

# Taking fun to school lunchrooms



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- Policies are in place to encourage healthful eating
  - Policy does not ensure consumption
  - F/V are not often voluntarily eaten by kids
  - Mandatory policies can lead to unintended consequences
- Reach of National School Lunch Program (NSLP)
- Rising rates of childhood obesity rates and comorbidities

# Projects

1. Fun in the Lunchroom: Develop Healthy Eating Habits in Elementary School Children in Socioeconomically Deprived Hispanic Population of West Texas  
July 2013 to June 2014  
with Conrad Lyford, Ph.D.
2. Table Talkers Talk Kids into Healthy Eating  
September 2015 to September 2018  
with Michelle vanDellen, Ph.D.

# Fun in the Lunchroom

# Purpose

- Examine the use of stickers and toys to nudge fruits and vegetables (F/V) selection and consumption
- Taste based decision to fun-and-food based decision
- Two low-income elementary schools (grades 1 through 5) in West Texas, 600 students, underserved Hispanic community



# Methods



- Repeated measures replicated field experiment
- Baseline, intervention, and post-intervention period

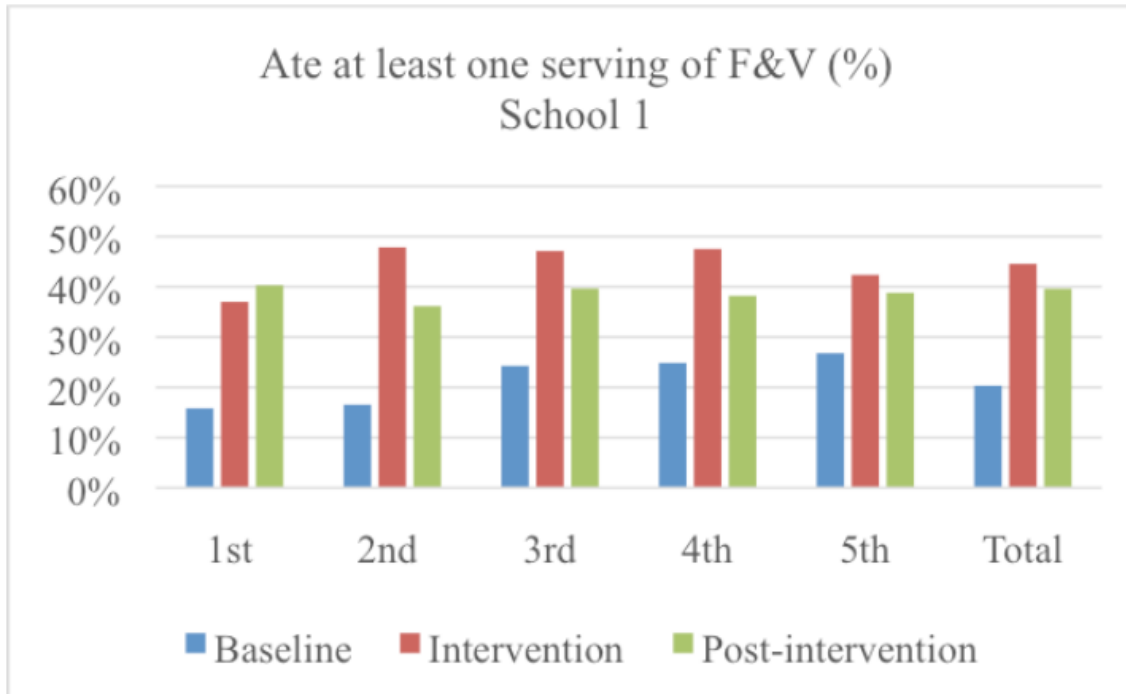


# Measures

- Plate waste method (quarter waste)
- Two measures of F/V selection
  1. frequency for which the student selected and consumed at least one serving of F/V during the days of observation, and
  2. frequency for which the student selected but did not consume at least one serving of F/V across the same period of observation.
- Two measures of F/V consumption
  1. servings of F/V consumed by each student across the observed days in increments of half servings, and
  2. frequency at which the student ate at least one serving of F/V across the observed days.

