

THE EFFECTIVENESS OF THE UNIVERSITY CHRISTIAN CHURCH (UCC)
COMMUNITY WEEKDAY SCHOOL (WDS) SEED TO PLATE
EDUCATION PROGRAM

by

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Submitted in partial fulfillment of the
requirements for Departmental Honors in
the Department of Nutritional Sciences
Texas Christian University
Fort Worth, Texas

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To Mrs. Claire Graham, Director of the University Christian Church Weekday School, and friend, for assisting in numerous ways with acquiring data and information regarding the school, assisting in the communication process between authors and parents, and support in the project, as well as guidance throughout the entire research process.

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INTRODUCTION

The Seed to Plate Educational Program, conducted at the University Christian Church Weekday School, was established by Dr. Gina Hill in early 2012. She applied for a faculty-grant to aid in the implementation of an instructional development plan. Grants are available for faculty to apply for in cases where course improvement would not be possible without additional financial assistance. Her desire was to provide a location where students could further their education while receiving hands on experience helping young children learn about nutrition, gardening, and health. In order to accomplish this goal, Dr. Hill approached Claire Graham, University Christian Church Weekday School Director (UCC WDS), with the idea of re-vamping the already-existing (but slightly dilapidated) garden at the church.

Dr. Hill, along with the entire research team, feel passionate about educating pre-school aged students at a time when they are malleable and eager to learn new things. She believes that if they can be taught about fruits and vegetables, where they come from, and how important they are to our health and environment, this knowledge will make a huge impact on their future and their overall nutrition. In addition, the program exceeds basic nutrition education and also included lessons about food and water conservation, composting, vermiculture, food preservation, and more.

The purpose of this study is to investigate the effectiveness of the Seed to Plate educational program offered in conjunction with Texas Christian University and University Christian Church (UCC) Weekday School (WDS). As childhood obesity continues to rise, the importance of incorporating nutrition education into a child's life is essential. Many families either do not have access to adequate nutrition education or

choose not to integrate it into their household eating values. Having nutrition education as a part of school curriculum develops the opportunity for a significant change in eating behaviors not only for the child, but also for the entire family. In 2012, more than one third of children and adolescents were overweight or obese.¹ These statistics are continuing to rise and many are seeking affective methods to reverse the increasing rates by implementing prevention strategies.

The most effective form of prevention for young children is in schools, because for many, it is a safe and supportive environment for learning. Thus, it would be best to target schools when introducing nutrition education into the curriculum. Also, the younger the children, the more effective the program will be, as very young children tend to be more open to trying new foods and haven't established permanent eating behaviors. Interest in gardening and other topics in the Seed to Plate Education Program by young children could have an impact on family eating habits as well. Parents may be more inclined to provide their child with a wider variety and increased amount of fruits and vegetables if they know their child is more willing to try new foods or has tried them and liked them during the program.

Overall, the hope is that integrating nutrition education; in this case the Seed to Plate Education Program, into school curriculum will help increase fruit and vegetable consumption and encourage healthy eating behaviors in young children to prevent the risk of childhood obesity as well as other chronic diseases. Long-term effects would include reversing the overall rates of childhood obesity and incorporating healthy eating behaviors in families. This research and continued research on this same program, will

help solidify the need for this education program in schools to promote and improve healthy eating behaviors in young children.

Research Objectives

The objectives for the research project included:

1. The purpose of this study is to investigate the effectiveness of the Seed to Plate educational program offered in conjunction with Texas Christian University and University Christian Church (UCC) Weekday School (WDS).
2. The goal of this study was to assess the correlations, via statistical analysis, between retention of the program, increase fruit/vegetable consumption, previous and current family eating patterns, and overall satisfaction of the program.

REVIEW OF LITERATURE

Educating elementary children about nutrition before they establish permanent behaviors may increase the likelihood that they will practice positive eating behaviors and healthy habits in the future.² Children have the cognitive capacity to understand the health benefits of foods and develop food likes and dislikes at a young age.³ Research shows that interventions that improve preference may result in increased fruit and vegetable consumption.⁴ Therefore, educating children about nutrition while they are still young can be beneficial in reducing the risk of chronic diseases later in life. Previous interventions to improve children's knowledge of nutrition have significantly improved fruit and vegetable consumption.⁵

Nutritional Knowledge and Nutritional Habits Formed During Childhood

Most chronic diseases in adulthood originate from nutritional habits formed at a younger age. Following a balanced nutritional regimen could have an important role in children's development, and consequently decrease the incidence numerous diseases.⁶ Other nutrition education school-based programs have measured these mediators; results are mixed to inconclusive, but mostly positive, and underscore the need for well-designed impact studies.⁷ Incorporating nutrition education lessons into elementary curriculum has the potential to establish long term and positive eating habits, which would reduce the risk of chronic diseases later in life. Using suitable ways of improving nutritional patterns and promoting the health quality of the diet should be a priority. There have been a number of studies showing how education programs can influence nutritional behavior and health outcomes in children.⁸ In order to choose and plan an efficient program, the first step is to recognize specific needs and existing nutritional problems.⁹ It has been

shown that the knowledge of parents and children can affect the nutritional behavior of children.¹⁰ It is, therefore, important to educate both parents and children.

Nutrition Education Intervention Improves Children's Self-efficacy to make Healthy Choices

In addition to nutrition education programs, children's belief in their own ability to perform a specific task, such as the ability eat raw vegetables once or twice per week, has also been shown to influence intake of fruits and vegetables, that is, children with higher self-efficacy have a greater intake of vegetables.⁵ One study compared a group of 1047 students that participated in a nutrition intervention program, to a group of 890 control students. The study revealed that a defined intervention delivered in a SNAP-Ed setting could positively impact mediators associated with vegetable intake for fourth-grade students.¹¹ Implications of this study also revealed that a short-term classroom-based intervention, encompassing state education standards and sensitivity to the limitations and structure of the school setting improved self-efficacy, attitude, preferences toward vegetables, and knowledge of healthful outcomes for fourth-grade students. Improving a child's response to vegetables offered and consumed has the potential to improve health including weight normalization.¹¹

Implementing nutrition intervention programs that aim at improving children's self-efficacy when it comes to eating healthy and making healthy choices has a positive effect on what children actually consume. One study revealed that self-efficacy and developing a habit of eating fruits and vegetables at school lunch are related to lunch fruit and vegetable consumption. Increasing self-efficacy and social norms about consuming fruits and vegetables at school appear to be important targets to improve fruit and

vegetable consumption.¹²

Role of Variety in Increasing the Consumption of Fruits and Vegetables Among Children

Research reveals that children consume less than the recommended amount of vegetables.¹³ According to data obtained through the National Health and Nutrition Examination Survey III, there is an inverse relationship between a higher consumption of dairy, grains, and total fruits and vegetables and central obesity in adolescents.¹⁴ Serving low quality produce is one major barrier that children face in consuming fruits and vegetables. Children prefer fresh vegetables to the canned or overcooked options that school cafeterias often provide.¹⁵ One study found that that each additional fruit or vegetable item that is offered in schools increases the fraction of children who eat at least one serving of fruits and vegetables by 12 percent.¹⁶ Nutrition intervention education programs can help increase children's awareness of different types of fruits and vegetables, thereby increasing the chance a child consumes fruits and vegetables.

