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## How A Healthy Population Acquires Nutrition and Exercise Information: A Mixed Methods Study

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HOW A HEALTHY POPULATION ACQUIRES EXERCISE AND NUTRITION  
INFORMATION; A MIXED METHODS STUDY

BY

Sally Jean Spanhake Hillis

A DISSERTATION

Presented to the Faculty of  
The Graduate College at the University of Nebraska  
In Partial Fulfillment of Requirements  
For the Degree of Doctor of Philosophy

Major: Human Sciences  
(Nutrition and Health Sciences)

Under the Supervision of Professor Fayrene Hamouz

Lincoln, Nebraska

November, 2015

# HOW A HEALTHY POPULATION ACQUIRES EXERCISE AND NUTRITION INFORMATION; A MIXED METHODS STUDY

Sally J Spanhake Hillis, Ph.D.

University of Nebraska, 2015

Advisor: Fayrene Hamouz

Faced with an overwhelming amount of available sources and different perspectives, researchers in the field of Nutrition and Health Sciences continually strive to identify key factors that shape a healthy lifestyle. Employing an exploratory sequential mixed methods design, phase one of this research utilized a constructivist grounded theory approach to develop a model explaining the process by which healthy individuals acquire nutrition and exercise information. Interested in studying a population identified by good nutrition and daily exercise, the researcher set the participant criterion to include daily consumption of 2-3 balanced meals, 45-60 minutes daily moderate-intensity exercise, and a normal BMI. To offer a more complete understanding of this process, this theoretical model rests on the characterological traits and life experiences of the participants (N=8) in seeking meaningful and reliable sources guiding their challenge-solving skills and information-seeking behaviors. To test and elaborate upon the model, phase two integrates the qualitative findings into a new instrument, the Healthy Population Questionnaire (HPQ). Phase three commenced with the launching of the HPQ to a national sample (N=309) meeting the same criteria. Nine independent variables and one dependent variable were constructed from the survey data. The independent variables were mindfulness, discipline, self-esteem, happiness, good nutrition, daily exercise, food knowledge, learned behaviors, and challenge solving/cooking skills. The dependent

variable was sources of nutrition and exercise information. Employing exploratory factor analysis using SPSS, a path analysis was developed to represent the theoretical model from the qualitative phase. Using Pearson's correlation, the characterological traits of mindfulness, discipline, self-esteem and happiness were significantly associated with decision-making,  $r(307) = .545$ ,  $p < .001$ . Further, significant correlations were found between decision-making and resources of nutrition and exercise information  $r(307) = .587$ ,  $p < .001$ , as well as good nutrition-daily exercise and sources of nutrition and exercise information  $r(307) = .321$ ,  $p < .001$ . The information presented in this study advances our understanding of not only the characterological traits, process and sources of nutrition and exercise seeking information for a healthy population, but the complexity, interconnectedness, and relationships of these concepts.

## COPYRIGHT

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## DEDICATION

This Dissertation is dedicated to:  
Mom and Dad  
Mike  
Mary and Charlie  
Susan and John  
Thank You for your support and understanding!  
  
Grandparents  
For keeping me inquisitive and confident!

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## **Chapter 1: Introduction**

Faced with an overwhelming amount of available sources and different perspectives, researchers in the field of Nutrition and Health Sciences continually strive to identify key factors that shape a healthy lifestyle (Hillis, 2013). What is a healthy lifestyle? The Merriam-Webster definition of lifestyle is, “the typical way of life of an individual, group, or culture”. The word “lifestyle” originated in the late 1920’s and encompasses the habits, attitudes, tastes, moral standards, and economic level that together constitute the mode of living of an individual or group (dictionary.com). Changes in lifestyle have been associated with many chronic diseases including cancer, diabetes, heart disease, birth defects, stroke, and neurological disorders. Concern among many health professionals, researchers, and policy makers is not only an increased prevalence of life-long disease, but the younger age these conditions occur. Since changes in lifestyle is one of the major factors associated with chronic disease, the question remains, what differs between a healthy and unhealthy lifestyle?

Focusing on a single predictor of lifestyle seemed to give only a partial explanation of this phenomenon. Curious about the uniqueness of a population who 1) engaged in an hour of daily moderately-intense exercise, 2) consumed 2-3 balance meals and planned snacks throughout the day, and 3) had a normal body mass index (BMI) the PI decided to focus on a combination of these predictors of a healthy lifestyle for this research. For the purposes of this study, participants or respondents meeting this three factor criterion are synonymous with healthy individuals or a healthy population.

With the explosion of technology, the sources and availability of information seems unlimited. Deciphering where and how to look for answers to our inquiries differs

among most people. The information comes from sources of not only varying degrees of credibility and accessibility, but may represent misinformation or conflicting theories. So assuming a healthy population acquires exercise and nutrition information from reliable sources, the researchers designed this study to expand the knowledge of this information seeking practice.

When faced with a challenge or inquiry about nutrition or exercise, how do healthy individuals find their answers? Interested in understanding the process of identifying these foundations, nutrition and exercise information seeking-behavior became the topic of this project. The problem is a gap in knowledge understanding the process a healthy population engages to seek reliable nutrition and exercise information sources.

### **Purpose Statement**

The purpose of this mixed methods exploratory sequential design with instrument development was a continuation of my Master's thesis, exploring the phenomenon how and where a healthy population seeks nutrition and exercise information. The study aim was to refine and expand the theory represented in a model, Process Understanding How A Healthy Population Seeks Nutrition and Exercise Information (Hillis, 2013). This mixed methods project consists of three successive phases. The first phase of the research is a grounded theory study of a small sample (N=8) of a healthy population in the Midwestern United States. Using face-to-face interviews, exercise and food diaries the PI explored strategic factors, discovered a process, and identified sources of nutrition and exercise information in a healthy population. Incorporating the theory from phase one with a literature review, the researcher then launched into the second phase of the study, instrument development. There were no known existing instruments to measure, in such a

comprehensive manner, the information from phase one. The Healthy Population Questionnaire (HPQ) was developed based on the key factors from the theory refined in qualitative phase. After piloting the survey, the Healthy Population Questionnaire (HPQ) was administered to a larger national sample (N=309) of a Healthy Population. The intent was to develop an instrument that could accurately measure this phenomenon, as well as be modifiable to various populations.

### **Research Questions**

Crafting research questions to each phase of the study to answer and reflect the different nature of inquiry is important to guide the research process. Creswell (2011) comments,

Research questions and hypotheses narrow the purpose statement into specific questions and predictions that will be examined in the study. In a mixed methods study, qualitative, quantitative, and mixed methods questions are presented. (p. 160)

Qualitative inquiry focuses on a single phenomenon to be explored. Grounded Theory qualitative research questions begin with “what” or “how” and use non-directional language. Related to the type of qualitative research, verbs commonly used include discover, understand, explore, describe, or report. The researcher can expect the questions to change during the research process. Specifying the participants and the site provides depth and rigor to the questions (Creswell, 2013). Little is known about how a healthy population seeks answers inquiries about nutrition and exercise. A tool to measure this construct does not exist, therefore exploration and understanding of the topic is necessary to gather information.

### **Phase I: Qualitative research questions.**

The central question to the qualitative phase of this research is:

What is the process by which a healthy population acquires nutrition and exercise information? Sub questions to further explore this phenomena are;

RQ1: How do healthy individuals look for nutrition and exercise information?

RQ2: What sources do healthy individuals utilize for this information? How do they find them?

RQ3: What challenges do healthy individuals face when using these resources?

RQ4: What role does a healthy population's character traits play in understanding the process of finding nutrition and exercise information?

Quantitative research questions are non-directional or can be hypotheses predicting outcomes. The independent, dependent, covariate, and mediating variables are stated for comparison of groups, relate variables, or to describe trends. Quantitative research questions are developed from a test or a theory. The independent variables are listed first in the inquiry, followed by the dependent variables (Creswell, 2013). The "Theoretical Model Used to Understand How a Healthy Population Acquires Nutrition and Exercise Information" developed in Phase I was used to design the quantitative research questions.

Approached from three focuses, a mixed method question is written 1) methodologically, 2) content-focused or 3) a hybrid of quantitative and qualitative elements.

### **Phase II: Mixed Methods research questions.**

RQ1: To what extent do qualitative findings generalize to a specified population?

(Methodologically focused)

RQ2: How does the survey of a healthy population support the characterological traits, challenge-solving process, and reliable sources from the qualitative interviews on acquiring nutrition and exercise information? (content-focused)

RQ3: How will the characterological traits, challenge-solving process, and reliable sources from the qualitative phase be further explored in the survey phase? How will the quantitative instrument generalize to a larger sample of a healthy population? (Hybrid of quantitative and qualitative elements)

### **Phase III: Quantitative research questions.**

RQ1: Do the characteristics of mindfulness, discipline, self-esteem and happiness describing a healthy population affect their decision making process when seeking nutrition and exercise information?

RQ2: Do prior learning experiences, our own knowledge or challenge solving skills affect the choices when seeking nutrition and exercise information?

RQ3: Does daily exercise (active lifestyle) and good nutrition (limited processed foods) affect resources for nutrition and exercise information?

### **Significance of Study**

This research has the potential to impact the fields of health and research methodology based on innovative features utilized in this study. The major contribution of this mixed methods research is the development of a tool, Healthy Population Questionnaire (HPQ) that could accurately generalize this theory to a larger national sample of a healthy population. This measurement tool will assist in understanding how



and where we choose resources of information for our health and exercise information. Second, the expansion and refinement of a theory explaining how and where a healthy population seeks nutrition and exercise information. This theory explores the challenge-solving process, characterological traits, and sources of information a healthy population utilizes in this model. Finally, defining and identifying the sample population based on exercise and nutrition criteria may assist in understanding health from a new perspective. From a methodological perspective, Exploratory Mixed Methods Design with Instrument Development provides the opportunity for a rigorous study utilizing grounded theory research in the qualitative phase, then integrating the findings into an instrument to test on a larger national sample in the third phase.

### **Audiences Who Will Benefit**

Audiences who will benefit from this research include educators and practitioners developing interdisciplinary curricula for the general population, health professionals, and others interested in learning about this process. Policy makers and others involved with curriculum development and decision-making in the areas of nutrition and exercise.

From a content perspective this study includes many key factors that have been studied in antecedent research, however in this research the factors are combined to look for augmenting variables. The intent is to develop a theory, subsequently create and test the new instrument on the population identified in the study. The items on the survey represents a multidisciplinary perspective based on the two constructs included in the research, good nutrition and daily exercise. Other fields interested in a multidisciplinary approach to understanding complex issues will benefit from this rigorous mixed methods research.

Methodologically the process of transforming knowledge in the form of themes to items on a survey is outlined with the use of figures and tables. Eventually, the researcher explain the steps in this integration process.

### **Definition of Terms**

**Body Mass Index** (BMI) is a clinical measure to define weight categories of children and adults. Healthy weight BMI for adults is between 18.5 and 24.9 kg/m<sup>2</sup> (Centers for Disease Control and Prevention).

**Nutrition** is simply defined as the utilization of foods by living organisms for normal growth, reproduction, and maintenance of health (Stipanuk, 2013)

**Exercise** has become synonymous with physical activity. Recommendations for healthy adults under age 65 years is moderately intense aerobic exercise 30 minutes a day for five days a week, or vigorously intense aerobic exercise 20 minutes a day for three days a week and 8 to 10 strength training exercises with 8 to 12 repetitions of each exercise twice a week (NIH, 2013). Criteria for this research project was set at 60 minutes moderate daily exercise (Hillis, 2013).

**Health Revolution** is a rethinking (and changing) of our current health situation (Hillis, 2013).

**Healthy Population** is the description for a group of people who meet the following criteria; 1) engage in an hour of daily moderately-intense exercise, 2) consume 2-3 balance meals daily and planned healthy snacks throughout the day, and 3) have a normal body mass index (BMI) (Hillis, 2015).

## **Philosophical Assumptions**

Understanding the philosophical assumptions for a study, forms a foundation for the researcher answering, how we gain knowledge and what we know. Created to share beliefs and values among fellow researchers, the elements of worldviews; ontology, epistemology, axiology, methodology and rhetoric shape the unique character of each worldview (Creswell, 2013). The researcher in this study blends postpositivism, constructivism and pragmatism to craft a foundation complementing the phases of the mixed method project. The qualitative phase employs many of the key elements of constructivism; multiple realities, closeness to participants in the interviews, biased interpretations, inductive theory generation beginning with words and building to theories, and informal style. Postpositivism reflects the empirical character of the quantitative research phase, elements include; verification of a *priori* theory, measurable through survey, objective collection of data, elimination of bias, a deductive process-starting with the theory and ending with variables, and formal style of presentation. Unifying the entire project is pragmatism. The underlying foundation, embracing the characteristics of postpositivism and constructivism, is pragmatism, the practical lens. Relying on what we know and how we gain knowledge to distinguish “what works” in research. My beliefs and assumptions for this project rest upon a blending of constructivism, postpositivism and pragmatism.

## **Chapter 2: Literature Review**

This literature review is organized around the emergence of the qualitative study and additional research after developing the qualitative theory. A literature map (Figure 1) helps visualize the order in which the concepts were added to the research.

