

Increasing Fruit & Vegetable Consumption of Preschoolers in Child Care Centers: Final results of 5 a Day Preschool Power Plus

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The LANA Program:

An intervention to increase total and targeted fruit and vegetable consumption of preschoolers in 20 Midwestern childcare centers





Presentation Outline

- Study background and design
- Intervention and evaluation methods
- Results
- Conclusions

5 A Day Preschool Power Plus

Goal: to develop, implement and evaluate an intervention to increase f/v consumption among preschool children in childcare centers

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Our thanks to New Horizon Child Care

5 A Day Preschool Power Plus Hypothesis

A multi-component program targeting children, parents and teachers in childcare centers

will significantly increase children's consumption of total f/v and eight target f/v at lunch and snack

Secondary Hypotheses

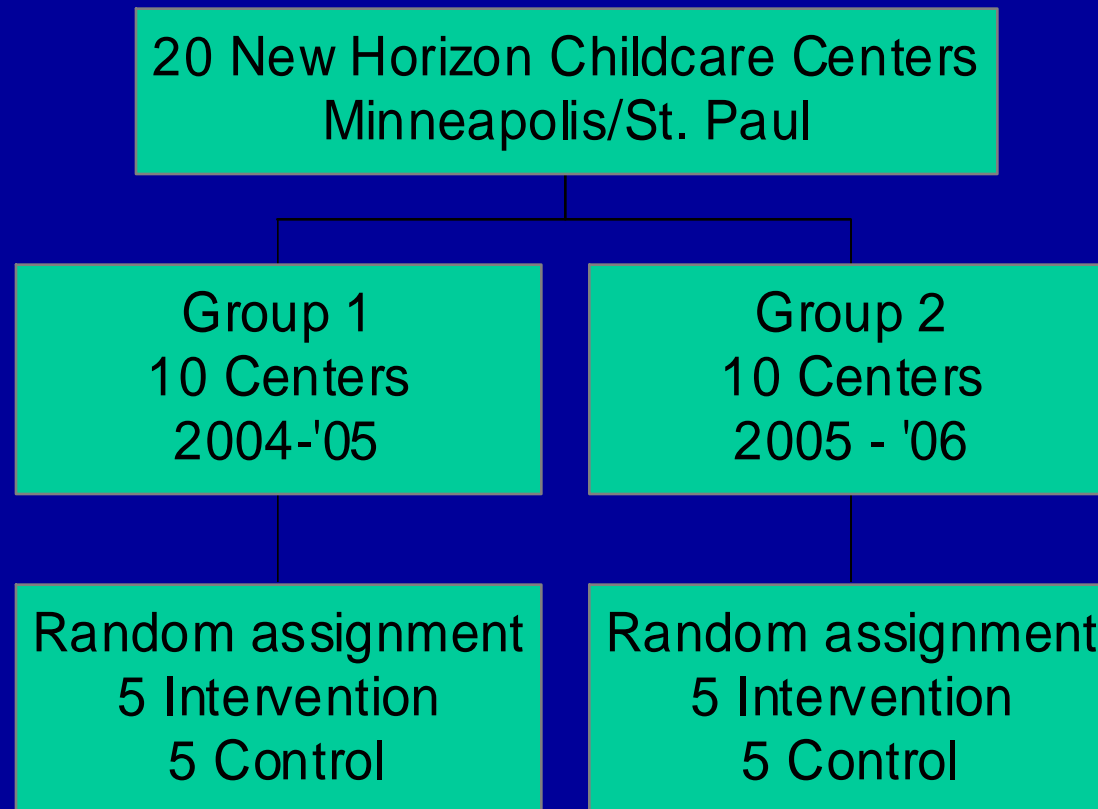
At follow-up parents of children in the intervention centers will be more apt to:

- **serve** targeted f/v at home
- **know** whether/not their child **likes** the taste of targeted f/v
- **report** their **child strongly likes/likes** the taste of targeted f/v
- **Report lower food neophobia** in their child than parents of children in the comparison centers

Additional Expectation

At follow-up BMI will be lower in children in the intervention centers than comparison

Randomized Intervention Trial Split Cohort



Analysis of data from all 20 centers combined 2006-2007

Target Population

Children in the two oldest preschool classrooms in each center (ages 2-5 years), their parents, and teachers

Complete data from 508 children (baseline and follow up) and caregiver (baseline)
(from groups 1 and 2 combined)

Study Outcomes

Primary outcomes: child (observed/measured)

- F/V intake at lunch (L) and snack (S)
- Intake of 8 target F/V at L and S
- Child height and weight (added)

Secondary Outcomes

Parents (survey)

- Child liking of f/v, serving f/v at home, food-related parenting style, child neophobia, family meals

Teachers and cooks (survey)

- Teacher consumption of f/v, food-related parenting style, teacher neophobia, strategies for increasing f/v at home (teachers)

Study Timeline

2002–'03: Recruit centers, formative assessm't

2003–'04: Develop/pilot test/revise interv/eval

2004–'05: Conduct study in 10 group-1 centers

2005–'06: Conduct study in 10 group-2 centers

2006–'07: Combine, analyze, report data
control center implementation

Intervention Design



Intervention Design Process

Perry, CL 1999. *Creating Health Behavior Change: How to develop community-wide programs for youth*. Thousand Oaks, CA: Sage.

