

Using Ecological Momentary Assessment in Audiology Research: The Participants' Perspective



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INTRODUCTION

Ecological momentary assessment (EMA) is a methodology involving repeated collections of real-time or very recent data describing subjects' experience and context in their natural environments (Shiffman, Stone, & Hufford, 2008). Compared to traditional questionnaires, EMA allows self-report measurements in-situ which minimizes recall bias and collects contextual information of the environment. Given the advantages of EMA, when the participant is required to repeatedly answer survey questions, it may place a burden on the participant and decrease compliance. The purpose of this paper was to understand participants' experience after participating in an EMA study about assessing adult listeners' auditory ecology using a smartphone/hearing aid-based EMA system.

METHODS

Participants

- 10 normal-hearing listeners (NH)
 - Age: 19-32 (M=38.57, SD=11.19)
- 9 experienced bilateral hearing aid users (HI)
 - Age: 48-79 (M=69.09, SD=9.81)

Hearing aid fitting

- Hearing aids: Starkey Halo2 RIC 13
- NH: - Programmed to zero gain (muted; acoustically transparent)
 - Open dome
- HI: - Aided response matched to own device aided response in order to minimize the impact of acclimatization
 - Dome selection audiologically motivated, based on degree of hearing loss

Procedure

- Each pair of hearing aids was wirelessly connected to an Android phone.
- Each participant wore bilateral hearing aids for a period of one week.
- Sampling protocol: An interval contingent prompting strategy was used. A 14-item survey was initiated by a mobile app (AudioSense+) about every 40 minutes during the active hours of each participant (a phone ringtone). If a survey was not able to answer, the participant was allowed to skip or snooze that survey occurrence for 30 minutes.
- An exit interview was performed on each participant.

Complete the survey to describe what happened during the past 5 minutes (multiple choice questions)

- Were you actively listening most of the time?
- What did your active listening involve?
- Were you talking with more than one person?
- What kind of sounds were you listening to?
- Were you in wind?
- Was there music in the background environment?
- Were there people around you talking in the background environment?
- Overall, how loud were the background environmental sounds?
- The speech of interest was ___ when compared to all other sounds. (e.g., softer, louder)
- You could follow the conversation/speech.
- You had to strain to understand the conversation/speech.
- What was your main listening goal?
- It was important to achieve your main listening goal(s).
- It was difficult to achieve your main listening goal(s).