Advances in science and technology over the past 50 years have tremendously impacted our lifestyles and environment. Notable changes have occurred in the quality and quantity of the foods we consume, methods of communication and our overall health. The topic of my dissertation research, how and where a healthy population seeks exercise and nutrition information is a complex and emerging concept that directly or indirectly affects every person.

Key terms identified for this literature review include nutrition, exercise, information sources, behaviors, food choice, health behavior, food behavior, television food advertising, celebrities, media, nutrition misinformation, and health information seeking.

A grounded theory study conducted by Bisogni (2002) “Who We Are and How We Eat: A Qualitative Study of Identities in Food Choice” explored how person constructs identities related to eating including eating practices, personal characteristics and reference social categories. The identities were reported to be stable and dynamic overtime and were shaped by a participant’s life course experiences. Mental self-images are associated with identity and a person bases these identities on everyday interactions with people, groups and objects. The implications section of this paper suggested future research of individuals living diet related diseases in contrast to healthy individuals. This

information shaped who we were going to study, healthy people, as well as and including the concept of self-identity in this research.

Considering different sources of influential people, research about television food advertising, celebrity endorsement of food products and impact of social media were reviewed. A global study's findings, that advertising targeted broadcasting of unhealthy food advertisements when the highest number of children are watching and the use of child-oriented persuasive marketing techniques define a media environment in which children are frequently and deliberately targeted with commercial messages that run counter to nutritional requirements (Bridget, 2010). This parallels substantial scientific evidence published by the World Health Organization showing the link between unhealthy food marketing and children's food choices, purchases and consumption (Cairns, 2009). A call for development or extension of statutory regulations to prohibit unhealthy food advertising as a preventive strategy against childhood obesity was one of the messages from this research. UK law currently prohibits "celebrities popular with children" from advertising noncore foods (Halford, 2013). Noncore foods include foods high in fat, sugar and salt, such as fruit drinks, alcohol, cakes, cookies, sugar sweetened drinks, snack foods, fast food restaurants. Finding a independent relationship between higher TV fast-food advertising receptivity and obesity raises concerns about the role of such advertising may play in the risk of obesity (McClure, 2013). These articles were used to shape questions for the interviews, as well as the survey.

In the pursuit of information about celebrities, a convergent mixed methods study conducted in Australia, evaluating the Jamie Oliver community-based cooking skills program was reviewed (Flego, 2014). The aim was to improve cooking skills, cooking

confidence and individual eating behaviors. Winkler (2008) hypothesized that the growth in nutrition-related diseases related to decline in cooking skills in sections of Western population. Six key findings from this study include 1) Increase in cooking confidence in key skill areas required for daily food preparation. 2) Increase in vegetable consumption. 3) Evidence of behavior change, frequency of cooking the main meal from scratch, including vegetables and reducing take away consumption. 4) Positive shift in elements of knowledge, attitudes, beliefs, satisfaction of cooking and healthy eating. Including bringing families together to share the process of cooking and eating together. Also increasing knowledge and skills like previous generations. 5) Increase vegetable purchasing and decrease take away foods. 6) Increase self-esteem and increase perceived general health in intervention of participants after completion of the cooking skills program. Influential in selecting characterological traits, as well as cooking skills and knowledge about cooking and food in this study.

The American Dietetic Association position paper, Food and Nutrition Misinformation, states that food and nutrition misinformation can have harmful effects on the health, well-being and economic status of consumers (Wansink, 2006). The credentialed association members are qualified to advocate for and promote science-based nutrition information to the public, function as primary nutrition educators to health professionals, and actively correct food and nutrition misinformation. An increased awareness and information in consumer decision making about nutrition and changing eating behaviors, has created opportunities for food and nutrition misinformation to flourish. Recognizing it's responsibility to help consumers, the ADA set guidelines, 1) ADA members should provide consumers with sound, science-based nutrition

information and help them to recognize misinformation; 2) ADA members need to be the primary source of sound science-based nutrition information for the media and to inform them when misinformation is presented; and 3) ADA members should continue to diligently work with other health care practitioners, educators, policy makers, and food and dietary supplement industry representatives to responsibly address the health and psychological, physiological, and economic effects of nutrition-related misinformation (Wansink, 2006). This article sparked the idea of where healthy people find sound information and how do they identify misinformation.

“Let’s Move”, is First Lady Michelle Obama’s program addressing the power of marketing in influencing kids’ food choices and the need for leveraging this power toward healthier food options for our nation’s children (Simon, 2013). Empowering parents by controlling the products and messages their kids are exposed to, is an influential program grounded in the principles of healthier food choices for kids and their families.

Transcribing the interviews from the qualitative phase, led to the pursuit of research based on phase 1 findings. Mindfulness, happiness, discipline, self -esteem, daily exercise, good nutrition, and information seeking became topics to explore and gather information.

Learning that mindfulness interventions improve mental and physical health outcomes (Brown, Ryan, Creswell, 2007), reduce the risk for major depression relapse (Ma & Teasdale, 2004), improve immune system function (Barrett, 2012) and reduce pain (Zeidan, 2011) are a few of the studies demonstrating the influential outcome of this characterological trait. Mindfulness is fundamentally a quality of consciousness, rooted in

the fundamental activities of consciousness: attention and awareness (Brown, Ryan, Creswell, 2007). The review, by Brown, Ryan and Creswell illustrates a growing convergence of findings across multiple methodologies, all of which point to the provisional conclusion that mindfulness and its cultivation support healthy, adaptive human functioning (2007). Articles on health consciousness (Mai, 2014), and development of the mindful eating questionnaire (Framson, 2009) brought insight to the topic of mindfulness. In addition, use of learning mindfulness techniques as a component of behavioral therapy in patients with treatment-resistant depression actually restored the dorsal lateral prefrontal cortex to normal activation levels (Eisendrath, 2015).

*Mindfulness* by Ellen J. Langer (2014) is an excellent read exploring the costs of mindlessness, increasing motivation by the opportunity to make choices, giving people more reason to remember makes memory loss reversible, reduce depression associated with old age, self-esteem and mindfulness. In addition one of the characteristics of creative people is a mindful attitude focused on the process not the outcome.

Information summarizing self-esteem was found in a Mayo Clinic brochure (2006) in the Rochester patient education center.

Self-esteem is your overall opinion of yourself-how you honestly feel about and value yourself. Self-esteem involves judging your worth as a person. Most of your beliefs about yourself are learned, based on your experiences, thoughts and feelings and your conclusions about what happens to you. No single event or person determines your sense of self-worth. Self-esteem starts to form early in life. Many beliefs you hold about yourself today reflect messages you receive from others. Personal relationships with those close to you (parents, siblings, peers, teachers and other important adults) can be especially powerful. If your close relationships are basically satisfactory and you receive generally positive feedback, you are more likely to see yourself as worthwhile. Your thoughts have perhaps the biggest impact on your self-esteem. Thoughts include “self-talk”, your perceptions of situations, and your beliefs about yourself, other people and events. Other factors that can influence self-esteem include work or school



experiences, illness or injury, culture and religion. Healthy self-esteem involves having a balance, accurate view of oneself. (p. 1-3)

Characteristics describing healthy self-esteem outlined in the Mayo Clinic information was developed into questions on the survey.

Finally, the benefits of healthy self-esteem improve all aspects of life. People who value themselves are open to learning and feedback from others, which increases their ability to meet and solve challenges. They have confidence in their abilities and thus tend to do well at school or work. They feel secure and worthwhile and have generally positive relationships with others. (p. 4-5)

Improving self-esteem involves many facets of life, including improving the lifestyle choices of a healthy diet, exercise, and adequate sleep. The words about self-esteem resonant in this study of a healthy population.

The understanding of discipline as used in this study is a system of learned rules and a trait of well-being derived from the Latin word “disciplina”, which means teaching, learning, when you have discipline you have self-control. (Vocabulary.com) Discipline is a developed behavior through instruction, practice and self-control. Training, upbringing, and preparedness are properties impacting a person’s formative years and influencing their discipline. Adele Diamond (2013) discusses discipline as an aspect of self-control in reference to executive functions. An effortful practice, executive functions are referred to a family of top-down mental processes needed when you have to concentrate and pay attention. Overall, executive functions make it possible for us to “mentally play” with ideas, be quick and flexible to adapt to changing circumstances, to take time to consider what to do next, to resist temptations, to stay focused and meet unanticipated challenges (Diamond, 2013). Furthermore, she emphasizes the importance of social, emotional and physical health for cognitive health, noting that executive functions are the first to suffer if you are stressed, lack of sleep, sad or are not physically fit. The effects of these cause

you to appear to have a disorder of executive functions, such as ADHD, when you do not. In concluding she reiterates the deleterious effects of stress, sadness, loneliness and lack of physical health or fitness at the physiological, neuroanatomical, and behavioral level. Executive functions are critical for many skills that most people would agree will be important for success in the 21<sup>st</sup> Century, namely creativity, flexibility, self-control and discipline.

Gilbert's (2006) central thesis in *Stumbling on Happiness* is through perception and cognitive biases, people imagine the future poorly in particular what will make them happy. Imagination tends to add and remove details, but people do not realize that key details may be fabricated or missing from the imagined scenario. Imagined futures (and pasts) are more like the present than they actually will be (or were). Imagination fails to realized that things will feel different once they actually happen-most notably, the psychological immune system will make things feel not so bad as they are imagined to feel. Gilbert covers the topic of "filling in" or the frequent use of patterns, by the mind, to connect events which we do actually recall with other events we expect or anticipate fit into the expected experience. This "filling in" is also used by our eyes and optic nerves to remove our blind spot or scotoma, and instead substitute what our mind expects to be present in the blind spot. A scotoma is an area of partial alteration in the field of vision consisting of a partially diminished or entirely degenerated visual acuity that is surrounded by a field of normal vision.

Amit Sood, author of the *Mayo Clinic "Happiness"* book discusses happiness as a state of experiencing positive emotions. Sood refers to happiness as a habit, some are born with it while others have to choose it, but don't realize they must make this chose. A

lot of happiness is up to you and your choices guided by two brain modes, focused and default. Understanding that the brain goes back and forth between these modes in decision-making process. Focused requires effort and intentionally choosing your thoughts leading to a happier person. In default mode one is distracted usually experiencing stress, depression, anxiety and not happiness. With neutral or negative thoughts and spending too much time in default mode or dwelling on imperfections allows the mind to wander in “open files”. The mind focuses on three things; threats, pleasure and novelty. Most threats in the mind are not the external world, rather come from a warehouse of memories and experiences, past hurts, regrets and future fears. Modern fears are false expectations appearing real. Your brain experiences everything you imagine as if it has already happened. Hurts, regrets, fears, and open files increase time in a “survival mode” and bypass happiness and live unfulfilled life. The sources that cause stress are also those that cause joy and happiness. Being able to find meaning and something positive amid adversity is the hallmark of resilience, and the ability to prevent, withstand, and bounce back from adversity. This process brings us to mindfulness and gratitude meditation.

There seems to be more controversy as opposed to affirmation when exercise is discussed in regards to health. The titles of the articles tell the story, How Exercise Boosts Your Brain (Berkeley Wellness, 2011), The Right Dose of Exercise for a Longer Life (Reynolds, 2015), to Protect Your Aging Brain, Start With Exercise (Preidt, 2015), An Hour of Moderate Exercise a Day May Decrease Heart Failure Risk, (Andersen, 2014), Regular, Vigorous Exercise May Lengthen Your Life: Study Intense Workout Seem More Beneficial Than Less-Intense Ones (Gebel, 2015), More Evidence That Even

‘Moderate’ Exercise Helps Women’s Hearts (Preidt, 2015), Target Heart Rate: Wrong Number? (Berkeley Wellness, 2014), Dose of Jogging and Long-Term Mortality (Schnohr, 2015), Hazards of Too Much Exercise (Berkeley Wellness, 2015), Even Light Activity Can Boost Seniors’ Health (Preidt, 2015), Tope Fitness Trend; High-Intensity Interval Training (Hellmich, 2014), More Exercise=More Fat Loss for Older Women (Friedenreich, 2015), Too Much TV, Too Little Exercise When Young May Hasten Mental Decline Later (Preidt, 2015), or Thirty Minutes of Exercise is Not Enough, (Berry, 2015). Healthy People 2020 outlines national goals and objectives for improving the health of all Americans. Two of the topics listed are Nutrition and Weight Status and Physical Activity. Reviewing the populations, number of participants in these studies, as well as setting and collection of data were considered in the design of this research.

The final component of this literature review is health information seeking. The two major interacting factors, sources and awareness, direct the dynamic nature of information-seeking activity and outcomes as proposed in the model of information seeking of professionals (Leckie, 1996). A study in Iran found TV to be the first place used for health information, followed by family, relatives or close friends. Books and public libraries were also among the top choices for information (Gavgani, 2013). Health information-seeking behaviours or the process of health information retrieval are linked to information-seeking models and the reliability of online health resources and difficulties in a study at City University London (Mukherjee, 2012). Results from a survey administered in this study showed a wide range of resources when searching for health information. Most popular was the internet, followed by books and asking friends or family. Libraries, general practitioners, health centers and information leaflets were

also mentioned. Mukherjee's research (2012) suggests that information seeking is a retrieval process involving a common sense approach to assess reliability, as well as reviewing the reputation of individual websites.

In addition, other influential books read at this time include, *Are You Fully Charged?* written by Tom Rath (2015) and *The Teenage Brain* by neuroscientist Frances E. Jensen, MD.

