

Physical Activity and Physical Fitness Measures for PhenX Toolkit

	Measure	Brief Description of Recommended Protocols
1	Cardiorespiratory Fitness – Exercise Test Estimate	An exercise test used to estimate maximal oxygen consumption (VO_{2max}). The heart rate is measured during the test and is one of the variables required to complete the equation to measure VO_{2max} .
	a. One Mile Walk	The participant is asked to complete a 1-mile walk test as quickly as possible on a track.
	b. Treadmill Test	The participant is asked to walk on a treadmill at a 5% grade for 4 minutes.
2	Cardiorespiratory Fitness – Non-Exercise Test Estimate	Cardiorespiratory fitness is estimated from a non-exercise test model that includes gender, age, body mass index, resting heart rate, and self-reported physical activity.
3	Integrated Fitness	Multiple tests used to assess a person's general fitness.
	a. Adult	Adult fitness tests include half sit-ups (abdominal muscle strength), standard or modified push-ups (upper-body muscle strength), and sit and reach (flexibility).
	b. Older Adult	A battery of tests for older adults is completed with the assistance of an examiner.
	c. Child	Children's fitness tests include the Progressive Aerobic Cardiovascular Endurance Run (PACER) test (similar to the shuttle run); curl-up; trunk lift; push-up (or modified push-up); and back-saver sit and reach.
4	Muscle Strength	Hand grip strength is measured with a device called a dynamometer.
5	Physical Activity – Neighborhood Environment	Self-administered questions about the characteristics of the participant's neighborhood that may influence the ability to exercise (e.g., walk, run, bicycle).
6	Physical Activity Readiness	Self-administered physical and medical questions used to determine if the person needs to visit a doctor or fitness expert prior to an increase in physical activity.
7	Physical Activity Self-Efficacy	Scales that include self-administered questions used to assess the person's perceived ability to exercise on a regular basis.
	a. Adolescent	A scale that includes questions about situations in which respondents have free time and whether or not they perceive they could be physically active during those times.
	b. Adult	A scale that includes questions about the person's perceived ability to overcome barriers that may impede participation in exercise on a regular basis.
8	Physical Functioning – Objective	Brief tests used to evaluate a person's balance, gait, strength, and endurance.
9	Physical Functioning – Subjective	The interviewer asks the participant (or proxy) a series of questions about the level of difficulty he or she has performing everyday activities.
10	Sitting/Sedentary Behavior	An estimate of how many hours and minutes the person spends sitting or doing sedentary activities.
	a. Adult	A self-reported estimate of how many hours and minutes a person spends sitting watching television or traveling in a vehicle on a typical weekday or weekend day.
	b. Adolescent	These self-administered questions provide an estimate of how many hours and minutes an adolescent spends doing sedentary activities each day before and after school during a typical school week (including the weekend).
11	Total Physical Activity – Comprehensive	These questionnaires are used to capture physical activities from the last several days to estimate general physical-activity levels.
	a. Adolescent	The adolescent is asked to recall all of the physical activities he or she engaged in during the previous 3 days by completing an activity log.
	b. Adult	The 7-Day Physical Activity Recall (7-Day PAR) is an interviewer-administered instrument used to recall and record all of the physical activities the participant engaged in during the previous 7 days.
	c. Older Adult	A self-administered questionnaire is used to capture physical activities the respondent engaged in during the past 4 weeks.
12	Total Physical Activity – Objective Measure	An accelerometer is used to continuously measure the intensity of movements; a minimum of 4 days is recommended.
13	Total Physical Activity – Screener	Self-administered questions about the normal level of physical activity associated with the person's job and leisure-time activities in the past year.
14	Walking-Ambulation Objective Measure	An accelerometer-based pedometer is used to measure the number of steps the respondent takes during a measurement period (e.g., 3 days).

NOTE: Complete protocols and links to common data elements are available through the PhenX Survey at <https://www.phenxtoolkit.org>.

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