Master of Public Health Field Experience Report

INVESTIGATING CHILD FEEDING IN A VIRTUAL REALITY BUFFET

by

COREY MILLER
MPH Candidate

submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

Graduate Committee:
Dr. Tandalayo Kidd
Dr. Mark Haub
Dr. Nancy Muturi

Field Experience Site:
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Field Experience Preceptor:
Dr. Susan J. Persky, Ph.D.

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Manhattan, Kansas

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Summary

In partial fulfillment of the Masters of Public Health (MPH) degree, I completed my field experience in the Social and Behavioral Research Branch (SBRB) at the National Human Genome Research Institute (NHGRI) of the National Institutes of Health (NIH) in Bethesda, Maryland from June 5th 2017 through August 11th 2017. The NIH is a federal government agency which serves as the nation's primary resource for biomedical and public health research that improves health and save lives. NHGRI is one of twenty-seven institutes at the NIH. NHGRI's mission is to encompass a broad range of studies aimed at understanding the structure and function of the human genome and its role in health and disease. The branch I specifically worked in was SBRB, which conducts a broad array of research in applying new genomic discovery to improve health and clinical care. During my time at NHGRI, I was able to use my skills attained from the Masters of Public Health program at Kansas State University to advance the progress of ongoing projects as well as increase my knowledge and skills in areas outside of obesity research, such as diabetes related-stigma and virtual reality child feeding measures.

For my experience, I worked with Dr. Susan J. Persky; a senior investigator in SBRB. Throughout my time at SBRB, I was tasked to work on a variety of ongoing projects which will assist with future research. Tasks included implementing coding systems to transform observed dietary behavior into quantitative variables, data coding, creating future study materials and presenting research findings at NIH poster day.

Subject Keywords: Public Health, Nutrition, Genomics, NIH

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List of Abbreviations

CDC	Centers for Disease Control & Prevention
CGCGB	Cancer Genetics and Comparative Genomics Branch
CMS	Centers for Medicare & Medicaid Services
CSGB	Computational and Statistical Genomics Branch
DHHS	United States Department of Health & Human Services
FDA	Food & Drug Administration
GDRB	Genetic Disease Research Branch
GMBB	Genetics and Molecular Biology Branch
HRSA	Health Resource & Services Administration
IHS	Indian Health Service
IVETA	Immersive Virtual Environment Testing Area
MCIDGB	Metabolic, Cardiovascular and Inflammatory Disease Genomics Branch
MGB	Medical Genetics Branch
MGMGB	Medical Genomics and Metabolic Genetics Branch
MPH	Masters of Public Health
MTURK	Mechanical Turk
NHGRI	National Human Genome Research Institutes
NIH	National Institutes of Health
NTECH	New Technology and Child Health
SBRB	Social and Behavioral Research Branch
TFGB	Translational and Functional Genomics Branch
USDA	United States Department of Agriculture
USPHS	United States Public Health Services

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"And I am Certain that God, who began the good work within you, will continue his work until it is finally finished on the day when Christ Jesus returns" (Philippians 1:6)

Chapter 1 - Field Experience Scope of Work

In partial fulfillment of the Masters of Public Health (MPH) degree, I completed my field experience in the Social and Behavioral Research Branch (SBRB) at the National Human Genome Research Institute (NHGRI) of the National Institutes of Health (NIH) in Bethesda, Maryland from June 5th 2017 through August 11th 2017. The United States Department of Health & Human Services (DHHS) mission is to enhance and protect the health and well-being of all Americans. DHHS fulfills that mission by providing for effective health and human services and fostering advances in medicine, public health, and social sciences. DHHS has 11 operating divisions, including eight agencies in the United States Public Health Service (USPHS) and three human services agencies. Additionally, DHHS supports the advancement of new healthcare knowledge throughout these divisions and agencies by providing funding through grants more than any other government agency. Agencies such as the Centers for Disease Control and Prevention (CDC), Food and Drug Administration (FDA), Health Resources and Services Administration (HRSA), Indian Health Service (IHS), Centers for Medicare and Medicaid Services (CMS), NIH, and many more are housed under the DHHS, and work independently and together to achieve the DHHS mission (United States Dept. of Health & Human Services, 2017).

The NIH is a federal government agency which serves as the nation's primary resource for biomedical and public health research that improves health and save lives. NIH's mission is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability (National Institutes of Health, 2017). The NIH is made up of many institutes which help fulfill their mission. NHGRI is one of the twenty-seven institutes at the NIH. NHGRI's mission is to encompass a broad range of studies aimed at understanding the structure and function of the human genome and its role in health and disease. NHGRI is made up of different research branches which specialize in a certain area of genomic research. Specifically, there are 9 branches within NHGRI which include Cancer Genetics and Comparative Genomics Branch (CGCGB), Computational and Statistical Genomics Branch (CSGB), Genetic Disease Research

Branch (GDRB), Genetics and Molecular Biology Branch (GMBB), Medical Genetics Branch (MGB), Medical Genomics and Metabolic Genetics Branch (MGMGB), Metabolic, Cardiovascular and Inflammatory Disease Genomics Branch (MCIDGB), SBRB and Translational and Functional Genomics Branch (TFGB). The branch I specifically worked in was SBRB, which conducts a broad array of research in applying new genomic discovery to improve health and clinical care. SBRB translates genomic discoveries into interventions that improve health-related decisions and outcomes and investigates the social, ethical and public policy impact of genomic research (National Human Genome Research Institute, 2017).

