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The Evidence Base for the Satter Eating Competence Model

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Webinar Objectives

- Define and describe the Satter Eating Competence model
- Identify the evidence base for the Satter Eating Competence model
- Frame public health goals with eating competence

Eating Competence is an intra-individual approach to eating and food-related attitudes and behaviors that entrains positive bio-psychosocial outcomes.

Competent Eaters are . . .

- ✓ matter-of-fact and reliable about getting enough to eat of enjoyable and nourishing food
- ✓ positive, comfortable and flexible with eating
- ✓ trusting of being able to eat satisfying amounts of rewarding food to maintain a stable body weight

ecSatter Inventory

Eating Attitudes and Behaviors

I am relaxed about eating.

I am comfortable about eating enough

I enjoy food and eating.

I am comfortable with my enjoyment of food and eating.

I feel it is okay to eat food that I like.

Internal Regulation of Intake

I trust myself to eat enough for me.

I eat as much as I am hungry for.

I eat until I feel satisfied.

Food Acceptance

I experiment with new food and learn to like it.

If the situation demands, I can “make do” by eating food I don’t much care for.

I eat a wide variety of foods

Eating Context

I tune into food and pay attention to eating.

I make time to eat.

I have regular meals.

I consider what is good for me when I eat.

I plan for feeding myself.



Great Lakes Basin



Measuring Eating Competence

Satter Eating Competence Inventory (ecSI)

Always → 3

Often → 2

Sometimes → 1

Rarely → 0

Never → 0

Test-Retest Reliability (n= 259)

Spearman Rho=.68;

16 items

Possible Scores: 0 to 48

≥ 32 = Eating Competent

n=507; $\alpha = 0.90$; 4 SUBSCALES

Eating Attitudes 5 items $\alpha = 0.85$

Internal Regulation 3 items $\alpha = 0.79$

Food Acceptance 3 items $\alpha = 0.64$

Contextual Skills 5 items $\alpha = 0.82$

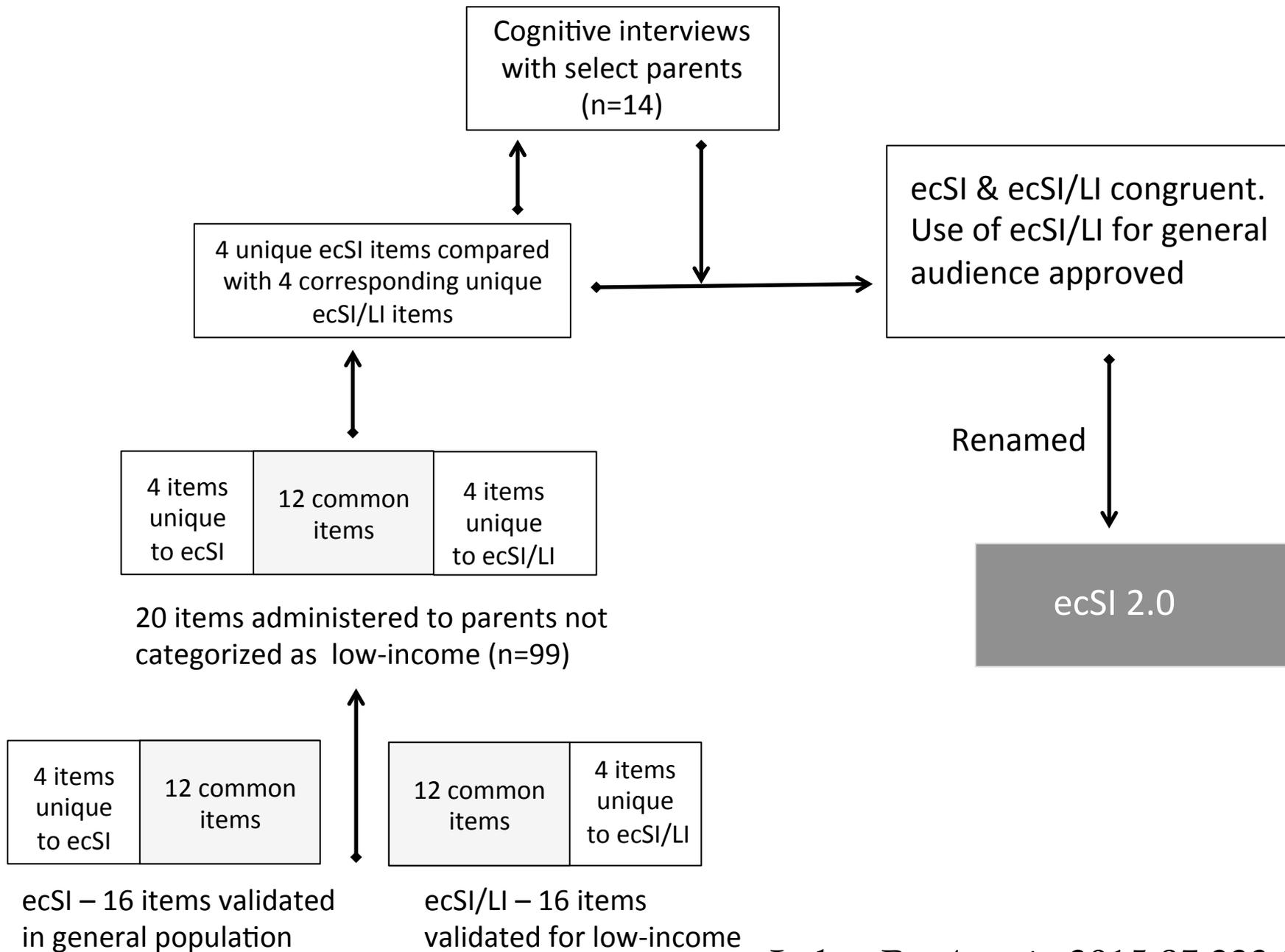
Krall JS, Lohse B. *Int J Behav Nutr Phys Act.* 2011;8:26.
Stotts JL, Lohse B. *J Nutr Educ Behav,*
2007;39(5S):S167-S170. Lohse B, et al., *J Nutr Educ Behav,* 2007; 39(5S):S154-S166.

ecSI

- I assume will get enough to eat.
- I tune in to food and pay attention to myself when I eat.
- I think about nutrition when I choose what to eat.
- I generally plan for feeding myself. I don't just grab food when I get hungry

ecSI-Low Income

- I trust myself to eat enough for me.
- I tune in to food and pay attention to eating.
- I consider what is good for me when I eat.
- I plan for feeding myself.