Summary

Research studies have determined that educating elementary children about nutrition may increase their likelihood to practice positive eating behaviors and healthy habits in the future.¹⁷ Self-efficacy plays a large role in consumption of fruits and vegetables.

Children that believe they have the ability to identify the healthy foods are more likely to develop positive eating behaviors. Studies also show that habits children develop when they are young play an important role in their development or avoidance of chronic diseases later in life. When children are exposed to a variety of fruits and vegetables at a

young age, they are more likely to develop good eating habits. In short, nutrition intervention programs for elementary students or younger children are demonstrating a good venue in which to improve children's nutritional self-efficacy, help them develop healthy habits, and expose and challenge them to try a wider variety of fruits and vegetables.

METHODS

Texas Christian University students enrolled in NTDT 40363 (Community Nutrition) or NTDT 30113 (Infant and Child Nutrition) courses taught weekly nutrition lessons, for nine weeks, to pre-school students at University Christian Church. The children who participated in the program were ages three through five. The nine topics included: Composting, Planting and Watering Seeds, Water Conservation, What Are Plants?, Worms, Herbs and Vegetables, Fruits, Seed Saving, and Yummy Food for Healthy Bodies. An electronic survey was developed using Survey Monkey. The study was approved by the Texas Christian University Institutional Review Board. Researchers collected data from the parents/caretakers of students participating in the Seed to Plate program using a survey created to determine the effectiveness and receptiveness of the program's content and retention. Emails were sent to 77 adults using email addresses provided by UCC WDS to request study participants. A link to the survey with informed consent was included. Survey questions were developed to assess children's consumption of particular foods, as well as their interest in various topics, prior to and following the program, family relationship status and common meal habits, utilization of the educational handouts, and their willingness to try new foods. Qualitative data from Survey Monkey including suggestions for improvement and additional topics caregivers would like included were recorded. Data were analyzed using SPSS version 21.

RESULTS

All of the participants who responded (N=23) were mothers of the children enrolled in the Seed to Plate program with a response rate of ~30% out of 77 emails sent. These individuals also reported to be married and 83% (N=19) were white. About 61% (N=14) of the mothers have a post graduate degree, 26% (N=6) have a college degree, and only 13% (N=3) had less than a college degree. The mean age of participants was 35.9 +/- 8.3 years. Nearly 61% (N=14) of participants stated that they sit down as a family to have meals together in their homes at least once a day. About 65% (N=15) of participants said they grocery shop with their child on a weekly basis.

About 35% (N=8) of the participants reported that their child consumed the ideal amount of fruits per day (1-1.5 cups) however almost 61% (N=14) reported that intake was 3-4 cups which exceeds recommendations. About 53% (N=12) of participants reported that their children consumed more than 1 cup of vegetables every day. The recommended amount is 1.5 cups for 4 year old children. Only 4% (N=1) of participants reported that their child consumed the recommended daily amount of milk or dairy (2 cups). About 22% (N=5) of participants reported that their child consumed the recommended amount of protein per day (4 oz.). None of participants consumed the recommended amount of grains per day (5 oz.). The majority of the participants (78%, N=18) reported that their children consumed less than the recommended amount per day however, 17% (N=4) consumed at least 4 oz per day – almost reaching the recommended daily amount of grain.

Over 65% (N=15) of participants reported that the Seed to Plate program helped improve their children's dietary habits. Over 82% (N=19) of participants felt that the

Yummy Foods for Healthy Bodies lesson was the most valuable, followed by Vegetables and Herbs, and then What are Plants/What Do They Need to Grow?. About 57% (N=13) and 52% (N=12) reported that following the program their family ate more vegetables and fruits, respectively. Almost 61% (N=14) reported that they were highly satisfied with what their children learned from the program and ~70% (N=16) reported that their children had discussed the health benefits of different foods at home after completion of the program.

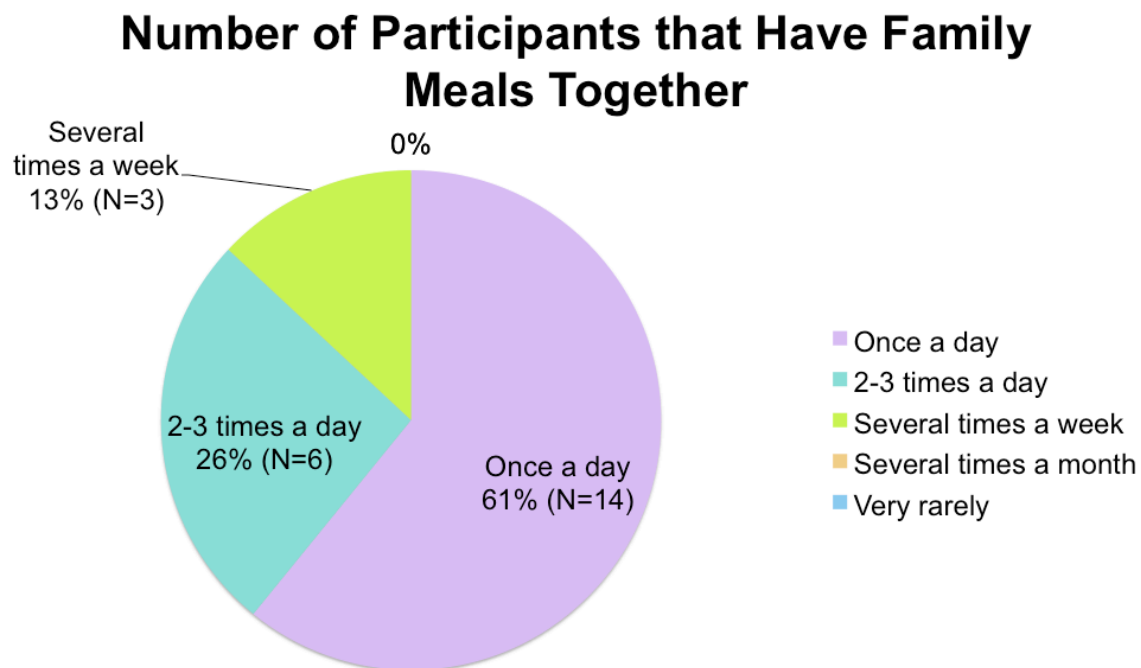
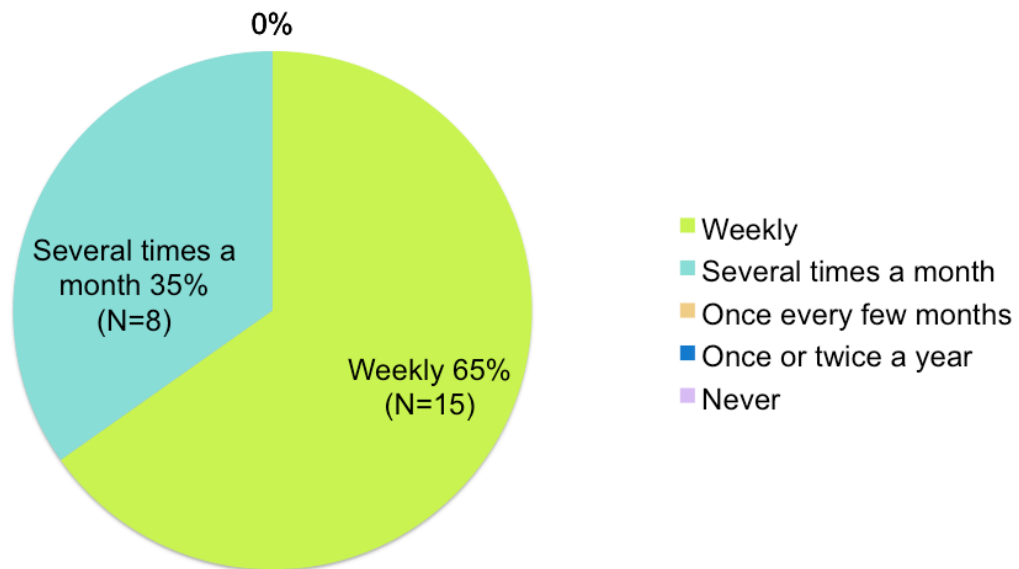
LIST OF GRAPHS**Table 1**

