

HEALTH

Urban Design, Lifestyle, and the Development of Chronic Conditions

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Why the Recent Obesity Epidemic?

Agreement: Change in Environment,
but many competing hypotheses

- Television/Video
- Too much homework
- Less exercise
- Decline in PE
- More fast food
- Urban Sprawl/Car Culture

Some ideas are plain false

Actual changes at times surprising

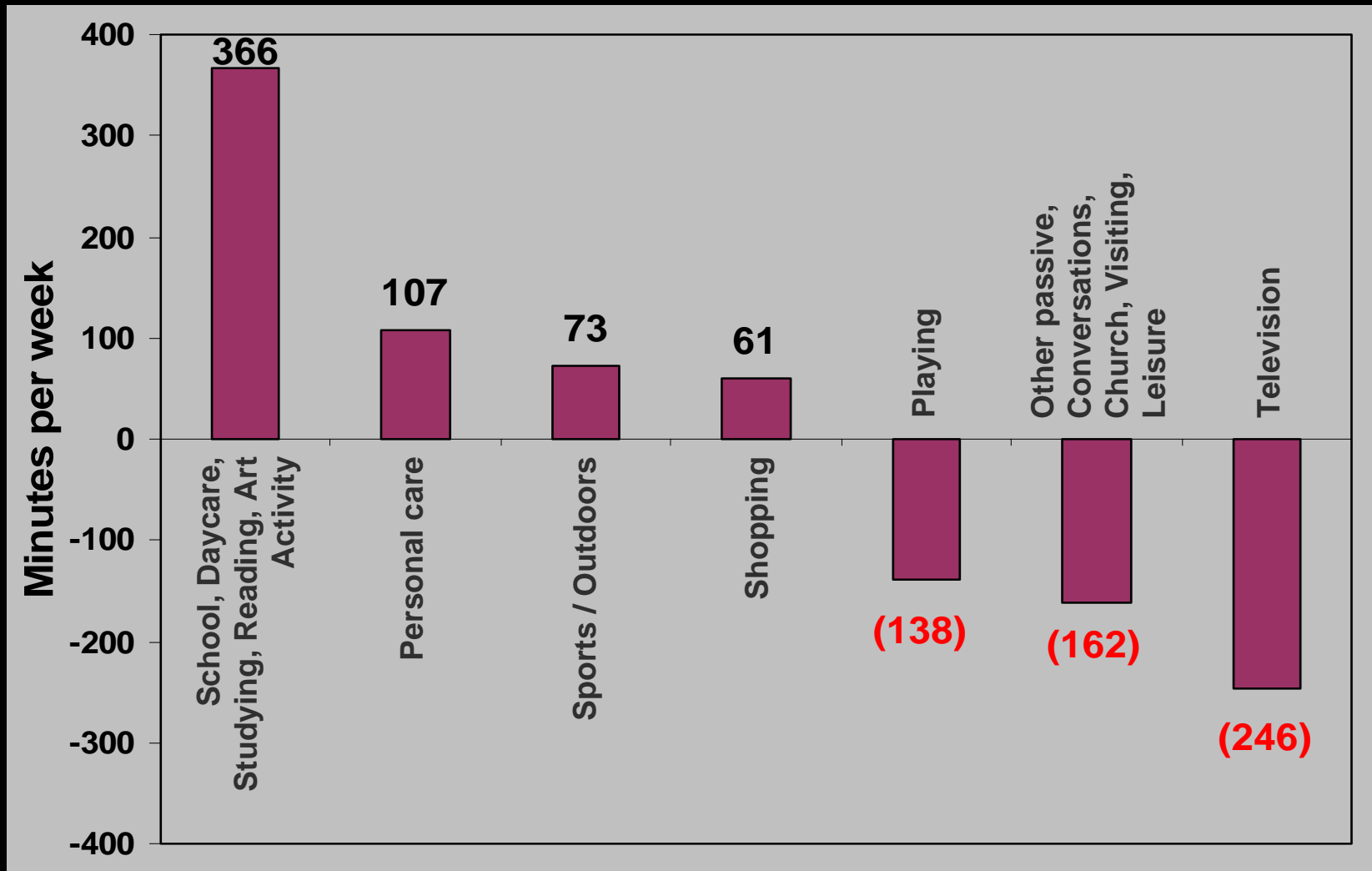
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Today's Presentation

- 1. How have children's lives changed in last 30 years?**
 - Time use, transportation
 - See background papers for media, homework, PE, diet
- 2. Urban design, lifestyles, and chronic conditions**
 - What differs across age groups?

