

DEPRESSIVE SYMPTOMS, NOT FOOD INSECURITY, INCREASED DURING COVID-19 PANDEMIC IN AT-RISK GROUP WITH METABOLIC SYNDROME

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Conflict of Interest

Barbara Lohse has no conflicts of interest to declare.

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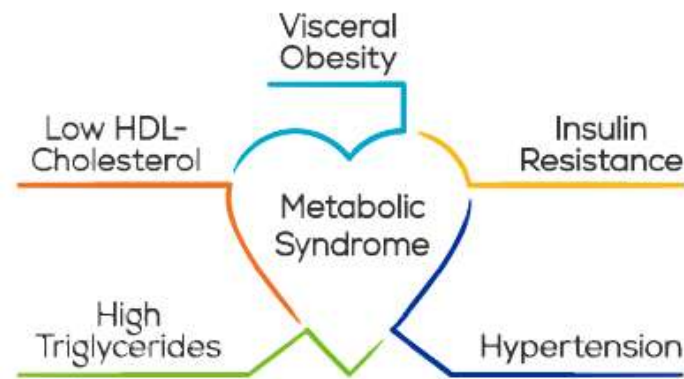
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WHAT IS METABOLIC SYNDROME?



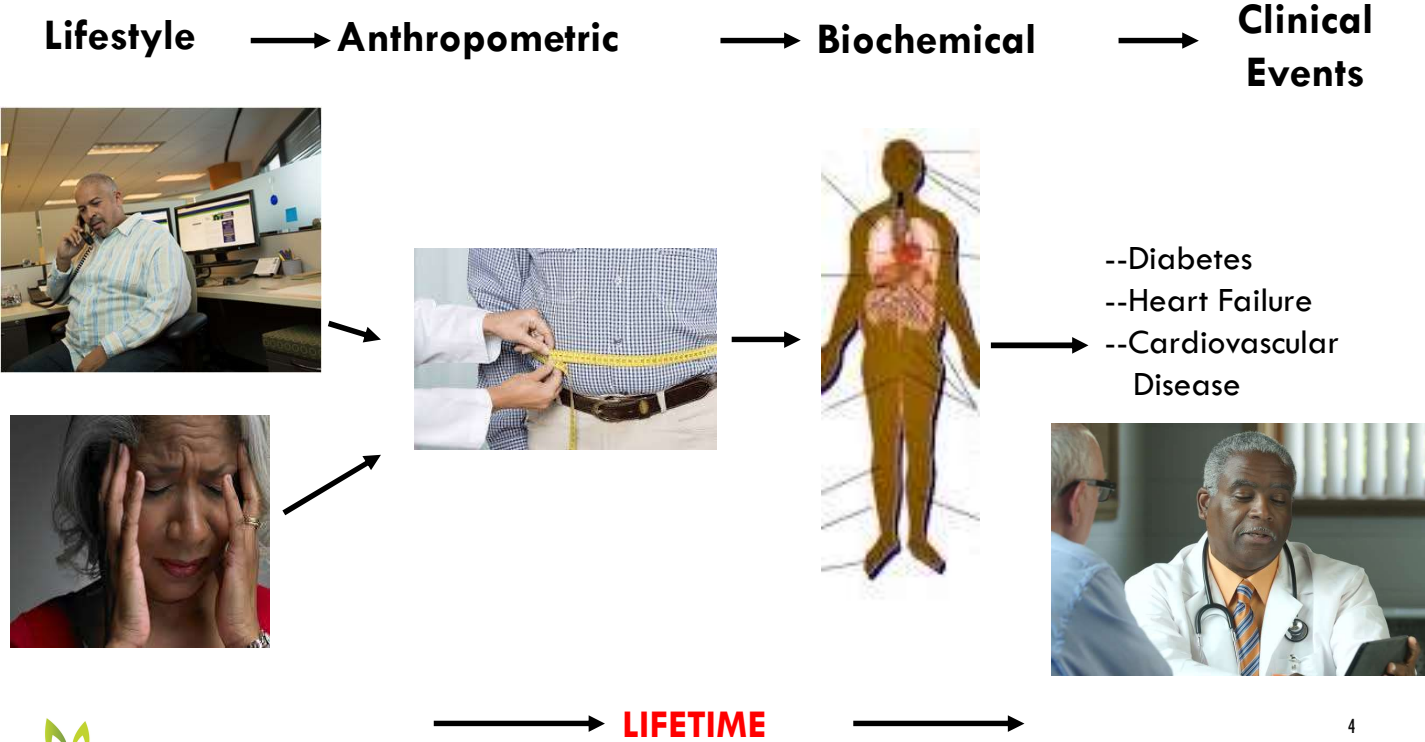
Having 3 or more risk factors:

- Waist circumference ≥ 40 inches (men) and ≥ 35 inches (women)
- Fasting blood glucose 100-125 mg/dL
- High blood pressure or on high blood pressure medication
- Triglycerides ≥ 150 mg/dL
- HDL cholesterol <40 mg/dL in men or <50 mg/dL in women



What is Metabolic Syndrome?

