# NEEDS FOR BONES IS A TESTED, EFFECTIVE OSTEOPOROSIS EDUCATION INTERVENTION FOR MIDDLE SCHOOL YOUTH

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Program No. 624.6

**PENN STATE** 1855

**needs** NUTRITION EDUCATION ENGINEERING & DESIGNS

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## Abstract #2622

*NEEDS for Bones* (NFB), a 4-lesson osteoporosis-prevention curriculum for grades 6-8, was presented to 525 students in SNAP-Ed eligible PA schools. Students (51% male; 68% 7th grade) were from 29 classes in 2 school districts. On a scale of 1 (least) to 5 (most) learning about calcium in fast foods generated the most interest (3.50 ± 1.2, median 4). Only 8% of students expressed disinterest in all lessons and 51% were very interested in at least 2 lessons. Girls were interested in more lessons than boys (1.9 ± 1.5 vs. 1.6 ± 1.4; P=.03), especially lessons on fast food and convenience store calcium sources. Tasting experiences included refried beans, vanilla soymilk, sunflower seeds, calcium-fortified juice, and Swiss cheese.

Only 14% had tasted all foods, 6% hadn't eaten any, and 2 to 4 foods were novel for 61% of students. Over 45% of the students had not yet tasted the calcium-fortified juice, soymilk, or refried beans. Gender differences in tasting history or response were not significant. Compared to girls, boy were more relaxed about eating (P=.02), tending toward a higher eating attitude score (P=.07). Cluster analyses revealed gender, rather than tasting experience, lesson interest, or eating attitude, as a strong cluster predictor. Students learned calcium food sources, weight bearing activities, and calcium-related diseases, supporting NFB as a strong option for osteoporosis prevention education. USDA Funding

## About *NEEDs for Bones*

*NEEDs for Bones* addresses nutrition and health factors related to consumption of calcium-rich foods in 4 lessons.

| Name | Lesson Activities | Lesson-Specific Activites | # PA Dept of Ed Academic Standards met |
|---|---|---|---|
| Enjoy Calcium-rich Foods | • Discussion<br>• Weight-bearing Physical Activity<br>• Taste testing<br>• Extend the lesson activities | Graphing calcium content in favorite foods | 8 |
| Calcium Case Studies | | Case studies activity | 9 |
| Where's "Cal"? | | Where's "Cal?" Worksheet<br>Making "Cal" visible graphing activity | 13 |
| Fast "Cal" | | Choosing Fast Foods worksheet<br>Finding "Fast Cal" worksheet | 8 |