# Results

Servings with at least one serving of fruits and vegetables (F\V) eaten

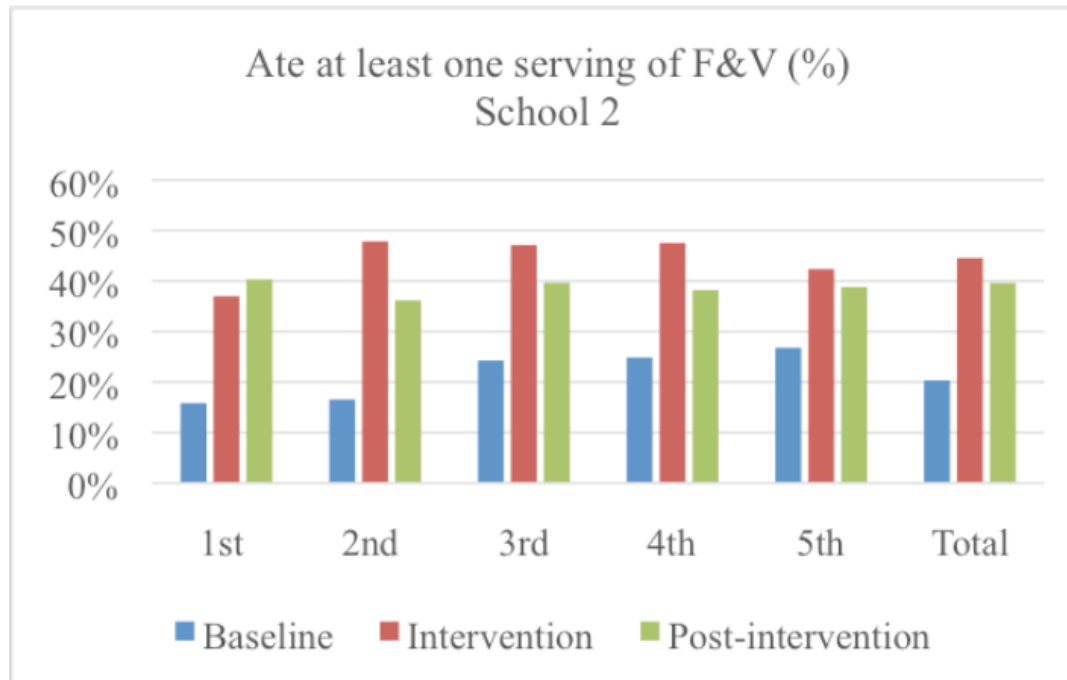


	1st	2nd	3rd	4th	5th	Total
Baseline	16% (1509)	17% (1365)	24% (1236)	25% (362)	27% (306)	20% (5774)
Intervention	37% (905)	48% (1003)	47% (1362)	48% (772)	42% (1036)	45% (5078)
Post-intervention	40% (1141)	36% (940)	40% (1069)	38% (492)	39% (657)	40% (4299)



# Results

Servings with at least one serving of fruits and vegetables (F\|V) eaten



	1st	2nd	3rd	4th	5th	Total
Baseline	20% (611)	25% (537)	19% (540)	16% (468)	23% (325)	20% (3092)
Intervention	64% (634)	67% (609)	77% (630)	72% (449)	76% (388)	67% (3368)
Post-intervention	47% (213)	35% (223)	52% (315)	38% (216)	48% (190)	43% (1439)

# Results

**Table 3: Multivariate regression to estimate the impact of nudging and choice architecture intervention<sup>1</sup> on fruits and vegetables (F/V) selection and consumption measures**

Outcome measures	Baseline	Intervention	Post intervention
<u>Measure of F/V selection</u>			
Percentage selected but did not eat at least one serving of F/V	0.283	0.034	0.417
P value	<.0001	0.0028	<.0001
Percentage selected at least one serving of F/V	0.579	0.634	0.893
P value	<.0001	<.0001	<.0001
<u>Measure of F/V consumption</u>			
Servings of F/V consumed	1.773	6.081	2.512
P value	<.0001	<.0001	<.0001
Percentage ate at least one serving of F/V	0.296	0.601	0.476
P value	<.0001	<.0001	<.0001

<sup>1</sup> The intervention was use of inexpensive stickers and toys in F/V serving containers in school cafeteria. Measures of F/V selection and consumption were constructed from plate waste data observed at the lunch tray level. Students' trays were observed for plate waste data for an average of 10 days during the baseline period, followed by 8.5 days during the intervention period, and 6 days during the post intervention period

# Take away

- Intervention impact on selection and consumption
- Bulk purchase to keep cost low (1 cent per serving)
- Inexpensive stickers and toys could be used by school nutrition professionals to combat the issues of unhealthy dietary choices and increased food waste