It's All About Imbalance



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ELM STUDY RESEARCH QUESTION

Which lifestyle program is more effective in helping people reverse the Metabolic Syndrome and sustain it at 2 years?

Self-Directed Program or Group-Based Program

BACKGROUND- PANDEMIC IMPACT

“The COVID-19 pandemic embodies many overwhelming stresses. A few of the obvious ones are loss of employment; deaths of family members, friends, or colleagues; financial insecurity; and isolation from others, particularly in those who live alone.”

Shader, RI. *Clinical Therapeutics*. 2020;42:962-963

“Previous studies suggest that depression, anxiety disorders, substance abuse, increased suicidal tendencies, and PTSD commonly follow major economic crises or natural disasters. If similar patterns hold for the COVID-19 pandemic, the psychological effects of persistence stress among the general population and exacerbation of several mental health disorders among the vulnerable individuals will further strain the current health care system. It may also prevent resumption to normal life for many people when the physical threat to viral infection eventually subsides.”

Hossain M, et al. *F1000 Res*. 2020;9:636

BACKGROUND- PANDEMIC IMPACT

Statewide population level survey in Vermont from March 29, 2020 to April 12, 2020

USDA 6-item food security screener; n= 3219.

1/3 increase in food insecurity from previous study; 35.5% of these are newly food insecure.

Niles MT et al. *Nutrients*. 2020;12:2096.

Food Security Issues:

- Changes in dietary patterns
- Increase in sedentary activity
- Emotional eating
- Unemployment
- Unfounded nutrition claims

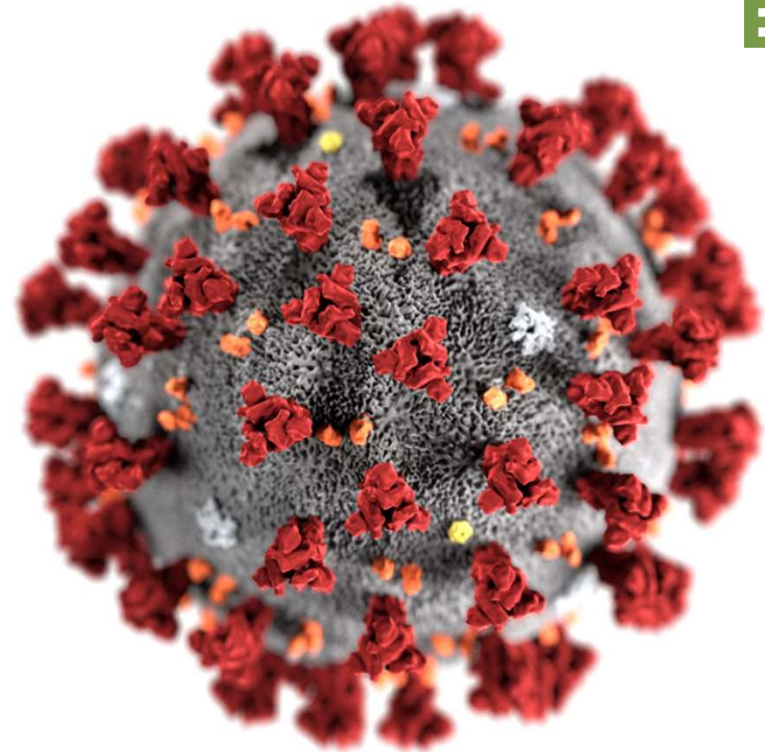
- Food access issues-trade, travel disruptions
- Food supply chain problems
- Public-private sector cooperation requirements

Naja & Hamadeh. *Eur J Clin Nutr*. 2020.