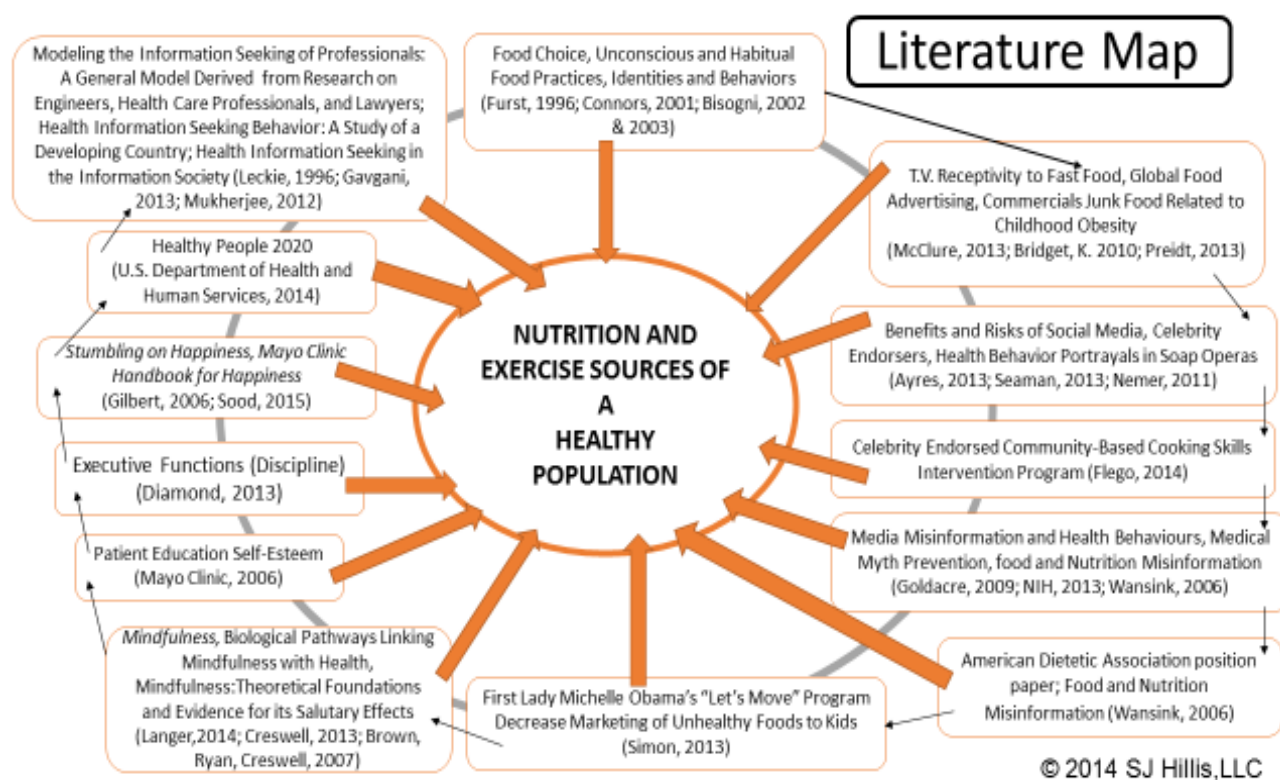


Figure 1: Literature Review Map

### Chapter 3: Methods

#### Rational of Mixed Methods Exploratory Sequential Design with Instrument Development

Since the late 1980's the definition of Mixed Methods has evolved from an early methodological meaning to a combination of methods, philosophy and research design orientation (Creswell & Plano Clark, 2011). Most recently, Creswell explains that in mixed methods *several definitions exist depending on the perspective of the author* (Creswell, 2015). He further positions mixed methods, *my stance is to look at mixed methods as a method*.

This means that I will give it a distinct methods orientation, one in which data collection, analysis, and interpretation hold center stage. This is not to minimize the importance of philosophy or of methodology or of the research questions. It is simply to place emphasis on the methods, because they provide a specific, concrete way to enter the field of mixed methods. (p. 2)

In addition to a definition, Creswell identifies the “Core Characteristics of Mixed Methods” to clarify the characterization of mixed methods:

- Collection and analysis of quantitative and qualitative data in response to research questions
- Use of rigorous qualitative and quantitative methods
- Combination or integration of quantitative and qualitative data using a specific type of mixed methods design, and interpretation of this integration
- Sometimes, framing of the design within a philosophy or theory (p. 3)

After careful consideration of each core characteristic, Mixed Methods was selected for this project. Justification was based on the complexity of the issues, deficiency in literature, need to explore the topic and problem before explaining ideas, need for theory refinement and expansion, and need for instrument design. More can be learned about the research problem by mixing quantitative and qualitative data collection and analysis that by either alone.

Individually, quantitative and qualitative research processes follow basic research protocol: begin with the identification of a problem, craft research questions based on type of qualitative or quantitative design, collect data for specified design, analyze data and compare to research questions, and draw conclusions including what the results mean and how they're related to other parts of the research protocol. Mixed methods study requires the researchers to be skilled in both approaches including an understanding of the advantages and disadvantages of qualitative and quantitative research.

Creswell (2015) mixed methods typology presents three basic mixed methods designs including convergent design, explanatory sequential design, and exploratory sequential design. Each design is unique in the integration of the qualitative and quantitative databases. This project utilized an exploratory sequential design (Figure 2), first exploring the topic and problem, followed by constructing a new instrument based on initial exploration, and finally collecting and analyzing data using the new instrument.

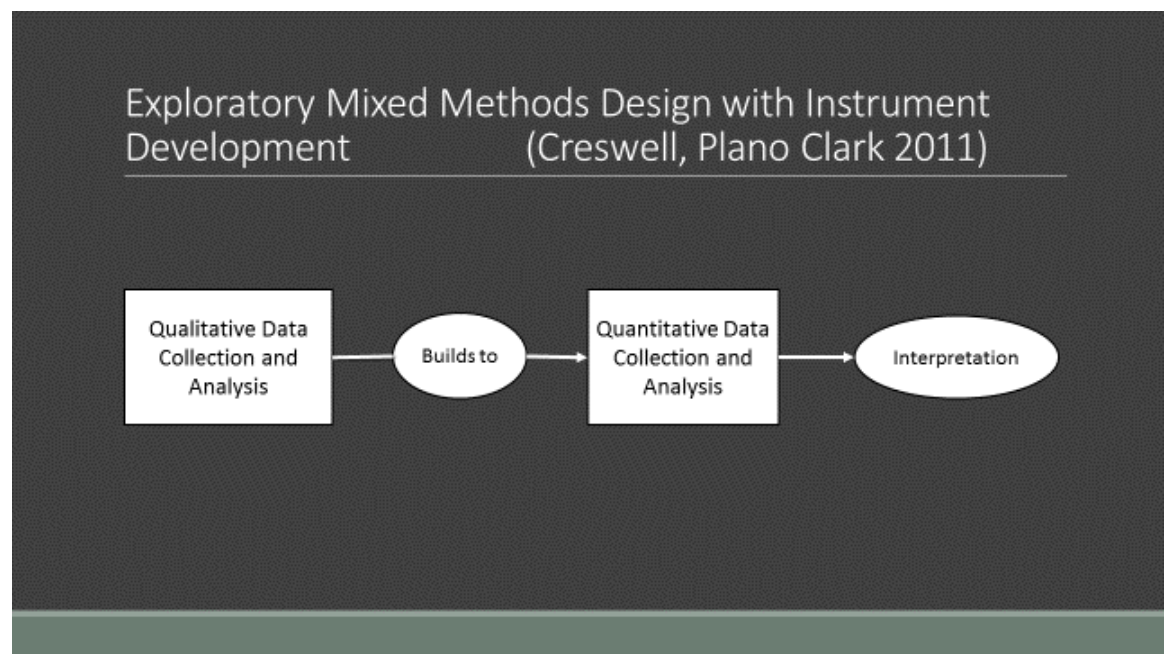


Figure 2: Exploratory Mixed Methods Design with Instrument Development

Unlike most studies, this project began with an *A Priori* Theory, the Model of the Process Understanding How a Healthy Population Seeks Nutrition and Exercise Information (Figure 3) (Hillis, 2013). The model was developed in a pilot study for my Master's thesis. A summary of the model is described in the qualitative phase of this dissertation research. The theory was refined and expanded in the qualitative phase, next findings were integrated into a new tool (survey), followed by administration of the tool to a larger population. Behaviors, choice and identities are complex issues, therefore exploring this topic using mixed methods, involving subjective and objective information, will strengthen and generalize a scientific understanding of how and why a healthy population acquires nutrition and exercise information. Existing information seeking and identity literature has been limited to small studies lacking tools to generalize to larger populations.

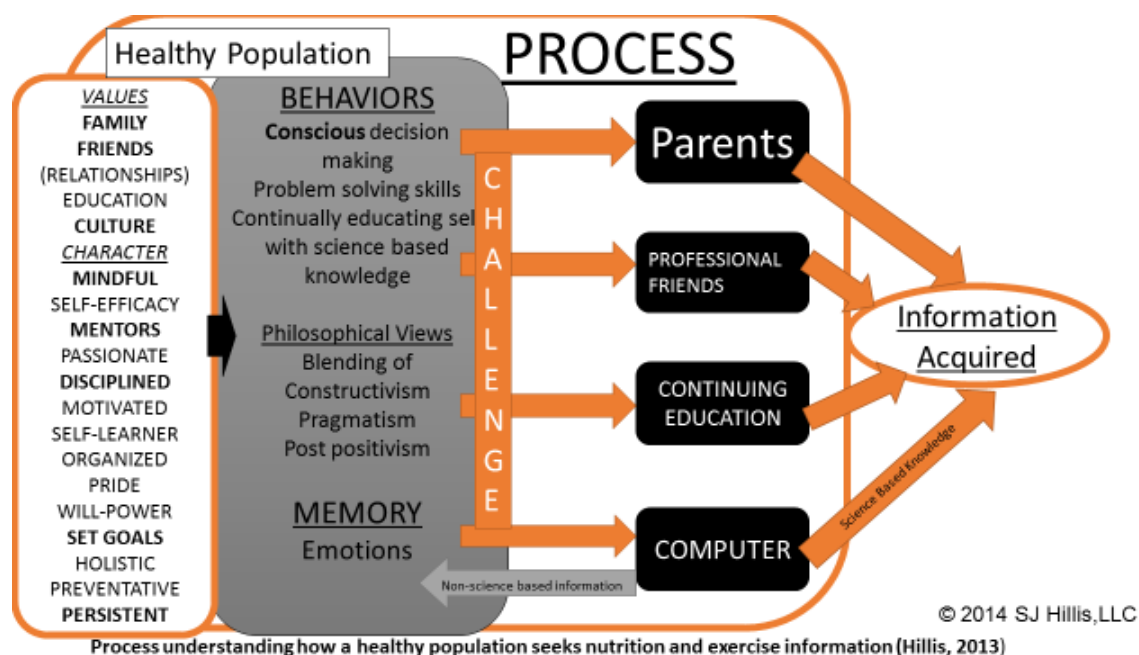
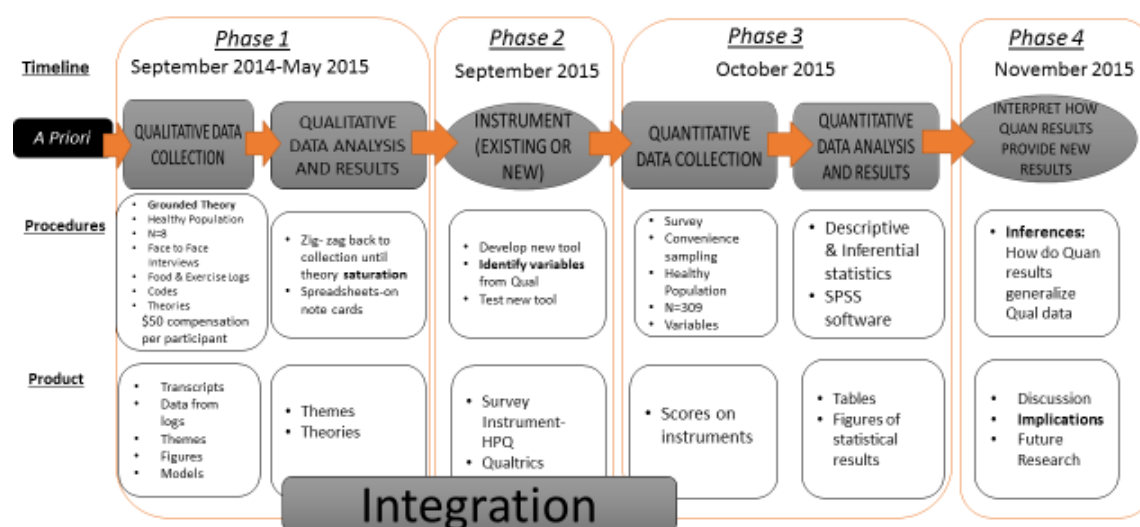


Figure 3: Process understanding how a healthy population seeks nutrition and exercise information



Initiating this project with interviews and self-reported food (Appendix A) and exercise (Appendix B) diaries, the subjective qualitative phase utilized grounded theory approach to first understand a process, and identify variables influencing the process. Phase two integrated the qualitative results in an instrument designed to measure information objectively. A preliminary testing of the survey was completed by phase one participants and others meeting the criteria for a healthy population. Utilization of the instrument commenced in the third phase, the quantitative research. How the quantitative results support the qualitative findings as well as provide new information was contained in the fourth phase. Following is a visual model for this exploratory sequential design (Figure 4).



