ACTIVITY 2: A Decision-Making Process for Selecting an Assessment Tool for Diagnosis

Answer Guide

Note: Complete the Activity from the Test Validity Rests in Evidence topic prior to completing this activity. You will need the articles that you used and the Excel file comparison table that you created.

Table 1

Comparison of the Diagnostic Accuracy Results Found in Two Different Diagnostic Accuracy Studies (from the Test Validity Rests in Evidence activity).

Author, year	Diagnostic System	Index Test	Target Disorder	Reference Standard Test	Sensitivity	Specificity	Index Test. Vs. Reference Standard Correlation Coefficients (p-values)	Area Under the Curve (p-value)
Vermiglio et al. (2018)	1	HINT (average threshold)	Speech recognition in noise disorder	Self-report	80%	86%	Not applicable	AUC = .86 (p < 0.01)
Vermiglio et al. (2018)	2	Pure-tone threshold test (bilateral PTA)	Speech recognition in noise disorder	Self-report	28%	95%	Not applicable	AUC = .51 (p = 0.94)

Part 1 Instructions

The generalizability of the data from a diagnostic accuracy study is addressed in the following questions. You should answer these questions for each diagnostic accuracy study under review.

1. Were the components of the diagnostic system (index test, target disorder, "gold" or reference standard test) clearly described to allow for replication?
   ANSWER: Yes.

2. Does the target disorder have an unambiguous definition?
   ANSWER: Yes, a speech recognition in noise disorder is defined as difficulty with speech perception in noise as experienced in daily life.

3. Was the "gold" or reference standard test appropriate?
   ANSWER: Yes, it is reasonable to assume that a patient would be able to accurately describe their auditory difficulties. Furthermore, self-report is used as a response for all behavioral

auditory testing in audiology.

4. Was an argument presented for the selection of the "gold" or reference standard test? If yes, what was the authors' rationale give for this selection?
   ANSWER: Yes, according to the authors self-report has been used as a "gold" or reference standard test for studies on pain, tinnitus, hearing loss and a speech recognition in noise disorder.

5. Is there empirical support for the reference standard test? In other words, was the reference standard test used as an index test in a previous diagnostic accuracy study? If so, what was its diagnostic accuracy.
   ANSWER: No empirical evidence was offered in support of the reference standard test.

6. If the reference standard test does not have empirical support, is its suitability self-evident?
   ANSWER: Vermiglio (2024) has argued that that self-report of sensory perception is a self-evident reference standard test.

7. Was the index test included as part of the reference standard test or test battery?
   ANSWER: No.

Part 2 Instructions

Consider the following questions for Diagnostic Accuracy Comparisons across Index Tests:

1. Does the design of the diagnostic accuracy studies allow for the generalizability of the results? If no, then comparisons across tests may be questionable.
   ANSWER: Yes, the results may be generalized to speakers of native-English who are similar in age to the study participants.

2. When comparing diagnostic accuracy performances across tests, were the target disorders the same? It is not appropriate to presume that the sensitivity and specificity of an index test for one target disorder is relevant for the detection of a different target disorder.
   ANSWER: Yes, the target disorders were the same.

3. Which tests possess acceptable diagnostic accuracy for the target disorder(s) in question?
   ANSWER: According to the results of the diagnostic accuracy studies shown in Table 1, the HINT average threshold is a reasonable predictor of a speech recognition in noise disorder (AUC = 0.86, $p < 0.01$, sensitivity = 80%, specificity = 86%). The bilateral pure-tone threshold average is a very poor predictor of a speech recognition in noise disorder (AUC = 0.51, $p = 0.94$, sensitivity = 28%, specificity = 95%). These results support the utilization of a the HINT (average threshold across three listening conditions) as a reasonable test for the identification of a speech recognition in noise disorder for individuals with normal pure-tone thresholds.

References

Vermiglio, A. J. (2024). *20Q: Auditory processing disorders - Is there a gold standard?* Available at www.audiologyonline.com