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# DIFFERENCES IN RESPONSE TO "NO BONES ABOUT IT!"

### BETWEEN BOYS AND GIRLS

By

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A Thesis Submitted in Partial Fulfillment Of the Requirements for a Degree with Honors (Dietetics and Nutrition, Fitness, and Health)

The College of Consumer and Family Sciences

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#### **INTRODUCTION**

Early adolescence is a critical time for skeletal development, as this is when maximal bone growth occurs (1). Development of bones mass during adolescence can help reduce the risk for childhood fractures and osteoporosis later in life. Low calcium intakes can contribute to poor bone health and can increase the risk of developing osteoporosis (2). An adequate intake of 1300 milligrams per day of calcium was set for both male and female adolescents by the Institute of Medicine (3). Unfortunately, most adolescents do not attain this recommendation. Thus, researchers have aimed to investigate various effectively reaching young people to adopt healthy behaviors, such as improving calcium intake and bone health, which is particularly challenging.

Industry estimates that 45 million homes have video-game consoles and the majority of users are teenagers (4). Whereas computer games are often associated with inactivity (5), emerging research suggests that computer games may provide an avenue for providing prevention health messages for cancer, diabetes, obesity, and other health problems (6). Computer games directed to the improvement of children's health are still in their infancy (7). Most of the multimedia-based interventions that exist today focus on fruit, vegetable, and fat intake (8). Studies on other dietary components also may be useful in improving health and preventing health risk behaviors. The role of computer-based games as learning tools for increasing awareness of bone-related health risks and improving bone health in early adolescents has not been scientifically studied. An examination of computer-based games as a learning tool is needed to evaluate whether interaction with a game directed to changing behaviors might guide adolescents to develop plans to improve their calcium intakes.

Delivering health content via multimedia and computer games has several advantages when compared to traditional teaching methods, such as lectures, textbooks, and videos. Using

multimedia and computer games to deliver health content can allow for interactive learning, which has been shown to be highly effective (9). The fidelity of the messages and content of the lessons can be protected, when health education is delivered with multimedia and computer games. This is particularly important, as it can help prevent the messages and content from transitioning into misinformation or information being dropped entirely due to a teacher's lack of confidence about a topic. Furthermore, use of these tools in school settings can reduce the burden on teachers since teachers would not need to plan lessons for subject areas outside of their specialty areas.

A systematic evaluation of the student responses to intervention programs that have incorporated games, may help illuminate whether multimedia can contribute positively to children's comprehension of health content. Given the emerging interest in video- and computer-games as a mode of delivering health content and information, an effort to identify features of games which may be most important for learning would be useful. The *No Bones About It* multi-media intervention using video and games was developed to improve calcium and bone health of middle school students following national science and health educational standards and a behavioral model call the transtheoretical model. An important concept of the transtheoretical model is for the recipients of an intervention to articulate a plan showing willingness to make a commitment to change. Appropriate health plans for calcium intake as promoted by *No Bones About It*! would support the contention that multi-media tools can provide a foundation for improving the health practices of early adolescents.

Given that a multimedia intervention would be delivered the same without accommodating potential differences between boys and girls, the purpose of this study was to compare the cognitive outcomes from *No Bones About It*! between boys and girls. The outcomes

specifically examined were: 1) the acquisition of knowledge about bone health and calcium intake; 2) the ability to articulate the game objectives which addressed how to increase calcium intake; and 3) the ability to articulate a plan of commitment to improve calcium intake.

#### **METHODS**

Sample Recruitment and Study Design. A diverse population was attained by using locations in six states: Arizona, California, Hawaii, Indiana, Nevada, and Ohio. Schools with 6<sup>th</sup> grade classes in these locations that had larger proportions of Asian or Hispanic students than the state average and were located within a 1-hour distance from the participating university were eligible for participation. Apriori the goal was to enlist a minimum of four schools per site that at least two pairs of schools could be formed within each state. Once schools agreed to participate, schools were paired together based on similarities in race/ethnic distribution and participation in free or reduced-price school lunch. Within a set, schools were randomly assigned to intervention (n=18 schools) or control (n=25 schools). All schools participated throughout the entire project. All schools were asked to refrain from participating in any milk promotion campaigns during the duration of their involvement. For this sub-study, pre- and post-tests among students in one pair of matched schools, i.e., the intervention school (n=216 students at baseline) and its matched control school (n=187 students at baseline), were administered at the beginning and end of the school year. Control schools did not receive any special program. The institutional review boards of each participating site approved the study protocol as exempt due to the research being conducted in established educational settings, involving normal education practices; the research involving the use of education tests, and the information obtained was recorded in such a manner

that human subjects could not be identified either directly or through code numbers linked to the completed materials.

Intervention Implementation. Refer to Figure 1 for a diagram of the *No Bones About It!* intervention. The content of the intervention was guided by the transtheoretical model. Research staff conducted the sessions in each class at every intervention school. Classroom teachers were present in each room. Each of the six sessions unfolded as described below. A session lasted 50 minutes and started with the students watching a DVD which included a story line and an interactive segment. The story line was used to increase motivation for the topic and create a real life scenario for the students. The interactive segment was intended to keep students engaged in the story and enhance learning about calcium and bone. After watching the DVD, students played games on computers. Depending on the session, one or two new games were introduced. The interactive games were designed to deliver ideas of how to increase calcium intake.

**Reflection Worksheets.** The reflection worksheets included one question or two questions that asked the students to describe how the game(s) in that session helped them understand concepts regarding improving their calcium intakes. Each reflection worksheet included the 1 or 2 questions about the games based on how many games were included in that particular session. Copies of the six reflection worksheets are in Appendix 1. Reflection worksheets were distributed at the end of every session to all students in each of the 6 sessions and a different reflection worksheet was used for each session. The worksheets were printed on duplicate NCR paper, and students retained the original for their personal portfolios and the copies were collected by staff. The collected worksheets were then sent to the Data Coordinating Center. A

low of 2,012 reflection worksheets were received by the Coordinating Center for session one to a high of 2,676 reflection worksheets for session four.

Action Plan Worksheets. The action plan worksheets reviewed students' readiness to change. The students were given action plan worksheets in the last two sessions (sessions 5 and 6). The action plan worksheets are in Appendix 2. According to the theoretical model used to design the program, making a plan to carry out behavior change (e.g. increasing calcium consumption) is a critical pivotal point at moving from thoughts about an action or preparation for an action to action itself. In session 5, students were first invited to make an action plan, if they were ready. For the action plan, students were asked to list foods that would increase the amount of calcium in their diets, as well as actions they could do to assist with their plans to increase calcium intake. Furthermore, students were asked when they would be ready to start their plans. Options included today, this week, next week, later, and not ready to start an action plan. A total of 2,800 action plan worksheets were sent to the Coordinating Center after session 5. In session 6, students were again invited to make a plan for improving calcium intake, or to refine the plan they made in session 5. Since sessions were completed two or more weeks apart, it is possible for students who, in session 5, stated they were ready to start their action plans today, this week, or next week to comment on the progress of their action plans in session 6. The presentation of this concept was not clear as evidenced by responses from the students (e.g., the majority provided progress, as well as a new plan versus a revised plan). Therefore, evaluation of the action plans was limited to those collected in session 5.

