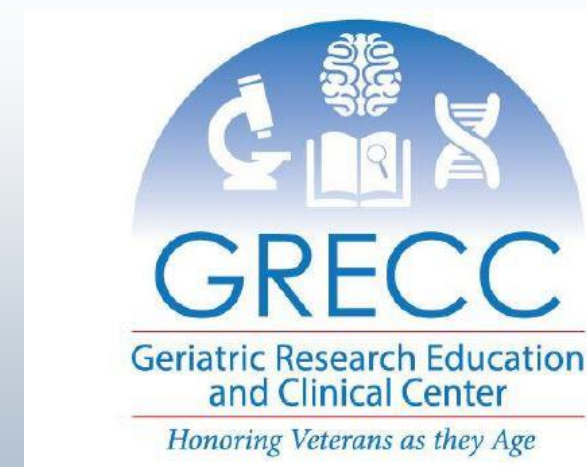# CAN SIMULATED SUFFICE? CONSIDERING REAL-EAR AIDED RESPONSE AND TELEHEALTH IN VETERANS

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INTRODUCTION

- VHA Directive 1170.02 requires audiologists to verify hearing aid (HA) fittings using validated techniques.
- Providers have sought to minimize face-to-face interaction throughout the COVID-19 pandemic. Although restrictions have eased, telehealth continues to benefit Veterans with difficulty traveling to a clinic.
- Simulated real-ear measurements (S-REMs) are a coupler-based method that uses acoustic transforms to predict the sound pressure level in a patient's ear canal.

OBJECTIVE

- Quantify the difference in sound pressure level between REMs and S-REMs in the Veteran population with regard to HA style.

METHODS

- Within-subjects study using prospective data collected with the Audioscan Verifit.

Input Thresholds and Select HA Style/Coupling
↓
Measure (W)RECD
↓
Verify HA Output Using S-REMs
↓
Undo Any Programming Adjustments
↓
Verify HA Output Using REMs

