Examining the Relationship between Neighborhood Adversity and Glycemic Control Among Adolescents with Type 1 Diabetes

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Background

- Type 1 diabetes is a chronic medical condition in which the pancreas produces little to no insulin and requires complex, daily care and management.

- African American youth with Type 1 Diabetes (T1D) demonstrate poorer glycemic control (average blood glucose levels) than White youth.

- Among adults with diabetes, neighborhood adversity (NA) factors have been shown to affect glycemic control.
    - Neighborhood poverty levels
    - Neighborhood residents unemployed
    - Neighborhood residents with less than a 12th grade education, no diploma

- Research on the relationship between neighborhood factors and glycemic control in youth with type 1 diabetes is lacking.
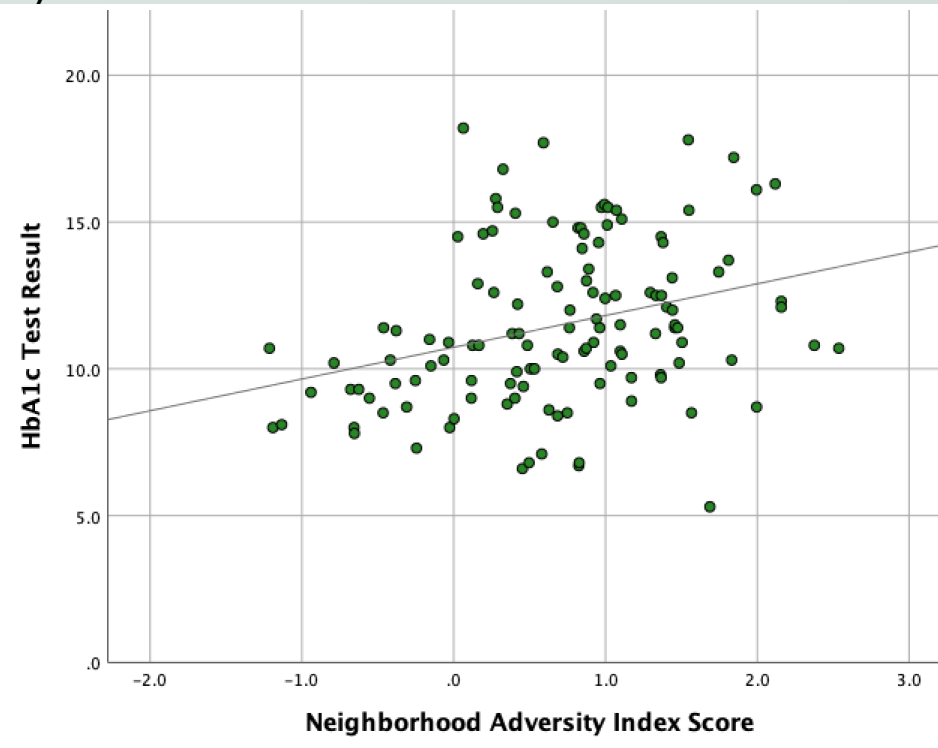
Hypothesis

- This study examined the relationship between neighborhood adversity and glycemic control among African American adolescents.

  - Neighborhood adversity refers to a greater proportion of combined socio-economic stressors in the area where one lives.

- We hypothesized that higher levels of neighborhood adversity would be associated with poorer glycemic control

Methods

- Design
  - Baseline data from a longitudinal multi-center clinical trial
  - 124 youths recruited from 4 hospital-based diabetes clinics: 1 in Chicago and 3 in Detroit.
- Participants
  - African American youth with Type 1 Diabetes aged 10-16
- Measures
  - HbA1c, the measure of average blood glucose levels during the past 90-120 days, was collected via finger-stick at baseline.
  - *American Community Survey*
    - census block group data
    - Index of neighborhood-level socio economic adversity, e.g. education level, employment, housing, occupation, poverty level.

Cutchin MP, Eschbach K, Mair CA, Ju H, Goodwin JS. The socio-spatial neighborhood estimation method: An approach to operationalizing the neighborhood concept. *Health & Place*. 2011;17(5):1113-1121. doi:10.1016/j.healthplace.2011.05.011.

Results

- Pearson's correlation demonstrated a significant, positive relationship ($r = 0.310$, $p < 0.001$) between HbA1c and NAI scores.
  - This suggests adolescents had higher HbA1c levels when they lived in neighborhoods with greater adversity.

Conclusion

- This study is among the first to explore this relationship between NA and A1c levels among youth with T1D.

- Our results supported our hypothesis that higher levels of neighborhood adversity would be associated with poorer glycemic control.

- Research is needed to test the possible mechanisms of this relationship
  - Youth in high adversity neighborhoods may experience more stress, which may lead to poorer glycemic control through a biological stress response (i.e., greater cortisol level)
  - Parents of youth living in neighborhoods with high levels of adversity may not have the resources, financial or otherwise, to provide adequate care for a child with a chronic illness, like T1D

- Limitation: use of correlational data
  - Future studies could investigate this relationship using a longitudinal design

Public Health Implications

- Individual and family stressors might interact with NA and should be explored.

- The ability to identify these stressors may allow interventionists to ameliorate the effects of NA.

- Identifying interventions to mitigate the negative effects of NA on health outcomes are needed to address this critical factor on adolescent health and health outcomes.