JOHNS HOPKINS
BLOOMBERG SCHOOL
of PUBLIC HEALTH

Adolescent food acquisition behaviors by food security status prior to and during the COVID-19 pandemic

Kaitlyn Harper, MA, MS

November 15, 2021

Why focus on adolescents?

Approximately 6.8 million adolescents experience food insecurity in the United States (Feeding America, 2016)

Food insecure adolescents are at an increased risk

Biologically:

- Reduced growth, sexual development, bone density
- Higher risk of early and adult chronic diseases

Socially:

- Risk behaviors
- Skipping meals to provide food for younger siblings

Youth food acquisition

To date, only two studies have assessed how food insecure adolescents acquire food (Feeding America and Urban Institute 2018, Mmari 2019)

Adolescents in these studies reported…

- Limited healthy options in neighborhoods
- Often purchasing inexpensive options from fast food restaurants, corner stores, and gas stations
- Using school food as a consistent source of meals
- Food access was harder during out-of-school times (e.g., summer vacation)

Food acquisition during out-of-school times

Fewer meals are served during the summer months (USDA FNS 2018)

- National School Lunch Program: 22 million served per day
- Summer Food Service Program: 3 million served per day

Adolescents are less likely to engage in the summer meals programs compared to younger children (Ralston et al., 2017; Waxman 2016)

COVID-19 created a food environment for children and adolescents similar to summer vacation, plus increased restrictions and the requirement of online school

Research questions

This qualitative study aimed to answer the following questions:

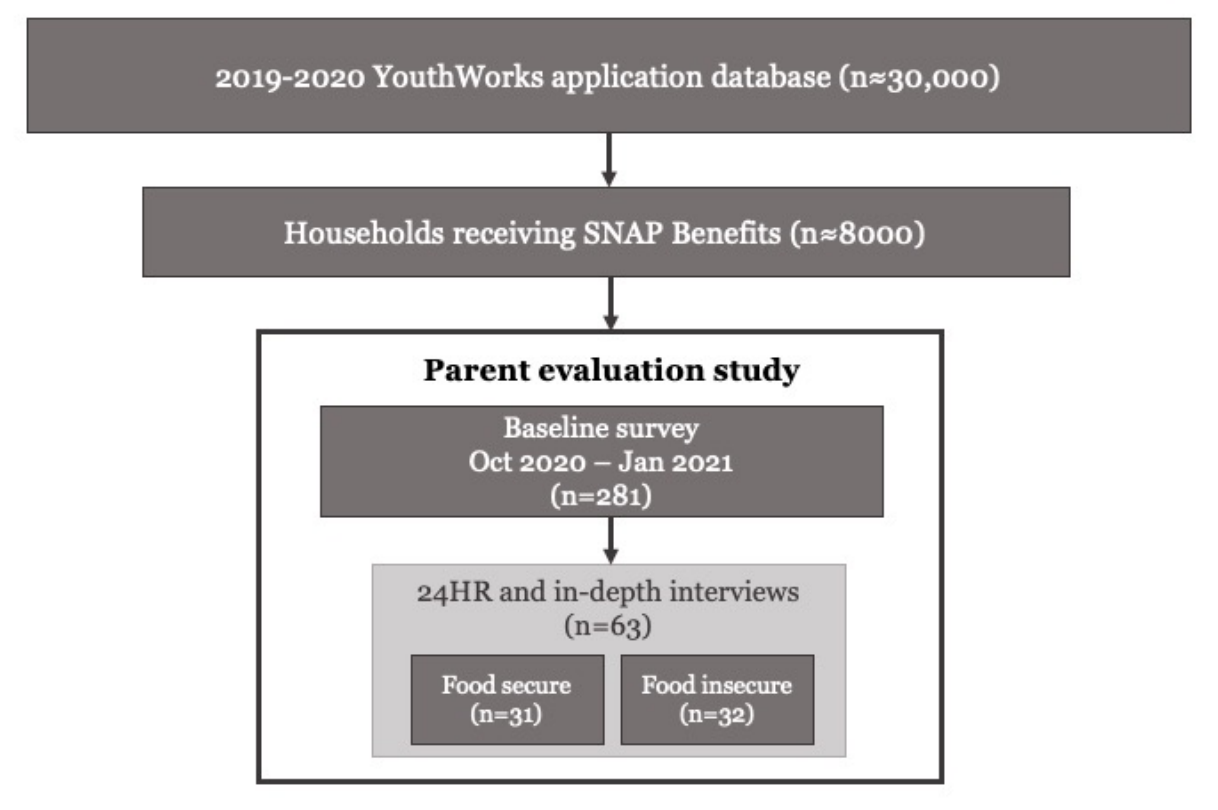
(1) Are there differences in how adolescents acquired food prior to compared with during the pandemic?

