Methods for developing and assessing reliability of a micro-scale, built environment audit tool for research and evaluation of active commuting to school

Leigh Ann Ganzar, DrPH MPH, **Katie Burford, PhD**, Deborah Salvo PhD, Chad Spoon, James F. Sallis PhD, & Deanna M. Hoelscher PhD, RDN, LD, CNS, FISBNPA

Active Living Conference
March 17, 2025

The University of Texas at Austin College of Education
TexCEP
UTHealth Houston School of Public Health
Michael & Susan Dell Center for Healthy Living

@msdcenter
/msdcenter
msdcenter.org

MICHAEL & SUSAN DELL
CENTER *for* HEALTHY LIVING

Healthy children in a healthy world.

STRATEGIC PLAN GOALS

Acknowledgements

STREETS team members

- Dr. Deanna Hoelscher (PI)
- Dr. Adriana Pérez
- Dr. Leigh Ann Ganzar
- Dr. Kevin Lanza
- Dr. Shelton Brown
- Dr. Deb Salvo
- Sarah Bentley, MPH
- Dr. Yuzi Zhang
- Dr. Katie Burford
- Dr. Kaitlyn Swinney

- Thank you to the City of Austin SRTS department and study participants.

- Work on this study by LAG, KB, DS, and DMH was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) at the National Institutes of Health (NIH) under Grant R01 HD097669. Work on this study by CS and JFS used funding from the Robert Wood Johnson Foundation.

The University of Texas at Austin College of Education

TexCEP

UTHealth Houston School of Public Health

Michael & Susan Dell Center for Healthy Living

It is important to measure micro-scale environments around schools.

Source: Photo by Jake Ingle on Unsplash

Micro-scale features (e.g., sidewalk width, sidewalk continuous, bike lane with barrier, marked crosswalk) of the built environment can influence ACS in children.

Safe Routes to School (SRTS) programs often focus on micro-scale features near schools.

There is a need for measures that capture these elements.

The University of Texas at Austin College of Education
TexCEP
UTHealth Houston School of Public Health
Michael & Susan Dell Center for Healthy Living

Existing audit tools are resource intensive, a barrier for use by communities.

Existing tools that assess school environments:

- Do not specify a street sampling method for determining the school environment.
- Use a buffer to determine which area to sample, requires GIS skills.
- Only assess aspects of the elementary school grounds but do not capture aspects of the streets near schools.

Example of a 0.5km buffer for auditing, from Pocock et al. (2020)

Purpose

This presentation will describe the methods used to adapt an existing micro-scale audit tool to be **feasible** and **suitable** for assessing the built environment around schools and to assess **reliability** of the tool.

The University of Texas at Austin
College of Education

TexCEP

UTHealth Houston
School of Public Health

MICHAEL & SUSAN DELL
CENTER for HEALTHY LIVING

Study setting

Safe Travel Environment Evaluation in Texas Schools (STREETS) study

- Five-year **natural experiment that assesses the impact of Safe Routes to School** infrastructure projects funded by a 2016 bond initiative from the City of Austin on children's physical activity and ACS.
- Schools recruited into the quasi-experimental, prospective cohort study to examine changes in child physical activity levels and psychosocial outcomes.

Development of the Micro-scale Audit of Pedestrian Streetscapes for Safe Routes to School (MAPS-SRTS) tool

MAPS-SRTS was adapted from MAPS and MAPS-Abbreviated tools.