Lohse B. *Appetite* 2015;87:223-228.

Studies: Sample Characteristics

▪ **Gender**

- Male only
- Female only
- Both

▪ **Participant Age**

- College Student
- Elderly
- General

▪ **Targeted Income**

- Low-income
- All incomes

▪ **Health Status**

- No chronic dx
- Chronic dx

▪ **Children's Age**

- Preschool
- Elementary Age
- General

▪ **Location**

- Pennsylvania
- Colorado
- New Mexico
- California
- Utah
- Ohio
- USA
- Spain

Parameters Examined

- Physical Activity
- Cardiovascular Risk
- Dietary Intake
- Sleep Behavior
- Parenting Behaviors

- Eating Behaviors
- BMI
- Food Security
- Demographics
 - Age
 - Gender
- Intervention Outcomes

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Age, by itself, does not appear to be associated with eating competence.

Age

Telephone dietary assessment; all female (n=149) recruited from 63 EFNEP and SNAP-Ed classes in Pennsylvania; 56% white, 42% black, 61% some post HS education, 60% SNAP

Age Range	EC score ¹	% EC ²
18 – 30 y	29.6 ± 7.3 ^a	49
31 – 50 y	28.3 ± 8.2 ^a	32
> 50 y	34.2 ± 6.4 ^b	71

¹ F=4.8, P=0.01; ² Chi Square 10.6, P=0.005

ecSI validation

Age ranged 18 – 71	Age (y)
Low tertile (n=296)	33.7 ± 12.5 ^b
Middle tertile (n=266)	35.6 ± 13.5 ^b
High tertile (n=257)	39.8 ± 13.6 ^a
P ≤ 0.001	
EC (n=375)	34.1 ± 13.0
Not EC (n=444)	38.8 ± 13.5
P ≤ 0.001	

Lohse B, et al., *J Nutr Educ Behav*, 2007; 39(5S):S154-S166

ecSI/LI validation

Age ranged 18 - 45	Age (y)
Low tertile (n=175)	31.6 ± 6.7
Middle tertile (n=163)	32.1 ± 7.0
High tertile (n=169)	31.7 ± 7.3
NS	
EC (n=148)	31.8 ± 7.1
Not EC (n=444)	31.8 ± 7.0
NS	

Krall JS, Lohse B. *Int J Behav Nutr Phys Act*. 2011;8:26.

Age

Study ↑ age (n)	Age (y)	EC score	% EC
1689	All 18 – 19	31.0 ± 7.0	--
343	All 18 – 20	28.2 ± 0.9	45
1708	23.8 ± 7.1	29.6 ± 8.4	41
259	26.9 ± 10.4	31.3 ± 6.4	--
25	27.7	28.8 ± 8.0	40
512	30.7 ± 7.5	28.9 ± 8.5	39
52	31.5 ± 9.3	25.4 ± 9.6	25
507	31.8 ± 7.0	26.3 ± 9.7	29
832	36.2 ± 13.4	31.1 ± 7.0	46
339	37.2 ± 7.7	33.6 ± 8.5	59
638	66.7 ± 6.4/67.7 ± 5.7	30.9 ± 6.3	46

Gender

Males are more eating competent than women.

Men have higher scores on the eating attitudes subscale; contextual scale scores contribute the most and eating attitudes scores the least to female eating competence scores.

Physical Activity

Eating competent persons more frequently perceive being physically active.

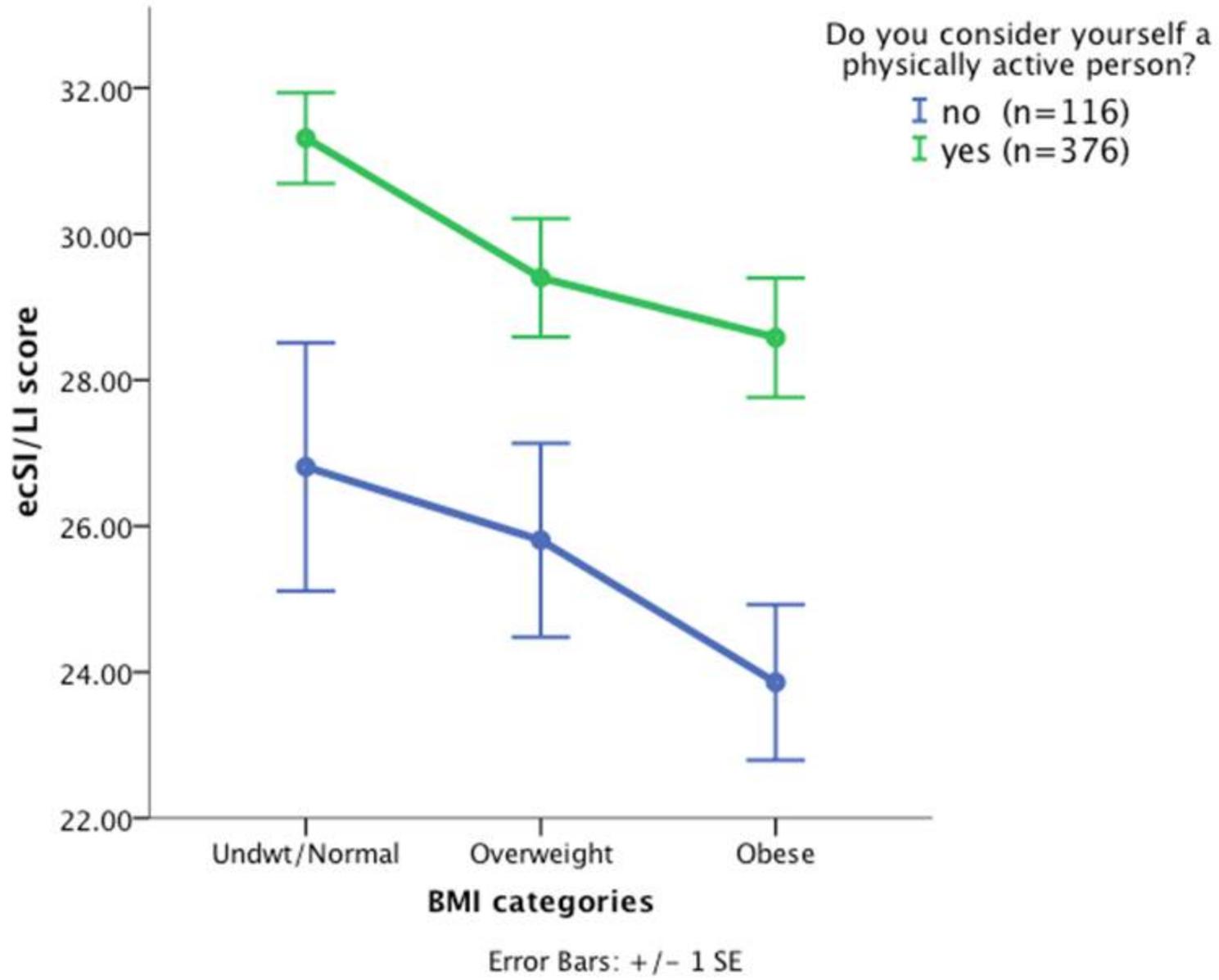
VO_2max is lower in persons who are not eating competent.

