Weight Loss and Maintenance for Individuals with Intellectual and Developmental Disabilities

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Definition of IDD

• Intellectual and Developmental Disability (IDD)

• A disability originating before the age of 10, characterized by significant limitations in both intellectual function and in adaptive behavior

• IDD is diagnosed when an individual has an IQ below 70 and limitations in two or more adaptive behaviors
  – Mild: IQ of 50-69
  – Moderate: IQ of 35-49
  – Severe: IQ of 20-34
  – Profound: IQ below 20
Causes of IDD

• Genetic
  – Phenylketonuria
  – Down syndrome (trisomy 21)
  – Di George syndrome
  – Fragile X syndrome

• Growth or nutritional deficiencies during pregnancy

• Autism

Obesity Rates of Adults with IDD

• The rates of obesity are 2-3 times greater in individuals with IDD
  – 55% of adults with IDD are considered obese
  – Another 30% are considered overweight
Obesity Rates of Typically Developing Adolescents

31% 19%

Overweight (>85th% ile) Obese (> 95th % ile)

Obesity Rates in IDD


Contributors to Obesity

- Poor Diet Quality (HEI 45.6) *
  - Low Consumption of Fruits and Vegetables *
  - Low Physical Activity

Weight Gain

* Found in a group of both adolescents and adults

Limitations to Research in Individuals with IDD

• Protected population
• Poor memory
• Literacy
• Guardianship
• Decision making skills
• Living arrangements
• Obtaining accurate assessments
Previous Research in Adults with IDD

- No adequately powered, long-term studies that targeted changes in both energy intake and energy expenditure
- The most recent interventions reported include:
  - A behavioral approach focusing on teaching self-control techniques (rate of eating, environmental events)
  - A physical activity only intervention (walk set minutes/day)
  - A health promotion intervention for adults with IDD living in hospitals or long-term facilities
- Mean weight change was minimal
  - +0.7 kg to –3.4 kg (1.5 - 3%)
  - Considerably less than the long-term weight loss to achieve health benefits (5-10%) recommended by the NHLBI Guidelines

Conventional Diet

• A conventional reduced energy diet (CD) is recommended by the Academy of Nutrition and Dietetics (AND) and the NHLBI Guidelines.
  – Reducing energy intake by 500-750 kcals/day
  – Reducing portion size
  – <30% of energy from fat
  – Increasing fruits and vegetables
  – Results in 1-2 lbs loss per week
Limitations of CD

- Requires calorie counting
- Group format
- Reading nutrition labels
- Comprehending education materials
Saunders et al

- Pilot study in 79 adults with mild to moderate IDD (age = 31.6 ± 9.6 yrs., BMI = 37.0 ± 9.6).
- Placed on an enhanced Stop Light Diet (eSLD) ~1200 to 1300 kcals/day
  - Original Stop Light Diet
  - Pre-packaged meals (2 shakes and 2 prepackaged entrees)
  - 5 servings of fruits and vegetables
  - Physical activity

<table>
<thead>
<tr>
<th>% Weight Loss</th>
<th>Baseline</th>
<th>6 months</th>
<th>12 months</th>
<th>18 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series 1</td>
<td>0%</td>
<td>-6.30%</td>
<td>-9.10%</td>
<td>-8.90%</td>
</tr>
</tbody>
</table>

- Total weight loss ranged from 5.8 kg to 23.2 kg

Enhanced Stop Light Diet

• Enhances the Original Stop Light Diet with Portion Controlled Meals (PCMs) and 5 servings of fruits and vegetables per day.
Original Stop Light Diet

- Categorizes foods according to energy content
  - Red
  - Yellow
  - Green

Original Stop Light Diet

• Categorizes foods according to energy content
  • Red
  • Yellow
  • Green (Low Energy)

Original Stop Light Diet

• Categorizes foods according to energy content
  • Red
  • Yellow (Moderate Energy)
  • Green
Original Stop Light Diet

• Categorizes foods according to energy content
  • Red (High Energy)
  • Yellow
  • Green

