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Early Childhood Health Education: A Nursing Perspective on Developmentally Based Teaching

Katie Yamanishi

University of Portland

ABSTRACT

Objective: This study was designed to expand the literature on health education in early life populations (ages 0-5) particularly regarding health education and development, through a nursing lens. This study focuses on ages 3 - 5-year-olds, also commonly referred to as preschoolers. Research indicates that low socioeconomic early life populations are at a high risk for childhood obesity, which poses a significant problem from a public health perspective.

Design: The nursing model, Assess, Diagnose, Plan, Implement, and Evaluate (ADPIE) and Piaget's cognitive development theory were used as a design framework. Children were interviewed through an "assess, teach, and evaluate" model for their understanding of fruits versus vegetables. Assessment questions were asked, an interactive test, "the sticker game" was played, and evaluative questions were assessed. Children who wanted to draw, were encouraged as an extra method of assessing development. By the end of the interview, participants were anticipated to be able to teach back at least one example of a fruit and vegetable as well as an accurate, health promoting example of why fruits and vegetables should be consumed.

Participants: Due to scheduling and unforeseen absences from the program, only 36 of the 40 students who signed up for the study were able to participate. Participants were recruited from three different classrooms at two main school sites.

Results: This study supported prior research linking children of low socioeconomic status to having less exposure to a variety of different fruits and vegetables. Participants, however, illustrated higher levels of health literacy than expected related to exposure of early program curriculum which aided in closing the knowledge gap seen in low socioeconomic children. Secondary to this study, evidence was found that suggest Piaget's cognitive development theory may be too broad for modern cognitive development in children.

INTRODUCTION

Childhood obesity is defined by the Centers for Disease Control and Prevention (CDC) as a Body Mass Index (BMI) greater than the 95th percentile for the same age and gender in the United States (Childhood Obesity Facts, 2018). In 2017, the CDC stated that the number of obese children in the United States had tripled in the last four decades (Childhood Obesity Facts, 2018). Now, one in five school-aged children are obese (Childhood Obesity Facts, 2018). In 2013, 5% more of low socioeconomic children were obese as compared to other socioeconomic demographics (Hansen et al., 2015). This supports other studies that suggest that these children are a high-risk demographic for obesity. Childhood obesity is a significant public health concern due to the negative long-term effects on an individual's general health and well-being. Research shows that there are many factors that may contribute to this phenomenon, including: low maternal education, paternal and maternal BMI, maternal employment, and low socioeconomic status (Alberdi et al., 2016; Boone-Heinonen et al., 2017; Flores & Lin, 2013; Zahir, Heyman, & Wojcicki, 2012). In general, children's health knowledge was greater in households with incomes earning more than \$20,000 annually due to the increased amount of exposure and availability to healthy foods (Hansen et al., 2015). This links health knowledge with socioeconomic status and obesity.

In this study, fruit and vegetable recognition was used as the main topic of discussion because of the universal exposure most children have with the subject. Food is also a prominent determinate of health maintenance, and developmentally, most preschool children can conceptualize the idea of specific fruits and vegetables as different food groups (Flores & Lin, 2013; Zahir et al., 2012). Understanding health and wellness as related to fruits, vegetables, and

healthy activities is a more mature thought process, and it was used during this study in an effort to solidify the health education material.

An increase in fruit and vegetable consumption decreases children and adults' risk of obesity and comorbidities such as diabetes, cardiovascular disease, and cancer (Carraway-Stage, Spangler, Borges, & Goodell, 2014; Hastmann, Bopp, Fallon, Rosenkranz, & Dzewaltowski, 2013). In children, particularly preschool aged children, an increase in fruit and vegetable consumption is linked with positive associations of the foods, positive outcome statements, and exposure to a variety of different whole fruits and vegetables (Carraway-Stage, Spangler, Borges, & Goodell, 2014; Hansen et al., 2015; Hastmann, Bopp, Fallon, Rosenkranz, & Dzewaltowski, 2013).