Physical Activity

Women (n=512); 93% white; 58% some college; 60% SNAP
61% O/O; 39% EC; mean age 30.7 ± 7.5 y

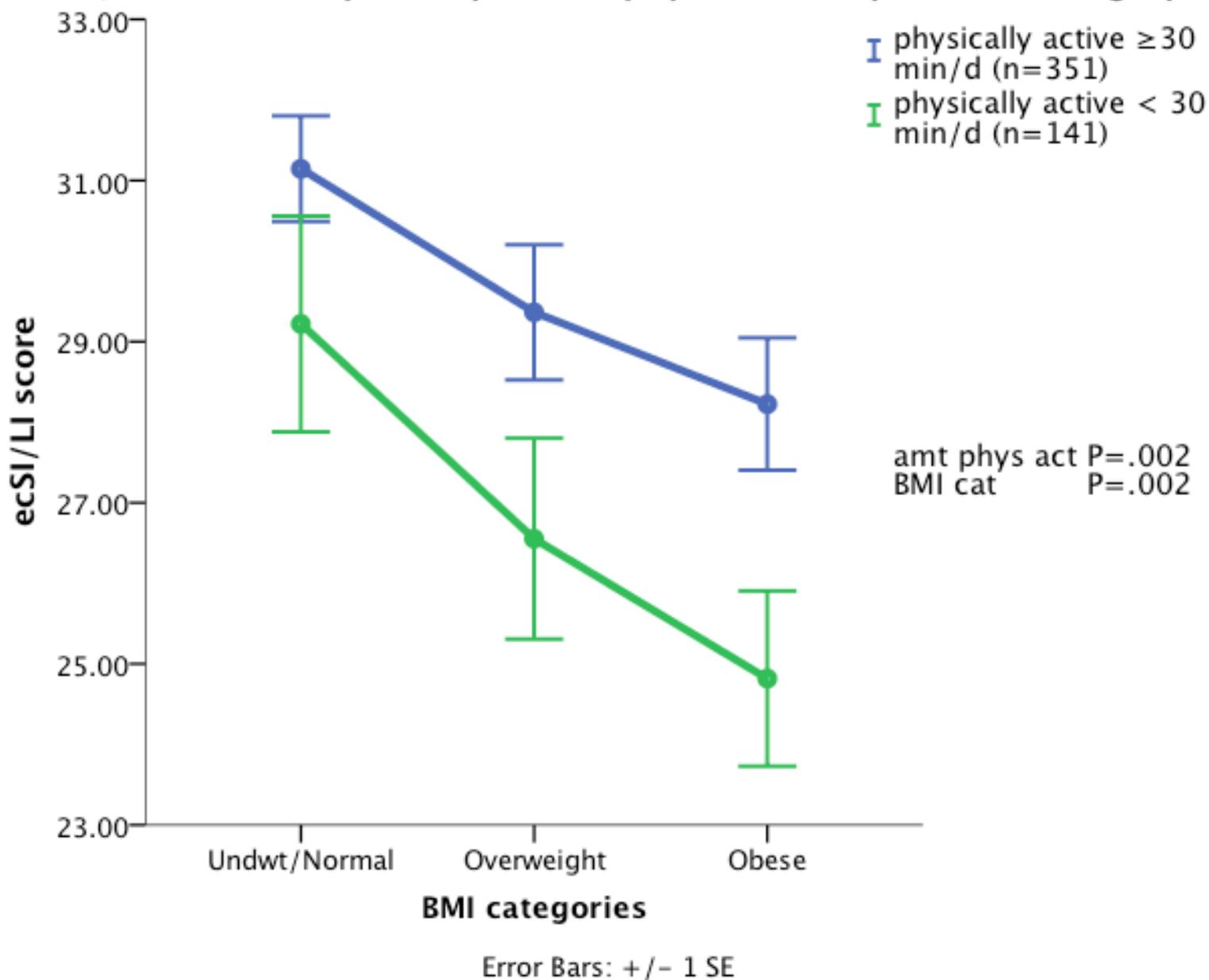
	Physically Active	Not Physically Active	P
Eating Competent	44%	22%	<0.001
High Eating Competence tertile	40%	21%	<0.001
Eating Competence score	30.1 ± 8.3	24.9 ± 8.1	<0.001*

* controlling for age, weight satisfaction, and BMI



Lohse et al. *Women's Health*. 2013;13:12.

ecSI/LI scores compared by amt. of physical activity and BMI category



Lohse et al. *Women's Health*. 2013;13:12.