Changes in Weekly Minutes Spent on Activities from 1981 to 1997, Age 3-12

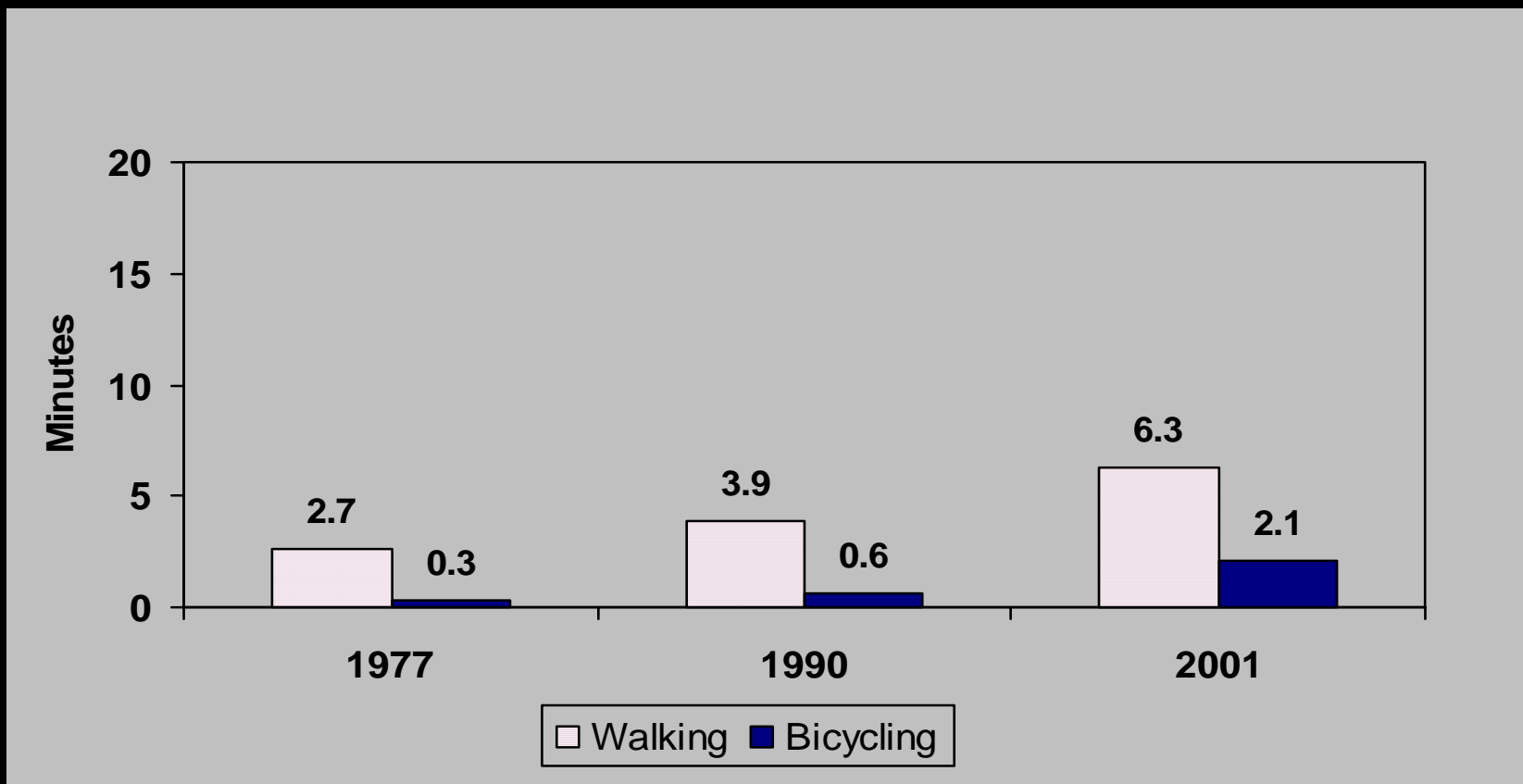


If Children Spend More Time Away From Home, How Do They Get There?