**Figure 4: Exploratory Sequential Instrument Design Visual Model**

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### Phase I: Qualitative Grounded Theory

The central question of the qualitative phase of this research is: “What is the process by which a healthy population acquires nutrition and exercise information?” requires exploration and understanding of a process. Interested in understanding how

people interpret their experience in making food and exercise decisions, rather than determining cause and effect, predicting, or describing the distribution of a variable among a population, the underlying interest in phase I is uncovering the meaning of a central phenomenon for those involved. Qualitative researchers are interested in understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences (Merriam, 2009). According to Merriam (2009), contemporary qualitative research was influenced by two landmark publications, one by Barney Glaser and Anselm Strauss, the *Discovery of Grounded Theory: Strategies for Qualitative Research* (1967), and a second by Egon Guba, *Toward and Methodology of Naturalistic Inquiry in Educational Evaluation*. Glaser and Strauss's work provided the theoretical framework and principles of theory emerging from inductively analyzing social phenomenon. Guba's study took place in the real world, naturalistic settings, thus whatever was being researched (observed) was allowed to happen without control or manipulation. Both exhibited "discovery-oriented" research where findings are not predetermined (Merriam, 2009).

Characteristics that frame or model grounded theory research include face-to-face interviews conducted in a natural setting with the focus on the rich description of the participant's point of view and reiteration of their voices. The researcher generates and understands a process through a combination of inductive, deductive or abductive inference (Charmaz, 2014). The primary data collection instrument is the researcher, thus the skills, experience and knowledge become assets in the rigor as the research unfolds. In grounded theory, a type of purposeful sampling called theoretical sampling is often employed, where the researcher selects his or her sample based on perceived relevance to

the emerging theory (Hood, 2007). A researcher must be open-minded and able to see things from multiple perspectives. In addition the investigator must understand a central phenomenon from the participant's point of view as well as the reflexivity of the researchers. (Babchuk, 2012; Corbin & Strauss, 2014; Creswell, 2013, Denzin & Lincoln, 2011; Hatch, 2002; Merriam & Tisdale 2015; Stake, 2010)

Charmaz's constructivist approach emphasizes the co-construction of knowledge by the researchers and participants based on their shared interpretation of views, values, beliefs, feelings, assumptions and ideologies (Charmaz, 2014).

The following passage from *Constructing Grounded Theory: A Practical Guide to Qualitative Analysis* by Charmaz (2006), resonates my concepts in regards to grounded theory methodology.

Grounded theory involves taking comparisons from data and reaching up to construct abstractions and simultaneously reaching down to tie these abstractions to data. It means learning about the specific and the general- and seeing what is new in them- then exploring their links to larger issues or creating larger unrecognized issues in entirety. An imaginative interpretation sparks new views and leads other scholars to new vistas. Grounded theory methods can provide a route to see beyond the obvious and a path to imaginative interpretations. (p. 181)

Babchuk (2012) advocates the use of grounded theory in any field that contains a practice component, as this method has a long history of successful use in practitioner settings such as health care, social work, and education. This approach encourages the researcher to delay the literature review until the study is well underway. Key components are an iterative zigzag comparative data collection and analysis process of grounded theory. Adding to the unique interpretation emerging is the active, reflexive role of the researcher. The epistemologically dynamic theory developing from this process addresses many gaps to strategize restructuring of learning environments not only

to meet the needs of adult learners, but many social science disciplines (Babchuk, 2012).

The purpose of this grounded theory study is to identify and develop an explanation of the process by which individuals acquire health related information specifically in the areas of nutrition and exercise.

The grounded theory research checklist (Appendix C) was adopted to be used in this study as a tool for meeting the project requirements (Badiee & Babchuk, 2011).

### ***A Prior Theory***

The Model of the Process Understanding How a Healthy Population Seeks Nutrition and Exercise Information (Hillis, 2013) will be the groundwork for this project. Personal values, characteristics, behaviors, philosophical views, and memories impact our "how" and "why" decisions. In the journey to identify, sort, code, and categorize themes, the complexity and individual uniqueness of this process becomes evident. Exploring the transformation to new knowledge is reflected in model (Figure 3). This model rests on the actions of participants in seeking meaningful and reliable sources guiding their decision-making strategies and offers a more complete understanding of this process. The type of challenge directs us to the source we determine to be the most helpful. In the pilot study four sources emerged; parents, friends, education, and internet sources. Parents were identified as the first source for several reasons; availability, genetic traits, and life experiences. Friends, with an understanding of science based knowledge were the second resource. Friendships are developed not only for companionship, but also in a less mindful process to collaborate and cultivate our information needs (Rath, 2006). Education, former studies, or continuing educational classes were a third source. The final source was the internet. If the information retrieved

from the internet was science based knowledge, the process was complete with acquiring new information. A second purpose for using the internet was for idea generation and exploration of information. In summarizing, the process of a healthy population's choice for seeking information initially involves conscious and unconscious influences from memory, behaviors, philosophical views and values; next the difficulty of the challenge is taken into consideration before seeking a source or multiple sources; and finally new information is acquired (Hillis, 2013).

**Sampling method.** Snowball sampling, a nonprobability sampling strategy (Creswell, 2012), characterizes the manner in which participants were located for the first phase of this project. Snowball, chain, or network sampling is perhaps the most common form of purposeful sampling (Merriam, 2009).

**Participant Sampling.** In *The Discovery of Grounded Theory*, (Glaser and Strauss, 1967), one of the defining components of grounded theory practice includes sampling aimed toward theory reconstruction, not for population representativeness. Charmaz's (2006) definition of theoretical sampling fits the process followed in this study:

Theoretical sampling means seeking pertinent data to develop your emerging theory. The main purpose of theoretical sampling is to elaborate and refine the categories constituting your theory. You conduct theoretical sampling by sampling to develop the properties of your categories until no new properties emerge. (p. 96)

The goal is not to sample randomly selected populations or a sample representative of distributions of particular population. When engaged in theoretical sampling, the researcher seeks people, events, or information to illuminate and define the boundaries and relevance of these categories. Because the purpose of theoretical

sampling is to sample to develop the theoretical categories, conducting it can take the researcher across sustainable areas (Charmaz, 2014). This allows the participants to open-up their world to the researcher. The sampling frame used for this phase included a healthy population with possible participants in a graduate level classes, professional colleagues, people exercising on the Trails, or anyone who looked healthy.

Three criteria set for healthy population for this project include; a healthy self-reported body mass index (BMI), self-reported one hour of daily moderate-intensity exercise, and self-reported consumption nutritious foods (balanced meals) in a regular pattern. Self-reported food and exercise logs (appendices A & B) and BMI were used to validate the participant criteria information. Participants must be at least 19 years of age. Participants were located in the Midwestern urban community of the United States. Living in an urban midwestern community, the PI of this study exercises daily on the city trail system. Keeping in mind, criterion based Snowball sampling proceeds to theoretical sampling (Babchuk, 2014), the PI considered where participants meeting this criteria would be found. Recognizing several other daily trail users, the PI approached the participants with verbal description about the study, then invited them to participate. Snowball sampling proceeded with these initial contacts. Seven participants meeting the criteria were identified and included in the first phase of this study. The participant from the IRB approved pilot study was also included, therefore N=8 for the qualitative research. Questions seeking information about demographic and educational background were included in the interview protocol. In addition current job position, how long at the present position, highest level of education, field of academic degree, age, ethnic background, and current self-assessed health rating were included.

The exercise criteria defining a healthy population in this study exceeded the government guidelines. Based on the exercise regimen of the participant in the pilot study, as well as the daily exercise of the PI, the exercise criteria of a healthy population was established. Triangulation with the participant allowed the researcher to discover deep meanings in the information collected. A comfortable rapport was established between the participants and the PI throughout the interviews.

Demographic characteristics from the seven participants, as well as the participant in the pilot study are included in Table 1. Participants who completed the food and exercised logs, and interviews were compensated \$50 cash.

Participant Pseudonym	Ann	Blanche	Claire	Don	Elaine	Frank	George	Helen	
Age	45	80	39	92	57	34	25	52	
Ethnicity	Caucasian	German Danish	Caucasian	Danish English German	Bohemian English, Irish Native American "typical American"	European Caucasian	Latvian	Caucasian Italian	
Education	Doctoral degree	Some college	Some college certification	College degree Post-grad work	Some college	Beyond Master's Degree	Master's Degree	College Degree	
Current Marital Status	M	M	M	M	M	M	S	M	
Current Health (self-report)	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	
BMI (18.5-24.9) (self-report)	19.7	23.0	20.94	24.82	18.88	22.82	21.87	20.80	
1 hour Moderate Exercise Daily self-rep/recorded	Yes/yes	Yes/yes	Yes/yes	Yes/5	Yes/yes	Yes/6	Yes/6	Yes/6	

Table 1 : Demographics for Participants in Qualitative Phase

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**Data collection.** Qualitative data collection occurred from September 2013 through May 2015.

In qualitative research the primary mode of data collection is face-to-face interviews (Merriam, 2009) and has historically been the primary data collection source in grounded theory research (Creswell, 2013). The researcher acts the primary data collection instrument and interviews the participants. Once participant criteria was

clarified and the purpose of logs were reviewed with the participants, they were asked to record five days of food and exercise information. Upon completion of the food and exercise logs, the participant contacted the PI to schedule an interview time. When the participant arrived at the interview, the completed logs were presented to the PI. Face-to-face interviews and food and exercise logs (Hillis, 2013) (appendices A & B) were the primary sources of data collected for this qualitative phase. A follow-up interview was implemented to clarify information recorded in the interview and on the food and exercise logs. A semi-structured interview protocol was designed by the researcher for this study interview. The initial interview protocol (appendix D), consisted of three open-ended questions and eleven probes and four closing questions. The interview goal was to ask questions that enabled the participant to provide information addressing the central research question and sub-questions. Interviews were conducted and recorded by the PI at a location convenient for the participant. Initial interviews ranged from 12 minutes 24 seconds to 28 minutes 59 seconds, and averaged 20 minutes 27 seconds in length. The initial interviews were transcribed verbatim by the PI and paper copies were shared with participants for member checking. The number of transcribed double spaced pages for the initial interview ranged from 5 to 11, with the average initial interview transcription of 8 1/2 pages. Second interviews were used to clarify the details on the food and exercise logs, as well as member checking of the information from the initial interview. The total time recorded for the initial and follow-up interviews was 5 hours 4 minutes and 27 seconds. The total pages of the double spaced transcriptions were 153 pages.

Visual observations of participant during interview and additional listening (for emotional context) of voice interviews were included in the interpretation. Respecting the



privacy of the participants, anonymity was sought by using pseudonyms only known to the researcher. Data will be kept confidential and shared only with those working on the project.

**Data Analysis.** Analyzing grounded theory research is as unique a process utilizing the researcher as the analytic tool. The analytic process begins in data collection with the establishment of rapport and trust with your participants. How and what types of data we collect from our participants will shape the content of our data analysis. Respecting the views, actions, opinions and understanding the lives of our participants is critical in developing their perspective. Researchers attempt to access the world of participants and have them aid us in interpreting and understanding their lived realities. Two key questions to keep in mind while analyzing grounded theory research are: 1) What are the basic social processes? 2) What are the basic social psychological processes? (Charmaz, 2014). The logic of grounded theory entails going back to data and forward into analysis using an iterative, zig-zag process (Creswell, 2013). Subsequently you return to the field to gather further data and to refine the emerging theoretical framework (Charmaz, 2014).

Initial coding was implemented during the first phase of coding. In initial coding, you can code words, phrases, lines, or incidents (Charmaz, 2006). Line-by-line initial coding is characterized by sticking close to the data and coding with action words. Next, you build to categories, which emerge into themes, and eventually build into theories.

The analysis of the data began with transcription of the interviews to a text copy. The simultaneous data collection and analysis described by Charmaz (2006) was utilized in this research. An advantage of implementing simultaneous data collection and analysis is the researchers are able to go deeper into the research problem (Charmaz, 2006).

Figure 5 visualizes this rigorous process.

