Development of a Computerized Adaptive Diabetes Behavioral Health Screener: Leveraging Our Commitment to Health Equity and Evidence-Based Assessment to Promote Healthier Children, Youth, and Families

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Introduction: Youth with type 1 diabetes face multiple challenges, yet equitable, efficient, and evidence-based psychosocial screening tools aligned with professional standards of care are limited. We aimed to develop a multidimensional computerized adaptive test (MCAT) to equitably conduct psychosocial screening among patients with Type 1 Diabetes (T1D).

Methods. Participants living with T1D (*N*=570; *M*age=13.9± 2.2; 41.1% male; 19.5% Latine; 83.7% White, 10.1% Black, African American, Biracial, or Asian; T1D diagnosis>6mo) completed 200 items from validated self-report batteries across recommended screening domains.

Results: A sequence of Exploratory graph-, bifactor confirmatory factor-, differential item functioning (DIF)-, and multidimensional item response theory analyses provided strong evidence of model fit, reliability, validity, diagnostic accuracy for an item-culled non-DIF 130 item-bank that yields estimates of general distress and specific domain factors of diabetes distress, family conflict, problem areas, hypoglycemia and hyperglycemia worry, weight/body concerns, and internalizing symptoms. MCAT simulations performance under various stopping rules revealed a 3-item reduced-length survey could yield a general distress score that correlated 0.90 with the 130-item version with excellent diagnostic accuracy (AUC = .98, Sensitivity =.93, etc). A similar pattern was found for all 3-item specific-domain versions (Cor: $M = 0.73$, $SD = 0.04$, AUC: $M = 0.87$, $SD = 0.03$, Sensitivity $M = 0.87$, $SD = 0.03$). All scales' performance increased with additional items.

Conclusions: This DIF-informed multidimensional computerized adaptive test (MCAT) delivers fast, precise, and minimally-biased psychosocial screening for youth with type 1 diabetes. It maintained exceptional accuracy while cutting test length by over 95%, with performance consistent across racial, gender, Hba1c, and socioeconomic groups. By integrating DIF with adaptive testing, this MCAT helps to better ensure equity, enhances personalized care, and aligns with Diabetes Specific Care Standards, offering a scalable, transformative model for reducing disparities and advancing equitable behavioral health assessment in pediatric diabetes care.

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