(2) How do food acquisition behaviors differ based on food security status?

Methods

Sampling

Part of a larger evaluation study of how federal nutrition assistance programs affect food security status for adolescents in Baltimore, MD



In-depth interview sampling

Participants were purposively sampled for the IDI based on:

- Age: younger (14-15 years), mid (16-17 years), and older (18-19 years)

- Gender: boys, girls + nonbinary

- Food security status: food secure (0-1), food insecure (2-9) (Connell 2004)

24-hour recalls + in-depth interviews

IDI guide included questions on:

- Neighborhood environment
- Food access
- Food acquisition behaviors (prior to and during pandemic)
- Food security
- Coping mechanisms for food insecurity (when applicable)
- Individual probes based on dietary recalls

IDI analysis

Inductive thematic analysis was used to analyze IDIs

Three coders developed the initial codebook using 6 transcripts to check for inter-rater reliability

Matrices were developed to compare codes across

- Food security status: food secure (FS), moderately food insecure (MFI), and severely food insecure (SFI)
- Gender
- Age

Memo writing was used to capture reflexivity during the coding and analysis process

Results

Changes in food acquisition during the pandemic – *eating breakfast*

Before pandemic

- Both FS and FI youth skipped breakfast because they weren't hungry or didn't have time before leaving

During pandemic

- Easier to eat meals in the morning during online school

I used to wake up at six o'clock in the morning. I would have to leave at seven. In [that time], I would have to take showers and iron my clothes and things like that, so I wouldn't have time to eat breakfast unless I did it on the way to school. If I stopped at a gas station and got a muffin or something. Now that I'm home [...] I try to eat breakfast, whether it's a granola bar or oatmeal or something that has some kind of substance. (MFI younger boy)

Differences in food acquisition during the pandemic – *getting food during the day*

Before pandemic

- Both FS and FI youth acquired food at/around school or on their commute to and from school
- School breakfasts were preferable, lunches were perceived as unpalatable, which sometimes led to meal skipping

> I would just like not eat breakfast and if I did, it was probably like a nutri-bar. […] And at lunchtime, I don't like the food 'cause it was kinda stale and tastes weird and I wouldn't eat that, I'd give it away. And by dinner, I'd probably eat a whole meal because […] I didn't eat all day. Or I will pick up something on my way home […] like Subway or Chick-Fil-A. (FS younger girl)

Differences in food acquisition during the pandemic – *getting food during the day*

During pandemic

- Both FS and FI youth acquired food at/close to home
- Simple/convenient meals were preferred
- Youth purchased food when none was available at home

> So if I was hungry, the first thing that I would try to do is I would try to see what I have inside my refrigerator. If there's food inside the fridge, I'll usually try to eat something out of there. Or my second option [...] is to look on my card and see how much money I have so I can order something off of GrubHub [...] Or I'll walk to the corner store [and] get me something to eat. (FS younger girl)

Differences in food acquisition during the pandemic – *free food resources*

Before pandemic

- Both FS and FI youth obtained free food at/around school
- Friends, teachers, extracurriculars, restaurants
- Youth in charge of finding free food

During pandemic

- FI youth talked about obtaining free food more than FS youth
- Schools, churches, delivery services
- Parent in charge of obtaining food

This one guy worked there [at the restaurant] and we knew him. Me and my friends, we knew him since middle school or elementary. […] We'd show him our report cards and stuff, and usually, you know, [he'd] give us a free chicken box sometimes, or he'd just be like, "Hey, come here" and then give us free stuff. (FS mid boy)

Differences in food acquisition by food security status – *food availability*

Food secure youth

- Described having the ability to choose what foods to eat during the day (both healthier and unhealthier)

- Those that could cook did so; those that couldn't had other options readily available

Food insecure youth

- Those with cooking skills were able to cope by creating meals that were palatable
- Those without cooking skills resorted to meal skipping

With me and my family, we make a way even if we [only] have cases of noodles. I know how to cook certain things. I can make a meal out of anything essentially. This is going to sound weird, but with noodles I can take that and turn it into something like a good meal. (MFI younger boy)