# Table Talkers Talk Kids into Healthy Eating



# Methods

- Randomized field experiment study using pre-post design with control group
- Field experiment conducted in two distinct Northeast Georgia counties with the objective of:
  - comparing the effect of intervention on food selection and consumption between student cohorts from different socio-economy and socio-demography



## School characteristics (2013/2014) by study design

Experiments	Field experiment 1				Field experiment 2			
	LowSES district (L)				Comparison district (H)			
Treatment	Control (C)		Intervened (I)		Control (C)		Intervened (I)	
Period	Pre-post intervention		Pre-post intervention		Pre-post intervention		Pre-post intervention	
Number of elementary schools	2		2		2		2	
School code	LC1	LC2	LI1	LI2	HC1	HC2	HI1	HI2
Total number of students (N)	557	387	519	575	497	350	338	349
Reduced or free lunch participation (%)	Free lunch to all student due to Community Eligible Provision <sup>26</sup>				66*	78*	76*	68*
<u>Gender (%)</u>								
Male	53	54	51	54	52	53	49	48
Female	47	47	49	46	48	47	51	52
<u>Race (%)</u>								
Asian	6	0	2	3	2	1	2	1
African American	43	80	42	49	8	4	5	1
Hispanic	4	14	12	8	13	10	23	23
White	43	3	40	35	74	81	67	71
Two or more	4	4	5	5	3	4	2	3
<u>Grade (%)</u>								
1st grade	16	17	15	16	14	18	15	17
2 <sup>nd</sup> grade	15	14	16	18	19	15	14	17
3 <sup>rd</sup> grade	13	12	11	15	18	14	18	14
4 <sup>th</sup> grade	11	13	16	13	16	14	15	15
5 <sup>th</sup> grade	15	16	13	14	16	17	15	17



# Intervention

- Nudging fruits and vegetable consumption with the use of attractively designed table talkers
  - Table talkers are three sided communicators placed on tables to advertise items.
  - They are a common form of triggers private industries have used to promote impulse buying and eating
- Objective of using table talkers
  - Communicate interesting and fun facts about fruits and vegetables with elementary school children
  - The facts were intended to increase children's familiarity of fruits and vegetables rather than to communicate the nutrition value of fruits and vegetables



# Messages

Messages were developed for a set of randomly selected fruits and vegetables served in the two selected school district. The messages were developed by PhD specialist in psychology.

Table 2: Messages developed for fruits and vegetables

Fruits and vegetables	Messages
Apples	<ul style="list-style-type: none"><li>• Some apples are as small as cherries; some apples are as large as grapefruits</li><li>• Apples float in water because 25% of their volume is air</li><li>• What kind of apple has a bad temper? A crab apple</li></ul>
Bananas	<ul style="list-style-type: none"><li>• In Japan, some people make fabric and paper out of bananas</li><li>• A man in India once ate 81 bananas in half an hour</li><li>• Why don't bananas snore? Because they don't want to wake up the rest of the bunch.</li></ul>
Broccoli	<ul style="list-style-type: none"><li>• The tips of broccoli are actually teeny tiny little flowers</li><li>• Broccoli look like trees but they grow like plants</li><li>• Broccoli was first grown on an island off of Italy's coast</li></ul>
Carrots	<ul style="list-style-type: none"><li>• Carrot seeds are so small that 2,000 can fit in a teaspoon</li><li>• Carrots are usually orange but can be purple, red, white, and yellow.</li><li>• The biggest carrot in the world was over 19 feet long</li></ul>





# Intervention

The University of Georgia





# Data collection

- Primary data on fruits and vegetables plate waste was collected for 4 days each before and after the intervention
- Before and after data collection across one season in each school district
- Plate waste record sheets were developed based on the Quarter-Waste Method
- NSLP program serves two options of fruits and two options of vegetables each day. Data was recorded separately for each of these options.