Utilitarian Walking Important Source of Physical Activity

- Walking to get somewhere – different from exercise
- Small energy imbalance sufficient for obesity epidemic:
 - ½ mile a day additional walking could have prevented it
- Utilitarian walking influenced by built environment
 - are destinations within walking/biking distance?
- Land use mix, zoning regulations
- School siting

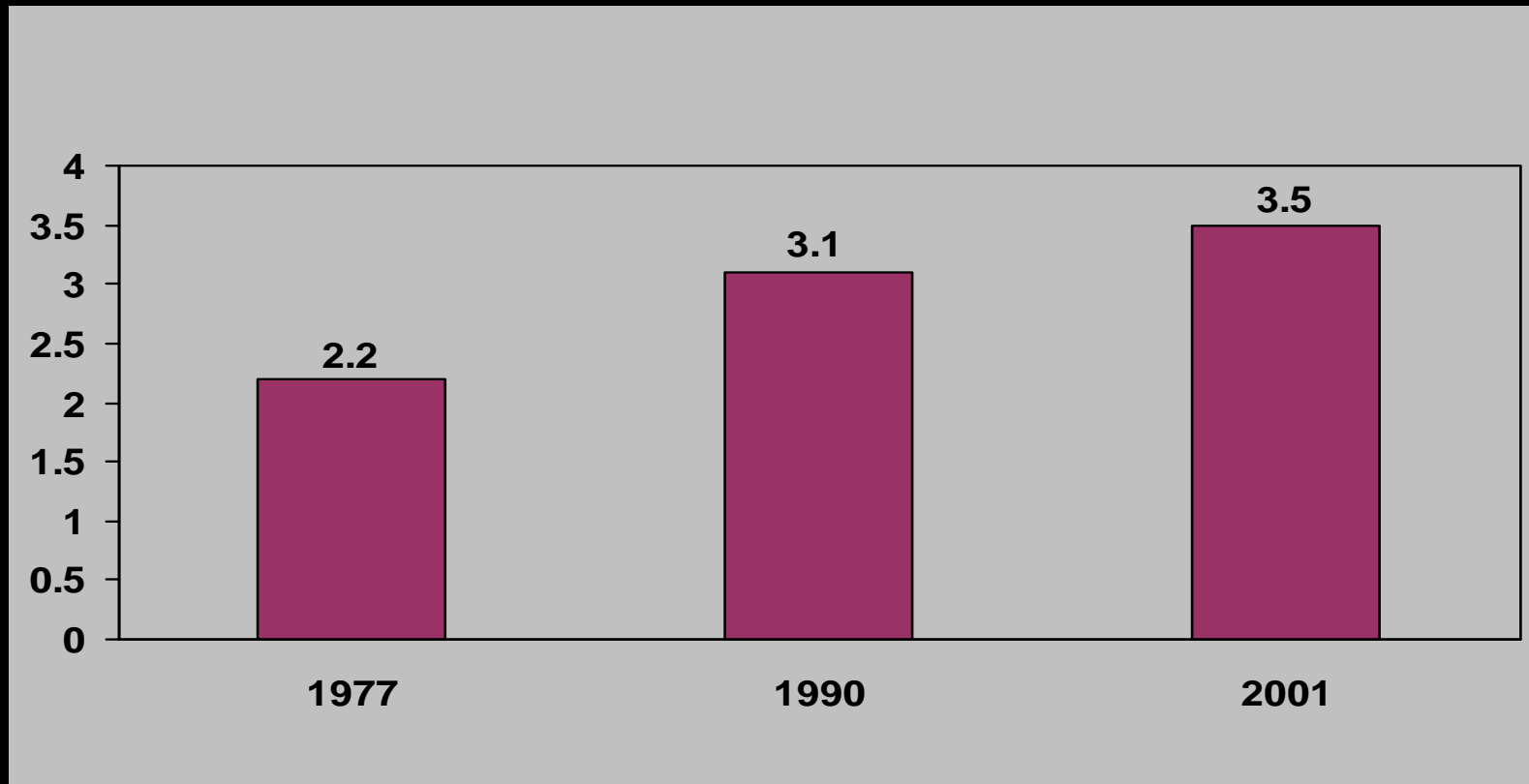
Data Show No Decline in Total Active Travel Time for Children 5-15 (Mins/Day) -But Active Travel Time Is Minimal



