

# The Impact of COVID-19 on Children's Obesogenic Behaviors

KEITH BRAZENDALE, PHD MSC  
LEIGH ANN GANZAR, DRPH MPH

**MODERATOR:** ETHAN T. HUNT, PHD MPH

**UTHealth** | The University of Texas Health Science Center at Houston  
School of Public Health in Austin

Michael & Susan Dell Center for Healthy Living  
1616 Guadalupe | Suite 6.300 | Austin, TX 78701  
512.482.6170 tel



# Sleep Crisis



In 2<sup>nd</sup> grade, 31% of Hispanics and 30% of African Americans do not have a regular bedtime during the school week compared to 19% of White/Other ethnicity<sup>2</sup>.

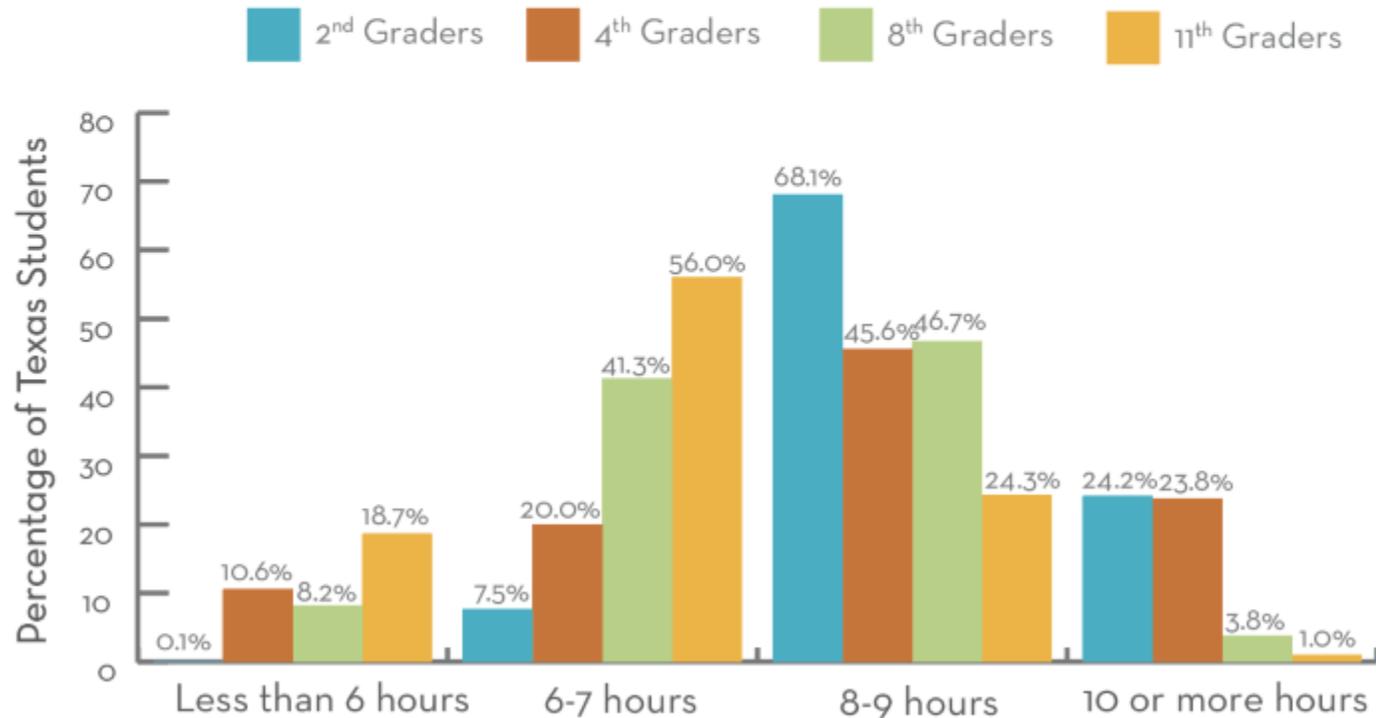


Only 57% of 2<sup>nd</sup> grade Texas border students meet sleep recommendations compared to 70% of non-border 2<sup>nd</sup> graders. However, 33% of 11<sup>th</sup> grade Texas border students meet sleep recommendations compared to 23% of non-border 11<sup>th</sup> graders<sup>2</sup>.



54% of 2<sup>nd</sup> graders have electronic devices in their bedroom compared to 92% of 11<sup>th</sup> graders<sup>2</sup>.

## Hours of sleep per day<sup>2</sup>





# THE COVID-19 PANDEMIC HIGHLIGHTS THE IMPORTANCE OF *STRUCTURE* TO ADDRESS CHILDHOOD OBESITY

**Keith Brazendale, PhD, MSc**

Department of Health Sciences  
College of Health Professions and Sciences  
University of Central Florida  
Orlando, FL USA



MICHAEL & SUSAN DELL  
CENTER *for* HEALTHY LIVING

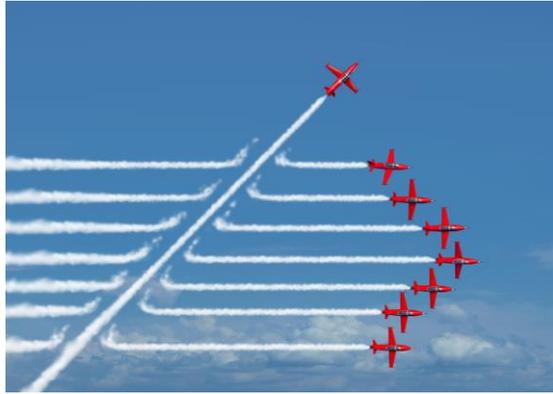


1.5 BILLION CHILDREN IMPACTED



TEAM COVERAGE  
CORONAVIRUS PARENTS SCRAMBLE AFTER COVID-19 SCHOOL CLOSURES 5

This was a major disruption!





**“obesity prevalence increased”**

(2 to 17 years; attending clinics; N=500,417 visits)

**“gained an extra five lbs. compared to pre-pandemic reference period of similar length”**

(N=191,509; 5 to 17 years)

**“monthly increases in BMI nearly doubled during the pandemic”**

(N=432,302; 2 to 19 years)

**“children treated before pandemic, maintained weight loss at 12 months versus children treated during pandemic exhibited weight gain of at 12 months”**

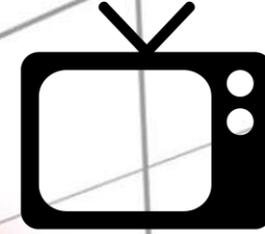
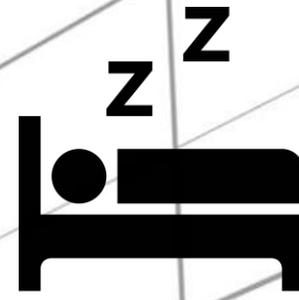
**“increases were of greater magnitude for individuals with overweight or obesity...and in school-age children 6-to-11 years”**

**“the largest single-year increase since the beginning of the measurement program 15 years ago”**

United Kingdom's National Child Measurement Programme



**>100 research studies  
'Obesogenic Behaviors'**



**Physical activity levels decreased**  
**Sedentary time increased**  
**Screen/media time increased**  
**Sleep duration/timing was altered**  
**Dietary habits were impacted**

A group of five diverse children, including a girl with curly hair in a green shirt, a boy with a shaved head in a green shirt, a girl with blonde hair in a grey shirt, a boy with curly hair in a grey shirt, and a girl with curly hair in a pink and white striped shirt, are smiling and looking up at the camera. The image is overlaid with a semi-transparent dark grey filter.