<https://doi.org/10.1038/s41430-020-0634-3>

OBJECTIVE

The objective of this study was to examine the impact of the pandemic on food security, depressive symptoms, and perceived stress in adults diagnosed with Metabolic Syndrome (MetS)



METHODOLOGY-MEASURES AND DATA COLLECTION



DATA COLLECTED VIA FACE-TO-FACE MEETINGS AND/OR ONLINE SURVEY. RIGOROUS ELIGIBILITY CRITERIA EXCLUDED THOSE WITH CO-MORBIDITIES AND PSYCHIATRIC CONDITIONS. BIOMEDICAL CONFIRMATION OF METS WAS REQUIRED.

Measured only at baseline (10/16/2019 – 3/12/2020)

- Satter Eating Competence Inventory (ecSI 2.0; 16 items, 5 response options)
- SF-36 vitality and mental health scales
- Socioeconomic and demographic items.
- Researcher measured height and weight

Measured at baseline and during pandemic (6/4/2020 – 7/28/2020)

- Patient Health Questionnaire-8
- Cohen perceived stress scale
- USDA 10-item Food Security Screener



RESULTS-PARTICIPANTS (N=132)

67% self-report as female

70% self report as White;
11% Hispanic; 20% Black

61% college or post-graduate degree

\$86,000 median annual income
(\$11,000-\$300,000)

9% report difficulty paying for basics

17% marginal/low food security; 5%
low/very low food security

Age 57.0 ± 11.0 y (range 27 -84 y)

3.6 ± 2.4 servings/d fruits and vegetables
(0 -18 servings)

47% were Eating Competent (ecSI 2.0 \geq
32)

ecSI 2.0 mean 30.7 ± 7.2 (10 -47)

SF-36 Vitality Scale 59.0 ± 19.4 (6 – 94)

SF-36 Mental Health Scale 81.1 ± 11.1
(40 – 100)



PARTICIPANTS HAD METABOLIC SYNDROME

- BMI 36.9 ± 8.0 (24 – 84); 15% overweight, 84% obese
- Waist circumference $116.4 \text{ cm} \pm 14.4$ (88-164 cm)
- SBP 130.5 ± 16.2 mm (90 – 167)
DBP 82.8 ± 10.7 mm (57 – 109)
- Total cholesterol 193.1 ± 43 mg/dL (93 -316)
HDL-C 46.2 ± 10.7 mg/dL (29 -86)
Triglycerides 173.9 ± 112.2 mg/dL (50 -1020)
- Fasting glucose 97.9 ± 11.8 mg/dL (71 – 137)
HgA1c 5.8 ± 0.3 (5 – 7)



DEPRESSIVE SYMPTOMS

Measured with Patient Health Questionnaire. 9 items, 4 response options

Possible range 0-27. 1-4 minimal; 5 – 9 mild; 10-14 moderate; 15-19 mod severe; 20 – 27 severe. Study inclusion criteria <10.

BASELINE INFORMATION

Normal distribution after transformation to Log10

No relationship to race, education level, age, food security

Inversely correlated **with eating competence** (P=0.01),
positively correlated with **BMI** (P=0.02)

Females > depressive symptoms (P=0.02)



CHANGE FROM BASELINE TO PANDEMIC ERA

Factor	Baseline (n=132)	COVID (n=132)	P
PHQ-Depression	2.1 ± 2.3	3.5 ± 3.4	<0.001

Depressive symptoms increased even when controlling for eating competence status, food security and for sex ($P < 0.001$), i.e., men and women both had more depressive symptoms in the pandemic era.

Change in depressive symptoms was not significant when controlling for BMI.



PERCEIVED STRESS

Measured with Cohen Perceived Stress Scale. 14 items, 5 response options

Possible range 0 -56; 13 considered average; high stress ≥ 20

BASELINE INFORMATION

Normal distribution

No relationship to race, education level, sex, age

Greater with **Low/Very Low Food Security vs. Marginal vs. High**. $P=0.40$

Inversely correlated with **eating competence, mental health, vitality**; positively correlated with **depressive symptoms** (all $P<0.001$)

Baseline: 40% in high stress category

COVID: 25% in high stress category



CHANGE FROM BASELINE TO PANDEMIC ERA

Factor	Baseline (n=132)	COVID (n=132)	P
Perceived Stress Scale	18.5 ± 6.4	14.9 ± 7.2	<0.001

Perceived stress decreased in the Pandemic even when controlling for eating competence, vitality, mental health, depressive symptoms, BMI, and food security (all $P \leq 0.03$).