Discussion

Summary

Before vs during the pandemic

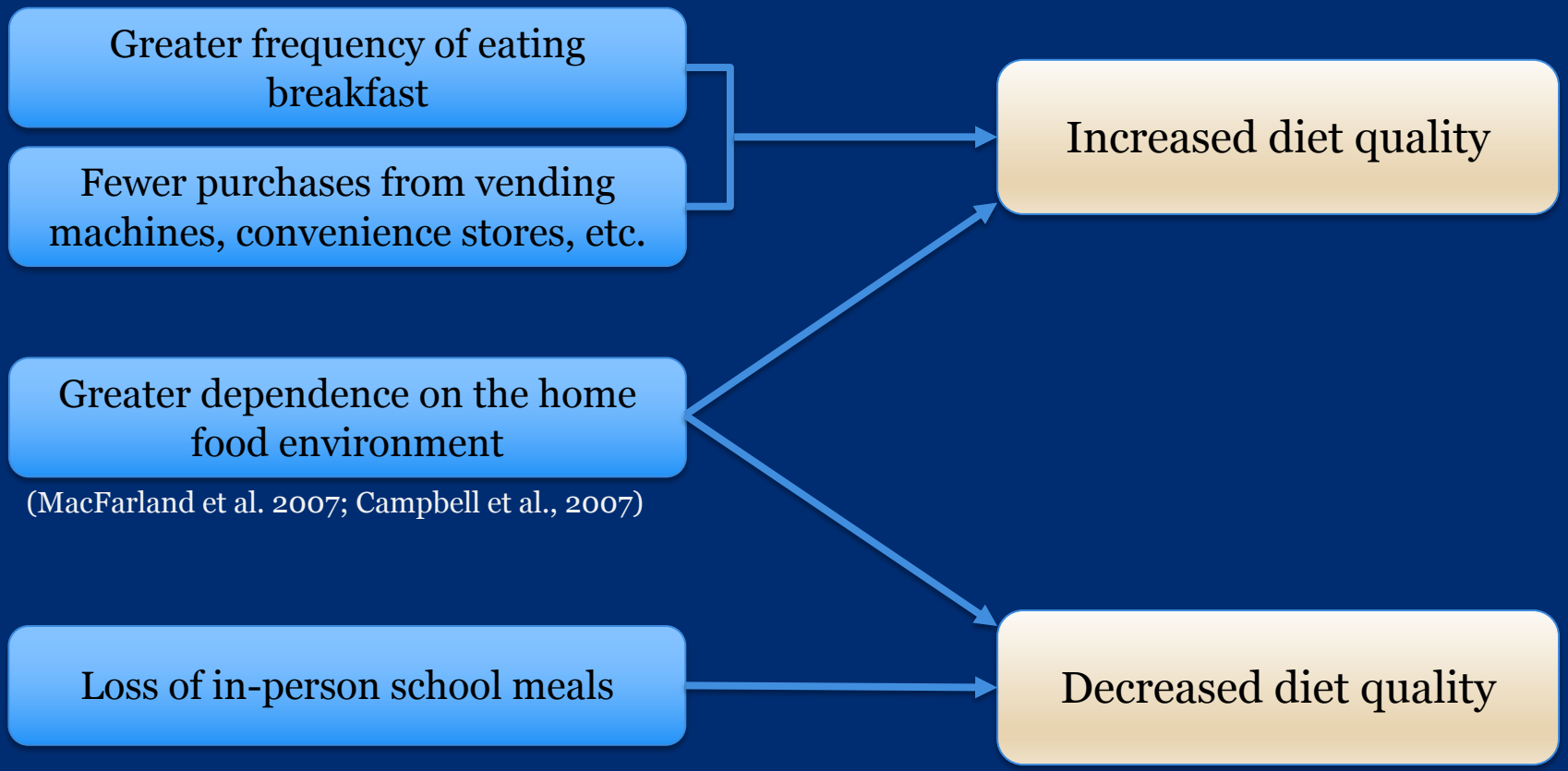
- Food acquisition based on convenience:
  - At/around school (before) vs at/around home (during)
  - If they had time (before) vs throughout the day (during)
- Food acquisition based on preference:
  - Skipped meals if they didn't prefer foods (before) vs often had preferable foods around (during)