Original Stop Light Diet

- Grade 1 (strong, consistent supporting evidence) for its effectiveness in weight management for children
  - The Academy of Nutrition and Dietetics Evidence Analysis Library

Portion Controlled Meals

- High volume, low energy prepackaged meals
- Convenient and Decision Free

Grade 1 evidence for their effectiveness in weight management
Potential Weight Management Approaches for Individual with IDD

- Past approaches
  - eSLD
- Limitations of Saunders study
  - No comparison diet
  - Only used in adults
  - Participants only seen 1x per month
  - Dietary assessments not validated

Weight Loss And Maintenance For Individuals With Intellectual And Developmental Disabilities
Donnelly (PI)
7 R01 DK083539-02
Design Overview

• 18 month intervention: 6 month weight loss, 12 month maintenance

• 151 adults with IDD

• Participants randomized to either an enhanced stop light diet (eSLD) or a conventional diet (CD)

• Monthly, in-home meeting with a health educator.

• Track food (icons), steps, and activity.
Participants

**Inclusion Criteria**
- 18 + years of age
- Mild to moderate IDD
- BMI > 25 kg/m²
- Able to walk
- Ability to communicate through spoken language

**Exclusion Criteria**
- Insulin dependent diabetes
- Participated in a weight reduction program in the past 6 months
- Treatment for major depression or eating disorders
- Consuming special diets
- Prader-Willi Syndrome
- Pregnant, planning on becoming pregnant, or became pregnant during the study
Diet Groups

eSLD

STOP LIGHT FOOD RATINGS

Low Calorie—Eat plenty of these!
Somewhat More Calories—Go easy on these!
Even More Calories—Limit and avoid eating these!

CD

ChooseMyPlate.gov

Vegetables

Fruits
Grains
Protein
Dairy
# Stoplight Guide

## Stop Light Food Ratings

- **Green**: Low Calorie – Eat plenty of these!
- **Yellow**: Somewhat more calories – Go easy on these!
- **Red**: Even more calories – Limit & avoid eating these!

### Vegetables:
- Asparagus
- Beans: Green & Yellow
- Beets
- Broccoli
- Cabbage
- Carrots
- Cauliflower
- Celery
- Cucumber
- Lettuce
- Mushrooms
- Onions
- Peas
- Peppers
- Spinach
- Squash
- Tomatoes
- Zucchini
- Beans (White, Garbanzo, Black)
- Corn
- Lentils
- Potatoes (Baked/Mashed)
- Sweet Potatoes (Baked/Mashed)
- Potatoes (Fried)
- Sweet Potatoes (Fried)

### Fruit:
- Apples
- Apricots
- Blueberries
- Blackberries
- Cantaloupe
- Cherries
- Grapefruit
- Grapes
- Honeydew Melon
- Kiwi
- Mango
- Nectarines
- Oranges
- Peaches
- Pears
- Pineapple
- Plums
- Pomegranates
- Raspberries
- Strawberries
- Tangerines
- Watermelon
- Bananas
- Canned Fruit
- Dried Fruit
Intake Tracking Form eSLD

**Notes:** Circle the shoe if you did planned exercise. Also, circle the type of exercise(s) you did and how many minutes you did that day. 

Example: 
- **Green:** light foods
- **Yellow:** light foods
- **Red:** red light foods
- **Blue:** exercise for 10 minutes or more

**Exercise:**
- Mon:____
- Tues:____
- Wed:____
- Thurs:____
- Fri:____
- Sat:____
- Sun:____

**Steps:**
- Mon:____
- Tues:____
- Wed:____
- Thurs:____
- Fri:____
- Sat:____
- Sun:____

**Food & Exercise Tracker**

<table>
<thead>
<tr>
<th>MON</th>
<th>TUES</th>
<th>WED</th>
<th>THURS</th>
<th>FRI</th>
<th>SAT</th>
<th>SUN</th>
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</tbody>
</table>

**Name:** ____________________  **Week:** ______

**Other:**
- Mon:____
- Tues:____
- Wed:____
- Thurs:____
- Fri:____
- Sat:____
- Sun:____
## Intake Tracking Form MyPlate