For my field experience, I worked with Dr. Susan J. Persky; senior investigator and head of the Immersive Virtual Testing Area (IVETA) in SBRB. Dr. Persky holds a PhD in Social Psychology from the University of California, Santa Barbara. Her work uses virtual reality-based healthcare simulations to investigate how information about genomic discoveries related to common conditions influence outcomes such as health care communication; relationships between patients and providers; medical decision-making; and beliefs, emotions and behavior of individuals. Other interests of Dr. Persky focus on how new genomic information might influence social stigma, health disparities and other forms of unequal treatment. She also examines the context and ways in which genomic information is disseminated; for example, through social media, as well as the health-relevant effects of that dissemination (National Human Genome Research Institute, 2015).

During my time at NHGRI (Figure 1.1), I was able to use my skills attained from the Masters of Public Health program at Kansas State University to advance the progress of ongoing projects, as well as increase my knowledge and skills in areas outside of obesity research, such as diabetes related-stigma and virtual reality child feeding measures. Throughout my time at SBRB, I was tasked with work on a variety of ongoing projects which will assist with future research. The primary focus of my field experience was to assist with data management and coding. Both, data management and coding is very beneficial and vitally important in not only public health organizations but many companies in general. They both play a part in minimizing potential errors, along with improving worker efficiency within organizations. All areas of research collect

data of some sort. The data must be analyzed to understand it. Analysis typically begins with the labeling of data to how it was collected. Working with the original data, however, can be quite complicated. Because of this reason, data is often coded. Data coding makes the researchers' job easier by condensing large quantities of quantitative or qualitative data into smaller analyzable units, which makes a data set much easier to manage. As data is coded, it is important to prepare the codebook carefully. The codebook serves a unique purpose for the researcher, as it provides an ordered guide for identifying values associated with a coding response given for a specific survey question. More specifically, this process describes how the data is arranged; explains what the various numbers or text represent, along with any special instructions regarding how to use the data properly.

Figure 1.1 NHGRI logo

Chapter 2 - Learning Objectives

Dr. Persky outlined three specific learning objectives for this field experience. The first objective was to be able to describe the body of work, including that taking place in SBRB, linking genetics, nutrition-oriented behavior, and psychological factors. The second objective was to discuss simulation approaches to measuring food intake. The third objective and primary focus of my field experience was to implement coding systems to transform observed dietary behavior into quantitative variables. All objectives were completed during my time at NHGRI-SBRB and will be discussed in the following sections of this report.

Activities Performed

During my time at NHGRI-SBRB, several activities were performed under Dr. Persky's leadership. I had the opportunity to perform small literature reviews related to dietary measurement, which assisted Dr. Persky with writing research papers, updating protocols along with redesigning current study materials. All literature reviews helped assist in an ongoing study called "Parents TAKE," which is an acronym for *Parent's Thoughts About Kids and Eating*. Parents TAKE was created in two phases, the first phase started in 2011 and the second phase is dated to start in 2017. The total length of this project is estimated to cover eight years. The purpose of this study is to assess the influence of information about children's obesity risk on parental feeding behavior, beliefs, and attitudes. The primary objective of Parents TAKE was to find out what is the influence of information about children's obesity risk on parent feeding behavior. This was assessed through virtual-reality buffet choices. The secondary objective was to discover the mechanisms that explain the influence of information regarding children's obesity risk on parental feeding behavior, which was assessed by self-report questionnaires. Lastly, the exploratory objective was to understand user behavior in the virtual reality buffet, along with gender differences in behavior.

On this specific project, I, unfortunately, was not able to be involved in the actual research study itself, as the first phase had finished. My primary role was assisting with literature reviews and reference searches on specific topics to support Dr. Persky with writing, along with redesigning study materials (Figure 2.1) to be used in the second

phase regarding the importance of physical activity, nutrition and sleep. Additionally, I was responsible for helping Dr. Persky find literature related to one of her research papers regarding identifying gender differences in parent-child feeding, as well as give a general sense of what the literature says about gender differences in specific eating behavior traits such as disinhibition, pickiness, food neophobia and binge eating. Disinhibition is the tendency to overeat in response to different stimuli. Pickiness is an unwillingness to eat familiar foods or try new ones. Food neophobia is an extreme fear or dislike of trying new foods. Binge eating is defined as uncontrolled eating. After searching the literature, it appeared that pickiness and food neophobia were commonly linked together. Additionally, gender differences were shown where females were more likely to engage in disinhibition, whereas males were more likely to binge eat.