Figure 1. Schematic of data collection protocol.
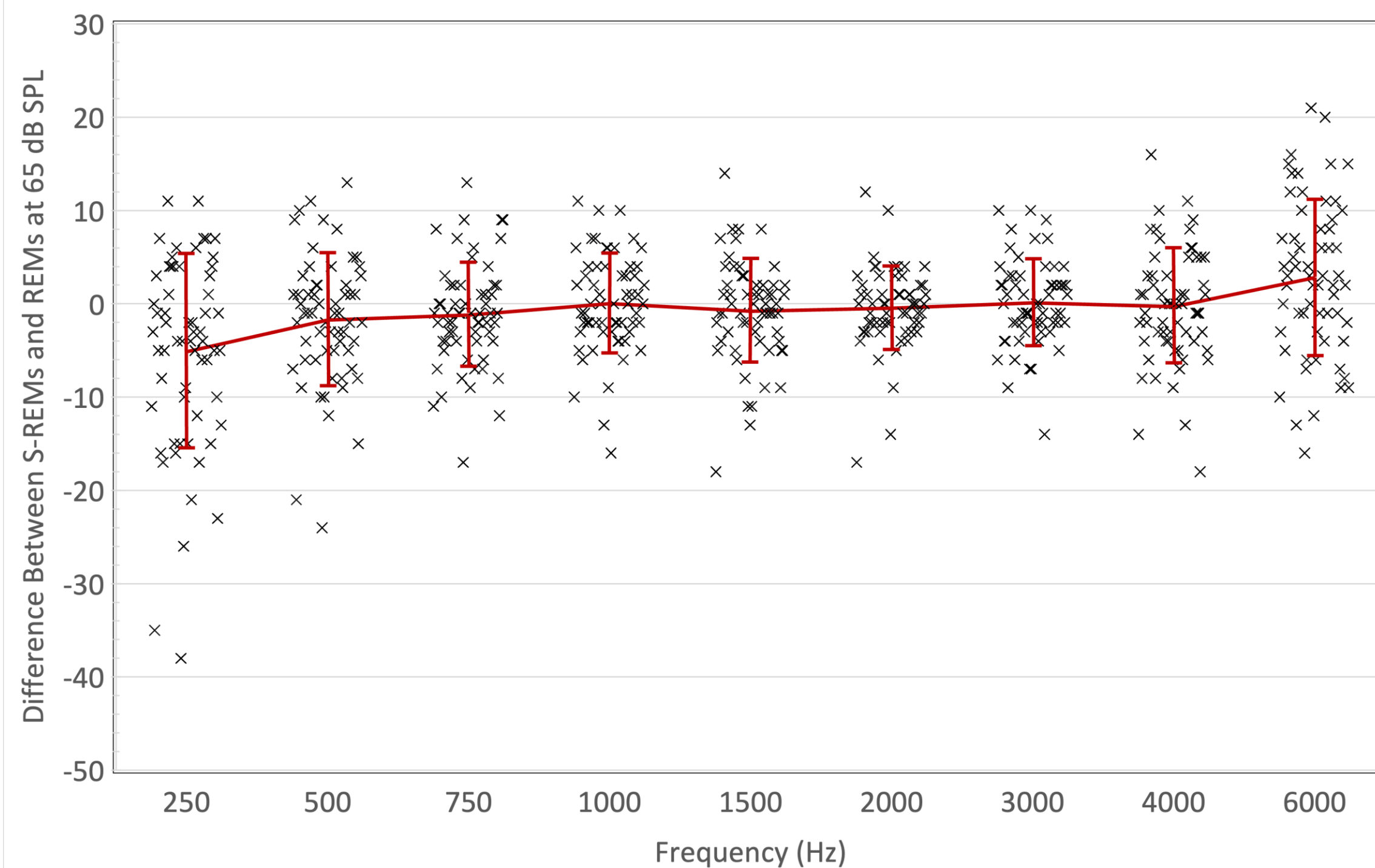
RESULTS

S-REM Accuracy

Figure 2. Difference in HA output between S-REMs and REMs at 65 dB SPL. Positive and negative values indicate that S-REMs overfit and underfit the hearing aids, respectively. Solid line indicates the average. Error bars indicate the standard deviation at at each frequency (see Table 1). 31% of these values were overfit or underfit by at least 5 dB SPL and 84% of participants' S-REMs differed by greater than 5 dB SPL when compared to REMs in at least one ear and at least one frequency from 500-4000 kHz.

Freq. (kHz)	.25	.5	.75	1	1.5	2	3	4	6
SD (dB)	10	6	5	5	5	4	4	6	8

Table 1. Standard deviation of the difference in HA output at each frequency.
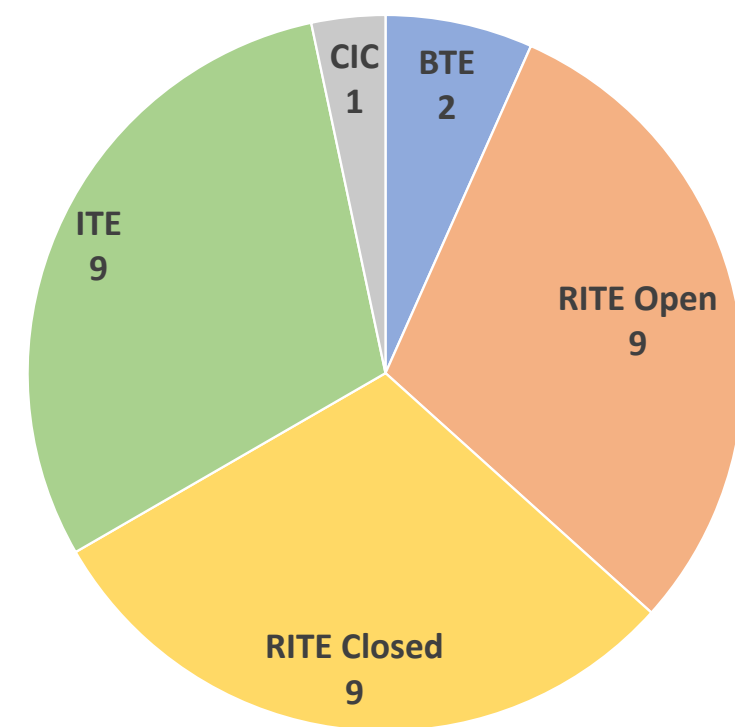
Style of Hearing Aid Fitted