PROJECT DESIGN & METHODS

Framework

This project was based on the nursing process framework: Assessment, Diagnosis, Plan, Implement, and Evaluate (ADPIE) tool. This tool is helpful in guiding practice in an orderly, efficient manner for individualized care and consideration. To translate this process into a public health/education based setting, the researcher chose to use three phases – assess, teach, and evaluate – which is supported by previous literature as the best way to reliably conduct a study with children (Wiseman & Harris, 2015). Teaching application was based on Piaget's theory of cognitive development.

Site of Study and Participants

The study was conducted at local program sites derived from a nationally based organization. The organization is dedicated to supporting school readiness in low income children under the age of 5, and their families. The program's goal is to provide full day

comprehensive and developmentally-based services to preschool children as well as infants and toddlers.

Teachers at various locations in a large metropolitan area were contacted regarding their classes' participation in this study. Those classes who chose to participate received consent forms that were sent home to primary caregivers and returned before interviewing the child. Children (n=36) ages three to five years old were interviewed individually in order to minimize distractions.

Phase 1: Assessment

Once children were brought into a separate interviewing area, assessment questions were asked. These questions consisted of phrases such as:

- What do you know about fruits and vegetables?
- What's your favorite fruit/vegetable?
- Are they healthy?
- Why are they healthy?
- What are unhealthy foods?
- What are healthy foods?
- What are healthy activities?
- Who's the healthiest person you know, and why?

Question length and depth depended on each child's age and level of interaction. Some children were shy and multiple questions were asked to help stimulate conversation, whereas others were more extroverted and answered questions eagerly.

Following the completion of assessment questions an educational 'sticker game' was played. Fruit and vegetable stickers were used to sort each food group. Pictures, or photographs

have been identified in past research as the best tool to use with preschool children (Carraway-Stage, Spangler, Borges, & Goodell, 2014; Durbin, 2018; Wiseman & Harris, 2015). Stickers also assure test standardization, help assure methods are reproducible for large numbers of participants, help control for limited verbal capability, and create an interactive activity that is more inviting for preschoolers (Carraway-Stage, Spangler, Borges, & Goodell, 2014; Wiseman & Harris, 2015). This game involved two columns, one labeled 'Fruits' and the other labeled 'Vegetables.' The goal was to place the correct sticker under each column. The researcher and participant read the column's names and stated the fruits and vegetables aloud to standardize the pictures for testing purposes. This created a baseline understanding, especially for children who were not able to read. The fruits and vegetables on the stickers included: bananas, apples, oranges, strawberries, pears, watermelons, grapes, raspberries, carrots, broccoli, and lettuce. Some or all of the stickers may have been used, depending on participant enthusiasm and involvement. Pictures were obtained for data analysis.

Phase 2: Teaching

If the participant correctly identified the fruits and vegetables, praise was given. If fruits and vegetables were not correctly identified, the researcher asked questions based on the participant's answers such as, "Is a banana a vegetable?" This gave participants an opportunity to correct their mistake, before being told the correct answer. If participants stood by their answer, education was given about why each food item should be in the other category.

Despite whether or not the participant placed the stickers correctly the first time, answers were repeated before evaluative questions were asked and each participant received a sticker before returning to class. During the repeating process, the participant and researcher pointed to

each food item sticker and shared statements such as, “a banana is a fruit, an apple is a fruit, broccoli is a vegetable, and lettuce is a vegetable.”

After examples of fruits and vegetables were established, the researcher and participant had a conversation about why fruits and vegetables are healthy. Literature about health education emphasizes the importance of positive associations with fruits and vegetables increasing children’s consumption of these foods in the future. Statements such as, “they help you grow big and strong”, suggest positive outcomes and correlate with higher fruit and vegetable consumption by preschoolers (Hansen et al., 2015). This study by Hansen et al., 2015, also highlights the importance of introducing fruits and vegetable in a play-based activity as a strong indicator for making healthier food choices in children under five years old. These recommendations guided the researcher’s discussion about why fruits and vegetables are healthy, and therefore children were told that these foods keep them growing big and strong.