SHOULD WE HAVE ANTICIPATED  
THIS *DETERIORATION* IN  
CHILDREN'S HEALTH?



SHOULD  
THE  
CITY

**Yes!**

PARTICIPATED  
ON IN  
THE

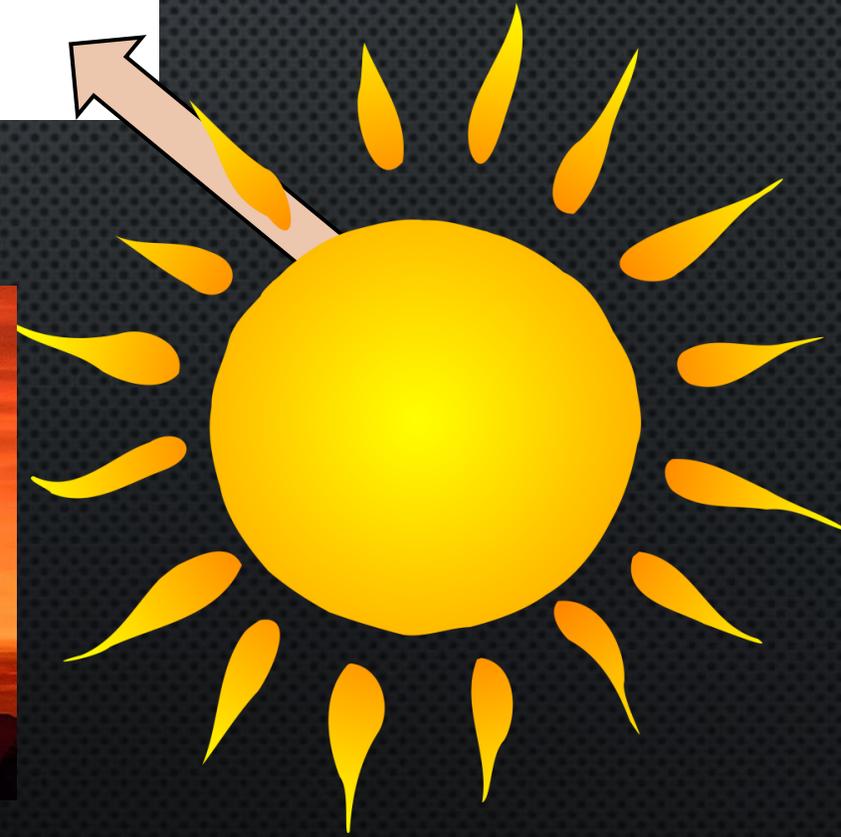
~~Schedule~~

~~Routine~~



SCHOOL  
HOLIDAYS!

WEEKEND



# THE *STRUCTURED DAYS HYPOTHESIS*

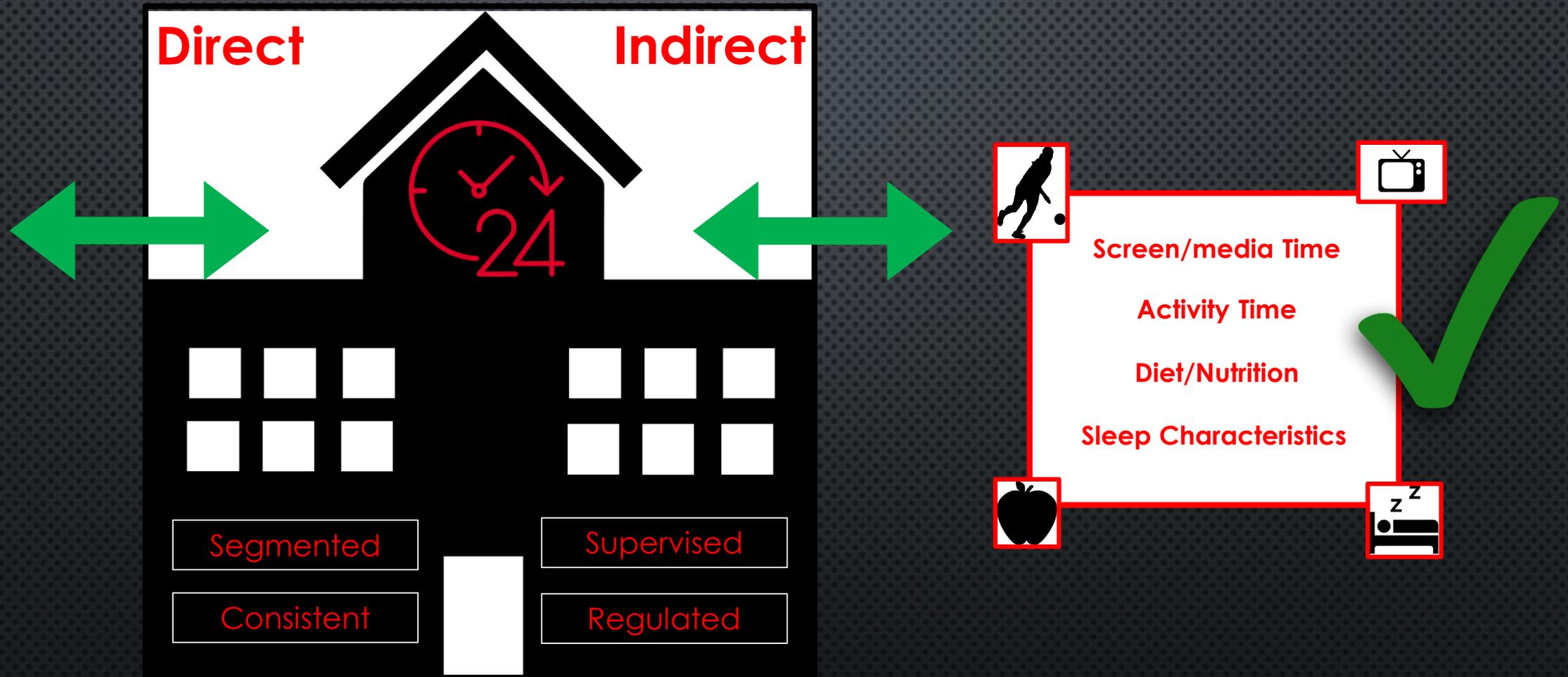
Brazendale, K., et al. (2017) *Int J Beh Nutr Phys Act*, 14(1), 1-14.

“... obesogenic behaviors are more favorable when children are exposed to a structured day versus a less-structured day...”



