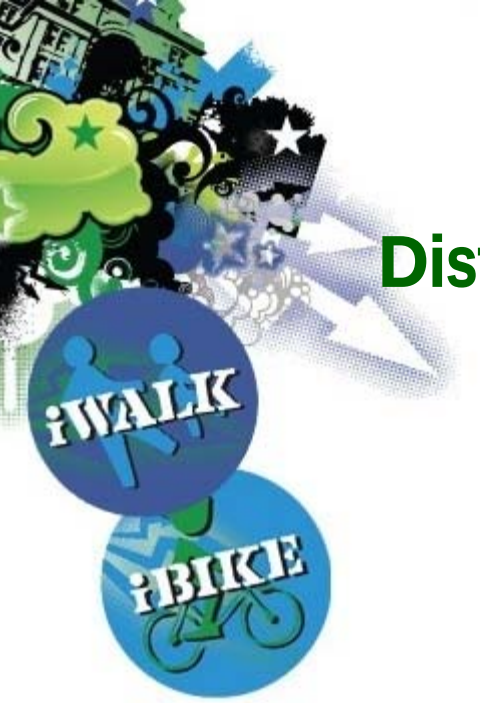

Impacts of Objective and Perceived Distance on Walking-to-School Behaviors and Roles of Other Built Environmental Attributes in These Relationships

Active Living Research Annual Conference
March 11, 2014, San Diego

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Supported by two grants from the Robert Wood Johnson Foundation's Active Living Research program (Grant ID: 65539 and 65695)

Design Research for Active Living

CONTENT

I. **Background and Significance**

II. **Literature Review**

III. **Study Design**

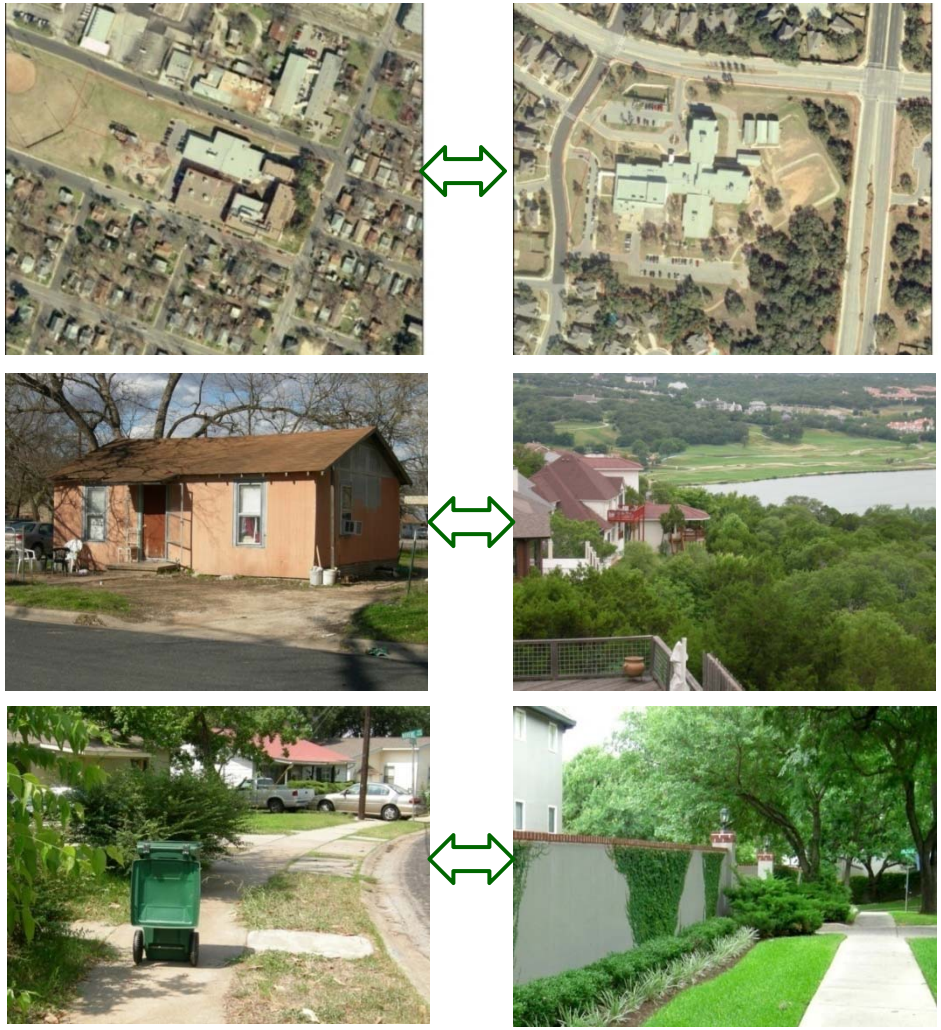
IV. **Results**

V. **Discussion**

(http://sheepworkspublishing.com/)

BACKGROUND & SIGNIFICANCE

- **Distance vs. walking to school (WTS):** Objective & perceived distances are the most commonly reported barriers.
- **Perceived distance** may be influenced by not only objective distance but also other built environmental factors.



BACKGROUND & SIGNIFICANCE

- **Perceived distance** is important for **parental decision-making** about their child's school travel mode choice.

- **Significance:** Better understanding of the impact of object vs. perceived distance is needed to inform **school development/siting policies** and to guide the development of **WTS promotion interventions**.