Literature searches specifically involved investigating if parents feed boys more calories than girls, along with identifying if parents have a sense of whether they are feeding high or low-calorie meals to their kids. Other searches included exploring if fathers are under-represented in the child feeding literature, along with seeing if kids would eat less if parents put less food on their plate. Also, I identified methods and papers in which parent feeding of a child was measured in a variety of ways such as using fake food, food choice from a virtual reality buffet, real buffet, use of pictures or measurement tools which show how much food a parent would feed the child, parents choosing foods from a menu for the child or other similar approaches. The goal of identifying a list of the different methods in which parent-child feeding is measured was to help Dr. Persky compare these methods to the virtual reality buffet method that she had developed.

As phase two of the Parents TAKE study is scheduled to start this Fall, 2017, I was able to help develop new materials to be used in the upcoming study. To assist me in developing the new materials, I searched the internet for examples of public health-oriented educational materials that were aimed at parents which address childhood obesity risks and the family environment, along with genetics. Additional tasks included compiling a list of web-based sources for parents regarding information on children's health that specifically focused on nutrition, physical activity, and sleep. Good nutrition,

physical activity, and adequate sleep are the building blocks for a healthier life for children.

Nutrition is an essential component of children's health. With the percentage of children with obesity tripling since the 1970's; there is no doubt that most kids get more than enough to eat (CDC, 2017). The problem is that a lot of the food children consume is high in calories but very low in nutrients (CDC, 2017). A balanced diet of carbohydrates, protein, fats, and fiber provide the body with all the essential nutrients it needs. Specifically, a diet rich in fruits, vegetables, whole grains, healthy oils and low-fat dairy products will provide all the important nutrients a child needs such as calcium, vitamin D, iron and vitamin A (Building Healthy Kids, 2017).

Along with a nutritious diet, physical activity provides several health benefits for children. Physical activity promotes the development of stronger muscles and bones, a leaner body, and a reduced risk of becoming overweight which ultimately decreases early risk factors for type 2 diabetes, heart disease, hypertension, diabetes and osteoporosis (Janssen & LeBlanc, 2010).

Another important component of children's health, but sometimes overlooked, is sleep. A consistent sleep schedule is extremely important for children because it directly impacts mental and physical development. Sleep recommendations for children ages 1 through 12, ranges from 9 to 14 hours per day. Sleep deprivation can cause a child to be hyper, emotional, irritable along with additional changes in behavior; so, it is vitally important for a child to get an adequate amount of sleep per day.

Overall, the goal is to keep children healthy while providing an environment that supports those healthier behaviors related to dietary intake, physical activity, and sleep. Parenting styles are different, and children are different; therefore, the list of web-based sources I compiled will be included in the information-seeking measure for the Parents TAKE protocol to measure which source the parents click on.

The Raising Healthy Kids module (Figure 2.1) used for phase two of the Parents TAKE study is provided in the products developed section of this field experience report. Additional Parents TAKE modules will be posted in the appendix.

The majority of my time at NHGRI-SBRB was spent assisting with data management and implementing coding processes to transform observed dietary

behavior and diabetes data into quantitative variables. I had the pleasure of gaining coding experience with a very large diabetes data set. This specific research dealt with diabetes stigma. Diabetes encompasses a group of metabolic diseases characterized by hyperglycemia that is caused by defects in insulin secretion, insulin action, or both.

The vast majority of diabetes cases fall into two categories; type 1 or type 2 diabetes which are both considered chronic diseases. Type 1 diabetes is a condition in which the pancreas produces little or no insulin. Insulin is needed to allow glucose to enter cells to produce energy. Type 2 diabetes affects the way the body metabolizes glucose. The body either resists the effects of insulin or simply doesn't produce enough to maintain proper glucose levels (American Diabetes Association, 2014). Type 1 diabetes has a much earlier onset and is typically diagnosed in childhood or early adulthood whereas type 2 diabetes is more frequently diagnosed during adulthood. The cause of type 1 and type 2 diabetes involves many factors. Type 1 diabetes is believed to be more related to genetics, whereas type 2 diabetes is more commonly associated with lifestyle behaviors (Steck & Rewers, 2011; National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2016).

Over the years, advocacy groups and scientist have communicated the need for diabetes-related stigma research. To date, this research remains predominately qualitative. According to the scientific literature, health-related stigma is highly associated with poorer health outcomes (Browne et al., 2013). More research on diabetes-related stigma should give us a better understanding of the topic.

Dr. Persky has taken the initiative to further explore and assess type 1 and type 2 diabetes stigma. Her research specifically focused on the health outcomes associated with causal understanding, stigma, and self-concept among patients affected with type 1 and type 2 diabetes. Within this study, the research consisted of administering anonymous questionnaires to patients with type 1 and type 2 diabetes, as well as a sample of healthy controls through online surveys with a purpose of helping researchers understand how people think and feel about issues related to diabetes. The online survey was developed using ResearchMatch for patients with type 1 and type 2 diabetes and Mechanical Turk (MTurk) for the healthy controls. ResearchMatch and MTurk are both web-based recruitment sites that offer efficient and convenient ways of