Summary

Food secure vs food insecure

- Both FS and FI youth acquired free food (before) vs FI more frequently acquired free food (during)
- FS youth had consistent access to convenient and palatable foods, while some FI did not
- FI youth with cooking skills were able to adapt while those without cooking skills were more likely to skip meals

Food acquisition and diet quality



(MacFarland et al. 2007; Campbell et al., 2007)

Food availability and youth cooking

Adolescents have greater responsibility in acquiring/preparing foods but may have little autonomy over food choices available at home (Ziegler et al., 2021)

Food availability refers to both physical accessibility of food and ability to prepare foods

Cooking classes have shown success in improving skills and self-efficacy among adolescents (Oakley et al., 2017; Jackson, 2018)

- Cooking interventions have short-term benefits in diet quality but long-term benefits in self-efficacy (Kuroko et al., 2020)

Food availability and youth cooking

Challenges

- Many cooking classes are geared toward younger children
- Home economics has been cut from curriculum at many public schools

  •Students only receive up to 8 hours of required nutrition education per year (CDC 2015)

Recommendations

- Bring back home economics!
  - Emphasis on modern tips (e.g., preparing quick and healthy meals, how to avoid pitfalls while grocery shopping) (Lichtenstein and Ludwig 2010)
  - Increase funding for infrastructure, elective classes

Strengths and limitations

Strengths

- Repeated interviews with participants led to greater rapport and allowed us to create individualized probes
- Large number of participants in each group, which allowed us to reach saturation
- Insight from adolescents about their own experiences

Limitations

- Study population was not representative of the entire population of youth in Baltimore
- Recall bias may have influenced what respondents shared

Acknowledgements

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Thank you!

Description of participants (n=63)

Age
Younger: 32%
Middle: 43%
Older: 25%

Gender
Boy: 48%
Girl: 49%
Non-binary: 3%

Food security status
FS: 49%
MFI: 29%
SFI: 22%

Race
Black: 97%
Biracial: 3%

Youth employment
No job: 65%
Part-time: 32%
Full-time: 3%

Housing instability
5%

Lives in HFPA
32%

Adolescent health risk behaviors, adverse experiences, and self-reported hunger

Analysis of 10 states from the 2019 Youth Risk Behavior Surveys

Kathryn Krupsky, PhD, MPH
November 15, 2021
Food Security Webinar

13.6% US households with children experienced food insecurity in 2019

Coleman-Jensen, A., Rabbit, M. P., Gregory, C. A., & Singh, A. (2020). *Household Food Security in the United States in 2019, ERR-275.* Retrieved from

2.4 million

...children (6.5% of household with children) experienced disrupted eating patterns because their household lack the resources necessary to provide consistent and dependable access to food, in 2019.

Coleman-Jensen, A., Rabbit, M. P., Gregory, C. A., & Singh, A. (2020). *Household Food Security in the United States in 2019, ERR-275.* Retrieved from

How many adolescents are food insecure?

- It's hard to say...
- U.S. Department of Agriculture provides high-quality estimates to describe the distribution of household food insecurity in the U.S., both overall and among households with children
    - However, estimates of childhood FI are aggregated to the household level
    - No differentiation between child age groups
    - Rely on caregiver-report, which may differ from adolescents' self-reports

Feeding America's adolescent-specific estimates from 2016

- 6.8 million (ages 10-17) adolescents were food insecure
- 2.9 million of which experienced periods of hunger (very low food security)

https://map.feedingamerica.org/

Adolescence & food insecurity

- Adolescence can be a vulnerable time
  - Physiologically
    - Brain undergoes immense structural changes
  - Socially
    - Household dynamics are in flux
    - Autonomy to manage food resources
    - Sensitivity to peer judgement

