Beyond the normative data: Understanding the Bayley Scales of Infant Development version 3 (BSID-III)

BSID-III is a standardized neurodevelopment assessment used by clinicians and researchers to assess the developmental functioning of children ages 1 to 42 months; five domains evaluate cognition, expressive and receptive language, and gross and fine motor skills. The Standard Score (SS) is derived from the raw score to follow the normal distribution of a known mean and the standard deviation (SD). However, SS has limited utility for low functioning individuals (LFI) because when developmental function is delayed but age exceeds 42 months, BSID-III use is appropriate but SS are unavailable. Age equivalence score (AEq) and Developmental Quotient (DQ) are available in BSID-III for LFI, and can be used to understand the neurodevelopmental natural history trajectory and measure intervention efficacy. AEq and DQ interpretive application is limited (unlike SS) because there is no known distribution of the variables, and therefore no SD, although AEq and DQ are derived from samples representing the normal population. Thousands of data points from the BSID-III manual normative data were simulated to characterize SD. An algorithm was created to map raw to discrete SS for all ages. AEq then referenced the corresponding ±1SD, ±2SD SS to create the lower and upper bounds for age-specific AEq SDs. DQ SD lines were calculated by fitting respective regression lines between generated age-specific AEq SDs and age. An example of this application will be demonstrated within a pediatric population of severe mucopolysaccharidosis type II (MPS II).