Phase 3: Evaluate

Finally, evaluative questions were asked to help determine understanding of the teaching.

Questions included:

- If you were to teach siblings/friends about fruits and vegetables, what would you say?
- If someone were to ask you why fruits and vegetables were healthy for you, what would you say?
- If someone wanted to eat a fruit/vegetable, what are some examples you could tell them to eat?

These questions were aimed at simply reiterating the teachings they had just learned. Answers ranged from simple repetition (i.e. “banana” or “an apple”) to complex explanations and elaborate scenarios that explained how they would respond.

Some children are artistically inclined and are inherently more expressive through the use of coloring. Due to this understanding, and for developmental purposes, drawing materials were available in the interview space if participants chose to engage. This activity will be discussed later in this paper.

RESULTS

Developmental ages played a big role in initial answers for each participant. Children around the age of three had a difficult time placing the stickers in the correct columns. These children seemed like they did not have enough experience with each food item and would guess with each sticker. By the end of the sticker game, when asked if they were sure a fruit sticker should go under the vegetable category, they seemed to have forgotten what the categories were or did not understand what they meant. This group, however, was excellent at reiterating back answers during the evaluation phase and, by the end of the interview, seemed to have a basic understanding of the different categories with examples of fruits and vegetables.

On average, the 4-year-olds had the best performance on the sticker game, getting the most amount of fruits and vegetables correct during the sticker game. In general, their mistakes consisted of food items that they had not seen before, and simply did not know the appropriate food category. These children were highly interactive with the game and loved the idea of the stickers in the whole activity. During the assessment phase, these children had more elaborate answers than the 3-year-olds but did not answer questions as logically as the 5-year-olds. This group based their answers on their own experiences, and what they had been told, rather than critically thinking and reasoning throughout the interview. They would answer that these foods were healthy because “they were told so” or they would repeat the phrase “because they’re healthy” back to the researcher (personal communication, December 10, 2018). When asked the

question “what is your favorite fruit or vegetable” answers consisted of, “donuts”, “soup”, “chicken”, and “burritos” as well as, “red apples and green apples”, “bananas”, “lettuce and maybe oranges”, and “watermelon, apple, strawberry, tomato” (personal communication, December 10, 2018). When asked, “do you eat that a lot?”, answers about donuts and burritos confirmed that these were foods their parents gave to them, often. Answers about fruits and vegetables resulted in participants recalling that they had eaten these foods during meals at school.

Participants’ answers presented a theme about where they remembered first being introduced to different fruits and vegetables. Children may have been introduced to a specific fruit at home, but in the program’s classrooms, they were introduced to a greater variety of fruits and vegetables. They were not only learning about the different fruits and vegetables in the classroom, but they were also eating them and fully integrating these experiences into their memory about healthy eating. The sticker game was played during the teaching phase, and participants tended to correctly identify the category each sticker belonged to on their first attempt (see Table 1, Figure 2). If a mistake was made, education was provided. During the evaluation phase, the 4-year-olds were quick to pick up on the answers and demonstrated a good understanding of the material by connecting food examples with why they are healthy, cohesively. This group would create stories and show their understanding by telling the researcher how they would explain the material to a family member or friend.

The 5-year-old group were the most versatile in their answers. Some did well on the assessment questions, sticker game, and evaluation questions, some performed poorly, and some mixed up the rules (see Table 1, Figure 3 & Table 1, Figure 4). This group was quick to understand the sticker game, and the researcher hardly had to explain the purpose. They were

also quick to respond with appropriate, in depth answers during the assessment phase as demonstrated by two different interview sessions:

Researcher: “Who is the healthiest person you know and why?”