Figure 3. Style of HA fitted (N=30 participants). In this sample, participants were fitted with Oticon (N=15 participants), Phonak (N=6 participants), and Starkey (N=10 participants) HAs. Each HA manufacturer had comparable S-REM accuracy (data not shown).
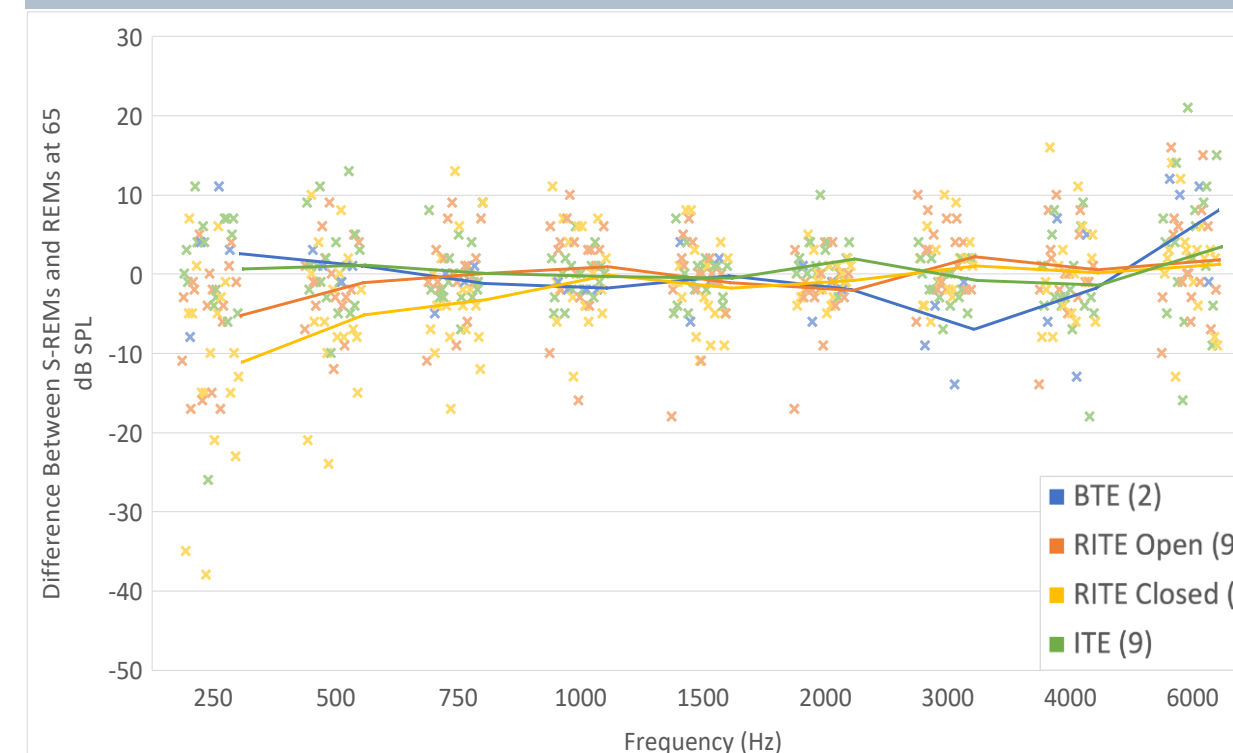
HA Style and S-REM Accuracy

Figure 4. Average trend graph showing the difference in hearing aid output between S-REMs and REMs at 65 dB SPL by hearing aid style (N=60 ears). Positive and negative values indicate that S-REMs overfit and underfit the HAs, respectively. Solid line indicates the average. The one participant fitted with a CIC HA is omitted from the figure.