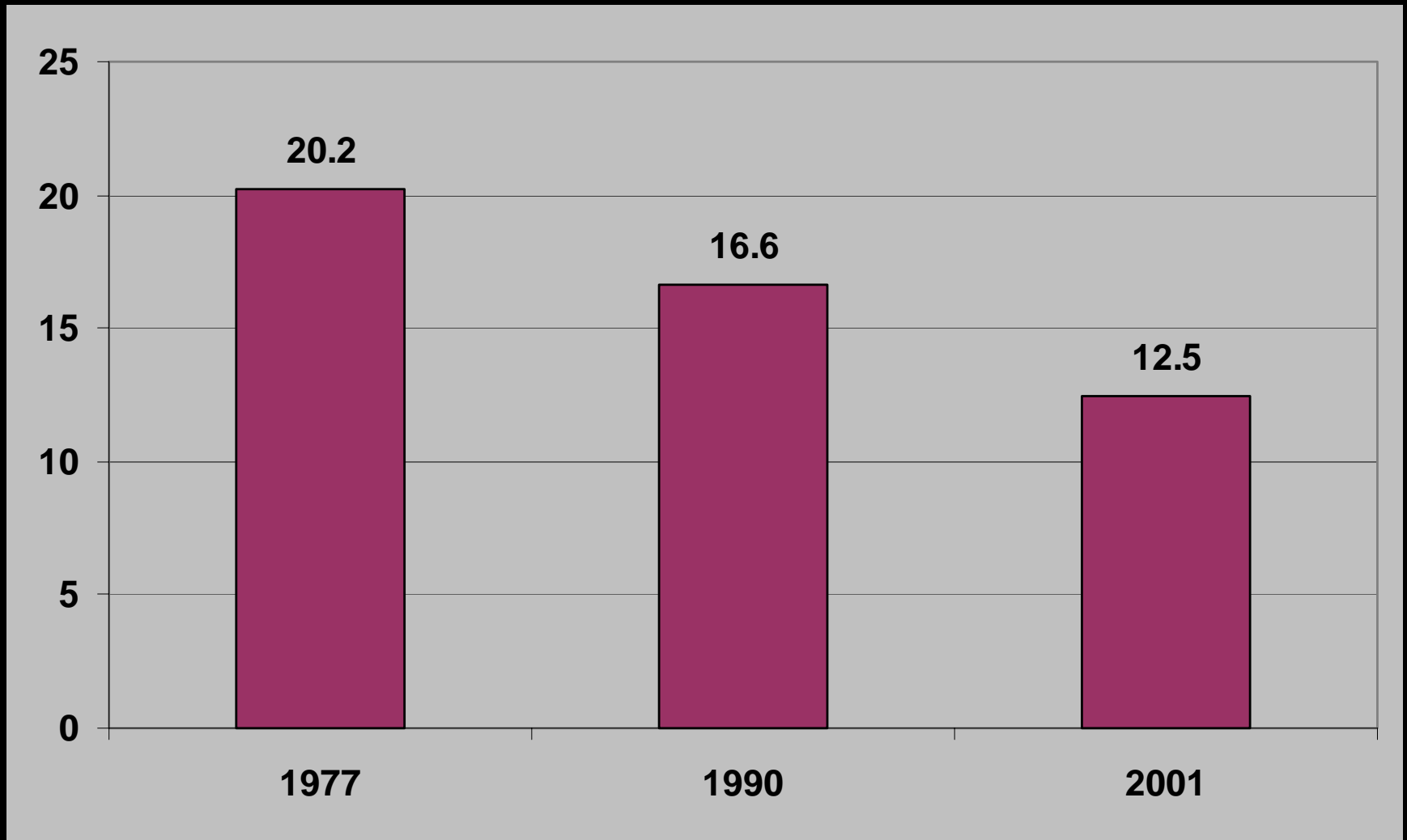
But there are issues about data comparability over time