Participant 1: “Me, because I ate all of my fruits and vegetables”

Researcher: “What is healthy?”

Participant 1: “Going to the beach because I can bring fruit to eat for lunch”

(personal communication, November 29, 2018).

Researcher: “What is your favorite fruit or vegetable?”

Participant 2: “strawberries, pineapple”

Researcher: “What do you know about fruits and vegetables?”

Participant 2: “I know that vegetables have seeds”

(personal communication, December 6, 2018).

As observed by the second interaction, this group of participants were strong advocates of rule following. Although this participant was incorrect that vegetables have seeds, they simply confused the rule with the definition of fruits. This participant’s sticker sheet is shown in Table 1, Figure 4 where it is evident that the participant tried to follow the rule, but confused a few of the foods that the participant thought had seeds (bananas) and some that they thought didn’t have seeds (an orange and raspberries). This group overall, had logical, rational thought processes that attempted to explain some of their experiences with the different food items. This conflict between rules and experience seemed to be the defining factor that confused participants into choosing the wrong answer.

Addressing obesity in preschool children is the key to preventing negative long-term health consequences. The goal of this study was aimed at increasing the probability that 3, 4, and

5-year-olds would consume more fruits and vegetables in the future by addressing positive associations with the foods, positive outcome statements, and exposing preschoolers to a variety of different fruits and vegetables. Health knowledge and literacy was effectively assessed, education was provided to fill individual knowledge gaps, and evaluation of retention was conducted by having participants teach back the information. Overall, the participants who completed all three phases of the study were able to give examples of at least one fruit and one vegetable as well as give one accurate, health promoting example of why fruits and vegetables are good for people to eat.

In order to assess the context of these findings, secondary data was extracted from organization records for all preschool children in select classes. The secondary data was analyzed for the prevalence of obesity based on CDC guidelines. Based on the Centers for Disease Control (CDC) guidelines, 13.75% of the children enrolled in these select classes were overweight or obese, compared to the national average of 13.9% for the same age group (Childhood Obesity Facts, 2018).

DISCUSSION

This study supported prior research linking children of low socioeconomic status to having less exposure to a variety of different fruits and vegetables (Hansen et al., 2015). Participants demonstrated in their responses that they had a reduced exposure to fruits and vegetables in their homes, which is one of the key traits associated with childhood and adult obesity (Hansen et al., 2015). However, due to the program's curriculum, the study found that these children had an increased understanding and exposure to fruits and vegetables. Participants stated learning about fruits and vegetables in class, and frequently referred to their school breakfast and lunch when giving examples of seeing and eating different fruits and vegetables.

Findings suggest that the implementation of this school-based dietary breakfast and lunch program counteract the knowledge deficit that children experience in their homes. Participants illustrated higher levels of health literacy than expected, and furthermore, indicated a trend towards healthier eating.

Although the obesity prevalence is comparable to national statistics for this age group, the participating locations care for almost five times the national average of Hispanics and non-Hispanic African Americans, who are high-risk populations for obesity. Based on the data, the program's African American population is only 16% obese as compared to the national average of 22% for the African American youth in the US (U.S. Census Bureau QuickFacts: UNITED STATES, 2018). Findings of lower obesity rates associated with an increase in health literacy and a greater exposure to fruits and vegetables are evidence of a preventative approach to the US obesity health crisis.

Participant drawings were utilized to help measure appropriate development and age differentiations. They served as benchmark evidence to confirm normal developmental age which lead to credibility for later statements regarding cognitive differences. Table 1 offers comparisons with explanations.