- MAPS tool consists of 120 micro-scale environmental items
- Developed to audit route from participant's home address towards a pre-determined destination (e.g., park, commercial destinations)
- Four sections: overall route, street segments, crossings, and cul-de-sacs.
- Items collected for each section were summarized into subscales

Modifications for MAPS-SRTS were made to:

1. The structure and content of the audit tool sections
2. Observation route
3. Scoring

Development of MAPS-SRTS

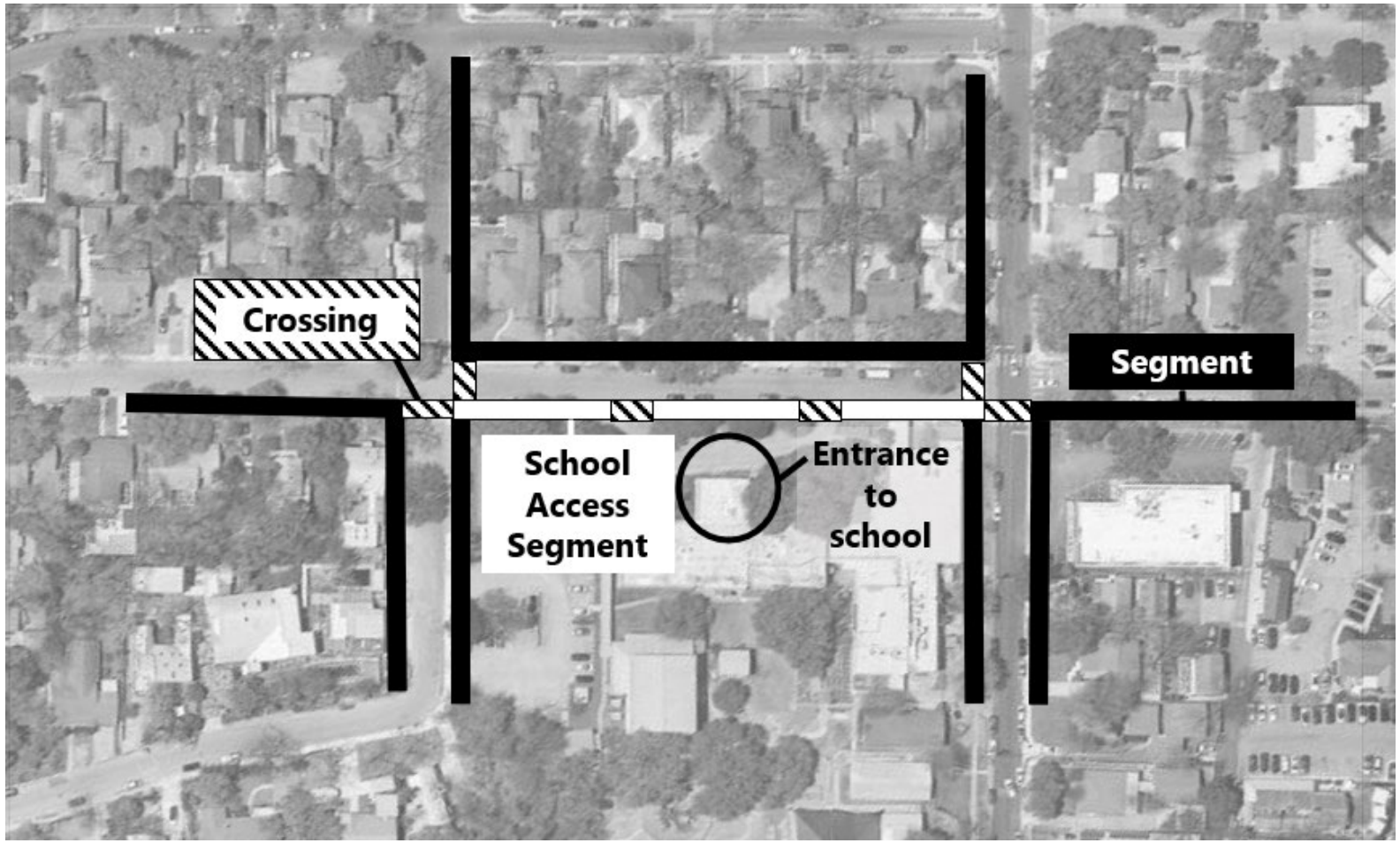
Structure and content

Three sections - a section was added called the "**school access segment**," and had the same items and subscales as the original segments section, with two items for school zone signage added.