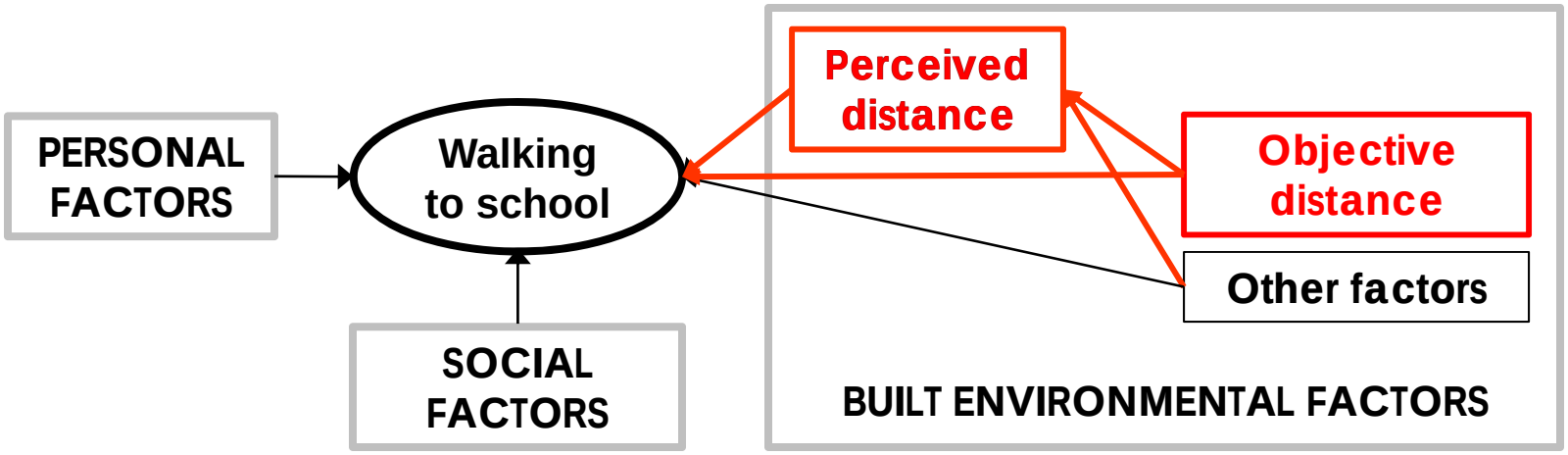
LITERATURE REVIEW

- **34 studies** examined impacts of distance on WTS & all showed **negative associations.**
  - **16** used objective distance.
  - **18** used subjective distance.

- **Other built environmental factors showed mixed results.**
  - **Neighborhood walkability**
    (e.g., density, land use mix, street connectivity, block size)
  - **Non-motorized traffic infrastructure**
    (e.g., sidewalk, bike lane, traffic calming, traffic signal)
  - **Motorized traffic infrastructure**
    (e.g., busy roads, signalized intersections, speed hump)

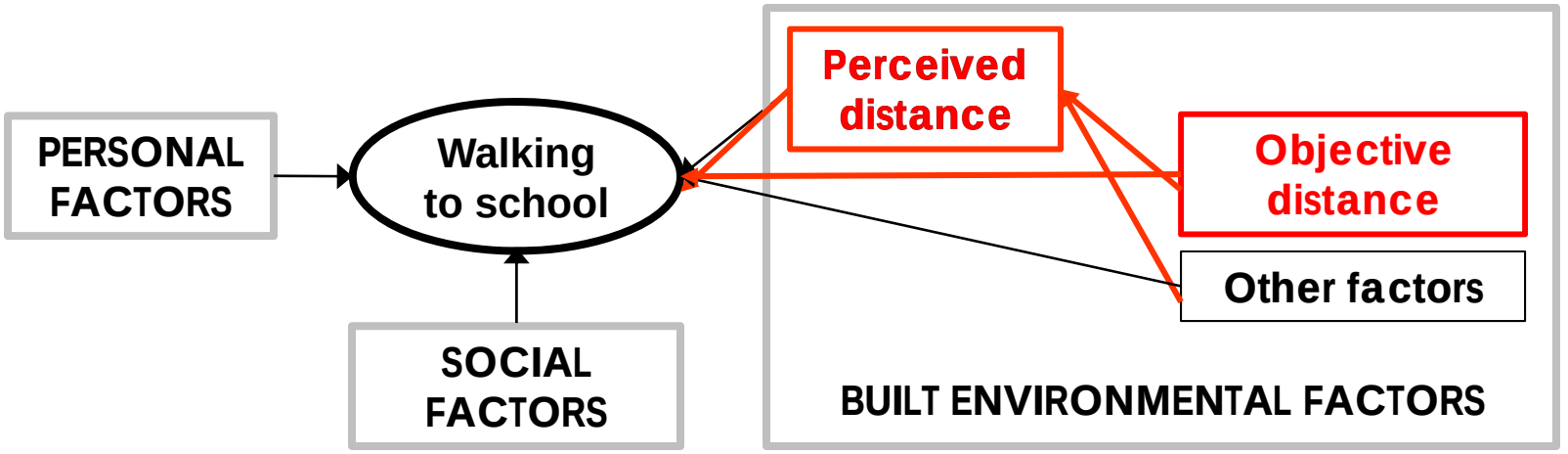
LITERATURE REVIEW

- **Limitations in Previous Studies**
  - Did not consider **both objective & perceived distances.**
  - Did not examine the **mediating role** of perceived distance.