Food Insecurity & poorer adolescent outcomes

Physical Health

- iron deficiency
- tooth decay
- chronic health conditions
- asthma

Behavioral Health

- school suspensions
- difficult social relationships
- greater misconduct

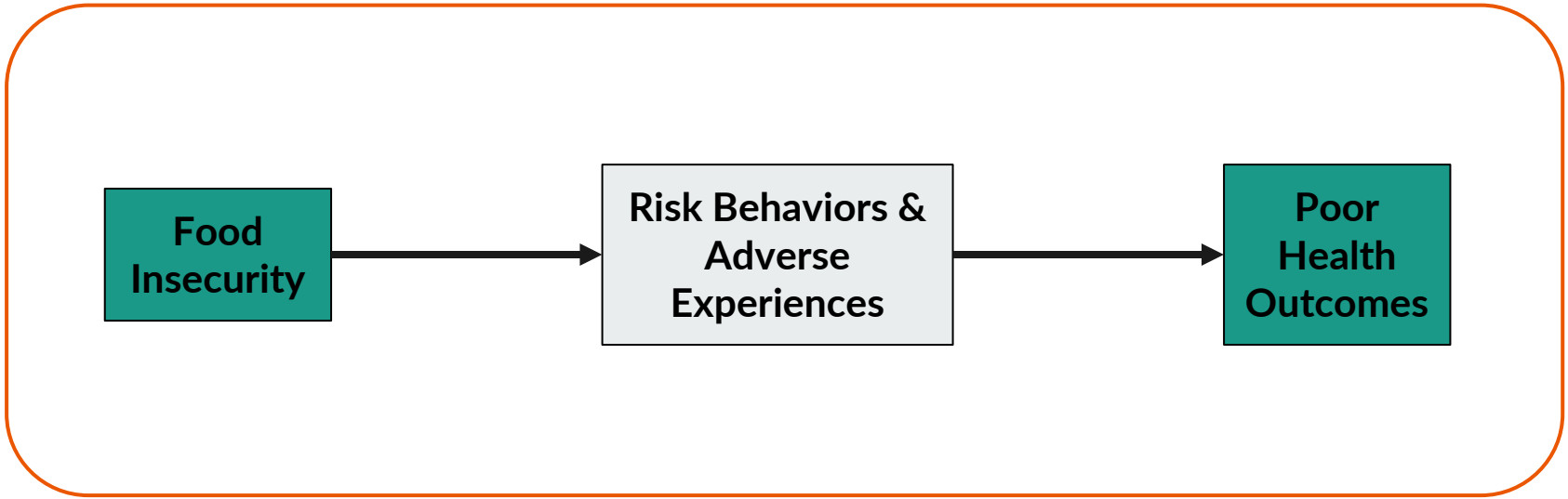
Mental Health

- mood disorders
- anxiety disorder
- substance use disorders

Health risk behaviors and poorer adolescent health

- Risky sexual behaviors
  → elevated risk for teen pregnancy
  → sexualy transimitted diseases
  → forced sexual intercourse

- Substance use in adolescence
  → substance use problems in adulthood



Key References:

Mmari K, A. O, Gross S, Mendelson T. How adolescents cope with food insecurity in Baltimore City: An exploratory study. Public Health Nutrition. 2019;22(12):2260-2267. http://doi.org/10.1017/S1368980019001216

Popkin S, Scott M, Galvez M. Impossible choices: teens and food insecurity in America. Washington, DC: The Urban Institute & Feeding America;2016. https://www.urban.org/research/publication/impossible-choices-teens-and-food-insecurity-america

Objectives

- **Primary**
  - To examine the prevalence of substance use, risky sexual behaviors, and adverse experiences relative to FI among a pooled sample of adolescents from 10 states.
- **Secondary**
  - To determine whether sex modified such relationships

Youth Risk Behavior Survey (YRBS)

- Ongoing biennial surveys, overseen by the CDC
- Designed to assess priority health risk behaviors among 9th through 12th graders the US
- Complex survey design with weighting that accounts for non-response, student grade, sex, and race/ethnicity
    - Estimates are generalizable to the jurisdiction in which they were assessed

https://www.cdc.gov/healthyyouth/data/yrbs/index.htm

The YRBS continued...

- YRBS standard questionnaire (national/state)
- Individual states can customize their questionnaire
  - In 2019, 17 states
    - included optional question about **experiencing hunger**
      - *Arizona, Arkansas, Colorado, Georgia, Hawaii, Idaho, Nevada, New Jersey, North Carolina, North Dakota, Pennsylvania, Rhode Island, Tennessee, Utah, Vermont, Virginia, and Wisconsin*
    - Obtained a sufficiently high response rate
    - Made data publicly available data

During the past 30 days, how often did you go hungry because there was not enough food in your home?

1. Never
2. Rarely
3. Sometimes
4. Most of the time
5. Always

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*Self-reported hunger as proxy for food insecurity

During the past 30 days, how often did you go hungry because there was not enough food in your home?