**Sampling Frame for the Worksheets.** When the worksheets were received at the Coordinating Center, the worksheets were filed by school, session number (sessions 1-6), and worksheet type (Reflection, My Action Plan). Each worksheet was stamped with a random, unique ID number

for data entry, but none of the worksheets were coded to be associated with any one individual student. A systematic sample of the reflection worksheets was collected by pulling every tenth sheet from the reflection worksheet folders by school and session number. Counting started over with each new school and each new session. Among the 2,012 to 2,676 reflection worksheets filed for each of the 6 sessions, roughly 280 were sampled per session. The same sampling technique was used for the action plan worksheets except every fifth sheet was pulled. Among the approximate 2,800 action plan worksheets filed for sessions 5 and 6, about 560 were sampled per sessions 5 and 6. The actual number of reflection worksheets sampled for sessions 1-6 for this analyses were n=232, n=272, n=282, n=284, n=264, and n=233, respectively. The number of action plan worksheets sampled for sessions 5 and 6, were n=598 and n=529, respectively. Assessment Measures. Students' responses to the multiple choice pre- and post- knowledge tests were scored as being correct or incorrect. Students' responses to the reflection worksheets that were collected in each of the six sessions were evaluated as addressing the objectives for each respective game (yes/no). Students' written plans on the My Action Plan worksheet were evaluated as identifying a calcium food source or being an appropriate action for improving calcium intake (yes/no). The plan was further assessed as addressing 1) personal factors; 2) skills; 3) and environmental factors/family support (9). A well developed plan was defined as at least one food and one action being recorded. The quantitative pre- and post-tests covered

calcium intake were also covered. The multiple-choice test included 20 questions and a copy of the test is in Appendix 3.

knowledge about calcium, bone, growth, and development. In addition, behaviors regarding

**Data analysis.** Double-data entry was used for the pre- and post-tests, the written responses on the Reflection worksheets, and the My Action Plan worksheets. The duplicate data files were

compared using the Compare procedure in SAS. To check the accuracy of the sampling frame for the reflection worksheets compared to the entire population of reflection worksheets, three comparisons of categorical variables were made using chi-square tests. The first comparison was of the total student population to the working sample was assessed for session number, gender, and state. The second check was the response to questions on the reflection worksheet regarding liking or disliking the lesson (i.e., session). The third comparison was the proportion of blank responses on the worksheets. The accuracy of the sampling frame for the action plan worksheets ascertained by a comparison of the working sample to the total action plan worksheets by gender and state using chi-square tests.

After all data were entered, responses were categorized based on their relation to the intended objectives of the game(s) or as an appropriate plan to improve calcium intake. Analyses followed a Grounded Theory approach to data reduction and integration (5). Both a priori theme analysis and emerging themes analysis were used to analyze the response data. The first step of data reduction was to identify salient themes, recurring ideas or language, and patterns of comprehension. The second step of analysis was to characterize each category's properties with previous incidents in the same or different categories. The final categories were examined and collapsed as appropriate.

To check for reliability, an inter-rating test was performed. A lab assistant who was not involved with the *No Bones About It!* intervention reviewed the first ten responses from each session. This individual was trained to categorize data by matching the student's response to the appropriate category based on the response's relation to the game objectives. Using SPSS, the lab assistant's categorizations from each session were compared to the first ten categorizations made by the original categorizations for each session. The percent of agreement between categorizations was evaluated as achieving at least 70% agreement. If this was not achieved, then categorization was reevaluated.

Frequencies were completed for the response categories. The responses were organized according to gender groups, to allow for easier interpretation of expected themes and issues. Multivariate regression was used to compare the knowledge scores. For the games and action plans, differences between boys and girls were examined using chi-square tests.

Reflection Worksheet Responses to the Games. Game objectives and examples of responses that met game objectives are outlined in Table 1. Response categories for the reflections worksheet responses to the games included 1) comprehension; 2) enjoyable; 3) perceived understanding; 4) unrelated comment; 5) difficult; 6) not fun; 7) no help; 8) unable to respond; and 9) no response. Comprehension entailed responses that reflected the true purpose of the games. Enjoyable expressed a strong liking for the game, but no evidence of game objectives being met. Perceived understanding revealed that participants felt the games taught them new information, but the actual response did not provide feedback about the specific contribution of the game. If a student made a comment, but the comment did not relate to the game or the game objectives, the response was categorized as unrelated comment. Responses in the *difficult* category indicated that the material presented in the games was challenging for students, but again does not reflect comprehension. Not fun responses suggested that the games were not appealing to students and did not contribute to the intervention as intended. The no *help* category includes responses where the student articulated that the games were not helpful or they "did not know" how the games helped their understanding. No response and unable to respond can be distinguished in that No response forms had questions one and two blank, while unable to respond were not able to provide any discernible feedback, e.g., "don't know" or

"unable play game". Responses from the comprehension and perceived understanding categories were combined to identify responses that showed evidence of comprehension of the objectives of the game(s). Responses from the difficult and no help categories were combined to identify responses that showed no evidence of enhancing learning as related to meeting the game objectives.

**My Action Plan Worksheet Responses.** Categorization and evaluation of the action plan responses were divided into three parts: 1) foods to improve calcium intake as shown in Table 2; 2) actions to improve calcium intake as shown in Table 3; and 3) when to start the action plan. The processes of evaluating responses regarding foods and actions to include in the plan are outlined in Figures 2 and 3.

The students' responses regarding foods or beverages that may help them boost the amount of calcium in their diets were divided into nine categories: 1) Calcium-rich foods (2-3 bone foods); 2) lower calcium foods (1/2-1 bone foods); 3) healthy choices, but not specific to calcium; 4) less than desirable food choices; 5) foods usually consumed with a calcium-rich food(s); 6) phrase related to the *No Bones About It*! intervention; 7) phrase not related to the *No Bones About It*! intervention; 8) phrase indicating inability to answer; and 9) no response. A description of these categories, as well as examples of responses for each category, is listed in Table 2.

The students' responses regarding things needed to carry out their action plans (or things that they can do to help improve their action plans) were divided into eight categories: 1) logical actions for improving calcium intake (self-directed); 2) logical actions for improving calcium intake (related to parent or caregiver); 3) logical actions for improving calcium intake inferred (self-directed); 4) logical actions for improving calcium intake inferred (related to parent or

caregiver); 5) logical actions for improving bone mass other than calcium (self-directed); 6) positive plan, but not specific to calcium; 7) response indicated no interest or lack of direction to proceed; 8) no response. Descriptions of the eight categories, as well as examples of responses that fit into these categories, are listed in Table 3.

Plans that addressed personal factors included responses from the following categories: logical actions for improving calcium intake (self-directed), logical actions for improving calcium intake inferred (self-directed), and logical plans for improving bone mass other than calcium (self-directed). Plans that addressed skills included responses from the following categories: logical actions for improving calcium intake (self-directed), logical actions for improving calcium intake (related to parent or caregiver), logical actions for improving bone mass other than calcium (self directed). Plans that addressed environmental factors/family support included responses from the following categories: logical plans for improving calcium intake (related to parent or caregiver), logical plans for improving calcium intake (related to parent or caregiver), logical plans for improving calcium intake inferred (related to parent or caregiver).