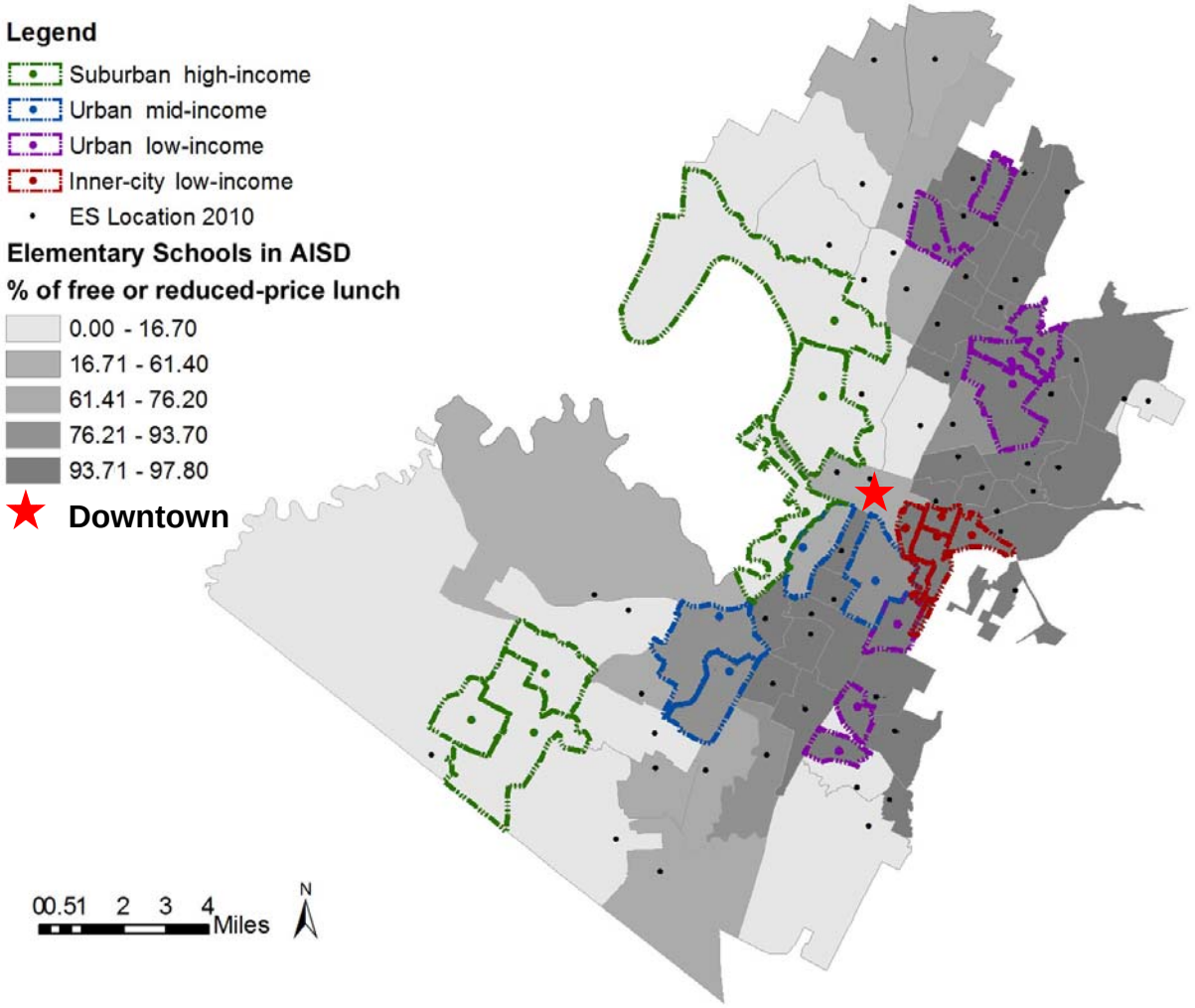
STUDY DESIGN

- **Cross-sectional**
- **Data Collection**
  - **Parental survey** collected data for school travel modes; personal, social & built environmental factors; home address; perceived distance, in 2007 and 2010
  - **GIS analysis** measured objective distance
- **Data Analysis:** Structural Equation Modeling (SEM) in Mplus



