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# Acceptability, Perceived Benefits, and Unintended Consequences of a Virtual Nutrition Intervention for Adolescents with Autism Spectrum Disorder

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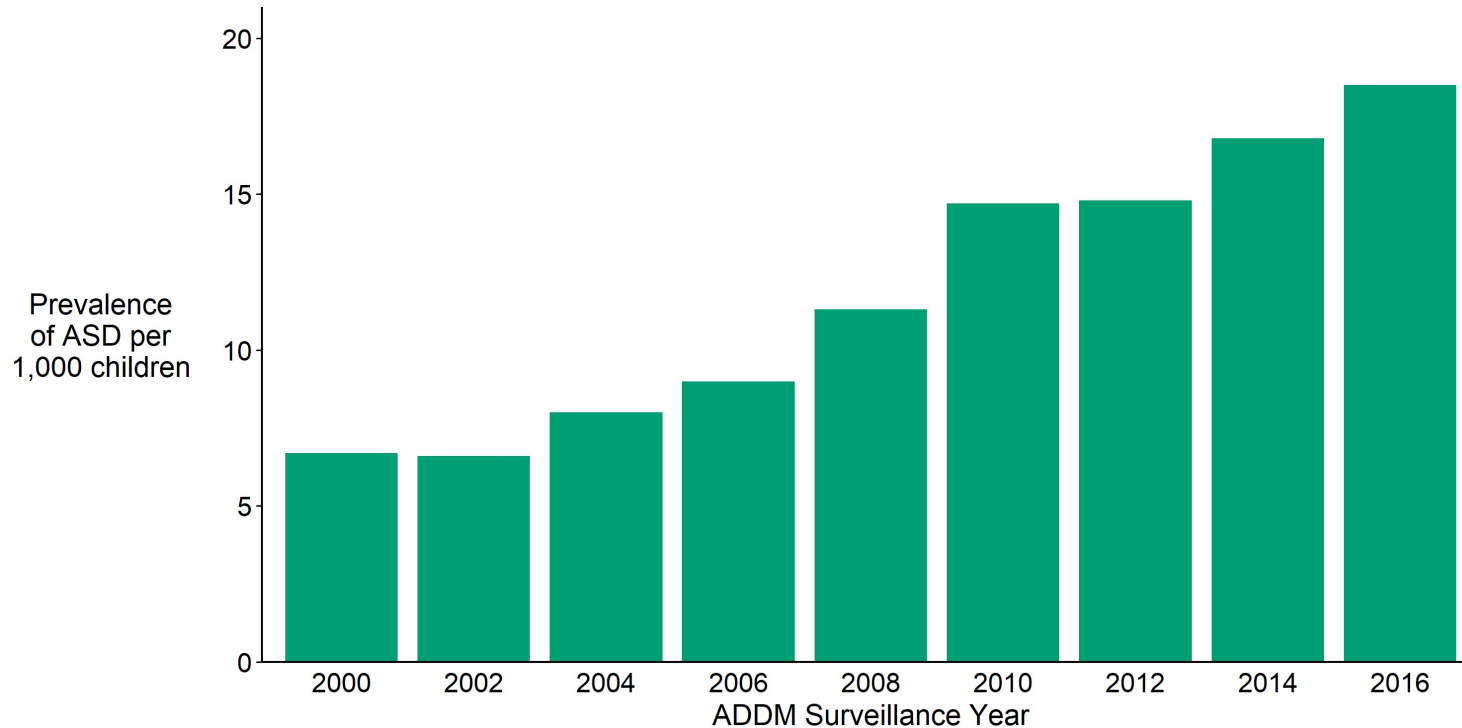
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# Autism Spectrum Disorder (ASD)<sup>1</sup>





# Unhealthy Weight Gain in Youth with ASD

- **22.2%** prevalence of obesity in youth with ASD<sup>1</sup>
- **41.1%** greater risk of developing obesity compared to typically developing youth<sup>1</sup>

# Behavioral and Environmental Risk Factors for Obesity in Youth with ASD



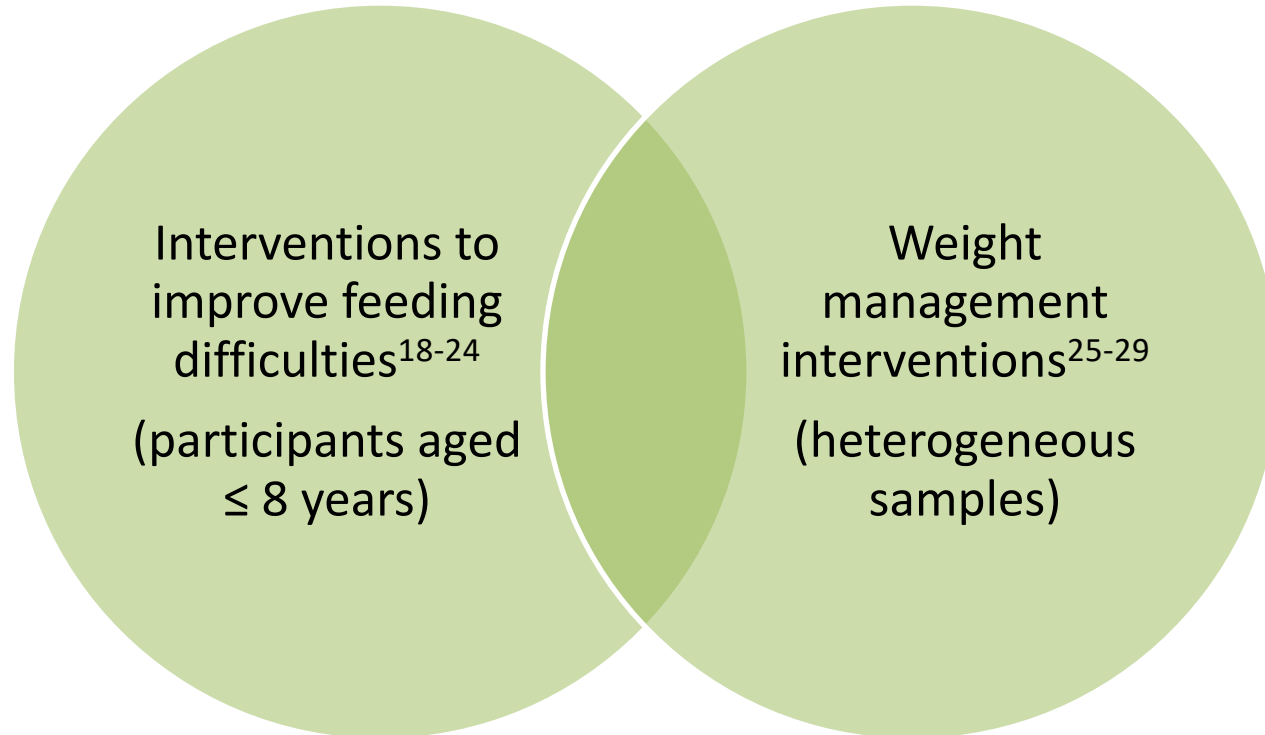
- Unhealthy eating behaviors<sup>2-3</sup>
- Physical activity and screen time<sup>4</sup>
- Sleep disturbances<sup>5</sup>
- Social and behavioral impairments<sup>6</sup>
- Environmental challenges<sup>7-8</sup>