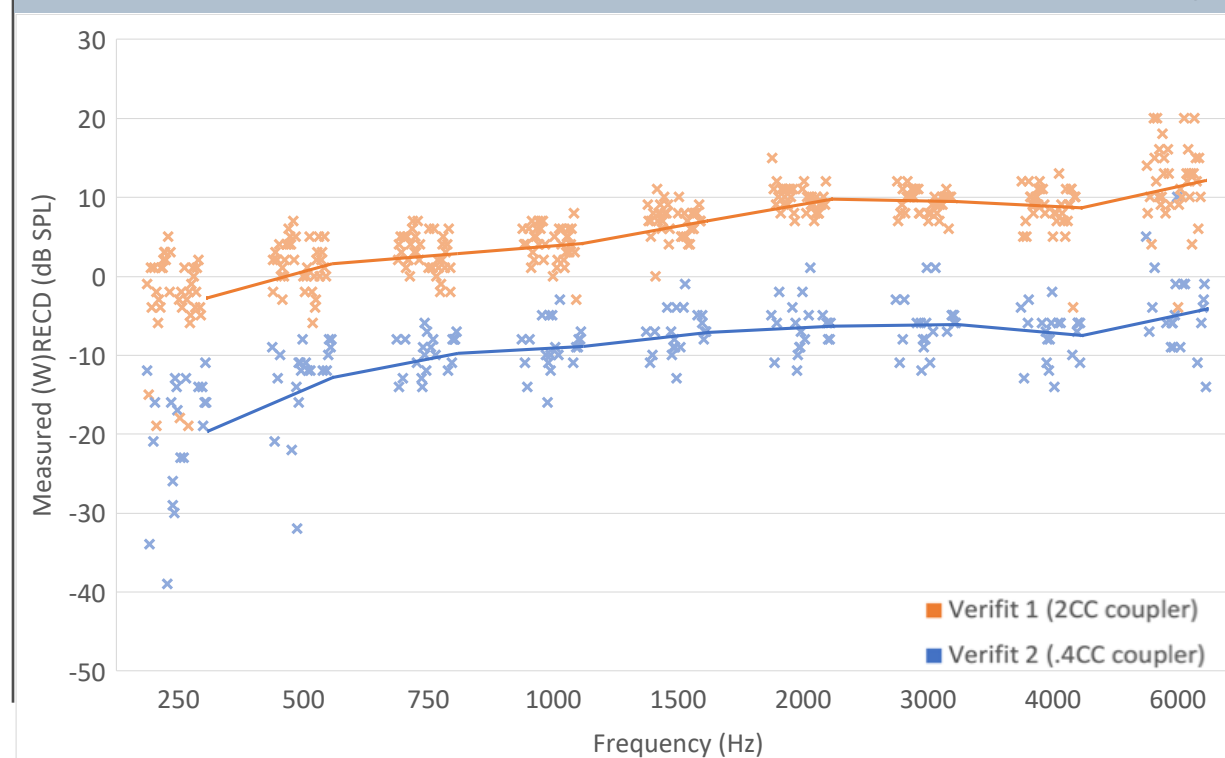### Measured (W)RECD Differs by Verifit Edition

Figure 5 Average trend graph showing measured RECD values from the Verifit 1 using a 2CC coupler (N=38 ears) and Verifit 2 using a .4CC coupler (N=24 ears). Solid line indicates the average. Participants' S-REMs and REMs were completed with the same Verifit edition.

