The Parent Mealtime Action Scale (PMAS):
Development and association with children’s weight and diet

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Grant support: Children’s Miracle Network, Penn State Univ
Publication: Appetite, 2009
1. INTRODUCTION
Over 30% of American children are now overweight or obese:

(Wang & Beydown, 2007)

They have more physical, social, psychological problems:

- Diabetes
- Bowed legs
- Asthma
- Peer teasing
- Fewer friends
- Stereotyped as lazy, ugly, stupid
- Anxiety disorders
- Depression
- Poor Quality of Life
Recommendations for children’s weight and diet:

1. **BMI%** = Reduced to between 10 and 85

2. **FRVEG** = Eat more fruits and vegetables

3. **SNACKS** = Eat fewer high-fat, high-sugar, high-salt snacks

(CDCP, 2000)
Parent feeding measures available:

Child Feeding Questionnaire  (Birch et al., 2001)

Infant and Preschooler Feeding Questionnaires  (Baughcum et al., 2001)

Caregiver Feeding Styles Questionnaire  (Hughes et al., 2005)

Comprehensive Feeding Practices Questionnaire  (Musher-Eizenman & Holub, 2007)
Why develop another scale?

1. To focus on **PARENT BEHAVIORS, NOT ATTITUDES** . . . . . . .
   
   Parents often want specific behavioral “do and “don’t” lists
   
   Attitudes are already quite consistent (.76), but behaviors are not (.55)

2. To complete **MORE PSYCHOMETRIC EXAMINATION**
   
   - Larger sample sizes
   - Exploratory and confirmatory factor analysis
   - Examination of gender differences
   - Internal reliability
   - Test-retest reliability
   - Convergent validity

3. To examine how well our scale **EXPLAINED CHILDREN’S WEIGHT AND DIET**
   
   BMI%, FRVEG, SNACKS
Selection of 66 possible PMAS items:

FROM THEORY

- Social Cognitive Theory (Bandura, 1997)
  - parent modeling
  - verbal persuasion
  - repeated experience
  - offers of rewards
  - consider physiological factors
- Group Socialization Theory (Harris, 1995)
  - peer modeling
- Self-Determination Theory (Deci & Ryan, 1985)
  - offers of food choice

FROM PAST RESEARCH

- offers of rewards
- offers of food choice
- food restriction may backfire
- fat reduction may backfire
- avoidance of satiation
- avoidance of coercion
- repeated taste experiences (8-10 to “like” a food)
- special meals (parents give up after 3-5 attempts)

FROM CLINICAL EXPERIENCE
2. METHODS
Sample 1

2008 mothers, 130 fathers
48% boys; mean age = 8.3 yrs; 87% Caucasian

Procedures: Random cluster sample of parents from schools in 67 counties of PA
Parents completed anonymous questionnaires

Measures: FOR 66 PMAS ITEMS -- parents used 3-pt rating to report use in a typical week
1 = never
2 = sometimes
3 = always

BMI% -- calculated from parent reports of child’s height and weight
FRVEG -- # daily servings of 40 FRVEG from food frequency
SNACKS -- # daily servings of 12 SNACKS from food frequency

GENETIC RISK FOR OBESITY -- calculated as mother’s BMI from height and weight
TELEVISION TIME -- # hours/day as estimated by parent
EXERCISE -- # days/week exercise 30+ minutes as estimated by parent
Sample 2

541 mothers, 309 fathers
51% boys; mean age = 4.5 yrs; 64% Caucasian

Procedures:
Convenience sample from 1 elementary school, 3 preschools in eastern PA
Both the mother and the father completed separate anonymous questionnaires

Measures:
FOR 66 PMAS ITEMS -- parent rated HIS/HER OWN USE of the action
1 = never
2 = sometimes
3 = always

FOR 66 PMAS ITEMS -- parent rated the OTHER PARENT’S USE of the action
1 = never
2 = sometimes
3 = always
Sample 3

49 mothers, 6 fathers

46% boys; mean age = 8.1 yrs; 99% Caucasian

Procedures:

Convenience sample from 1 elementary school in eastern PA

Parents completed the same questionnaire twice, two weeks apart

Measures:

FOR 66 PMAS ITEMS -- parent used 3-pt rating to report use in a typical week

1 = never
2 = sometimes
3 = always
3. RESULTS
Factor analysis approach:

Eliminated 8 items with “floor effects” ( > 75% of parents said “never” used)

Eliminated 2 items with “ceiling effects” ( > 75% of parents said “always” used)

Used varimax rotation

Required each PMAS dimension to include 3+ items

Required each item to have .40+ factor loads in only one PMAS dimension
# Factor Analyses for 31-Item PMAS:

<table>
<thead>
<tr>
<th>PMAS Dimension (# items)</th>
<th>Exploratory mean loads (2008 mothers of Sample 1)</th>
<th>Confirmatory mean loads (541 mothers of Sample 2)</th>
<th>Confirmatory mean loads (439 fathers of Sample 1 and 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snack Limits (3)</td>
<td>.84</td>
<td>.81</td>
<td>.82</td>
</tr>
<tr>
<td>Positive Persuasion (4)</td>
<td>.72</td>
<td>.72</td>
<td>.72</td>
</tr>
<tr>
<td>Daily FV Availability (3)</td>
<td>.77</td>
<td>.72</td>
<td>.75</td>
</tr>
<tr>
<td>Use of Rewards (4)</td>
<td>.65</td>
<td>.63</td>
<td>.63</td>
</tr>
<tr>
<td>Insistence on Eating (3)</td>
<td>.75</td>
<td>.78</td>
<td>.80</td>
</tr>
<tr>
<td>Snack Modeling (3)</td>
<td>.73</td>
<td>.75</td>
<td>.78</td>
</tr>
<tr>
<td>Special Meals (4)</td>
<td>.58</td>
<td>.53</td>
<td>.44</td>
</tr>
<tr>
<td>Fat Reduction (3)</td>
<td>.71</td>
<td>.72</td>
<td>.71</td>
</tr>
<tr>
<td>Many Food Choices (4)</td>
<td>.58</td>
<td>.55</td>
<td>.55</td>
</tr>
<tr>
<td>PMAS DIMENSION (# items)</td>
<td>Internal reliability (2549 mothers of Samples 1 and 2)</td>
<td>Test-retest reliability (49 mothers of Sample 3)</td>
<td>Convergent validity (221 parent pairs of Sample 2)</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>SNACK LIMITS (3)</td>
<td>.81</td>
<td>.51</td>
<td>.70</td>
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<tr>
<td>POSITIVE PERSUASION (4)</td>
<td>.75</td>
<td>.56</td>
<td>.74</td>
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<tr>
<td>DAILY FV AVAILABILITY (3)</td>
<td>.70</td>
<td>.51</td>
<td>.70</td>
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<tr>
<td>USE OF REWARDS (4)</td>
<td>.65</td>
<td>.55</td>
<td>.78</td>
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<tr>
<td>INSISTENCE ON EATING (3)</td>
<td>.68</td>
<td>.74</td>
<td>.72</td>
</tr>
<tr>
<td>SNACK MODELING (3)</td>
<td>.54</td>
<td>.69</td>
<td>.59</td>
</tr>
<tr>
<td>SPECIAL MEALS (4)</td>
<td>.45</td>
<td>.58</td>
<td>.61</td>
</tr>
<tr>
<td>FAT REDUCTION (3)</td>
<td>.59</td>
<td>.75</td>
<td>.76</td>
</tr>
<tr>
<td>MANY FOOD CHOICES (4)</td>
<td>.42</td>
<td>.67</td>
<td>.60</td>
</tr>
</tbody>
</table>

**MEANS =**  .62  .62  .69
Example of items within PMAS dimensions:

**DAILY FV AVAILABILITY =**

- You gave the child fruit each day
- You ate fruit each day
- You ate vegetables each day

**FAT REDUCTION =**

- You stopped the child from eating too much
- You made changes to the child’s food to lower fat
- You made change to your own food to lower fat
Example of items within PMAS dimensions:

**POSITIVE PERSUASION =**

You told the child how much you liked the food

You told the child how good the food will taste if he/she tries it

You told the child that his/her friends or siblings like the food

You told the child that the food will make him/her healthy, smart, strong

**INSISTENCE ON EATING =**

You insisted the child eat even if he/she said “I’m not hungry”

You insisted the child eat when he/she was sleepy, not feeling well

You insisted the child eat when he/she was emotionally upset
Example of items within PMAS dimensions:

**SNACK MODELING =**

You drank soda each day

You ate candy or sweets each day

You ate salty snacks each day

**SPECIAL MEALS =**

You sat with the child, but did not eat

You prepared a special meal for the child, different from the family meal

You ate the same foods as those offered to the child (REVERSED)

You placed some of each food on the child’s plate (REVERSED)
Gender differences in use of PMAS dimensions?