# Health Outcomes of Obesity in Youth with ASD

- Nutrient deficiencies<sup>9-10</sup>
- Poor oral and bone health<sup>11-13</sup>
- Altered gut microbiome<sup>14-15</sup>
- Chronic disease<sup>16-17</sup>



# Nutrition Interventions for Youth with ASD



# Online Nutrition Interventions

- Show promise for improving nutrition knowledge, attitudes, and behaviors in typically developing youth<sup>30-31</sup>



# Objective

- To examine the **acceptability, perceived benefits, and unintended consequences** of a virtual implementation of BALANCE (Bringing Adolescent Learners with Autism Nutrition and Culinary Education), an 8-week theory-driven nutrition intervention for adolescents with ASD

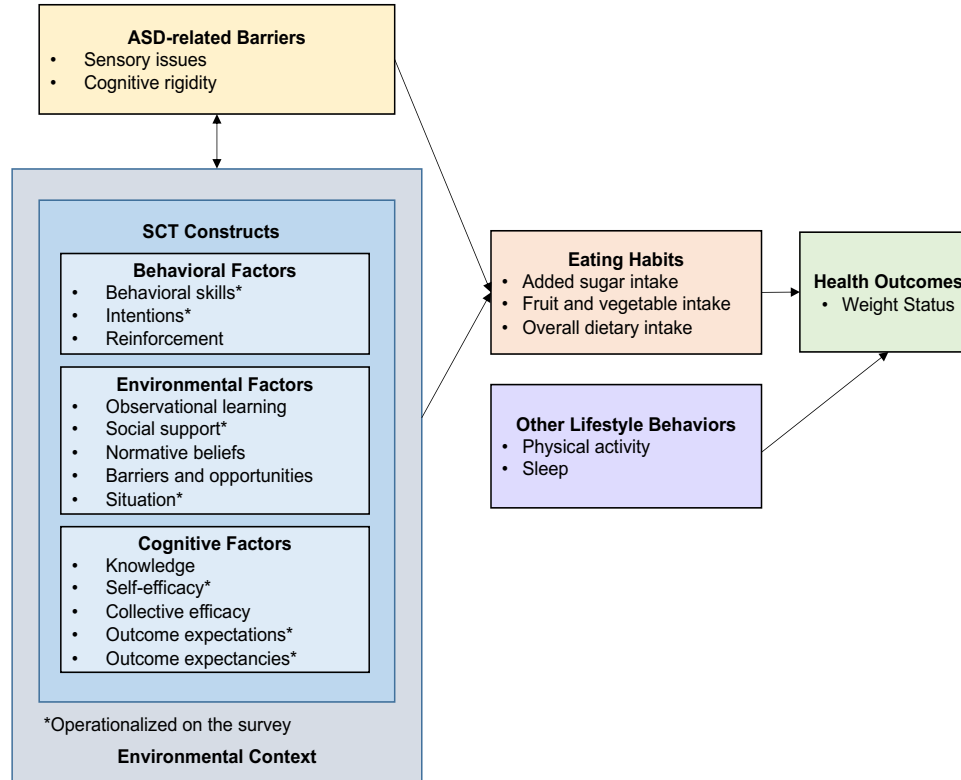
# Intervention

- 8 weekly 45-minute lessons
  - Brief homework assignments
- Weekly parent email handouts
- Three parent webinars





# Theoretical Framework<sup>32</sup>



# Lesson Topics

1. Exploring Taste, Flavor, and Texture
2. Mealtimes and Rules
3. Food Groups and Nutrients
4. Moderation
5. Beverages
6. Cooking
7. Well-being
8. Sustaining Healthy Eating Habits

## LESSON 1: EXPLORING TASTE, FLAVOR, AND TEXTURE

### Aim

Explore the role of taste, flavor, and texture in food preferences.

### Objectives

- Discuss taste, flavor, and texture preferences.
- Demonstrate willingness to explore a new taste, flavor, or texture.
- Plan to overcome barriers to exploring a different taste, flavor, or texture.

### Overview

This lesson begins with a discussion of taste, flavor, and texture. Next, students will participate in an activity to assess preferences. The class will share foods and describe their tastes and textures, and students will be asked to identify flavors or textures that they like and do not like. Students will be asked to identify barriers to trying new flavors and textures. Finally, the class will come up with ideas to overcome barriers to trying these new foods.

### Preparation

1. Open the lesson booklet PDF so that you can share it with others during the lesson.
2. Gather materials: notebook or paper, markers, 1-2 example foods to discuss different tastes and textures (e.g. berries, crackers, nuts, carrots), a bowl or plate, and napkins or paper towels.