#### **RESULTS**

Distribution of collected reflection worksheets from the total sent to the Coordinating Center to the working sample was very similar when compared by session number ( $x^2$ =.229, df=5, p=.99), gender ( $x^2$ =.395, df=2, p=.821), and state ( $x^2$ =.805, df=5, p=.977) (Tables 4-6). Distribution of collected reflections worksheets from the total project to the working sample was also similar when comparing responses to the statements "I liked this lesson" ( $x^2$ =.622, df=3, p=.891) (Table 7) and "I learned some new information from this lesson" ( $x^2$ =.445, df=3, p=.931) (Table 8). Feedback in the upper ( $x^2$ =.938, df=1, p=.333) and lower ( $x^2$ =.533, df=1, p=.465) portion of the reflections worksheets were also similar between the total project and the working sample (Tables 9 and 10). Distribution of collected action plan sheets from the total project to the working sample for session 5 was similar for gender ( $x^2=.168$ , df=1, p=.682) (Table 11) and state ( $x^2=.799$ , df=5, p=.977) (Table 12).

A total of 187students (96 female and 91 male) from the control school and 216 students (120 female and 69 male) from the intervention school completed the knowledge pretest (Figure 4). The mean pretest knowledge scores were not significantly different between the intervention and control schools (p=.3977) or between boys and girls (p=.8409). A total of 178 students (93 female and 85 male) from the control school and 197 students (106 female and 91 male) from the intervention school completed the knowledge post-test (Figure 5). The post-test scores were significantly higher among the students in the intervention school (p<.0001) and girls did significantly better than boys (p=.0278).

The proportion of boys indicating that they liked the lesson for sessions 1-6 ranged from a low of 84 to a high of 94%, while the proportion of girls ranged from 61-87% (Table 13). In sessions 4 and 6, the proportion of boys indicating that they liked the lesson was significantly higher than the girls (p=.008 and p=.001, respectively). The proportion of boys indicating that they learned some new information from sessions 1-6 ranged from a low of 87% to a high of 96%, while the proportion of girls ranged from 75-94% (Table 14). In session 6, the proportion of boys indicating that they learned some new information was significantly higher than girls (p=.007).

The proportion of written responses reflecting evidence of identifying the content of the games for sessions 1-6 ranged from a high of 47% to a low of 64% (Table 15). Evidence of identifying the content from each game (total of 10 games across the 6 sessions) ranged from a

low of 54% to a high of 69% among the boys, and 38% to 61% among the girls. In 3 out of the 10 games, the proportion of boys best identifying the game's content was significantly higher than the girls (p<.05) (Table 16). When examining responses to the games that were categorized as "Comprehension," boys and girls were not significantly different. However, in 1 of the 10 games, a greater proportion of responses from boys were categorized as "Perceived Understanding" when compared against girls. The proportion of responses reflecting no evidence of enhancing comprehension ranged from 5-16% for boys and 4-26% for girls (Table 17). In 2 out of the 10 games, a greater proportion of written responses from girls than boys reflected no evidence of enhancing comprehension (p<.05). Furthermore, the proportion of responses from session 1 to session 6.

On average, girls recorded more foods to start with than boys  $(3.8\pm2.1 \text{ versus } 3.0\pm1.7;$ p<.001) (Table 18). Girls also recorded a higher average of calcium foods than boys  $(3.2\pm2.0 \text{ versus } 2.6\pm1.7; p<.0001$ ). A greater proportion of girls recorded yogurt, cheese, and orange juice (p<.05), while the proportions of girls and boys listing milk and soy were not significantly different (Table 19). Among those students who listed three or more foods for their action plan, a greater proportion of girls listed yogurt and orange juice (p<.05).

In comparison to the boys, a greater proportion of girls recorded plans addressing personal factors (p=.01) (Table 20). There was no significant difference between boys and girls who recorded plans addressing skills (p=.05) and environment/family support (p=.07) on the action plan worksheets. When examining written responses that had at least one calcium food recorded, boys and girls were not significantly different (p=.133) (Table 21). However, a greater proportion of girls than boys recorded at least one plan of action in their plan (p=.001). When compared to the boys, a greater proportion of girls recorded a well developed plan to improve calcium intake (p=0.006).

The overall distribution of both girls and boys of time to start action plan as recorded in sessions 5 and 6 is shown in Figure 6. The time to start an action plan was significantly different between boys and girls (p<0.0001) (Table 22). Time to start an action plan was not significantly different among girls who recorded at least one calcium food in their action plans (p=.305), but was significantly higher among girls who recorded at least one plan of action (p=.025) and who recorded a well developed plan (p=.042). Similarly, time to start an action plan was not significantly different between boys who recorded at least one food in their action plan (p=.231), but was significantly different among boys who recorded at least one plan of action (p=.001) and a well developed plan (p=.001).

#### DISCUSSION

Overall, the outcomes evaluated in this study showed that "*No Bones About It!*" positively influenced learning about calcium and bones. Girls performed better on the knowledge test of content. On the other hand, boys showed better comprehension when responding to content presented through games. Girls were better able to articulate plans (i.e. foods and actions) for improving calcium intake than boys. Girls were more progressive in their time to take action whereas boys were more variable in their time to take action. These results support multimedia as a method for delivering health content related to calcium and bone health, and suggest that computer games may be more effective among boys.

The system software only allowed new games to be opened at their corresponding session. Once a game was opened, the students could always go back and play other games from

previous sessions after playing the new games for the current session. Therefore, reintroducing a game could have an effect on the evidence of comprehension of the game objectives, as seen with the Calcium Countdown game that was introduced in sessions 2 and 6. The evidence of comprehension among boys and girls declined substantially (63% to 54% and 55% to 38%, respectively), likely showing lack of interest versus lack of comprehension. However, increasing the difficulty of the game may not have influenced evidence of comprehension of the game objectives, such as with the Calcium Concentration game and the Advanced Calcium Concentration game introduced in sessions 1 and 5, respectively. Under these circumstances, the evidence of comprehension remained constant (68% to 63% for boys, 58% to 53% for girls) which suggests a level of enthusiasm that translates to better reporting about the game's value with regard to calcium intake.

The differences in the types of foods recorded by the boys and girls might be explained by advertising. The majority of advertisements related to calcium and bone are geared towards females. Thus, for being able to identify calcium rich food sources and identify multiple sources may be more entrenched in a girls' minds. The girls were better able to clearly communicate action plans that appeared sound and doable. This ability to communicate a complex plan may reflect the advanced developmental progression of girls beyond boys at the sixth grade. Additionally, girls may be more prone to social desirability that may have led to better responses with regards to action plans. The hope would be that the girls would carry out these plans, unfortunately, the national data on calcium consumption among girls (3) would suggest otherwise. The evaluation of *No Bones About It!* did not include following girls over time to ascertain whether the plans were followed or not.

Some of the limitations of the study reported here include the lack of behavioral or biological indicators. Ideally, one would want to follow these children to evaluate whether their action plans were carried and if that translated into improved calcium intake or bone mass. The Cal-Girls girls study included intensive intervention delivered as part of a Girl Scout program (12). Despite following girls for two years, no improvements in bone mass were documented and minimal improvements in calcium intake.