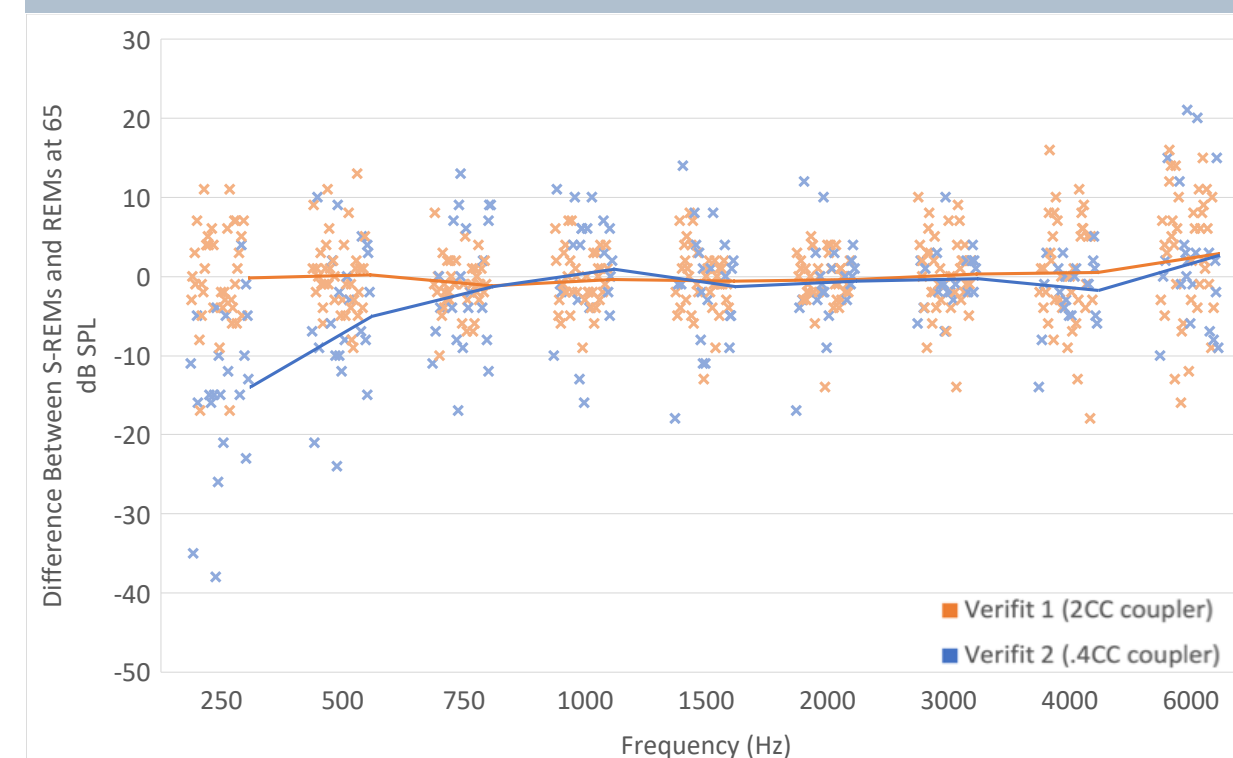### Verifit Edition and S-REM Accuracy

Figure 6. Average trend graph showing the difference in hearing aid output between S-REMs and REMs at 65 dB SPL by Verifit edition (N=61 ears). Positive and negative values indicate that S-REMs overfit and underfit the hearing aids, respectively. Solid line indicates the average.

DISCUSSION

- Providers must consider how to support remote service-delivery models while maintaining best practices.
- Hearing aid style and Verifit edition do not explain variability in the difference between S-REMs and REMs.
- S-REMs are not a replacement for REMs nor considered best practice but useful in situations where a Veteran is unable to visit the clinic in-person.

FUTURE DIRECTION

- This information will assist our group in planning future telehealth services.
- More participants are needed to explore factors that contribute to differences between S-REMs and REMs.
- Future analyses may consider the impact of average (unmeasured) RECD.

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