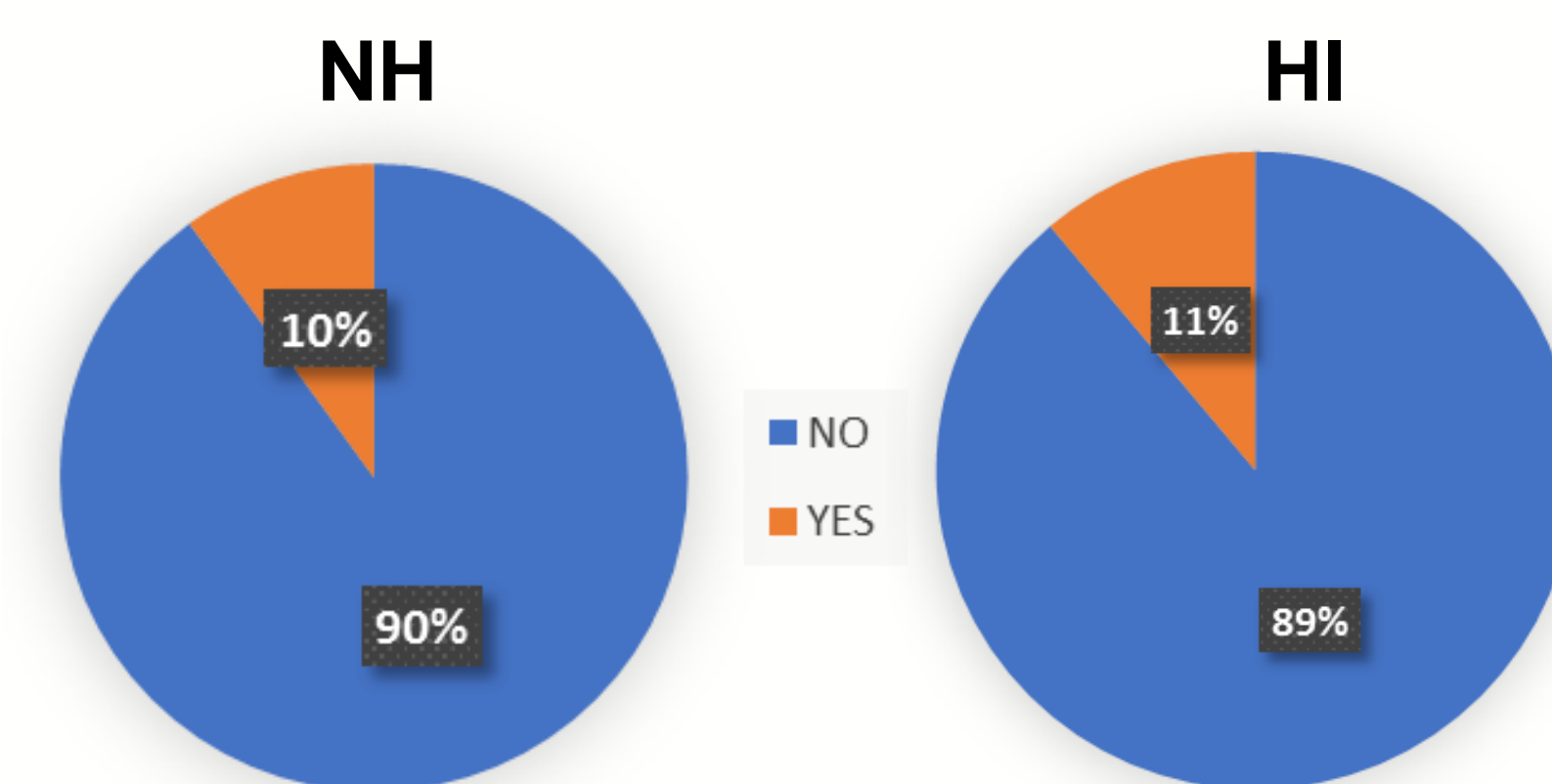
RESULTS

EMA survey

- For both NH and HI groups,
- on average, each participant completed 9.1 surveys per day;
 - average response rate (total number of completed surveys divided by total number of survey that supposed to initiate) was 0.46.

