Ecological Momentary Assessment (EMA) in Hearing Research :

Psychometric Characteristics, Limitations, and Opportunities

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ARO 2022

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Outline

- Why EMA
- Psychometric characteristics of EMA
- Limitations of EMA
- Opportunities of EMA in hearing research

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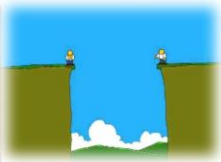
Laboratory



Real world

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Retrospective self-reports

- Questionnaire and interview
- Limitations:
  - Recall bias
  - Low context resolution

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"**Listening to the television with other family or friends**: For this situation, how satisfied are you with your cochlear implants?"

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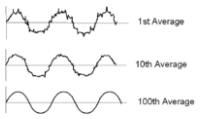
In-situ self-reports

- Ecological Momentary Assessment (EMA)
- A methodology involving **repeated** collections of **real-time** or **very recent** (i.e., momentary) data describing subjects' *experiences and context* in their **natural** (i.e., ecological) environments
  - Experience: "How much speech did you understand in the past 5 min?"
  - Context: "How noisy was it?"
- "Auditory ecology"



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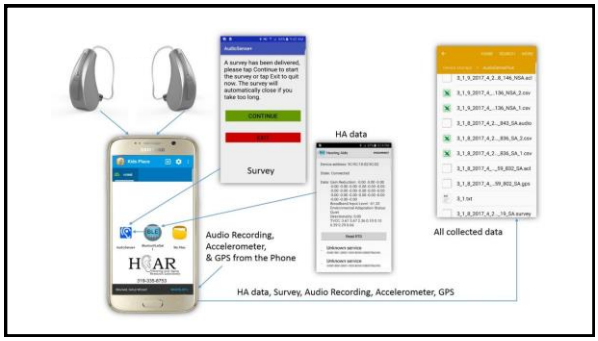

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Psychometric Characteristics of EMA

Validity, reliability, and sensitivity

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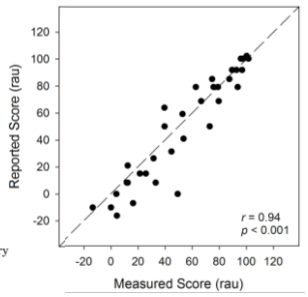
Construct validity

"How much speech did you understand?"



Construct Validity of the Ecological Momentary Assessment in Audiology Research

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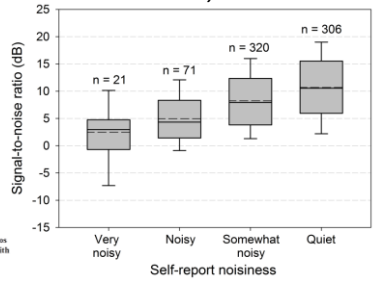
Construct validity

"How noisy was it?"

Real world



Characteristics of Real-World Signal to Noise Ratios and Speech Listening Situations of Older Adults With Mild to Moderate Hearing Loss

(Ear & Hearing 2018;39:293–304)

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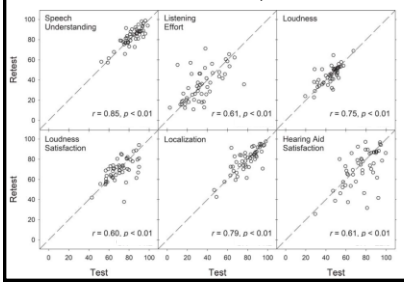
Test-retest reliability



Questionnaire	Subscale	r Value
HHIE	Emotional	0.78
	Social	0.83
APHAB	Ease of Communication	0.64
	Reverberation	0.74
	Background Noise	0.72
	Aversiveness	0.77
SADL	Positive Effect	0.87
	Service and Cost	0.36
	Negative Features	0.55
	Personal Image	0.63
SSQ	Speech	0.85
	Spatial	0.82
	Qualities	0.82

Test-Retest Reliability of Ecological Momentary Assessment in Audiology Research

J Am Acad Audiol 2020;31:599–612.