Table 2

How Often Participants Take Their Child Grocery Shopping



The following five tables show the reported consumption of fruit (Table 3), vegetables (Table 4), dairy (Table 5), protein (Table 6), and grains (Table 7). A bolded outline and an asterisk at the top of the bar indicate the recommended daily requirements for children aged four to five within each dietary category. The recommendations are as follows: fruit – 1 cup or one small fruit; vegetables – 1 cup raw or half a cup cooked; dairy – 4 servings (1/2 cup of milk for example); protein – 4 ounces; and grains – 5 ounces.

Table 3

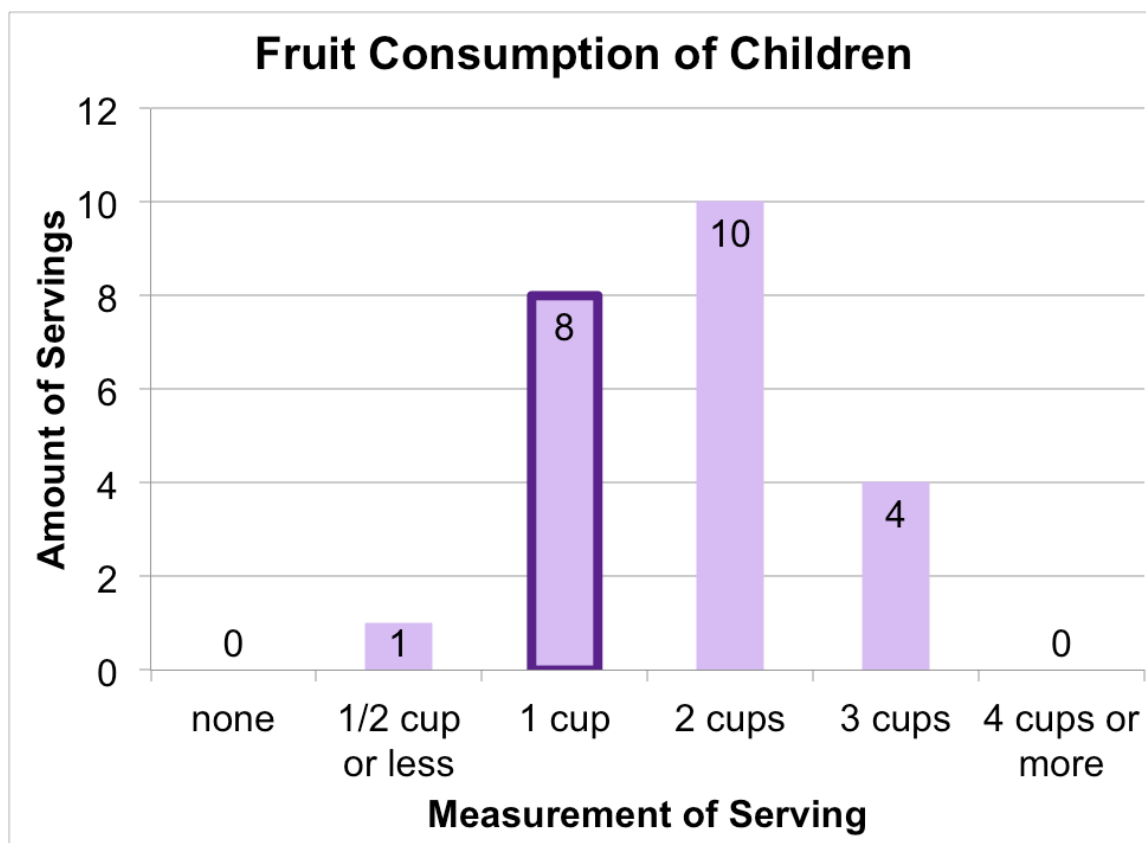


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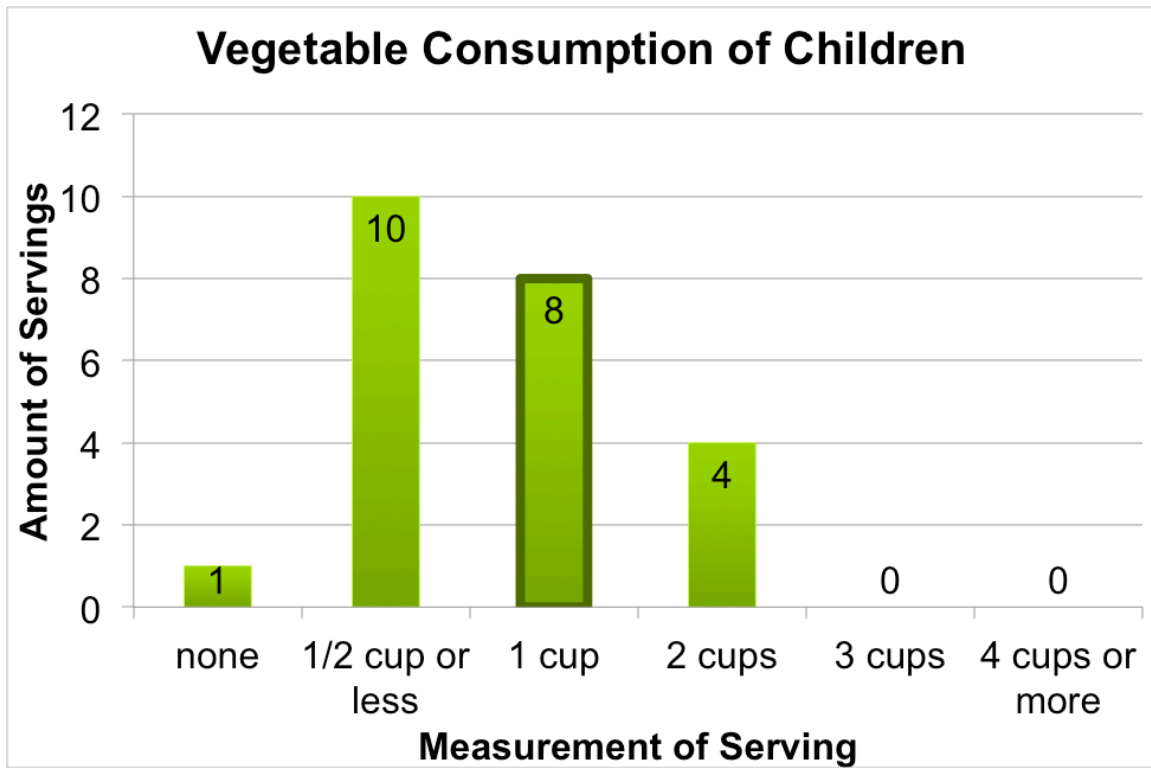


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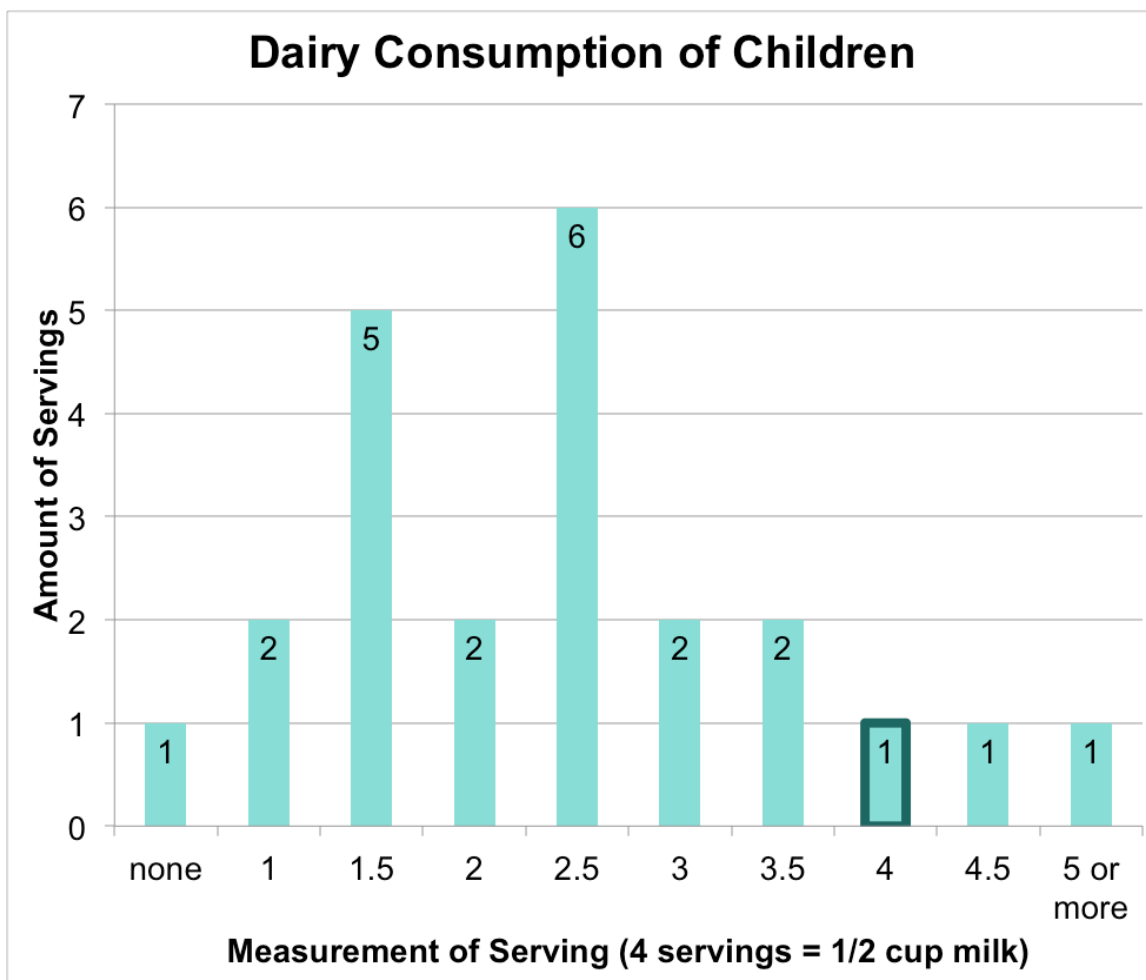