### Procedure (45 min)

#### Introduction (5 min)

Ask everyone to practice using the "raise hand," "mute," and "unmute" features in Microsoft Teams while you are waiting for everyone to join the session. Once everyone has joined, ask everyone to introduce themselves. As an ice breaker, ask each student what their favorite food is. Have the class list examples of flavors and textures and come up with example foods for each one. Share the lesson booklet page 3 and read some keywords for visual and verbal prompts.

#### Sharing foods (30 min)

Ask how many student set up their tasting session. Tell students that we will let each person share and taste the food they prepared. Start by sharing the food that you brought and describe its taste and texture. Show the foods and describe their taste or texture. Ask the students to share the food they brought, referring to lesson booklet page 3 if anyone needs help thinking of words to describe taste or texture. Ask students if they like the foods that are being shared.



## LESSON 6: COOKING TOGETHER

### Goal

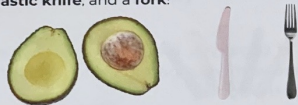
Practice preparing a healthy meal and plan to help prepare food at home.

### What we will do

- Discuss current practices for preparing food in the home.
- Practice making a healthy snack.
- Conduct a tasting session.

### Preparation

1. In Lesson 6, we will practice making guacamole. Guacamole is an avocado-based dip often eaten with chips. Make sure you have an **avocado**, a **plastic knife**, and a **fork**:



2. Gather any other recipe **ingredients** that you have at home: **lime**, **salt**, **diced tomato**, **diced onion**, a **spoon**, and **tortilla chips**. You may ask your parent or a family member to help you with this preparation. It's okay if you don't have all of the items. We're just going to practice making the recipe.



3. Prepare your area with your **guacamole ingredients** and **computer**. Have **page 28** and **page 29** of this booklet ready. It's okay if you could not find avocado or any other ingredients. It's always good to have all the ingredients for a recipe, but even if you did not have time or forgot to prepare, you can still join the lesson and learn about various ingredients and how to make guacamole!



## SINGLE-SERVING GUACAMOLE

NAME \_\_\_\_\_

DATE \_\_\_\_\_

### Ingredients:

- 1 avocado
- 1 spoonful of diced red onion
- 1 spoonful of diced tomato
- 1 squeeze of lime juice
- Pinch of salt

### Materials:

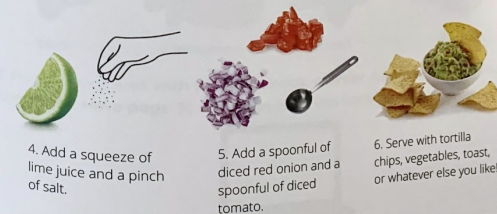
- Child-safe knife
- Food safety gloves
- Fork
- Tablespoon
- Bowl



1. Wearing gloves, cut the avocado in half and remove the pit.

2. Cut the avocado into small chunks.

3. Mash the avocado with a fork until it is smooth.



4. Add a squeeze of lime juice and a pinch of salt.

5. Add a spoonful of diced red onion and a spoonful of diced tomato.

6. Serve with tortilla chips, vegetables, toast, or whatever else you like!



# Study Design and Setting



- Adolescent focus groups
- Parent interviews
- Virtual via Microsoft Teams

# Sample and Recruitment

- Recruited through a local community partner
- 27 adolescents aged 12-20 years completed the 8-week intervention
  - **21 parents** participated in an interview
  - **12 adolescents** participated in a focus group (6 groups with 1-5 per group)



# Analysis

- Audio-recorded and transcribed
- Analyzed for *a priori* and emergent themes regarding intervention acceptability (likes, dislikes, satisfaction, and suggestions for improvement), perceived benefits, and unintended consequences



# Acceptability

- Virtual format
- Group setting
- Autonomy/independence
- Sensory components
- Interaction
- Reinforcement (SCT)
- Parent component



# Virtual Format

“I think I participated because it was online...we have so many therapies and so many things going on that it's not that nutrition is not a priority but in the list of the things that you need to do, that you got to have a behavior analyst, you got to have the neurologist, the psychiatrist, the occupation therapist, the physical therapy. **So, nutrition... you balance that, you say, 'That can wait. That can wait.'**” – Parent of a 12-year-old male

“It's good since **I'm used to it** with my other group.”  
– 18-year-old male

“You can do a 45-minute session. **It's really only 45 minutes.** It's not an hour and a half.” – Parent of a 15-year-old male

# Autonomy/Independence

"I feel like [he] was really happy. At that time, I have classes scheduled at the same time, and I cannot be with him or prompting him to join all the time. **He was in his own accord joining.**" – Parent of a 16-year-old male

# Sensory Components

“The avocado, **guacamole**, he was so proud of himself when he was done making it. And he loved that, so that was something I had not expected him to be that excited about.”  
– Parent of a 14-year-old male

“I love the **book**. It’s colorful. It’s easy to read. It’s perfect. The descriptions are good.”  
– 12-year-old male

“The only thing that would have been better would have been...taking the pages out and cutting them up into little **cards**. That would be a very nice, you know, tactile, visual reinforcer for him.” – Parent of a 16-year-old male

# Parent Component

“I did look at them all, and I thought they were beneficial because since [he] was taking the iPad out of the room, I wasn’t participating in the class, except for the one time when I helped with food. But I think those were good because it gave us **an update on what was covered** and everything.” –  
Parent of a 12-year-old male

“A little bit more **asynchronous** as opposed to live will probably be helpful. It will at least allow me to budget my time and be there at whatever time I can jump into it.” - Parent of a 17-year-old female

# Perceived Benefits

- Diet changes
- Knowledge/awareness (SCT)
- Behavioral strategies (SCT)
- Self-efficacy (SCT)
- Outcome expectations (SCT)
- Outcome expectancies (SCT)
- Healthy weight
- Other lifestyle changes