1. Select health behavior
2. Develop rationale
3. Create model of predictive factors
4. Write intervention objectives
5. Ensure objectives are applicable to audience
6. Determine programs or components
7. Create activities to meet objectives
8. Construct the program
9. Implement program
10. Maintain program

Targeted Health Behavior and Study Rationale

- Problem behavior: Low intake of f/v in young children
- Rationale for studying:
 - Importance to health
 - Low intake: significant percent of toddlers eat no f/v*
 - F/V preferences established at an early age
 - Many children receive up to half their daily food intake in centers
 - Small literature on preschool children

JADA 2004;104:S38-S44.

Objectives to Address Predictive Factors

Environmental factor Limited variety of f/v on menu	Objective Increase variety of f/v on menu
Individual factor Limited self-efficacy for tasting new f/v	Objective Increase opportunities for tasting f/v
Behavioral factor Few opportunities for repeated exposure	Objective Offer repeated exposure to f/v

Information gathering to Focus the Intervention Objectives

Observations in 22 centers

Interviews w/ corporate and pilot center staff

Focus groups with parents and teachers
adults' anxiety about feeding children
children eat separate food /locations
role modeling

Write Focused Objectives

Env'tal Factor Limited variety of f/v on menu	Objective Increase variety of f/v on menu	Focus Objective Add 8 "target" new f/v to menu
Behavior Factor Lack of repeated exposure to f/v	Objective Offer repeated exposure to f/v	Focus Objective Serve all 8 target f/v weekly for 26 weeks (L or S)
Individual Factor Low self-efficacy for tasting f/v	Objective Increase tasting opportunities	Focus Objective Weekly tasting activity (target f/v)

Construct and Pilot Test the Program: The LANA Program

26-week intervention period

Classroom, food service, parent components

Activities designed for each component to address program objectives



LANA Program

Intervention Map: Exposure

	Foodservice	Classroom	Home
Exposure	F/v on menu daily	F/v of the week; weekly cooking + tasting	Take-home kits; Support parents to serve
F/V Skills	Self serve	Self serve at table Cooking/tasting	Parent events: children cook
Role modeling	Train teachers to eat and enjoy f/v at meals	Train teachers to taste/cook; Use LANA	Parents eat f/v at events; train on modeling
Attitudes and Experiences	Serve f/v for snacks; eating f/v is fun and usual	Theme weeks	Parent communication

Daily Menu Changes

To provide repeated exposure (and variety)

- 8 target f/v are added to usual f/v served
- Target f/v served each week for L or S

Competitive items removed from menu

Target f/v: broccoli, sweet red pepper, sugar snap peas, cherry tomatoes, sweet potato, strawberries, kiwi, apricot

LANA Preschool Program Menu

Menu: Week One

New Horizon Child Care

	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast	Fresh Fruit Cold Cereal Bagel/English Muffin Milk	Pears French Toast w/ Syrup Milk	Fresh Fruit Pancakes w/ Syrup Milk	Fresh Fruit Breakfast Muffin Milk	Peaches Cold Cereal Bagel/English Muffin Milk
Lunch	Au Gratin Potatoes w/ Ham Breadsticks Green Beans Pineapple Milk	Swedish Meatballs Rice w/ Gravy <u>Dinner Roll</u> Peas Rosy Applesauce Milk <i>Sweet Potatoes</i>	Mexican Soft Shelled Tacos w/ Beef and Cheese Carrots Mixed Fruit Milk <i>Sugar Snap Peas</i>	Tomato Soup Grilled Cheese Sandwiches Raw Veggies (<i>Red Pepper w/ Dip</i>) Pears Milk	BBQ Pork on a Bun <u>Tri Tators</u> Mixed Veggies Banana <i>Kiwi</i> Milk
Snack with changes	<i>Fresh Broccoli</i> Soft Pretzels with Cheese Sauce <u>Fruit Juice</u> <i>Milk</i>	<i>Apricots</i> <i>Breadsticks</i> <u>Vanilla Pudding</u> <u>Chocolate Teddy</u> <u>Grahams</u> Milk	<i>Strawberries</i> <i>String Cheese</i> Saltines Fruit Juice	<i>Cherry Tomatoes w/ Dip</i> <i>Hard Cooked Eggs</i> <u>Brownies</u> Milk	Fresh Fruit Vanilla Yogurt Fruit Juice

Note: Red, italic items were items added to the menu. Underlined items were removed from the menu.