**>400 citations related to COVID-19**

# THE STRUCTURED DAYS HYPOTHESIS

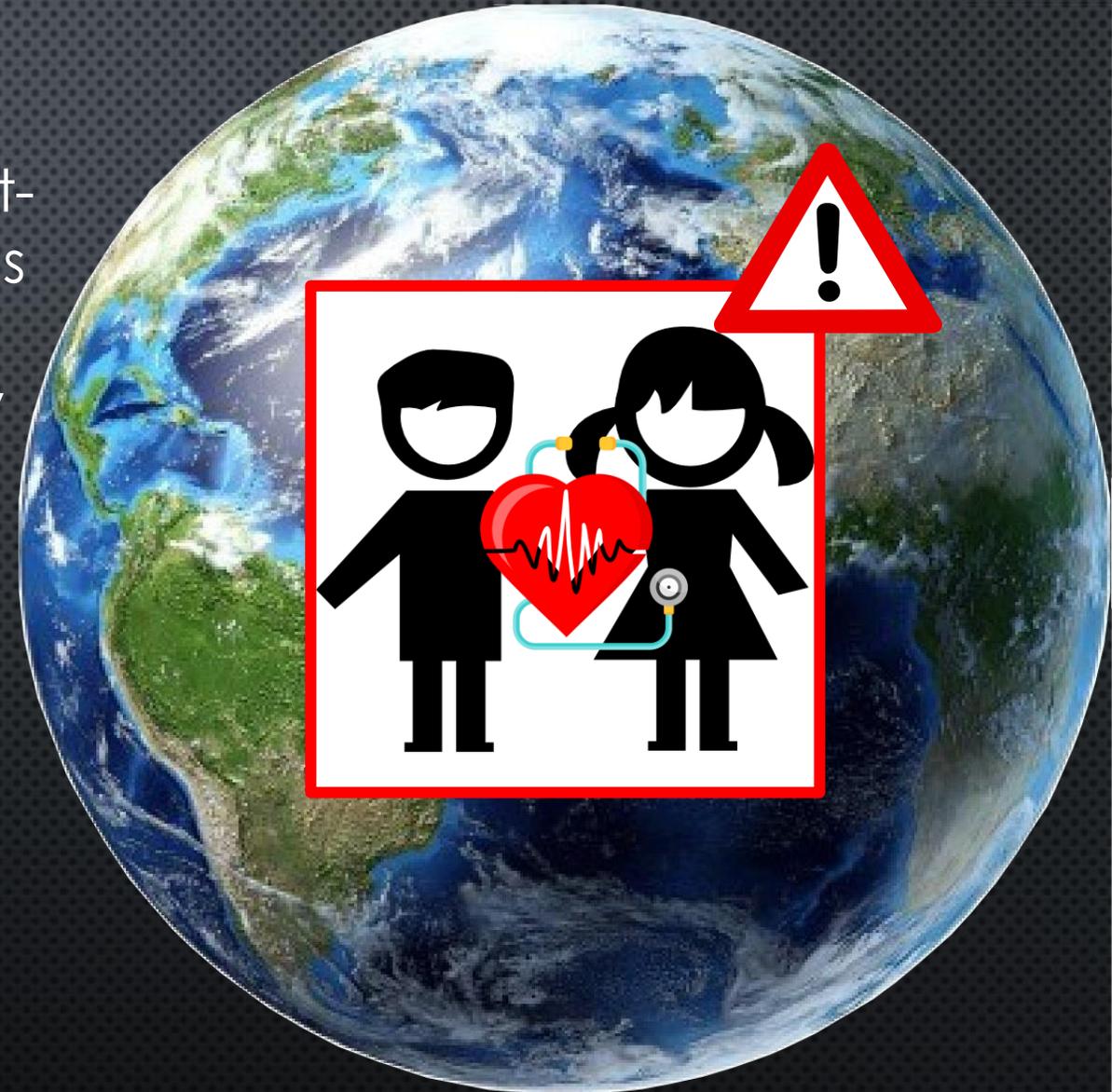


# COVID-19 AND THE SDH



Activity Time

couldn't attend school- and sport-related programs that promote physical activity



# COVID-19 AND THE SDH



**Screen/media Time**

increased  
unsupervised access  
to engage in higher  
amounts of sedentary  
and screen/media  
time



# COVID-19 AND THE SDH



Sleep Characteristics

did not have to adhere to school start times which afforded more freedoms/leniency around bed/wake times



# COVID-19 AND THE SDH



**Diet/Nutrition**

relied on household  
for dietary/nutrition  
needs with access  
eliminated to  
free/subsidized meals

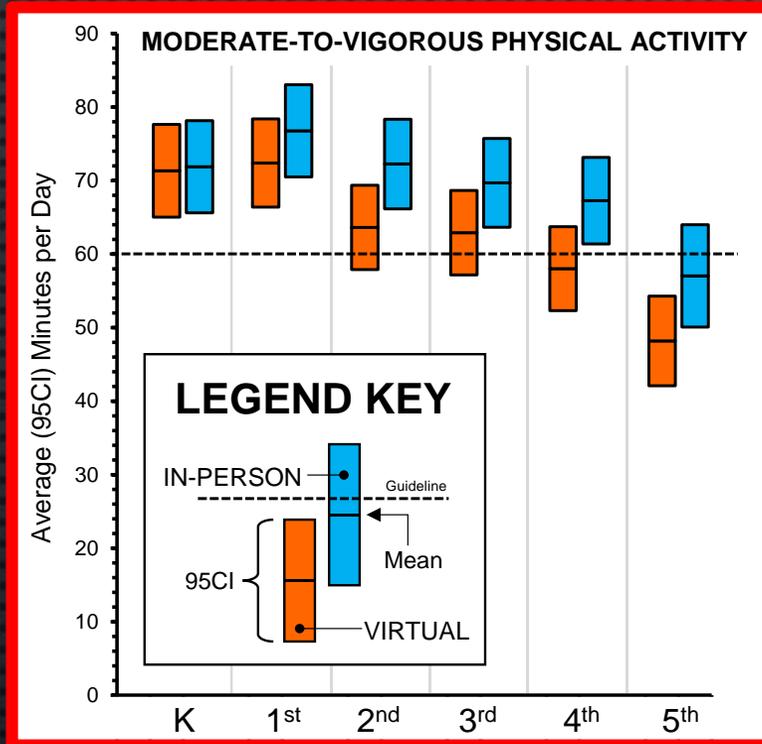
increase in  
food insecurity

snacking on  
caloric-dense  
shelf-stable  
foods

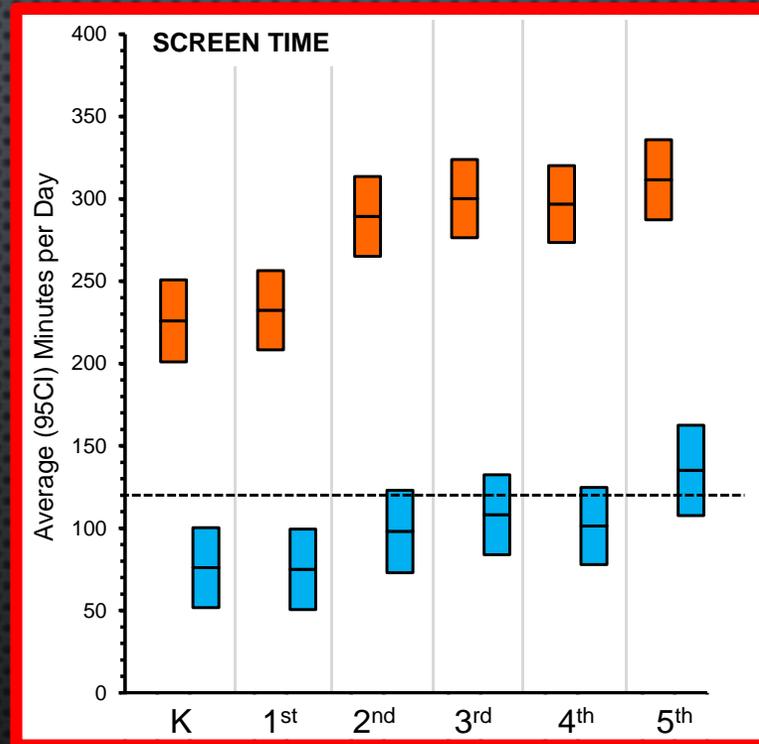


# HOT OFF THE...

Within-Subject Differences (SAME 14-day period)