# Diet Changes: Self-Regulation

**Instead of reaching for the four slices of pizza, he's only reaching for two**, so that's a pretty drastic change for him... If he drinks a sugary drink, he won't ask for dessert later in the day, which is really like a big thing for him because usually he's like – because we don't really do a lot of – it's all water here, but every now and then, we'll go to the store, and he'll want one of those Arizona Mango cans... **if he drinks that, he won't ask for a dessert or cookie...** he's like, “No, I had my tea today.” – Parent of a 13-year-old male

“I've been eating less. **I was eating a whole lot more before joining this.**”  
– 18-year-old male

## Diet Changes: Trying New Foods

“He seems like to eat two apples a day or sometimes even more. He didn’t like the texture before, but now, I don’t know what happened. It seems like he doesn’t mind to eat apples. Just about four weeks ago. And every day he eats [apples], so **I have to keep buying a lot of apples.**” – Parent of a 17-year-old male

**“I tried different things. I**  
tried to make this pasta  
salad.” – 19-year-old male



# Knowledge/Awareness

“He’s more **aware**. At least he comes out and make some popcorn or takes a little bit of fruit. He is more receptive to the timing when I said, **‘It's time to eat.’** He’s more aware now that he has to eat, **while he eats, not doing something else** and going around here to sit with us and eat, and we’re trying to make it the family kind of situation, putting the **social component** and enjoying of the meal.” – Parent of a 16-year-old male

“It gave me some big brain knowledge about certain foods. **Big brain knowledge.**” – An 18-year-old male

# Unintended Consequences

- Anxiety/Discomfort

# Anxiety/Discomfort

“Just when he was frustrated and he didn’t want to participate. It seemed like in the beginning, he was like really gung-ho, but then towards the end and maybe say like the last four lessons, he was just, he’d had a lot of like SIB [self-injurious behaviors] where he would kind of like **pull his hair or the normal things that we would see during schoolwork.**”

– Parent of a 13-year-old male

“Is it okay if I leave early? I’m just not into it today...**I just feel too stressed today.**” –  
12-year-old male

# Context

- Diet history
- Food environment
- Family support
- Changes due to COVID-19
- Motivation for participating

# Diet History

“[He] has found a very **limited** list of foods that he will reliably eat and feel like he’s getting something good to eat, and I allow him to continue to have that limited diet because it’s easier for me.” – Parent of a 16-year-old male

“If we get takeout... [he] wants nothing to do with it. He goes in a different room. **He doesn’t want to smell it.** He doesn’t want to see it.” – Parent of a 12-year-old male

“I will make sure like he has his pizza. **He likes it chopped into 16 pieces**, and then we will place it on the table for him, make sure he’s got a fork and a napkin, and if he asks to have a drink, he’s got to get his own drink”. – Parent of a 16-year-old male

# Food Environment

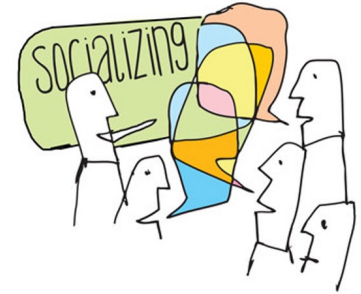
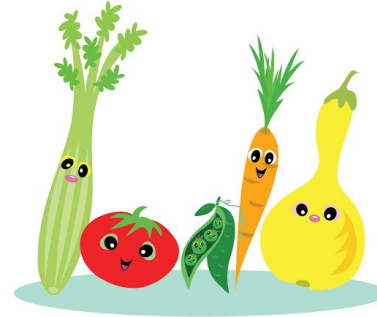
“I have all the snacky stuff locked in my closet, so **there’s nothing out for him to get.**” – Parent of an 18-year-old male

“We order very often. When I work, I work 24 hours, so I’m not here for an entire day, so especially then it’s **super easy** for my husband to just order pizza, you know what I mean?” – Parent of an 18-year-old male

“He does love fruit. He will eat three apples a day if we let him, but then **apples get expensive** when you’re eating three a day, so he gets in trouble for eating all the apples.”  
– Parent of a 16-year-old male

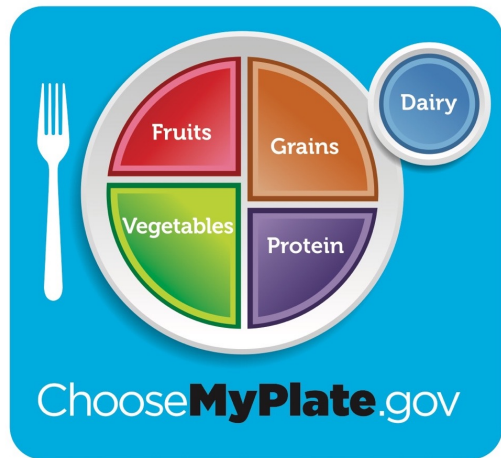
# Summary of Results

- The virtual implementation was acceptable to adolescents and parents
- Several psychosocial and behavioral benefits
- Anxiety/discomfort was an unintended consequence
- Emergent findings on the impact of the COVID-19 pandemic





# Suggestions for Improvement



- Age-appropriate strategies
- More visual reinforcers
- Improved parent component

# Conclusions

- The virtual implementation was acceptable according to adolescents and their parents
- Many adolescents with ASD may benefit from small group interventions
- Virtual settings may be especially advantageous for nutrition interventions for this population due to competing priorities



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# *Montana Offers Innovative Virtual School Nutrition Leadership Institute During COVID-19*