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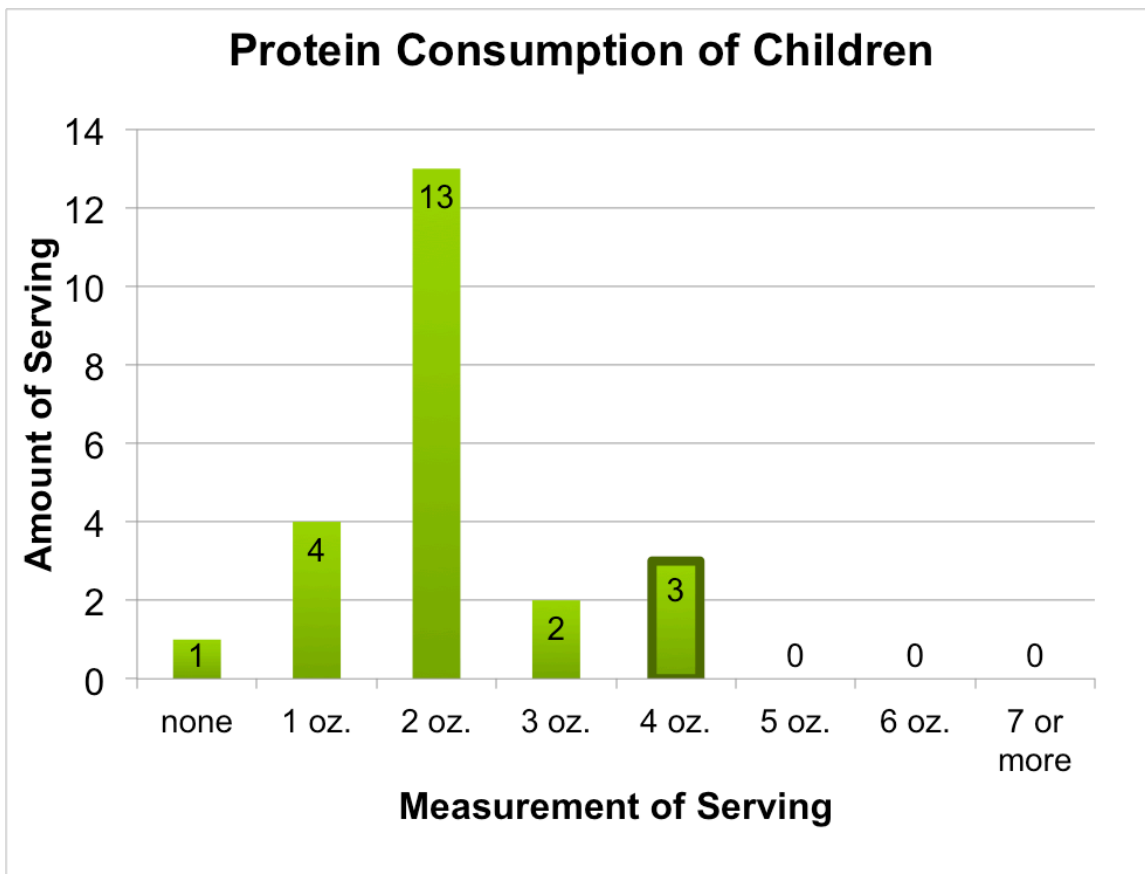
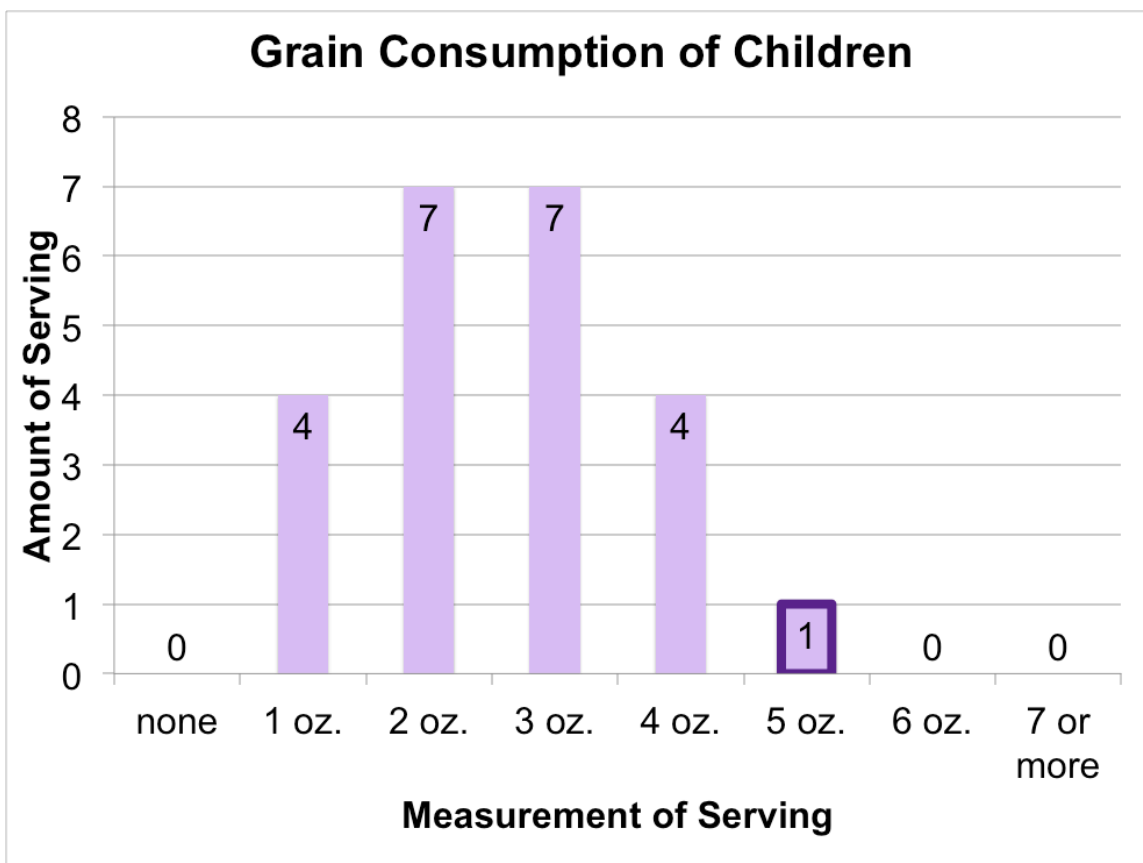


Table 7



CONCLUSION

It is clear that, based on the data retrieved, that participants valued the Seed to Plate program and thought that it taught their children valuable lessons. Data also showed that the majority of the topics were retained by the children and discussed at home. This shows that the lessons were clear and interesting enough to the young children to be effective as a method for nutrition and health education.

One of the weaknesses of the experiment entailed the way in which whole grain consumption was surveyed. The study was not specific when surveying participants about their children's fruit and vegetable consumption. No references for fruit and vegetable serving sizes were provided to the participants. Also, no examples or guidelines on what counts as fruit or vegetable, such as juices verses whole foods, were provided to the participants. Therefore, data draw on this information was limited and subject to error.

Additional comments showed overall positive feelings towards the program. Some participants stated that their answers were frequently neutral because their children already eat healthy prior to program implementation, they already have a garden, or they have focused specifically on these topics already at a younger age with their children.

APPENDIX A - CONSENT FORM GIVEN TO PARENTS:



**Department of Nutritional Sciences
Research Review Board**

**Texas Christian University
Fort Worth, Texas**

CONSENT TO PARTICIPATE IN RESEARCH

Title of Research: Evaluating the Effectiveness of the University Christian Church (UCC) Weekday School (WDS) Seed to Plate Education Program

Funding Agency / Sponsor: none

Study Investigators: Carly Benge, Jessica Koiner, and Connelly Weeks

What is the purpose of the research? The purpose of this study is to investigate the effectiveness of the Seed to Plate educational program offered in conjunction with Texas Christian University and University Christian Church (UCC) Weekday School (WDS).

How many people will participate? Approximately 80 adults, who are caregivers or caregivers of children enrolled in the four year old and kindergarten classes, will be invited to complete the survey.