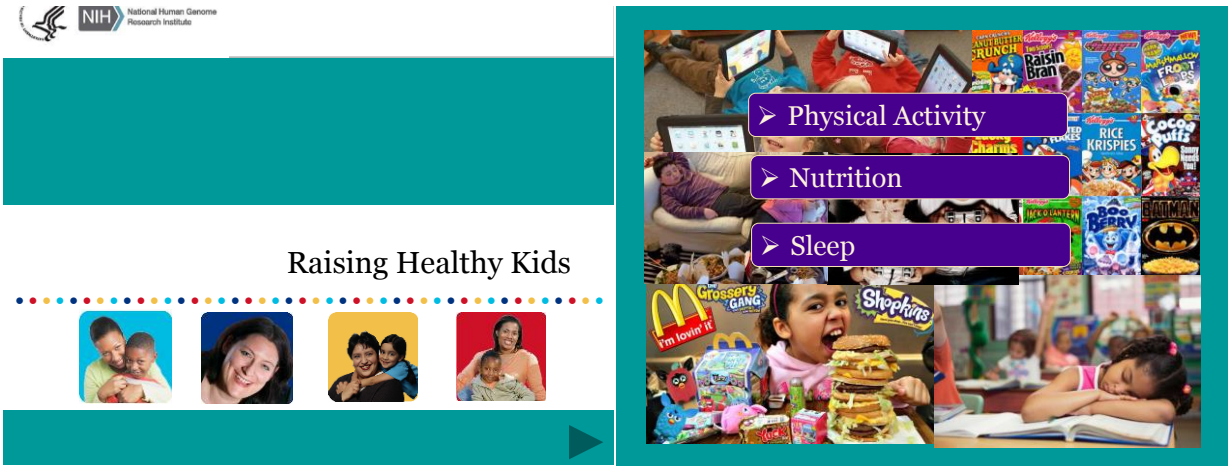
reaching large amounts of research subjects. Participants in all groups completed the first module of questions which assessed general perceptions of diabetes, quality of life, health status and demographics. Following the completion of the first module, patients with type 1 or type 2 diabetes completed an additional module related to disease management, diabetes symptoms, disease perceptions and disease-related self-concept. Upon completion of the online survey, both groups of participants were incentivized via amazon gift cards for their participation.

Within the diabetes data set, there were over 900 participants with a large number of variables attached. Unfortunately, I was not able to work with the full data set, as the majority of the variables were already coded. My specific role on this project was to code three specific questions which asked the participant to describe type 1 diabetes, type 2 diabetes, and the difference between the two types of diabetes. I used a 2-point coding scheme to code participant responses. This coding scheme was designed by Dr. Persky and another NIH investigator. The coding scheme dimensions consisted of the age of onset, causal factors, severity, prevalence, controllability, pathophysiology, treatment, and outcome. Furthermore, respondents who touch upon 2 or more of the coding dimensions, making no mistakes, are coded as possessing a good understanding of type 1 or type 2 diabetes. Those who touch upon only 1 of the coding dimensions and/or make some minor mistakes are coded as having a satisfactory understanding. Lastly, those who note fewer than 1 of the coding dimensions and/or make major mistakes are coded as having a poor understanding. An example of a response demonstrating a good understanding is “Type 1 involves the body not being able to make insulin properly, while in type 2 it still can produce insulin, the cells just can’t absorb it from the blood. Type 1 also usually appears during childhood or the teen years while type 2 usually shows up later.” In this example, the participant touches on pathophysiology shown by their explanation of the body’s production of insulin and age of onset with their explanation of when type 1 and type 2 diabetes develops, earning a 2-point coding score for their response. Going forward, the data will be further analyzed and used for future research papers simultaneously adding valuable quantitative research to the literature.

Lastly, additional coding and codebook development was completed for a very large study called New Technology and Child Health (nTech). This particular study evaluated and tested new behavioral science methods and measures using virtual reality tools in the IVETA research facility for future research projects. The IVETA had recently acquired a tool that is designed to assess participant emotional state based on automated, computer-based coding of facial expressions. Before using this tool, Dr. Persky wanted to test its feasibility, efficacy, and validity in social and behavioral health research. Throughout the course of these evaluations, multiple research questions were tested in regards to the influence of emotion and health communication information framing on food choices made for one's child. This study is beneficial because it would help researchers learn more about strategies for designing future research studies, tools and approaches for communicating health topics. Because of the many variables used in this study, Dr. Persky thought it was best suited for me to develop an analysis to create a scientific poster which would be presented at NIH poster day. NIH poster day is an annual campus-wide event to share the research interns conducted throughout the summer, as well as a time to develop communication and networking skills. This information will be discussed further in chapter 3 of this report.

