing aids, our participants were generally unconcerned about the details or implications of sharing their data.

**The connected hearing aids supported participation in meaningful activities**

Particular to the connectivity aspect, participants attributed opportunities to enjoy activities of meaning to their Halo hearing aids. Specifically, more enjoyable music listening, and conversing in the car, on the phone, and at work were highlighted by our participants.

**Implications and Conclusions**

The implications of these findings will be discussed in terms of what we have learned in this move away from the streetlight, and where we still need to look:

- Considerations for integrating the innovation into our clinical encounters
- Critical views on taken-for-granted assumptions in our field
- New research directions, beyond the streetlight

**The Clinical Encounter**

Clinicians may wish to consider two ways in which a smartphone-connected hearing aid may shift the nature of the patient-clinician relationship.

1. Patients who adopt smartphone-connected hearing aids may take on more responsibility in terms of usage effort and technological learning. Some patients may feel a sense of insecurity regarding their technological competence. Therefore, patient education and counseling may need to address the greater expectations of patient “workload” related to the technology – learning how to use the application for example – and to keep in mind that patients may need support as they develop their identity as a technology user.

2. Candidacy profiles for smartphone-connected hearing aids may look different than those for non-connected hearing aids. Clinicians may wish to attend to potential assumptions about who might benefit from smartphone connectivity, in light of some of our participants telling us about their willingness to try new technology or to learn new technology, even if they didn’t start out as smartphone-savvy. While heuristics have actually shown promise to be just as, or more, effective than protocols, (Wieringa & Greenhalgh, 2015) they do have some pitfalls (Norman & Eva, 2010). Clinicians should ask themselves who they might be inappropriately ruling out by applying their heuristics.

**Normalization and Stigma: Critical questions for our field**

A paradox presents itself in our findings. On the one hand, patients’ experiences of stigma may decrease by way of connecting a formerly stigmatized assistive device [the hearing aid] with a popular, everyday technology [the smartphone]. This outcome is, in many respects, positive. However, on the other hand, to make a hearing aid more discreet and “cool” may also feed into
societal stigma, as our field implicitly tries to hide hearing loss by blending it into everyday life. In this sense, stigma itself is not being decreased, but rather hearing aid wearers are blending in more effectively, hiding that which is still stigmatized.

Therefore, a crucial practice point for all of us in the hearing aid industry must be made: while we develop and dispense these technologies to help people, we must continue to critically challenge society to accept hearing loss as an aspect of life that many will experience. A range of choices is available to those with hearing loss, and this range will likely continue to grow. But rather than pushing discreet or “cool” technological innovations as the sole answer, we have an ethical imperative to continue to push society toward genuine acceptance and inclusion.

Everyday practices that may help achieve this goal include being mindful of the language we use in practice and in promoting hearing aids. We should attend to and query language that implies hearing loss should be hidden, keeping in mind that we may be influencing people’s sense of identity as an individual with hearing loss. Therefore, we must continually engage in critical analysis of our own practices and the language we use to talk about options and opportunities, lest we hurt those we are aiming to help (Phelan, Wright, & Gibson, 2014).

**Exciting new research directions, beyond the streetlight**

Further research could help articulate some considerations for candidacy decision-making, perhaps taking into account concepts from occupational science and auditory ecology. Occupational science looks at activities of meaning, toward enabling meaningful participation in society (Phelan & Kinsella, 2009). Given the substantial role of individual’s lifestyles and meaningful activity in connected hearing aid candidacy decision-making, an occupational science lens may help us attend to questions beyond the reach of our current theories in hearing science. While auditory ecology already considers the range of listening situations and demands people encounter, and their relative importance to people, (Gatehouse, Naylor, & Elberling, 2003) research in this realm may be expanded by an occupational science lens.

As innovations open up new possibilities for patients, the patient-clinician encounter may need to be informed by new science to shift most optimally. This “new” science may require a move away from the streetlight. Clinical decision-making research is an exciting field stemming from the cognitive and social sciences (Wieringa & Greenhalgh, 2015; Norman & Eva, 2010; Mamede, Schmidt, & Rikers, 2007). This study’s findings about clinicians’ use of heuristics open up many research questions that we will pursue.

**Summary**

Every field has its focus, and hearing healthcare has long focused where it certainly should. Yet this study opens up new avenues of research, which are also important to the field. As clinicians, engineers, scientists, and hearing aid users, we do not only exact our influence on future hearing innovations, we are also influenced by technologies (e.g. smartphones), and the new social possibilities they produce. These effects require continued interdisciplinary inquiry and critically conscious practices.
References