Sample Menu Changes

Lunch

Swedish Meatballs

Rice w/ Gravy

~~Dinner Roll~~

Peas

Rosy Applesauce

Milk

Sweet Potatoes

Snack

Cherry Tomatoes

w/ Dip

Hard Cooked Eggs

~~Brownies~~

Milk

Weekly Tasting and Cooking

“Fruit or Vegetable of the Week”, i.e. red pepper

- **Tasting** every week: small portion, served alone, children are asked to taste
- **Cooking** every week: preparing f/v using simple to more complex recipes







Intervention Map: F&V Skills

	Foodservice	Classroom	Home
Exposure	F/v on menu daily	F/v of the week; cooking/tasting	Take-home kits; Encourage parents to serve
F/V Skills	Self-serve	Cooking/tasting	Parent events: children cook
Role modeling	Train teachers to eat and enjoy f/v at meals	Train teachers to taste/cook; Use LANA	Parents eat f/v at events; train on modeling
Attitudes and Experiences	Serve f/v for snacks; eating f/v is fun and usual	Theme weeks	Parent communication







Intervention Map: Role Modeling

	Foodservice	Classroom	Home
Exposure	F/v on menu daily	F/v of the week; cooking/tasting	Take-home kits; Encourage parents to serve
F/V Skills	Self-serve	Cooking/tasting	Parent events: children cook
Role modeling	Train teachers to eat and enjoy f/v at meals	Train teachers to taste/cook; Use LANA	Parents eat f/v at events; train on modeling
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Cooking Activities

Vegetable Lasagna

Ingredients:

- 1- 26 oz. jar spaghetti sauce
- 3 cups chopped broccoli
- 3 cups cottage cheese
- 2 cups shredded mozzarella

Layer:

- Half of spaghetti sauce
- Half of the noodles
- Half of broccoli + cottage cheese
- Rest of noodles



Intervention Map: Attitudes & Experiences

	Foodservice	Classroom	Home
Exposure	F/v on menu daily	F/v of the week; cooking/tasting	Take-home kits; Encourage parents to serve
F/V Skills	Self-serve	Cooking/tasting	Parent events: children cook
Role modeling	Train teachers to eat and enjoy f/v at meals	Train teachers to taste/cook; Use LANA	Parents eat f/v at events; train on modeling
Attitudes and Experiences	Serve f/v for snacks; eating f/v is fun and usual	Theme weeks	Parent events and communication

Monthly LANA Theme Weeks

1 week/month for six months

Eating the Alphabet

Introduce LANA/program

Vegetarian Animals

Animals eat f/v

Our Senses Teach Us

Learning through senses

Inside/Outside

Identifying and sorting

Growing Things

How f/v grow

Foods for Everyone

Families eat different f/v



Reaching Parents Through Child

- Parent letters with each theme unit
- Take-home tasting kits (units 2-6)
- Parents Talk...About Feeding Kids (5)
- All LANA stories (units 2-5)
- Lana's Favorite Recipes Cookbook
- Written communication on program

Parents TALK... about feeding KIDS

If you have questions about any information in this flyer please contact:

