Feasibility and Acceptability of BALANCE (Bringing Adolescent Learners with Autism Nutrition and Culinary Education)

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Autism Spectrum Disorder (ASD)\(^1\)

Estimated Autism Prevalence 2020

*Centers for Disease Control and Prevention (CDC) prevalence estimates are for 4 years prior to the report date (e.g., 2020 figures are from 2016)*
Unhealthy Weight Gain

• **22.2%** prevalence of obesity in youth with ASD\(^2\)

• **41.1%** greater risk of developing obesity compared to typically developing youth\(^2\)
Behavioral and Environmental Risk Factors for Obesity in Youth with ASD

- Unhealthy eating behaviors$^{3-4}$
- Physical activity and screen time$^5$
- Sleep disturbances$^6$
- Social and behavioral impairments$^7$
- Environmental challenges$^{8-9}$
Health Outcomes of Obesity in Youth with ASD

- Nutrient deficiencies\(^{10-11}\)
- Poor oral and bone health\(^{12-14}\)
- Altered gut microbiome\(^{15-16}\)
- Chronic disease\(^{17-18}\)
Nutrition Interventions for Youth with ASD

Interventions to improve feeding difficulties\textsuperscript{19-25} (participants aged \leq 8 years)

Weight management interventions\textsuperscript{26-30} (heterogeneous samples)
Study Purpose

To examine the feasibility and acceptability of BALANCE (Bringing Adolescent Learners with Autism Nutrition and Culinary Education) in adolescents with ASD in a school setting
Theoretical Framework

ASD-related Barriers
- Sensory issues
- Cognitive rigidity

SCT Constructs
- Behavioral Factors
  - Behavioral skills*
  - Intentions*
  - Reinforcement
- Environmental Factors
  - Observational learning
  - Social support*
  - Normative beliefs
  - Barriers and opportunities
  - Situation*
- Cognitive Factors
  - Knowledge
  - Self-efficacy*
  - Collective efficacy
  - Outcome expectations*
  - Outcome expectancies*

*Operationalized on the survey

Eating Habits
- Added sugar intake
- Fruit and vegetable intake
- Overall dietary intake

Other Lifestyle Behaviors
- Physical activity
- Sleep

Health Outcomes
- Weight Status

Environmental Context
Intervention

- Eight weekly 45-minute lessons
- Interactive activities and tasting sessions
Lesson Topics

1. Exploring Taste, Flavor, and Texture
2. Mealtimes and Rules
3. Food Groups and Nutrients
4. Moderation
5. New Foods
6. Cooking
7. Fill and Full
8. Sustaining Healthy Eating Habits
Example: Alignment with SCT Constructs

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Activities</th>
<th>Constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Engage students in an interactive discussion of taste, flavor, and textures.</td>
<td>Knowledge, self-efficacy</td>
</tr>
<tr>
<td>30</td>
<td>Have a tasting session for foods with different tastes and textures.</td>
<td>Self-efficacy, observational learning, outcome expectations, normative beliefs</td>
</tr>
<tr>
<td>10</td>
<td>Work with students to plan to overcome barriers to exploring a new taste, flavor, or texture.</td>
<td>Outcome expectations, barriers and opportunities, intentions</td>
</tr>
</tbody>
</table>
Recruitment

• Inclusion Criteria
  – Clinical diagnosis of ASD
  – Aged 10 years or older
  – Enrolled in the participating school

• Exclusion Criteria
  – Below third grade reading level
  – Concurrent participation in another nutrition-related intervention
Participants and Setting

• 12 adolescents with ASD
  – Aged 8-19 years
  – 8 males
  – 9 had teacher-reported high social communication skills
  – 3 were overweight; 4 had obesity

• Private school for youth with ASD
  – Classroom setting
  – During normal class time
Measures

• Feasibility
  – Fidelity checklist
  – Attendance records

• Acceptability
  – Focus group after Lesson 4
Fidelity

• Fidelity checklist\textsuperscript{31}
  – 7 items for adherence;
  – 7 items ranking high, adequate, or low quality;
  – 1 item on exposure for each lesson

• Attendance records

Example items:

<table>
<thead>
<tr>
<th>Adherence</th>
<th>Quality</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepares visual materials in advance (Yes/No)</td>
<td>Gathers all recommended materials prior to implementation (High)</td>
<td>45-minute lesson delivered (Yes/No)</td>
</tr>
<tr>
<td>Prepares visual materials in advance (Yes/No)</td>
<td>Gathers/prepares most materials prior to implementation (Adequate)</td>
<td></td>
</tr>
<tr>
<td>Minimal or no materials prepared (Poor)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example items:
Rapid-Cycle Evaluation

- Focus group after Lesson 4 (n=10)
- Thematic analysis in NVivo 12
  - Strengths and weaknesses, SCT constructs, ASD-related factors, and behavior change
  - Inter-rater reliability
Fidelity

- 45-50-minute lessons
- 100% adherence
- High quality
- 11 students on average (10-12)
Acceptability

- Small group activities
- Sensory exposure
- Behavior change
Mealtime Schedule

Breakfast - 6:30 am
   cereal
   banana

Snack - 9:00 am
   school

Lunch - 11:00 am
   sandwich
   gummy bear
   taco

Snack - 3:00 PM

Dinner - 6:00 PM

Snack - 9:00 PM
   cookie
Sensory Exposure

• Tasting sessions, hands-on activities, visual cues
  – Oh yeah, [trying new foods] is what I also like. I liked it because I got to taste the different textures and feelings of it. – 15-year-old female
Healthy Eating

- Knowledge, self-efficacy, and outcome expectations
  - I’m learning things about protein and all and how that’s good for diets and fruits and veggies are the best things to eat and that's what I'm doing now with my diet. – 17-year-old male
- Half indicated that they made changes to their diet
Revised 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
Limitations

• Generalizability
• Social desirability bias
• Checklist

Strengths

• Theory-based
• Mixed methods approach
• Novel intervention
Implications
Conclusions

• BALANCE is feasible and acceptable in adolescents with ASD

• Future research
  – Parent and teacher feedback
  – Virtual intervention
Thank You!!