Diabetes Resilience: Psychometric Properties of a Measure for Pre-Adolescents with Type 1 Diabetes

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ABSTRACT

Pre-adolescence is a vulnerable time for T1D management, yet many youth achieve good quality of life (QOL), adherence, and glycemic control. These resilient youth are poorly characterized in the literature due in part to lack of a validated measure of diabetes resilience. We report psychometric properties of a new 12-item Diabetes Resilience Measure for Children (DRM-C) ages 9-13. On the DRM-C, youth rate their perceived ability to successfully live with and manage T1D; address T1D management challenges; and get help from family, friends, and providers. Participants were 175 pre-adolescents (M age=11.3±1.1; 55% female, 39% non-Caucasian, M A1c=8.3±1.1; 43% on insulin pumps) and their primary caregivers. Cross-sectional measures include risk and protective factors, QOL, parent-reported adherence, blood glucose monitoring frequency via meter download, and glycemic control by A1c. Reliability was good (Internal consistency: α=0.70, item-total correlations: r range=0.24-0.56). Validity was assessed in comparison to related and disparate constructs (see results). Initial indications of good psychometrics suggest the DRM-C adequately measures adaptive attitudes and behaviors. Mixed adherence results may reflect common shifts in T1D management responsibility at this age. This brief instrument may be appropriate for use in clinical settings and to assess intervention impact in this age group.

BACKGROUND

• For youth with type 1 diabetes (T1D), the transition to adolescence is a period of vulnerability for deteriorating adherence, quality of life (QOL), and glycemic control.
• Establishing effective strategies for T1D management during late childhood is critical to lay a strong foundation in preparation for adolescence.
• Many youth achieve good outcomes despite the challenges of T1D. Behavioral, psychological, and family risks for suboptimal outcomes are well-documented, yet relatively little is known about protective or strength behaviors that can buffer those risks.
• There is no validated measure that explicitly assesses the individual, family, and systems-level protective behaviors and processes that youth with T1D and their families use to overcome risks and achieve diabetes resilience, or better than expected outcomes including high regimen adherence, in-range glycemic control, and good QOL.
• A brief, standardized measure of T1D strengths would help guide clinical care and research to promote diabetes resilience.
• The purpose of this study was to evaluate the psychometric properties of a newly developed measure of strength behaviors related to diabetes resilience in pre-adolescents with T1D.

METHODS

• Participants were N=175 pre-adolescents with T1D (age range: 9-13 yrs) and one parent/caregiver.
• Informed consent and assent for longitudinal study of strengths, resilience, and diabetes outcomes, approved by local IRB.
• Data include self-parent/report questionnaires, blood glucose meter downloads, and data from electronic medical record.
• This poster represents cross-sectional baseline data analysis.
• Psychometric property analyses: internal consistency, item-total correlations, correlations and t tests with validity measures.

MEASURES

Diabetes Resilience Measure for Children (DRM-C)
• 12 items, youth self-report
• Adapted from DRM for Adolescents, content and language adjusted for younger children.
• Items assess perceived competence for managing T1D regimen demands, adapting to unpredictable T1D situations, and seeking help and support with diabetes-related tasks.
  o I can figure out ways to take care of my diabetes even when I am busy.
  o I ask for help with my diabetes when I need to.
  o I stay calm when I talk to my parent(s) about my diabetes, like talking about blood sugar checks.
• Frequency of behaviors in general, no specific time frame (“circle the one answer that tells you about yourself best”)
• Rated on 5-point scale: Never to Almost Always

Validity Measures:
• Resiliency Scales for Children and Adolescents (RSCA) (Prince-Embry, 2007): 44 items, self-report of general strength behaviors reflecting mastery and social relatedness.
• Devereux Student Strengths Assessment Mini (DESSA) (Naglieri et al., 2011): 8 items, parent-report of general strengths (e.g., take steps to achieve goals, try to do his/her best)

Discriminant Validity Measures:
• Children’s Depression Inventory 2 Short-Form (CDI-SF) (Kovacs, 2011): 12 items, self-report of depressive symptoms over previous 2 weeks, clinical cut-off score≥6.
• Problem Areas In Diabetes – Child (PAID-C) (Weissberg-Benchell et al., 2011): 26 items, self-report of diabetes-related emotional distress, teen version adapted for younger children.