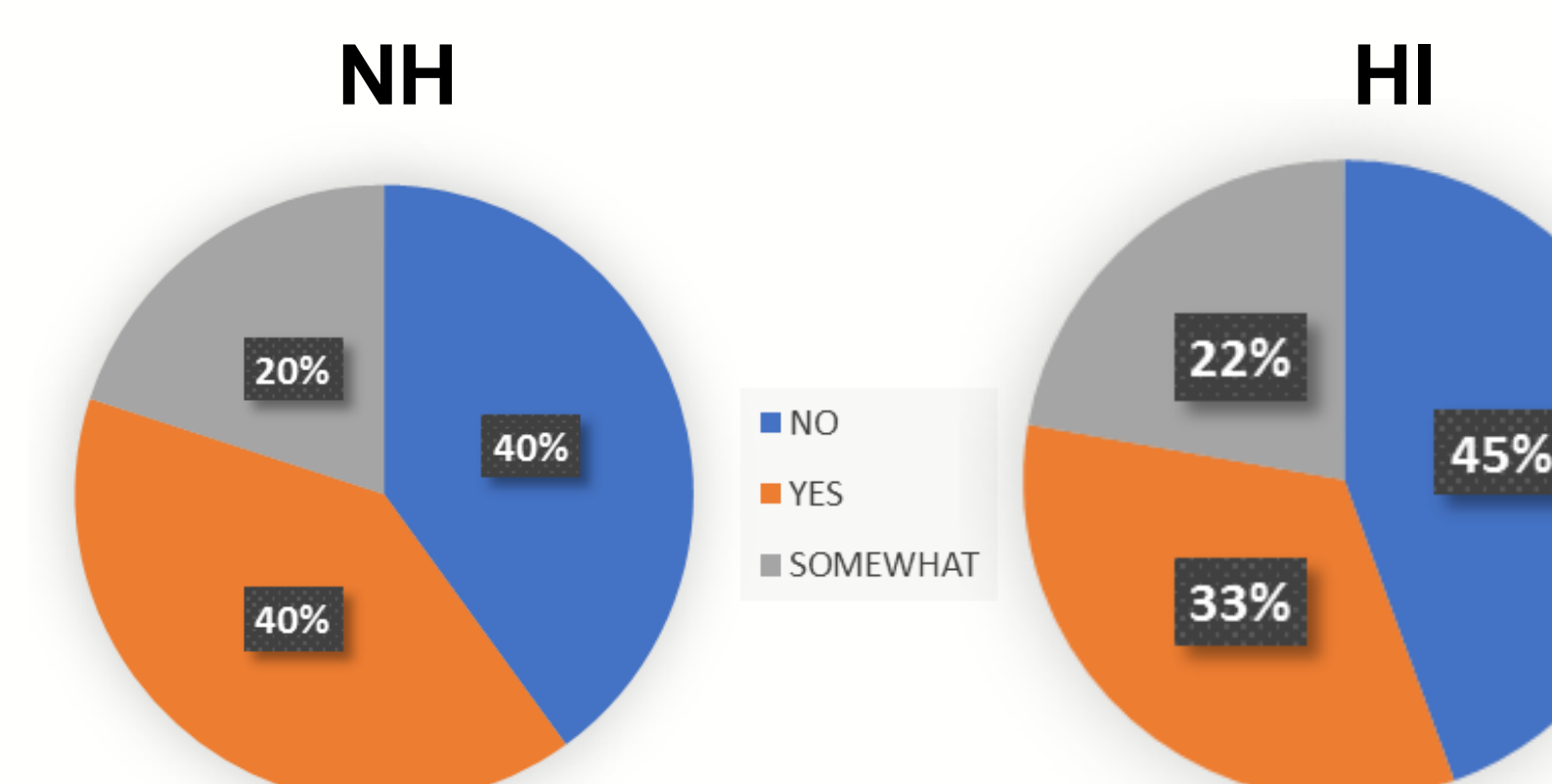
Exit interview questions

Q1. Was it difficult to use the mobile app?