Observation route

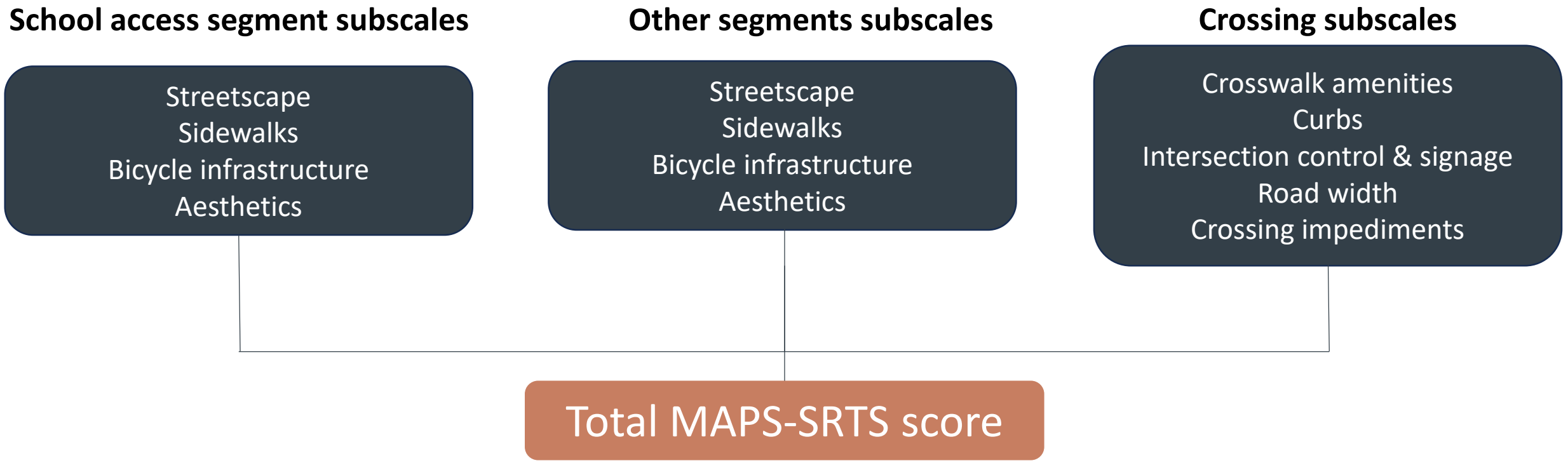
The observation route for each school **began on the school access segment**, and the main school entrance was always the point of reference. The route was determined using the "nearest-neighbor" method of spatial sampling.

MAPS-SRTS observation route



MAPS-SRTS subscales and scoring

The total MAPS-SRTS score is an aggregate score of 30 subscales where a **higher score indicates a more supportive environment** for walking and bicycling to school.



