Long Term Student Outcomes of the Integrated Nutrition & Physical Activity Program (INPAP)

07.03.2007
Summary of Student Nutrition Surveys 2nd through 8th grade

Methods – In 2nd and 3rd grade, surveys were conducted before INPAP lessons began in late September and after completion of the 26 INPAP lessons in late April or early May. Surveys were completed in the classroom with the assistance of RMPRC staff. Evaluators read each question and response set aloud, waited for all students to answer the question, then read the next item. The results for 2nd and 3rd grade are described in more detail in Belansky, et al (JNEB, 38:106-13,2006). No surveys were administered to the comparison cohort one year older until the fall and spring of 4th grade. Starting in 5th grade surveys were administered once per year in the spring. In 6th through 8th grade, questions were administered by classroom teachers at the request of the middle school administration. Question sets were identical within a grade for both cohorts. However, questions have changed across grades in order to be age-appropriate. This summary is limited to survey items on nutrition, the primary focus of the lessons.

Results

In 2nd grade, significant improvement was observed for ability to identify healthy foods and self efficacy for food preparation and eating 5-a-day. In 3rd grade students scored similar to how they had scored in 2nd grade with some additional gains in knowledge.

Table 1. Knowledge and Self-Efficacy “Scores” before and after INPAP curriculum

<table>
<thead>
<tr>
<th></th>
<th>Resource Teacher Cohort only</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Second Grade (n=149)</td>
</tr>
<tr>
<td></td>
<td>Pre</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
</tr>
<tr>
<td>Of healthy choice</td>
<td>3.2(0.1)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td></td>
</tr>
<tr>
<td>Food Preparation</td>
<td>3.6(0.1)</td>
</tr>
<tr>
<td>Eating more fruits and</td>
<td>4.1(0.1)</td>
</tr>
<tr>
<td>vegetables</td>
<td></td>
</tr>
</tbody>
</table>

*a All variables were coded such that higher numbers denote more favorable outcomes. Mean (SD) presented
*b Count of answers in desired direction (possible range 0-5).
*c Average across items that have a 5 point scale, with 5 being desired response (e.g., 5 = feeling extremely confident in ability).
*P<0.05; **P<0.01; ***P<0.001. The Wilcoxon sign rank test was used to test if the median change between pre- and post-test within grade was different from zero.

In the fall of 4th grade, students in the Resource Teacher cohort (the large majority received the curriculum in 2nd and 3rd grade) scored significantly higher on knowledge about the food guide pyramid and correctly choosing the milk with the percent fat that is healthiest for the heart. Other items were more often correct in the Resource Teacher cohort but group differences were small.
In the spring of 5th grade, students in the Resource Teacher cohort who had completed a survey at Boyd in third grade, reported significantly more correct answers about the food guide pyramid and the recommended number of fruits and vegetables than the Comparison cohort. While scores for five of seven of the remaining items were more favorable for the Resource Teacher cohort, none were significantly different.

<table>
<thead>
<tr>
<th>Table 2. Knowledge, Self-Efficacy, and Attitude “Scores” for nutrition, Fall Fourth grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Teacher</strong> (n=179; 43% male)</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
</tr>
<tr>
<td>Food Guide Pyramid (max=6)</td>
</tr>
<tr>
<td>How to add more fruits/veg at meals (max=2)</td>
</tr>
<tr>
<td>Fat in Foods (max=2)</td>
</tr>
<tr>
<td><strong>Self-Efficacy</strong></td>
</tr>
<tr>
<td>Food preparation (4 items)</td>
</tr>
<tr>
<td>Eating fruits and vegetables</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
</tr>
<tr>
<td>Like skim or low fat milk</td>
</tr>
</tbody>
</table>

*All variables were coded such that higher numbers reflect more favorable outcomes.

*b Number of correct answers.

*c Scale is 1-Strongly Disagree to 4-Strongly Agree

*p<0.05; **p<0.01; ***p<0.001. Tested by the Wilcoxon rank sum test.

In the spring of 5th grade, students in the Resource Teacher cohort who had completed a survey at Boyd in third grade, reported significantly more correct answers about the food guide pyramid and the recommended number of fruits and vegetables than the Comparison cohort. While scores for five of seven of the remaining items were more favorable for the Resource Teacher cohort, none were significantly different.