Products Developed

As I indicated previously, Figure 2.1 is the rough draft of the common module which will be used in the second phase of the Parents TAKE study:



Physical Activity, Nutrition and Sleep Benefits include:

- ✓ healthy growth
- ✓ leaner body
- ✓ less likely to become overweight
- ✓ better concentration
- ✓ better outlook
- ✓ better able to handle challenges
- ✓ decreased risk of disease
- ✓ increased ability to fight sickness

Physical Activity

- ➢ School demands, busy lifestyles, and busy working families can hinder daily activity levels

- ➢ Parents can help by instilling a love of activity and fitting activity into their everyday lives

The Three Elements of Fitness

- ➢ **Endurance**: playing tag

- ➢ **Strength**: crossing the monkey bars

- ➢ **Flexibility**: bending down to tie shoes

Nutrition

Important Macro-Nutrients for Your Child

- ➢ **Protein**
- ➢ **Carbohydrates**
  - ➢ **Fiber**
- ➢ **Fats**

Some Important Micro-Nutrients for Your Child

- ➢ **Calcium**
- ➢ **Iron**

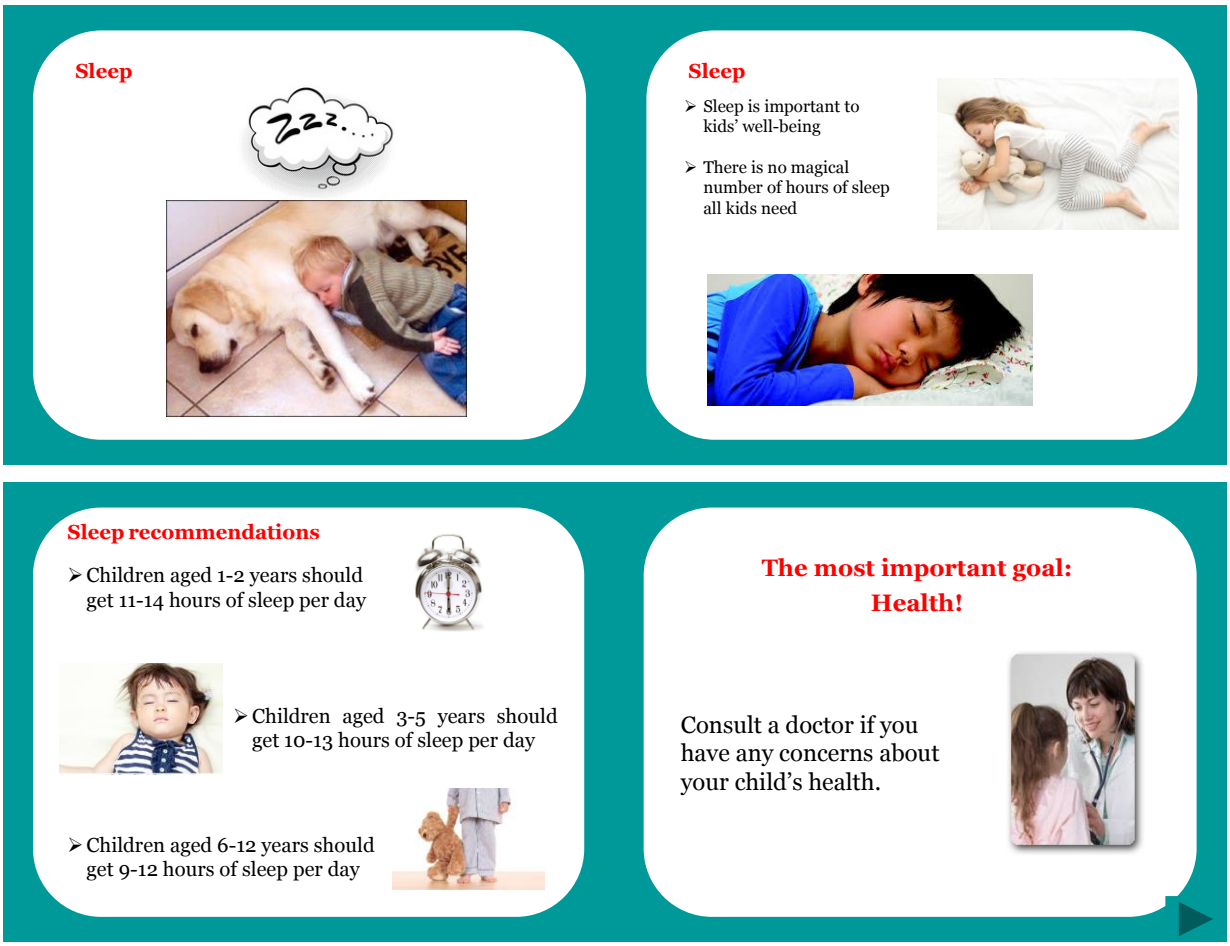


Figure 2.1 Parents TAKE Common Module

Chapter 3 - Capstone Project / Culminating Experience

For my capstone project, I was able to use the nTech data set to develop a research question to present at NIH Poster day (Figure 3.1). This data set primarily consisted of behavioral, emotion, health risk, genetics, nutrition, and child feeding related questions. After weeks of meetings with Dr. Persky, discussing possible research questions and running analysis to no avail, we finally came across a question that was significant. That question was related to investigating child feeding in a virtual reality buffet and the influences that message framing has on parent emotion. It is important to understand effective ways to communicate to parents about child nutrition, as well as contextual factors that influence parent responses to health messages.

Research has consistently explained the importance and benefits of fruit and vegetable consumption such as disease prevention or reducing the risk of chronic disease. These health benefits have been attributed to fruits and vegetables supplying dietary fiber which is linked to lower incidences of cardiovascular disease and obesity. Along with dietary fiber, fruits and vegetables supply vitamins and minerals to the body. Vegetables are sources of phytochemicals which provide antioxidants and anti-inflammatory agents that fight off disease (Slavin & Lloyd, 2012). Although the importance of fruits and vegetables is commonly known, parents still are not feeding nearly enough to their kids. Because of this, Dr. Persky and I wanted to figure out the best way to craft our messages so we can influence parent's behavior.