FOOD SECURITY (FS)

10 item USDA Food Security Screener. Possible range 0 - 10; Varying response options

0-High FS; 1 – 2 Marginal FS; 3 – 5 Low FS; 6- 10 Very Low FS

BASELINE INFORMATION

Not normally distributed; nonparametric or categorical analyses

Correlated with **eating competence** ($P=0.002$), **age** ($P=0.001$) and **income** ($P=0.02$).

Low/Very low FS associated with **increased stress** ($P=0.04$), **less education** ($P=0.01$; Low/Very low FS 86% no college degree), and being **non-white** ($P=0.01$; High FS 64% white; marginal FS 44% white), and being **Hispanic** ($P=0.03$; 60% of Hispanics have high FS; 85% of Whites have high FS).

No relationship to sex, BMI.

CHANGE FROM BASELINE TO PANDEMIC ERA



Factor	Baseline (n=132)	COVID (n=132)	P
High Food Security	109 (83%)	119 (90%)	<0.001
Marginal Food Security	16 (12%)	12 (9%)	
Low/Very Low Food Security	7 (5%)	1 (1%)	

Improvement in food security persisted in White and Non-White, Hispanic and non-Hispanic, competent or non-competent eaters, and in those without a college degree, but not in those with a college degree or higher (likely because it was already very high).



A CLOSER LOOK AT THE 6 WHOSE FOOD SECURITY DECREASED

Food Security Migration	Food Secure High Baseline (BL)	BL Food Secure Marginal	BL Food Secure L/VL
FU Food Secure High	103	13	3
FU Food Secure Marginal	6	3	3
FU Food Secure L/VS	0	0	1

- Food security status changed from High to Marginal
- Represented 4 of the 5 study sites
- Broad range in education level
- 1/3 African American; 2/3 white
- \$20,400 – \$150,000 reported annual income; median income \$93,000
- 50% male
- 2 eating competent; 4 not eating competent
- No change in depressive symptoms (Wilcoxon test with transformed PHQ)
- No change in perceived stress



CONCLUSION-TRIAL CONSIDERATIONS

In this educated, higher SES sample with confirmed MetS, food security status improved, stress level decreased, but depressive symptoms increased.

Depression may have impact on dietary and physical activity behavior, treatment engagement, and motivation. Therefore, consider depressive symptom change in analysis of treatment impact from intensive and maintenance treatment outcomes.

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EATING COMPETENCE RELATIONSHIP TO BIOPSYCHOSOCIAL CHARACTERISTICS IN METABOLIC SYNDROME REPLICATES THE GENERAL POPULATION

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BACKGROUND-EATING COMPETENCE DEFINED

- Eating competence (EC) is a comprehensive model addressing eating attitudes and behaviors.
- EC focuses not on nutrients, portion size, or food groups, but rather on enjoying food and eating, paying attention to variety in the diet, attending to signals of hunger and satiety, and preparing meals and snacks regularly with some attention to nourishing food and the environment in which it is consumed.
- As Satter notes, there is a positive tension between PERMISSION and DISCIPLINE. Competent eaters give themselves permission to eat foods they like in satisfying amounts, but discipline to maintain a structure of sit-down meals and snacks. Practices such as eating a variety of foods, which is a hallmark of traditional education, will follow from giving yourself structure and being able to practice internal regulation, the mantra of many dieting programs, will follow from having permission to really learn how much is enough for you.

EATING COMPETENCE IS A PROXY FOR HEALTHFUL BEHAVIORS AND OUTCOMES

In studies of the general population and in samples that varied in age, ethnicity, sex, and socioeconomic position, competent eaters . . .

- were more likely to have a normal BMI
- had fewer disordered eating characteristics, e.g. drive for thinness
- had less emotional or uncontrolled eating
- perceived being more physically active
- had better sleep hygiene
- reported feeling less stress
- had fewer oral health issues, when food security status was controlled
- demonstrated more food resource management skills
- had lower blood pressure and cholesterol levels

ADDITIONALLY, EATING COMPETENT PARENTS. . .

. . . of 4th grade youth

More frequently modeled behaviors that encouraged fruit and vegetable intake and had greater in-home fruit and vegetable availability.

This was noted in a mostly White, non-Hispanic sample as well as in a sample that was mostly Hispanic.