The research also provides evidence that potentially challenges age-specific standards about cognitive development. Based on this research, cognitive development is significantly different for a 3-year-olds, 4-year-olds, and 5-year-olds. Piaget's preoperational stage, as a comprehensive term used to categorize 2- 7-years-olds, appears to be too broad for children today. Children as young as the age of 5-years-old are beginning to demonstrate characteristics of thinking and logic that Piaget classifies as the next level of cognitive development, only attainable by 7-year-olds to 11-year-olds (Halpenny & Pettersen, 2013). Although Piaget's

classifications are not inaccurate, they do not articulate the modern cognitive complexities that distinguish between each age of life. Table 1 breaks down the cognitive disparities in development, supporting the suggestion that Piaget's theory may be too broad. It simply doesn't delineate cognitive progression clearly between each twelve-month interval.

Limitations

As the study continued, some of the participants mentioned their teachers were educating them about the different fruits and vegetables prior to being interviewed. To adjust to this unforeseen complication, these participants were not assessed on their baseline health knowledge, but rather evaluated for their retention. The researcher adapted a condensed assessment, played the sticker game, and focused on the evaluation phase of the study.

Another limitation were social factors that affected the study. One participant was too shy to be interviewed alone. A teacher assisted this student to the interview and helped the student answer questions throughout the discussion. This limited the information the researcher could gather, and this interview was excluded from the sample.

Lastly, this project was limited to three classrooms at two preschool sites with 36 participants, which is a small sample size.

Conclusion

This project taught me the real implications of applying theoretical frameworks into my practice. I learned to question the relevance and timeliness of Piaget's theoretical preoperational stage into modern teaching and learning practices with preschool children. Updates and adjustments to the theory may need to continue to be modified in order to fit current child development. More data is recommended to continue adapting appropriate studies to the literature.



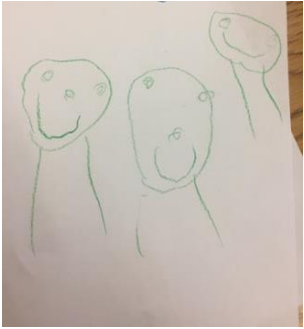


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Table 1

Comparison of ages and cognitive development

FIGURES	DEVELOPMENTAL DESCRIPTION
 <p data-bbox="370 730 678 758">Figure 1. 3-year-old's sticker sheet</p>	<p data-bbox="867 405 1490 533"><i>Drawing:</i> London, Ladewig, Ball, Bindler, and Cowen (2016) claim that developmentally appropriate skills include being able to draw a circle.</p> <p data-bbox="867 569 1507 732"><i>Cognitive Development:</i> Piaget claims all of these age groups are cognitively in the preoperational stage. Halpenny & Pettersen (2013) describe Piaget's understanding of this stage as a progression of thinking and making meaning.</p>
  <p data-bbox="204 1167 813 1215">Figure 2. A 4-year-old's sticker sheet Figure 3. 4-year-old drawing Of family</p>	<p data-bbox="867 789 1495 982"><i>Drawing:</i> London, Ladewig, Ball, Bindler, and Cowen (2016) claim that developmentally appropriate skills include being able to draw shapes and at least a 6-star person. This drawing is appropriate, but has little depth of colors, or background.</p> <p data-bbox="867 1020 1507 1184"><i>Cognitive Development:</i> Piaget claims all of these age groups are cognitively in the preoperational stage. Halpenny & Pettersen (2013) describe Piaget's understanding of this stage as a progression of thinking and making meaning.</p>
  <p data-bbox="204 1654 813 1703">Figure 4. A 5-year-old's sticker sheet Figure 5. 5-year-old drawing Of family</p>	<p data-bbox="867 1236 1507 1430"><i>Drawing:</i> London, Ladewig, Ball, Bindler, and Cowen (2016) claim that developmentally appropriate skills include being able to draw shapes and at least a 6-star person. This drawing is appropriate, and this child added more colors as well as props, like grapes, and a background.</p> <p data-bbox="867 1467 1507 1631"><i>Cognitive Development:</i> Piaget claims all of these age groups are cognitively in the preoperational stage. Halpenny & Pettersen (2013) describe Piaget's understanding of this stage as a progression of thinking and making meaning.</p>