#### **CONCLUSION**

The *No Bones About It!* was comprised of a variety of multi-media methods. The variation in responses to the various forms of multimedia supports the inclusion of a variety of media methods to better address the learning processes of girls versus boys. Programs that include a greater variety will likely address the variation in learning styles. These results support multimedia as a method for delivering health content related to calcium and bone health.

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**Table 1.** List of computer games by session with accompanying learning objectives and examples of responses from students that reflect achievement of objectives

Session	Game title	Objectives	Examples of responses reflecting achievement of objectives (as recorded by students in the intervention)
1	Calcium Th Concentration	The student will be aware that: 1. some foods contain more calcium than others 2. there are calcium-rich foods in all of the food	"I know how that some foods contain more calcium than others."
		groups	"I didn't Know orangesdidn't have a lot of calcium and stuff."
	Food Court	<ol> <li>The student will:         <ol> <li>identify calcium-rich foods he/she might enjoy</li> <li>have a more positive attitude toward calcium-rich foods</li> <li>be aware of calcium-rich food options available away from home</li> </ol> </li> </ol>	"It helped me choose what foods are yummy and good for you. (which food help my bones.)"
2	Calcium Countdown	<ul><li>The student will:</li><li>1. assess dietary intake as it relates to calcium food sources</li><li>2. idenitfy ways to improve calcium intake</li></ul>	"It helped me to see what I was eating." "Helps you know how much calcium you have a day."
	Corner Grocery T	The student will identify: 1. foods that contain more calcium than others	"It told me how foods with cheese often have one bones and milk has three bones."
		<ol> <li>that there are calcium-rich foods in all of the food groups</li> </ol>	"It helped which foods have a lot of calcium and some don't have calcium at all."

**Table 1.** List of computer games by session with accompanying learning objectives and examples of responses from students that reflect achievement of objectives

Session	Game title	Objectives	Examples of responses reflecting achievement of objectives (as recorded by students in the intervention)
3	No Bones About It	<ol> <li>The student will:         <ol> <li>be aware of various milk-based high-calcium options</li> <li>be aware of other beverage options that are good calcium choices</li> <li>be reassured that there are other calcium-rich beverage choices for those who do not drink milk</li> <li>have clarification on common misunderstandings about milk</li> </ol> </li> </ol>	"It helped me learn I can drink milk low fat milk and get enough calcium" "It Showed me my other choices for calcium other than just milk"
4	Build A Meal	<ul> <li>The student will:</li> <li>1. be able to plan a calcium-rich meal that he/she would enjoy, consisting of familiar and realistic choices</li> <li>2. understand that even products with small amounts of calcium can contribute</li> </ul>	"It helped me learn what combos of foods are a good source of calcium." "It helped you know what you should eat in one meal to git the calcium you need."
5	Kitchen Explorer	<ul><li>The student will be able to:</li><li>1. identify high-calcium items available at home, and begin to plan for other needed items</li></ul>	"We need to buy more Calcum rich foods." "It taught me I have a lot of calcium rich foods at home."

**Table 1.** List of computer games by session with accompanying learning objectives and examples of responses from students that reflect achievement of objectives

Session	Game title	Objectives	Examples of responses reflecting achievement of objectives (as recorded by students in the intervention)
	Advanced Calcium Concentration	<ul><li>The student will be able to identify that:</li><li>1. some foods contain more calcium than others</li><li>2. there are calcium-rich foods in all the food groups</li></ul>	"which foods have high or low calcium" "By helping me find the 0, 1, 2, 3 bone foods."
6	Food For The Day	<ul> <li>The student will:</li> <li>1. be able to plan a calcium-rich meal that he/she would enjoy, consisting of familiar and realistic choices</li> <li>2. understand that even products with small amounts of calcium can contribute</li> </ul>	"It helped me decide which foods I can choose from to get healthy meals."
	Calcium Countdown	<ul><li>The student will be able to:</li><li>1. assess dietary intake as it relates to calcium food sources</li><li>2. identify ways to improve calcium intake</li></ul>	"I learned that I usually get enough calcium in my diet." "It helped me know if I got enough calcium yesterday."

Category Number	Category Title	Category Description	Example (as recorded by student)
1	Calcium-rich food	Foods or beverages which contain greater than or equal to 200 milligrams of calcium per serving (e.g. 2-3 bone foods)	"milk," "cheese," "yogurt," "sardines," "milkshakes"
2	Lower calcium food	Foods or beverages with 199-50 milligrams of calcium per serving (e.g. ½-1 bone foods)	"broccoli," "beans," "ice cream," "mixed greens"
3	Healthy, not specific to calcium	Foods that are typically regarded as "healthy," but would not contribute meaningful amounts of calcium to the diet	"vegetables," "eggs," "fruit," "meat"
4	Less than desirable choice	Foods or beverages that are typically regarded as "unhealthy" and that do not contribute meaningful amounts of calcium to the diet	"fried food," "cream cheese," "cake"
5	Usually consumed with calcium-rich food	Foods or beverages that are usually consumed with a calcium-rich food source; however, it was not specified whether or not this food was consume with a calcium-rich food source	"cereal," "oatmeal," "nachos"
6	Phrase indicating inability to answer	Phrases that suggested the student could not respond to the question regarding foods to improve calcium intake	"don't know," "I don't want a plan right now"
7	Phrase related to No Bones About It!	Phrases regarding a positive phrase related to food, but did not mention a specific food	"food that have calcium in it"
8	Phrase not related to No Bones About It!	Phrases that did not relate to any of the content mentioned in the <i>No Bones</i> <i>About It</i> ! intervention	"every food I can get my hands on"
9	No response	This particular section of the Reflection worksheet was completely blank	N/A

**Table 2.** Description of action plan categories and corresponding examples for the responses regarding foods that will help improve calcium in the diet.

Category Number	Category Title	Category Description	Example (as recorded by student)
1	Logical plans for improving calcium intake—related to parent or caregiver	Indicates a specific action that would that would contribute calcium to the diet and requires assistance from a parent or caregiver	"have my mother buy calcium rich foods"
2	Logical plans for improving calcium intake—self-directed	Indicates a specific action that would contribute calcium to the diet without assistance from a parent or caregiver	"DRINK Milk & Chocolate milk"
3	Logical plans for improving calcium intake—related to parent or caregiver (inferred)	Indicates an action that may help improve calcium intake with the assistance of a parent or caregiver, but is not specific to calcium	"Tell my mother to go and buy all that food"
4	Logical plans for improving calcium intake—self-directed (inferred)	Indicates an action that may help improve calcium intake without the assistance of a parent or caregiver, but is not specific to calcium	"Get them at the store"
5	Logical plans for improving bone mass— self-directed	Indicates an action that would improve bone mass other than through calcium intake	"get exercice"
6	Positive plan, but not specific to calcium	A positive plan is described, but the plan is not related to improving calcium intake or bone mass	"Keep some snacks with me"
7	Response indicated no interest or lack of direction to proceed	The response indicated that there was no interest in developing a plan of action or that the student did not know how to develop a plan	"I don't really need a plan I get enough calcium already"
8	No Response	This particular section of the My Action Plan worksheet was completely blank	N/A

**Table 3.** Description of action plan categories and corresponding examples for the responses regarding actions<sup>a-c</sup> that will help improve calcium in the diet.