Sunday August 8<sup>th</sup>, 2021

2021 Society for Nutrition Education and Behavior Annual Conference

*#SNEB2021: Raising Reliance and Resilience*

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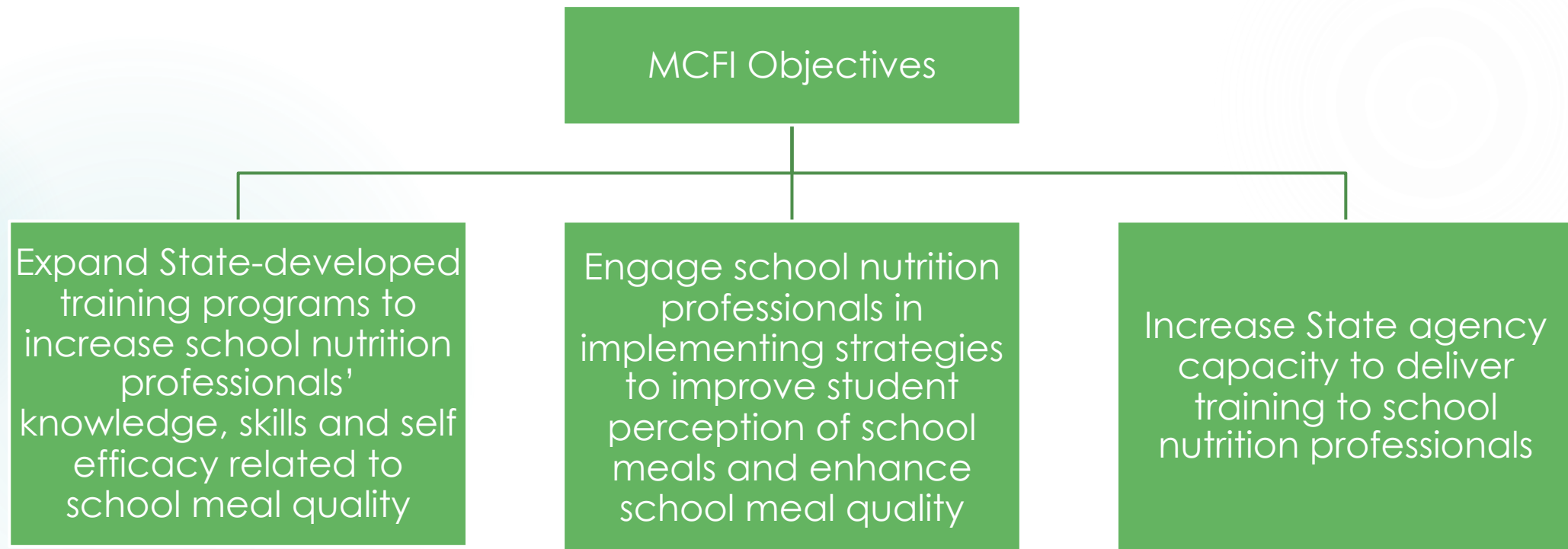
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#SNEB2021: Raising Reliance and Resilience

# Montana Cook Fresh Initiative (MCFI)

A year long, comprehensive training program designed to support Montana school districts in serving **fresh, nutritious meals designed to meet student/cultural preferences and include scratch cooked recipes made with Montana, regional, and USDA foods.**





# Montana Cook Fresh Leadership Institute

- ▶ School nutrition program management
  - USDA Child Nutrition program meal patterns, offer vs. serve and record keeping
  - Procurement and USDA Foods
- ▶ Essential culinary skills
  - Mise en place, knife skills and production planning
  - Soups, salads, and side dishes
  - Whole grain baking from scratch
  - Seasonings, spices and more
- ▶ Peer mentorship and networking
- ▶ Farm to school and Harvest of the Month
- ▶ Behavioral economics and smarter lunchrooms
- ▶ Local school wellness policy
- ▶ And more



**Montana Cook Fresh**  
LEADERSHIP INSTITUTE



*#SNEB2021: Raising Reliance and Resilience*

# “Unprecedented Times”

In March 2020, the COVID-19 pandemic resulted in school closures and travel restrictions in Montana and across the country.

## GOVERNOR BULLOCK DIRECTS THE CLOSURE OF PUBLIC K-12 SCHOOLS FOR TWO WEEKS; STRONGLY RECOMMENDS SOCIAL DISTANCING MEASURES TO SLOW THE SPREAD OF COVID-19

Sunday, March 15, 2020 / Categories: [Former Governors](#), [Montana.gov](#) / Tags:

Governor Steve Bullock today announced a set of directives and guidance to slow the spread of COVID-19 and protect vulnerable Montanans, including closing of public K-12 schools, social distancing measures, and limiting visitation at nursing home facilities.

 Food and Nutrition Service  
U.S. DEPARTMENT OF AGRICULTURE

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## COVID-19 Nationwide Waiver to Allow Meal Pattern Flexibility in the Child Nutrition Programs

*#SNEB2021: Raising Reliance and Resilience*



# Going Virtual: 2020 Montana Cook Fresh Leadership Institute

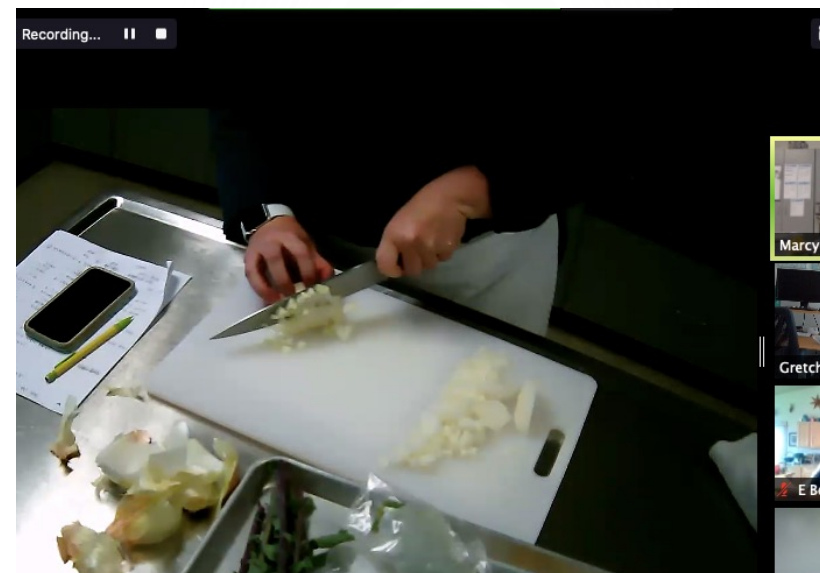
- ▶ Held over 10 days, with 3 hours per day (30 hours total)
- ▶ Live classes on Zoom and independent assignments via online learning management system
- ▶ Additional curriculum on emergency preparedness and alternative meal service