Number of Daily Walking Trips

may have increased, but could be incomparable survey designs



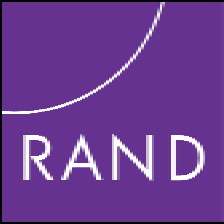
Walking to School as Percent of School Trips (Children 5-15)



Summary: Transportation Trends for Youth

- **Definitely a decline in walking to school and opportunity for interventions to increase physical activity**
- **Unclear whether transportation trends changed youth physical activity in recent years**
- **Best estimate would show small increase in active travel because of increased number of trips**
- **However, total amount of active travel is negligible: not even 10 minutes/day for 5-15 years olds**
- **“Active Living Communities”?**

Why Do We Care?



HEALTH

Suburban Sprawl, Physical and Mental Health

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**Funded by the National Institute of Environmental Health Sciences,
Grant number P50ES012383**

Research Question

- **Study relation between objective measures of sprawl and medical and mental health problems**
- **Many strong opinions and wild claims, few facts**
- **Good evidence for accidents, air pollution, increased driving**
- **Early evidence suggesting relation to reduced walking, higher BMI**
- **No analyses of broader set of health measures yet**

Individual Level Data

- **Healthcare for Communities (HCC), national household phone survey fielded in 1998-2001**
- **Clustered in 60 sites and national sample, 10,000 observations in wave 1, 12,000 in wave 2**
- **Suburban sprawl indicators available only for 38 sites, resulting in N = 8686**
- **Adults only (chronic conditions not particularly relevant for children)**

Sprawl Can Be Measured

Dimension	Metrics
Street length	<ul style="list-style-type: none">• Average block length• Block size in square miles• % small blocks
Land use mix	<ul style="list-style-type: none">• % population within 1 mile of shopping, schools, business• Job/resident balance
Concentration of people and jobs	<ul style="list-style-type: none">• Variation of density across census tracts• Density gradient• % of population less than 3 or more than 10 miles from business center
Population density	<ul style="list-style-type: none">• People per square mile• % in low or high density areas• Average lot size

Cities Ranked by Sprawl

From Least to Most Sprawl

New York	178
San Francisco	147
Portland, OR	126
Los Angeles-Long Beach	102
Rochester, NY	78
Atlanta	58
Riverside-San Bernardino	14

Outcome Measures

- **Physical health: 16 chronic health conditions or symptom clusters**
- **Mental health: validated scales (CIDI-SF) for depressive and anxiety disorders**
- **Health-related quality of life: validated scales for physical health (PCS-12), for psychological well-being (MHI-5). Higher values indicate better health**
- **Linear and logit regression with sprawl as main explanatory variable and adjusting for individual and site factors**