Methods to assess reliability

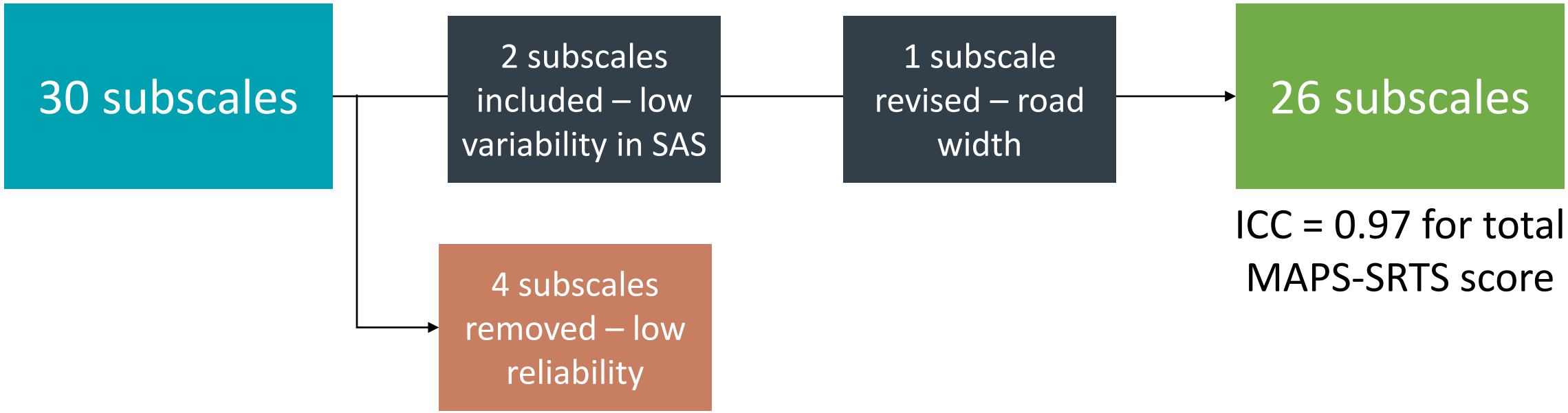
MAPS-SRTS audits of **36 schools** were completed in pairs between March 2019 and June 2021.

To assess interrater reliability, **15% of schools were randomly selected** and were independently assessed by two pairs of raters.

One-way, random effects single-measure intraclass correlation coefficients (ICC) were used for ordinal and continuous scales, and an **ICC of 0.60 or higher was deemed acceptable reliability**

Results

Average time to complete audits = 77.8 minutes per school (SD=29.5 minutes)



ICC = 0.97 for total MAPS-SRTS score

Implications

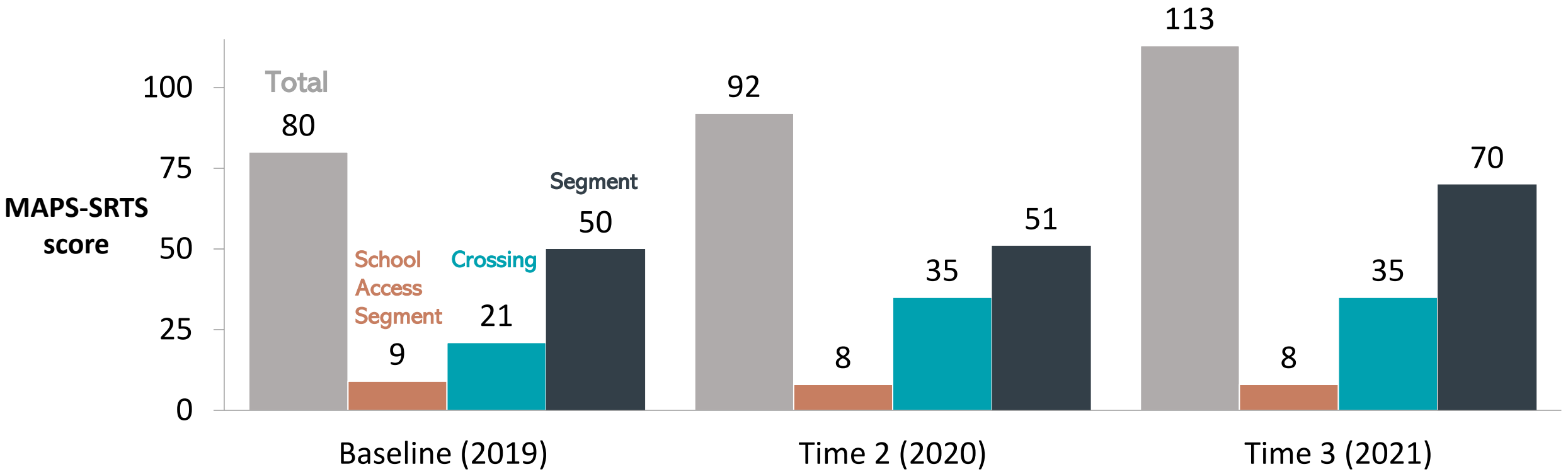
MAPS-SRTS can be used:

- ✓ To document built environment changes from infrastructure interventions.
- ✓ To evaluate SRTS interventions.
- ✓ To document current conditions around schools to inform policy actions.
- ✓ To identify priority areas and microscale aspects that need investment.