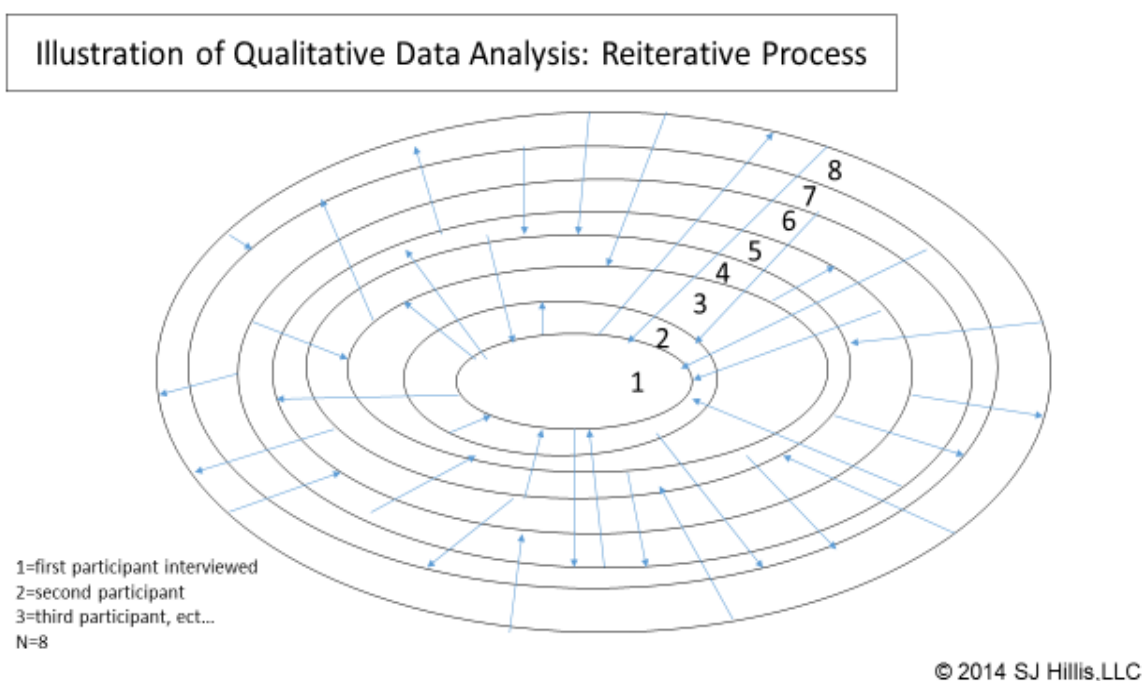


Figure 5: Illustration of Qualitative Data Analysis: Reiterative Process

The PI listened to the participant's voices on the taped interviews four to five times to complete an accurate verbatim transcription. This rigorous task was extremely valuable to understand the feelings and emotions of the participants. The transcribed interviews were then coded line by line. Gerunds, verbs ending in "ing" functioning as nouns, were used to describe the major idea or feeling of each line. The descriptive codes were transformed to analytic codes. Next, the analytic codes were developed into categories yielding many threads throughout the data. Memos were written in regards to the analytic codes and *in vivo* coding was included to support the findings. The deeper the PI proceeded into the rich descriptions of the participant's experiences, the categories became clearer. As with other researchers, the zigzag back and forth between the

transcribed interviews, the voice of the participant, and the categories, generating new questions to help clarify and explain information from the initial interview. The memos were sorted into categories, and then into themes. Sketching preliminary models was helpful to visualize how the process was emerging. Member checking was employed to verify the accuracy of the information.

Reviewing and analyzing the exercise and food logs was a simultaneous procedure following the initial interview. The food logs requested general information about the amounts and time of day food, supplements, and vitamins were consumed. Amount of sleep and additional comments were included on the food logs (appendix A). This study's criteria for healthy food choices included limited fast food, processed food entrees or sugary drinks; reasonable serving sizes and variety of foods at each meal; eating three meals and two-to-three snacks per day; water consumption; limiting alcoholic beverage consumption to one drink per day for women and two drinks per day for men; and hours of sleep.

The exercise logs included type of exercise, time of day, time exercising, distance, intensity, overall feeling and comments (appendix B). Exercise logs were examined to verify that the participant engaged in one hour of moderate intensity exercise on a daily basis.

Since this project is a continuation of a previous theory, we are reiterating the prior theory from the pilot study.

### *A Prior Theory*

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acquired (Hillis, 2013).

**Data Validation.** Consistently with ethical considerations, the researcher must question the basis of the validity of their qualitative study. Are the findings relevant to the inferences made from the data (interviews and other forms of data collection)? How certain are we of the relationships we discovered in our coding process? Is our understanding and interpretation of these documents clear or complete? This is a sampling of the questions that direct my thoughts in the validation process. Suggestions by Babchuk (2014), Charmaz (2014), and Creswell (2013) include questions and statements about key steps in the process. Charmaz (2014) includes concern about categories, depth of analysis, links between categories and data, understanding implications about theory, and final contribution of the theory. Creswell (2013) sites six points in grounded theory criteria: 1) the study of a process, an action, or an interaction as the key element in the theory. 2) A coding process that works from the data to a larger theoretical model. 3) The presentation of the theoretical model in a figure or a diagram. 4) A story line or proposition that connects categories in the theoretical model and presents further questions to be answered. 5) The use of memoing throughout the process of research. 6) A reflexivity or self-disclosure by the researcher about his or her stance in the study.

Babchuk (2014) simplifies and clarifies the process of validation with a checklist for Grounded theory (appendix D). Intercoder agreement was not used in this study due to the difficulty in finding another researcher with similar background to the PI. Member checking with participants was used to verify the accuracy of the transcripts.

Triangulation of the interviews, exercise and food logs by the researcher on an individual

basis, as well as reviewing exercise and food logs from several participants simultaneously looking for evidence supporting the construct.

Saturation of data was reached when no new sources of information were given by the participants. The research goal was met in this phase of the study.

**IRB and Ethical Considerations.** Ethics has become a more pervasive idea stretching from the origins of a research study to its final completion and distribution. Ethics should be a primary consideration rather than an afterthought, and it should be at fore-front of the researcher's agenda (Babchuk, 2012). Researchers involved have completed the CITI training as required by the University of Nebraska Institutional Review Board (IRB). The project was submitted as per IRB protocol and approval was received prior to data collection (appendix E). Mixed Method research involves two separate studies, therefore when submitting the application for approval the researcher can provide some tentative details for the second phase and then seek an addendum once the quantitative instrument has been developed or since the two phases do not include the same participants, it is also possible to submit the application as two separate IRB proposals (Creswell, 2011). For this project two separate IRB proposals were submitted. The first phase, the qualitative research, was an expansion of the pilot study conducted the prior year. An addendum to the initial protocol was requested to include 20-30 participants.

The informed consent form (appendix F) includes the purpose of the research, procedures, risks and/or discomforts, benefits, confidentiality, opportunity to ask questions, voluntary participation and freedom to withdraw at any time, consent, and the right to receive a copy of the consent form. The study participants were given a copy of this document in advance of the interview; and was read to the participants prior to

each interview. Prior to data collection the informed consent form and interview protocol were shared with each participant for review. An analog tape recording of the participant interviews was made and transcribed by the primary investigator. The audio recordings, interview transcriptions and exercise and food logs are password-protected and accessible only to the researcher. The transcriptions and exercise food logs do not include any identifying information and will be stored on password-protected computer. Hard copies of these materials are kept in locked filing cabinets of the researcher. To further protect and ensure participant privacy, the participant was assigned a pseudonym known only to the researchers as a form of participant protection and a means of triangulation of data. Additional ethical considerations include unbiased coding of the data, fair inductive analysis and reasoning, and accurate theme development. Implement validity checks, including triangulation, member checks, and reflexivity. Understanding my values and behaviors, helps me in two ways; 1) to identify values and behaviors in the participants and 2) recognizing that I am biased to my core beliefs (Hillis, 2013). Values that most resonate with me include family, friendship, health, education, honesty, responsibility, fairness, trust, change, courage, wisdom, mindfulness, persistence, curiosity, commitment, self-discipline, motivation, efficiency, compassion, challenge, and adventure.

## **Phase II: Instrument Development-Healthy Population Questionnaire (HPQ)**

Apprehending the transformation of the qualitative findings into quantitative information that could be generalized to a larger sample of our target population, required considerable thought and quandary. In order to capture the essence of the central phenomenon reflected in the components of the theoretical model, character-logical

traits, challenge-solving skills, information sources, and implementation of solution, and replicate the findings we reflected on many aspects of measurement and assessment.

Beginning with a general perspective on measurement, DeVellis (2012) reminds us,

Measurement is a fundamental activity of science. We acquire knowledge about people, objects, events, and processes by observing them. Making sense of these observations frequently requires that we quantify them (i.e., that we measure the things in which we have a scientific interest). The process of measurement and the broader scientific questions it serves interact with each other; the boundaries between them are often imperceptible. This happens, for example, when a new entity is detected or refined in the course of measurement or when the reasoning involved in determining how to quantify a phenomenon of interest sheds new light on the phenomenon itself. (p.2)

Surveys have long been used to gather and quantify information in the physical and social sciences. Duncan (1984) has argued the roots of measurement lie in social processes and that these processes and their measurement actually precede science: “All measurement...is social measurement. Physical measures are made for social purposes” (p. 35). Duncan further summarizes “their origins seem to represent attempts to meet every day human needs, not merely experiments undertaken to satisfy scientific curiosity.” In addition, he comments on the process,

...can be drawn in the history of physics: the measurement of length or distance, area, volume, weight and time was achieved by ancient peoples in the course of solving practical, social problems; and physical science was built on the foundations of those achievements. (p. 106)

Commenting on measurement procedures, DeVellis (2012) states that each science has developed specialized methods and equipment for their techniques.

Within the behavioral/social sciences, psychometrics has evolved as the subspecialty concerned with measuring psychological and social phenomena. Typically, the measurement procedure used is the questionnaire and the variables of interest are part of a broader theoretical framework. (p. 3)



Emergence of the survey as we know today began in the 1920's and 1930's with improvements in sampling strategies and development of different scales of measurement. Many social science fields including marketing research, journalism, public opinion research, and charities are using surveys (Neuman, 2000). In the 1930's with the development of a summative rating scale, the Likert scale (credited to Rensis Likert) the standardization and consistency of measurement improved (Thorndike, 2010).

The increasing use of Web sites and the Internet to collect data has led to the emergence of public opinion polls and panel companies to gather information from the public. As predicted by Creswell in 2012, electronic surveys and communications will probably revolutionize the use and applications of survey research in the future. Donna Mertens endorses their utility, surveys are good because they allow collection of data from a larger number of people than is generally possible when using a quasi-experimental or experimental design. But also cautions, surveys rely on individuals' self-reports of their knowledge, attitudes, or behaviors. Thus, the validity of the information is contingent on the honesty of the respondent (Mertens, 2015).

Survey research is the process of identifying a sample of a target population you wish to learn and describe behavior, characteristics, or opinions (Creswell, 2012).

Creswell further differentiates survey designs from experimental research,

Survey designs differ from experimental research in that they do not involve a treatment given to participants by the researcher. Because survey researchers do not experimentally manipulate the conditions, they cannot explain cause and effect as well as experimental researchers can. Instead, survey studies describe trends in the data...Survey researchers often correlate variables, but their focus is directed more toward learning about a population and less on relating variables or predicting outcomes, as is the focus in correlational research. (p. 376)

Reliability or consistency of the instrument is of fundamental importance. As the term implies, a reliable instrument is one that performs in consistent, predictable ways ( DeVellis, 2012). Garbin (2015) refers to internal reliability, do the items measure a central “thing”? Will the items add up to a meaningful score? Non-statistical and statistical types of validity are explained by Garbin (2015) as; non-statistical types of validity include face validity and content validity. Statistical types of validity are criterion-related validity and construct (convergent and divergent) validity, Garbin (2015) states:

Another approach to understanding the differing types of validity in a behavioral science study is to review the general intent of a research effort; “the intent of behavioral research is to provide definitive results about causal relationships between behavioral constructs, so that the results can be broadly applied.” We can connect the four aspects of this intent with four types of research validity. In behavioral research, “definitive results” are based on data and are probabilistic rather than exact, and reflect statistical conclusion validity. “Causal relationships” refers to the evidence needed to say there is a relationship defined by temporal precedence, statistical relationship between IV and DV, and no confounds or alternative causes for the effect. “True Experiments” must meet the criteria of random assignment of participants to treatment conditions, manipulation of treatment by the researcher, and systematic control of potential confounds. In psychometric studies “causal relationships” are best linked to internal validity of the study. “Behavioral constructs” are the attributes studied in behavioral sciences and help organize and explain human behavior. Measurement validity reflects the representiveness of “behavioral constructs”. In the final aspect of the general intent, “results can be broadly applied”, we want our results and conclusions to be “meaningful” and “applicable” either to theory or practice emphasizes external validity.

Building upon the knowledge gained from my professors, coursework, and readings, the creation of the actual instrument to measure the construct commenced. The first step in a survey is to identify and write the purpose which then can be expanded in terms of specific objectives that the survey will address (Mertens, 2015). The purpose of this survey was to verify the themes identified in the qualitative research of this study;

character-logical traits of a healthy population, challenge solving skills, sources of information and trying (implementation of) the solution.

The purpose is then used to determine the design of the survey. In this study the researcher chose to collect data at one point in time, a one-shot survey for the purpose of describing the characteristics of a sample at one point in time. Creswell (2012) refers to this design as cross-sectional survey, while Mertens (2015) identifies it as simple descriptive approach.