Thai grain bowl, (Legumes and Whole Grains Lesson) and whole grain biscuit (Whole Grain Baking Lesson)



Scratch cooked chicken tortilla soup (Soups, Salads, and Side Dishes Lesson)

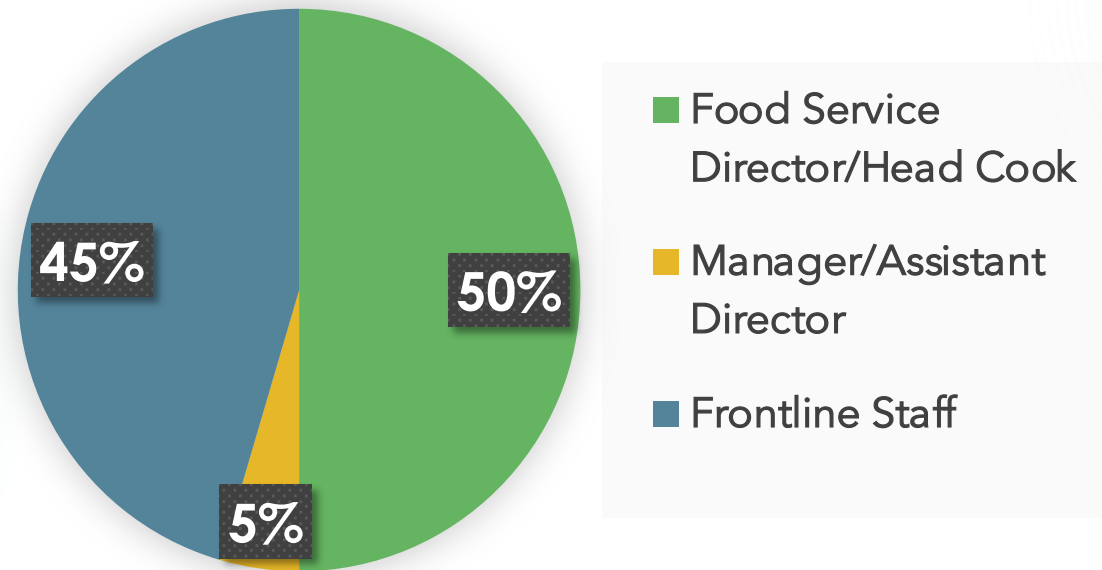


Knife Skills Lesson

*#SNEB2021: Raising Reliance and Resilience*

# Participant Breakdown

- ▶ 22 school food service professionals from 9 school districts
- ▶ 8 of 9 school districts were considered rural
- ▶ 1 SFA on Native American Reservation



# Evaluation Outcomes

From pre to post, participants reported promising increases in their comfort level and confidence in the following topics:

- Developing an emergency preparedness plan: **+26.50%\***
- Accurately completing a daily production record: **+23.31%\***
- Using herbs and spices in a recipe: **+20.48%\***
- Farm to school and Harvest of the Month: **+16.98%**

**\* $p < 0.5$**



Flavors and Seasonings Lesson and roasted vegetable demonstration



# Evaluation Outcomes



Fresh kale salad

Participants also reported an increased likelihood of performing the following behaviors during the next school year:

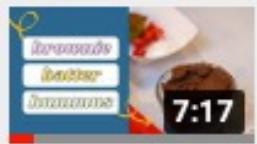
- Participate in remote professional development activities: **+16.40%**
- Use a new recipe that includes fresh or dried legumes: **+13.71%**

**100% of participants agreed or strongly agreed with the post Institute evaluation statements:**

***"I feel more confident in my ability to participate in remote or distance professional development in the future."***

***"I increased my knowledge and skills on school nutrition rules and regulations."***

# Conclusion and Future Directions



## How to: Brownie Batter Hummus

MT Team Nutrition



## How to: Overnight Black Forest Oats

MT Team Nutrition



## How to: Citrus Whole Grain Breakfast Bowl

MT Team Nutrition



## How to: Roasted Chickpeas

MT Team Nutrition



## How to: Zesty Oat, Corn and Bean Salad

MT Team Nutrition



## How to: Falafel

MT Team Nutrition

- ▶ The COVID19 pandemic amplified a pre-existing need for distance learning for school nutrition professionals in a large, rural state.
- ▶ The pre and post survey results for this training indicates that a virtual institute can achieve positive learning outcomes.
- ▶ Montana Team Nutrition looks forward to continuing to implement virtual learning strategies in future professional development activities.

Culinary videos made for the Institute can be found on the Montana Team Nutrition Youtube Channel

*#SNEB2021: Raising Reliance and Resilience*

# Acknowledgments

Thank you to the participating school districts and partners that made this Institute possible. School nutrition professionals in Montana and across the country worked tirelessly throughout this pandemic, often working under incredible stress and risk, to ensure children received nutritious and dependable meals. The impact that you have on our communities is immeasurable.

Thank you to Katie Bark, Dr. Carmen Byker Shanks, Molly Stenberg, Aubree Roth, Tracee Hume, Ginger Buchanan, Caroline Olson, Deb Jones, Pam Fruh, Cindy Giese, Marcy Gaston, Sally Donch, Danielle Anderson, Montana State University Academic Technology and Outreach Office, Montana State University Department of Health and Human Development, Montana Office of Public Instruction School Nutrition Programs, Montana No Kid Hungry, and USDA Team Nutrition for making this project possible.