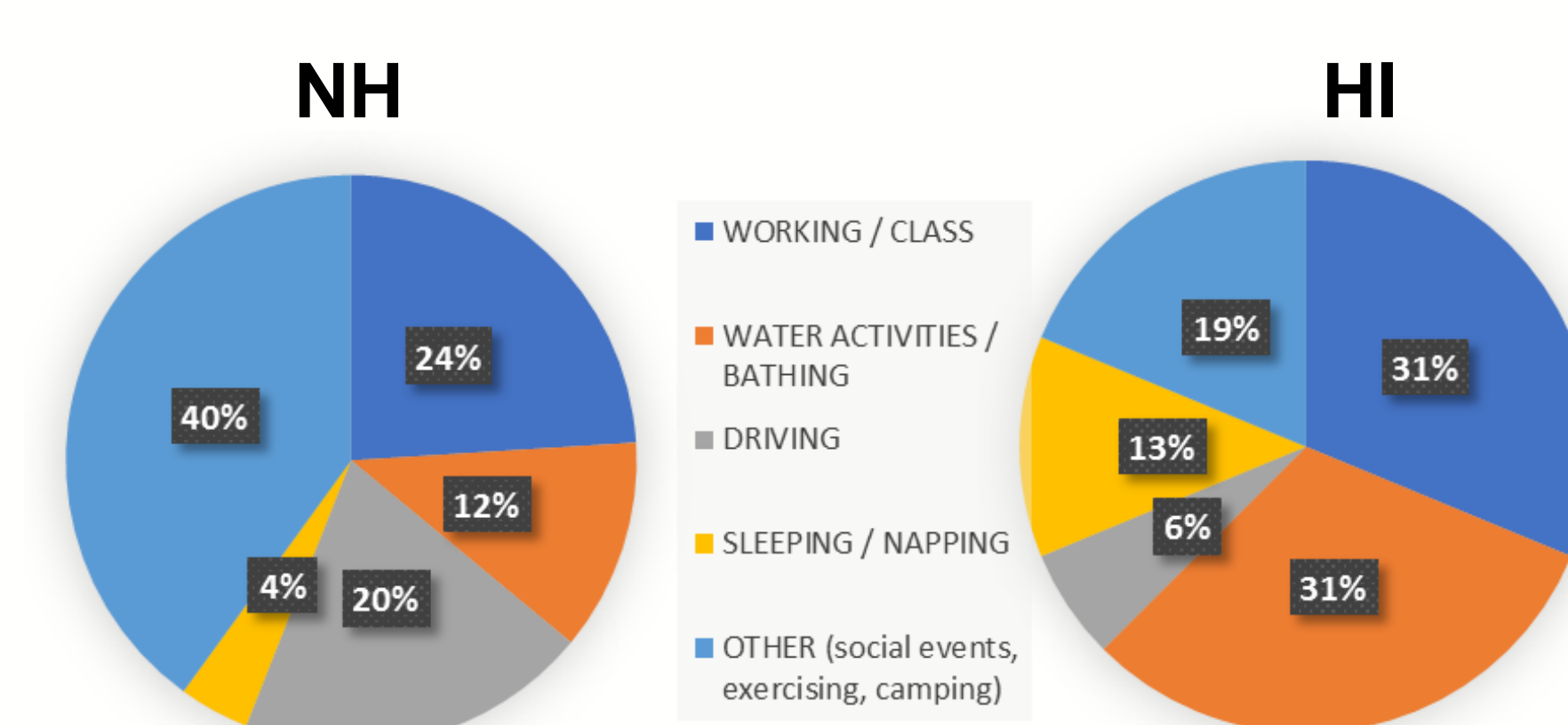
- Both groups reported the Android app was very easy, convenient, and straight forward to use.
- Some participants suggested addition of a visual indicator or notification on the screen with each survey delivery.

Q2. Was the repetitive survey interrupting your daily activities?