Susan Bishop: 651-282-2969,

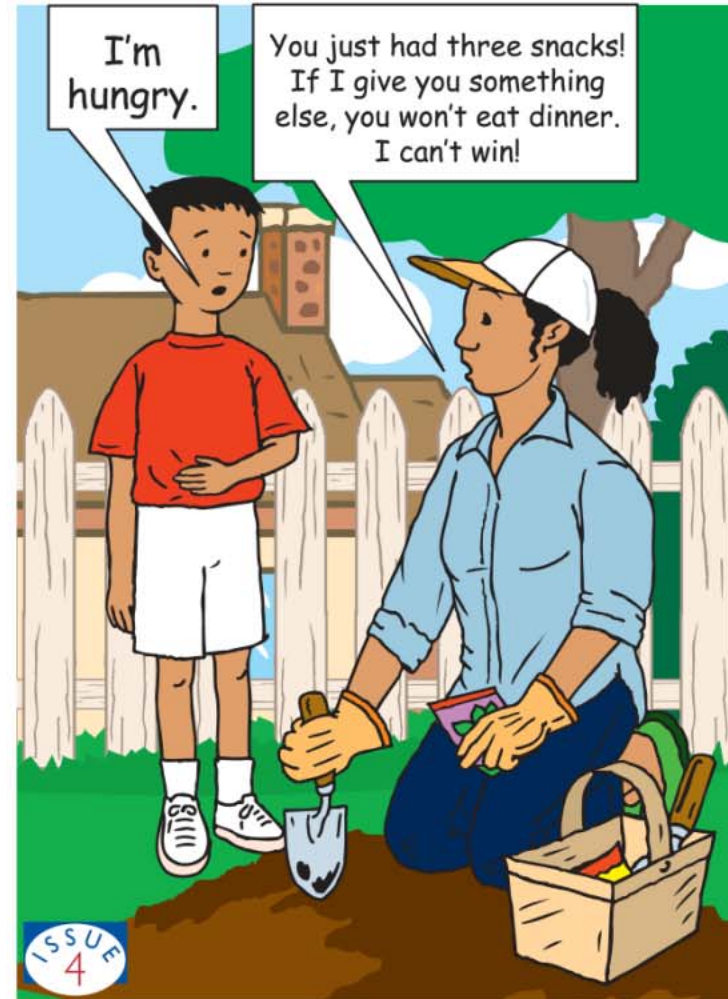
Kate Franken: 651-284-3002 or Angela Kong: 651-281-9799



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Parents TALK... about feeding KIDS