What is my involvement for participating in this study? You will be asked to complete a brief survey online (surveymonkey.com).

How long am I expected to be in this study for and how much of my time is required? You will be in this study only to complete the survey. The survey will take approximately 10-20 minutes to complete.

What are the risks of participating in this study and how will they be minimized?

There is minimal risk of emotional distress related to answering questions about the current health status or eating behaviors of your child and family. All answers will remain anonymous and confidential for the duration of the study. If such emotional distress occurs, the participant may stop taking the survey at any time.

What are the benefits of participating in this study? Your participation in this study will help instructors measure the effectiveness of the Seed to Plate program. These findings will help identify what worked well and what things need to be changed as this program continues.

Will I be compensated for participating in this study? You will not be compensated for your participation in this study.

What is an alternative procedure(s) that I can choose instead of participating in this study? There is no alternative procedure. You may choose at any time not to take part in this study.

How will my confidentiality be protected? Your confidentiality will be protected by designing the survey to be completed anonymously. The investigators will not ask questions that will allow you to be identified. Only researchers have access to completed surveys. Email addresses are not linked with completed surveys.

Is my participation voluntary? Your participation in this study is completely voluntary.

Can I stop taking part in this research? You may withdrawal from the study at any time.

What are the procedures for withdrawal? If you wish to withdrawal from the study, please close the survey browser. None of your responses will be saved or used for analysis.

Will I be given a copy of the consent document to keep? A copy of the consent document is attached to the email along with the link to the online survey.

Who should I contact if I have questions regarding the study?

Principle investigator – Gina Hill, PhD, RD, LD

- Phone: (817) 257-6320
- Email: G.JARMAN@tcu.edu

Carly Bengel:

- Email: CARLY.BENGE@tcu.edu

Jessica Koiner:

- Email: J.SEVERNAK@tcu.edu

Connelly Weeks:

- Email: C.L.WEEKS@tcu.edu

Who should I contact if I have questions regarding my rights as a study participant?

Dr. Lyn Dart, Chair, Department of Nutritional Sciences Research Review Board
Telephone 817-257-6321.

Dr. David Cross, Chair, TCU Institutional Review Board,
Telephone 817 257-6416.

Checking the box at the beginning of the survey indicates that you have read the information provided above, you have received answers to all of your questions and have been told who to contact if you have any more questions, you have

freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.

I agree

Date: _____

Investigator's Signature: _____

Revised July, 2012

APPENDIX B - SURVEY GIVEN TO PARENTS:

Evaluating the Effectiveness of the University Christian Church Weekday

Department of Nutritional Sciences
 Research Review Board
 Texas Christian University
 Fort Worth, Texas

CONSENT TO PARTICIPATE IN RESEARCH

Title of Research: Evaluating the Effectiveness of the University Christian Church (UCC) Weekday School (WDS) Seed to Plate Education Program

Funding Agency / Sponsor: none

Study Investigators: Carly Bengé, Jessica Koiner, and Connelly Weeks

What is the purpose of the research? The purpose of this study is to investigate the effectiveness of the Seed to Plate educational program offered in conjunction with Texas Christian University and University Christian Church (UCC) Weekday School (WDS).

How many people will participate? Approximately 80 adults, who are caregivers or caregivers of children enrolled in the four year old and kindergarten classes, will be invited to complete the survey.

What is my involvement for participating in this study? You will be asked to complete a brief survey online (surveyMonkey.com).

How long am I expected to be in this study for and how much of my time is required? You will be in this study only to complete the survey. The survey will take approximately 10-20 minutes to complete.

What are the risks of participating in this study and how will they be minimized? There is minimal risk of emotional distress related to answering questions about the current health status or eating behaviors of your child and family. All answers will remain anonymous and confidential for the duration of the study. If such emotional distress occurs, the participant may stop taking the survey at any time.

What are the benefits of participating in this study? Your participation in this study will help instructors measure the effectiveness of the Seed to Plate program. These findings will help identify what worked well and what things need to be changed as this program continues.

Will I be compensated for participating in this study? You will not be compensated for your participation in this study.

What is an alternative procedure(s) that I can choose instead of participating in this study? There is no alternative procedure. You may choose at any time not to take part in this study.

How will my confidentiality be protected? Your confidentiality will be protected by designing the survey to be completed anonymously. The investigators will not ask questions that will allow you to be identified. Only researchers have access to completed surveys. Email addresses are not linked with completed surveys.

Is my participation voluntary? Your participation in this study is completely voluntary.

Can I stop taking part in this research? You may withdrawal from the study at any time.

What are the procedures for withdrawal? If you wish to withdraw from the study, please close the survey browser. None of your responses will be saved or used for analysis.

Will I be given a copy of the consent document to keep? A copy of the consent document is attached to the email along with the link to the online survey.

Who should I contact if I have questions regarding the study?

Principle investigator – Gina Hill, PhD, RD, LD
 • Phone: (817) 257-6320

Evaluating the Effectiveness of the University Christian Church Weekday

• Email: G.JARMAN@tcu.edu

Carly Bengé:

• Email: CARLY.BENGE@tcu.edu

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• Email: J.SEVERNAK@tcu.edu

Connelly Weeks:

• Email: C.L.WEEKS@tcu.edu

Who should I contact if I have questions regarding my rights as a study participant?

Dr. Lyn Dart, Chair, Department of Nutritional Sciences Research Review Board

Telephone 817-257-6321.

Dr. David Cross, Chair, TCU Institutional Review Board,

Telephone 817 257-6416.

Thank you for your participation in this study and for allowing your child to participate in the Seed to Plate Education Program, your input is greatly appreciated.

1. Checking the box below indicates that you have read the information provided above, you have received answers to all of your questions and have been told who to contact if you have any more questions, you have freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.

I agree.

Evaluating the Effectiveness of the University Christian Church Weekday

PROTECTED HEALTH INFORMATION AUTHORIZATION FORM

Researchers from the study "The Effectiveness of the University Christian Church (UCC) Weekday School (WDS) Seed to Plate Education Program" would like your permission to use your health information which will be gathered as a part of this study.

The following health information will be gathered from you:

Your child's consumption of fruits, vegetables, water, and general eating habits

The names of the TCU researchers who will gather this information from you are (insert the names of all TCU researchers starting with the lead researcher):

Jessica Koiner
 Carly Bengé
 Connelly Weeks
 Gina Jarman Hill, PhD, RD, LD

Your health information may be shared with others who are working with the TCU researchers on this study, institutes that are paying for this study or involved in any other way, or as required by law. The names of these other researchers (include name, affiliation, and role in the study) or institutions (name and role in the study) are listed below.