<table>
<thead>
<tr>
<th>Table 3. Knowledge, Self-Efficacy, and Attitude “Scores” for nutrition, Spring Fifth Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Teacher</strong> (n=131a; 48% male)</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
</tr>
<tr>
<td>Food Guide Pyramid</td>
</tr>
<tr>
<td>How to add more fruits/veg at meals (max=2)</td>
</tr>
<tr>
<td>Fat in Foods (max=2)</td>
</tr>
<tr>
<td>Recommended fruits/veg. servings</td>
</tr>
<tr>
<td>Vitamins in vegetables (max=4)</td>
</tr>
<tr>
<td><strong>Self-Efficacy</strong></td>
</tr>
<tr>
<td>Food preparation (4 items)</td>
</tr>
<tr>
<td>Eating fruits and vegetables</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
</tr>
<tr>
<td>Like to try new foods</td>
</tr>
<tr>
<td>Like skim or low fat milk</td>
</tr>
</tbody>
</table>

*a Includes students with a third grade pre or post test indicating that they attended Boyd when INPAP lessons were taught.

*b All variables were coded such that higher numbers reflect more favorable outcomes.

*c Number of correct answers. Tested by the Wilcoxon rank sum test.

*d Scale is 1-Strongly Disagree to 4-Strongly Agree, Tested by the Wilcoxon rank sum test.

*e Percent correct is given in means column, Tested by Chi-Square.

*p<0.05; **p<0.01; ***p<0.001.
In 6th through 8th grade, students were asked where they attended 2nd and 3rd grade. These analyses should be more sensitive than the analysis in earlier grades, since we were able to restrict analysis of both cohorts to only those children who attended Boyd in both 2nd and 3rd grade. While most findings were consistent with more favorable outcomes in the Resource Teacher cohort, only six items were statistically different in 6th grade. The Resource Teacher cohort was more likely to report correctly which foods are healthier from facts on a food label (3 items comparing 2 drinks, 2 snacks and 2 sundaes) and to determine where on the food guide pyramid a food belongs from the facts on a food label. Students who had received the lessons reported more often that the foods they eat now will both effect their health now and their health as an adult, and that they value their future health as an adult. In 8th grade (Table 5), and only 2 items approached statistical significance.

Table 4. Knowledge, Self-Efficacy, Attitude, Behaviors, and Foods Planned for in a Day “Scores” for nutrition, Spring 6th grade

<table>
<thead>
<tr>
<th></th>
<th>RT(^a) (n=105; 51% male)</th>
<th>Comparison(^a) (n=116; 47% male)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Guide Pyramid (max=2)</td>
<td>1.38(0.07)</td>
<td>1.28(0.07)</td>
</tr>
<tr>
<td>Which Foods are Healthier (max=3)</td>
<td>2.43(0.07)</td>
<td>2.18(0.08)</td>
</tr>
<tr>
<td>Servings in Foods (max=4)</td>
<td>1.99(0.10)</td>
<td>2.00(0.09)</td>
</tr>
<tr>
<td>Recommended fruits/veg. servings</td>
<td>28%</td>
<td>14%</td>
</tr>
<tr>
<td>Reading Nutritional Labels (max=5)</td>
<td>3.50(0.13)</td>
<td>3.13(0.13)</td>
</tr>
<tr>
<td><strong>Self-Efficacy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food preparation (4 items)</td>
<td>3.51(0.06)</td>
<td>3.41(0.06)</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like to try new foods</td>
<td>3.21(0.06)</td>
<td>3.26(0.06)</td>
</tr>
<tr>
<td>Towards fruits and vegetables (2 items)</td>
<td>3.10(0.07)</td>
<td>3.00(0.07)</td>
</tr>
<tr>
<td>Preference for Healthy Choice</td>
<td>37%</td>
<td>35%</td>
</tr>
<tr>
<td>Outcome Expectations (2 items)</td>
<td>3.15(0.09)</td>
<td>2.80(0.08)</td>
</tr>
<tr>
<td>Value for Health as an Adult</td>
<td>3.52(0.07)</td>
<td>3.33(0.07)</td>
</tr>
<tr>
<td><strong>Behaviors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat Dinner with Family</td>
<td>3.34(0.09)</td>
<td>3.37(0.08)</td>
</tr>
<tr>
<td>Eat Something for Breakfast</td>
<td>2.96(0.10)</td>
<td>2.37(0.09)</td>
</tr>
<tr>
<td>Use labels to decide what to eat/buy</td>
<td>1.84(0.10)</td>
<td>1.72(0.08)</td>
</tr>
<tr>
<td>Help prepare a meal at home</td>
<td>2.55(0.09)</td>
<td>2.47(0.07)</td>
</tr>
<tr>
<td>Decision making power for which foods are bought, prepared and served in home (2 items)</td>
<td>2.84(0.08)</td>
<td>2.90(0.07)</td>
</tr>
<tr>
<td><strong>Foods Planned for in a day</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servings of Fruit(^i)</td>
<td>2.37(0.19)</td>
<td>1.63(0.14)</td>
</tr>
<tr>
<td>[Range] [0-8]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servings of Vegetables(^i)</td>
<td>1.73(0.13)</td>
<td>2.09(0.15)</td>
</tr>
<tr>
<td>[Range] [0-5]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Only Students who attended Boyd in both 2nd and 3rd grade are included.