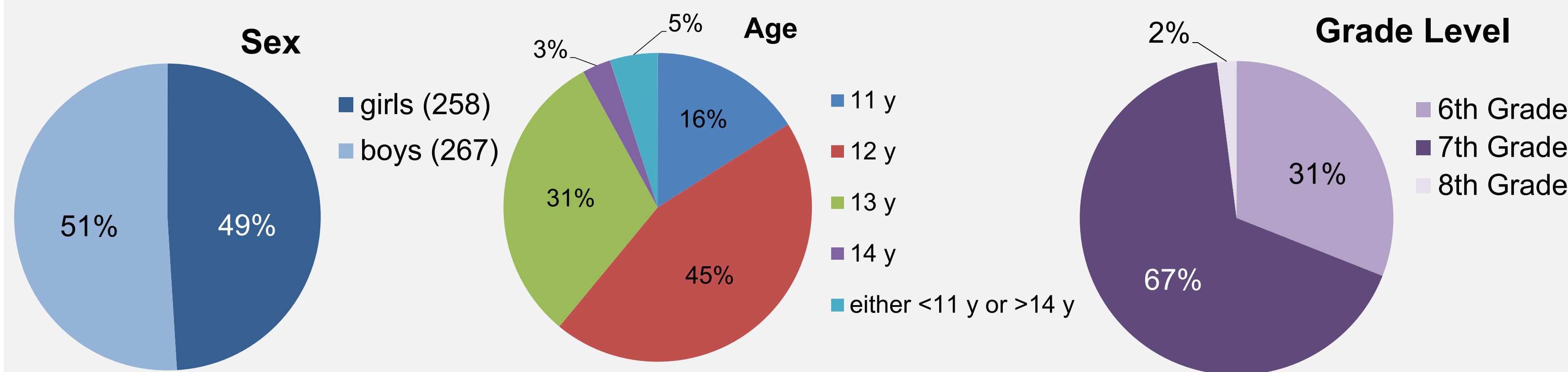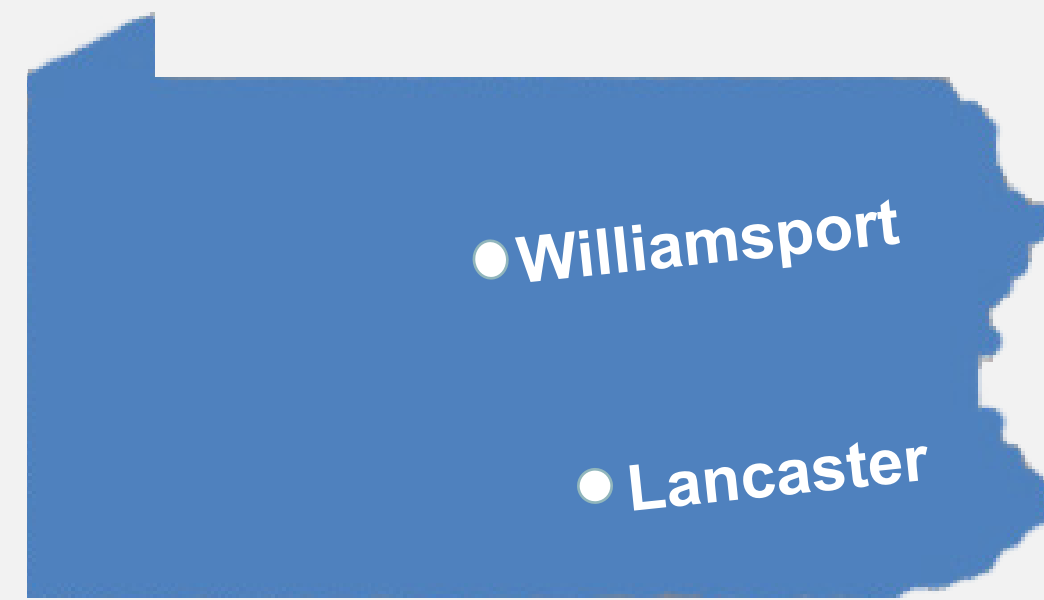| Health Beliefs Model Tenet | Tenet Appearance in NFB |
|---|---|
| Perceived Susceptibility<br>What do you think your chances are of getting a condition? | Osteoporosis risk factors are presented. Calcium needs of adolescents are identified. Students learn if their intake meets their needs. |
| Perceived Severity<br>What are your beliefs about the; seriousness of a condition and its consequences? | Graphic images of normal and osteoporotic bone are displayed; consequences of osteoporosis are discussed. |
| Perceived Benefits<br>How effective is taking action to reduce risk or seriousness of the condition? | Students complete case studies that require taking action to reduce risk of osteoporosis. |