As our attention shifts to the instrument development phase of the study, participant quotes, categories, and the qualitative themes are integrated into a tool which is grounded in our theory. Transforming my philosophical assumptions from a constructivist, multiple perspective approach in the qualitative strand to one guided by postpositivism in the quantitative strand. Identifying, organizing, and integrating the qualitative data into variables and applying statistical tools to test the results to see if they can be generalized to a larger sample of our target population. Once again, the primary tool becomes the researcher who interprets how the quantitative results build on the initial qualitative results. (Creswell, 2011)

The Healthy Population Questionnaire (HPQ) was constructed by using the guidelines provided in the first five steps from DeVellis (2012):

1. Determine clearly what it is you want to measure.
2. Generate an item pool.
3. Determine the format for measurement.
4. Have initial item pool reviewed by experts.
5. Consider the inclusion of validation items. (p.73-102)

***Quantitative constructs; determining clearly what you want to measure?*** Beginning with the qualitative central phenomenon as the quantitative construct to be measured by the new tool, the researcher deconstructs the grounded theory from phase one. The themes become the subscales to be measured, the categories become variables, and quotes from individuals transform into items or questions on the instrument (Creswell, 2011). We develop scales when we want to measure phenomena that we believe to exist because of our theoretical understanding of the world but that we cannot assess directly (DeVellis, 2012). DeVellis (2012) defines measurement instruments as collections of items combined into a composite score and intended to reveal levels of theoretical variables not readily observable by direct means and are often referred to as scales. (p.11)

DeVellis (2012) also comments on the importance of being well grounded in substantive theories related to the phenomenon to be measured. Noting the importance of theory consideration prior to scale development, “theory is a great aid to clarity” (p.73) to help identify and understand the boundaries of the phenomenon.

Garbin (2015) reminds us that psychometrics is the process of assigning values to represent the amounts and kinds of specified behaviors or attributes, to describe participants, measuring specific behaviors or attributes of a participant. He further describes constructs as essential in psychological research. “They’re called constructs because most of what we care about as psychologists are not physical measurements, such as time, length, height, weight, pressure & velocity...rather the “stuff of psychology” such as performance, learning, motivation, anxiety, social skills, depression, wellness, etc. are things that “don’t really exist”.

The quantitative construct emerged from the central phenomenon in phase I. The theory addressing how and where a healthy population seeks nutrition and exercise information by identifying key factors that shape a healthy lifestyle includes constructs most of which are interesting but not measured in terms physical measurements. The themes linked together in the grounded theory qualitative phase were deconstructed to reflect scales to be measured by the new instrument. The three themes, character-logical traits, challenge solving skills, and information-seeking/resources applying the new idea to a situation, trying the solution, became the framework for the scale development and independent variables. The subscale of character-logical traits encompassed the criteria information, including normal BMI, daily moderate exercise, balanced diet, as well as mindfulness, happiness, discipline, positive self-esteem, cooking skills, and food knowledge. Challenge solving skills slightly overlapped the character-logical traits and included cooking skills, knowledge, experiences, and learned behaviors. Source of information applied to a new idea or trying the solution included subscales of “self-implementation”, trying new experience to improve self, or to help others. Quotes from individuals became questions or items on the survey.

In addition to the above identified variables, demographic information was collected in the survey. The demographic questions included information about geographic location, age, ethnicity, education, field of study, and marital status.

The dependent variable for this study was the reliable sources of information. Resources of exercise and nutrition information defined as more than one reliable source, ranging from family, friends, books, self-knowledge, and various internet sites previously identified in the grounded theory qualitative phase.

***Generate an item pool and review by experts.*** Item generation is the process of writing stems, part of the item which presents the problem and the list of possible answers or options (Thorndike, 2010). Ideally, the items will “produce answers that are reliable and valid measures of something else we want to describe” (Fowler, 1995, p 2). Many studies do not clarify how the qualitative findings are transformed into quantitative items. (Hitchcock et al., 2006; Tashiro, 2002, Weitzman & Levkoff, 2000.) The researcher in this study returned to the qualitative memos, reviewing the participant quotes and information gathered in the food and exercise logs, to begin to writing close ended questions or items. In addition, the qualitative data was reviewed for answer choices for the survey. The use of *in vivo* items contributed richness, depth and uniqueness to the instrument.

The researcher selected close ended questions for survey including multiple-choice, scalar questions, and a checklist asking the respondent to mark all that apply. Psychologically sensitive questions were avoided and clarity was vital to completely understand the items. Definitions were provided to the item stems if our pilot respondents thought the information wasn't clear. Mertens (2015) suggests short items to long items, avoid negative wording or asking about more than one idea in a question. Also, to avoid jargon and big words, as well as biased or leading questions. With this information in mind, the researcher listed 163 items from memos. Next, the researcher consulted with Calvin Garbin and he shared the following advice which was followed.

With a sequence of item writing from Garbin (2015),

Get the item writing done 1<sup>st</sup> time,

Have them peer reviewed for thoughts and questions.

Take 3 days completely away from the items (no peaking-try not to even think about them).

Reread and edit (cold reads often reveal much!).

Have someone who really likes you sit with you, read each one & have the following dialogue, they read the item, they answer the item, they tell you what the item is asking (including telling you if they had to decide amongst alternatives), they tell you how easy it was to choose the answer & if there are options you should have included.

Keep notes on suggested edits, but don't actually change anything.

Another 30 day cold spell.

Edit the items from your notes.

Share the 2<sup>nd</sup> version with your advisor.

Simultaneously with item writing, the PI visited the Buros Center for Testing at the University of Nebraska Lincoln. Viewing actual psychometric instruments helped understand more about the process and end product encompassing instrument development and design. Reviewing the detailed information in the Eating Inventory (Stunkard & Messick, 1983) helped the researcher see the transformation of research into instrument items.

Appendices (G, H, I) shows the organization of themes, categories, and quotes to items.

Pilot testing the instrument with participants from phase one, indicated a very good coefficient alpha (.85-.95) for the survey.

***Determine the format and physical construction of instrument including validation items.*** Considering the distribution of the survey on a national scale, the researcher decided to construct the HPQ for an online environment. After reviewing information and visiting with specialists in the field of survey, the researcher contacted several panel companies capable of accommodating the needs of this survey. The PI in this study selected Qualtrics based on price and their excellent customer service provided in initial information gathering stages. Following is a summary of the Qualtrics company profile.

Qualtrics, the world's leading enterprise survey technology solution, has been providing online samples for over five years. Qualtrics partners with over 20 online panel providers to supply a network of diverse, quality respondents to our worldwide client base. Our Qualtrics Panels Team has completed over 15,000 projects across every industry vertical including travel, financial services, healthcare, retail, consumer goods, technology, and manufacturing both in the US and globally. (p. 3)

The College of Education and Health Sciences currently holds a license with Qualtrics, making the price for the project affordable. After setting up an individual account, the researcher was able to rebuild their survey in the Qualtrics system. The support staff was very knowledgeable about their product and provided assistance both on-line and in telephone conversations.

Two blocks of items were designed in the HPQ (appendix K). Following a brief explanation about the two parts of the survey, the IRB consent form was the first item of the first block. Following were six criteria questions to identify the target population all of which had forced responses. A BMI computator, as well as items screening for daily moderate exercise and eating balanced meals were included in block one. Being concerned about alcohol consumption items, the researcher set the minimum age at 21



years old to participate in the survey. If all the criteria questions were answered with pre-determined acceptable replies, the respondents were prompted to continue the survey. If the criteria questions were incorrectly answered, a note ending the survey appeared.

The second block of items on the HPQ, begins with brief instructions about the 135 forced response items starting with demographic questions including ethnicity-heritage, education, field of study, marital status as well as geographic location. The remaining items on the survey are arranged first by variables identified as characterological traits and challenge solving skills, then the sources utilized to acquire nutrition and exercise information (appendix K).

Challenges researchers generally face in data collection include panel company bias, social desirability, and acquiescence (Garbin, 2015; Mertens, 2015; Creswell, 2012; DeVellis, 2012; Thorndike, 2010). To best address these challenges, information was gathered and reviewed on the reliability of respondents and of the panel company. In addition, to ensure data quality, Qualtrics added quality check items, performed a soft launch (30 criteria met responses), and monitored the survey from start to finish. To exclude duplication and ensure validity, Qualtrics checks every IP address and uses a sophisticated digital finger printing technology (Qualtrics, 2014). For ease of completion, page breaks were added every 1-2 questions. Adjustments were made to the format of close-ended questions so the survey could be completed on computers, as well as mobile devices. Appendices K & L summarize this process.

### **Phase III: Quantitative Survey, Healthy Population Questionnaire (HPQ)**

The major characteristics of quantitative research differ from our first phase of qualitative research in the way we describe the research problem, create a narrow purpose statement,

collect data, analyze data and report the results (Creswell, 2015). In the quantitative phase of this study the research problem reflects testing and generalizing the process of how and where a healthy population acquires reliable exercise and nutrition information. Representing the variables are the items in an instrument to collect specific data. The goal is to analyze the results and generalize the inferences to a larger sample of the target population.

**Sampling Method.** Who will be in the quantitative study? The goal is to have a sample that represents the target population (Garbin, 2015). Defining our target population requires an understanding of who we are intending to study. A component of external validity, the stages of sampling are target population, sampling frame, selected sample, and data sample. The target population for this study is defined as people who have a self-reported BMI ranging between 18.5-24.9 kg/m<sup>2</sup>, on average moderately exercise a minimum of one hour each day, eat a healthy well-balanced diet, and be at least 21 years of age or older. The researcher requested Qualtrics stratify the respondents by geographic location-national representation, gender-either gender to compromise not more than 60% of the total, and age-representation of decades through 60. Qualtrics asked the researcher for a sampling frame to find respondents meeting this criteria. The researcher referred to the 2015 County Health Rankings study from a collaboration between the Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute, to identify the top three “most healthy” counties in each of the 50 states. A total of 2063 zip codes were identified as the purposive sampling frame and entered on an excel spreadsheet and emailed to Qualtrics. Qualtrics sent a group invitation and respondents self-selected to voluntarily participate in the study. Of the

2,799 responses, 309 respondents met the criteria and completed the survey and became the data sample for this study.

Gender			Ethnicity		
Female	188	61	Black	22	7
Male	120	39	Asian	13	4
Other	1	0	Native Hawaiian	1	0
Marital Status			White-European		
Single	98	32	White-Middle East	15	5
Married	178	58	White-North Africa	1	0
Widowed	7	2	Native Indian	5	2
Divorced	24	8	Hispanic	22	7
Separated	2	1	Multiracial	6	3
Ages			Education		
21-29	84	27	High School Grad	47	15
30-39	70	23	College, no degree	52	17
40-49	43	14	Trade/Technical	16	5
50-59	53	17	Associate degree	35	11
60-79	59	19	Bachelor's degree	95	31
Mean age=42.77			Master's degree	50	16
Population-reside			Professional degree		
<10,000	61	20	Doctorate degree	9	3
10,001-100,000	111	36			
100,001-500,000	75	24			
>500,001	62	20			

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Table 2: Demographics for the HPQ respondents



Figure 6: Geographic stratification of data sample

**Data Collection.** The Healthy Population Questionnaire (HPQ) data was collected online through Qualtrics Panel Company. The online survey was convenient for the respondents, as well as reliable for the researchers to collect the data in an efficient, expedited manor. Respondents were not identified in the data and the information was reported in aggregate form. The data was electronically transmitted to the researcher, as well as stored in Qualtrics secure servers. A soft launch of the HPQ began on September 28, 2015. Within approximately 2 hours, 30 completes were loaded into the data for the researcher's review to catch any issues or discrepancies. A few misspelled words were corrected and the survey was back in the field to resume data collection. The Qualtrics project manager watched the results live and channeled the survey to geographic regions, age and gender stratifications. October 1, 2015 the 300 completes as requested for this project were collected, and Qualtrics closed down the HPQ. Only the valid responses were downloaded on an Excel file. Do to the size of the file some difficulty was encountered, but Qualtrics Support helped solve the problems.

**Data cleaning and review.** What does it mean to “clean” data? Once the data are collected the researchers need to review the descriptive statistics for skewness, outliers, and overall behavior of the data. The PI recoded the variables that were in reverse order on the survey. Also computed new variables for the independent variables and dependent variable of interest in this study (appendix L) for item details. Labels and values were added to the variable view tab of the SPSS spreadsheet. Due to the nature of the data and by including criteria to identify the target population, adjustments for skewness and outliers were not required.

### **Data analysis and Validation.**

The next step in the research loop is statistical analysis on the data. A major concern in this step is statistical conclusion validity. Garbin (2015) suggests we ask the following questions;

- 1) Do our results represent the relationships between characteristics and behaviors that we intended to study?
- 2) Did we get non-representative results “by chance”?
- 3) Did we get non-representative results because of external, measurement or internal validity flaws in our study?

Awareness of experimenter expectancy effects unintentionally “produce the results a researcher wants” of two kinds. First, modifying participants’ behavior with subtle differences in treatment, inadvertently conveying response expectancies/research hypotheses, or performance difference due to differential quality of instruction or friendliness of interaction (Garbin, 2015). Through the use of a panel company for administration of the survey, we assume these concerns were controlled.

The second, data collection bias includes the coding and interpretation of self-reported data, as well as subjectivity in interpretations. Using scales to represent items in predesigned variables eliminated subjectivity. Basing the decisions on statistical tools and reports generated through the use of SPSS, the researcher began analysis with exploratory factor analysis.

**IRB and Ethical Considerations.** This project was conducted in full accordance with applicable sections of the IRB Guidelines (appendix M). Since the informed consent form appeared on-line, the IRB number was included on the appropriate line (appendix K).

The criteria block of the survey explained the two parts of the questionnaire.

This survey consists of two parts. The first part explains the purpose of the survey and includes criteria questions to help us identify the target population. After completing the question about your age, the first set of questions are quickly analyzed. The next screen will either be brief instructions for the remaining questions or a note ending the survey.