In previous literature, college students were induced to feel anger or fear and then given gain or loss-framed messages about the importance of fruit and vegetable consumption. This work found that a "gain" frame was more effective in increasing fruit and vegetable consumption for those in an anger state and a "loss" frame more effective for those in a fearful state (Gerend & Maner, 2011). A lack of literature exists regarding the role of emotion and message framing in decision-making for child-feeding (O'Keefe & Nan, 2012). We examined this possibility within the nTech study which explored the role of these factors in genetic information-seeking and child-feeding. The objective of this research question was to determine whether emotion (fear vs. anger) induced in participants, crossed with language framing of a preventive health message

(gain vs. loss frame) results in hypothesized effects consistent with previous research and whether this differs for mothers vs. fathers. We hypothesized that elicited emotion and framing of health message will interact, such that participants will select more servings of fruits and vegetables from the virtual buffet for their child when exposed to the following combinations: anger with “gain” frame, and fear with “loss” frame.

Pertaining to message framing, individuals in an angry state tend to feel high levels of personal control and certainty about decisions along with perceiving lower risk. Contrarily, individuals in a fearful state tend to feel low levels of control, certainty about the decision and perceive higher risk. An anger state is well matched with a “gain” frame message (what one will gain from doing the preventive behavior). For example, eating plenty of fruits and vegetables can protect your child’s health. Whereas, a fearful state is well matched with a “loss” frame message (what one will lose by not doing the behavior). For example, not eating plenty of fruits and vegetables can endanger your child’s health.

Within this study, 190 participants, parents of children 4-7 years of age had six tasks. First, the participant answered an online consent and questionnaire based on their selves, their child, and their thoughts about aspects related to health. Following this, participants were emotionally induced to either anger or fear. Induction was done by showing the participant one of two short movie clips. To induce anger, a clip from the movie “Crash” was shown, where a cop pulls over a black couple and sexually assaults the woman. Fear was induced by showing a clip from the movie “The Ring” where a man’s TV randomly turns itself on, and a girl on the screen crawls out of the TV and pulls her hair out of her face before the images on the TV turn blank with static noise. Proceeding emotional induction, participants received a health message, where they were randomized to gain or loss framing. Next, the participant answered another questionnaire based on their thoughts and beliefs on other topics. Following the questionnaire, participants were asked to use a virtual reality-based buffet restaurant simulation to make hypothetical food choices for their child. To do this, the parent put on a virtual reality headset and walked around the virtual cafeteria to select their child’s food and drink. Lastly, the participant watched a short presentation related to a child health topic and answered a final questionnaire.

The outcome measure for this particular research question is the number of servings of fruits and vegetables chosen from the virtual reality buffet. This included oranges, grapes, carrots, corn, green beans and black beans. After running an analysis on the demographics, the majority of participants were highly educated, white, mothers and fathers with an average age of 38 years old with children aged five years old with an average BMI of 29 (overweight). After running the demographics, manipulation checks were done to see if our message framing actually worked, which was a success. Following manipulation checks, a 3-way interaction was conducted to discover the main outcome. Results showed that mothers chose more servings of fruits and vegetables for their child when they were angry and received the gain frame, whereas fathers chose more servings of fruits and vegetables when they were fearful and received the gain frame message. In conclusion, mothers followed the hypothesized pattern, based on previous literature. However, fathers followed a different pattern. Dr. Persky and I are not sure why this is, but Dr. Persky will follow up on why fathers exhibited a different behavior pattern. This could be related to an emotion induction problem. Nevertheless, fathers are under-studied in the literature; therefore, influences on behavior are not well understood. Future research is needed to help understand factors that influence behavior in response to health messages for all parents.

Interestingly, my experiences within public health and the NIH, help me realize that research is not a strong interest of mine. Living in Washington D.C., interacting with people outside of the NIH, and constantly being around politics has sharpened my interest in implementing health policy, something I did not have the opportunity to do during my internship with the NIH. It may appear strange that I completed an internship that involved research, yet my passion for work related to health policies increased. I attribute that passion to a long-standing desire I have had since entering the Masters of Public Health program at Kansas State University, and that is to improve limited-resource communities to promote healthier lifestyle behaviors.

From my oral presentation, based on the comments from the audience, my capstone project could have been improved in a variety of ways. Although the main purpose of my capstone project was to pilot test the emotion detection software, I realized the study could have provided additional benefits for other researchers related

to dietary intake, physical activity, and stress. Measuring blood pressure and respiration before and after the introduction of the fear or anger movie clips could help researchers compare the physiological response with the participant's emotional response. Assessing the parents' hunger level before selecting foods for their children could help researchers see the relationship between the level of hunger ness and amount of food selected. Additionally, monetary dollar amounts could have been added to the virtual reality buffet to explore more about parent-child feeding and the potential barriers associated with social, economic status.