Criterion Validity Measures:
• Mind Youth Questionnaire [MY-Q] (De Wit et al., 2012): 24 or 32 items (by age), self-report of generic and diabetes-specific QOL adapted for children.
• Blood glucose monitoring frequency [BGMF]; daily blood glucose checks downloaded from participants’ blood glucose meter(s) and averaged over 14 previous days.
• Diabetes Self-Management Questionnaire (DSMQ) (Markowitz et al., 2011): 9 items, parent-report of adherence to T1D tasks (e.g., BGMF and timing, insulin adjustments, food, activity).
• Hemoglobin A1c [A1c]: glycemic control, measured via fingerstick capillary blood sample and analyzed immediately using DCA 2000 Siemens-Bayer system.

RESULTS

Participants

Demographic & Clinical Characteristics (N=175)

<table>
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<tr>
<th>Characteristic</th>
<th>Mean ± SD</th>
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<tbody>
<tr>
<td>Age, years</td>
<td>11.3 ± 1.3</td>
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<tr>
<td>Gender, % female</td>
<td>55% (96)</td>
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<tr>
<td>Caregiver, % mother</td>
<td>82% (125)</td>
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<tr>
<td>Insurance type, % public or none</td>
<td>33% (58)</td>
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<tr>
<td>Diabetes duration, years</td>
<td>4.0±4.1</td>
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<tr>
<td>Insulin administration, % pump</td>
<td>43% (75)</td>
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<tr>
<td>A1c, %</td>
<td>8.3±1.5</td>
</tr>
<tr>
<td>BGMF, meter download</td>
<td>4.9±2.1</td>
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<tr>
<td>BGMF, % parent-report checks/day</td>
<td>41% (72)</td>
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Parent-Reported Race/Ethnicity

N=175

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<tr>
<th>Race/Ethnicity</th>
<th>More Than One 3%</th>
<th>White, Non-Hispanic 66%</th>
<th>Black, Non-Hispanic 15%</th>
<th>Hispanic 20%</th>
<th>Asian or Pacific Islander 1%</th>
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RELIABILITY

• Internal Consistency: α=0.78
• Item-Total Correlations: r range=0.24-0.56, p<0.001

CONSTRUCT VALIDITY

• General strengths (RSCA): α=0.52, p<0.0001
• General strengths (DESSA): r=0.25, p<0.003

DISCRIMINANT VALIDITY

• Depressive symptoms (CDI-SF): r=-0.40, p<0.0001
• CDI-SF Cutoff (score ≥6): (171)=3.9, p=0.002
• Diabetes distress (PAID-C): r=-0.36, p<0.0001

CRITERION VALIDITY

• General QOL (MY-Q): r=0.31, p<0.0001
• Diabetes QOL (MY-Q): r=0.39, p<0.0001
• Adherence (DSMQ): r=0.10, n.s.
• BGMF (Meter Download): r=0.06, n.s.
• BGMF (DSMQ: <5 v. ≥5/day): (171)=2.1, p=0.036
• Glycemic Control (A1c): r=-0.42, p<0.0001

CONCLUSIONS

• The DRM-C reliably and validly measures adaptive attitudes and behaviors related to T1D in preadolescents.
• T1D strength behaviors measured by the DRM-C items are associated with key clinical diabetes outcomes: better QOL, lower A1c, and possibly more frequent blood glucose monitoring.
• Mixed adherence results may reflect continued parental oversight and shifts in T1D management responsibility at this age.
• Strong potential for use in strengths-based clinical care & research:
  o Resilience promotion intervention with systematic monitoring of T1D strengths plus feedback to youth and families about what they are doing well for T1D care.
  o As a key patient-reported outcome to evaluate behavioral mechanisms of behavioral interventions.
• Part of a suite of T1D strengths and resilience measures from childhood through young adulthood.

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