<table>
<thead>
<tr>
<th>MON</th>
<th>TUES</th>
<th>WED</th>
<th>THURS</th>
<th>FRI</th>
<th>SAT</th>
<th>SUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Food Icon]</td>
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</tr>
</tbody>
</table>

Other:  Other:  Other:  Other:  Other:  Other:  Other:


Exercise:  Exercise:  Exercise:  Exercise:  Exercise:  Exercise:  Exercise:
Game Board
## Assessments

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Weekly</th>
<th>Monthly</th>
<th>6 mo</th>
<th>12 mo</th>
<th>18 mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropometrics (height, weight, waist circumference, BMI)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Chronic disease risk factors (blood lipids, insulin, glucose, BP)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Accelerometry (4-day physical activity)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Care giver self-efficacy</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietary intake (24hr recalls on 3 days)</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietary intake (24hr recalls)</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body weight (for participant and counseling only)</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-monitoring logs (diet, physical activity)</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What do we expect

• Adults in the eSLD group will lose more weight at 6 months than those in the UC group
• Adults in the eSLD will maintain weight better than those in the UC group
Feasibility Of Using Tablet Computers To Promote Weight Loss In Adolescents With Intellectual And Developmental Disabilities
Technology Use in Adolescents with IDD


Design Overview

• 2 month intervention

• Participants randomized to either an enhanced stop light diet (eSLD) or a conventional diet (CD)

• Participants given a tablet computer (iPad 2) and instructed to use it to track daily food intake and physical activity

• Weekly FaceTime meetings with health educator to provide feedback and education
Participants

**Inclusion Criteria**

- 11-18 years of age
- Mild to moderate IDD
- Overweight or obese (BMI > 85th percentile on CDC growth charts)
  - or have greater than a 0.5 ratio of height to waist circumference
- Live at home with a parent
- Ability to communicate through spoken language

**Exclusion Criteria**

- Insulin dependent diabetes
- Participated in a weight reduction program in the past 6 months
- Treatment for major depression or eating disorders
- Consuming special diets
- Prader-Willi Syndrome
- Pregnant, planning on becoming pregnant, or became pregnant during the study
Diet Groups

**SLD**

STOP LIGHT FOOD RATINGS

Low Calories - Eat plenty of these!

Somewhat More Calories - Go easy on these!

Even More Calories - Limit and avoid eating these!

**CD**

ChooseMyPlate.gov

- Fruits
- Grains
- Vegetables
- Protein
- Dairy
Physical Activity
Tablet Computer

- Apple iPad 2
  - Track daily food
  - Track daily steps
  - View weekly education lesson
  - Weekly FaceTime session
  - Incentives
Lose It! & iStep Log/Fitbit
Intervention

• Baseline (In-Person)
  – Outcomes assessment
  – 90 min. diet orientation with participant and parent

• Weekly (FaceTime)
  – Diet and Physical Activity Education
  – Review Lose It! and Step Data

• Month 1 (In-Person)
  – Deliver Food/Incentives
  – Collect Weight

• Month 2 (In-Person)
  – Outcomes assessment
# Assessments

**Baseline and Mo. 2 Assessments**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary Intake</td>
<td>3-Day Photo-Assisted Food Record</td>
</tr>
<tr>
<td>Diet Quality</td>
<td>Health Eating Index-2005</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>Accelerometer</td>
</tr>
<tr>
<td>Height (cm)/Weight (kg)</td>
<td>Stadiometer /Digital Scale</td>
</tr>
<tr>
<td>Age, Sex, Race/Ethnicity</td>
<td>Self-Reported Questionnaire</td>
</tr>
<tr>
<td>Program Evaluation</td>
<td>Semi-Structured Interview</td>
</tr>
</tbody>
</table>

## Weekly Assessments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary Intake</td>
<td>Lose It!</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>Lose It!</td>
</tr>
<tr>
<td>Daily Steps</td>
<td>iStep Log/ Fitbit</td>
</tr>
</tbody>
</table>
Recruitment