| Perceived Barriers<br>Material or psychological costs associated with addressing the problem. | Addresses difficulties finding good sources of calcium, especially in fast foods and convenience stores as well as being unsure of good sources of calcium. Problems participating in weight-bearing exercise are addressed. |
| Self-efficacy<br>Confidence in one's abilities to address the problem. | Students taste foods that are good sources of calcium. They practice identifying calcium-rich foods found in convenience stores and fast food restaurants and learn to do easy weight-bearing exercises. |
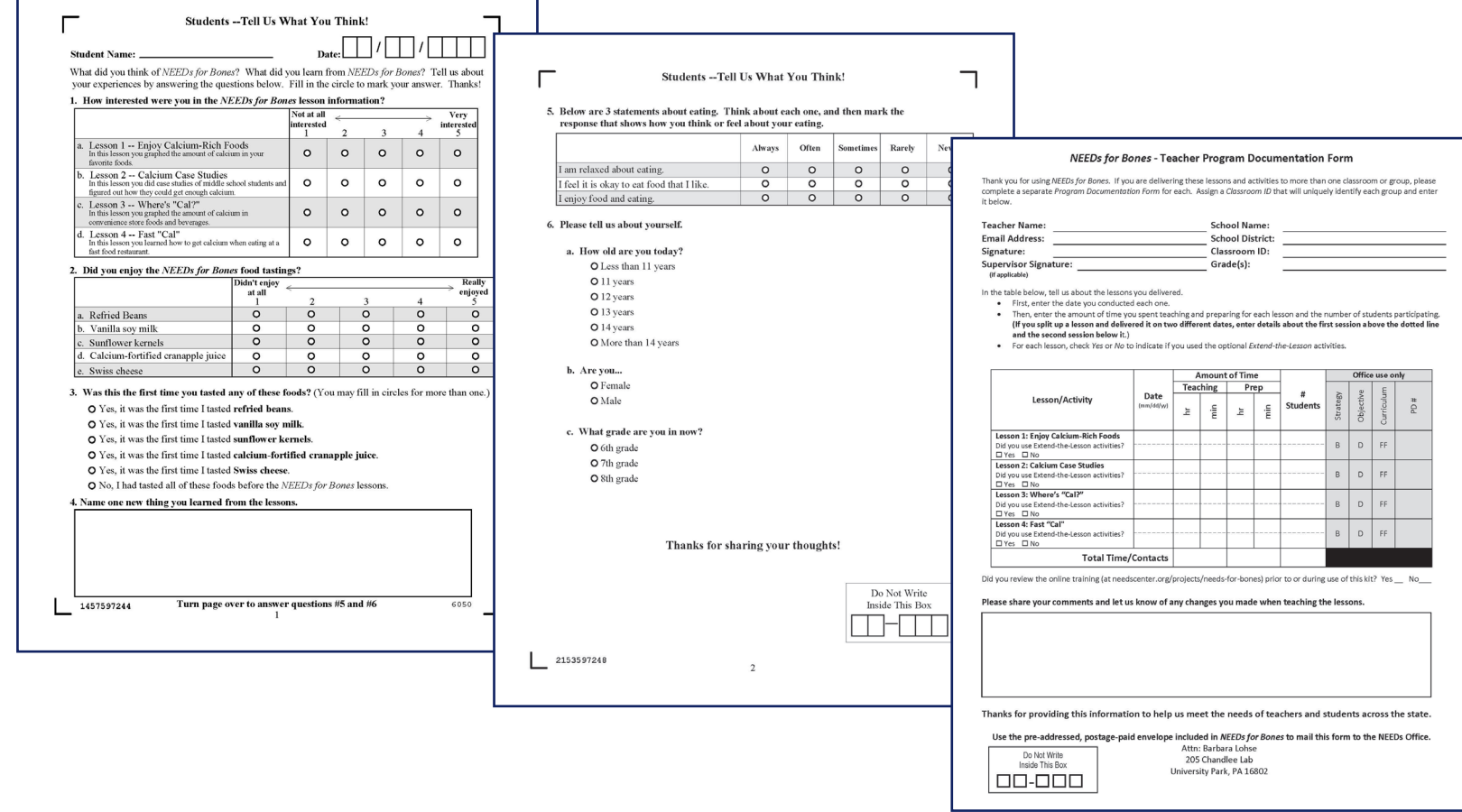
## Procedure