# Data analysis

- Difference-in-difference regression analysis
- Separately for LowSES and comparison district
- Intervention effect:
  - Coefficient of post intervention period \*intervention schools
  - Model included controls for the following:
    - Post intervention period,
    - Grade level,
    - Gender,
    - Day of the week, and
    - School fixed effects



# Results

Table 3: Summary statistics comparing intervention and control school in the two districts

Experiments	Field experiment 1 LowSES district (L)				Field experiment 2 Comparison district (H)				
	Control (C)		Intervened (I)		Control (C)		Intervened (I)		
Treatment	LC1	LC2	LI1	LI2	HC1	HC2	HI1	HI2	
No. of trays observed	383	709	541	418	571	515	310	555	
Baseline	<u>Servings of FV consumed</u>								
	<i>Total</i>	329.5	504	463	278.5	438.5	359	174.5	310
	<i>Average</i>	0.86	0.71	0.86	0.67	0.77	0.70	0.56	0.56
	<u>Servings of FV selected</u>								
	<i>Total</i>	593	1013	1052	657	860	764	383	869
	<i>Average</i>	1.55	1.43	1.94	1.57	1.51	1.48	1.24	1.57
No. of trays observed	510	320	676	339	725	692	759	752	
Post-intervention	<u>Servings of FV consumed</u>								
	<i>Total</i>	360.5	295.5	468.5	203.5	600.5	245	393.5	466
	<i>Average</i>	0.71	0.92	0.69	0.60	0.83	0.35	0.52	0.62
	<u>Servings of FV selected</u>								
	<i>Total</i>	793	583	1009	538	1197	935	1021	1311
	<i>Average</i>	1.55	1.82	1.49	1.59	1.65	1.35	1.35	1.74



# Results



## Table 4: Effect on serving of fruits & vegetables consumed

	LowSES district			Comparison district		
	Effect	Std. error	p value	Effect	Std. error	p value
Intercept	.910	.035	.000	.813	.041	.000
<u>Interest variables</u>						
Post intervention period*intervention schools	-.059	.047	.206	.153	.044	.001
<u>Period</u>						
Pre-intervention						
Post-intervention	-.028	.030	.343	-.203	.030	.000
<u>Grade</u>						
1 <sup>st</sup> grade						
2 <sup>nd</sup> grade	-.003	.030	.924	-.044	.030	.144
3 <sup>rd</sup> grade	-.087	.034	.011	.021	.032	.506
4 <sup>th</sup> grade	-.109	.030	.000	-.030	.031	.328
5 <sup>th</sup> grade	-.022	.044	.620	-.056	.032	.084
<u>Schools</u>						
LC1/HC1						
LC2/HC2	-.312	.033	.000	-.256	.033	.000
LI1/HI1	-.090	.037	.014	-.298	.046	.000
LI2/HI2	-.245	.036	.000	-.339	.039	.000
<u>Gender</u>						
Female						
Male	-.034	.022	.119	-.066	.020	.001
<u>Day of the week</u>						
Monday						
Tuesday	.107	.035	.002	.166	.037	.000
Wednesday	.177	.029	.000	.230	.032	.000
Thursday	-.022	.051	.670	.197	.033	.000
Friday	.105	.034	.002	.204	.034	.000



# Results

## Table 5: Effect on serving of fruits & vegetables selected

	LowSES district			Comparison district		
	Effect	Std. error	p value	Effect	Std. error	p value
Intercept	1.609	.038	0.000	1.535	.053	.000
<u>Interest variables</u>						
Post intervention period*intervention schools	<b>-.209</b>	.051	.000	<b>.190</b>	.057	.001
<u>Period</u>						
Pre-intervention						
Post-intervention	.084	.033	.010	-.118	.039	.002
<u>Grade</u>						
1 <sup>st</sup> grade						
2 <sup>nd</sup> grade	-.011	.032	.744	.028	.039	.471
3 <sup>rd</sup> grade	-.032	.037	.383	-.038	.041	.349
4 <sup>th</sup> grade	-.062	.033	.059	-.025	.040	.542
5 <sup>th</sup> grade	-.044	.048	.356	-.074	.042	.079
<u>Schools</u>						
LC1/HC1						
LC2/HC2	-.192	.036	.000	-.226	.042	.000
LI1/HI1	.311	.040	.000	-.394	.060	.000
LI2/HI2	.005	.039	.895	-.155	.051	.002
<u>Gender</u>						
Female						
Male	<b>-.096</b>	.023	.000	<b>-.126</b>	.026	.000
<u>Day of the week</u>						
Monday						
Tuesday	.024	.038	.529	.326	.048	.000
Wednesday	.150	.031	.000	.292	.042	.000
Thursday	.024	.056	.665	.209	.043	.000
Friday	-.053	.038	.160	.619	.045	.000



## Key take away

- Table talkers could be used successfully to promote consumption of FV
- Intervention effectiveness differ across jurisdictions
- More studies needed to validate findings
- Industry style nudging can be adopted in school settings