Effect of School Breakfast Program on the Prevalence of Breakfast Skipping, Double-Dipping , and Obesity among Adolescents: A Time Use Perspective.

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Motivation

- School breakfast programs (SBP) play an important role in reaching low-income children who are in need of food assistance.

- Previous studies have found that these programs induce more children to consume a nutritious breakfast and improve their dietary intake, which is critical in combating the current obesity problem. Meyerhoefer and Yang (2011)

- There are concerns, however, that some children might be having a meal at home or on the way to school and then eating the school meal as well, specially in universal free in the classroom breakfast programs. (Double-Dipping)

Motivation

- In this scenario, SBP create a conflict between the goal of providing children from low-income families with a meal they might not have at home and that of preventing childhood obesity.

Question

- What is the relationship between adolescents' participation in SBP, their breakfast eating habits, their overall eating and physical activity behaviors, and their associated weight outcomes?

Motivation

- Adolescents are a demographic group that has not been targeted in this type of studies and whose behavior significantly differs from that of younger children.

  - *Timlin, Pereira et al. (2008) find a reduction of breakfast-eating frequency throughout adolescence that is inversely associated with body weight.*

  - *Miech, Kumanyika et al. (2006) find trends of increasing overweight among 15-17 year old adolescents between 1971 and 2004 specially among those living below the poverty line. These same is not true among younger 12-14 year old adolescents*

Data

- **Eating and Health Module (EHM) of the American Time Use Survey (ATUS-X) for the years 2006, 2007, and 2008***

- Nationally representative cross-section published once a year since 2003.

- Allocation of time of individuals age 15 or older during a 24 hour period.

- Comprehensive set of socioeconomic characteristics.

- The **Eating and Health Module** contains additional information on eating patterns, BMI, SNAP program participation, and meals obtained at school.

Data

- **The sample includes** weekday observations for adolescents aged 15 to 18 who were enrolled in school during the week prior to the interview.

- **Breakfast** is defined as any primary eating and drinking and secondary eating episode reported between 4:00 am and 10:30 am.

- This time interval accounts for schools that serve school breakfast mid-morning.

Data

- **Double-Dipping** is defined as reporting more than one eating episode, one at school and one away from school (home, car, restaurant, etc) between 4:00 am and 10:30 am.

- **Participation in the school breakfast program**: Indicator that equals 1 if the respondent ate a breakfast prepared and served at school during the past week.

- Note that this measure excludes meals brought from home.

Data

Socio-economic Characteristics

	Mean	Std. Err.
Age	16.35	0.04
Female	49%	0.01
Race/Ethnicity		
Non-Hispanic White	60%	0.02
Non-Hispanic Black	13%	0.01
Hispanic	20%	0.01
Other	7%	0.01
Income < 185%		
Poverty	14%	0.01
Employed	35%	0.02
Number of Obs	902	

Source: Authors' computations, ATUS-X, 2006-2008

Data

Participation in Federal Nutrition Assistance Programs

	Mean	Std. Err.
NSLP	55%	0.02
SBP	15%	0.01
Both NSLP and SBP	14%	0.01
SNAP	5%	0.01

Source: Authors' computations, ATUS-X, 2006-2008

Minutes per Day Allocated to Eating Breakfast by Participation in School Breakfast Program

Total	No SBP	SBP
All Locations	8.6	15.1
At School	1.8	9.9
Away from School	6.8	5.2
Primary		
All Locations	6.9	11.7
At School	0.9	6.9
Away from School	6.0	4.7
Secondary		
All Locations	1.7	3.4
At School	0.9	3.0
Away from School	0.8	0.5

Source: Authors' computations, ATUS-X, 2006-2008

Probability of Eating Breakfast and Double-Dipping by Participation in School Breakfast Program

Probability of Eating Breakfast	No SBP	SBP
Any Location	54%	69%
Away from School	49%	35%
At School	11%	41%
Double-Dipping	**5%**	**6%**

Source: Authors' computations, ATUS-X, 2006-2008

Weight Outcomes
by Participation in School Breakfast Program

Weight Outcomes	No SBP	SBP
BMI	23.5	24.7
	0.20	0.52
Overweight	33%	42%
	0.02	0.05

Source: Authors' computations, ATUS-X, 2006-2008

Estimation Strategy

$$A_{it} = \beta' X_{it} + \alpha_1 Female_i + \alpha_2 SBP_i + \alpha_3 NSLP_i + \alpha_4 SNAP_i + \alpha_5 (Female_i \; x \; SBP_i)$$

$$+\alpha_6 (Female_i \; x \; NSLP_i) + \alpha_7 (Female_i \; x \; SNAP_i) + K_t + u_{it} \qquad (1)$$

Where for individual *i* in year *t*:

A: Breakfast behavior (minutes or discrete indicator)

X: age, race/ethnicity, household income below 185% of the poverty line, employment status, and census region.