Consented: 21

Drop: 1

Completed Study: 20
### Subjects

<table>
<thead>
<tr>
<th></th>
<th>All Participants (n=20)</th>
<th>Participants on CD (n=10)</th>
<th>Participants on eSLD (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (yrs)</strong></td>
<td>14.9 ± 2.2</td>
<td>13.9 ± 2.2</td>
<td>15.9 ± 1.8</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11 (55%)</td>
<td>5 (50%)</td>
<td>6 (60%)</td>
</tr>
<tr>
<td>Female</td>
<td>9 (45%)</td>
<td>5 (50%)</td>
<td>4 (4%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>1 (5%)</td>
<td>1 (10%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Black</td>
<td>4 (20%)</td>
<td>0 (0%)</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>White</td>
<td>14 (70%)</td>
<td>8 (80%)</td>
<td>6 (60%)</td>
</tr>
<tr>
<td>Mixed</td>
<td>1 (5%)</td>
<td>1 (10%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td><strong>Level of IDD severity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>2 (60%)</td>
<td>8 (80%)</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>8 (40%)</td>
<td>2 (20%)</td>
<td>6 (60%)</td>
</tr>
</tbody>
</table>
Anthropometrics

No significant differences between groups
Covariates and Weight Change

• Covariates that significantly affected the change in weight:
  – Race (p=0.0145)
  – BMI (p=0.0355)
  – Severity Level of IDD (p=0.0052)
Physical Activity

• Valid accelerometer data
  • Baseline: 16 subjects (7 eSLD, 9 CD)
  • Month 2: 15 subjects (9 eSLD, 6 CD)
• Significant decrease in sedentary activity time in both groups (p=0.0280)
  • No significant differences between groups
  • No significant differences in moderate or vigorous activity were detected
• Daily steps increased by 3000 steps per day
Changes in Energy and Macronutrient Intake Across Intervention in eSLD and CD Groups

<table>
<thead>
<tr>
<th></th>
<th>Energy (kcal)</th>
<th>Carbohydrate (g)</th>
<th>Fat (g)</th>
<th>Protein (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD</td>
<td>-674.90</td>
<td>-83.05</td>
<td>-31.81</td>
<td>-17.06</td>
</tr>
<tr>
<td>eSLD</td>
<td>-844.93</td>
<td>-60.31</td>
<td>-51.90</td>
<td>-32.79</td>
</tr>
</tbody>
</table>

* Significantly greater reduction of energy intake in eSLD compared to CD (p=0.0477)
Diet Quality

• Calculated using The Healthy Eating Index-2005

No significant differences between groups
Tablet Computer Usage

- Tablet Computer Assistance:
  - 42% of participants used the tablet without help
  - 26% had parents help when using the tablet
  - 32% only had parents using the tablet
Program Evaluation

• 100% of parents liked the program and felt it was beneficial in teaching weight management strategies to their dependents

• 95% of participants enjoyed using the tablet
Limitations

- Self funded
- Small sample size/power
- No follow-up period
- Not stratified by level of IDD severity (mild vs. moderate)
Conclusions

• All adolescents with IDD were able to lose weight regardless of diet group
• eSLD may be more effective than the CD
• Adolescents with IDD will consume prepackaged meals, and find them helpful for weight loss
• The use of tablet computers appears to be a feasible tool to deliver a weight loss intervention in adolescents with IDD
• It is unknown if the use of a tablet computer as a delivery system for weight loss is more effective than traditional dietary tracking and face-to-face health education
Overview

• There are limitations to conducting research in individuals with IDD.
• Individuals with IDD have increased rates of obesity.
• Simple modifications to evidence based diet approach may teach weight loss and maintenance to individuals with IDD.
• The use of technology may improve the ability to conduct research in this population.
Where do we go from here?

- Long term/adequately powered study looking at use of technology vs. face-to-face
- Physical activity interventions using technology
- Valid dietary assessment techniques
Thank You

• Any Questions?