MVPA



SCREENTIME

(non-educational)

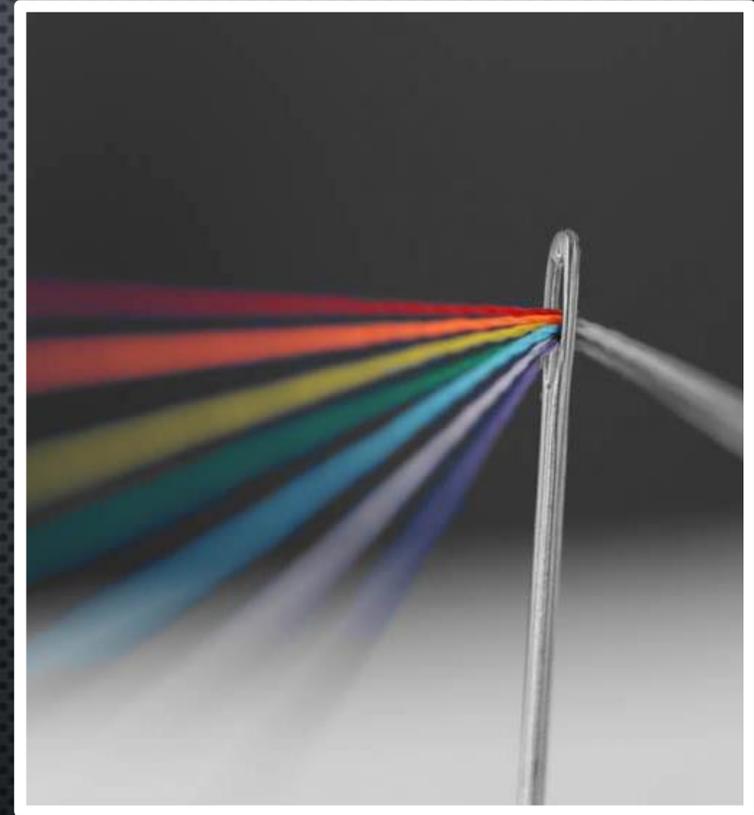


- Wrist-placed accelerometers
- 24hr wear protocol
- 14-days
- Weekdays only (M-F)
  
- Total # Days: 4,873
- Total Kids: 690

# COVID-19 AND THE SDH: **A COMMON THREAD...**



Children were removed  
from this consistent  
exposure to structure



# COVID-19 AND THE SDH: **A COMMON THREAD...**



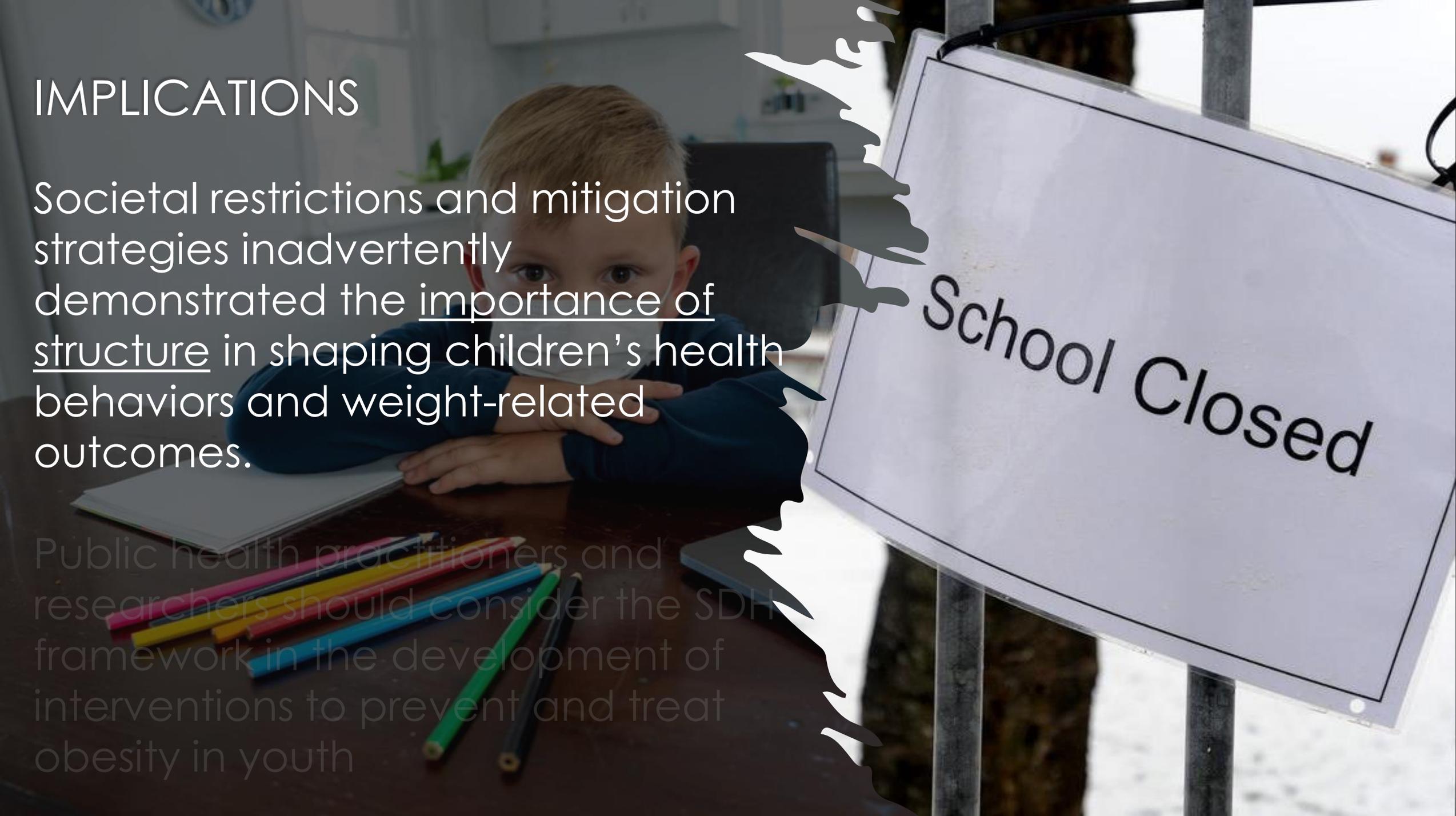
Children were removed from this consistent exposure to structure for a prolonged period



# IMPLICATIONS

Societal restrictions and mitigation strategies inadvertently demonstrated the importance of structure in shaping children's health behaviors and weight-related outcomes.