1. Never
2. Rarely
3. **Sometimes**
4. **Most of the time**
5. **Always**

= Self-reported hunger

Robson SM, Lozano AJ, Papas M, Patterson F. Food insecurity and cardiometabolic risk factors in adolescents. *Preventing Chronic Disease.* 2017;14. https://doi.org/10.5888/pcd14.170222

Selecting Outcome Variables

https://health.gov/healthypeople/objectives-and-data/browse-objectives/adolescents

Categories

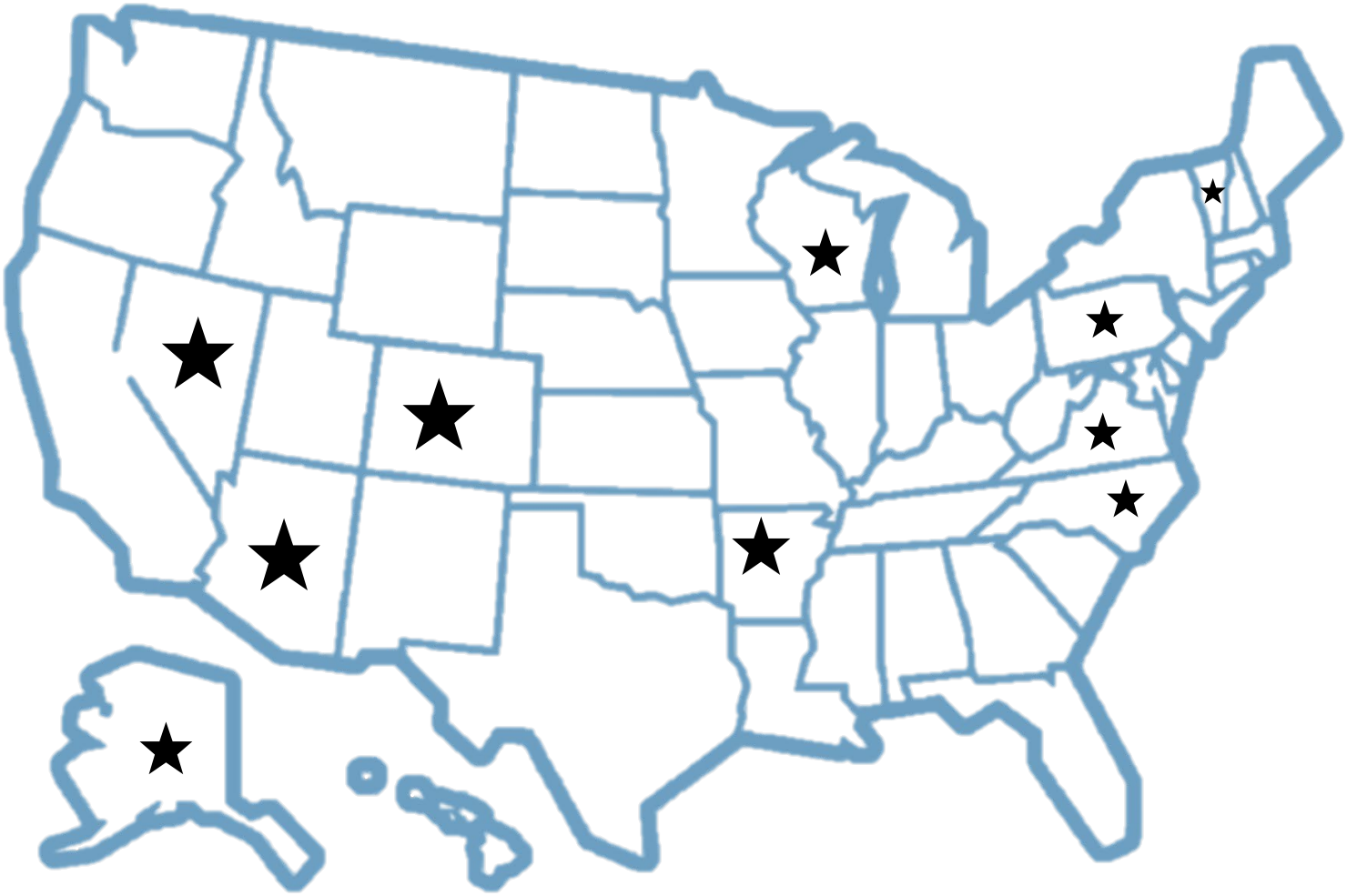
1. Substance use behaviors
2. Risky sexual behaviors
3. Violence-related behaviors/experiences

Selecting Outcome Variables Continued...