The next item was the full informed consent form stating the title of the project, purpose of the research, procedures, risks, benefits including compensation from Qualtrics, confidentiality, contact information for questions or concerns, right to withdraw and voluntary consent. The next question was a yes/no item to accept the articles of the informed consent and voluntarily participate in the study by completing the HPQ. No one under 21 years of age was allowed to participate in this study.

Information about who participated was kept confidential by Qualtrics. Any identifying information obtained from the survey was de-identified by Qualtrics and reported to the investigator in aggregate form. No data will be identified with name or other personal identifiers. A number will be assigned to respondents and used when reporting the data. The electronic records and data will be stored on Qualtrics secure servers. The project records will be kept for 5 years.

On September 18, 2015 we received a letter from Becky Freeman, CIP for the IRB, to notify the researcher of the certification of exemption for our project by the IRN for the Protection of Human Subjects. Our proposal is in compliance with the institution's Federal Wide Assurance 00002258 and the DHHS Regulations for the Protection of Human Subjects (45CFR 46) and has been classified as exempt (appendix M).

The HPQ data is stored on a password protected computer in a locked office. Access to this information is provided only to my advisor and committee members.

**Phase IV: Mixed Methods Interpretation**

As in this mixed method study it is important to note the data analysis consists of analyzing separately the quantitative data and the qualitative data, using appropriate methods for each. In addition, it also involves analyzing both sets of information using techniques that “mix” the quantitative and qualitative data and results-the mixed methods analysis (Creswell, 2011). The qualitative data provided the base for the development of the quantitative strand and thus the integration in this research occurred in phase II with the development of the instrument.

## Chapter 4: Findings and Results

### Phase I: Qualitative Grounded Theory Findings.

Flushing out as much information as possible from the interviews and exercise and food logs was imperative. Through the use of line-by-line coding and the iterative process of returning to previously collected information, 44 5x7 colored note cards (appendix N) were used to organize the data. Looking similar to a spread sheet, the cards denoted the first initial of the participant's pseudonym across the top of the card. The columns listed information and choices from the participants, each card contained 10-16 initially coded reflections. The themes constructed in the coding process, were deconstructed to identify key factors to be used in the survey.

*Exercise Logs.* The exercise logs indicated the range of time exercising per day from 30 minutes to 5 hours and 20 minutes, the average time exercising per day was 2 hours 35 minutes. The number of exercise sessions per day ranged from 1 to 5, with an average of 2 sessions per day. The type of exercise listed by the participants included, running, biking, lifting, workouts, power walking, raking the yard, cleaning the barn, playing with kids, gardening, and yoga.

The self-reported intensity of exercise ranged from easy to moderately hard depending on type and length of exercise. The participants planned exercise as part of their daily routine and commented they felt better on days they did moderate exercise.

All of the participants either exercise or preferred to exercise in the morning, and then depending on their schedule exercised at noon or after the evening meal. Distance varied with type of exercise with running/walking mileage between 1 and 19 miles, and biking between 2 and 28 miles. The overall feelings reported by the participants include



*Good! Great Workout-beautiful day! Rejuvenated, Alive! Enjoyed the weather! Pretty darn good! Cruddy! Accomplished! Refreshed! Calm, collected! Enlivened! Tired! Good,* was the comment reported most often by the participants. (Appendix P)

*Food Logs.* One participant recorded fast food as a lunch choice.

Processed foods were recorded by three participants and included crackers, chips or cereal, with one of those being only organic products. All of the participants drank water throughout the day, recording only when they remembered, so it was difficult to estimate amounts. None of the participants drank sugary drinks, though 3 drank occasional diet sodas, 1-3 per week. The meals recorded on the food logs contained a variety of foods in all food groups, and most participants ate 3 balanced meals at the same time each day. Two to four planned snacks of fruit, nuts, yogurt, multi-grain bars, fruit juice, or chocolate were included in their daily routine. Three of the participants recorded one serving of wine or beer on one day of the food logs. Sleep recorded on the logs ranged from 6.5-9 hours per night, with an average of 8 hours per night. (Appendix Q)

*Interviews.* Description of a Healthy Population. In understanding the process by which a healthy population seeks nutrition and exercise information resources, one must first understand the characteristics, values, behaviors and philosophical views of a healthy population. Throughout the interviews, several characteristics and identifying behaviors persisted.

Exercise was used to identify the healthy population. Following are excerpts from the raw data collected throughout the interview about the exercise which was later coded for themes. Weather was a factor for the amount and type of exercise for three of the participants, exercising less or indoors during the winter. *I do exercise on the weekends,*

*but usually just one of the days .....unusual when I don't...it's usually outside, so during the winter, sometimes that's harder to accomplish. One participant knew how to calculate the exercise intensity based on the target heart rate range. Because as I showed on that chart, I try to exercise at 85% of my maximum heart rate and that's 220-age, and then 85% of that. Other participants knew it was moderate by their breathing, they exercised until they felt exhausted, amount of perspiration, or had been exercising many years and could feel their pace. I know because of my breathing, I exercise to a point of complete exhaustion...*

*And so I feel by now I have a pretty good body awareness. And whether I'm pacing or just how I'm feeling, I can tell pretty quickly. Even when it comes to pacing, I can have a pace in mind and I'm able to hit it even without looking at my watch for a while. So intentional.*

Many comments on daily routine and balance were made by the participants.

*I'm a creature of habit. I love routine. Yeah, I really do feel like we're all morning people.*

When asked how you have time to exercise every day. *Everything else is after exercise.*

*That's number one with me. I exercise every morning.*

*And that's probably why I'm in this routine and I don't feel like I'm in a rut but it really works in my life right now.*

*And growing up our meal time was pretty regimented.*

*So I grew up with mother who sat us down at night, everyone sat down and she cooked from scratch all the time.*

*...the point of this is I'm a very structured person, I wish I was more flexible, but I'm not.*

*I'm a creature of habit anyway, so.....*

*I like the routine...when you are actually getting up at a certain time, having a certain time for breakfast, lunch, dinner, and exercising. I can really feel the benefits after. I really like that...my body was ready, my body knew when I had to exercise...*

*I have always been routine based, I've liked having a predictable outcome, not outcome, predictable lifestyle. It's kind of boring at times, but it's also allows me to have confidence in what I'm doing, it works for me.*

Exercising with friends was another aspect of their exercise ...*we had this big walking group.*

*We do a lot of talking after my long runs with my friends and it's such a diverse group. I have a small group of friends that are friends for a reason, our outlook on fitness and nutrition, and life in general.*

Food choices were also used to identify a healthy population. Comments about eating out were...*we really don't go out to eat very often.* When sharing childhood experience...*we ate out more because at the time it was definitely more convenient...but we'd find the healthiest choices that we could make...a good meal not just a fast food drive-through.*

*When we eat out we try to find the fresh stuff. We'll get burgers, we'd rather pay a little more when we go out on occasion and get locally raised stuff.*

Answers to questions about processed foods include a variety of information. Such as the response when asked, is most from raw ingredients you buy and prepare, *70% of the time it's raw and 30% prepared...my biggest downfall I would say would be some sort of chip or cracker. Which is processed.....*

*Just...fresh food. Is what I try to buy... Whether its maybe made for me by the people at an organic grocer, in the little bowls, and I know it's fresh. I do have an Annie's burrito, or like a frozen meal like, rice bowl or something like....*

*Oh, there are some packaged and processed things in there I'm sure. We don't consciously look to avoid it or buy it. It just happens to be what we are looking for. I think we've trended more towards the pattern of having more natural stuff if we find it. We definitely don't seek it out or exclusive buy it, we have no problem buying things that... are processed. We prefer to avoid it, but it is what it is for us.*

Comments on water consumption, *On average, I would say....40-60 ounces.*

*Enough to keep me from being thirsty. I don't know, I don't do cups or glasses during the day, I just drink when I'm thirsty, and try to stay as hydrated as I can basically.*

Comments on sodas and sugary drinks *I consume beverages like sodas and pops, but that's rare, maybe once a month....*

*No. I've never been a soda drinker. I don't know why, the taste never appealed to me, never had the temptation.*

Comments on balanced meals and lifestyle,

*I eat basically the same thing every day except the evening for supper.*

*I don't follow nutrition fads too closely, we eat for health, but we also eat for enjoyment too. We try and just keep, like a lot of things in our lives, balance to it.*

*Probably what informs most of my life, it's almost too much so we just kind of keep it balanced and just call it good, and what we've done so far and we don't overwhelm ourselves.*

Comments on alcoholic beverages...*Occasionally, rarely, probably more in the summer.*

*No. I don't feel like I'm restricting myself, I don't feel like I need them.*

*When referring to college...they'd get drunk, but not me. I would not drink.*

*Wine on occasion. Maybe one or two during the week that's a fairly good average.*

*Comments on sleep; When reiterating number of hours recorded, 7,8,7,6 , response to if this normal, yes, that's not unusual.*

*...it's important for me to get 8 hours of sleep.*

*Yea. I'm pretty much a set range of 6 ½ to 8 hours of sleep*

*Characterological traits of Healthy Population include;*

*Discipline. One of the most important things is discipline. I think I have to be able to discipline myself to eat the right foods and get the right exercise. And not do things that are harmful to my health. So it's a matter of discipline. And many, many people, most people don't have that discipline.*

*I learned to get up early in the morning, you have to think ahead of all the things that you need. Even food wise.....*

*Lifelong learner. I've always been interested in nutrition and what I eat, so when someone asks me a question I have an opinion because I've been studying it all my life. ... it's good to think about some of this stuff. It's interesting to think about where your thoughts come from on different parts of your life. Like I said I'm curious, I always think about where things come from. Some of this stuff you don't even think about you just do, it's like you've always done, its fun to learn about that kind of thing or at least think about it.*

*Mindful. ...I have to exercise more and eat less and be more mindful about what I eat.*

*She was just trying to be very mindful about keeping her heart healthy. When talking about young children.... And be mindful of the smaller meals they can't tolerate great big meals. Comment when reading labels....The last three or four years I've been more cognizant about looking at the labels. When talking about food choices...she's more conscious about her food choices. When talking about making pancakes for family breakfast...I do try to have it be conscious.*

Happiness. Laughter and smiles throughout most interviews of all participants. When asked for their own advice to someone else, *think about those people in your life that you look up to and think that they do a nice job, they seem to be able to fit those things into their schedule...all their lifestyle. They seem to be happy about the meals they cook, it doesn't seem to be stressful. I know that I'm in a good mood, I am happy....*

*Laughter after several comments about self....my mind doesn't turn off...that's the bottom line....I'm always thinking up things to do, now do they happen, not necessarily... And I was happy, and satisfied with the results for her, that I could actually make a difference and she feels better.*

Self Esteem. *I also need to practice what I preach, I need to be a good example for them....When talking about sharing knowledge with others...I think those are kind of good things. When talking about friends...I'm with a pretty healthy group of people. When talking about what good sources to share with others...to encourage them all the time to surround yourself with healthy people and be a good example for your children. I want to hold myself accountable....I feel better when I do those things.*

*So I already had some self-esteem. Being pretty good at it doesn't hurt anything. I've always enjoyed that part about it where I can challenge myself and see what I am*

*capable of. And I guess for now running happens to be an outlet.. The process is fun. I like the process of training. What keeps you going?*

*When listing character traits that described themselves, participant responses....loyal, trustworthy, and happy! Goal setter. Ummm...healthy, goal oriented, positive, real positive people, definitely... I'm pretty intentional, definitely hard working, optimistic, and curious.... I feel very fortunate to be as healthy as I am. ...it's just unbelievable.*

*Comments on cooking skills and food knowledge. While talking about exercising... it's interesting how that then leads to your kitchen table. My mother grew up on a farm and my grandmother was a phenomenal cook. Yes, I do have lots of cookbooks. I have sticky notes or fold the corner...I kinda know where my "go tos" are... When talking about sources...a lot of times go back to my library of cookbooks, if I'm wanting to make something. You know ...you wish they'd invent another food group or something. You know it's so much the same...after you've been cooking for ...years.*

*I try to look for different ways to prepare things, different recipes, a variety of things I can cook...*

*Explaining the process of solving a challenge. Responses to interview question one, when you have an inquiry about nutrition or health information, tell me how you look for an answer to your question? Hmmmmmm...(pause)...I guess it depends on what the question is.....*

*Several resources, first I start on the internet. And depending on the field, if I would know a physician, I would ask her or him....*

*The answer is on my experience and what I've learned throughout my lifetime.*

*Well, I usually like to ask people that I think have some good base knowledge. I do like to get on the computer and kind of get maybe a neutral or at least a couple different sides to the question.*

*Well, first of all I have education. I have plenty of books at home, so I go through and try to find an answer there. The easiest way of course is to look on line, but on line there's so many resource sources. You cannot be sure that's the right one, because you don't know who wrote the information.*

*I will reference sources from publications I read....And usually it's not the publication itself, it's things they site and talk about. I'll talk to friends. People who I know who live healthy lifestyles also and see what they do.*

*When responding to both nutrition and exercise...you know there's different variables here.*

*Sources. Mostly books. So, I guess I turn to...I have a thousand cookbooks, so go through those ... So, I think my family has always been the first source that I've gone to...  
....sometimes a lot of information is overwhelming to people. My mother, cookbooks, and interesting articles in the paper.*