Physical Activity

n=506 Penn women; 78% white; 68% O/O; 61% food insecure; 46% no post-hs education; mean age 31.8 ± 7.0 y

	Not EC	EC	P
Physically Active	44%	66%	<0.001

	Low EC tertile	Middle EC tertile	High EC tertile	P
Physically Active	39%	47%	66%	<0.001

Krall JS, Lohse B. *Int J Behav Nutr Phys Act.* 2011;8:26.

Physical Activity

n=832; from 33 states; 79% female; 92% white;
55% college degree; mean age 36.2 ± 13.4 y

Physically active 43% less likely to be in lowest EC tertile
OR .57 (CI .34 - .96) P<0.05

Physically active 1.67 times more likely to be EC
OR 1.67 (CE 1.12 – 2.51) P < 0.05

Physical Activity

**N=1689; from colleges in 8 states; 62% female;
79% white; 69% 18 – 19 y**

	Psychosocially Secure n=183	Behaviorally Competent n=178	High Risk n=179	P
ecSI	32.1 ± 5.8 ^x	37.7 ± 4.5 ^y	28.4 ± 5.0 ^z	<0.001
IPAQ Vig MET min/wk	1032.8 ± 961.1 ^x	3088 ± 1936.8 ^y	1616.2 ± 1581.1 ^z	<0.001
Estimated VO ₂ max	49.7 ± 3.8 ^x	48.6 ± 4.1 ^x	46.1 ± 5.4 ^y	<0.001

BMI

Strange, but true. . . BMI is not very related to eating competence, even when controlling for gender; coefficients are in the range of .16 to .23 and are negative in direction.

When related though, eating competent persons have a lower BMI, for BMIs from self-report or measured height and weight.

Clifford et al., in her study with college students, noted that weight satisfaction and not desiring to lose weight were more predictive of EC than BMI.

PREDIMED Study: Likelihood of EC decreased by 5% per unit increase in BMI (P=.013).

Diet Quality

Early studies revealed fewer competent eaters in Pre-Action Stages of Change. Validation studies show competent eaters report enjoying cooking more often, spend more time cooking, and have stronger food resource management skills (e.g., using a shopping list, preparing a budget, reading labels).

Subsequent studies support these findings.

- A study of low-income adults (mean age 31.5 ± 9.3 y) recruited using Facebook showed that EC persons tended to make more healthy/lowfat foods compared to those not EC (62% vs. 31%, $P=0.06$).
- Clifford et al., showed that perceived diet quality was important in a regression model predicting EC score in college students ($n=1,708$); those who perceived having a higher diet quality had a higher EC score ($P<0.001$). [Clifford D, et al., *Fam Con Sci Res J.* 2010;39(2):184-193]

Diet Quality

Parents of 4th graders; (n=309); 78% Hispanic; 89% female

	Fruit & Veg Availability
Eating Competent (n=182)	12.7 ± 3.0
Not Eating Competent (n=127)	11.9 ± 3.2
P=.024	

	EC Score
< median FV availability (n=152)	32.4 ± 8.2
≥ median FV availability (n=157)	34.8 ± 8.7
P=.014	

Lohse B, Cunningham-Sabo L. *J Nutr.* 2012;142(10):1904-1909.

Diet Quality

Females recruited from EFNEP/SNAP (n=149);
86% were 18 – 50 y; White-56%; Black 42%; 60% SNAP
participants; Intake 1620 ± 595 kcal; 32.3% kcal from fat

Compared to non-EC, EC women had > Kcal-adjusted intake of:

- Dietary fiber
- Vitamin A
- Vitamin E
- Vitamin C
- Most B vitamins
- Mg ⁺⁺
- Fe ⁺⁺
- Zinc ⁺⁺
- K ⁺
- HEI score

Pattern 1

- **Lower HEI score**
- **Refined grains**
- **Added fat**
- **Sweetened beverages**
- **Fried vegetables**
- **Added salts**
- **Whole fat dairy**
- **Less low-fat dairy**
- **Less unsweetened bev.**
- **No correlation with EC**

Pattern 2

- **Higher HEI score**
- **Dark green, yellow veg**
- **Other Vegetables**
- **Fruits**
- **Whole grains**
- **Reduced fat**
- **Fruit Juices**
- **Tomatoes**
- **Correlation with EC**
 - **R= .21 (P < .01)**

Diet Quality

Dietary Comparisons (n=638)

After adjusting for energy and gender, eating competent had > intake of:

- Fruits (P=.013)
- Fish (P=.076)
- n-3 fatty acids (P=.094)
- > adherence to the Mediterranean diet (P=.034)

Sleep

Cross-sectional data show having 8 or more hours of sleep a night is associated with greater eating competence.



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This data has not yet been
published.

Sleep - College Students

1252 college students; 80% white; 59% female; mean age 19 y
mean BMI 23.6 ± 3.7 .

Item	< 7 h n=344	7 – 8 h n=449	≥ 8 h n=459	P
Total EC (0-48)	30.6 ± 0.4	30.5 ± 0.5	31.7 ± 0.3	.03
Eating Attitudes (0-15)	10.9 ± 0.2	10.6 ± 0.1	11.1 ± 0.1	.04
Internal Regulation (0-9)	6.6 ± 0.1	6.5 ± 0.1	6.9 ± 0.1	<.01
Binge Eating (0 - 100)	43.6 ± 1.5	41.5 ± 1.3	38.5 ± 1.3	.03
Controlled for gender, race/ethnicity, negative affect, sleep disturbance				

Related to: Quick V et al., *Am J Health Promot.* 2014;29(2):e64-72.