- Modifiable YRBS surveys → variability between states in which “non-standard” questions are administered
- Identify behaviors/experiences that consistently appeared across surveys for states that
  - Administered the self-reported hunger question
  - Adequate samples sizes for weighting
  - Authorized distribution of data

2019 YRBS Matrix: States with Weighted Data and "FI" Question and Corresponding Health Risk Behaviors																	
Health Risk Behaviors	States (N = 17)																# States with Question
	AZ	AR	CO	GA	HI	ID	NV	NJ	NC	ND	PA	RI	TN	UT	VT	VA	WI	
Substance Use Behaviors																		
Q32. During the past 30 days, on how many days did you smoke cigarettes?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	17
Q35. During the past 30 days, on how many days did you use an electronic vapor product?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	17
Q41. During the past 30 days, on how many days did you have at least one drink of alcohol?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	17
Q42. During the past 30 days, on how many days did you have **4** or more drinks of alcohol in a row, that is, within a couple of hours (if you are **female**) or **5** or more drinks of alcohol in a row, that is, within a couple of hours (if you are **male**)?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		16
Q40. How old were you when you had your first drink of alcohol other than a few sips?	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	16
Q47. During the past 30 days, how many times did you use marijuana?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	17
Risky-sexual Behaviors																		
Q61. During the past 3 months, with how many people did you have sexual intercourse?	x	x	x		x	x	x	x	x	x	x	x			x	x	x	14
Q63. The **last time** you had sexual intercourse, did you or your partner use a condom?	x	x	x		x	x	x	x	x	x	x	x			x	x	x	14
Q59. How old were you when you had sexual intercourse for the first time?	x	x	x		x	x	x	x	x		x				x	x	x	12
Q60. During your life, with how many people have you had sexual intercourse?	x	x	x		x		x	x	x		x				x	x	x	11
Violence-Related Behaviors and Experiences																		
Q17. During the past 12 months, how many times were you in a **physical fight**?	x	x	x		x				x		x		x	x	x	x		10
Q19. Have you ever been physically forced to have sexual intercourse when you did not	x	x	x	x	x	x	x		x	x	x	x		x		x	x	14
Q22. During the past 12 months, how many times did **someone you were dating or going out with** physically hurt you on purpose?	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	16
Number of questions administered in given state:	13	13	13	7	13	11	12	11	13	9	13	10	8	9	12	13	11	

*Crosswalk used to select outcomes and preserve sample size



Outcomes (risk behaviors & adverse experiences)

Substance Use Behaviors

- Currently drank alcohol
- First drink of alcohol before age 13 yrs
- Currently were binge drinking
- Currently smoked cigarettes
- Currently used an electronic vapor product
- Currently used marijuana

Risky Sexual Behaviors

- Sexual intercourse for the first time before age 13 yrs
- Were currently sexually active
- Used a condom during last sexual intercourse
- Had sexual intercourse with ≥ 4 persons during their life

Violence-related Behaviors/Experiences

- In a physical fight over past 12 months
- Ever forced to have sexual intercourse
- Experienced physical dating violence

Analytic Sample

- Asked about experiencing hunger
- Obtained sufficient response rates or lack of bias
- Authorized distribution of data
- Surveyed students on the health risk behaviors and adverse experiences relevant to our analysis

10 States; N = 40,396

**with the exception of three health risk behaviors/experiences highlighted on previous slide*

Analytic Approach

- **Complex survey design**
  - State level weighting
    - Estimates generalizable to 9-12 grade students from states included in each model
  - Taylor series linearization for variance estimates
- **Descriptive statistics**
  - Proportions, 95% confidence intervals (CIs), P values
- **Multivariable models**
  - Poisson regression with robust standard errors to generate prevalence ratios
  - Covariates
    - Grade, Sex, Race/ethnicity
  - Limit discussion to only estimates ≥ 2.0
- **Effect Measure Modification by Sex**
  - Self-reported hunger*sex interaction
  - Applied Bonferroni correction for multiple comparisons [(0.5/13) = 0.004]

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Descriptive Results

Descriptive statistics overall and according self-reported experienced hunger				
	Overall (%)	Self-reported Hunger		P value
	(N = 40, 396)	Yes (%) (n = 4,811)	No (%) (n = 35,585)	
Overall Prevalence	-	13.1	86.9	-
Sex				
Female	48.9	48.7	49.3	0.63
Male	50.4	51.3	50.7	
Grade				
9th	25.8	25.7	26.1	0.07
10th	25.1	23.5	25.6	
11th	24.2	24.0	24.5	
12th	24.0	26.8	23.8	
Race/Ethnicity				
White	53.9	41.7	57.0	<0.0001
Black or African American	12.3	14.8	12.2	
Hispanic/Latino	20.8	28.5	20.1	
All other races	11.0	15.1	10.7	