- *NEEDs for Bones* was administered by classroom teachers at 2 PA schools participating in PA SNAP-Ed.
- Each teacher scheduled curriculum administration at their convenience; length of time to administer the curriculum ranged from 1 week to 6 weeks. Individual lesson length was approximately 45-60 minutes.
- Upon completion of the 4th lesson teachers and students completed the documentation and evaluation forms, respectively, then mailed the set to NEEDs center staff for scanning and analysis.
- Data analyses included t-tests, ANOVA, Chi Square as appropriate. An eating attitude index was calculated by summing responses to 3 eating behavior items. A Cluster analysis was performed to identify homogeneous subgroups within the sample. Independence among variables was confirmed ($r \leq 0.06$) before being entered into the analysis. The log-likelihood measure was used as a distance measure. The number of clusters was determined by automated cluster selection based on largest relative increase in distance between the two closest clusters defined by the Schwarz Bayesian Criterion. T-tests and chi-square tests evaluated differences between clusters. Open responses about topics learned were categorized and tallied for each category. Data were analyzed using SPSS 18.0; significance was set at P < 0.05.

## Findings

Participants (n=525)
- 2 geo-diverse school districts
- 29 classrooms
- 9 – 24 students per classroom

● Williamsport
● Lancaster

**Sex**
- girls (258) 51%
- boys (267) 49%

**Age**
- 11 y — 16%
- 12 y — 45%
- 13 y — 31%
- 14 y — 3%
- either <11 y or >14 y — 5%

**Grade Level**
- 6th Grade — 2%
- 7th Grade — 67%
- 8th Grade — 31%

### Lesson Interest

No Interest → Much Interest

| Interest in Lesson? | Mean± SD [1] | Median | Range | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|
| Lesson 1-Enjoy Calcium-rich foods n=524 | 3.31 ± 1.16 | 3 | 1 - 5 | 5 | 20 | 34 | 20 | 21 |
| Lesson 2-Calcium Case Studies n=513 | 3.18 ± 1.24 | 3 | 1 - 5 | 10 | 21 | 37 | 24 | 18 |
| Lesson 3-Where's "Cal?" n=512 | 3.33 ± 1.25 | 3 | 1 - 5 | 8 | 19 | 26 | 25 | 22 |
| Lesson 4-Fast "Cal" n=507 | 3.50 ± 1.24 | 4 | 1 - 5 | 7 | 16 | 27 | 22 | 29 |

[1] Possible scores are 1 (Not at all interested) to 5 (Very Interested)

Disinterest=Score of 1 or 2; Interest=Score of 4 or 5

| | All Lessons | 1 or 2 Lessons |
|---|---|---|
| Disinterest [1] | 41 | 190 |
| Neutral [2] | 23 | 137 |
| Interest [3] | 97 | 174 |

[1] Disinterest=Marking 1 or 2; [2] Neutral-Marking 3; [3] Interest=Marking 4 or 5

Girls (n=258) were interested in more lessons than boys (n=267) (t=2.24; P=0026). On average, girls were interested in 1.88 ± 1.5 lessons; boys expressed interest in an average of 1.59 ± 1.43 lessons. Likewise, lesson disinterest was higher in boys than girls (t=2.71, P=0.007; 1.18 ± 1.34 lessons for boys.

| Sex | Where's "Cal?" [1] | Fast "Cal" [2] |
|---|---|---|
| Boys | 3.19 ± 1.28 n=256 | 3.36 ± 1.26 n=253 |
| Girls | 3.47 ± 1.19 n=249 | 3.62 ± 1.21 n=247 |

[1] t=2.57, P=.01; [2] Fast "Cal"-t=2.38; P=.018

Boys and girls did not differ in their interest in Lesson 1 (Enjoy Calcium-rich Foods) and Lesson 2 (Calcium Case Studies). However, girls were significantly more interested than boys in Where's "Cal?" and Fast "Cal" lessons.

### Food Tastings

- When asked if ALL the foods had been tasted before, 18% (n=97) responded "Yes."
- When tasting history for each specific food was tallied, only 14% (n=72) noted prior tasting of all 5 foods.

| Food Item | Tasted for first time | Enjoyment of the Tasting | | | | |
|---|---|---|---|---|---|---|
| | | 1 Not at all | 2 | 3 | 4 | 5 Really enjoyed |
| Refried Beans | 53% | 29% | 14% | 21% | 12% | 24% |
| Vanilla Soy Milk | 66% | 37% | 16% | 16% | 12% | 19% |
| Sunflower Kernels | 20% | 8% | 10% | 12% | 22% | 49% |
| Ca-Fortified CranApple Juice | 45% | 6% | 5% | 10% | 19% | 60% |
| Swiss Cheese | 36% | 22% | 12% | 13% | 16% | 37% |