<sup>a</sup> Categories 1, 2, and 5 address personal factors
<sup>b</sup> Categories 1, 3, 5, and 6 address skills
<sup>c</sup> Categories 3, 4, and 6 address environmental factors/family support

Session Number	Total Population	Working Sample	Total
	<	n (%)	>
2	2,110 (14.6)	232 (14.8)	2,342 (14.6)
3	2,549 (17.6)	272 (17.4)	2,821 (17.6)
4	2,552 (17.7)	282 (18.0)	2,834 (17.7)
5	2,640 (18.3)	284 (18.1)	2,924(18.2)
6	2,435 (16.8)	264 (16.8)	2,699 (16.8)
7	2,169 (15.0)	233 (14.9)	2,402 (15.0)
Total	14,455 (100.0)	1,567 (100.0)	16,022 (100.0)

**Table 4.** Comparisons of session number for collected reflection
 worksheets from the total population to the working sample<sup>1</sup>

 $x^2$ =.229 df=5 *p*=.99 <sup>1</sup>The *No Bones About It*! intervention was completed in six U.S. states and included six intervention sessions.

 
 Table 5. Comparisons of gender for collected reflection worksheets
 from the total population to the working sample<sup>1</sup>

Gender	Total Population	Working Sample	Total
	<	n (%)	>
Male	5,940 (41.1)	655 (41.8)	6,595 (41.2)
Female	7,776 (53.8)	836 (53.4)	8,612 (53.8)
Unknown <sup>2</sup>	737 (5.1)	76 (4.9)	813 (5.1)
Total	14,453 (100.0)	1,567 (100.0)	16,020 (100.0)

 $x^2$ =.395 df=2 *p*=.821 <sup>1</sup> The *No Bones About It!* intervention was completed in six U.S. states and included six intervention sessions.

<sup>2</sup>Gender classification was not clear, not specified, or both genders were selected.

the total population to the working sample				
State	Total Population	Working	Total	
	ropulation	Sample		
	<	n (%)	>	
AZ	1,518 (10.5)	167 (10.7)	1,685 (10.5)	
CA	2,480 (17.2)	257 (16.4)	2,737 (17.1)	
HI	2,373 (16.4)	257 (16.4)	2,630 (16.4)	
IN	2,718 (18.8)	297 (19.0)	3,015 (18.8)	
NV	1,014 (7.0)	107 (6.8)	1,121 (7.0)	
OH	4,349 (30.1)	482 (30.8)	4,831 (30.2)	
Total	14,452 (100.0)	1,567 (100.0)	16,019 (100.0)	

**Table 6.** Comparisons of state for collected reflection worksheets from
 the total population to the working sample<sup>1</sup>

 $x^2$ =.805 df=5 *p*=.977 <sup>1</sup> The *No Bones About It!* intervention was completed in six U.S. states and included six intervention sessions.

Table 7. Comparisons of responses to the statement "I liked this lesson" for collected reflection worksheets from the total population to the working sample<sup>1</sup>

I I			
Possible	Total Population	Working Sample	Total
Responses			
	<	n (%)	>
Disagree	1,500 (10.4)	170 (10.8)	1,670 (10.4)
Agree	8,015 (55.5)	855 (54.6)	8,870 (55.4)
Undecided	3,442 (23.8)	376 (24.0)	3,818 (23.8)
No Answer	1,492 (10.3)	166 (10.6)	1,658 (10.4)
Total	14,449 (100)	1,567 (100)	16,016 (100)
$X^2 = .622$	df=3	<i>p</i> =.891	

<sup>1</sup> The No Bones About It! intervention was completed in six U.S. states and included six intervention sessions.

the working sample				
Possible	Total Population	Working Sample	Total	
Responses				
	<	n (%)	>	
Disagree	1,273 (8.8)	135 (8.6)	1,408 (8.8)	
Agree	9,918 (68.6)	1,086 (69.3)	11,004 (68.7)	
Undecided	1,769 (12.2)	184 (11.7)	1,953 (12.2)	
No Answer	1,488 (10.3)	162 (10.3)	1,650 (10.3)	
Total	14,448 (100)	1,567 (100)	16,015 (100)	
X <sup>2</sup> =.445	df=3	<i>p</i> =.931		

**Table 8.** Comparisons of responses to the statement "I learned some new information" for collected reflection worksheets from the total population to the working sample<sup>1</sup>

<sup>1</sup> The *No Bones About It!* intervention was completed in six U.S. states and included six intervention sessions.

**Table 9.** Comparisons of collected reflection worksheets with feedback in the upper portion of the from the total population to the working sample<sup>1</sup>

Dialik/reeuback	Total Population	working Sample	Total
	<	n (%)	>
Blank upper portion of form	1,421 (9.8)	142 (9.1)	1,563 (9.8)
At least some type of feedback in upper portion of form	13,022 (90.2)	1,423 (90.9)	14,445 (90.2)
Total	14,443 (100)	1,565 (100)	16,008 (100)
$X^2 = .938$	df=1	<i>p</i> =.333	

<sup>1</sup> The *No Bones About It!* intervention was completed in six U.S. states and included six intervention sessions.

the lower portion of the from the total population to the working sample <sup>1</sup>				
Blank/Feedback	Total Population	Working Sample	Total	
Blank lower portion of form	< 3,075 (21.3)	n (%) 321 (20.5)	3,396 (21.2)	
At least some type of feedback in lower portion of form	11,376 (78.7)	1,246 (79.5)	12,622 (78.8)	
Total	14,451 (100)	1,567 (100)	15,991 (100)	
$v^2$ 522	df_1	n- 165		

Table 10. Comparisons of collected reflection worksheets with feedback in

 $X^2$ =.533 df=1 p=.465 <sup>1</sup> The *No Bones About It!* intervention was completed in six U.S. states and included six intervention sessions.

**Table 11.** Comparisons of gender for collected action plan worksheets
 from the total population to the working sample<sup>1</sup> for session 5

Gender	Total Population	Working Sample	Total
	<	n (%)	>
Male	978 (43)	251 (44)	1,229 (100)
Female	1,296 (57)	320 (56)	1,616 (100)
Total	2,274 (100)	571 (100)	2,845 (100)

 $x^2$ =.168 df=1 *p*=.682 <sup>1</sup> The *No Bones About It!* intervention was completed in six U.S. states and included six intervention sessions.

from the total population to the working sample for session 5								
State	Total Population	Working Sample	Total					
	<	n (%)	>					
AZ	383 (16)	94 (16)	477 (100)					
CA	400 (17)	104 (17)	504 (100)					
HI	357 (15)	87 (15)	444 (100)					
IN	434 (18)	106 (18)	540 (100)					
NV	145 (6)	35 (6)	180 (100)					
OH	640 (27)	171 (29)	811 (100)					
Total	2,359 (100)	597 (100)	2,956 (100)					

 
 Table 12. Comparisons of state for collected action plan worksheets
 from the total nonulation to the working sample<sup>1</sup> for session 5

 $x^2$ =.799 df=5 *p*=.977 <sup>1</sup> The *No Bones About It!* intervention was completed in six U.S. states and included six intervention sessions.