Public health practitioners and researchers should consider the SDH framework in the development of interventions to prevent and treat obesity in youth

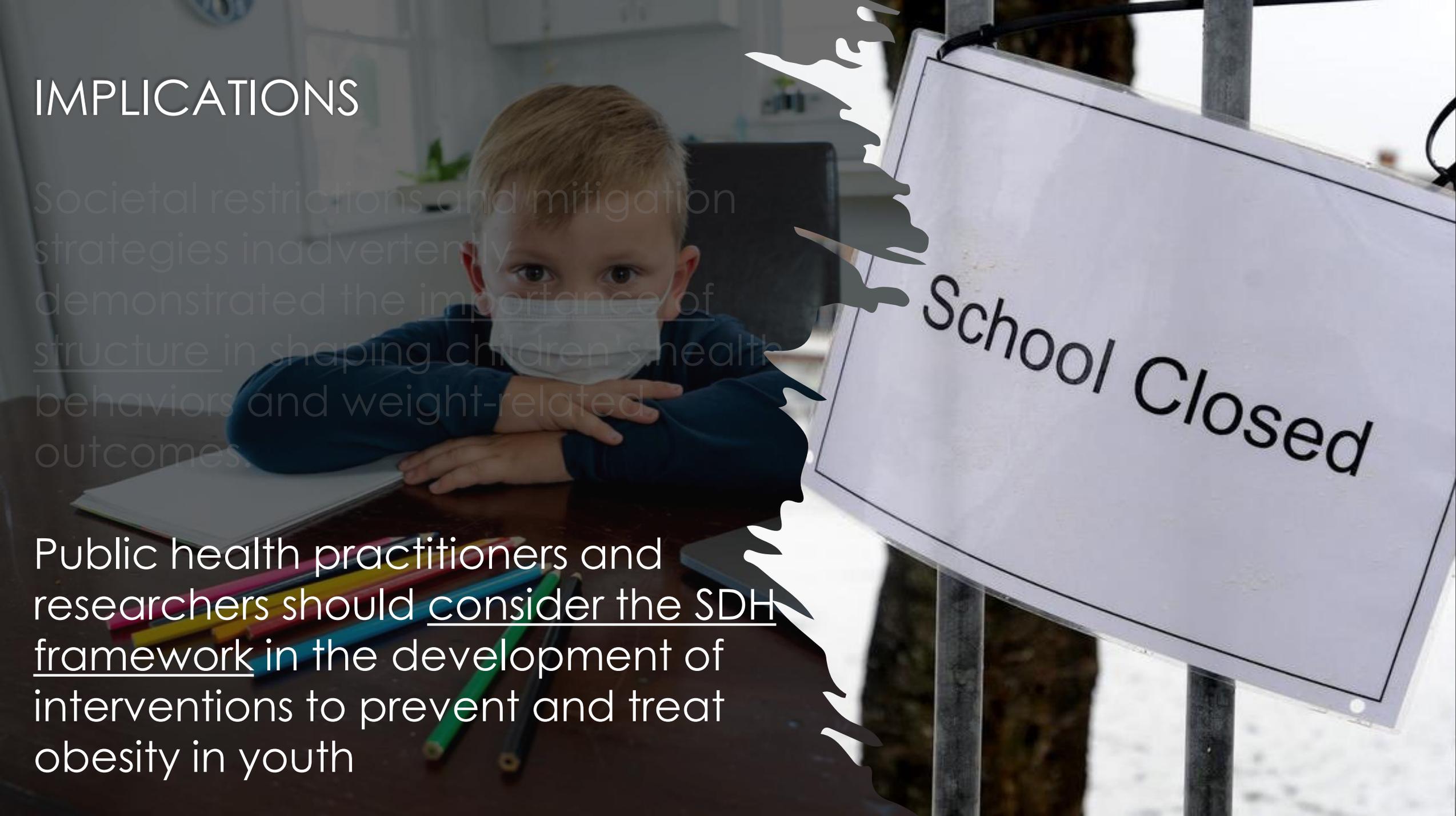
A young child with light hair, wearing a white face mask and a dark blue long-sleeved shirt, sits at a dark wooden desk. On the desk are several colorful pencils (pink, yellow, blue, green) and a stack of papers. In the background, a white sign on a metal post reads "School Closed". The scene is set in what appears to be a classroom or school environment.

School Closed

# IMPLICATIONS

Societal restrictions and mitigation strategies inadvertently demonstrated the importance of structure in shaping children's health behaviors and weight-related outcomes.

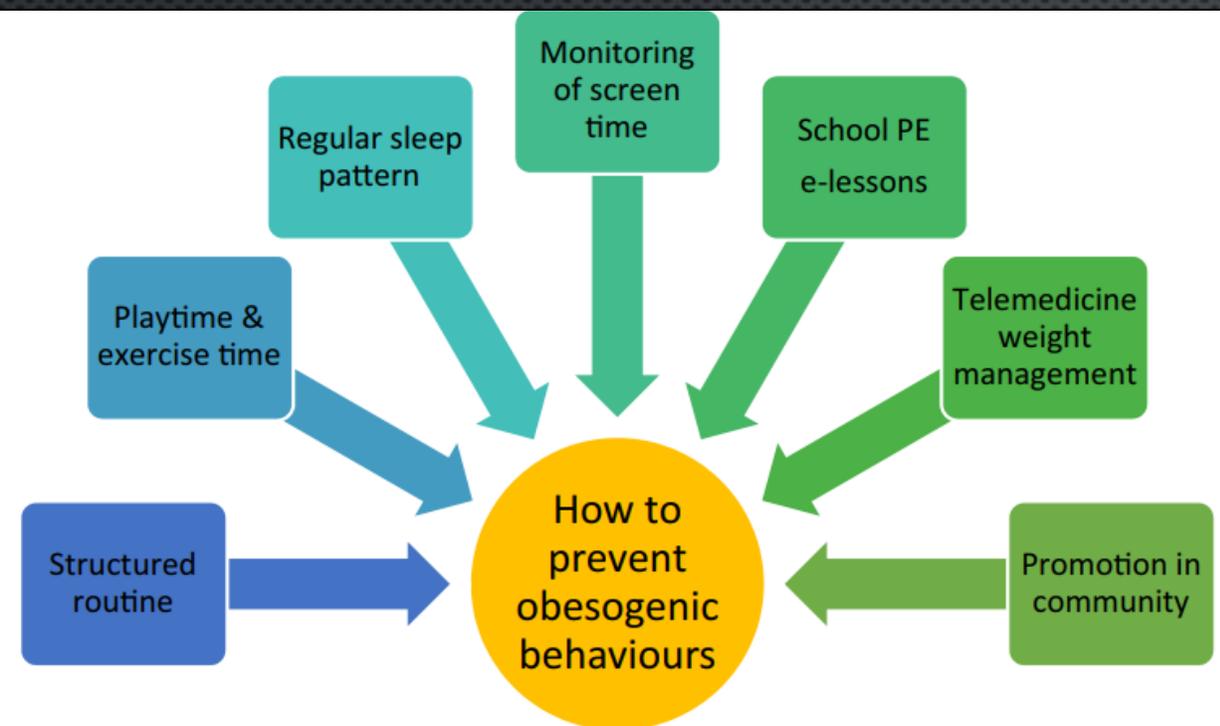
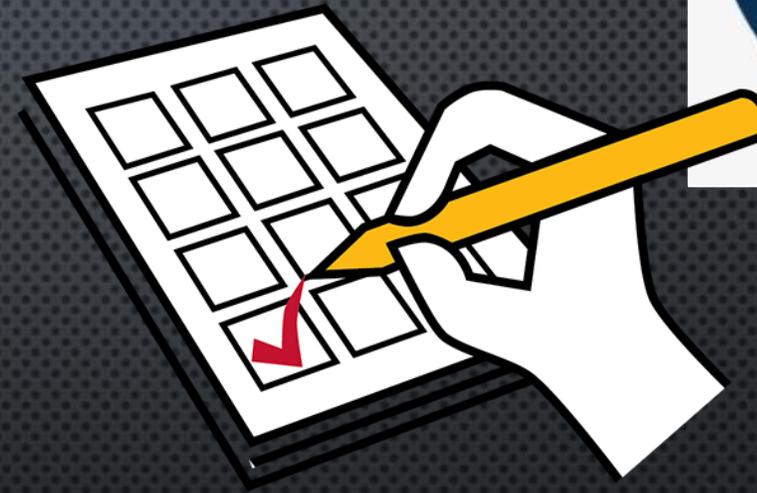
Public health practitioners and researchers should consider the SDH framework in the development of interventions to prevent and treat obesity in youth

