



## Speech and Hearing Measures for PhenX Toolkit

	Measure	Brief Description of Recommended Protocols
1	Audiogram Hearing Test	A hearing test that assesses an examinee's hearing threshold (in decibels) at seven frequencies by presenting pure tone signals to each ear through earphones.
2	Ear Infections (Otitis Media)	Two questions that capture the frequency of ear infections and whether or not the respondent has ever had tubes inserted in his or her ears.
3	Early Childhood Speech and Language Assessment	Two age-specific questionnaires (24–30 months old and 3–5 years old) that assess the development of age-appropriate speech and language skills.
4	Family History of Speech and Language Impairment	A nine-item, proxy-administered questionnaire, completed by a parent for his or her young child, which asks about the child's personal and family history of speech and language impairment.
5	Grammatical Impairments	Three age-specific protocols that assess the respondent's knowledge of grammar in order to identify those with specific language impairment or other categories of language impairment.
6	Non-word Repetition	A protocol that assesses the ability of the respondent to repeat multisyllable nonsense words to determine their ability to code and temporarily store information phonologically.
7	Personal and Family History of Hearing Loss	A questionnaire to assess risk factors related to hearing loss.
8	Phonemic Inventory	An interviewer-administered test that measures the respondent's articulation of consonant sounds.
9	Reading Comprehension	An interviewer-administered test in which the respondent is asked to read a short passage and identify a missing key word that makes sense in the context of the passage in order to assess the ability of an individual to understand what he or she reads.
10	Stuttering	An interviewer-administered test that records a sample of the respondent's speech to assess the severity of the respondent's stuttering.
11	Tinnitus	A questionnaire that assesses the impact of tinnitus on the respondent's general well-being.
12	Vertigo	A questionnaire that assesses perceived disability due to dizziness using three subscales that cover the areas of function, emotion, and physical aspects.
13	Vocabulary Assessment	A protocol that assesses an individual's understanding of the spoken English language.
14	Voice Impairments	A questionnaire that asks individuals to describe their voice and the effects of their voice on their life. Three subscales cover the areas of functional, emotional, and physical aspects of voice disorders.
15	Word Decoding	A protocol that assesses the respondent's ability to pronounce words accurately and fluently.

## What Is PhenX?

PhenX is a collaborative, consensus project between RTI International, the National Human Genome Research Institute (NHGRI) of the National Institutes of Health, and the larger research community. The objective of PhenX is to recommend measures with specified measurement protocols that have a high priority for inclusion in genome-wide association studies (GWAS). The consistent use of some measurement protocols across studies will facilitate cross-study comparisons. High-priority measures are, therefore, those measures that are broadly relevant to multiple health outcomes or assessments of health outcomes, although the measures are not focused on differential diagnosis.

## Research Domains

The PhenX Steering Committee (SC) chose 21 research domains. A research domain is a field of research with a unifying theme and easily enumerated quantitative and qualitative measures. Working Groups (WGs) of experts in a specific domain were constituted, and they:

- Evaluated the scope of the domain and the broad elements of that scope, and then
- Recommended potential high-priority measures with specific measurement protocols.

These measures were vetted with the larger research community, and final recommendations from the WGs were reviewed by the SC. The primary goal of the project is to collect these recommendations in a Toolkit that will enable scientists to select measures and implement those measures in studies.

For more information on the PhenX project, please visit the project's website at <https://www.phenx.org/>.

Research Area (Domain)	Status	WG Chair(s)	SC Liaison
Alcohol, Tobacco and Other Substances	In Toolkit	Deborah S Hasin	Erin M Ramos
Anthropometrics	In Toolkit	Michele Forman	Michelle Williams
Cancer	In Toolkit	Neil Caporaso and Christine B Ambrosone	Margaret R Spitz
Cardiovascular	In Toolkit	Thomas A Pearson	William R Harlan
Demographics	In Toolkit	Myles Cockburn	Peter Kraft
Diabetes	In Toolkit	Craig L Hanis	William R Harlan
Environmental Exposures	In Toolkit	Lynn R Goldman	Diane Wagener
Gastrointestinal	In Toolkit	David Whitcomb	William R Harlan
Infectious Diseases and Immunity	In Toolkit	Richard Kaslow	Jonathan Haines
Neurology	In Toolkit	Jeffery M Vance	Lindsay A Farrer
Nutrition and Dietary Supplements	In Toolkit	Patrick J Stover	Jose M Ordovas
Ocular	In Toolkit	Janey L Wiggs	Jonathan Haines
Oral Health	In Toolkit	James Beck and Bryan Michalowicz	Mary L Marazita
Physical Activity and Physical Fitness	In Toolkit	Bill Haskell and Rick Troiano	Jose M Ordovas
Psychiatric	In Toolkit	Jordan Smoller and Kenneth Kendler	Carlos N Pato
Psychosocial	In Toolkit	Bernice Pescosolido	Carlos N Pato
Reproductive Health	In Toolkit	Carol Hogue	Michelle Williams
Respiratory	In Toolkit	Edwin K Silverman	Terri H Beaty
Skin, Bone, Muscle and Joint	In Toolkit	Douglas P Kiel	Lindsay A Farrer
Social Environments	In Toolkit	Barbara Entwisle	Peter Kraft
Speech and Hearing	In Toolkit	Cynthia Morton and Mabel Rice	Mary L Marazita