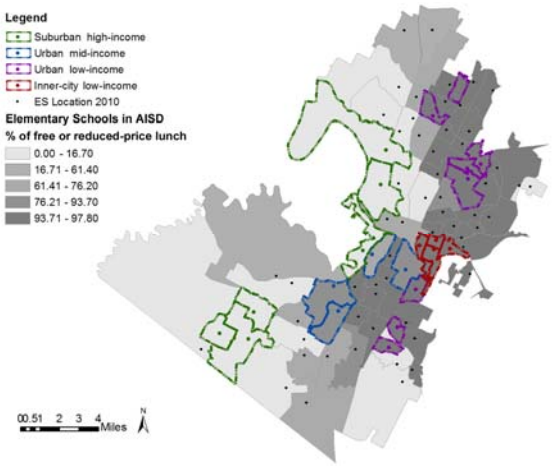
STUDY SETTING & POPULATION

- 22 elementary schools in Austin, TX
- Stratified random sampling based on SES



STUDY SETTING & POPULATION

- Diverse & representative sample



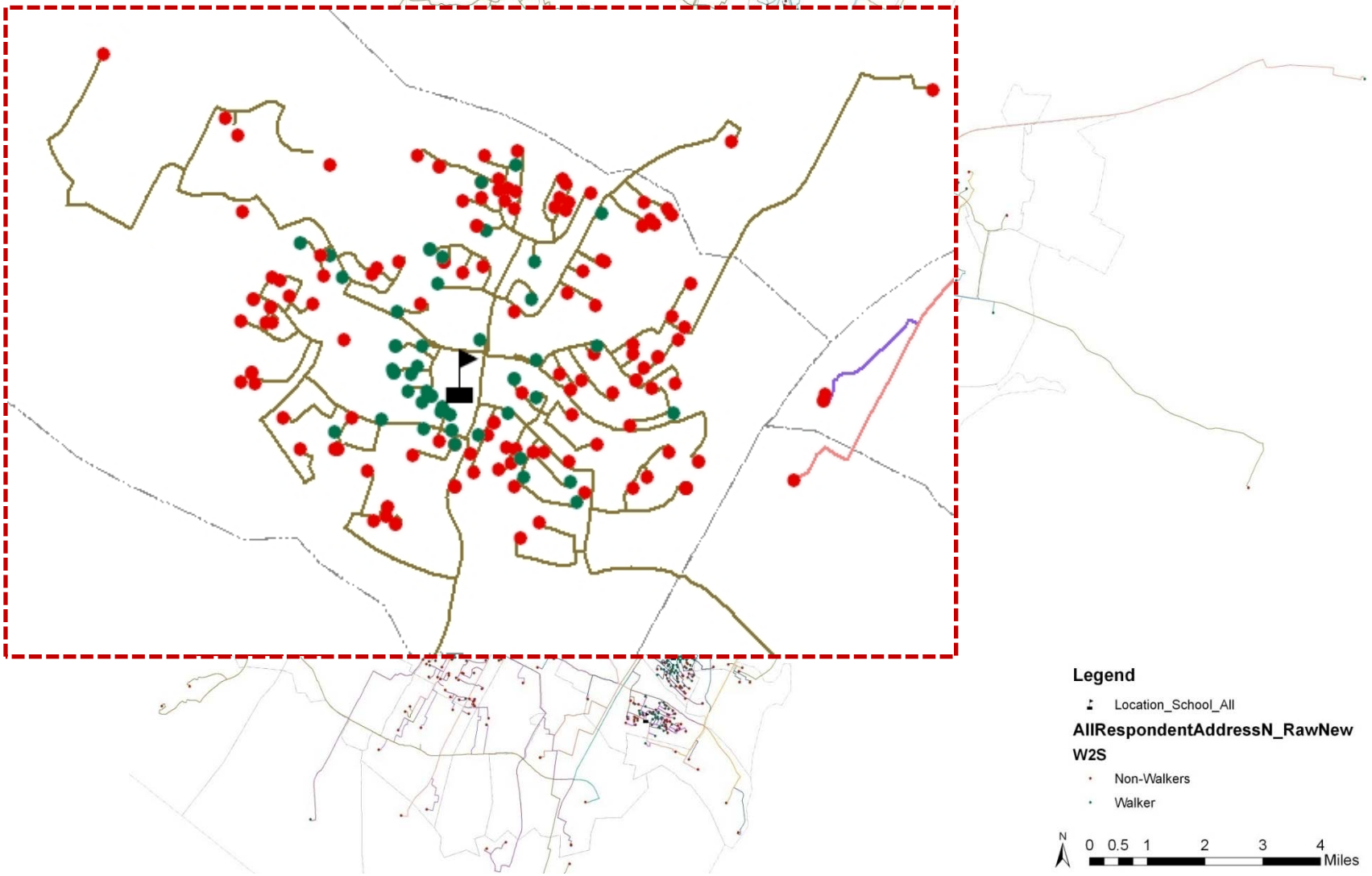
Built Environmental Factors	Mean (S.D.)
Population density (/acre)	7.8 (4.4)
Living within ½ mile from school (%)	25.7 (15.1)
Sidewalk completeness (%)	28.3 (17.2)
Street intersection density (#/acre)	0.2 (0.1)
Land use mix (0-1)	0.4 (0.2)
Crash rate per year (#/100 acres)	5.6 (3.6)
Crime rate per year (#/100 acres)	65.5 (51.4)

Population Characteristics[a]	Mean (S.D.)
Hispanic (%)	61.8 (30.0)
Free or reduced-price lunch (%)	67.3 (36.6)