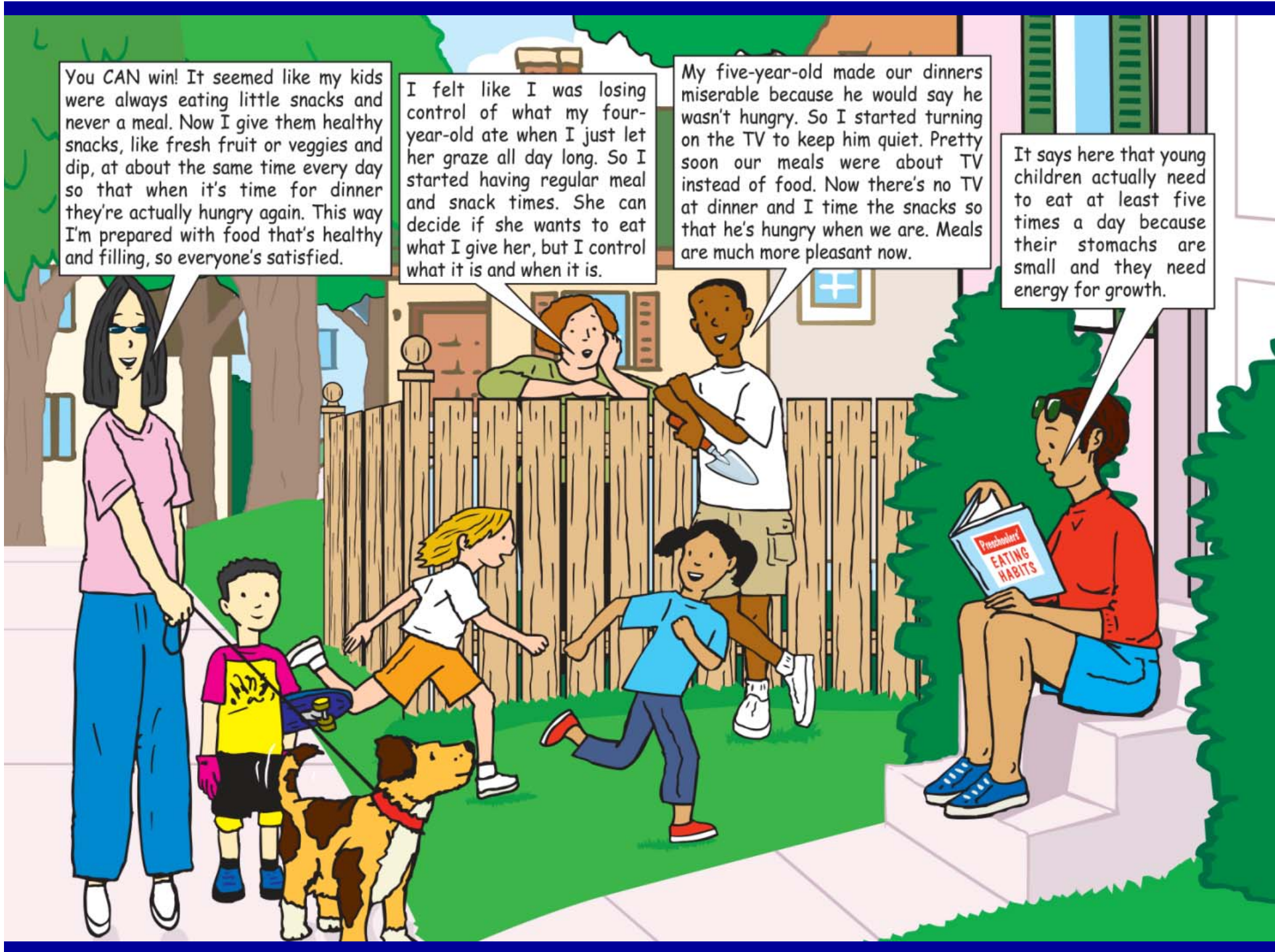


You CAN win! It seemed like my kids were always eating little snacks and never a meal. Now I give them healthy snacks, like fresh fruit or veggies and dip, at about the same time every day so that when it's time for dinner they're actually hungry again. This way I'm prepared with food that's healthy and filling, so everyone's satisfied.

I felt like I was losing control of what my four-year-old ate when I just let her graze all day long. So I started having regular meal and snack times. She can decide if she wants to eat what I give her, but I control what it is and when it is.

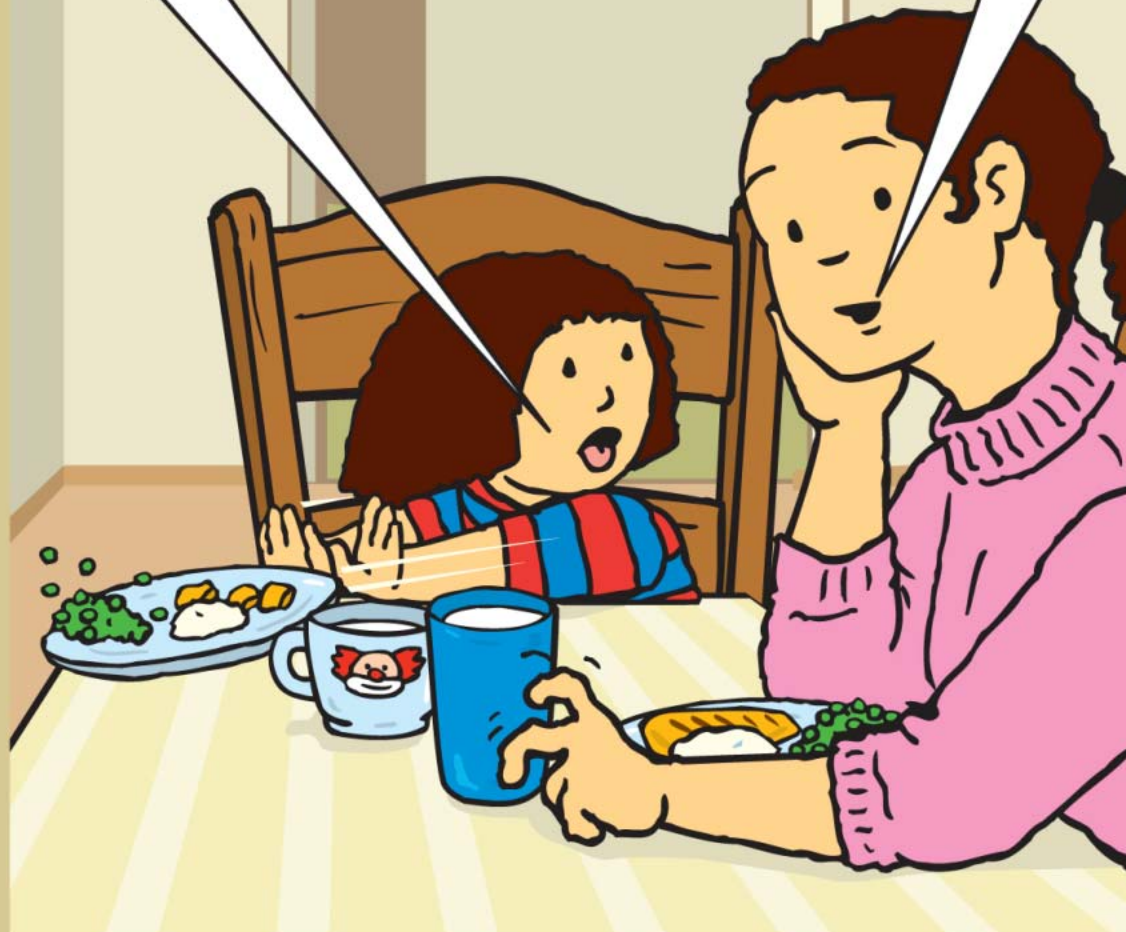
My five-year-old made our dinners miserable because he would say he wasn't hungry. So I started turning on the TV to keep him quiet. Pretty soon our meals were about TV instead of food. Now there's no TV at dinner and I time the snacks so that he's hungry when we are. Meals are much more pleasant now.