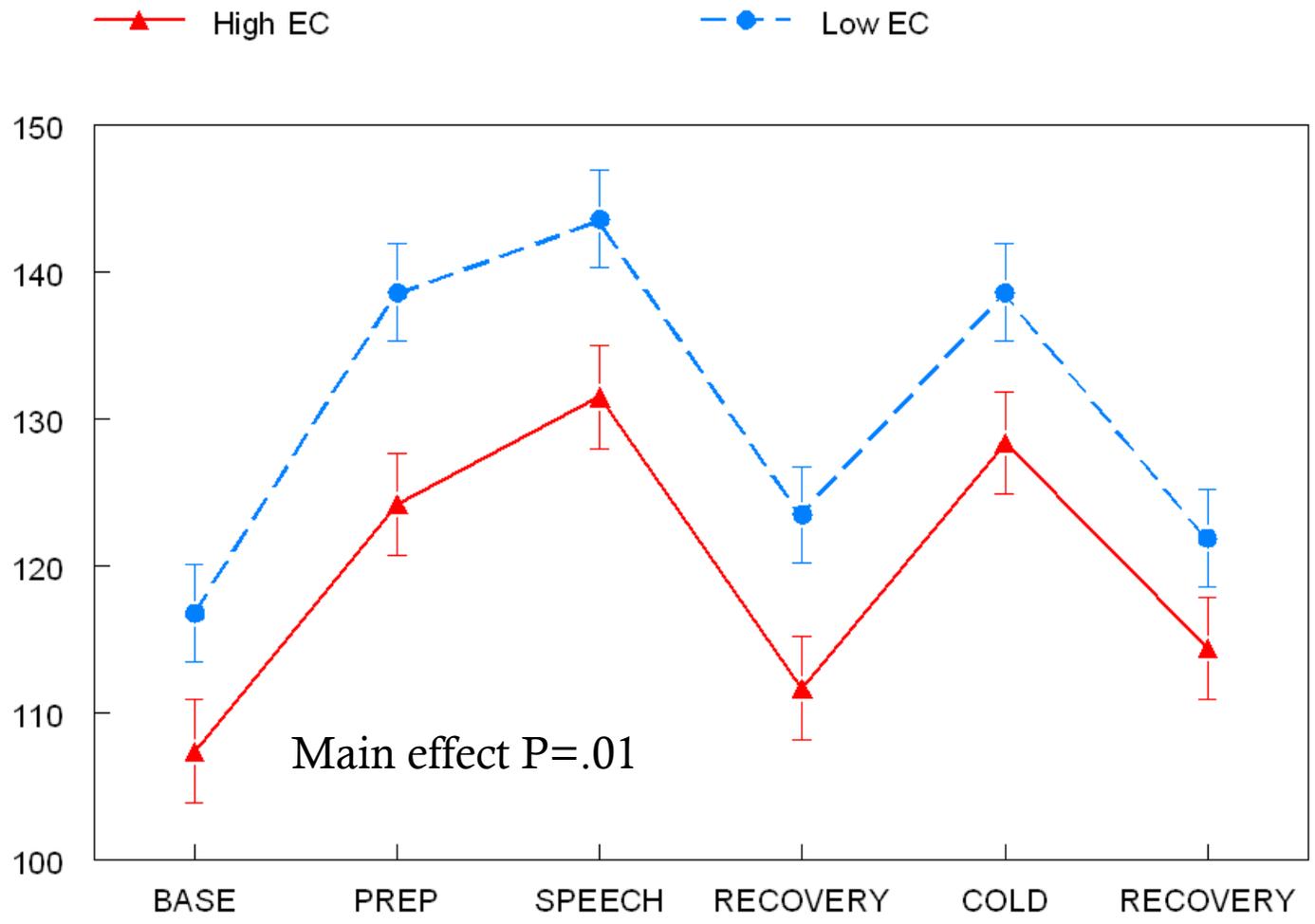
CVD Risk

Eating competence has been associated with biomarkers of reduced cardiovascular disease risk, but not consistently. Additional research is needed.

Suggest providing the Satter Eating Competence Inventory in clinically related studies and including the survey in NHANES.

Lohse B, et al. *J Nutr*. 2010;140:1322-1327.

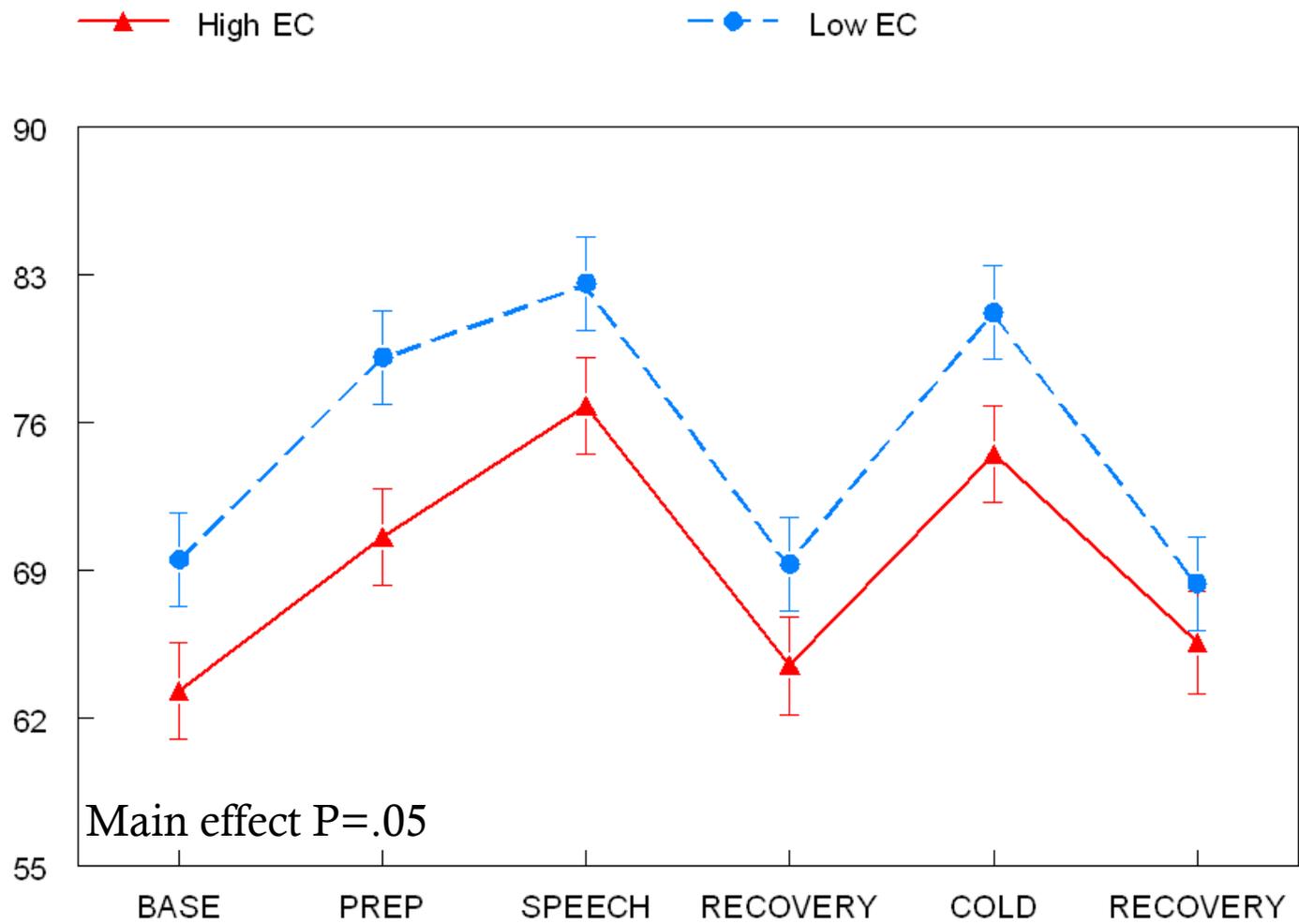
Psota TL, Lohse B, West SG. *J Nutr Educ Behav*, 2007;39(5S):S171-S178.



