

## CAT-MH™: A New Paradigm for Screening and Measurement Based Care

Mental health measurement has been based primarily on subjective judgment and classical test theory. Typically, impairment level is determined by a total score, requiring that all respondents be administered the same items. This traditional approach weighs equally the responses to items such as “Do you feel sad?” and “Do you feel like everyone would be better off if you were dead?” Clearly, this approach is far from optimal. An alternative to full scale administration is adaptive testing in which different individuals may receive different symptom items that are targeted to their specific impairment level.

**What is the CAT-MH™?** The CAT-MH™ is a suite of 10 computer adaptive tests (CAT) that represents a fundamental scientific breakthrough in measurement. Its applications in mental health measurement are widespread and can lead to dramatic savings for our healthcare system based on identifying high utilizers of physical healthcare services and providing a stepped care approach to treatment. The CAT-MH™ can identify patients with a wide array of mental health disorders and concomitant high risk of suicide and substance use disorder leading to the saving of human life. The CAT-MH™ was developed by Adaptive Testing Technologies, a leader in the design, testing and implementation of large scale mental health adaptive testing systems. Our tools have been validated against structured clinical interviews and published in top-tier [peer-reviewed journals](#) such as *JAMA Psychiatry*.

**How does the CAT-MH™ work?** The CAT-MH™ is based on multidimensional item response theory (MIRT). Within computer adaptive testing (CAT), individuals’ initial item responses are used to determine a provisional estimate of their standing on the measured trait to be used for subsequent item selection. Based on MIRT procedures, estimates of items (e.g., difficulty, discrimination) and individuals (e.g., severity of depression) can be obtained to more efficiently identify suitable item subsets for each individual. MIRT weighs more severe items more heavily than less severe items in deriving a test score. MIRT also provides an estimate of uncertainty that can be used to assess the significance of change. The CAT-MH™ adaptively selects a small set of items from a large bank of approximately 1,500 items. Instead of fixing the items and allowing the precision of measurement to vary, we fix the precision of measurement and allow the items to vary. The result is a dramatic increase in the precision of measurement with the same and in some cases even lower burden of measurement for the patient and the complete elimination of clinician burden.

**What CAT-MH™ modules are available?** The CAT-MH™ is a suite of adult CATs for depression, anxiety, mania/hypomania, suicidality, PTSD, substance use disorder, and psychosis. For perinatal populations, the CAT-MH™ has been optimized for the measurement of depression, anxiety, and mania/hypomania. For children and adolescents ages 7 to 17, the K-CAT™ has been validated for the measurement of depression, anxiety, mania/hypomania, ADHD, oppositional defiant disorder, conduct disorder, and suicidality. We have also carefully translated (forward, reverse and adjudicated) our entire adult item bank into Spanish and Chinese and have all our CAT-MH™ modules available in both English, Spanish and Chinese.

**What are the advantages of the CAT-MH™?** We can dramatically increase precision while eliminating clinician burden and minimizing subject burden. The CAT-MH™ provides constant precision of measurement throughout the entire severity continuum for any disorder that we measure. The adaptive nature of the CAT-MH™ targets a patient’s specific level of severity at that point in time. The CAT-MH™ has been validated against structured clinical diagnostic interviews (e.g. SCID-DSM-5) so it can also provide diagnostic profiles for a large number of disorders and suicide risk. The CAT-MH™ is ideal for longitudinal assessments essential for measurement-based care. The CAT-MH™ is cloud-based and scalable to any size population via a HIPAA secure Amazon Web Services (AWS) platform, meaning patients can be screened, measured and monitored in or out of the clinic.

**What are the potential applications of the CAT-MH™?** Large-scale screening and monitoring of depression and anxiety in integrated primary care and behavioral health care settings is a natural application of this work and is already in practice in several major institutions. Insurers can now monitor the progress of patients through treatment without the patient needing to be in the clinic for testing. High frequency monitoring, even hourly in response to fast acting new pharmacologic treatments (e.g. ketamine and deep brain stimulation) are possible because the same items are not repeatedly administered to the same patient. The CAT-MH™ is also uniquely suited to detect falsification of responses that may be made to either give the impression of an illness (e.g. in a jail) or to mask the presence of an illness (e.g. in the military). Large-scale University student screening and monitoring programs can now be implemented and students that need treatment can be immediately identified and treated. The CAT-MH™ has been used for state-wide assessment of mental health disorders in the state of Tennessee child welfare system where over 300 case-workers have been trained in its use. The CAT-MH™ has been used for large-scale diagnostic screening in a nationally representative survey of mental health disorders conducted by SAMHSA and RTI.

**Can you integrate with the Electronic Health Record?** We have fully integrated the CAT-MH™ into the Epic EHR at the University of Chicago and developed clinical workflows designed around their integration. This enables screening and measurement in the clinic using computers, and remote screening and assessment via the patient portal, with results immediately displayed in the EHR.

**Where can I learn more?** To learn more about the CAT-MH™, you may read the academic press on our website at [www.adaptivetestingtechnologies.com](http://www.adaptivetestingtechnologies.com). To get in contact with us, please call (312) 878-6490.