# Affiliations and Funding

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*#SNEB2021: Raising Reliance and Resilience*



# Thank you!



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Learn more about Montana Team Nutrition:

<https://www.montana.edu/teamnutrition/>



*#SNEB2021: Raising Reliance and Resilience*





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# Preliminary Efficacy of a Virtual Nutrition Intervention for Adolescents with Autism Spectrum Disorder

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## Professional Affiliations

USF College of Public Health

# Acknowledgments

## Committee Members

- Heewon Gray, PhD, RDN
- Russell Kirby, PhD
- Jennifer Marshall, PhD
- Jamie Holloway, PT, DPT, PhD

- CARD-USF
- USF College of Public Health
- Research participants

## Research Assistants

- Mikaela Strange
- Tiantian Pang, MPH
- Syed Hasan
- LaShae Rolle



# Preliminary Studies

- Needs for a healthy eating intervention
- Feasibility and acceptability of BALANCE in a school setting



# Findings from the School-Based Feasibility Study

**Tastes, Flavors, and Textures**

Next to each food, please record your reaction (examples: good, bad, @, @)

it's Good but taste like Peanut butter  
I'm allergic to them  
I love them  
there yammi  
yummi not bad  
not good!

**What did you eat yesterday?**

Time	Food	Amount
6:30 Am	cereal	bowl
9:00 Am	zebra cake	fist size
11:30 Am	lunchable apple chips	fist size bag
1:30 pm	Popcorn	bag
2:00 pm	Pizza	box
	Ice cream	fist size

USF HEALTH

Feeding Autism

- Sensory components
- Perceived benefits
  - Knowledge, self-efficacy, and outcome expectations
  - Eating habits



## Objective

- To examine the preliminary efficacy of BALANCE, measured by differences in pre-/post-intervention means for psychosocial determinants of dietary intake, fruit and vegetable intake, added sugar intake, and BMI z-score.

# Study Design, Sample, and Setting

- One-group pretest-posttest design
- 27 adolescents aged 12-20 years participated in the 8-week intervention via Microsoft Teams





# Intervention

- 8 weekly 45-minute lessons
  - Brief homework assignments
- Weekly parent email handouts
- Three parent webinars





# Lesson Topics

1. Exploring Taste, Flavor, and Texture
2. Mealtimes and Rules
3. Food Groups and Nutrients
4. Moderation
5. Beverages
6. Cooking
7. Well-being
8. Sustaining Healthy Eating Habits

## LESSON 1: EXPLORING TASTE, FLAVOR, AND TEXTURE

### Aim

Explore the role of taste, flavor, and texture in food preferences.

### Objectives

- Discuss taste, flavor, and texture preferences.
- Demonstrate willingness to explore a new taste, flavor, or texture.
- Plan to overcome barriers to exploring a different taste, flavor, or texture.

### Overview

This lesson begins with a discussion of taste, flavor, and texture. Next, students will participate in an activity to assess preferences. The class will share foods and describe their tastes and textures, and students will be asked to identify flavors or textures that they like and do not like. Students will be asked to identify barriers to trying new flavors and textures. Finally, the class will come up with ideas to overcome barriers to trying these new foods.

### Preparation

1. Open the lesson booklet PDF so that you can share it with others during the lesson.
2. Gather materials: notebook or paper, markers, 1-2 example foods to discuss different tastes and textures (e.g. berries, crackers, nuts, carrots), a bowl or plate, and napkins or paper towels.

### Procedure (45 min)

#### Introduction (5 min)

Ask everyone to practice using the "raise hand," "mute," and "unmute" features in Microsoft Teams while you are waiting for everyone to join the session. Once everyone has joined, ask everyone to introduce themselves. As an ice breaker, ask each student what their favorite food is. Have the class list examples of flavors and textures and come up with example foods for each one. Share the lesson booklet page 3 and read some keywords for visual and verbal prompts.

#### Sharing foods (30 min)

Ask how many student set up their tasting session. Tell students that we will let each person share and taste the food they prepared. Start by sharing the food that you brought and describe its taste and texture. Show the foods and describe their taste or texture. Ask the students to share the food they brought, referring to lesson booklet page 3 if anyone needs help thinking of words to describe taste or texture. Ask students if they like the foods that are being shared.



- Psychosocial determinants
  - Social cognitive theory-based survey
- Dietary intake
  - Block Kids Food Frequency Questionnaire
- Height and weight
  - Ruler and scale (virtual instruction)

[WELCOME](#)
[ABOUT YOU](#)
[WINNING](#)
[DRINKS](#)
[FRUIT](#)
[BREAKFAST](#)
[VEGETABLES/PASTA](#)
[MEATS](#)
[SNACKS/DESSERTS](#)
[BREADS/SPREADS](#)
[ACTIVITIES](#)
[YOUR RESULTS](#)

[Done](#)
[Reviewing](#)

Milk (not chocolate). (Don't count milk on cereal)

✓ **How many days last week** did you drink milk (not chocolate)? [More info](#)

None	<b>1 Day</b>	2 Days	3-4 Days	5-6 Days	Every Day
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✓ **How many glasses or cartons** each day?

1/2	<b>One</b>	Two	Three
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✓ **When you drink glasses of milk, what kind** did you usually drink? [More info](#)

Whole milk	<b>Reduced-fat (2%) milk</b>	Low-fat (1%) milk	Non-fat milk	Lactaid milk	Soy milk	Rice milk	Don't know
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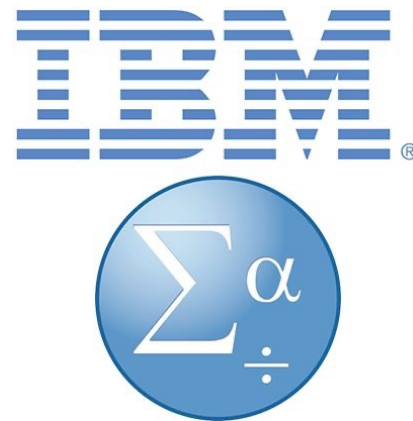
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In the past THREE MONTHS...