Differences in SBP Response to Stress by EC group

n=67, 21-70 y; Hypercholesterolemia; BMI < 35; No chronic Dz

Psota TL, Lohse B, West SG. *JNEB*. 2007;39:S171-178.



Differences in DBP Response to Stress by EC group

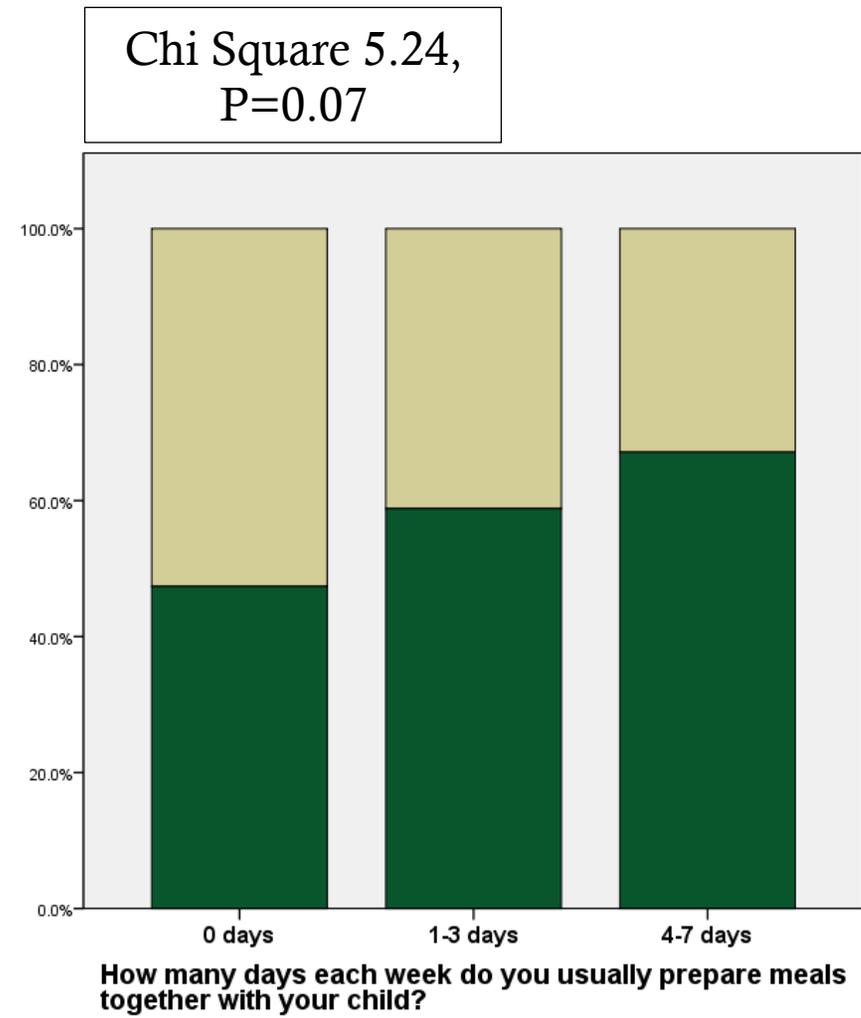
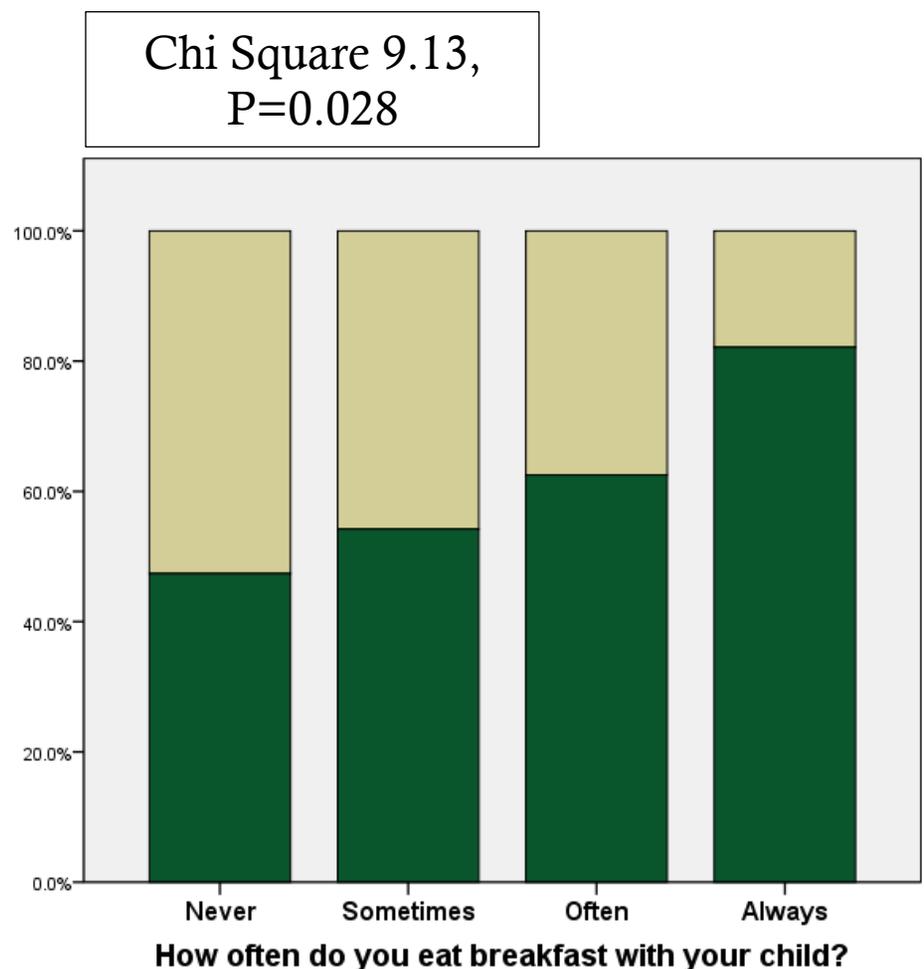