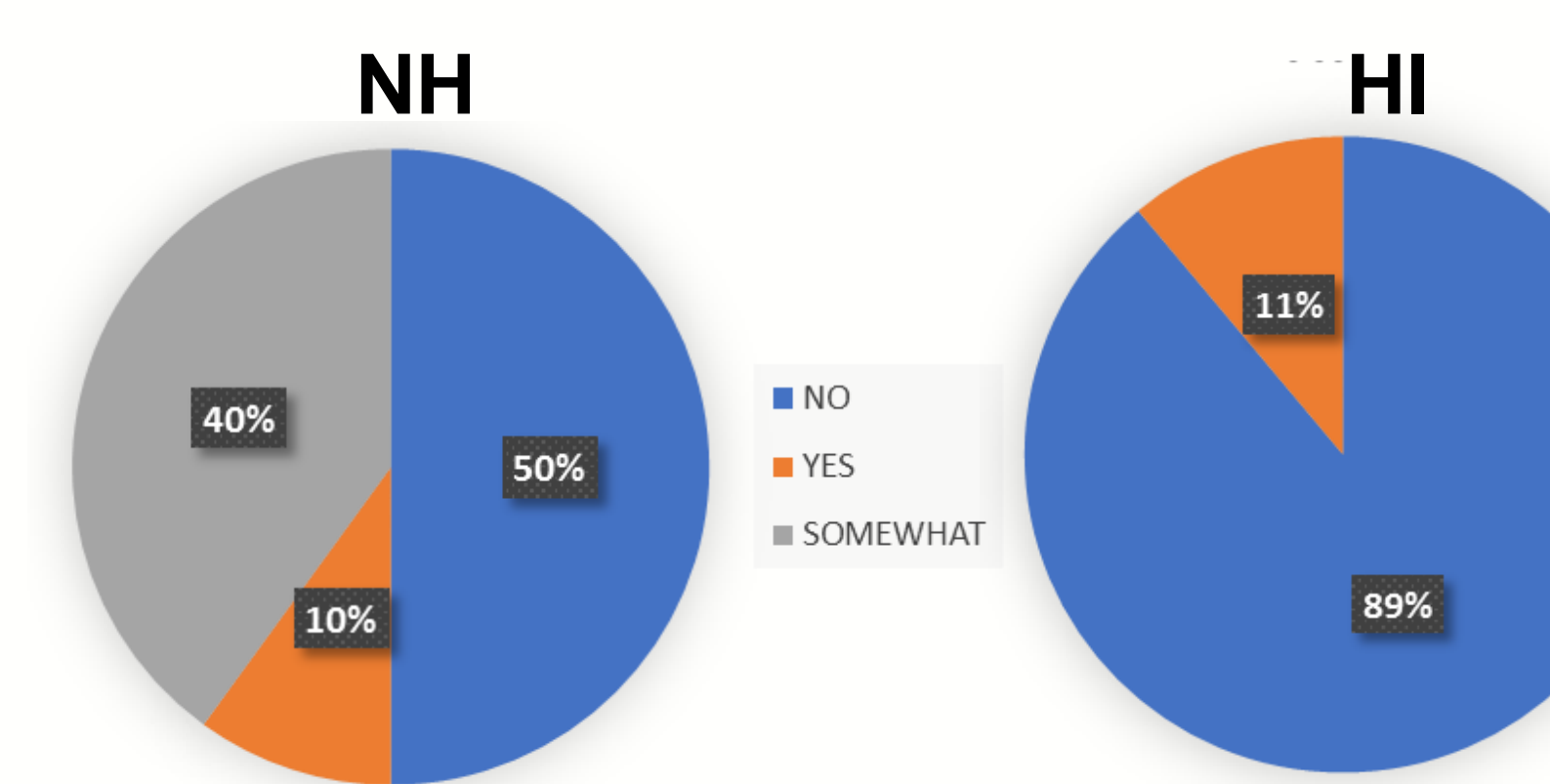
- Both groups reported surveys occasionally interrupted them while driving, in class, at work, or during social events. However, it was not overwhelming.

Q3. In what situations did you prefer to snooze or skip a survey?



- Participants sometimes preferred to snooze / skip a survey while driving, at work, exercising or during other social events.