None

The TCU researchers and other researchers who work with TCU will protect your health information in the following ways:

- Your health information will be kept private
- Your name or any other identifying information will not be made known
- Your health information may be shown in research papers or meetings without any information about you that will link it to you.
- Your health information will be given a special code for security
- Your health information will be grouped together with other people's health information to form an average
- Your health information will be locked in a cabinet and kept safe

You can agree or not agree to sign this form. If you agree to sign this form but change your mind, you can choose to stop being in the study at any time. If you decide to stop being in the study, you will need to contact the researcher (insert the name, telephone, and e-mail of the PI):

Principle investigator – Gina Hill, PhD, MS, RD, LD:

- Phone: (817 257-6320)
- Email: G.JARMAN@tcu.edu

Carly Bengé:

- Email: CARLY.BENGE@tcu.edu

Jessica Koiner:

- Email: J.SEVERNAK@tcu.edu

Connelly Weeks:

- Email: C.L.WEEKS@tcu.edu

You will be given a copy of this form to keep.

If you have any questions or concerns about your rights as a study participant, you can contact:

Dr. David Cross, Chair, TCU Institutional Review Board, Phone 817 257-6414.

Evaluating the Effectiveness of the University Christian Church Weekday

Dr. Janis Morey, Director, Sponsored Research, Phone 817 257-7516.

2. Checking the box below indicates that you have read the information provided above, you have received answers to all of your questions and have been told who to contact if you have any more questions, you have freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.

I agree.

Evaluating the Effectiveness of the University Christian Church Weekday

3. What is your relationship to the child attending University Christian Church (UCC) Weekday School (WDS)?

- Mother
- Father
- Foster parent
- Grandmother
- Grandfather
- Other

4. What is YOUR age?

5. With which group do you identify?

- American Indian or Alaska Native
- Asian
- Black or African-American
- Hispanic
- Native Hawaiian or Pacific Islander
- White
- Other

6. What is your current marital status?

- Married, spouse present
- Married, spouse absent
- Divorced
- Never married
- Separated
- Widowed

Evaluating the Effectiveness of the University Christian Church Weekday

7. What is the highest level of formal education attained by the mother, father or primary caretaker of the child?

- Less than High School
- High School Graduate
- Some College, No degree
- Associate Degree or Vocational Certificate
- College Graduate
- Post Graduate Degree

8. How many children live in your household?

9. What is the age of each child?

1.	<input type="text"/>
2.	<input type="text"/>
3.	<input type="text"/>
4.	<input type="text"/>
5.	<input type="text"/>
6.	<input type="text"/>

10. What is the gender of each child?

	Female	Male
1.	<input type="checkbox"/>	<input type="checkbox"/>
2.	<input type="checkbox"/>	<input type="checkbox"/>
3.	<input type="checkbox"/>	<input type="checkbox"/>
4.	<input type="checkbox"/>	<input type="checkbox"/>
5.	<input type="checkbox"/>	<input type="checkbox"/>
6.	<input type="checkbox"/>	<input type="checkbox"/>

11. How old is your child that took part in the UCC WDS Seed to Plate education?

- 4 years old
- 5 years old
- 6 years old

12. What is your child's gender?

- Female
- Male

Evaluating the Effectiveness of the University Christian Church Weekday

13. Which class was your child in this school year?

- 4 years old (2 days/week)
- 4 years old (3 days/week)
- 4 years old (5 days/week)
- Kindergarten

14. How often do you sit down as a family to have meals together in your house?

- 2-3 times a day
- Once a day
- Several times a week
- Several times a month
- Very rarely

15. How often do you take your child grocery shopping?

- Weekly
- Several times a month
- Once every few months
- Once or twice a year
- Never

16. Did you read the children's handouts that were created by the TCU students and sent home with your child?

- Always
- Almost always
- About half of the time
- Rarely
- Never

17. Did you read these handouts with your child?

- Always
- Almost always
- About half of the time
- Rarely
- Never

Evaluating the Effectiveness of the University Christian Church Weekday

18. Did another family member or caregiver read the children's handouts that were created by the TCU students and sent home with your child?

- Always
- Almost always
- About half of the time
- Rarely
- Never
- I do not know.

19. Did another family member or caregiver read these handouts with your child?

- Always
- Almost always
- About half of the time
- Rarely
- Never
- I do not know.

20. Did you read the parent handouts that were emailed home by your child's teacher that related to each lesson?

- Always
- Almost always
- About half of the time
- Rarely
- Never

21. Did another family member or caregiver read the parent handouts that were emailed home by your child's teacher that related to each lesson?

- Always
- Almost always
- About half of the time
- Rarely
- Never
- I do not know.

Evaluating the Effectiveness of the University Christian Church Weekday

22. Please estimate the average amount of fruit your child eats every day.

- none
- ½ cup or less
- 1 cup
- 2 cups
- 3 cups
- 4 cups or more

23. Please estimate the average amount of vegetables your child eats every day.

- none
- ½ cup or less
- 1 cup
- 2 cups
- 3 cups
- 4 cups or more

24. Please estimate the average number of servings of milk or dairy foods that your child consumes every day. (A serving for a 4-5 year old is 1/2 cup milk, 4 oz. yogurt, 1 string cheese, or 3/4 oz cheese.)

- none
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5 or more

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25. Please estimate the number of ounces of protein foods your child eats every day. (One ounce is equal to 1 oz meat, poultry or seafood, 1 egg, 1 Tablespoon peanut butter, 1/4 cup cooked beans or peas such as kidney, pinto, lentils.)

- none
- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

26. Please estimate the number of servings of grains your child eats every day. (A serving is 1 slice bread, 1 oz. ready-to-eat cereal flakes, 1/2 cup oatmeal, 1/2 cup cooked rice/pasta, 1 6" tortilla.)

- none
- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

27. How many of these grain servings are whole grain foods each day? (100% whole wheat bread or cereal, oatmeal, brown rice, 100% whole grain pasta, corn tortillas)

- none
- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

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28. Did the Seed to Plate program help improve your child's dietary habits?

- no
- yes

29. Did the Seed to Plate program help improve your family's dietary habits?

- no
- yes

30. Rate your overall satisfaction level with what your child learned from the Seed to Plate education.

- Highly satisfied
- Satisfied
- Neither satisfied nor dissatisfied
- Dissatisfied
- Highly dissatisfied

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31. How much do you agree or disagree with each statement?

(Mark one answer for each statement)

After the completion of this program my child...

	Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
has been more willing than before to eat fruits.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has been more willing than before to eat vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has been more willing than before to eat whole grain foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has been more willing than before to drink milk or eat other dairy foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has been more willing than before to eat sources of protein.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has expressed an interest in growing a garden or growing food at home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has asked more questions pertaining to plants.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has mentioned the term "compost."	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has talked about worms or worm bins.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has shown interest in saving seeds from vegetables or fruits.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has expressed a new concern for water conservation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has discussed the health benefits of different foods at home.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has encouraged the family or friends to eat more fruits and vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has been drinking more water.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
has discussed what is needed for a plant to grow: (water, nutrients, sunlight, and air).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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has eaten healthier.