It says here that young children actually need to eat at least five times a day because their stomachs are small and they need energy for growth.



What's THAT?
It looks YUCKY!
I'm not
eating THAT!

Here we go again.
Every time I try to get
her to eat a new food,
she has a major tantrum!
What can I do?



Data Collection Methods and Timeline

- Observed intake at lunch (n = 485)
- Observed intake at snack (n = 444)
- Child height and weight (n = 508)
- Parent survey (n = 397)

Baseline data collection: Oct-Nov 2004 (cohort 1); Oct –Nov 2005 (cohort 2)

Follow up data collection: May-June 2005 (cohort 1); May 2006 (cohort 2)

N's = complete data at baseline and follow up for cohorts 1 and 2 combined

Table 1: Demographic Characteristics of Preschool Children and Their Parent/Caregiver)

	Intervention	Control	P-value
Female	57%	55%	
Under 4 yrs old	51%	44%	
Child: white, Non-Hispanic	75%	81%	
Parent: white, Non- Hispanic	82%	88%	0.085
Parent Age	34 yrs	34 yrs	
College grad	64%	60%	
Child BMI >85	40%	36%	

Table 2: Serving size definitions for Targeted Fruits & Vegetables

	Grams per serving	Conventional unit per serving
Strawberries	83	6.91 medium (½ cup sliced)
Apricots	126.5	½ cup halves
Sugar snap peas	49	14.4 pods (½ cup chopped)
Broccoli	44	0.62 cup whole pieces: (½ cup chopped)
Kiwi	76	1 medium
Cherry tomatoes	90	5.29 cherry tomatoes (½ cup chopped)
Sweet potato	88.5	0.45 cup cut pieces (½ cup cut chopped)
Sweet red pepper	74.5	27.5 strips (½ cup chopped)

Table 3a: Lunch dietary intake of preschoolers at follow-up adjusted for baseline value, age, and race/ethnicity of caregiver

	Inter	Control	Diff.	P-value
Total fruits & vegetables	1.47	1.35	0.13	
Total fruits (no juice)	0.95	0.99	-0.04	
Total vegetables (no potatoes)	0.54	0.35	0.19	.005
Targeted fruits & vegetables	0.33	0.26	0.07	
Dietary Fiber (g)	2.32	2.18	0.14	

Table 3b: Snack dietary intake of preschoolers at follow-up adjusted for baseline value, age, and race/ethnicity of caregiver

	Inter	Control	Diff.	P-value
Targeted fruits & vegetables	.49	.44	0.05	
Targeted fruits	0.37	0.41	-0.04	
Targeted vegetables	0.12	0.03	0.09	0.03
Dietary Fiber (g)	1.80	1.13	0.67	0.03

Table 3c: Lunch & Snack dietary intake of preschoolers at follow-up adjusted for baseline value, age, and race/ethnicity of caregiver

	Inter	Control	Diff.	P-value
Total fruits & vegetables	1.93	1.80	0.13	
Total fruits (no juice)	1.30	1.41	-0.11	
Total vegetables (no potatoes)	0.66	0.38	0.28	.0008
Targeted fruits & vegetables	0.80	0.71	0.09	
Dietary Fiber (g)	4.11	3.30	0.80	.03

Table 4a: Parent/Caregiver reported servings of fruit & vegetables at home adjusted for baseline intake

	Inter	Control	Diff.	P-value
Total fruits & vegetables	3.44	3.11	0.33	.034
Total fruits (no juice)	1.58	1.45	0.12	
Total vegetables (no potatoes)	1.80	1.63	0.18	
Targeted fruits & vegetables	0.93	0.67	0.26	.0001