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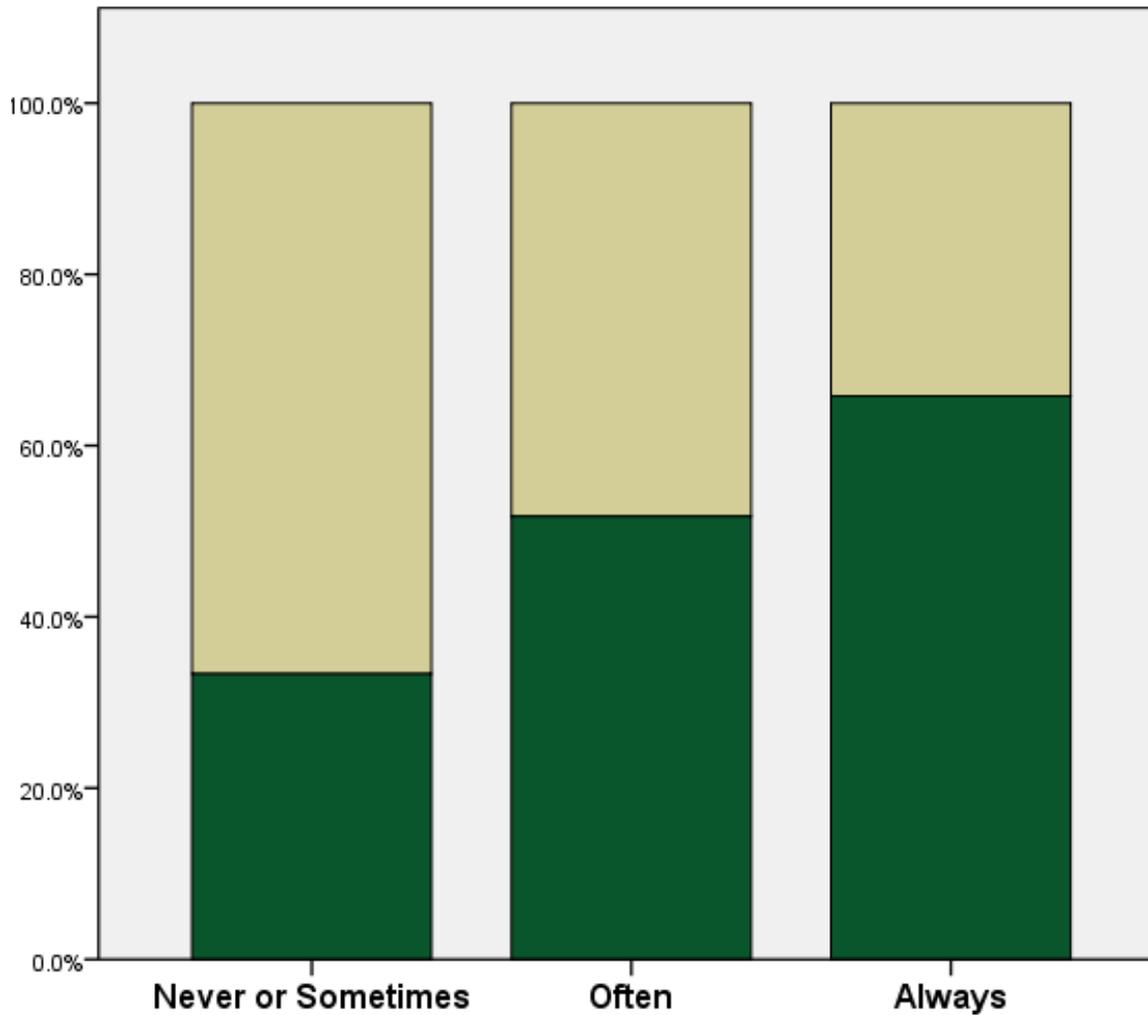
Parenting

Parents who are eating competent demonstrate reliable mealtime structure, self-efficacy for serving fruits and vegetables, and have more fruits and vegetables available in the home.