. . . of preschoolers 2- 5 years old

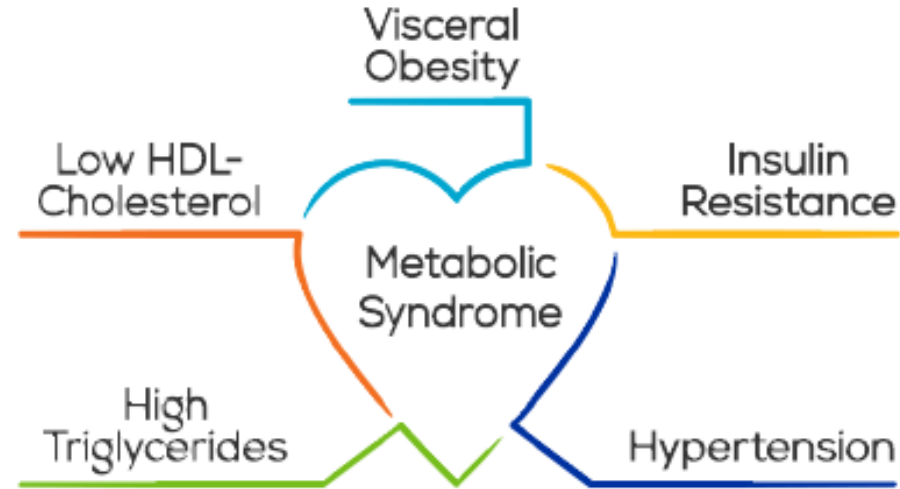
Reported a higher pediatric quality of life and less nutrition risk as measured by the NutriSTEP survey.

OBJECTIVE

These samples were in good general health with few to no medical issues.

The objective of this study was to examine the relationship of eating competence to these psychosocial and biomedical factors in a sample known to have Metabolic Syndrome (MetS), a condition associated with higher risk for diabetes, stroke and heart disease.

WHAT IS METABOLIC SYNDROME?



Having 3 or more risk factors:

- Waist circumference ≥ 40 inches (men) and ≥ 35 inches (women)
- Fasting blood glucose 100-125 mg/dL
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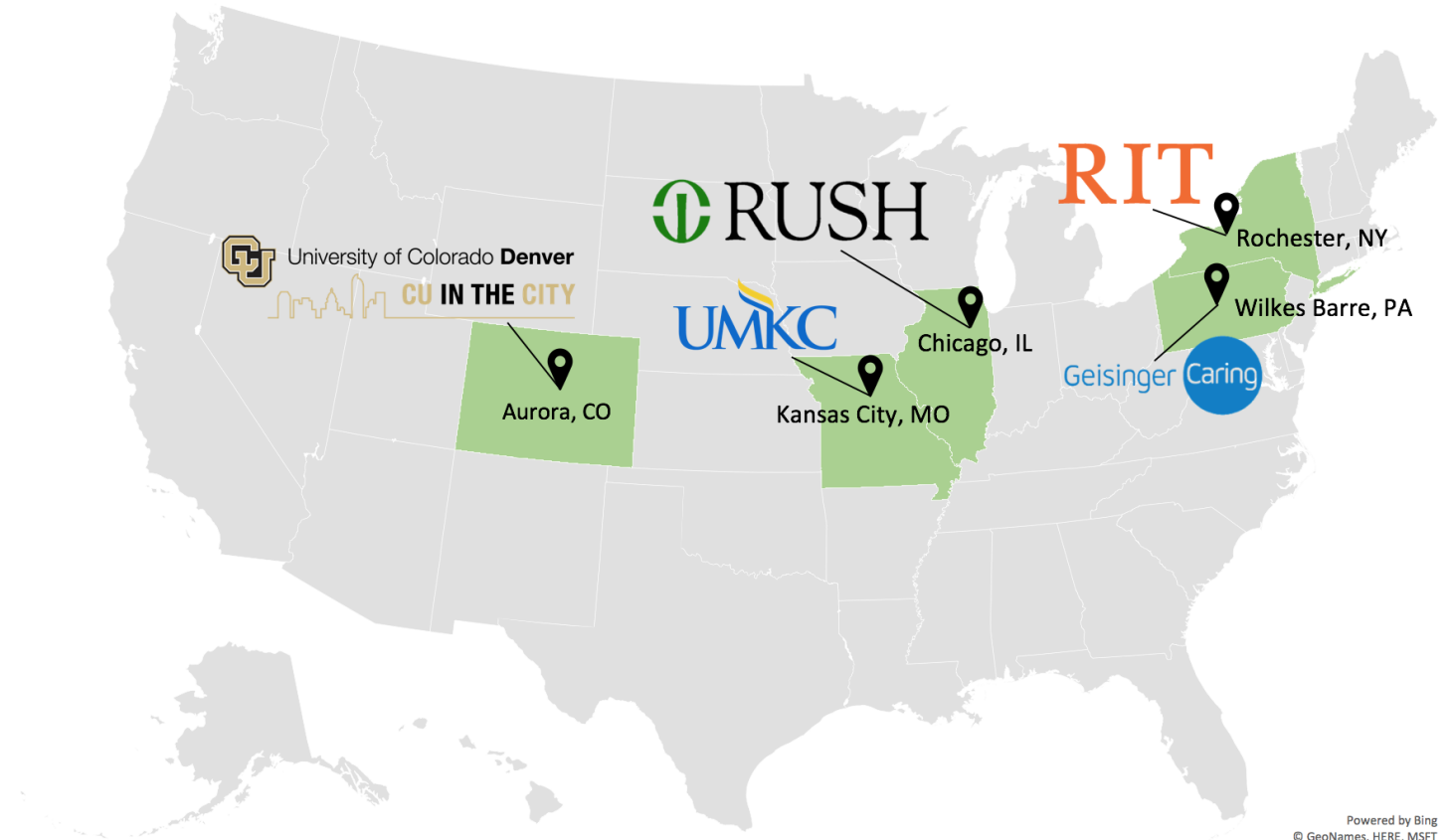
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- 70% self-report as White; 11% Hispanic; 20% Black
- 61% college or post-graduate degree
- \$86,000 median annual income (\$11,000-\$300,000)
- 9% report difficulty paying for basics
- 17% marginal/low food security; 5% low/very low food security
- Age 57.0 ± 11.0 y (range 27 -84 y)
- 3.6 ± 2.4 servings of fruits and vegetables daily (0 -18 servings)
- 47% were Eating Competent (ecSI 2.0 ≥ 32)
- ecSI 2.0TM mean 30.7 ± 7.2 (10 -47)