People Were Asked to Self-Report on A Variety of Chronic Health Problems

Asthma

Diabetes

Hypertension

Arthritis

Physical disability

Trouble breathing

Cancer

Neurological condition

Stroke

Angina/heart disease

Back pain

Abdominal/digestive problems

Liver disease

Migraine/headache

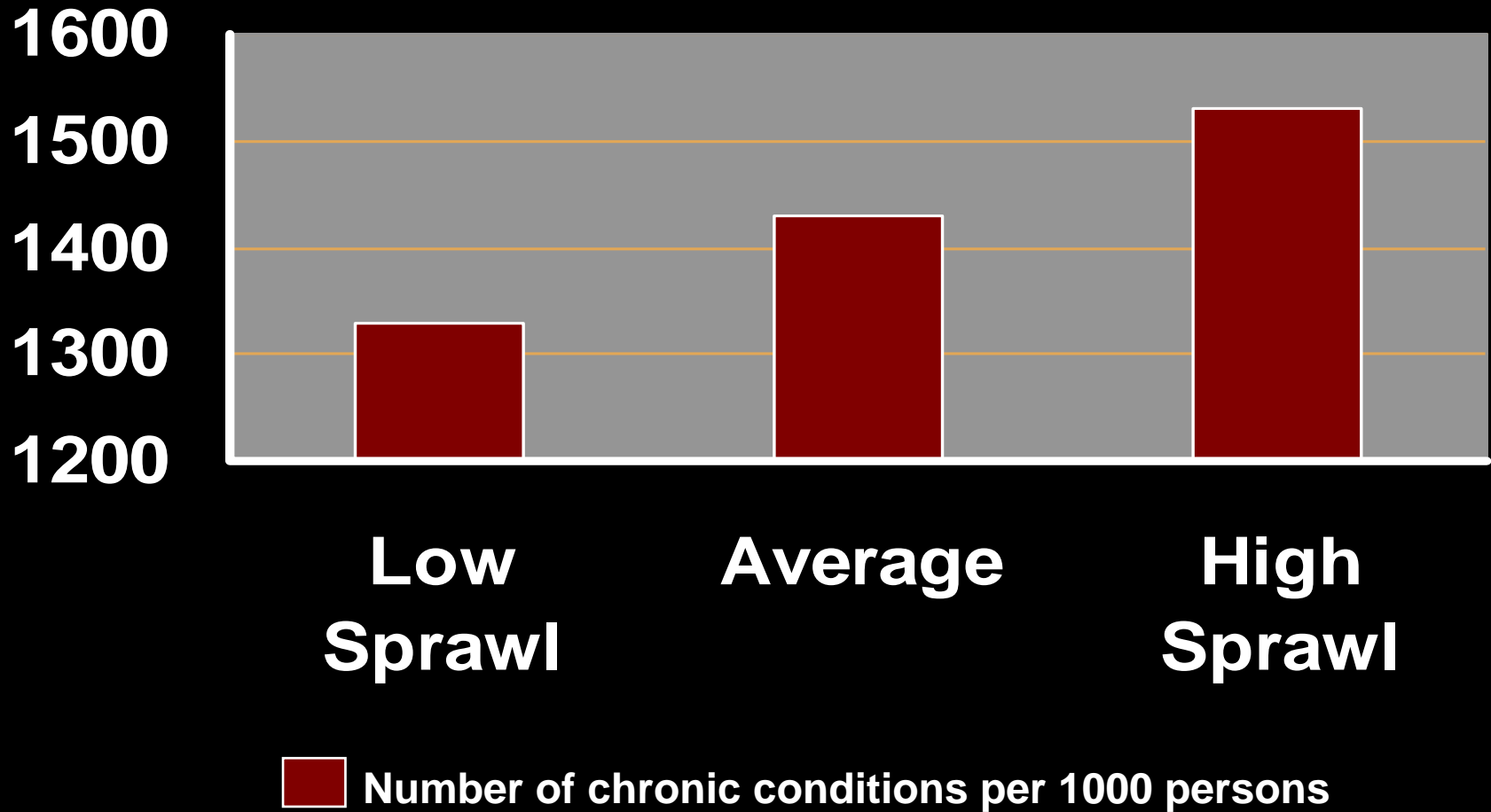
Urinary tract problems

Other chronic pain

Explanatory Variables and Analysis

- **Individual variables measured in HCC: Age, sex, race, educational, household income, marital status, family size, current employment, sex**
- **MSA variables (not from HCC): Annual rain days, days hotter 90 degrees, days colder 32 degrees, average household size, percentage working age**
- **Sensitivity analysis: Excluding employment status and income, include MSA size.**
- **Do not include lifestyle measures, e.g. BMI, which are consequences of sprawl**

Sprawl Is Associated with More Health Problems



Demographic Factors Associated with Increased Likelihood of Chronic Conditions

	Increase in Number of Chronic Conditions per 1000 people
Aging 4 years	100
Reducing household income by half	60
Black race	93
High school degree	319