\(^b\) All variables were coded such that higher numbers reflect more favorable outcomes.

\(^c\) Number of correct answers. Tested by the Wilcoxon rank sum test.

\(^d\) Scale is 1-Strongly Disagree to 4-Strongly Agree, Tested by the Wilcoxon rank sum test.

\(^e\) Percent correct is given in means column, Tested by Chi-Square.

\(^f\) Percent who prefer the healthier choice is given in means column, Tested by Chi-Square.

\(^g\) Scale is 1-Never to 4-Always, Tested by the Wilcoxon rank sum test.

\(^h\) Scale is 1-none to 4-A lot, Tested by the Wilcoxon rank sum test.

\(^i\) Tested by T-test.

\(*p<0.05; **p<0.01; ***p<0.001.*
Table 5. Nutrition Knowledge, Self-Efficacy, Attitude, Behaviors, and Scores on Making Health Choices, Spring 8th grade

<table>
<thead>
<tr>
<th></th>
<th>RT(^a) (n=91; 54% male)</th>
<th>Comparison(^b) (n=100; 53% male)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Guide Pyramid (max=2) (^c)</td>
<td>1.56(.06)</td>
<td>1.47(.06)</td>
</tr>
<tr>
<td>Which Foods are Healthier (max=3) (^c)</td>
<td>1.70(.06)</td>
<td>1.77(.05)</td>
</tr>
<tr>
<td>Servings in Foods (max=4) (^c)</td>
<td>2.59(.10)</td>
<td>2.35(.10)</td>
</tr>
<tr>
<td>Recommended fruits/veg. servings (^e)</td>
<td>24%</td>
<td>14%*</td>
</tr>
<tr>
<td>Reading Nutritional Labels (max=5) (^c)</td>
<td>3.04(.10)</td>
<td>2.96(.10)</td>
</tr>
<tr>
<td><strong>Self-Efficacy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food preparation (4 items) (^a)</td>
<td>3.63(.05)</td>
<td>3.58(.06)</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like to try new foods (^d)</td>
<td>3.19(.06)</td>
<td>3.22(.07)</td>
</tr>
<tr>
<td>Towards fruits and vegetables (2 items) (^d)</td>
<td>3.23(.06)</td>
<td>3.20(.06)</td>
</tr>
<tr>
<td>Preference for Healthy Choice (^f)</td>
<td>32%</td>
<td>40%</td>
</tr>
<tr>
<td>Outcome Expectations (2 items) (^d)</td>
<td>3.47(.07)</td>
<td>3.37(.08)</td>
</tr>
<tr>
<td>Value for Health as an Adult (^d)</td>
<td>3.53(.07)</td>
<td>3.57(.06)</td>
</tr>
<tr>
<td><strong>Behaviors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat Dinner with Family (^g)</td>
<td>3.22(.09)</td>
<td>3.21(.09)</td>
</tr>
<tr>
<td>Eat Something for Breakfast (^g)</td>
<td>2.81(.11)</td>
<td>2.56(.10)**</td>
</tr>
<tr>
<td>Use labels to decide what to eat/buy (^g)</td>
<td>1.88(.10)</td>
<td>1.72(.09)</td>
</tr>
<tr>
<td>Help prepare a meal at home (^g)</td>
<td>2.44(.08)</td>
<td>2.56(.08)</td>
</tr>
<tr>
<td>Decision making power for which foods are bought, prepared and served in home (2 items) (^h)</td>
<td>2.66(.08)</td>
<td>2.82(.07)</td>
</tr>
<tr>
<td><strong>Scores on making healthy choices and stating ‘why’</strong></td>
<td>(^i) Tested by T-test.</td>
<td>(^i) Tested by T-test.</td>
</tr>
</tbody>
</table>