A young boy with light brown hair, wearing a white face mask and a dark blue long-sleeved shirt, is sitting at a dark wooden desk. He has his arms crossed and is looking directly at the camera. On the desk in front of him are several colorful markers and a pencil. To the right of the boy, a white sign with black text that reads "School Closed" is attached to a metal post. The background is slightly blurred, showing what appears to be a classroom or office setting with a whiteboard and some plants.

School Closed

# WHAT CAN WE DO?

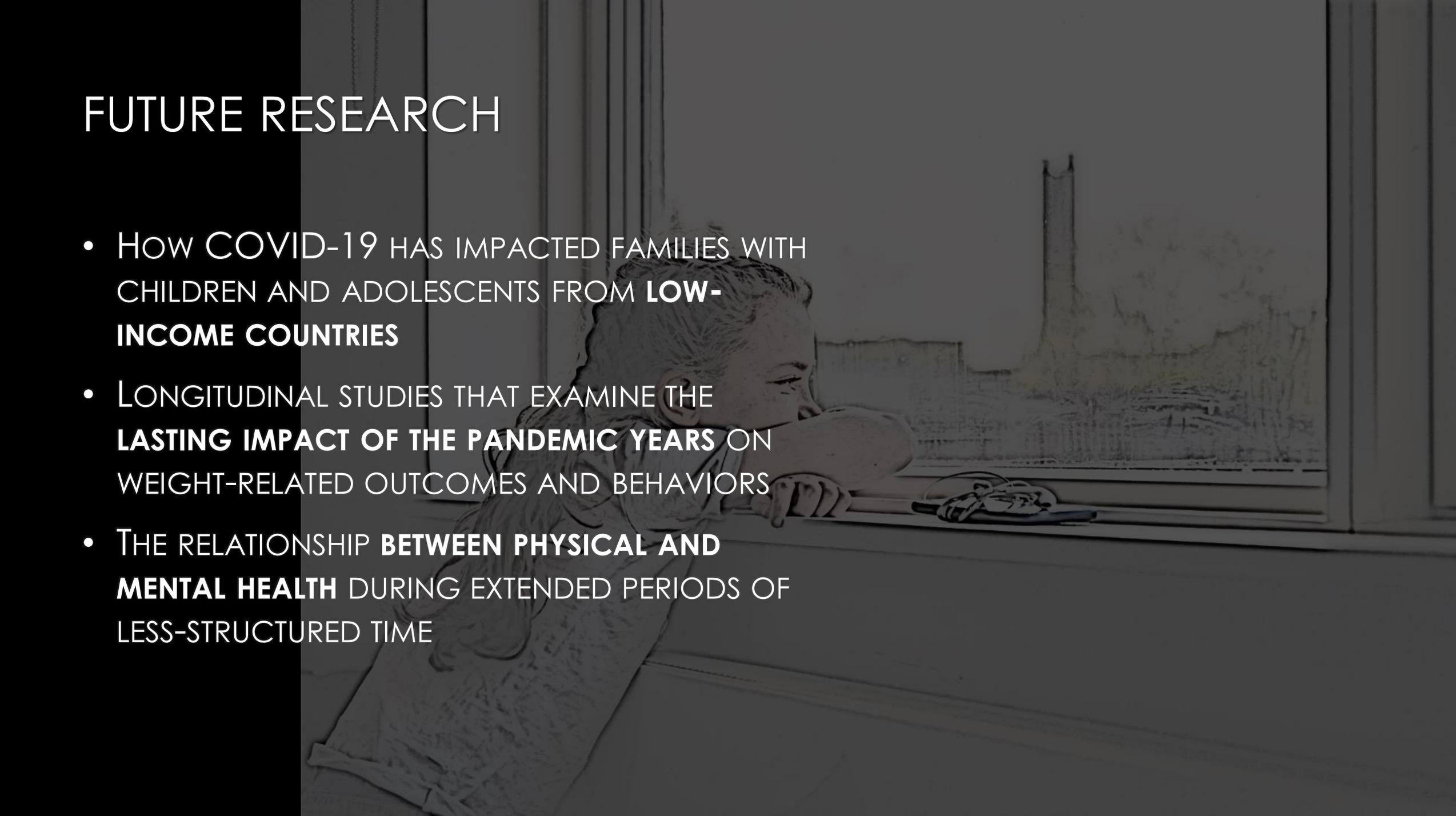
- CREATE STRUCTURE AND ROUTINE FOR CHILDREN
- MIMIC 'SCHOOL-LIKE' SEGMENTS



**Figure 3** How to prevent obesogenic behaviours amongst children and young people.

Ashikalli, L., Carroll, W., & Johnson, C. (2020). The indirect impact of COVID-19 on child health. *Paediatrics and child health*.

# FUTURE RESEARCH

A young girl with her hair in braids is looking out a window. She is resting her chin on her hand. Outside the window, a cityscape is visible, including a prominent tower. The scene is dimly lit, suggesting dusk or dawn.