Source: Sturm and Cohen, *Public Health*, 2004

Sprawl Has a Substantial Independent Effect

	Increase in Number of Chronic Conditions per 1000
Aging 4 years	100
Reducing household income by half	60
Black race	93
High school degree	319
50-point increase in Urban Sprawl Index	96

Source: Sturm and Cohen, *Public Health*, 2004

More Results

- **14 of the 16 physical conditions associated with more sprawl**
- **But no effect at all for mental health**
- **Subpopulation effects:**
 - **not very different for minorities (108 vs 93)**
 - **But substantially higher for lower income individuals (139) and the elderly (247)**
- **Most significant individual factors: street accessibility, land use mix**

Strongest Effects of Streets and Mixed Use Factors for these Conditions

- **Arthritis, joint pain**
- **Trouble breathing**
- **Abdominal/digestive problems**
- **Migraine/headaches**
- **Heart disease**

Weak Design -> Tentative Results

- **Metropolitan areas may be too large and heterogeneous for interpretation**
- **Data are from a single point in time; longitudinal data would be useful**
- **Outcome data are self-reported symptoms and conditions, not objective diagnoses**
- **But consistent with other studies of urban design and physical activity, BMI**
- **Physical activity pathway most plausible**

Discussion

- **Disproportionate impact on the physical health of the elderly and possibly the poor – maybe fewer resources to mitigate the limitations imposed by environment?**
- **Street, but not overall index, significantly associated with hypertension and heart disease**
 - **conditions for which a physical activity pathway is most plausible**
 - **Utilitarian walking?**
- **In contrast to prominent hypotheses, no effects of adverse effects on mental health.**

Sprawl and Health: Conclusion

- **Provides initial support to hotly debated claim that suburban sprawl affects health.**
- **Evidence is tentative, stronger data and research designs needed**
- **If results are replicated, policies that affect urban design can play a critical role in the prevention of chronic disease**
- **Costs and effect sizes of redesign not clear**

What Differs For Young Children?

- **Longitudinal survey of children, currently from K-G5**
- **More than 1000 schools nationwide, over 20,000 children**
- **Outcomes:**
 - **BMI change**
 - **Parent-reported outside play time**
 - **(chronic conditions not meaningful for this age group)**
- **No data on walk to school, utilitarian walking**

BMI Increase Over Time

	Boys			Girls		
	Mean	Median	50 th GC	Mean	Median	50 GC
BMI K	16.4	16.0	15.4	16.3	15.8	15.2
BMI G 1	16.8	16.2	15.5	16.7	16.1	15.5
BMI G 3	18.5	17.5	16.2	18.5	17.4	16.4

Excess BMI gain at median: 0.7 units for boys, 0.4 for girls

(At median, boys gain about 1.5 BMI units whereas they should only gain 0.8 according to growth charts → 0.7 too much)