Table 13. Comparison of affirmative responses to the statement "I liked this lesson" as recorded on reflection worksheets by session and by gender

			"I liked this lesson"	
Gender	Session	n	n	(%)
Male	1	84	79	(94)
	2	94	79	(84)
	3	103	90	(87)
	4	91	80	$(88)^{1}$
	5	86	75	(87)
	6	88	75	$(85)^2$
Female	1	52	45	(87)
	2	71	61	(86)
	3	78	65	(83)
	4	82	59	(72)
	5	76	61	(80)
	6	56	34	(61)

$$p^{1}p=0.008$$
  
 $p^{2}p=0.001$ 

Condor	Session	2	"I learned some new information"		
Gender	36881011	11	11	(70)	
Male	1 2 2	103 111	99 104	(96) (94)	
	3	122	111	(91)	
	4	121	114	(94)	
	5	106	92	(87)	
	6	111	100	$(90)^{1}$	
Female	1	62	58	(94)	
	2	91	81	(89)	
	3	86	77	(90)	
	4	91	79	(87)	
	5	81	67	(83)	
	6	68	51	(75)	

**Table 14.** Comparison of affirmative responses to the statement "I learned some new information" as recorded on reflection worksheets by session and by gender

<sup>1</sup>p=0.007

Session Number	Game title <sup>1</sup>	No Evidence of Comprehension Expressed	Evidence of Comprehension Expressed	Total
		<	n (%)	>
1	Calcium Concentration	92 (40)	140 (60)	232 (100)
	Food Court	113 (49)	119 (51)	232 (100)
2	Calcium Countdown	115 (42)	157 (58)	272 (100)
	Corner Grocery	121 (44)	151 (55)	272 (100)
3	No Bones About It!	122 (43)	161 (57)	283 (100)
4	Build A Meal	101 (36)	183 (64)	284 (100)
5	Kitchen Explorer	101 (38)	163 (62)	264 (100)
	Advanced Calcium Concentration	115 (44)	149 (56)	264 (100)
6	Food for the Day	97 (42)	136 (58)	233 (100)
	Calcium Countdown	123 (53)	110 (47)	233 (100)

**Table 15.** Evidence of comprehension in response to the games as recorded on the reflection worksheets by session

<sup>1</sup>Sessions included one or two games.

Session	Game title <sup>1</sup>	Males			Females		
		n	n	(%)	n	n	(%)
1	Calcium Concentration	115	78	(68)	80	46	(58)
	Food Court		62	(54)		39	(49)
2	Calcium Countdown	142	90	(63)	113	61	(54)
	Corner Grocery		86	(61)		61	(54)
3	No Bones About It!	149	96	(64)	117	62	(53)
4	Build A Meal	147	101	(69)	126	77	(61)
5	Kitchen Explorer	139	96	(69)*	115	63	(55)
	Advanced Calcium Concentration		87	(63)		61	(53)
6	Food for the Day	131	88	(67)**	93	45	(48)
	Calcium Countdown		72	(55)*		35	(38)

Table 16. Evidence of comprehension of objectives of the games as recorded on reflection worksheets by session and by gender

<sup>1</sup>Sessions included one or two games. \* $p \le .05$ , \*\* $p \le .01$  comparing males and females

Session	Game title <sup>a</sup>	]	Males			Females	
		n	n	(%)	n	n	(%)
1	Calcium Concentration	115	6	(5)	80	7	(9)
	Food Court		8	(7)		6	(8)
2	Calcium Countdown	142	10	(7)	113	10	(9)
	Corner Grocery		11	(8)		5	(4)
3	No Bones About It!	149	13	(9)	117	14	(12)
4	Build A Meal	147	13	(9)	126	15	(12)
5	Kitchen Explorer	139	17	(12)	115	15	(13)
	Advanced Calcium Concentration		22	(16)		12	(10)
6	Food for the Day	131	20	(15)	93	24	$(26)^{1}$
	Calcium Countdown		15	(12)		21	$(23)^2$

 
 Table 17. Responses recorded on reflection worksheets that reflected no evidence of learning as
 related to game objectives by session and by gender

<sup>a</sup>Sessions included one or two games. <sup>1</sup>p=0.050; <sup>2</sup>p=0.025 comparing males and females

Gender	n	Total Foods	s to Start	Total Calciun Sta	n Foods to rt
		Mean + SD	p-value	Mean + SD	p-value
Males	253	$3.0 \pm 1.7$	< 0.0001	$2.6 \pm 1.7$	< 0.0001
Females	317	$3.8 \pm 2.1$		$3.1 \pm 1.7$	

**Table 18.** Average of total foods and total calcium foods recorded on action plan worksheets by gender

	Total Sample						3 (	or More I	Foods	
Recorded in	Fer (n=	nale 317)	M (n=2	ale 253)		Fen (n=2	nale 200)	M (n=	ale 125)	
Plan	n	(%)	n	(%)	p-value	n	(%)	n	(%)	p-value
At least one calcium food	286	(90)	218	(86)	0.133					
Milk	224	(71)	169	(67)	0.322	178	(89)	111	(89)	0.955
Yogurt	145	(46)	66	(26)	< 0.0001	123	(61)	54	(43)	0.001
Cheese	145	(46)	94	(37)	0.039	123	(61)	73	(58)	0.579
Soy	25	(8)	10	(4)	0.052	24	(12)	8	(6)	0.099
Orange Juice	81	(26)	41	(16)	0.007	76	(38)	33	(26)	0.031

**Table 19.** Calcium foods recorded on action plan worksheets from the total sample and from students recording more than three foods by gender

gender					
Recorded in	Female (n=317)		Male (n=253)		p-value
plan	n	(%)	n	(%)	
At least one plan of action	242	(76)	161	(64)	0.001
Plan addresses:					
Personal factors	229	(72)	157	(62)	0.010
Skills	150	(47)	95	(39)	0.050
Environment/ family support	22	(7)	9	(4)	0.077

**Table 20.** Plans of action recorded on the action plan worksheets by gender

8					
Recorded in plan	Female (n=317)		M (n=2	ale 253)	
	n	(%)	n	(%)	p-value
At least one calcium food recorded	286	(90)	218	(86)	0.133
At least one plan of action	242	(76)	161	(64)	0.001
Well developed plan	225	(71)	152	(60)	0.006

Table 21. Responses indicating a well developed plan	<sup>i</sup> by
gender	

<sup>a</sup>Well developed plans include at least one calcium food recorded and at least one plan of action.