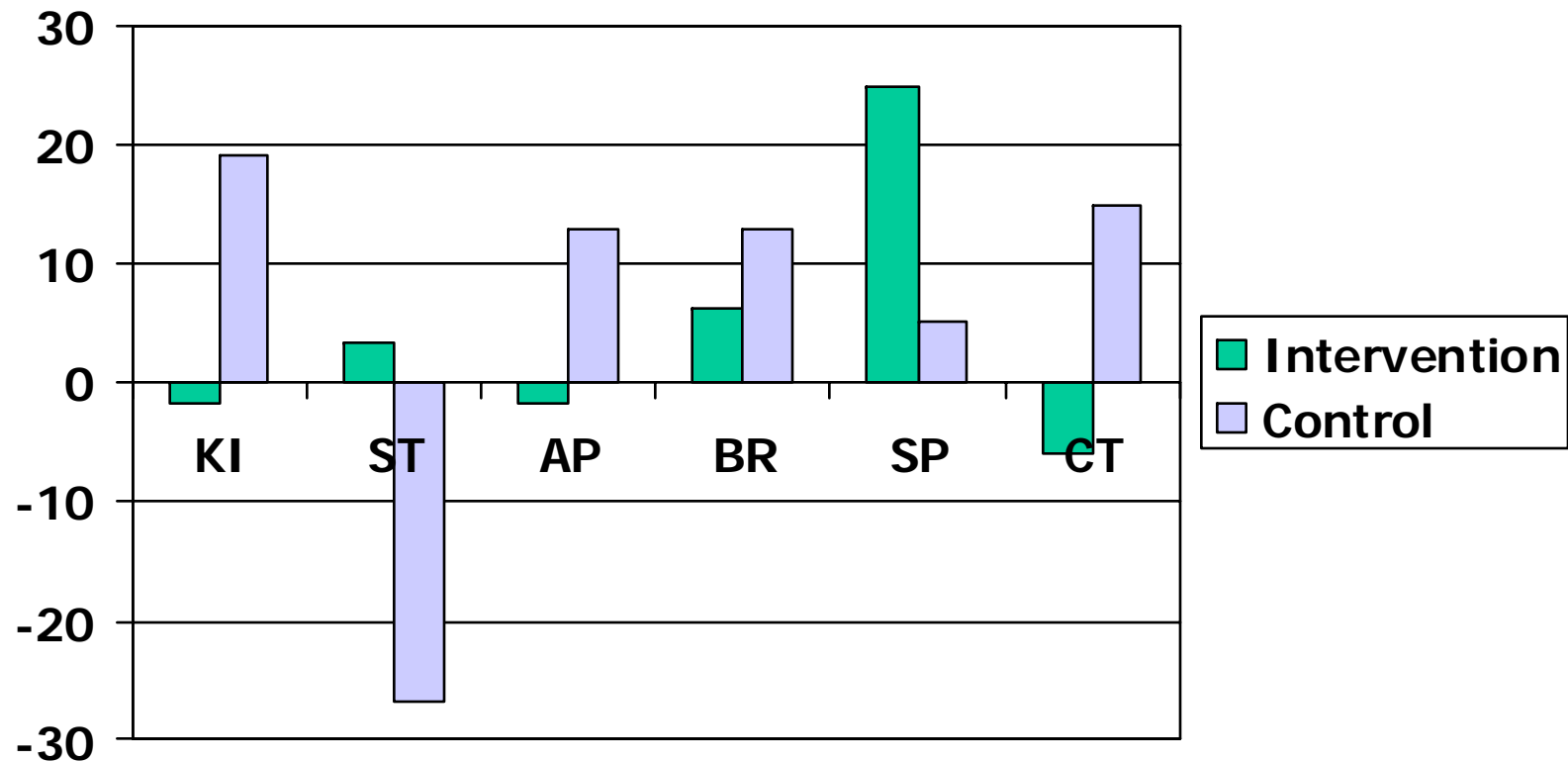
Table 4b: Parent/Caregiver reported servings of milk, soda, potatoes & fruit juice at home adjusted for baseline intake

	Inter	Control	Diff.	P-value
Fruit juice	0.53	0.50	0.02	
Potatoes	0.30	0.34	-0.12	.05
Soft drinks/Pop	0.13	0.17	-0.05	.03
Milk	0.93	0.95	0.02	