- How COVID-19 HAS IMPACTED FAMILIES WITH CHILDREN AND ADOLESCENTS FROM **LOW-INCOME COUNTRIES**
- LONGITUDINAL STUDIES THAT EXAMINE THE **LASTING IMPACT OF THE PANDEMIC YEARS** ON WEIGHT-RELATED OUTCOMES AND BEHAVIORS
- THE RELATIONSHIP **BETWEEN PHYSICAL AND MENTAL HEALTH** DURING EXTENDED PERIODS OF LESS-STRUCTURED TIME

# THANK YOU

[KEITH.BRAZENDALE@UCF.EDU](mailto:KEITH.BRAZENDALE@UCF.EDU)

DEPARTMENT OF HEALTH SCIENCES

COLLEGE OF HEALTH PROFESSIONS AND SCIENCES

UNIVERSITY OF CENTRAL FLORIDA

ORLANDO, FL USA



# Changes in Objectively-Measured Physical Activity and Sedentary Behavior among School-Age Children during COVID-19

Leigh Ann Ganzar, DrPH MPH

---

Deborah Salvo, PhD; Katie Burford; Yuzi Zhang; Harold W. Kohl III, PhD;  
Deanna Hoelscher, PhD, RDN, LN, CNS, FISBNPA



# Background



- Previous evidence on children's physical activity during COVID-19:
  - Cross-sectional studies
  - Self-report measures
  - Outside of US

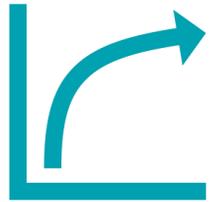
Yang S, Guo B, Ao L, Yang C, Zhang L, Zhou J, et al. Obesity and activity patterns before and during COVID-19 lockdown among youths in China. *Clinical Obesity*. 2020;10(6):e12416.

Yomoda K, Kurita S. Influence of social distancing during the COVID-19 pandemic on physical activity in children: A scoping review of the literature. *Journal of Exercise Science & Fitness*. 2021.

Okely AD, Kariippanon KE, Guan H, Taylor EK, Suesse T, Cross PL, et al. Global effect of COVID-19 pandemic on physical activity, sedentary behaviour and sleep among 3-to 5-year-old children: a longitudinal study of 14 countries. *BMC Public Health*. 2021;21(1):1-15.

Burkart S, Parker H, Weaver RG, Beets MW, Jones A, Adams EL, et al. Impact of the COVID-19 pandemic on elementary schoolers' physical activity, sleep, screen time and diet: A quasi-experimental interrupted time series study. *Pediatric Obesity*. 2022;17(1):e12846.

# Study Aims



To identify change trajectories of device-measured physical activity and sedentary time from pre-COVID-19 to during COVID-19 in school-aged children in the US.



To examine the socio-ecological factors associated with changes in movement behaviors.

# Methods

- Part of STREETS 5-year natural experiment
- Cohort of school-age children (age 8-11)
- Measured at 2 time points:
  - **Time 1:** Sept 2019 – Feb 2020
  - **Time 2:** Oct 2020 – March 2021





## **Movement behaviors from GT3X accelerometers using Evenson cutpoints for children:**

- Mean daily minutes of moderate-to-vigorous physical activity (MVPA)
- Mean daily hours sedentary behavior

## **Socio-ecological predictors:**

- Individual, family, social and organizational, and neighborhood

# Socio-Ecological Factors



## Individual

- Age
- Gender
- Race/ethnicity

## Family

- Parental education attainment (HS or less vs. above HS)
- Number of children in household
- Independent mobility (allowed to walk or play without adult vs. not allowed)

## Social and Organizational

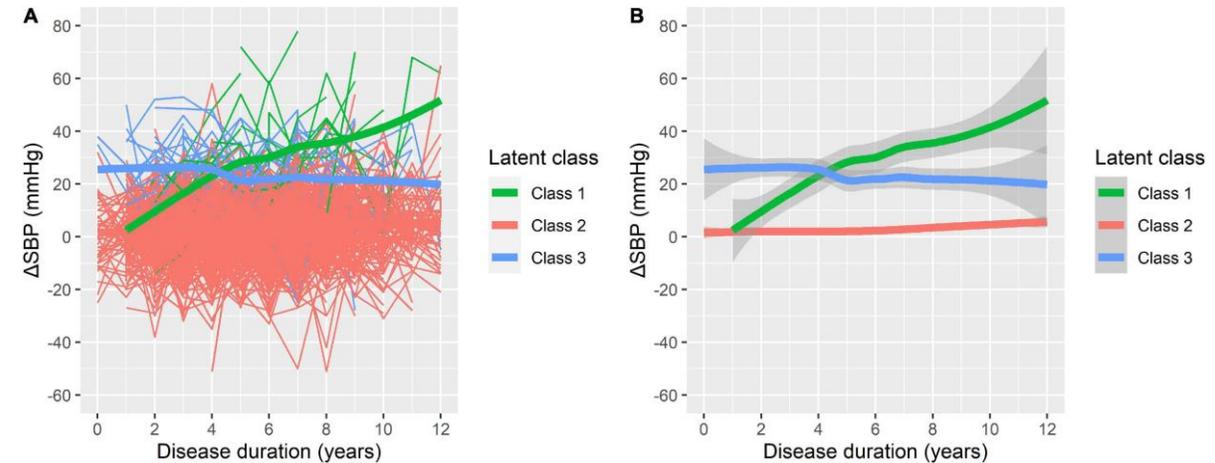
- School attendance during COVID (in-person vs. virtual)
- Informal social control (5 item scale)
- Social cohesion (5 item scale)
- Perceptions of crime and traffic (low vs. high)

## Neighborhood built environment

- Sidewalk availability (low vs. high)
- Crosswalk availability (low vs. high)

# Methods

- Descriptive statistics
- Latent class linear mixed models
  - Used to identify change trajectories of MVPA and sedentary time in separate models
- Logistic regression models
  - Used to examine association between socio-ecological factors and membership in trajectory groups for each movement behavior