Gender		To San	otal	At lea calcius reco	ast one m food orded	At lea pla act reco	ast one n of tion orded	W deve pl	'ell loped an
		n	(%)	n	(%)	n	(%)	n	(%)
Females				(n=	302)	(n=	302)	(n=	302)
	Today	78	(26)	72	(26)	59	(25)	54	(25)
	This week	106	(35)	96	(35)	87	(36)	82	(37)
	Next week	46	(15)	39	(14)	39	(17)	34	(15)
	Later	57	(19)	55	(20)	44	(19)	43	(20)
	Not Ready	15	(5)	13	(5)	7	(3)	6	(3)
	p-value			0.3	305	0.0	025	0.0	)42
Males				(n=	241)	(n=	214)	(n=	241)
	Today	76	(31)	66	31	52	33	49	32
	This week	60	(25)	56	26	50	31	47	31
	Next week	24	(10)	22	10	16	10	16	11
	Later	45	(19)	40	19	27	17	26	17
	Not Ready	36	(15)	28	13	15	9	13	9
	p-value			0.2	231	0.0	001	0.0	001

Table 22. Time to start an action plan for the total sample, calcium foods, plans of action, and well developed plan<sup>a</sup> by gender

 $^{1}p<0.0001$ , comparing males and females <sup>a</sup>Well developed plans include at least one food recorded and at least one plan of action.



**Figure 1.** Outline of the components of the *No Bones About It*! school-based intervention among 6<sup>th</sup> grade students in six states: Arizona, California, Hawaii, Indiana, Nevada, Ohio.



Figure 6. Outline of categorization of foods recorded on the My Action Plan worksheets in the final two sessions of the *No Bones About It!* intervention.



**Figure 7.** Outline of categorization of plans recorded on the My Action Plan worksheets in the final two sessions of the *No Bones About It!* intervention.



**Figure 4.** The calcium knowledge pretest scores of the students in the intervention school compared to the students in the control school.



Figure 5. The calcium knowledge post-test scores of the students in the intervention school compared to the students in the control school.

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**Figure 6.** Responses from students indicating when students intend to start their initial action plans. In Session 5 all were new, but not for session 6 (hence the smaller number).

	Stude	ent Name:		Appendix 1
Session 1	(Circle	One)		Date:
Reflections	Female	Male	/	/
			Month E	Day Year

This lesson developed the following ideas. Reflect on their importance to you. Write a sentence or two about your reflections.

- Osteoporosis is a disease that results from losing calcium from bones, making them weak and fragile.
- Bone density means the actual amount of bone that a person has. If calcium is lost, bones are less dense.
- Calcium loss from bones can be observed in x-rays.
- Getting enough calcium in our diet is particularly important to growing teenagers.
- Some foods have more calcium than others.

I liked this lesson. (Circle your response.)	Agree	Disagree	Undecided
I learned some new information.	Agree	Disagree	Undecided
How did the <i>Calcium Concentration</i> game rich foods?	help your ur	nderstanding o	of calcium-
How did the <i>Food Court</i> game help your un snacks?	nderstandinę	g of calcium-ri	ch drinks and

	Stud	ent Name:		Appendix 1
Session 2	(Circle	One)		Date:
Reflections	Female	Male	/	/
			Month	Day Year

This lesson developed the following ideas. Reflect on their importance to you. Write a sentence or two about your reflections.

- Our bodies need calcium every day to build strong bones.
- Calcium is used in many different ways in the body.
- As calcium is used up in our body, it must be replaced.
- Calcium digestion requires the presence of vitamin D.
- Milk and other dairy products, like cheese and yogurt, are good bone foods; but even foods with just a little calcium add up.

I liked this lesson. (Circle your response.)	Agree	Disagree	Undecided
I learned some new information.	Agree	Disagree	Undecided
How did <i>Calcium Countdown</i> help your une get from the foods you eat?	derstanding	of how much	calcium you
How did the <i>Corner Grocery</i> game help yo foods available at the grocery store?	ur understai	nding of the ca	alcium-rich

	Stude	ent Name:		Appendix 1
Session 3	(Circle	One)		Date:
Reflections	Female	Male	/	/
			Month [	Jay Year

This lesson developed the following ideas. Reflect on their importance to you. Write a sentence or two about your reflections.

- The shape of our body is determined by the shape of our skeleton.
- Our body dimensions will usually be pretty much the same as those of our parents and grandparents.
- The food pyramid is a guide for helping us select the foods we eat and drink daily.
- Milk and milk products are one way for people to get a lot of calcium in a single serving.
- Being different from others is okay. Choosing calcium-rich food is important even if others don't, because we are concerned about our health.

I liked this lesson. (Circle your response.)	Agree	Disagree	Undecided
I learned some new information.	Agree	Disagree	Undecided
How did the <i>No Bones About It</i> game help calcium-rich drinks available?	your unders	standing of the	e different

	Student Name:	Appendix 1
Session 4	(Circle One)	Date:
Reflections	Female Male	/ / Month Day Year

This lesson developed the following ideas. Reflect on their importance to you. Write a sentence or two about your reflections.

- Dieting may affect the health of our bones.
- High calcium foods that taste good are easy to find.
- Calcium loss begins at about age 30 for both men and women.
- By age 75, over half the women in this country have had a fracture due to bone loss.

I liked this lesson. (Circle your response.)	Agree	Disagree	Undecided
I learned some new information.	Agree	Disagree	Undecided
How did the <i>Build A Meal</i> game help your that can be built by combining foods?	understandi	ng of calcium	-rich meals

	Student	Name:	Appendix 1
Session 5	(Circle One	e)	Date:
Reflections	Female	Male	/ / Month Day Year

This lesson developed the following ideas. Reflect on their importance to you. Write a sentence or two about your reflections.

- There are different situations in life that cause us to lose calcium from our bones, including pregnancy, menopause, aging, and sickness.
- At home, we can be selective to get the foods and drinks that are high sources of calcium.
- Being committed to getting adequate calcium in our diet, now and in the future, helps to ensure strong bones.
- Being committed to getting adequate exercise, now and in the future, helps to ensure strong bones.

I liked this lesson. (Circle your response.)	Agree	Disagree	Undecided
I learned some new information.	Agree	Disagree	Undecided
How did the <i>Kitchen Explorer</i> game help ye foods you have at home?	our understa	anding of calci	um-rich
How did the Advanced Calcium Concentra calcium-rich foods?	<i>tion</i> game h	elp your unde	rstanding of

ircie One)	Date:
Male	/ / Month Day Year
;	e Male

This lesson developed the following ideas. Reflect on their importance to you. Write a sentence or two about your reflections.

- During our teen years, we need 1300 mg of calcium, or 130% of the Daily Value (DV) found on food labels. As adults, we will need 1000 mg or 100% DV.
- We can eat fortified foods or combine milk and cheese with other foods to help ensure an adequate calcium supply in our diet.
- Low bone density is found in some males and females of all ages.
- Being committed to getting adequate calcium in our diet, now and in the future, helps ensure strong bones.

I liked this lesson. (Circle your response.)	Agree	Disagree	Undecided		
I learned some new information.	Agree	Disagree	Undecided		
How did the <i>Food For The Day</i> game help your understanding of calcium-rich meals that can be built by combining foods?					
How did <i>Calcium Countdown</i> help your understanding of how much calcium you get from the foods you eat?					

Student Name	Appendix 2
(Circle One)	Date:
Female Male	/ / Month Day Year

# **MY ACTION PLAN**

By now, you may want to make an action plan for boosting the calcium in your diet, using the ideas you've learned.

• Here are the foods I'd like to start with.

**Session 5** 

• This is what I need to do to carry out my plan.

• This is when I plan to start (check one):

\_\_\_\_ Today

\_\_\_\_ This week

Next week

\_\_\_\_ Later

\_\_\_\_\_ I am not ready to start my action plan.