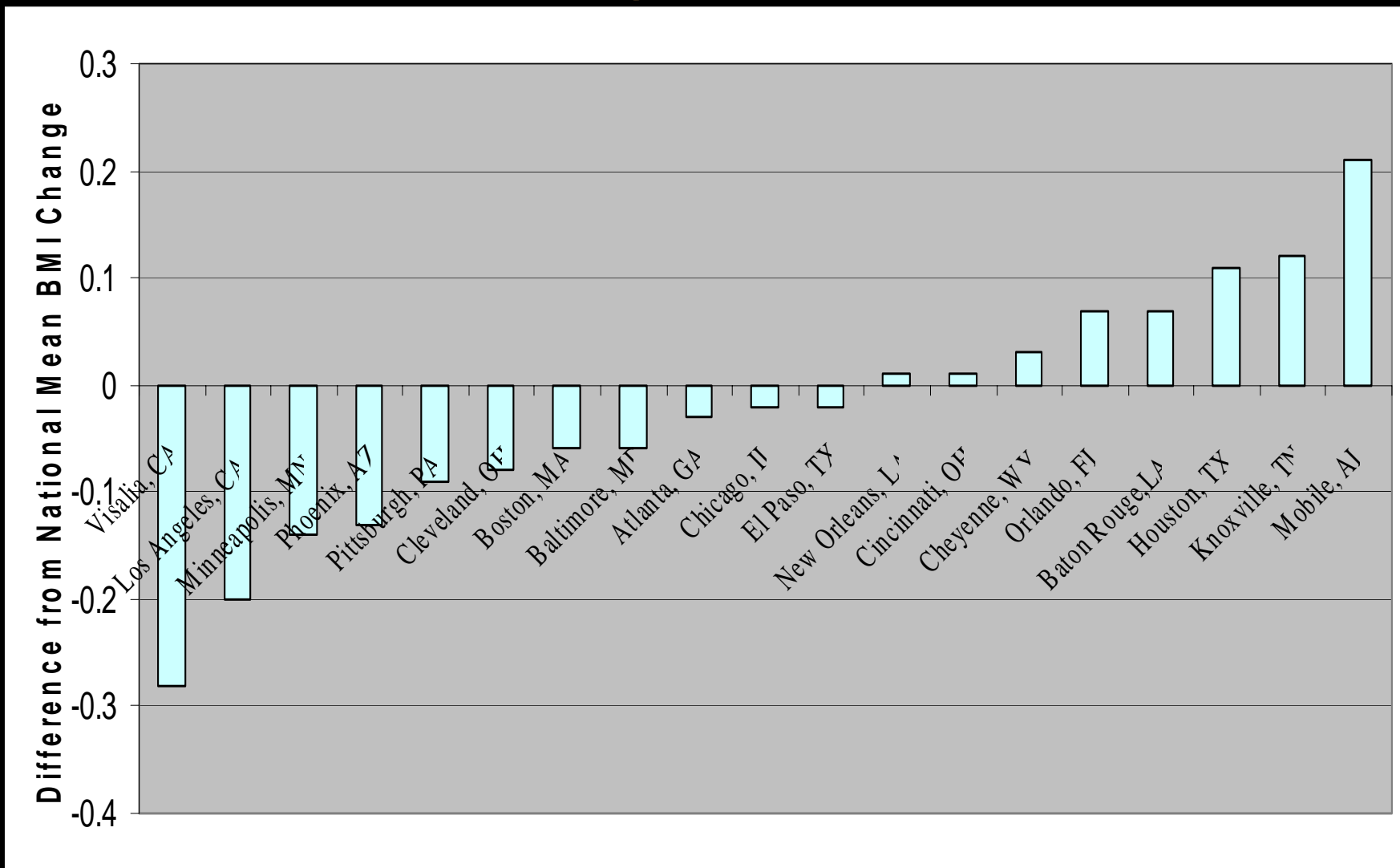
Effects for Young Children Are Different From Effects for Adults

- **No significant relationship of sprawl and BMI for young children (higher gain in more sprawling areas)**
- **More sprawl weakly associated with more parent-reported playing outside, but similarly small and statistically insignificant**
- **Unstructured playing outside important part of physical activity among young children (through elementary school)**
 - **May be more common in suburban cul-de-sacs**
- **However, utilitarian travel increases as children get older, active travel (biking, walking) could peak among adolescents**
 - **Need right mix of safety and connectivity**

Other Factors Important for Differential Weight Gain Among Young Children

- **Key role of individual and family factors**
- **School environment:**
 - **Physical education for girls at risk for overweight (Datar and Sturm, AJPH, 2004)**
- **Local food prices:**
 - **Relative prices for fruits and vegetables can explain large part of excess weight gain (Sturm and Datar, Public Health, in press)**
 - **But direct pathway from prices to consumption has not been demonstrated**

Effect of Local Food Prices on BMI Change Between Kindergarten and 3rd Grade



Summary

- **For adults, sprawl associated with higher prevalence of chronic conditions**
- **Association between sprawl and chronic conditions may reflect underlying physical activity pathway**
- **Utilitarian physical activity, especially walking, is important and dependent on urban design**
- **Walking to school unambiguously declined as source of utilitarian physical activity for children**
- **Less clear that total active travel time decreased**
- **No clear evidence either way that sprawl affects children's weight gain or outside playing time**