[a] For total student enrolment at school

GIS ANALYSIS

Geocoded homes & generated shortest home-to-school routes using network analysis



RESULTS: DESCRIPTIVE STATISTICS

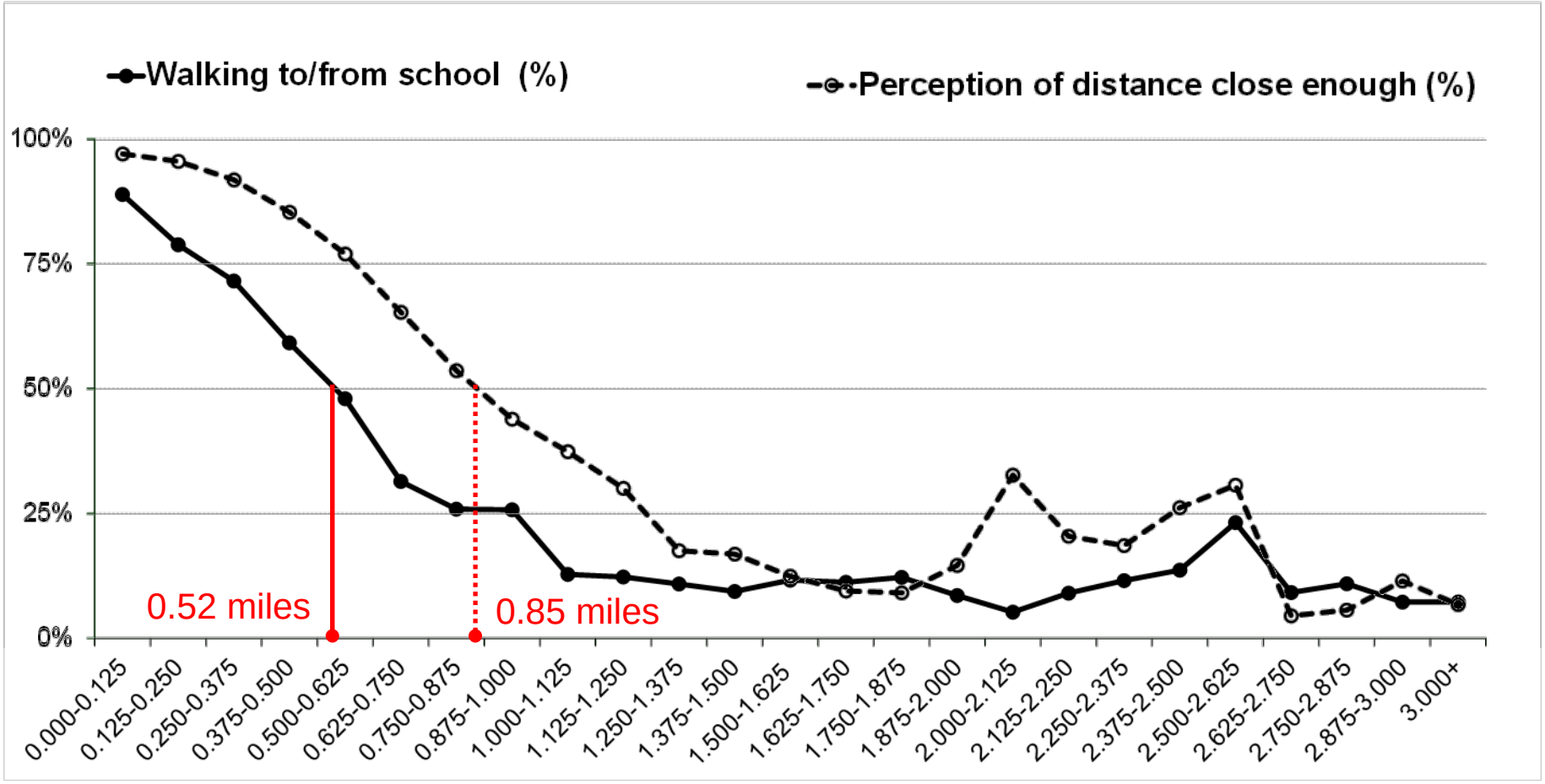
- **N=6,383**

	Frequency or Mean (S.D.)
Hispanic students	62%
Highest parental education (1 lowest – 6 highest)	3.3 (1.6)
Students walking to/from school	33% yes
Child crossing freeway en route to school	17% yes
Students with school bus service	33% yes
Parents perceiving distance being close-enough	50% yes

Descriptive Statistics for Home-to-school Distance

		Perception of Distance close enough		
		Yes	**No**	**Total**
Walking to/from school	**Yes**	Mean=0.550 S.D.=0.738 N=1693 (27.16%)	Mean=1.303 S.D.=2.061 N=390 (6.26%)	Mean=0.691 S.D.=1.143 N=2083 (33.42%)
	No	Mean=0.864 S.D.=0.989 N=1509 (24.21%)	Mean=2.15 S.D.=2.310 N=2641(42.37%)	Mean=1.680 S.D.=2.023 N=4150 (66.58%)
	Total	Mean=0.698 S.D.=0.880 N=3202 (51.37%)	Mean=2.044 S.D.=2.293 N=3031 (48.63%)	Mean=1.349 S.D.=1.838 N=6233 (100%)

WTS within Different Distance Ranges (Total Sample)