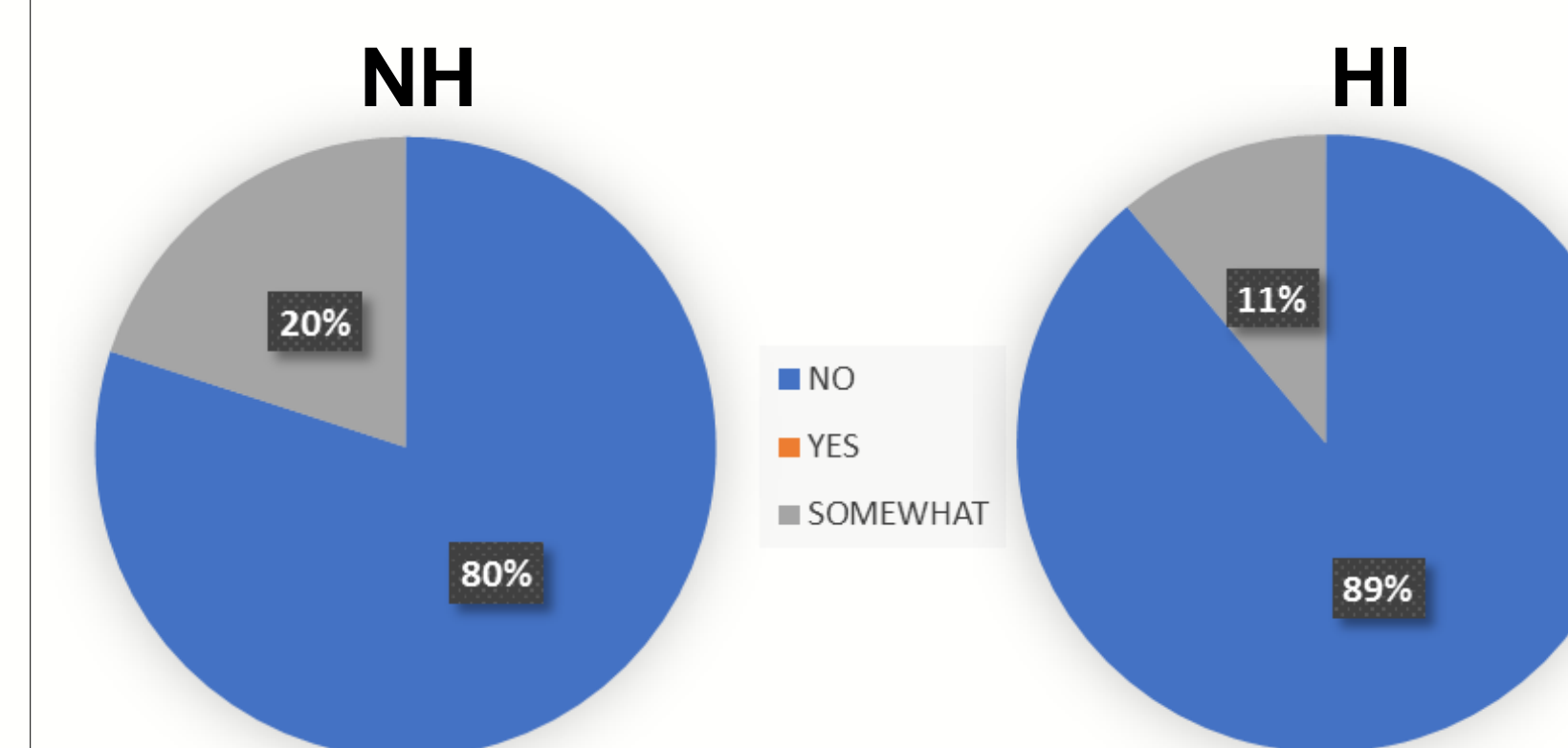
Q4. Was the survey delivered too frequently?



- Some NH participants perceived that they received surveys sooner than every 40 minutes when they were busy. This may be attributed to active and fast-paced lifestyle of young listeners.