Using 272 parent-pairs of Sample 2, with each parent’s self-rated PMAS

**ANALYSIS:** 2 X 2 repeated-measures ANOVA

- 2 child genders -- boys, girls
- 2 parent genders (repeated-measures for each child) -- mother, father

**OUTCOME MEASURE:** mean 3-pt rating for PMAS dimension items

**RESULTS:** (Only parent-gender significant)

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**MOTHERS USE MORE:**
- Snack limits
- Daily FV availability
- Fat reduction
- Positive persuasion

**FATHERS USE MORE:**
- Insistence on eating
Multiple regression to examine how well PMAS dimensions explain children’s weight (BMI%) and diet (FRVEG, SNACKS), but first partialling out 3 known predictors:

- **GENETIC RISK**
  (mother’s BMI)

- **TELEVISION TIME**
  (# hours/day)

- **EXERCISE**
  (# days/week)
### MULTIPLE REGRESSION RESULTS FOR PMAS DIMENSIONS ASSOCIATED WITH BMI%:

\[ R^2 = .11 \]
\[ F = 24.21 \]
\[ df = (6,1174) \]
\[ p = .000 \]

<table>
<thead>
<tr>
<th>PMAS dimension</th>
<th>beta</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSITIVE PERSUASION</td>
<td>-.077</td>
<td>2.72</td>
<td>.01</td>
</tr>
<tr>
<td>INSISTENCE ON EATING</td>
<td>-.124</td>
<td>4.39</td>
<td>.001</td>
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<tr>
<td>SNACK MODELING</td>
<td>.088</td>
<td>3.19</td>
<td>.01</td>
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<tr>
<td>FAT REDUCTION</td>
<td>.120</td>
<td>4.25</td>
<td>.001</td>
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</tbody>
</table>
MULTIPLE REGRESSION RESULTS FOR PMAS DIMENSIONS ASSOCIATED WITH FRVEG:

\[ R^2 = 0.13 \]
\[ F = 57.85 \]
\[ df = (4,1494) \]
\[ p = 0.000 \]

<table>
<thead>
<tr>
<th>PMAS dimension</th>
<th>beta</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAILY FV AVAILABILITY</td>
<td>0.318</td>
<td>12.95</td>
<td>0.001</td>
</tr>
<tr>
<td>POSITIVE PERSUASION</td>
<td>0.070</td>
<td>2.90</td>
<td>0.01</td>
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<tr>
<td>SPECIAL MEALS</td>
<td>0.069</td>
<td>2.82</td>
<td>0.01</td>
</tr>
</tbody>
</table>
MULTIPLE REGRESSION RESULTS FOR PMAS DIMENSIONS ASSOCIATED WITH **SNACKS**:

\[ R^2 = 0.09 \]
\[ F = 24.90 \]
\[ df = (6,1492) \]
\[ p = 0.000 \]

<table>
<thead>
<tr>
<th>PMAS dimension</th>
<th>beta</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNACK MODELING</td>
<td>0.166</td>
<td>6.69</td>
<td>0.001</td>
</tr>
<tr>
<td>MANY FOOD CHOICES</td>
<td>0.075</td>
<td>3.00</td>
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<tr>
<td>POSITIVE PERSUASION</td>
<td>0.077</td>
<td>3.08</td>
<td>0.01</td>
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<tr>
<td>FAT REDUCTION</td>
<td>-0.078</td>
<td>3.11</td>
<td>0.01</td>
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</table>
1. CONCLUSIONS
Parent actions associated with children’s healthy weight and diet:

- **DAILY FV AVAILABILITY**
- **POSITIVE PERSUASION**
- **INSISTENCE ON EATING**
Parent actions associated with children’s healthy weight and diet:

- **SNACK MODELING**
- **MANY FOOD CHOICES**
- **SPECIAL MEALS**
Next research steps:

1. Confirmatory factor analysis with sample of feeding clinic children

2. Experimental evaluation of PMAS to improve children’s weight & diet

FOR EASY-TO-SCORE PMAS:

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