# Sample Characteristics

**168**

Number of participants with valid physical activity at both timepoints



**56%** female  
**44%** male

**9**

Average age at baseline in years



**44%** White, Non-Hispanic  
**39%** Hispanic or Latinx  
**10%** Asian or Other  
**7%** Black or African American

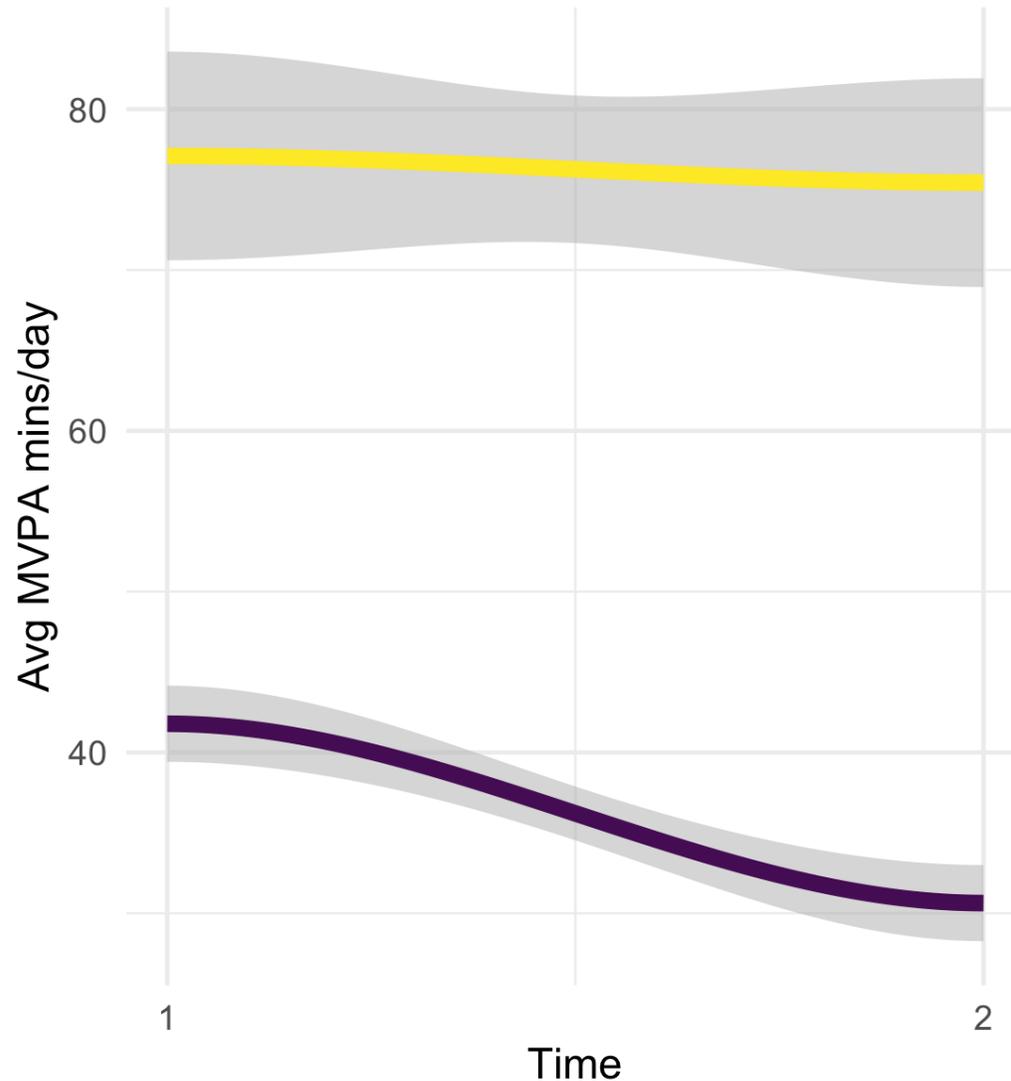


**29%** with parents who have high school education or less



**54%** virtual school attendance during COVID

# Physical Activity Trajectories



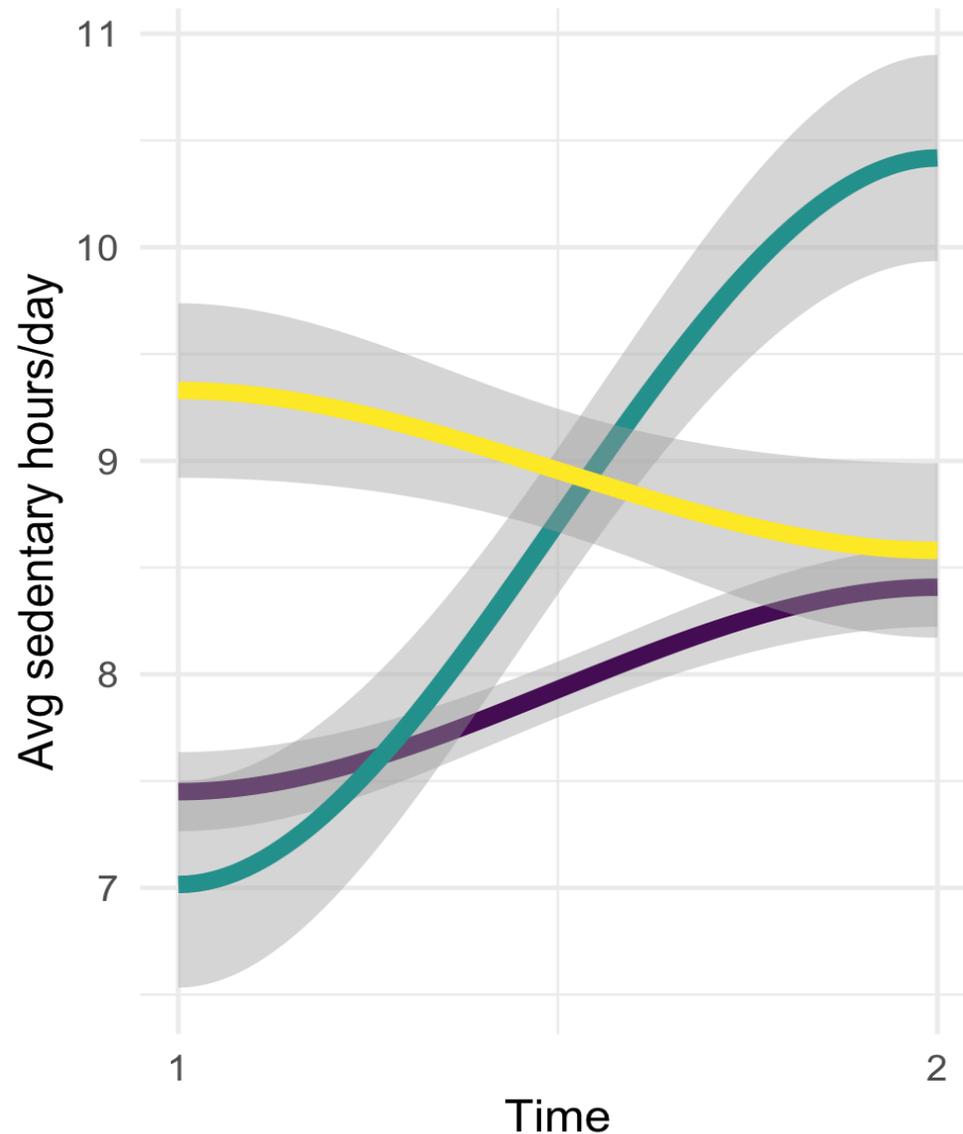
## Latent Class

- 1: 'Decrease MVPA', n=138
- 2: 'Maintain High MVPA', n=30

## Important factors:

- Gender
- Social cohesion

# Sedentary Behavior Trajectories



## Latent Class

- 1: 'Moderate Increase Sedentary', n=132
- 2: 'Steep Increase Sedentary', n=10
- 3: 'Decrease Sedentary', n=26

## Important factors:

- Social cohesion
- Race/ethnicity

# Discussion



Significant declines in physical activity and increases in sedentary behavior



Girls were less likely to maintain physical activity



Hispanic children more likely to decrease sedentary behavior



Importance of social cohesion

# Acknowledgements



- Coauthors

- Dr. Deborah Salvo
- Katie Burford
- Yuzi Zhang
- Dr. Bill Kohl
- Dr. Deanna Hoelscher

- Study Staff

- Sarah Bentley
- Data collectors

- School district, campus, and study participants

International Journal of Behavioral Nutrition and Physical Activity

[Home](#) [About](#) [Articles](#) [Submission Guidelines](#)

Research | [Open Access](#) | [Published: 19 May 2022](#)

**Longitudinal changes in objectively-measured physical activity and sedentary time among school-age children in Central Texas, US during the COVID-19 pandemic**



# Thank you!



## Leigh Ann Ganzar, DrPH MPH

Postdoctoral Research Fellow

Email: [leigh.a.ganzar@uth.tmc.edu](mailto:leigh.a.ganzar@uth.tmc.edu)

**UTHealth** | The University of Texas Health Science Center at Houston  
School of Public Health in Austin

[Michael & Susan Dell Center for Healthy Living](#)

1616 Guadalupe | Suite 6.300 | Austin, TX 78701

512.482.6170 tel

