

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

Mental health measurement has been based primarily on subjective judgment and classical test theory. Perinatal depression affects 10 to 20% of pregnant and postpartum women. 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 computer adaptive tests (CAT) that represents a fundamental scientific breakthrough in measurement. For perinatal populations, the CAT-MH™ has been optimized for the measurement of depression, anxiety, and mania/hypomania. 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™ 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 diagnostic interviews (e.g. SCID-DSM-5) 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. 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.

**Why have a unique version of the CAT-MH™ for perinatal women?** In a perinatal population, somatic symptoms that may be informative in a psychiatric population may be less reliable differentiators when these same symptoms are either produced or moderated by pregnancy and childbirth. In a [recent study](#) published in *Archives of Women's Mental Health* that examined how perinatal mood disorders differ from adult psychiatric disorders, one of the 66 depression items, one of the 69 anxiety items, and 15 of the 53 mania items exhibited DIF (i.e., failure to discriminate between high and low levels of the disorder). Removal of these items resulted in correlations of the original and perinatal calibrations of  $r=0.983$  for depression,  $r=0.986$  for anxiety, and  $r=0.932$  for mania.

**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™ 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. Because the CAT-MH™ is currently delivered via a secure mobile health application, its use can reduce barriers to screening and it can be easily integrated with electronic health records making results immediately available to clinicians even though patients can complete their evaluations remotely via cell phone and the internet.

**What are the potential applications of the CAT-MH™?** Recognizing that pregnancy includes a risk trajectory that spans almost 2 years (i.e., conception – 1 year post-partum), the CAT-MH™ can be administered serially to capture newly-symptomatic patients throughout this timeframe. Now calibrated for perinatal women, the CAT-MH™ can be used for longitudinal symptom monitoring. It may also be ideal for integration into stepped care models that rely on symptom severity to determine initial level of intervention and then monitor changing acuity levels over time to guide modification, withdrawal, or augmentation of therapy.

**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.