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32. How much do you agree or disagree with each statement? (Mark one answer for each statement)

Since taking part in this program, our family has...

	Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
planned or planted a garden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
visited the garden at UCC.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
begun composting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
started using a worm bin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
tried to conserve water.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
eaten more fruits.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
eaten more vegetables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
eaten more foods grown locally.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
eaten more produce grown in season.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
eaten healthier.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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33. What subject(s) did you find most valuable?

- What are plants? What do plants need to grow?
- Water Conservation
- Vegetables and Herbs
- Composting
- Planting and watering seeds
- Worms
- Yummy foods for healthy bodies
- Fruits
- Seed saving

Other (please specify)

34. What other topic(s) do you think should have been included or should be included in the future?

35. Please provide any other comments that you would like to share so that we may continue to improve this program and experience for the children attending UCC WDS.

REFERENCES

- 1 Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association* 2014;311(8):806-814.
- 2 Langelotto GA, Gupta A. Gardening increases vegetable consumption in school-aged children: a meta-analytical synthesis. *HortTechnology*. 2012; 22(4):430-445.
- 3 Zeinstra G, Koelen M, Kok F, de Graaf C. Cognitive development and children's perceptions of fruit and vegetables; a qualitative study. *IJBNPA*. 2007;4(1):30.
- 4 Baxter SD, Thompson WO. Fourth-grade children's consumption of fruit and vegetable items available as part of school lunches is closely related to preferences. *J Nutr Educ Behav*.2002;34:166-171.
- 5 Tuuri G, Zanovec M, Silverman L, et al. "Smart Bodies" school wellness program increased children's knowledge of healthy nutrition practices and self-efficacy to consume fruit and vegetables *Appetite*. 2009;52:445-451.
- 6 M. Abdollahi, M. Amini, H. Kianfar, et. al. Qualitative study on nutritional knowledge of primary-school children and mothers in Tehran. *Eastern Mediterranean Health Journal*. 2008. Vol. 14, No. 1.
- 7 Ratcliffe MM, Merrigan KA, Rogers BL, Goldberg JP. The effects of school garden experiences on middle school-aged students' knowledge, attitudes, and behaviors associated with vegetable consumption. *Health Promot Pract*. 2011;12(1):36-43
- 8 Powers AR, et al. Effects of a nutrition education program on the dietary behavior and nutrition knowledge of second- grade and third-grade students. *Journal of school*

- health*, 2005, 75(4):129–33
- 9 Moreno NP, et al. An approach to improving science knowledge about energy balance and nutrition among elementary- and middle-school students. *Cell biology education*, 2004, 3(2):122–30.
 - 10 Kirks BA, Hughes C. Long-term behavioral effects of parent involvement in nutrition education. *Journal of nutrition education*. 1986. 18(5):203-6.
 - 11 Wall, Least, Gromis, et. al, Nutrition Education Intervention Improves Vegetable-Related Attitude, Self-Efficacy, Preference, and Knowledge of Fourth-Grade Students. *Journal of School Health American School Health Association*, 2011, 82(1).
 - 12 Thompson VJ, Bachman CM, Baranowski T, Cullen KW. Self-efficacy and norm measures for lunch fruit and vegetable consumption are reliable and valid among fifth grade students. *J Nutr Educ Behav*. 2007;39(1):2-7.
 - 13 Lorson BA, Melgar-Quinonez HR, Taylor CA. Correlates of fruit and vegetable intakes in US children. *J Am Diet Assoc*. 2009;109:474-478.
 - 14 Bradleea LA, Singera MR, Qureshia MM, Moore LL. Food group intake and central obesity among children and adolescents in the Third National Health and Nutrition Examination Survey (NHANES III). *Public Health Nutrition*. 2010; 13(6), 797-805.
 - 15 Dalton, S. “Schools and the Rising Rate of Overweight Children.” *Topics in Clinical Nutrition*. 2004.19(1): 34–40.
 - 16 Just D, Lund J, Price J. The Role of Variety in Increasing the Consumption of Fruits and Vegetables Among Children. *Agricultural and Resource Economics Review*.

2012. 72–81.

17 Thomsom CA, Ravia J. A Systematic Review of Behavioral Interventions to Promote Intake of Fruit and Vegetables. *J Am Diet Assoc.* 2011;111(10):1523-1535.

ABSTRACT

THE EFFECTIVENESS OF THE UNIVERSITY CHRISTIAN CHURCH COMMUNITY (UCC) WEEKDAY SCHOOL (WDS) SEED TO PLATE EDUCATION PROGRAM. C. Benge, J. Koiner, C. Weeks, G. Jarman Hill, C. Graham

Background: Students enrolled in Texas Christian University's Community Nutrition and Infant and Child Nutrition courses in the Department of Nutritional Sciences taught nine lessons about nutrition, health, and gardening to preschool children, ages 4-6, enrolled in the University Christian Church Weekday School (UCC WDS). The educational program was titled Seed to Plate. Research was conducted to identify how effective the program was, which areas in particular had the most positive impact on the children's and family's behaviors as related to nutrition, health, and gardening.

Methods: The study was approved by the Institutional Review Board. A survey was developed and distributed using Survey Monkey, an electronic survey tool. An email with informed consent and a link to the survey was sent to a parent of each child that participated in the program during the spring 2013 semester. The survey consisted of questions to assess demographic data, current dietary practices of the children, frequency of meals eaten as a family and grocery shopping completed with child and parent together, use of the educational materials sent home through the Seed to Plate program, satisfaction with and value of the Seed to Plate program to the family, and if the family or children had implemented changes related to nutrition, health or gardening as a result of program participation. Data were analyzed using SPSS version 21 software.

Results: Emails containing the consent and a link to the survey were sent to parents' email addresses (N=77) provided by the preschool to send one email per household of a child that took part in the program. All of the participants who responded (N=23) were mothers of the children enrolled in the Seed to Plate program with a response rate of ~30%. The mean age of participants was 35.9 +/- 8.3. Over 65% (N=15) of participants reported that the Seed to Plate program helped improve their children's dietary habits. About 57% (N=13) and 52% (N=12) reported that following the program their family ate more vegetables and fruits, respectively. Almost 61% (N=14) reported that they were highly satisfied with what their children learned from the program and ~70% (N=16) reported that their children had discussed the health benefits of different foods at home after completion of the program.

Discussion: Despite reports of parental satisfaction with the Seed to Plate Program presented at UCC WDS and improved dietary habits in children following the program, it is difficult to assess the overall effectiveness of the program due to a low sample size and low response rate. Researchers may continue to evaluate the program by surveying parents of children that participate in the Seed to Plate program as it continues.