Student Name:	Appendix 2
(Circle One)	Date:

**Session 6** 

(Circle One) Female Male Date:

1 Month Day Year

# **MY ACTION PLAN**

If you made an Action Plan earlier in your portfolio, now is the time to check your progress in the left column below. If you are ready to start an action plan, use the right column.

Progress on my Action Plan	I am ready to make an Action Plan
• Since I started my action plan, I'm eating or drinking more calcium-rich foods. Some of these foods are	Here are the foods I'd like to start with.
	<ul> <li>This is what I need to do to carry out my plan.</li> </ul>
Other things I might do to improve my plan are	
	• This is when I plan to start (check one):
	Today
	This week
	Next week
	Later
	I am not ready to start my action plan.

# Keep Up the Good Work!

		Appendix 3
(Circle	One)	Today's Date:
Female	Male	/// Month Day Year

# Calcium Quiz (Knowledge Pre-test and Post-test)

Directions: On your paper please circle **one** answer to each question.

- 1. Which <u>one</u> of the following statements is **false**?
  - a. Teens (ages 11–13) need more calcium than adults.
  - b. Teens (ages 11–13) need 130% of the Daily Value of calcium.
  - c. Calcium is especially important in the teen years (ages 11–13) because the body is growing fast.
  - d. Teen girls (ages 11–13) need less calcium than teen boys (ages 11–13) because girls usually have smaller bones than boys.
- 2. Which <u>one</u> of the following statements is **false**?
  - a. We need calcium every day to replace calcium lost through our kidneys.
  - b. We need vitamin D plus calcium to build strong bones.
  - c. We need lots of calcium to build our muscles.
  - d. We need calcium for our heart and blood.
- 3. Which <u>one</u> of the following statements is **false**?
  - a. People don't need exercise for healthy bones once they retire from their jobs.
  - b. Teens (ages 11–13) need exercise equal to 10,000 steps a day.
  - c. People with bone loss still need to exercise.
  - d. Exercise includes playing, doing housework, or working in a garden
- 4. Which <u>one</u> of the following meals does **not** have about 1/4<sup>th</sup> of the calcium teens (ages 11–13) need each day?
  - a. a carton of milk and a hamburger
  - b. a carton of yogurt and a hamburger
  - c. a glass of calcium-fortified orange juice and a hamburger
  - d. a double hamburger and French fries
- 5. Which <u>one</u> of the following statements is **false**?
  - a. All foods have at least 1% or 2% of the calcium we need each day.
  - b. Adding flavors (chocolate or strawberry) to milk doesn't change the amount of calcium.
  - c. Foods can be fortified with calcium.
  - d. Fat free milk, low fat milk, and whole milk have about the same amounts of calcium.
- 6. Which <u>one</u> of the following statements is **false**?
  - a. The amount of fruits and vegetables we eat controls how tall we'll be.
  - b. Calcium and other minerals are important in bone building.
  - c. Fat is a source of body energy.
  - d. The Daily Value of a nutrient is found on food labels.

Appendix 3

- 7. Which <u>one</u> of the following statements is **true**?
  - a. Physical activity is only important in the teen years and early twenties.
  - b. People need physical activity to have strong skeletons.
  - c. People who are not physically active while they're growing will be shorter than those who are physically active.
  - d. An adult who does little physical activity need not worry about breaking bones.
- 8. Which one of the following statements is true?
  - a. High bone density increases your chances of getting osteoporosis.

b. A person with high bone density does not need to replace calcium leaving the body. c. After age 30, calcium is needed for bone growth.

- d. By age19 most people have completed about 95% of their bone growth.
- 9. Which one of the following statements is true?
  - a. Dieting helps build bone density.
  - b. Friends are a reliable source of information about diet and health.
  - c. Friends often influence what we eat.
  - d. We can look like an athlete or movie star by eating what they eat.
- 10. Which one of the following foods is not a source of calcium?
  - a. ice cream.
  - b. canned salmon and sardines
  - c. green, leafy vegetables
  - d. carrots
- 11. Which <u>one</u> of the following statements is **false**?
  - a. Osteoporosis involves loss of calcium from the bones.
  - b. Osteoporosis is found only in older women.
  - c. Risk of osteoporosis can be decreased with diet and exercise.
  - d. Osteoporosis often starts with poor diet in the teen years.
- 12. Which <u>one</u> of the following statements is **false**?
  - a. Too little vitamin D can cause bone loss.
  - b. Hormonal changes during menopause can cause bone loss
  - c. As we grow older, changes in how our body uses calcium can cause bone loss.
  - d. Too much fat in the diet can cause bone loss.
- 13. Which <u>one</u> of the following statements is **false**?
  - a. Osteoporosis is often first noticed when fractures occur in the hip, spine, or wrist.
  - b. Osteoporosis can cause our bodies to become bent and misshapen.
  - c. Both males and females should be concerned about osteoporosis throughout their lives.
  - d. Osteoporosis is commonly found in people who get enough vitamin D.

Appendix 3

- 14. Which <u>one</u> of the following statements is **false**?
  - a. Bones that look whiter in x-rays are denser than bones that look darker.
  - b. X-rays can show changes in bone density.
  - c. As people get older, their bones usually look whiter in x-rays.
  - d. X-rays of older people may show small fractures due to fragile bones.
- 15. Which <u>one</u> of the following statements is **false**?
  - a. Body Mass Index is based on measurements of a person's height and weight.
  - b. A person with a Body Mass Index of 25 and above may be overweight.
  - c. A person with a Body Mass Index of 14 and below is of normal weight.
  - d. Body Mass Index helps doctors assess a person's weight.
- 16. Which <u>one</u> of the following statements is **false**?
  - a. If children and teenagers don't have calcium in their diet, their bones will be built out of other minerals.
  - b. If a mother doesn't get enough calcium during pregnancy, the baby will take the calcium it needs from her bones.
  - c. If adults are ill, their bodies may not get enough calcium.
  - d. If individuals don't get enough calcium when they're young, their spine may compress (shorten and curl) in later years.
- 17. Our height is **not** determined by:
  - a. our age.
  - b. the physical activity we get.
  - c. being male or female.
  - d. the genes we inherited.
- 18. Which <u>one</u> of the following statements is **false**?

a. Foods we eat determine the kinds of nutrients that our bodies have to build, regulate, and produce energy.

- b. Foods at the tip of the Food Guide Pyramid have lots of calcium.
- c. A person who eats at a fast-food restaurant can build a meal that has lots of calcium.
- d. Keeping a record of the food we eat can help us find out the amount of calcium in our diets.
- 19. If people live to age 70, which <u>one</u> of the following statements is true?
  - a. Their bone density will be the same as when they were 30.
  - b. Their calcium intake should be the same as when they were age 12.
  - c. Their family genes can affect their bone density.
  - d. Every year they should reduce the amount of daily exercise they do.
- 20. Which <u>one</u> of the following statements is **true**?
  - a. Bone loss begins at about age 30 for men and age 20 for women.
  - b. By age 50 over half the women in this country have had a fracture due to bone loss.
  - c. Women on average have larger amounts of calcium in their bones than men.
  - d. Calcium loss from bones causes bones to become weaker in both men and women.