\(^a\) Only Students who attended Boyd in both 2nd and 3rd grade are included.
\(^b\) All variables were coded such that higher numbers reflect more favorable outcomes.
\(^c\) Number of correct answers. Tested by the Wilcoxon rank sum test.
\(^d\) Scale is 1-Strongly Disagree to 4-Strongly Agree, Tested by the Wilcoxon rank sum test.
\(^e\) Percent correct is given in means column, Tested by Chi-Square.
\(^f\) Percent who prefer the healthier choice is given in means column, Tested by Chi-Square.
\(^g\) Scale is 1-Never to 4-Always, Tested by the Wilcoxon rank sum test.
\(^h\) Scale is 1-none to 4-A lot, Tested by the Wilcoxon rank sum test.
\(^i\) Tested by T-test.
*p<0.07; **p<0.08.
Table 6 summarizes results across 4th through 8th grade in the tables above to show patterns of comparing the Resource Teacher cohort and the Comparison cohort. All statistically significant findings are in the direction of more favorable outcomes in the Resource Teacher cohort (being statistically significant suggests that they are not due to chance).

Table 6. Integrated Nutrition and Physical Activity Program (INPAP)
Summary Findings from Student Surveys
Comparison of Resource Teacher (RT) and Comparison Cohorts

<table>
<thead>
<tr>
<th></th>
<th>4th grade fall 2001-02&lt;sup&gt;a&lt;/sup&gt;</th>
<th>5th grade spring 2003-04&lt;sup&gt;b&lt;/sup&gt;</th>
<th>6th grade spring 2004-05&lt;sup&gt;c&lt;/sup&gt;</th>
<th>7th grade 2005-06</th>
<th>8th grade 2006-07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Guide Pyramid</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>N/S</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Of Healthy Foods</td>
<td>--</td>
<td>--</td>
<td>RT&gt;Comparison&lt;sup&gt;*&lt;/sup&gt;</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Adding Fruits/Veggies</td>
<td>RT&gt;Comparison&lt;sup&gt;*&lt;/sup&gt;</td>
<td>N/S</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Recommended Fruits/Veggies</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>--</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
</tr>
<tr>
<td>Fat in Foods</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
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<td>--</td>
</tr>
<tr>
<td>Servings in Food</td>
<td>--</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Vitamins in Vegetables</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Label Reading Skills</td>
<td>--</td>
<td>--</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>--</td>
<td>N/S</td>
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<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Food Prep</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>N/S</td>
<td>N/S</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Eating More Fruits/Veggies</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>N/S</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Attitudes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Towards Fruits/Veggies</td>
<td>--</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>I Like to Try New Foods</td>
<td>--</td>
<td>N/S</td>
<td>N/S</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Like Skim/Low Fat Milk</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>N/S</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Preference for Health Choice</td>
<td>--</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Outcome Expectations</td>
<td>--</td>
<td>--</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Value for Health as Adult</td>
<td>--</td>
<td>--</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Behaviors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eat Dinner with Family</td>
<td>--</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Eat Breakfast</td>
<td>--</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>RT&gt;Comparison</td>
</tr>
<tr>
<td>Use Nutrition Labels</td>
<td>--</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Help Prepare a Meal</td>
<td>--</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Decision Making Powers</td>
<td>--</td>
<td>--</td>
<td>N/S</td>
<td>--</td>
<td>N/S</td>
</tr>
<tr>
<td>Foods Planned for in a Day</td>
<td>--</td>
<td>--</td>
<td>RT&gt;Comparison&lt;sup&gt;**&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Fruits</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Vegetables</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Self-reported intake of fruits and vegetables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>--</td>
<td>--</td>
<td>3.3 &gt; 3.0</td>
<td>2.8 &gt; 2.6</td>
<td>2.6&gt;2.4</td>
</tr>
<tr>
<td>Vegetables</td>
<td>--</td>
<td>--</td>
<td>[2.8 &lt; 3.2]</td>
<td>3.0 &gt; 2.5</td>
<td>[2.3&lt;2.6]</td>
</tr>
</tbody>
</table>

<sup>a</sup>all 4<sup>th</sup> graders;
<sup>b</sup>RT excludes children who did not attend Boyd in 3<sup>rd</sup> grade;
<sup>c</sup>Both cohorts exclude children who did not attend Boyd in both 2<sup>nd</sup> and 3<sup>rd</sup> grade.
RT > Comparison means that RT scored significantly higher/better than the comparison cohort
N/S = No statistically significant difference; -- = Not asked; p<0.10; *p<0.05; **p<0.01; ***p<0.001