PARTICIPANTS HAD METABOLIC SYNDROME

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HgA1c 5.8 ± 0.3 (5 – 7)

EATING COMPETENCE & METABOLIC SYNDROME

Factor	Eating Competent (n=62)	Not Eating Competent (n=70)	P
BMI	35.4 ± 5.4	38.2 ± 8.9	0.037
Waist Circumference (cm)	Differences were not significant		
Triglycerides (mg/dL)			
Total cholesterol (mg/dL)			
HDL-C (mg/dL)			
Fasting glucose (g/dL)			
Hgb A1c			
Systolic BP	Differences were not significant		
Diastolic BP			

EATING COMPETENCE & BIOPSYCHOSOCIAL ITEMS

Factor	Eating Competent (n=62)	Not Eating Competent (n=70)	P
PHQ-Depression	1.6 ± 2.0	2.5 ± 2.5	0.035
SF-36 Vitality Scale	63.6 ± 18.0	55.0 ± 19.8	0.01
SF-36 Mental Health Scale	84.2 ± 8.7	78.4 ± 12.3	0.002
Perceived Stress Scale	17.0 ± 5.8	19.9 ± 6.6	0.007
Age	59.2 ± 10.5	55.1 ± 11.1	0.03
Food Security (High/Marginal vs Low/Very Low)	NS		
Annual income			
Education (< college vs ≥4y)			
Race (White vs non-White)			
Sex (M vs F)			

ADDITIONAL INFORMATION

- Recall that stress levels were higher in persons not EC
- Perceived stress categories: low (0-13), moderate (14-26), and high (27-40).
- ecSI 2.0TM scores were significantly higher with less stress (p=0.001)
 - Low stress (n=28) (34.6 ± 6.4)
 - Moderate stress (n=89) (30.1 ± 6.8)
 - High stress (n=15) (26.7 ± 7.9)
- Recall that BMI was higher in persons not EC.
 - When controlling for BMI, differences between EC and not EC in Mental Health, Vitality, and Stress remained significant; but reached trend level (P=.066) for Depression

CONCLUSION-NEXT STEPS

Bio-psychosocial relationships with eating competence in general, healthy samples were affirmed as also present in persons with confirmed metabolic syndrome.

This finding gives rise to other questions over the course of the ELM study . . .

1. Will any change in EC parallel changes in other biomedical indicators?
2. Is there a threshold in some measures required for eating competence change to be observed?
3. Will EC status predict response to the assigned treatment?
4. Will the relationships remain when considering specific MetS diagnostic criteria?

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