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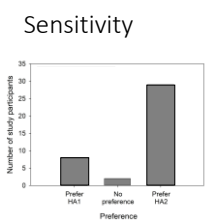
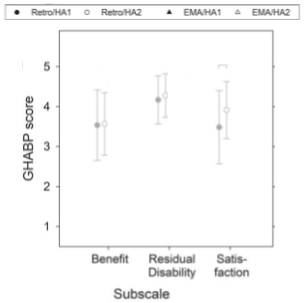
Sensitivity





Comparison of In-Situ and Retrospective Self-Reports on Assessing Hearing Aid Outcomes

J Am Acad Audiol 2020;31:746–762.

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Summary

- EMA has good construct validity.
- EMA's test-retest Reliability is similar to retrospective questionnaires.
- EMA is more sensitive than retrospective questionnaires.

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Limitations of EMA

Burden and compliance

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Burden and compliance

- High burden
  - Repeated measures
  - Intrusive
  - Smartphone
  - Complex instructions
- Would high burden of EMA generate subject-selection bias?
- Can CI users do EMA?

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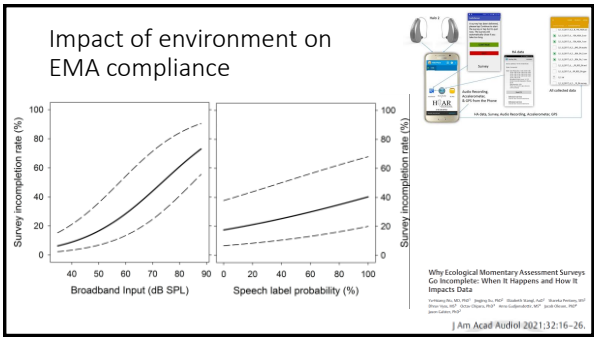
Impact of environment on EMA compliance



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Factors associated with EMA compliance: Cochlear implant (CI) users

- Factors investigated
  - CI condition: with vs. without CI
  - Age
  - Employment: employed vs. not employed
  - Word recognition score
  - Social network
  - Degreed of depression
  - Phone type: own a smartphone or not
  - Cognitive function

Personal Characteristics Associated with Ecological Momentary Assessment Compliance in Adult Cochlear Implant Candidates and Users
Yu-Hsiang Wu, Elizabeth Stangl, Jacob Oleson, Kristen Caraher, Camille C Dunn.
J Am Acad Audiol 2021;00:1–12.

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Factors associated with EMA compliance: CI users

- **Employment status** predicts EMA compliance
- As an individual's employment status transitions from not work to work there is a predicted 31% decrease in the response rate (p = .01).

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Summary

- EMA could miss the listening situations that we are interested (e.g., noisy situations).
- Although CI users could do EMA, EMA could generate subject-selection bias.

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EMA in Hearing Research

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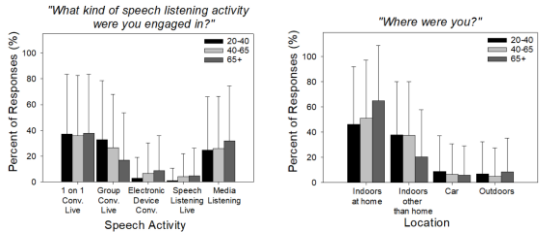
Auditory ecology of CI users: Effect of age



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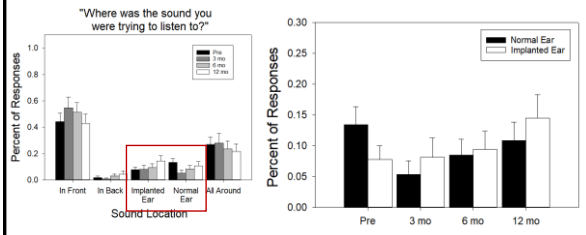
Single-sided deafness: Effect of CI



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Conclusions

- EMA is valid, reliable, and sensitive.
- EMA has limitations.
- EMA could be implemented to CI users.
- EMA is a powerful tool in hearing research.

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Acknowledgements

- NIH/NIDCD (R03DC012551, R01DC015997, P50DC000242)
- National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR 90RE5020, 90REGE0013)
- NSF (CNS-1750155)

IOWA

HEAR Hearing Aid and Aging Research Laboratory

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Thank you!

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