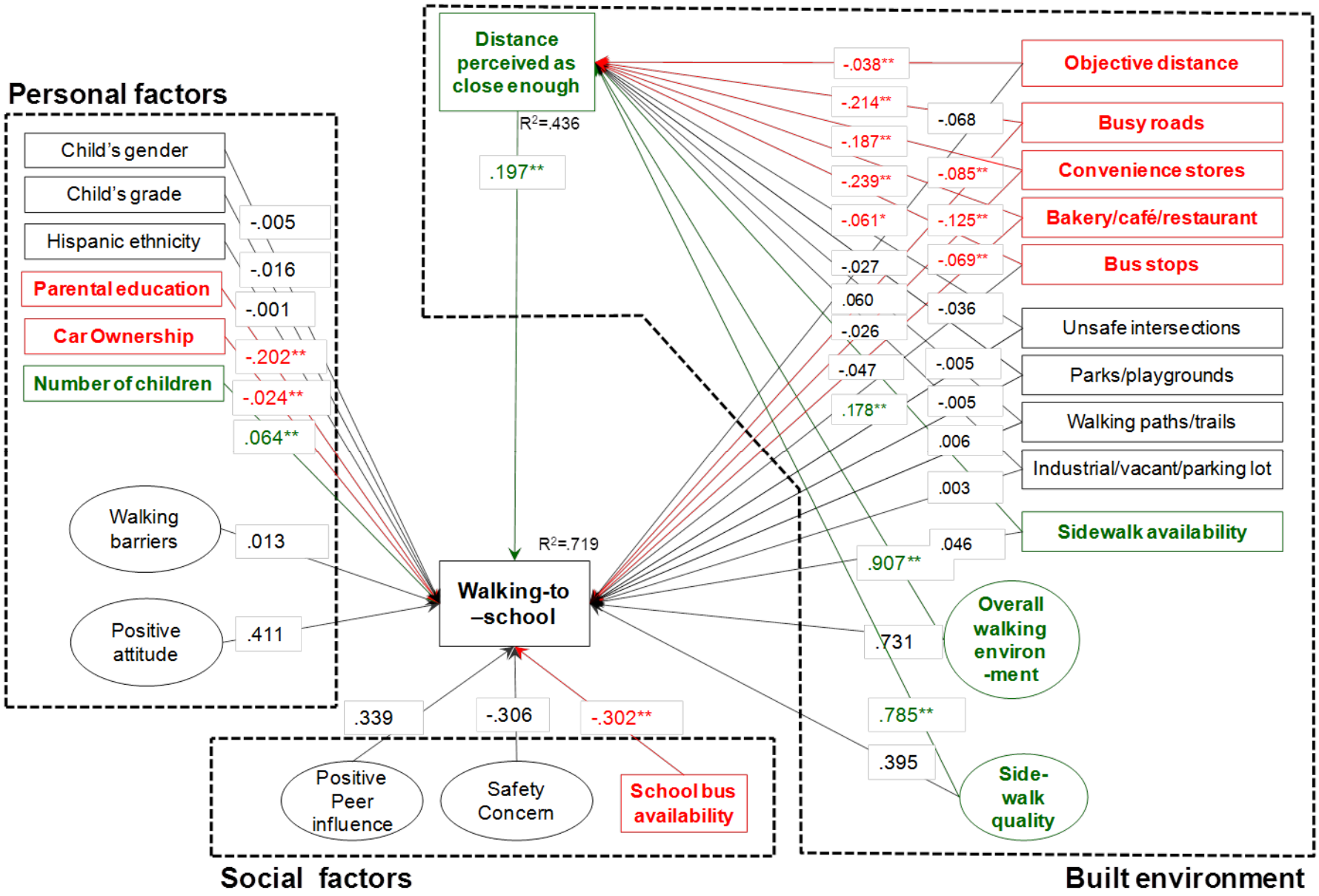


Home-to-school distance (Miles)

Results from the SEM model

1. To estimate the role of personal, social & built environmental factors (as hypothesized in the conceptual framework) in predicting WTS

2. To test the **mediating role of "perceived distance being close enough for WTS"**



Model fit: RMSEA=0.045, SRMR=0.061, CFI=0.812, TLI=0.792

(All coefficients are standardized. *: 0.01<p<0.05; **: p<0.01)