**How many of the tasted foods were new?**

New Foods
- All foods (n=34) — 6%
- 1 (n=98) — 18%
- 2 (n=151) — 28%
- 3 (n=114) — 21%
- 4 (n=63) — 63%
- 0 (n=72) — 14%
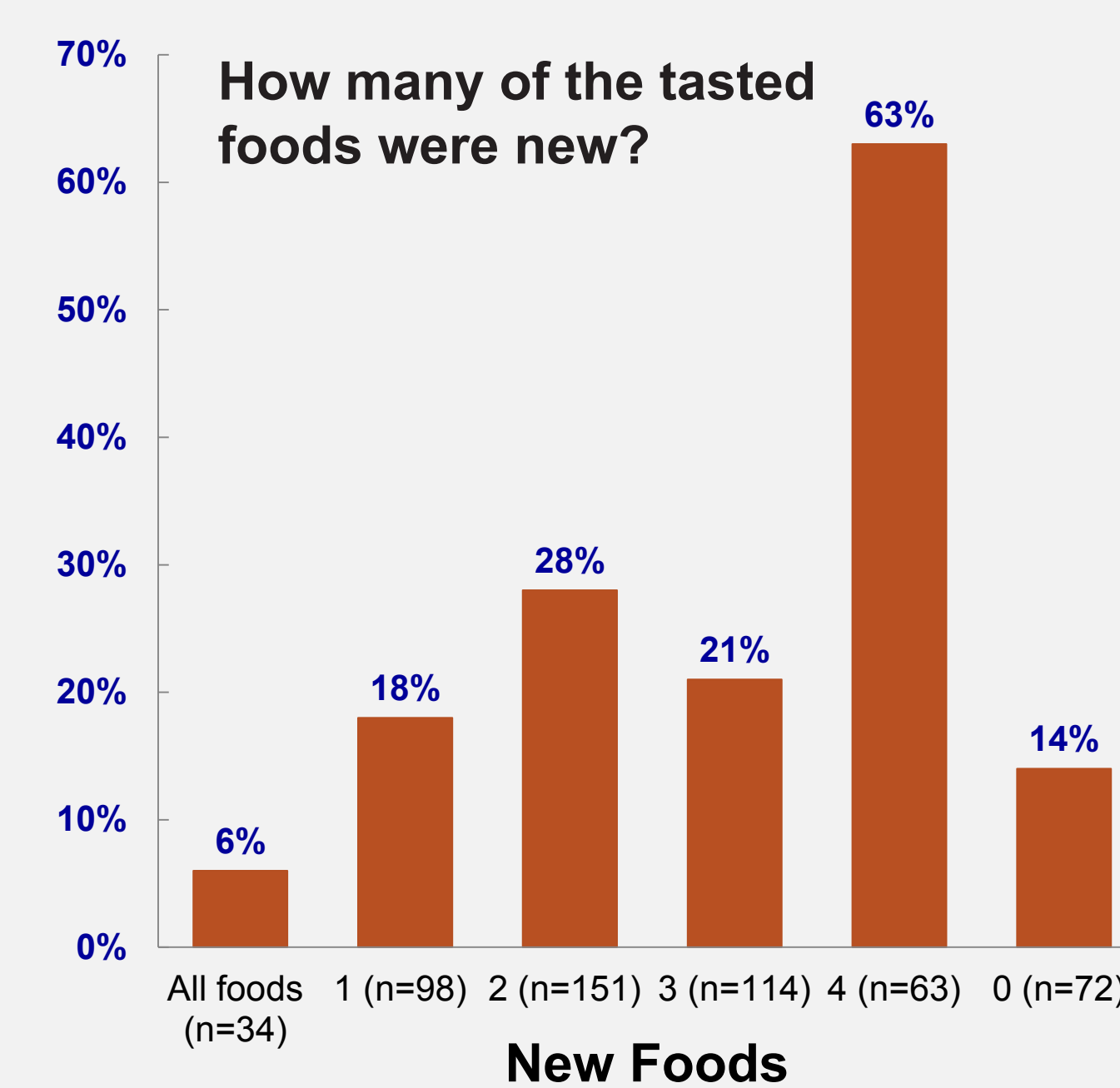
- Tasting food for the first time was not related to enjoying the tasting activity, with the exception of sunflower kernels (t=3.22, P=0.002).
- Those tasting sunflower kernels for the first time enjoyed the tasting activity less than those who had tasted them before the lesson (3.52 ± 1.6 vs. 4.06 ± 1.2).

