Effects of Using Tactile Food Pyramids With Visually Impaired Students

ABSTRACT

The Tactile Food Pyramid (Primary and Secondary) is an educational aid adapted with permission from The Nutrition Center of the U.S. Department of Agriculture (USDA). The desktop prototypes that were field tested were adapted with different embossed textures on each of the food groups and with a solid tactile line for the outline of the food pyramids. The text was reproduced in large print and braille.

Field test sites had 3 months to use the prototypes and complete the evaluation forms.

This poster has three sections: Educators section, Primary Pyramid section, and Secondary Pyramid section. Student demographics are described within the corresponding pyramid section. The SPSS® Statistics 17.0 software was used for descriptive statistics. Valid percent represents sample size on a given question.

EDUCATORS

Fifteen educators field tested the Tactile Food Pyramid. Some educators participated in both primary and secondary. The educators used the prototypes in public schools (60%), residential schools for the visually impaired and blind (27%), and through service/outreach centers (13%).

The educators were trained and experienced professionals. Teachers of the visually impaired (46.7%) represented the largest group of participants. They were followed by classroom teachers (20%) and intervention specialists (13.3%). Special education teachers, family and consumer science teachers (FACS), and primary teachers had equal representation (6.7%).

Before using the Tactile Food Pyramid, 47.6% of the educators used other materials to teach student(s) about nutrition and how to make healthy food choices. The materials included supplemental workbooks, odds and ends, and Good Enough to Eat by Lizzy Rockwell. Only 13.3% of the learners' educational teams (family, friends, teachers, specialists) incorporated the Tactile Food Pyramid in their students' IEP or IFSP.

Not all educators used the website www.MyPyramid.gov as recommended in the documentation. Of the 11 who did, 72.7% found the website to be useful.

PRIMARY TACTILE FOOD PYRAMID

DESCRIPTION

The Primary Tactile Food Pyramid consists of two, heavy sheets of paper (pyramid sheet and cut/paste sheet), both printed and embossed. The pyramid sheet contains the outline of the food groups with large print and braille labels. The cut/paste sheet contains the colored and textured sections of the pyramid and a key to show students where sections are to be pasted onto the pyramid.

METHOD

Students constructed the Primary Tactile Food Pyramid during their unit on nutrition, gradually building their personal pyramid as they progressed through the food groups. Teachers were instructed to use the tactile pyramids as an educational aid while following national guidelines or state educational standards. They were instructed to visit www.MyPyramid.gov for additional and creative ideas. Teachers asked students a series of nutritional questions at the end of the unit to determine how many improved their nutritional knowledge.

PARTICIPANTS

Forty-two students used the primary pyramid; however, evaluators did not report data for every student on every question. The chronological age of the youngest student was 6 years old and the oldest was 18 years old (N=42, M=12.64 years). The cognitive age of the youngest student was 1 year old and the oldest was 14 years old (N=41, M=6.31 years).

Height and weight information validated the need for the product. According to the Centers for Disease Control and Prevention (n.d.), for children and teens, BMI (Body Mass Index) is age- and sex-specific and is often referred to as **BMI-for-age**. After BMI is calculated, the BMI number is plotted on the CDC BMI-for-age growth charts (for either girls or boys) to obtain a percentile ranking. Percentiles are the most commonly used indicator to assess the size and growth patterns of individual children in the United States. The percentile indicates the relative position of the child's BMI number among children of the same sex and age. The growth charts show the weight status categories used with children and teens (underweight, healthy weight, overweight, and obese). See Table 1.

Table 1: Primary Weight Status Category

No. of Primary Students	Weight Status Category	Percentile Range
4	Underweight	< the 5th percentile
15	Healthy weight	5th percentile to <85th
1	Overweight	85th to < the 95th
7	Obese	Equal to or > the 95th

physically active at

A further breakdown by gender showed that 28% of the females (n=18) and 22% of males (n=9) who used the Primary Pyramid are obese. Of the student sample, 19 have eye-related diagnoses (cortical visual impairment and septo-optic dysplasia most prevalent) and 28 have physical and mental handicapping conditions (ADHD and autism most prevalent). Eleven students are regular print readers, nine are large print readers, six are braille readers, and 12 are non readers (N=38). Only one student is considered to be colorblind.