Parent eating competence proportion mapped to response options for selected modeling items



Parent eating competence proportion mapped to response options for selected modeling items



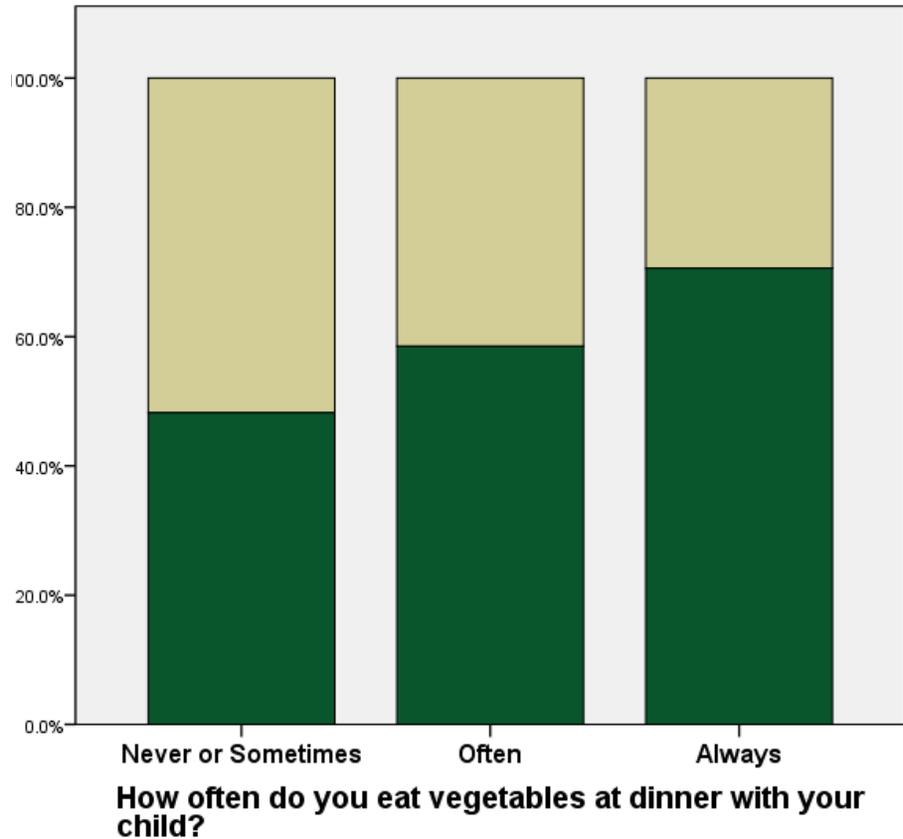
Chi Square 13.5,
P=0.001

How often do you eat dinner with your child?

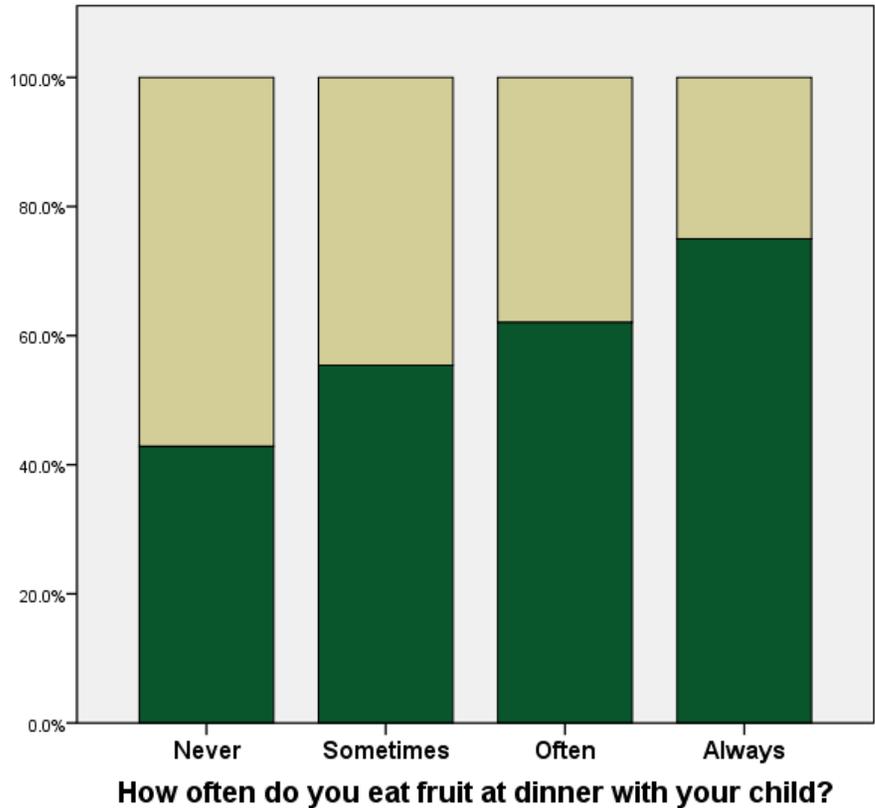
Parent eating competence proportion mapped to response options for selected modeling items



Chi Square 8.8,
P=0.012



Chi Square 8.36,
P=0.04





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published.

Cluster Analyses - 78% Hispanic

	Achievers (n=167)	Strivers (n=107)
Eats dinner w/child***	3.0 ± 0.0	1.8 ± 0.5
Eats breakfast w/child***	1.4 ± 0.7	1.0 ± 0.7
Modeling Scale***	17.3 ± 4.5	12.3 ± 3.5
Self-efficacy/OE Scale**	54.3 ± 8.5	51.5 ± 8.0
F&V Available**	13.1 ± 2.9	11.1 ± 3.4
Eating Competence***	34.9 ± 7.8 (n=153)	30.3 ± 8.9 (n=98)

** $P < 0.01$; *** $P < .001$

Lohse B. *J Nutr.* 2012;142(10):1904-1909



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Future Directions

- Population level assessment of eating competence
 - Plans for online access to ecSI 2.0
 - NHANES or other population-based survey
- Consideration in developing the Dietary Guidelines for Americans
- Intervention design, development and testing
 - Application of dissemination and implementation science principles



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