Personal Factors

Child's gender

Child's grade

Hispanic ethnicity

Parental education

Car Ownership

Number of children

-.005

-.016

-.001

-.202**

-.024**

.064**

.013

.411

Walking barriers

Positive attitude

Walking-to-school

R^2=.719

R^2=.175 Easier to drive child to school

R^2=.372 WTS involves too much planning ahead

R^2=.316 Child has too much to carry

R^2=.341 Child gets too hot and sweaty

R^2=.198 Child thinks WTS is cool

R^2=.200 Child walks in daily routine

R^2=.165 Parents walk in daily routine

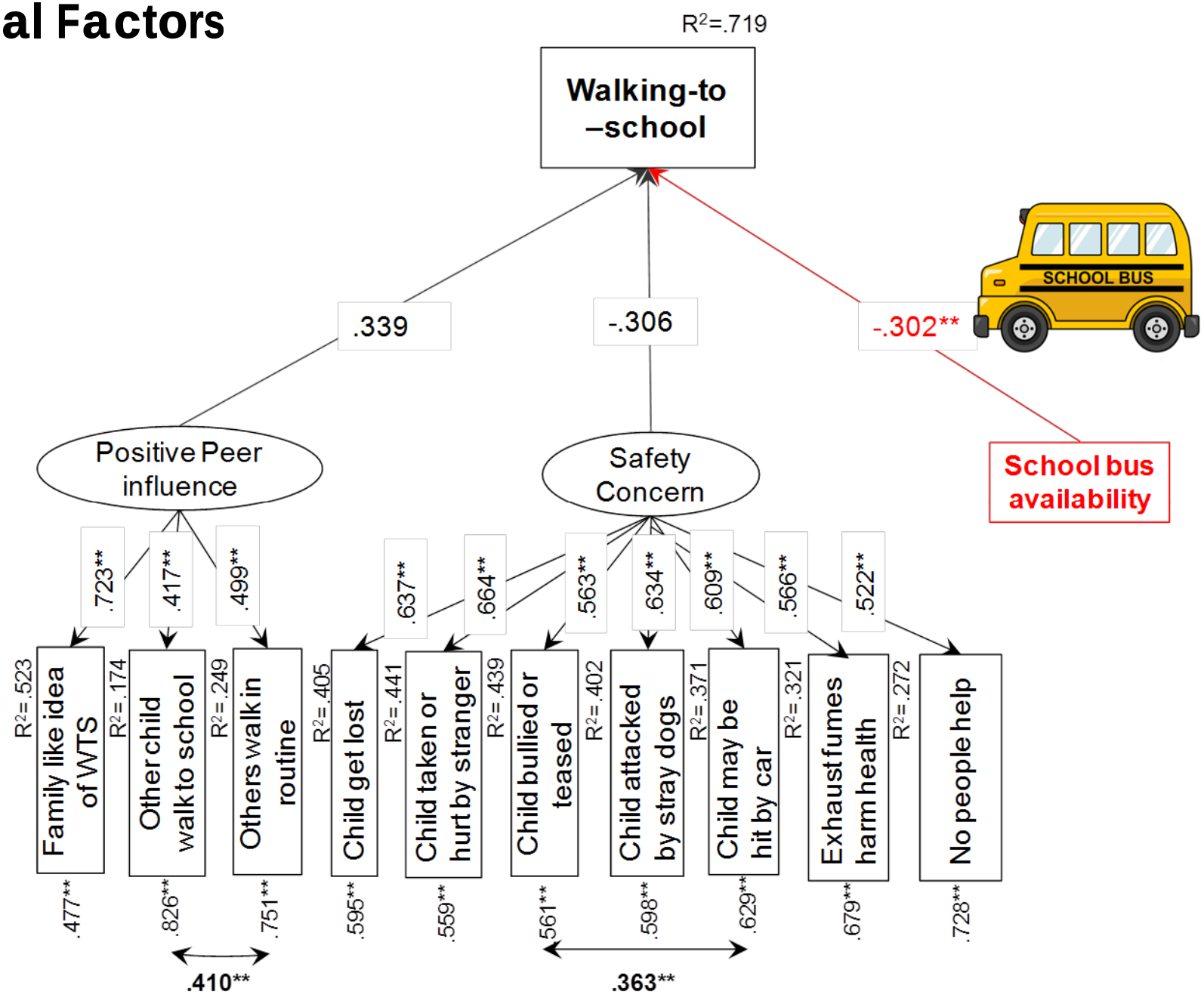
R^2=.433 Parents enjoy WTS with child

.825** .628** .684** .659** .802** .800** .735** .567**

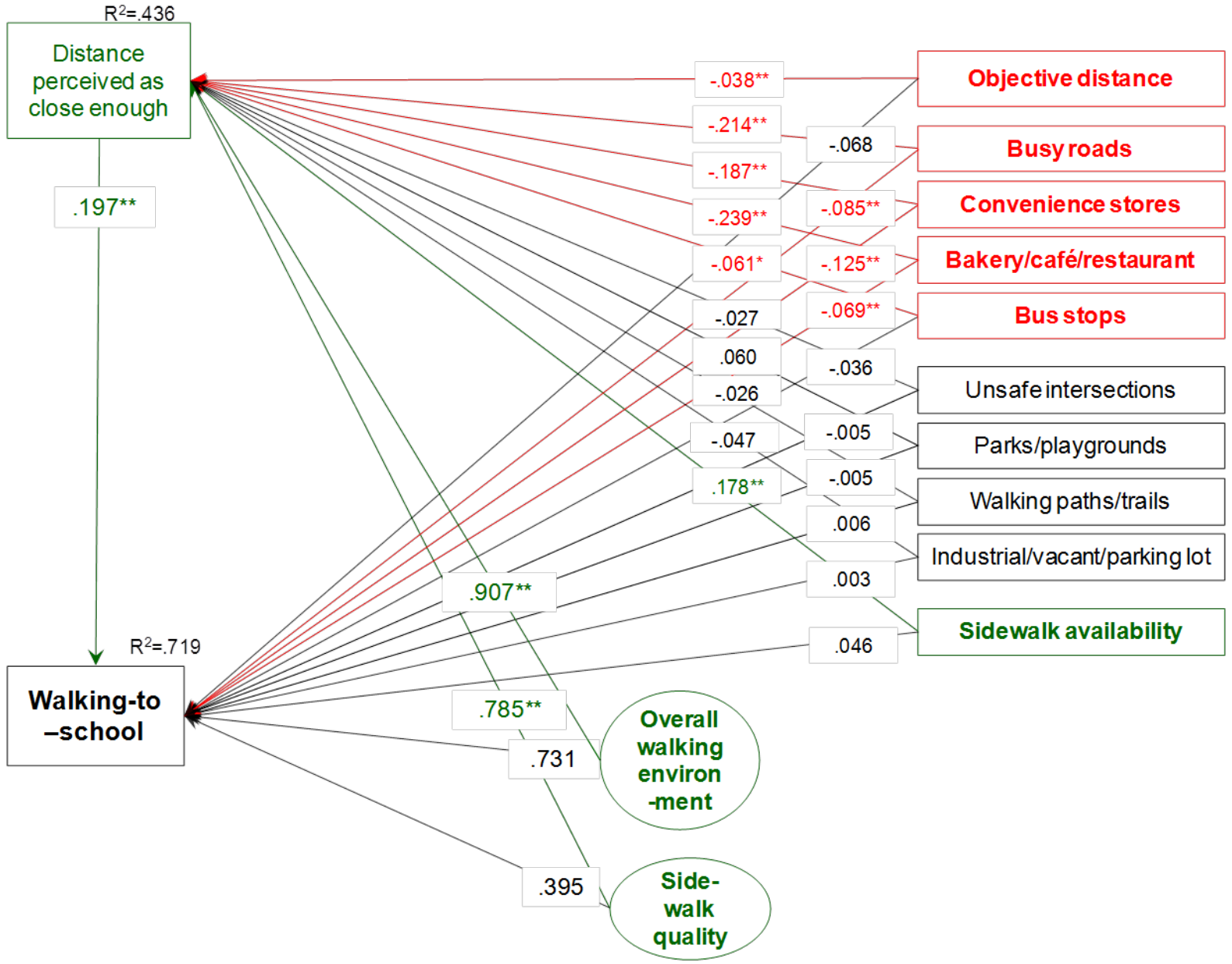
.419** .610** .562** .584** .445** .448** .407** .658**