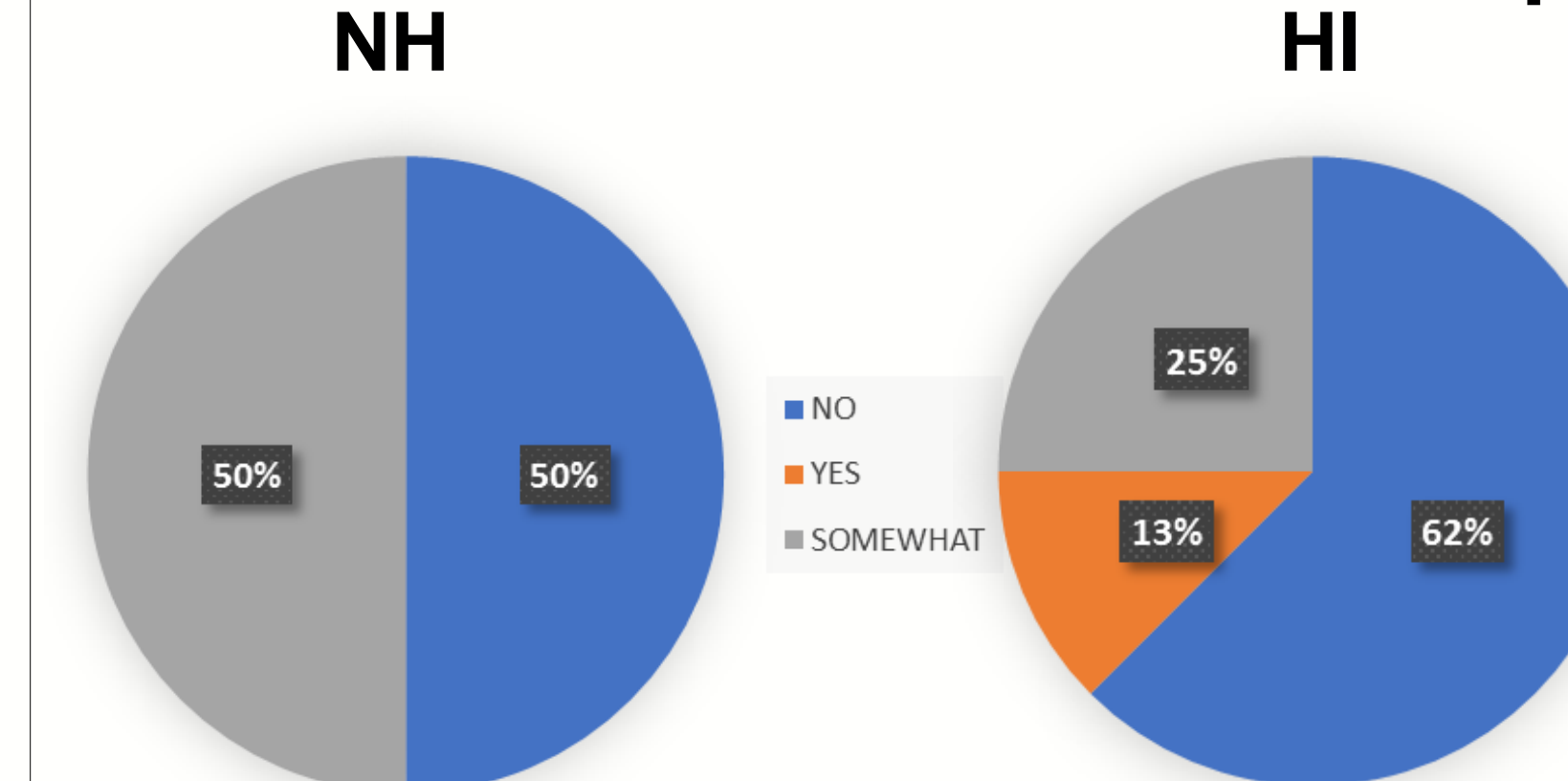
RESULTS (CONT.)

Q5. Was the survey too long?



- Length of survey questions and number of questions were appropriate in general.
- Maximum 14 questions per survey (adaptive format style).
- Completion time between 30 seconds to 2 minutes.

Q6. Was it difficult to answer the questions in the survey?



- Question 12 regarding listening goals was reported to be a little difficult to answer (response categories include: Ignore/block sounds; Be aware of sounds around you; Maintain listening/hearing comfort; Monitor sounds to take action; Locate sounds; Actively listen to speech/music/nature; and Converse/participate). It would be helpful to provide examples in the app for these categories.

Other comments:

- The most challenging aspect was remembering to carry all devices together (research smartphone, hearing aids along with personal belongings).
- Both NH and HI participants suggested the addition of self-initiated EMA prompts and an option for open-ended comments.

DISCUSSION & CONCLUSIONS

- The EMA protocol was appropriate and did not overly burden participants.
- Because a smartphone/hearing aid-based EMA system was used, survey data and hearing aid data were collected simultaneously. With this design, the survey was not initiated when the connection between the smartphone and the hearing aids was lost (e.g., the phone was off; hearing aids were far away from the phone). Thus, the response rate was partially influenced by wireless connectivity.
- The 14-item multiple choice survey was acceptable to both groups.
- In some situations, participants could not or would not complete surveys.
- For practical reasons, the participants in this study needed to carry a research phone in addition to their own phone. This was inconvenient. It would be preferable to use their own smartphones when possible.
- Listening goal is an important component of auditory ecology. This was our first attempt to explore this concept. Findings of this study could help to refine this question.

REFERENCE

Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annu. Rev. Clin. Psychol.*, 4, 1-32.