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Multivariable Results

Behavior/Experience	Adjusted PR	95% CI
Currently smoked cigarettes	2.2	1.9 - 2.5
Sex before age 13 years	2.8	2.2 - 3.6
Intercourse with ≥ 4 persons	2.0	1.7 - 2.3
Forced sexual intercourse	2.4	2.1 - 2.17
Physical dating violence	2.6	2.2 - 3.1

Multivariable Results

Substance Use Behaviors

Behavior/Experience	Adjusted PR	95% CI
Currently smoked cigarettes	2.2	1.9 - 2.5
Sex before age 13 years	2.8	2.2 - 3.6
Intercourse with ≥ 4 persons	2.0	1.7 - 2.3
Forced sexual intercourse	2.4	2.1 - 2.17
Physical dating violence	2.6	2.2 - 3.1

Multivariable Results

Risky Sexual Behaviors

Behavior/Experience	Adjusted PR	95% CI
Currently smoked cigarettes	2.2	1.9 - 2.5
Sex before age 13 years	2.8	2.2 - 3.6
Intercourse with ≥ 4 persons	2.0	1.7 - 2.3
Forced sexual intercourse	2.4	2.1 - 2.17
Physical dating violence	2.6	2.2 - 3.1

Multivariable Results

Violence-related Experiences

Behavior/Experience	Adjusted PR	95% CI
Currently smoked cigarettes	2.2	1.9 - 2.5
Sex before age 13 years	2.8	2.2 - 3.6
Intercourse with ≥ 4 persons	2.0	1.7 - 2.3
Forced sexual intercourse	2.4	2.1 - 2.17
Physical dating violence	2.6	2.2 - 3.1

What about effect modification by sex?

Insufficient evidence

- No *P* values for sex*self-reported hunger interactions were < 0.004
- Difference in the magnitude of the estimates not compelling

Summary of Findings

- 13% of adolescents self-reported experiencing hunger in the past 30 days
- Self-reported hunger was associated with a greater prevalence of every outcome assessed
  - Current cigarette smoking
  - Early sexual debut (before 13 years of age)
  - Intercourse with 4 or more people in lifetime
  - Ever being forced to have sexual intercourse
  - Ever experiencing physical dating violence
- Insufficient evidence to suggest the prevalence of health risk behaviors and adverse experiences meaningfully differed between male and female high school students

Strengths

- Large sample sizes
- Population-based
- Adolescent-reported
- Precise & consistent
- Alignment with key public health indicators

Limitations

- Generalizability
- Cross-sectional
- Sensitive nature of questions
- Missing key confounders
  (i.e., SES & length of residency in US)

Limitations continued…

"During the past 30 days, how often did you go hungry because there was not enough food in your home?"

- Reference period
  - Other common measures use longer reference periods (e.g., 6- or 12-months
    - Food insecurity is episodic
- Focus on "hunger"
  - May identify a relatively severe level of food insecurity
  - Single item insufficiently differentiates between hunger that stems from limited household resources verse the a sensation that most people feel at one point or another

Conclusions

- Adolescents with food insecurity may experience a greater frequency of health risk behaviors and adverse experiences
  - Results bulid upon exploratory findings
- Unclear whether health risk behaviors/adverse experiences are causally related to FI or concurrent public health issues
- Future surveillance need more robust measures of FI and longitudinal assessments
- Screening for food insecurity and dissemination of concrete economic and nutrition support from professionals interacting with teens regularly

Co-authors

Sarah Sliwa, PhD, MS

Hilary Seligman, MD, MAS

Andrea D. Brown, MPH

Angela D. Liese, PhD

Zewditu Demissie, PhD, MPH

Ellen Barnidge, PhD, MPH

Questions?

Email: krupsky.kathryn@gmail.com

Appendix

sex	Data from: What is your sex? A. Female B. Male

race4	4-level variable from race and ethnicity questions: 1 = “White” 2 = “Black or African American” 3 = “Hispanic/Latino” 4 = “All Other Races”

grade	Data from: In what grade are you? A. 9th grade B. 10th grade C. 11th grade D. 12th grade E. Ungraded or other grade