## Findings

### Eating Attitudes

- Eating Attitude Index: Scores ranged from low (0) to 12 (high): mean 8.97 ± 2.35; median 9; range 0 – 12.
- 30% had a score of 11 or 12; 2% scored 3 or lower.
- Eating attitude was not related to level of interest in any of the lessons.

| Statement | Mean ± SD [1] | Median | Range | Never [2] | Rarely [2] | Sometimes [2] | Often [2] | Always [2] |
|---|---|---|---|---|---|---|---|---|
| I am relaxed about eating. n=513 | 2.85 ± 1.06 | 3 | 0 - 4 | 4 | 4 | 29 | 30 | 33 |
| I feel it is okay to eat food that I like. n=507 | 3.16 ± 0.98 | 3 | 0 - 4 | 1 | 4 | 22 | 24 | 49 |
| I enjoy food and eating. n=506 | 2.96 ± 1.04 | 3 | 0 - 4 | 3 | 5 | 25 | 28 | 39 |

[1] Possible scores are 0 (never) to 4 (always); [2] Table entries are %

Compared to girls, boys tended to have a better overall attitude toward food, being more relaxed about eating and feeling okay to eat preferred foods. However, enjoyment of food was equal in boys and girls.

| Measure | Boys | Girls |
|---|---|---|
| Eating Attitude Index. [1]* | 9.17 ± 2.42; n=246 | 8.80 ± 2.23; n=251 |
| I am relaxed about eating. ** | 2.96 ± 1.06; n=255 | 2.75 ± 1.03; n=255 |
| I feel it is okay to eat food that I like. * | 3.24 ± .97; n=252 | 3.08 ± .97; n=252 |
| I enjoy food and eating. | 2.96 ± 1.09; n=251 | 2.96 ± .99; n=252 |