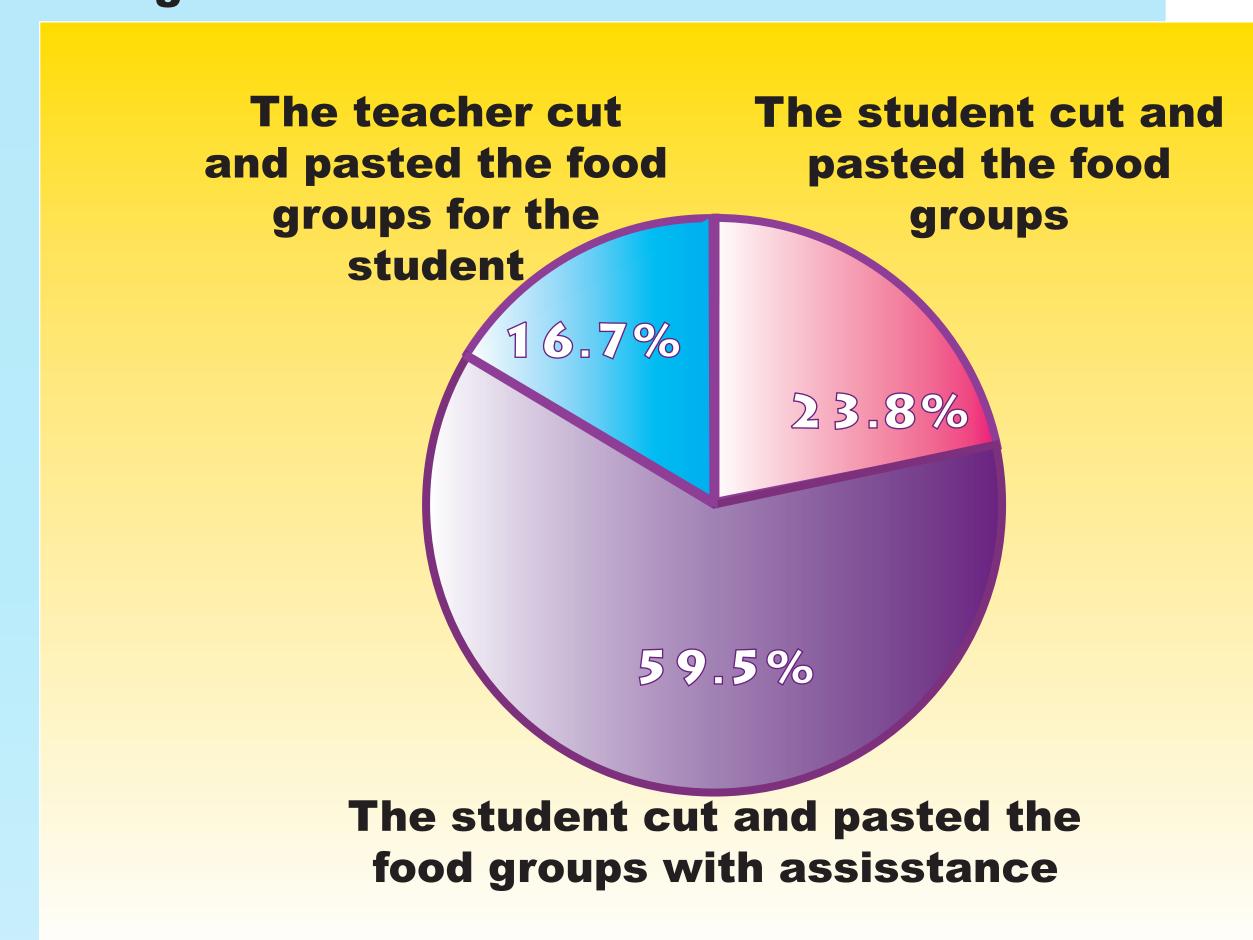
RESULTS

Color was critical to 33 of the 42 students. Thirty-one students (73.8%) found that the different colors of the food groups have sufficient contrast for them to distinguish and 21.4% said color did not apply to them. The participants submitted tactual contrast data on 41 students. The textures of the food groups had enough tactual contrast for 38 students (92.7%) to distinguish.

Teachers reported that the tactile lines were distinguishable enough to cut for 61.5% of the students and not for 38.5% (N=39). However, it is hard to say for sure that the tactile lines were distinguishable enough to cut as only 23.8% of the students cut and pasted the food groups independently, 59.9% cut and pasted the food groups with assistance, and 16.7% relied on the teacher or aide to do the tasks for them (N=42). See Chart 1. Six students used adapted scissors. The majority (59.5%) of the teachers felt a glue stick was not needed in the final product. See Chart 1.

Before using the TFP, only 38.1% primary students could name the food groups. **After** using the TFP, 69% primary students were able to name the food groups.

Chart 1: Are tactile lines distinguishable enough to cut?



Yes

51.3% 48.7%

51.3% 48.7%

76.3% 23.7%

60.5% 39.5%

After using the TFP with students, teachers asked a series of questions to see if their students learned to make the

healthier choice when presented with two options. See Table 2.

Table 2: Primary Nutrition Questions Question "What is the best choice, a fresh orange or a glass of orange juice?" Did the learner answer fresh orange? "What is the best choice, white bread or whole wheat bread?" Did the learner answer whole wheat bread?" "Which is healthier to drink, a glass of milk or a glass of Kool-Aid?" Did the learner answer milk? "What is the best choice, fried chicken or grilled chicken?" Did the learner answer grilled chicken?