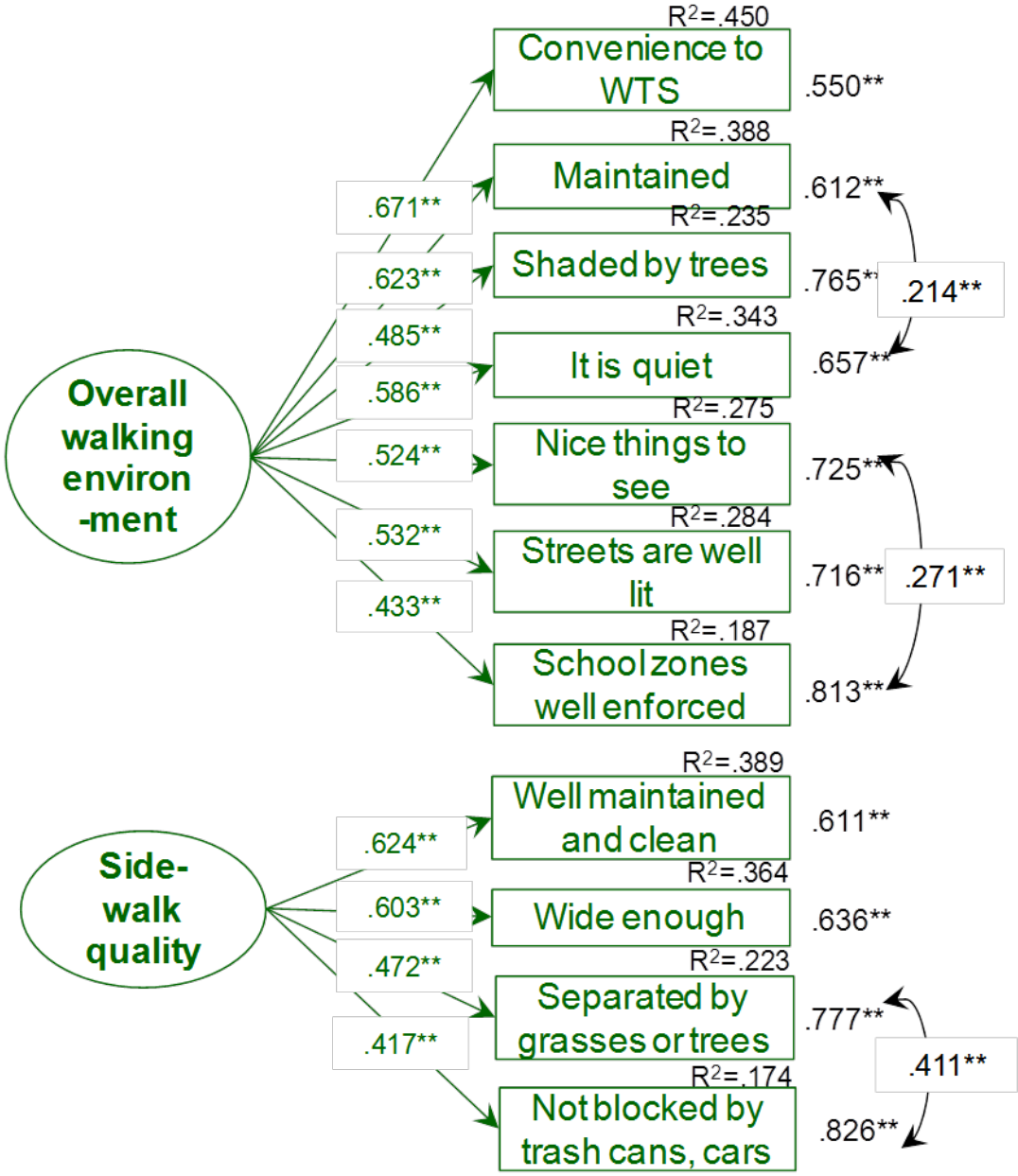
.086** .019** .102** .365**

Social Factors



Built Environmental Factors




Overall walking environ -ment
Side-walk quality
.671**
.623**
.485**
.586**
.524**
.532**
.433**
.624**
.603**
.472**
.417**
R²=.450
Convenience to WTS
.550**
R²=.388
Maintained
.612**
R²=.235
Shaded by trees
.765**
.214**
R²=.343
It is quiet
.657**
R²=.275
Nice things to see
.725**
R²=.284
Streets are well lit
.716**
.271**
R²=.187
School zones well enforced
.813**
R²=.389
Well maintained and clean
.611**
R²=.364
Wide enough
.636**
R²=.223
Separated by grasses or trees
.777**
.411**
R²=.174
Not blocked by trash cans, cars
.826**

DISCUSSIONS

- The importance of **perceived distance** as a **mediator**.
- **Indirect roles of objective distance and other environmental factors** on WTS through perceived distance.
- To lift the barrier of perceived long distance, **future interventions should target not only the *actual distance*, but also *other walkability factors*** such as sidewalk availability and quality, busy roads, maintenance, etc.

QUESTIONS?

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