Example of changes in MAPS-SRTS scores with SRTS implementation

SRTS infrastructure improvements at one school from City of Austin occurred between measurements at time 2 and 3:

1) New sidewalk
2) Rehab sidewalk



The University of Texas at Austin College of Education

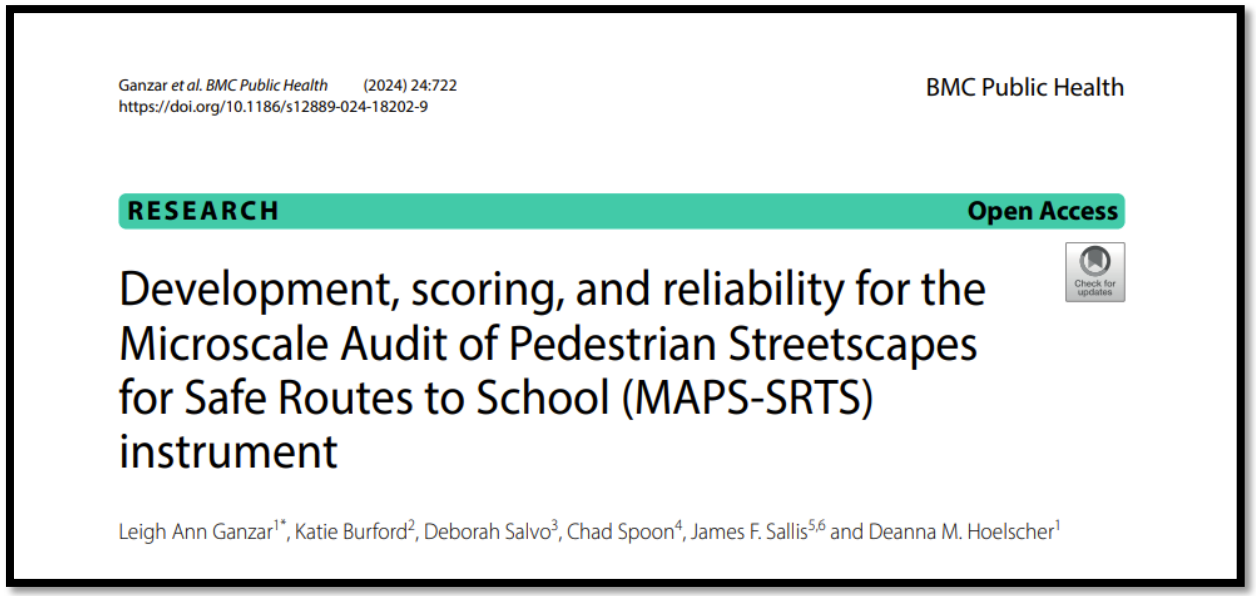
TexCEP

UTHealth Houston School of Public Health

Michael & Susan Dell Center for Healthy Living

Thank you!

Katie Burford, PhD
Post-Doctoral Research Fellow
Department of Environmental Health Sciences
Mailman School of Public Health
Columbia University Irving Medical Center
kb3424@cumc.columbia.edu