Less than half (40.5%) of the primary students could estimate amounts of foods by using common objects (e.g., deck of cards, baseball) for comparison. Only 29.3% could identify a healthy source of oil (e.g., fish, nuts, canola oil). Although oils are not a food group, everyone needs some for good health.

A new and very important component of MyPyramid is that it encourages/includes physical activity as necessary to a happy and healthy lifestyle. It was exciting to see that 81.1% (N=42) students participated in physical activity while learning about nutrition. Many students (65.9%) are now able to discuss the benefits of being physically active with their teacher and peers.

CONCLUSION

The number of obese teens has tripled since 1980 (Allen, Tass, & Peterson, 2010). Our field test showed that more females are obese at a younger age but more males are obese during the teen years. Whether underweight, overweight, or obese, a total of 43% of the teens and 54.5% of younger students who participated in the field test are not classified healthy by the CDC. These findings verify the need for nutrition educational aids for young and teen students who have visual impairment and blindness. The field testers responded that the color and tactual properties of the prototypes met the needs of their students. The majority of the primary and secondary students answered the nutritional questions correctly. Both set of students, especially the secondary students, improved their ability to name the food groups. As a result of the field test, APH will research lesson plans published by MyPyramid to determine if some can be made accessible and to possibly produce them as future products.

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REFERENCES

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Allen, R., Tass, B., & Peterson, J. (2010). One school district's strategy to improve fitness levels: A fitness challenge. The Journal of Physical Education, Recreation & Dance, 81(3), 16-23.

SECONDARY TACTILE FOOD PYRAMID

DESCRIPTION

The Secondary Tactile Food Pyramid is a large print, desktop-sized, educational aid made of plastic. It is printed in full color with all braille, tactile lines, and textures created by the thermoform process.

METHOD

Teachers were instructed to use the tactile pyramids as an educational aid while following national guidelines or state educational standards. They were instructed to visit www.MyPyramid.gov for additional and creative ideas. At the end of the unit, teachers asked students a series of nutritional questions to determine how many improved their nutritional knowledge.

PARTICIPANTS

Twenty-two students used the secondary pyramid; however, evaluators did not report data for every student on every question. The chronological age of the youngest students was 14 years old and the oldest was 18 years old (N=22, M=16.04 years). The cognitive age of the youngest student was 2 years old and the oldest was 18 years old (N=21, M=11.80 years). Again, height and weight information validated the need for the product and the BMI-for-age percentiles were used to indicate the relative position of the teen's BMI number among others of the same sex and age.

See Table 3.

Table 3: Secondary Weight Status Category

No. of Secondary Students	Weight Status Category	Percentile Range	
1	Underweight	< the 5th percentile	
12	Healthy weight	5th percentile to < 85th	
1	Overweight	85th to < the 95th	
7	Obese	Equal to or > the 95th	

A further breakdown of the students by **gender showed that 25% of the females (N=8) and 38.5% of males (N=13) who used the Secondary Pyramid are obese**.

Of the student sample (N=22), 15 have eye-related diagnoses (cortical visual impairment and optic nerve hypoplasia most prevalent) and eight have physical and mental handicapping conditions (autism, cerebral palsy, and cognitive disability most prevalent). Eight students are regular print readers, six are large print readers, seven are braille readers, and two are non readers. One teacher responded that a student is both a regular reader and large print reader. Three students are colorblind.

RESULTS

Data was submitted on 19 of the 22 secondary students on color contrast. Fourteen (73.7%) found that the different colors of the food groups have sufficient contrast for them to distinguish. Two (10.5%) said there is not enough contrast, and three (15.8%) responded that the question does not apply to them. All (N=22) submitted data on tactual contrast of the food groups, and 95.5% responded that the tactual contrast is distinguishable.

Before using the TFP, 63.6% students could name the food groups. After field testing, 90.9% students were able to name the food groups. At the end of field testing, teachers answered a series of questions about their teen students' knowledge about nutrition. See Table 4.

Table 4: Teen Nutritional Knowledge

Question	Yes	No
Can the learner compare food labels to determine which foods contain higher or lower amounts of nutrients or calories?	59.1%	40.9%
Can the learner describe the importance of making food choices over several days to get enough different kinds of foods and nutrients?	81.8%	18.2%
Can the learner identify specific foods he/she needs to eat to meet the food group recommendations?	95.5%	4.4%
Can the learner estimate amounts of foods by using common objects for comparison?	59.1%	40.9%
Can the learner		

MyPyramid describe amounts and kinds of foods to meet the food group recommendations?

Can the learner describe amounts and kinds of foods to meet the food group recommendations?

54.5% 45.5%

Can the learner discuss the benefits of being physically active?

86.4% 13.6%

Although 86.4% of the 22 teens can discuss the benefits of being physically active, only 63% participated in physical activity while learning about the TFP. This is decidedly down from the Primary Pyramid participants.



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