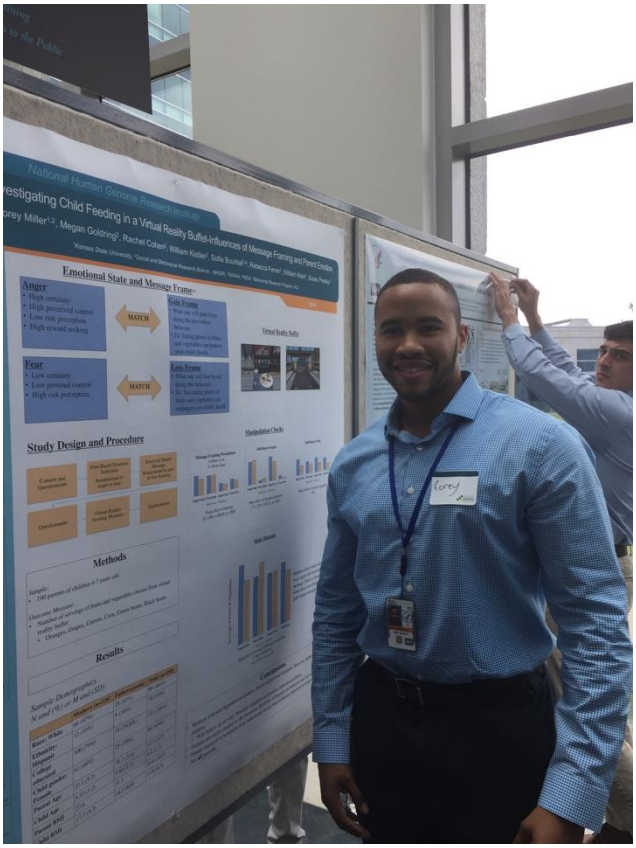


Figure 3.1 NIH Poster Day

Chapter 4 – Core Competencies

This section lists the core competencies and how they relate to my field experience.

Biostatistics

Biostatistics was used during my field experience to analyze results using SPSS for my summer NIH research poster. Additional skills learned from biostatistics were also used to create descriptive statistics for my research question.

Epidemiology

In regards to the diabetes stigma study, type 2 diabetes can cause many problems. It can also be reversed through a healthy diet and physical activity. Within epidemiology, diet can be a determinant of disease which nutrition education can help prevent and control this disease.

Environmental Health

Within Dr. Persky's line of work with virtual reality buffet simulations and regards to my capstone project, environmental health was related regarding the use of the virtual reality buffet reducing food waste that could have potentially existed if a real buffet was present in the NTECH study.

Health Services Administration

Health service administration could be related to my field experience by researchers lobbying to health insurance companies to pay for patients to participate in virtual reality patient research.

Social and Behavioral Science

While investigating child feeding in a virtual reality buffet and the influences of message framing and parent emotion, I was able to see how different emotional behaviors such as anger or fear impacts the amount of fruits and vegetables served while receiving a certain health message.

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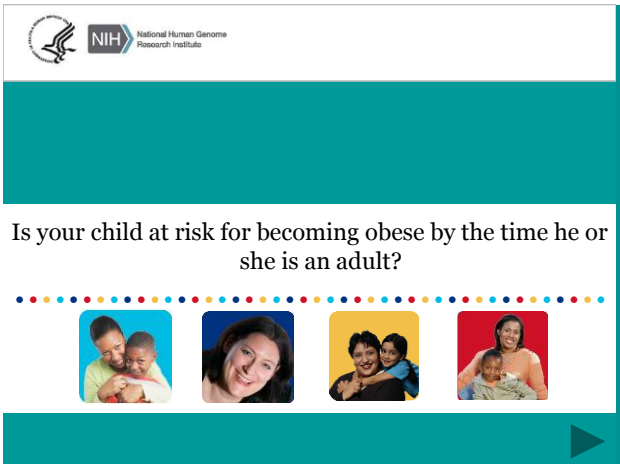
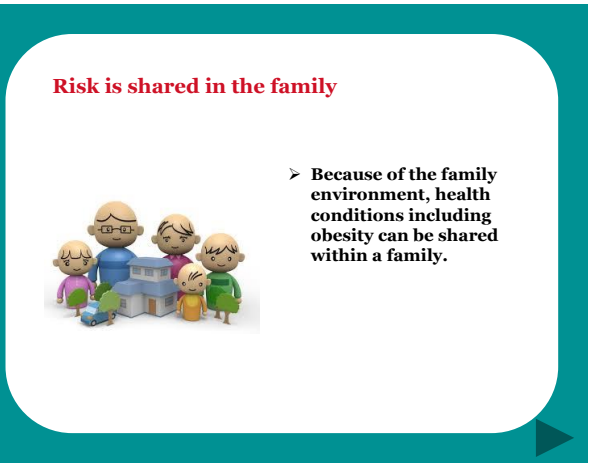
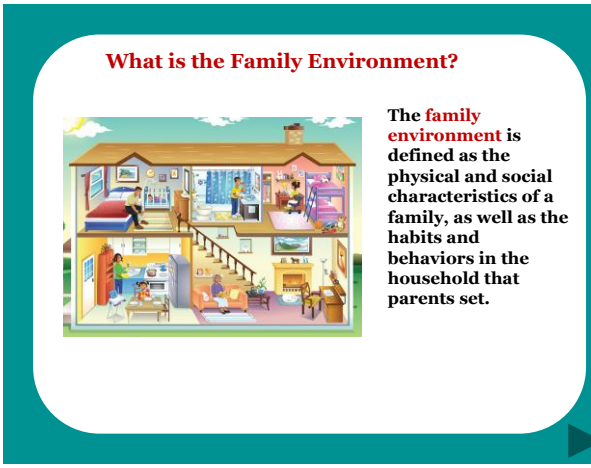
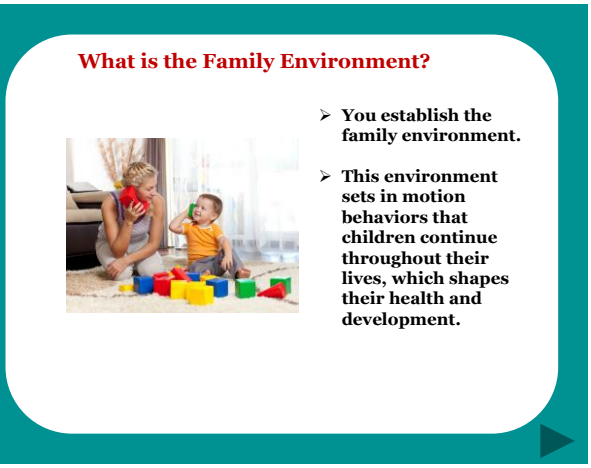
Appendix