[1] Possible 0-12; * P< 0.10  ** P< 0.05

### Cluster Analysis

2 clusters were derived when comparing number of foods eaten for the first time, number of lessons of interest, eating attitude index scores, and gender. Cluster strength was fair with average silhouette of 0.4; Gender was the greatest cluster predictor.
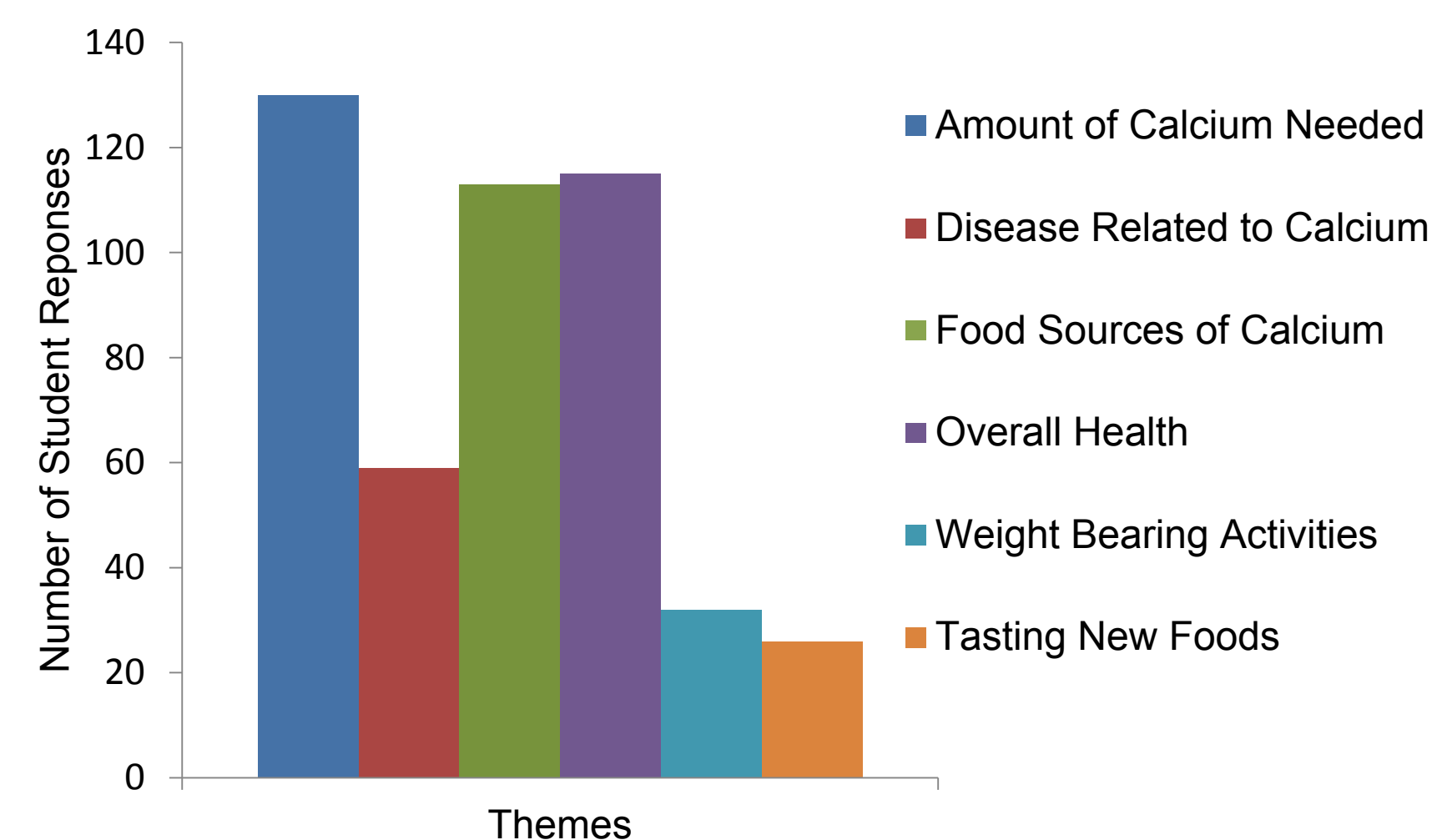
**Boys Cluster (n=246)**
- 100% male
- Mean # lessons of interest - 1.62
- Mean eating attitudes index - 9.17
- Mean # foods tasted for the first time - 2.17

**Girls Cluster (n=251)**
- 100% female
- Mean # lessons of interest - 1.88
- Mean eating attitudes index - 8.80
- Mean # foods tasted for the first time - 2.22

- Boys cluster tended toward fewer lessons of interest (P=0.051).
- Compared to the Girls cluster, interest in lesson 3, Where's "Cal?" was significantly lower (P=0.017) in the Boys cluster (3.21 ± 1.3 vs 3.48 ± 1.2).
- Also, the Boys cluster had significantly less interest (P=0.014) in lesson 4, Fast "Cal" (3.36 ± 1.2 vs 3.63 ± 1.2).
- Clusters did not differ in level of eating enjoyment for any of the foods tasted.

**What did students learn?**

Students reported learning a variety of topics, mostly related to calcium needs, sources of calcium, and overall health.

**Categorization of Student Reponses to "Name one new thing you learned from the lessons."**

Themes:
- Amount of Calcium Needed
- Disease Related to Calcium
- Food Sources of Calcium
- Overall Health
- Weight Bearing Activities
- Tasting New Foods

## Conclusions

- *NEEDs for Bones* was a positive learning experience for middle school youth from Pennsylvania schools participating in SNAP-Ed.
- A curriculum attentive to academic standards and distributed as a complete, all-in-one teaching kit can be successfully implemented by middle school teachers.
- *NEEDs for Bones* exposed middle school youth to good food sources of calcium.
- Gender differences in response to information, interest level, and eating attitudes suggest study of need for gender-specific nutrition education in middle school youth.