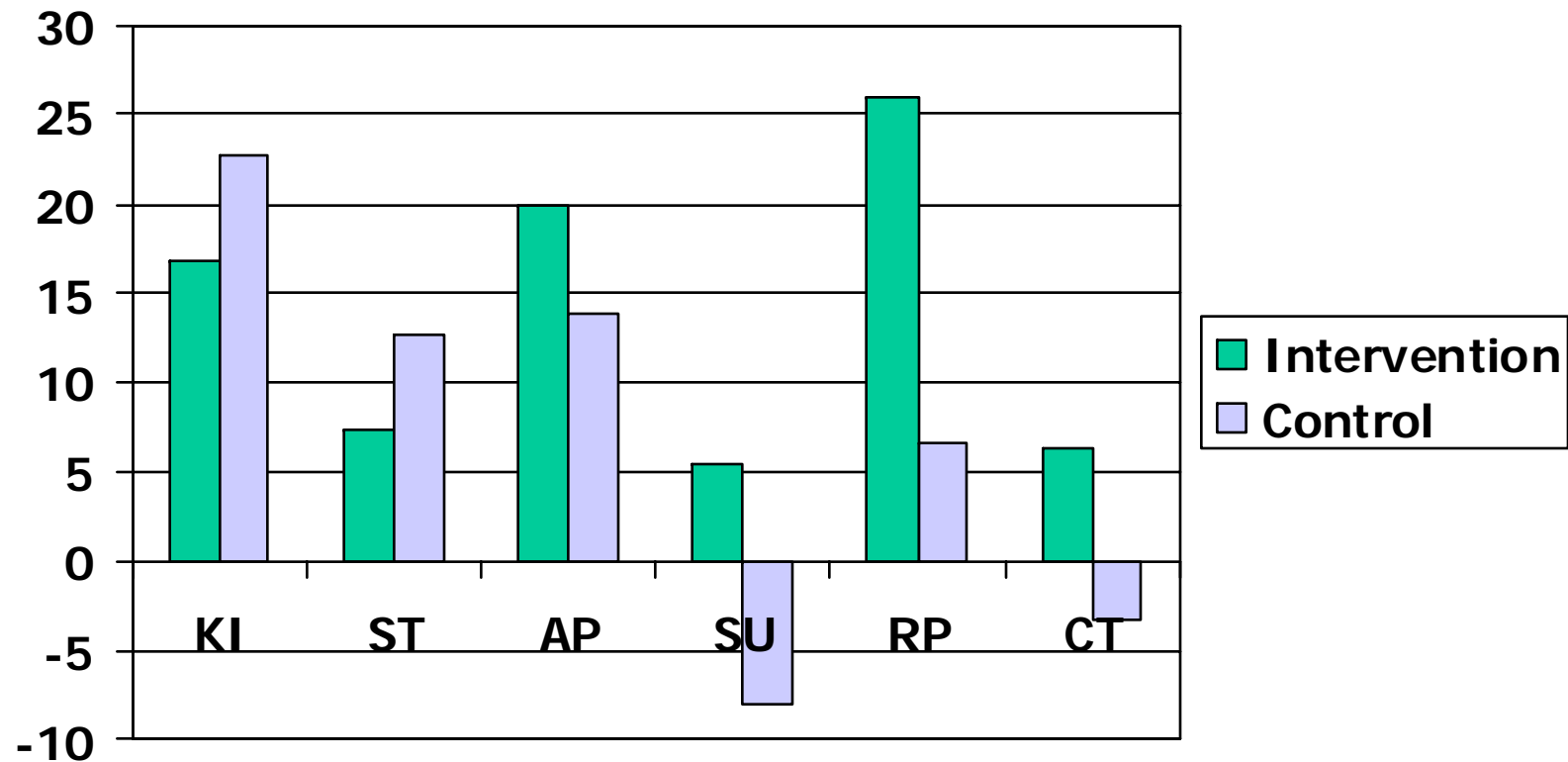
Table 5: Mean BMI Z score for Preschool Children at follow-up adjusted for baseline value, age in decimal years, and race/ethnicity

	Inter	Control	Diff.	P-value
Total Sample	0.74	0.61	0.13	.016
< 85° at base	0.30	0.16	0.14	
≥ 85° at base	1.46	1.37	0.09	
Boys	0.81	0.59	0.22	0.007
Girls	0.69	0.63	0.06	

% Change at Lunch in targeted f&v consumption for each f & v



% Change at Snack in targeted f&v consumption for each f & v



How much does your child like sweet potato?

	Don't know	Dislikes a lot	Dislikes a little	Likes a little	Likes a lot
Control					
Baseline	42%	21%	13%	19%	5%
Follow-up	39%	19%	18%	20%	3%
Inter-vention					
Baseline	44%	14%	10%	23%	8%
Follow-up	16%	13%	20%	33%	18%

How much does your child like....? "Don't know"

	Control Sites			Intervention Sites	
	Baseline	Follow-up		Baseline	Follow-up
Sugar Snap Peas	31%	22%		25%	6%
Apricots	52%	52%		46%	18%
Kiwi	47%	28%		32%	4%
Straw-berries	2.0%	1.5%		2.1%	0.5%

How much does your child like....? "Don't know"

	Control Sites			Intervention Sites	
	Baseline	Follow-up		Baseline	Follow-up
Broccoli	7%	3%		7%	1%
Sweet Potato	42%	39%		44%	16%
Red Bell Pepper	44%	32%		32%	7%
Cherry tomatoes	22%	21%		15%	6%

Findings

- Repeated exposures to targeted fruits & vegetables (f&v) resulted in **modest gains in consumption of vegetables** but not of fruit within the childcare setting
- Exposure to targeted f&v may be **more beneficial to f&v consumption in general than to specifically targeted f&v items**
- Consumption of f&v at lunch was perhaps weakened by availability of competing foods

Findings (con't)

- Based on parent/caregiver self-report, intervention significantly increased servings of f&v at home
- Lack of familiarity with targeted f&v was reduced
- No evidence increase in vegetable consumption prevented weight gain in this population

For more information

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