Below are additional study materials created for the Parents TAKE study regarding the family environment and genetics:









Obesity Risk for Children with an Overweight Mother

100 Children without any overweight parents

100 Children who have an overweight mother

Obesity Risk for Children with an Overweight Mother and Father

100 Children who have both an overweight mother and father

In most cases of obesity, it's not just one element of the family environment that's responsible.

There are hundreds of small ways that the home and family environment can influence kids' obesity risk.

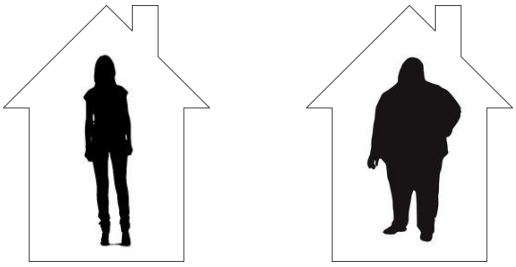
If obesity is shared in the family...

But families share the same genes...

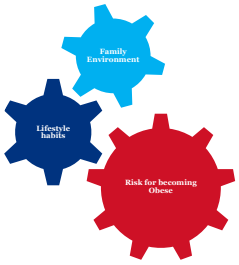
By studying twins!

Scientists study identical twins to separate the role of a family's shared environment from the role of genetics.

Here's one study:



Let's think about how this might work…



The family environment may include…

Available foods

or

The family environment may include…

encouragement to eat

The family environment may include…

role modeling

The family **environment** that you create for your children plays a **major role** in obesity risk – but **healthy habits** can help your child stay on top of it.

Prevention is key for those at risk!

NIH National Human Genome Research Institute

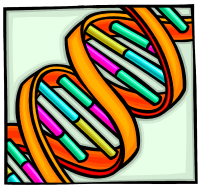
Is your child at risk for becoming obese by the time he or she is an adult?




Risk "Runs in the Family"

- **Because of genetics, health conditions including obesity can run in families**

What are Genes?



- **Genes are the instruction manuals for the body.**
- **Each parent gives a child one set of genes.**

- **You provide half of the genes that shape your child's health and development.**

Obesity Risk for Children with an Overweight Mother

100 Children without any overweight parents

100 Children who have an overweight mother

Obesity Risk for Children with an Overweight Mother and Father

100 Children who have both an overweight mother and father

In most cases of obesity, it's not just one gene that's responsible.

Hundreds of genes contribute to obesity in small ways.

If obesity runs in the family...

But families share the same environment...

Then how do we know what's genetic?

By studying adoptions!

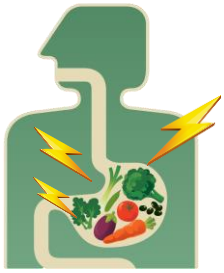
Scientists study adopted children to separate the role of genetics from a family's shared environment.

Here's one study:

Let's think about how this might work...

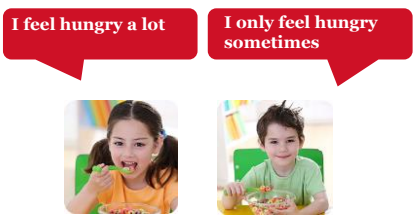
Genes may influence...

our metabolism



Genes may influence…

how often we feel hungry



Genes may influence…

whether we are driven to eat when we feel full

The **genes** that you pass down to your children play a **major role** in obesity risk – but **healthy habits** can help your child stay on top of it**.**

Prevention is key for those at risk!