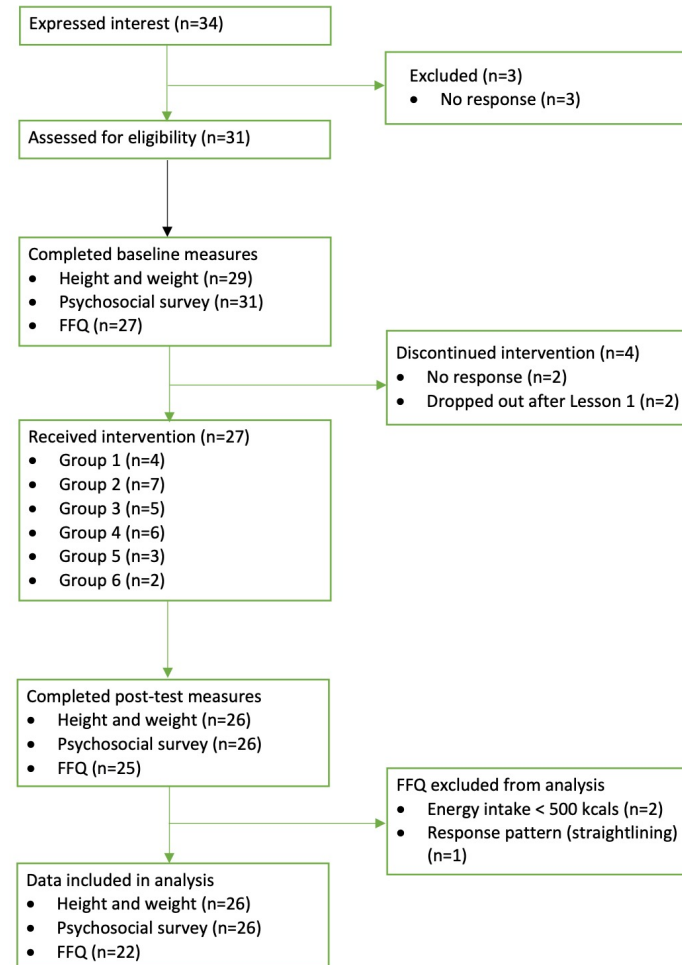
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# Analysis

- Descriptive statistics
- Wilcoxon signed-ranked tests
- McNemar's test



# Flow of the Study



## Participants (n=27)

- Aged **12-20 years** (mean 15 years)
- 74.1% male
- 63% White, 15% Hispanic or Latino, 11% Multiracial, 7% Black or African American, 4% Asian
- **44%** were homeschooled
- Most common comorbidity: **ADHD** (78%)
- Nearly half (48%) had household income  $\geq$  \$75,000
- 96% of participants had **high social communication skills** (mean > 2 out of 4)

Lessons Attended Per Student

Group	Mean	Min	Max
Group 1	6.8	6	7
Group 2	6.9	4	8
Group 3	6.8	5	8
Group 4	7.4	6	8
Group 5	7	5	8
Group 6	7.5	7	8
Total	7.1	4	8

# Psychosocial Determinants

Characteristic (Values)	Number of Questions	N	Baseline Mean (SD)	Post-intervention Mean (SD)	p-value
<b>Behavioral strategies<sup>a</sup> (1-5)</b>	<b>6</b>	<b>26</b>	<b>2.7 (0.5)</b>	<b>3.1 (0.6)</b>	<b>0.010*</b>
Situation <sup>b</sup> (1-6)	4	26	5.3 (0.8)	5.4 (0.7)	0.407
Social support <sup>a</sup> (1-5)	5	26	4.1 (0.7)	3.9 (0.7)	0.372
<b>Self-efficacy<sup>b</sup> (1-6)</b>	<b>7</b>	<b>26</b>	<b>3.3 (1.0)</b>	<b>4.0 (0.9)</b>	<b>0.001***</b>
<b>Outcome expectations<sup>b</sup> (1-6)</b>	<b>5</b>	<b>25</b>	<b>4.9 (0.8)</b>	<b>5.4 (0.8)</b>	<b>0.009**</b>
Outcome expectancies <sup>b</sup> (1-6)	5	26	3.3 (0.5)	3.3 (0.5)	0.935
Intentions <sup>c</sup> (1-4)	5	26	2.6 (0.8)	3.0 (0.7)	0.077

<sup>a</sup>Response options: Never, Rarely, Sometimes, Often, Always; <sup>b</sup>Response options: Strongly disagree, Disagree, Disagree slightly, Agree slightly, Agree, Strongly agree; <sup>c</sup>Response options: Not at all true of me, Not very true of me, Somewhat true of me, Very true of me

# Dietary Intake

Characteristic	N	Baseline Mean (SD)	Post-intervention Mean (SD)	p-value
Energy (kcal)	22	1740.9 (629.5)	1481.4 (408.2)	0.022*
Added sugar (tsp equivalents)	22	11.4 (5.2)	9.2 (5.2)	0.026*
Total fruit (cups)	22	1.8 (1.6)	1.6 (1.4)	0.211
Total vegetables (cups)	22	1.1 (0.6)	1.0 (0.5)	0.615

# Anthropometric Measures

Characteristic	N	Baseline Mean (SD)	Post-intervention Mean (SD)	p-value
BMI	26	22.2 (5.3)	21.8 (5.1)	0.061
<b>BMI percentile</b>	<b>25</b>	<b>54.8 (34.2)</b>	<b>52.1 (34.2)</b>	<b>0.013*</b>
<b>BMI z-score</b>	<b>25</b>	<b>0.3 (1.3)</b>	<b>0.2 (1.3)</b>	<b>0.010*</b>
		Prevalence n (%)	Prevalence n (%)	p-value
Obesity	26	5 (19.2)	4 (15.4)	0.500



## Summary of Results

- The findings suggest that BALANCE may improve some psychosocial determinants of dietary intake immediately after the 8-week intervention
- The results are also promising regarding dietary intake and BMI z-score

## Limitations

- Generalizability
- No follow-up
- Self-report bias
- Recall bias

## Strengths

- Theory-based
- Novel intervention
- Preliminary research
- Virtual setting

## Next Steps

- Future research should examine efficacy of the intervention compared to a control group and include follow-up measures to detect long-term outcomes of the intervention



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