SBP: equals one if the respondent participates in the SBP and the NSLP but not in the SNAP, and zero otherwise

NSLP: equals one if the respondent participates in the NSLP but not in the SBP or the SNAP, and zero otherwise.

SNAP: equals one if the respondent participates in the SNAP, regardless of participation in school meal programs, and zero otherwise

***k*:** year fixed effect.

Estimation Strategy

- I use ordinary least squares for minutes per day spent in a particular activity.(Stewart 2009) and Foster and Kalenkoski (2013).

- I use logistic regressions when analyzing the binary indicators of whether the person engages in a particular activity.

- Standard errors are computed by Successive Difference Replication methods using Eating and Health Module weights.

Results

Participation in School Breakfast Programs and Time Spent Eating Breakfast

Minutes per Day

		Total Time		Primary Time		Secondary Time	
		Males	Females	Males	Females	Males	Females
All							
Locations	**Coeff.**	**8.74** ***	3.51	**4.80** **	3.09	3.95	0.42
	Std. Err.	**3.26**	2.82	**2.29**	2.77	3.66	0.96
School	**Coeff.**	**10.88** ***	**3.56** *	**6.92** ***	3.35	3.95	0.22
	Std. Err.	**3.64**	**2.10**	**1.72**	2.09	3.42	0.83
Away from							
School	**Coeff.**	-2.13	-0.05	-2.13	-0.26	-0.01	0.20
	Std. Err.	1.67	1.88	1.77	1.92	0.41	0.41

Source: Authors' computations, ATUS-X, 2006-2008. Robust standard errors computed by successive difference replication using 2006 EH module weights. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Results

**Participation in School Breakfast Programs and
Probability of Eating Breakfast**

		Males		Females	
Any Location	Odds Ratio	2.91	***	1.55	
	Std. Err.	1.01		0.59	
At School	Odds Ratio	8.30	***	2.95	**
	Std. Err.	3.11		1.29	
Away from School	Odds Ratio	0.63		0.76	
	Std. Err.	0.19		0.30	
Double- Dipping	Odds Ratio	2.77	*	0.37	
	Std. Err.	1.62		0.40	

Source: Authors' computations, ATUS-X, 2006-
2008
Robust standard errors computed by successive difference replication
using 2006 EH module weights.
* p<0.10, ** p<0.05, *** p<0.01

Results

Participation in School Breakfast Programs and Time Spent in Overall Eating, Active and Passive Leisure Activities

		Males	Females
Primary Eating and Drinking	Minutes	1.3	8.4
	Std. Err.	5.0	5.2
Secondary Eating	Minutes	13.0	1.9
	Std. Err.	12.2	4.7
Secondary Drinking	Minutes	4.7	-12.1
	Std. Err.	23.2	20.1
Socializing, Relaxing and Leisure	Minutes	-40.2	-86.0 ***
	Std. Err.	26.6	21.9
Sports, Exercise and Recreation	Minutes	37.6 ***	-21.7 **
	Std. Err.	14.0	10.9

Source: Authors' computations, ATUS-X, 2006-2008 Robust standard errors computed by successive difference replication using 2006 EH module weights. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Results

Participation in School Breakfast Programs and Weight Outcomes

		Males	Females
BMI	Coeff.	-0.36	1.65 *
	Std. Err.	0.75	0.87
Overweight	Odds Ratio	0.98	1.36
	Std. Err.	0.31	0.53

Source: Authors' computations, ATUS-X, 2006-2008 Robust standard errors computed by successive difference replication using 2006 EH module weights. * p<0.10, ** p<0.05, *** p<0.01

Conclusions

• SBP participation is associated with a significant increase in the amount of time adolescent males spend eating breakfast as a primary activity at school, and the odds of engaging in this activity.

•SBP participation is not associated with a reduction in the time spent consuming breakfast away from school, or the odds of engaging in this activity among teenage boys.

• Male adolescents taking part in SBP are almost three times more likely to engage in double-dipping, relative to those not taking part in the program.

•There is no significant relationship between SBP participation and double-dipping among teenage girls.

Conclusions

• For both boys and girls, SBP participation is not associated with significant changes in the total amount of time devoted to eating and drinking or odds of engaging in secondary eating and drinking.

•Teenage boys involved in SBP spend more time and are more likely to engage in **active** leisure relative to those students not taking part in the program.

•Teenage girls involved in SBP spend less time in **passive and active** leisure, but have the same odds of engaging in these activities relative to students not involved in the program.

•There is no significant relationship between SBP involvement and BMI or the probability of being overweight among adolescent males.

•For females, SBP involvement is positively associated with BMI, but not with the probability of being overweight.

Thank You!