Link to paper with scoring code

The University of Texas at Austin College of Education

TexCEP

UTHealth Houston School of Public Health

MICHAEL & SUSAN DELL CENTER for HEALTHY LIVING

Figure 2: MAPS-SRTS Scoring Schema

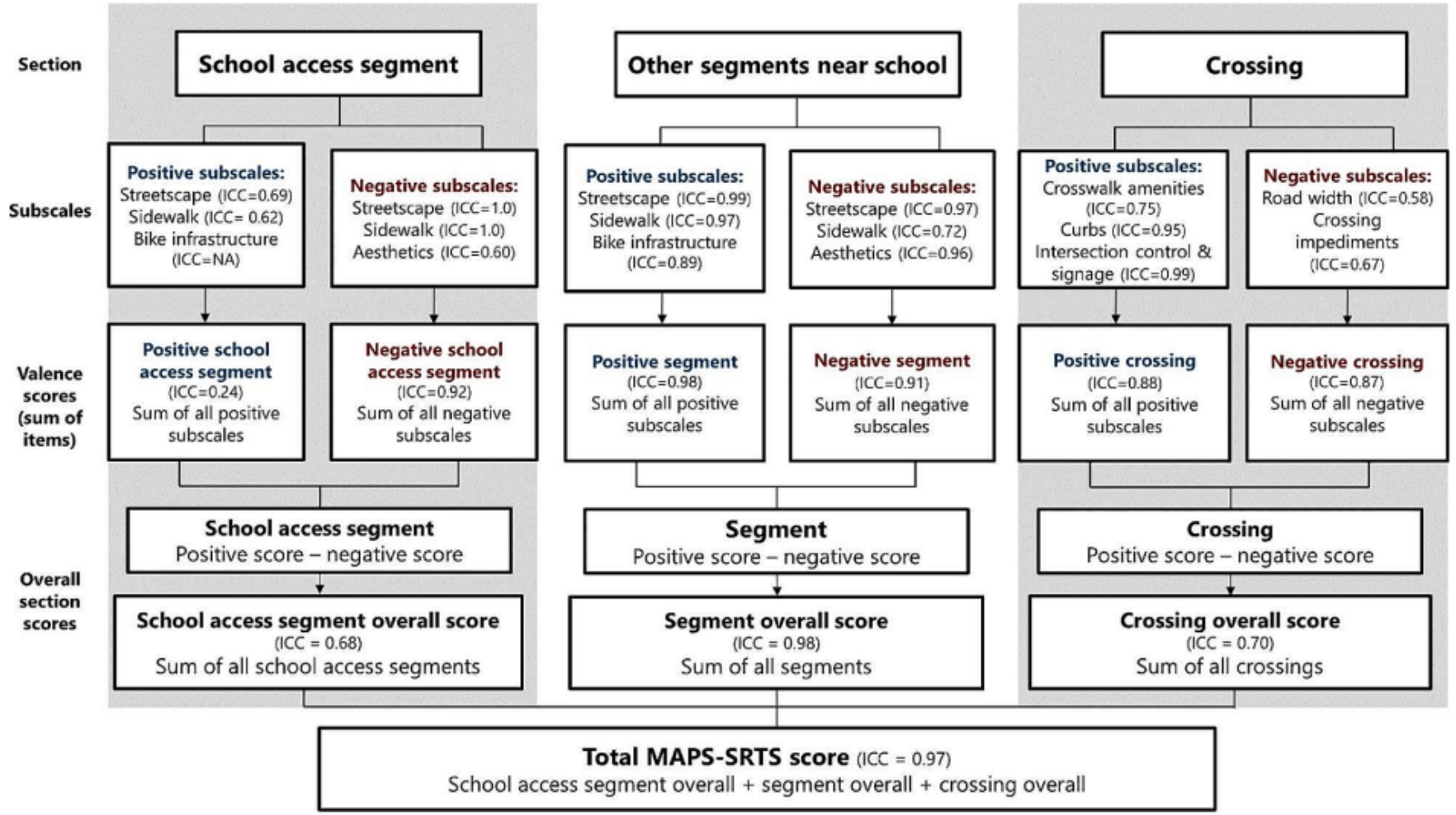


Fig. 2 Scoring schema of subscales and total score for the Micro-scale Aaudit of Pedestrian Streetscapes for Safe Routes to School (MAPS-SRTS) instrument