*Challenges. Contradictions. The things that sound too good to be true probably are. Because questions in my mind, it's about the validity about what I'm seeing and reading. So, I guess I always try to play devil's advocate a little bit. Look at the other factors that could maybe come in and make that...conflict so it's not always a straight path. You know when you're trying to find information I guess I like that part of it...it doesn't make me frustrated. Its fun to read between the lines and try to problem solve and figured out*



*you know why this works better for this person or why this works better for the other person.*

*...you always want to give yourself the best opportunity to be healthy. People are a lot more capable than they give themselves credit for. Once they just start with that one little step with that confidence they can make really good choices.*

*What kind of time do you have to do those things? I happen to take time to cook and I take time to do exercise. So I don't know...it's a value system isn't it? You know it's what do you value? Do you value maintaining good health or do you value how you look? Something isn't right in America, because people aren't getting the message. ...I do worry that everything is fast food...I think we as American's are on the cusp of not taking very good care of ourselves, because of the way we eat.*

*I don't know because food is such a corporate thing now, it isn't a homey thing. I just worry about people who don't eat correctly....that I don't know how in the kind of society we live...how do you marry the things you know are important with a society that is on the go all the time. Everybody has to be doing something all the time...there are so many obstacles that are in the way...so how do we find ways to prepare food that isn't the kind of junk stuff that people eat. Something that's prepared at home and not with a lot of chemicals in it...all you read on the boxes...that's not food!*

*The challenge is deciphering which is the best source...but then sometimes you get conflicting information ....then it's hard to decipher what's right and what's not.*

*Whenever I use research articles it's hard to find if it's really significant for you. ...they want to put nice style on the article, so when you read the first sentences, (you think)like this is something really good. But then you finish reading the article you realize this is for*

*a specific population and works under these conditions and this doesn't really work for you. So, I would say that's challenging for me....some (of the articles) are really complicated and hard to understand even though I have the knowledge in the field.*

*Because, there is lots of conflicting information....Seriously, common sense is how I try to interpret a lot of that...and try to have an open mind....but I think common sense comes down to it that's how I do my interpretation of anything.*

*I feel like there's a lot ...there's too much stuff out there. I feel like people are...will jump on anything that sounds good to them. I think that there's some really good sources. I think there's a lot of sources that aren't good. And can influence people a lot.*

*...there's so many new people who aren't educated and they can get really confused about what to do. ....they try to dramatize it a little maybe a little more than it should be.*

*Challenge solving skills...and by the end of the day you make slow rates of change and encourage them to make some better choices.*

*...I'm sure I probably just try to figure out what's going to work for us or for a certain situation, or certain person...a little trial and error.*

*So really looking at any situation and trying to factor out all of those things that do have an impact.*

*I'd probably just use my common sense and figure it out. I'm not...I don't do fades. I think there's simplicity in eating if you just really care about food. I feel I know what I feel intuitively what I should be eating and shouldn't be eating.*

*...while I mean just from my own logical deduction...I'll take the information and process it and use whatever I think is going to be the most beneficial for my particular situation.*

*Oh especially frustration if I'm not able to really find out the information that I think pin points specifically what's going on. That's a problem. So I would say there's a lot of freighting information out there that the general public who may not have a high level of common sense, it would be fearful.*

*Well, how I look things up and how I would say most people do is recommendations from others. Because, the world is actually very small. If there is someone good out there, you'll definitely know about them.*

*I will go to the internet for stuff...but I don't totally believe in it, but it's fun to get some different stuff, get different angles of stuff on the internet....*

*Being able to sort through what really is true. And what you have to take with a grain assault. You know, they can take one...they can take one message and spin it a million different ways....it can be confusing on how they present their information, definitely.*

*Pretty much anything I get I take with a grain assault.*

Most of the participants mentioned an influential person in their lifetime. When one participant referred to a coach...*He knew everything about food and nutrition. Weight control. And so I learned a lot from him.* When answering how anything or anyone influenced your choices...*They (parents) would always really encourage me to do what I was passionate about. That took me in a completely different direction than my peers because it took a lot of time, it was a big commitment and they really instilled that in me. ...my parents always taught me that I shouldn't leave anything (food on plate at mealtime)...that I should respect that we have food and we have to eat everything... .. Just my parents and how they raised me. Make the best choices you can and work hard and that's about it. My parents. Parents. And Siblings. Family.*

When participants commented on using a single source. *Not very. I have to....there's so much contradiction out there. So I feel like you have to go through....especially if you ever go to the internet for something. ....that's when I have to go to multiple things. And maybe using at least three of those sources before I come up with my own opinion. I would say...I'm going to stick with my parents. They haven't guided me wrong so far. You can't just rely on one source.*

*You can get your information from a lot of different places, if you're open-minded about it.*

*I don't like to get just one view. I try to find that there are several sources that are telling the same thing.*

Comments on best sources. *Go to somebody that you look up to and trust. First of all I think your best source of information has to be personal, in that you have to have some sort of or somehow an awareness of the food you should be eating. I would say, books, internet, and family.*

Comments on reliable sources. *Probably those that I am most familiar with given their recipes or use their suggestions. You know isn't that a time tested thing...you learn by doing....*

*Mayo obviously has the greatest reputation in our country and most reliable in our lifetime...and that would have come down from my parents.*

*I would say research articles...I really prefer to use them, because it's new and fresh (information).*

*I would consider talking with a professional, not try to look at things on line by themselves. A good specialist can just give you really good advice at the beginning....if you can find a really good specialist, you can really benefit from them.*

*...parents, were who basically gave me information on nutrition. ....and then onto people that I know and trust.*

*.... I would say, I look at what a person's done. I look at how well they site their sources. I would also look to see how or if other people I've listened to or read reference them or has heard of them.*

*One participant's response to finding reliable sources ...you know that's really hard. I can identify non-reliable sources.*

*I think the quality is pretty good. I suspect if I was new, that it would be very difficult to sift through everything. And find things that are simple, easy to follow, and understandable. There seems like there's a lot of advice out there and I think it's the nature of the world we live in, with the amount of information you can get your hands on, it's knowing where to go and what to do, it would be very difficult. Especially if I was brand new to it.*

*Try solution. Used it on myself.*

*I guess I'm also willing to be kind of my own guinea pig and try some things out on my own.*

*Most people want to do the right thing. To be selfless enough to encourage them to ask a lot of questions and ask for second opinion and get on the computer and ask other people so....*

*If you find something really good (referring to new approved NCAA food derived supplements), you are excited, and I like to experiment with my body, so I like to try it out.*

*Well, it's just that feeling....I feel like everyone in the world is here for some reason. ....I feel right now I have the knowledge to help in this field. That gives you the satisfaction then you can be passionate about it. And that's what I'm doing right now with my client.*

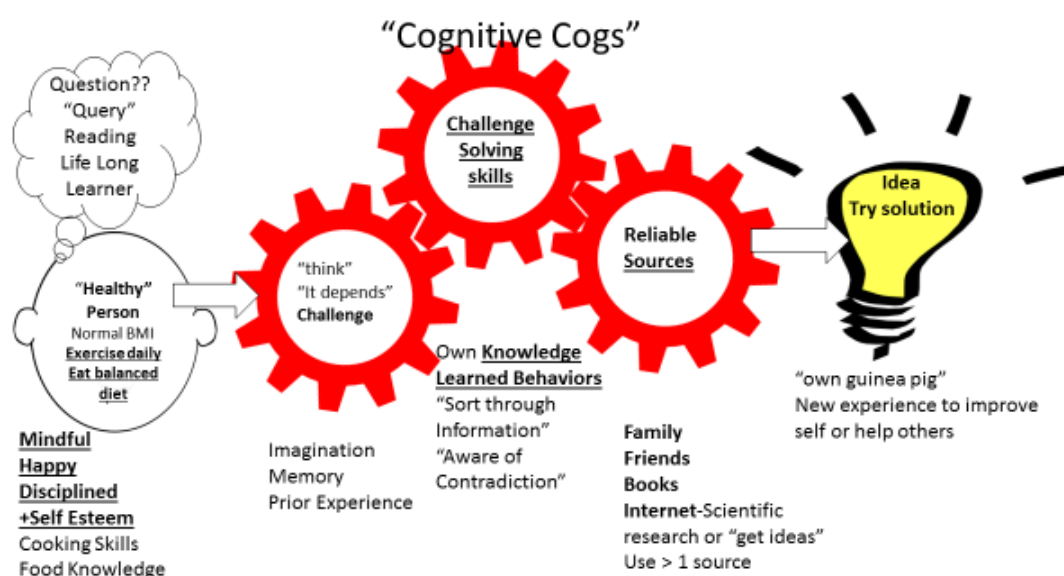
One participant offered this advice on exercise. *I would say, start light, so you don't get discouraged, so you don't get burnt out, so you don't get defeated. ...so they can really stay with it. The key is make it interesting, make it fun make it rewarding, that they feel accomplished at the end of the workout, so they'll want to do it again. There has to be a sense of accomplishment. That keeps somebody going.* Another participant's advice, *I guess my biggest thing is you just start eating whole foods. If it's in a package avoid it. If it's in its real state, real form eat it, start there. That would be the best advice for anybody.* When referring to own nutrition...*I wish I would have known then what I know now. ..That's part of life, definitely, so that's why you pass it on and share it with other people.*

Charmaz (2014) writes the following concluding thoughts on reconstructing theory:

The subjectivity and ambiguity I portray in constructivist grounded theory permeate objectivist approaches as well. But these approaches mask subjectivity and ambiguity through shared assumptions about the world and established formats for conducting and reporting research. In the end, inquiry takes us outward, and yet reflecting on it draws us inward. Subsequently, grounded theory leads us back to the world for a further look and deeper reflection-again and again. Our imaginative renderings of what we see and learn are interpretations, emanating from dialectics of thought and experience. Whether we adhere to positivist or interpretive traditions, we do not gain an autonomous theory, albeit one amenable to modification. Rather we are part of our constructed theory and

this theory reflects the vantage points inherent in our varied experiences, whether or not we are aware of them. (p. 260)

The PI was able to expand and refine the findings from the pilot study. The researcher developed a model reflecting the process identified in the data, Theoretical Model Used to Understand How and Healthy Population Acquires Nutrition and Exercise Information (Figure 7).



**Figure 7: Theoretical Model Used to Understand How a Healthy Population Acquires Nutrition and Exercise Information**

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Having similarities to the *A Priori* theory, the new model includes personal values, characteristics, and behaviors influencing "how" and "where" decisions. Once again, the new model rests on the challenge solving skills "cognitive cogs" of participants in seeking meaningful and reliable sources guiding their journey to new information. Being aware of contradicting and unreliable information and sources, they are able to identify and sort through information. The "cognitive cogs" represent a constant comparison, going back and forth process comparable to that of a researcher doing grounded theory research. As in the pilot study the four sources that emerged most often

are; parents, friends, own education, and internet sources. Books, personal cooking and food knowledge, and self-knowledge about the topic were also common sources. Parents were identified as the first source for several reasons; availability, genetic traits, and life experiences. Friends, with an understanding of science based knowledge were the second resource. Friendships are developed not only for companionship, but also in a less mindful process to collaborate and cultivate our information needs (Rath, 2006). Education, former studies, or continuing educational classes were a third source. The final source was the internet. If the information retrieved from the internet was science based knowledge, the process was complete with acquiring new information. A second purpose for using the internet was for idea generation and exploration of information. In summarizing, the process of a healthy population's choice for seeking information initially involves conscious and unconscious influences from characterological traits, life experiences, and learned behaviors; next the difficulty and scope of the challenge is taken into consideration before seeking a single or multiple sources; and finally new information emerges and is used to improve themselves or help others.

The emerging themes in this phase will be integrated to develop the dependent and independent variables in the instrument development. Accomplishing the two-fold purpose of this qualitative phase in the exploratory sequential mixed method design with instrument development, was first to expand and validate the Model from the thesis (Figure 3), and next, to identify the dependent and independent variables for the design of the new instrument. Moving on to phase II to integrate this new information into an instrument.



## **Phase II: Integration-Healthy Population Questionnaire (HPQ)**

The Healthy Population Questionnaire (HPQ), (appendix K) represents the integration of the qualitative data and the literature review into a new instrument. A brief summary of the instrument development is outlined in appendix P. Appendix Q outlines the process followed to launch the HPQ.

## **Phase III: Quantitative Results**

*Exploratory factor analysis (EFA).* The two main purposes of EFA are first for data reduction and second to explore theoretical structure (Garbin, 2015). EFA is an iterative process, moving back and forth from the EFA, literature reviewed and the qualitative theory developed in Phase I. Since the key purpose of this study was to explore a theoretical structure, we employed the use of EFA specifically, cluster analysis, principal component, path analysis, and linear discriminant function.

Examining the cluster analysis (CA), using the Ward Method, a substantial clumping of groups was noticed when going from 5 to 4 clusters. Close examination of the tables and line graphs (Figure 8) indicated 4 “kinds” of folks within this sample. The sample is described as having high group (above average), a low group (below average), and two interesting groups in the middle that have opposite values on most of the variables. If the two middle groups were combined into one cluster, there would be one group with almost perfect average values. Keeping the two groups separate, raises questions about who and why they are different.

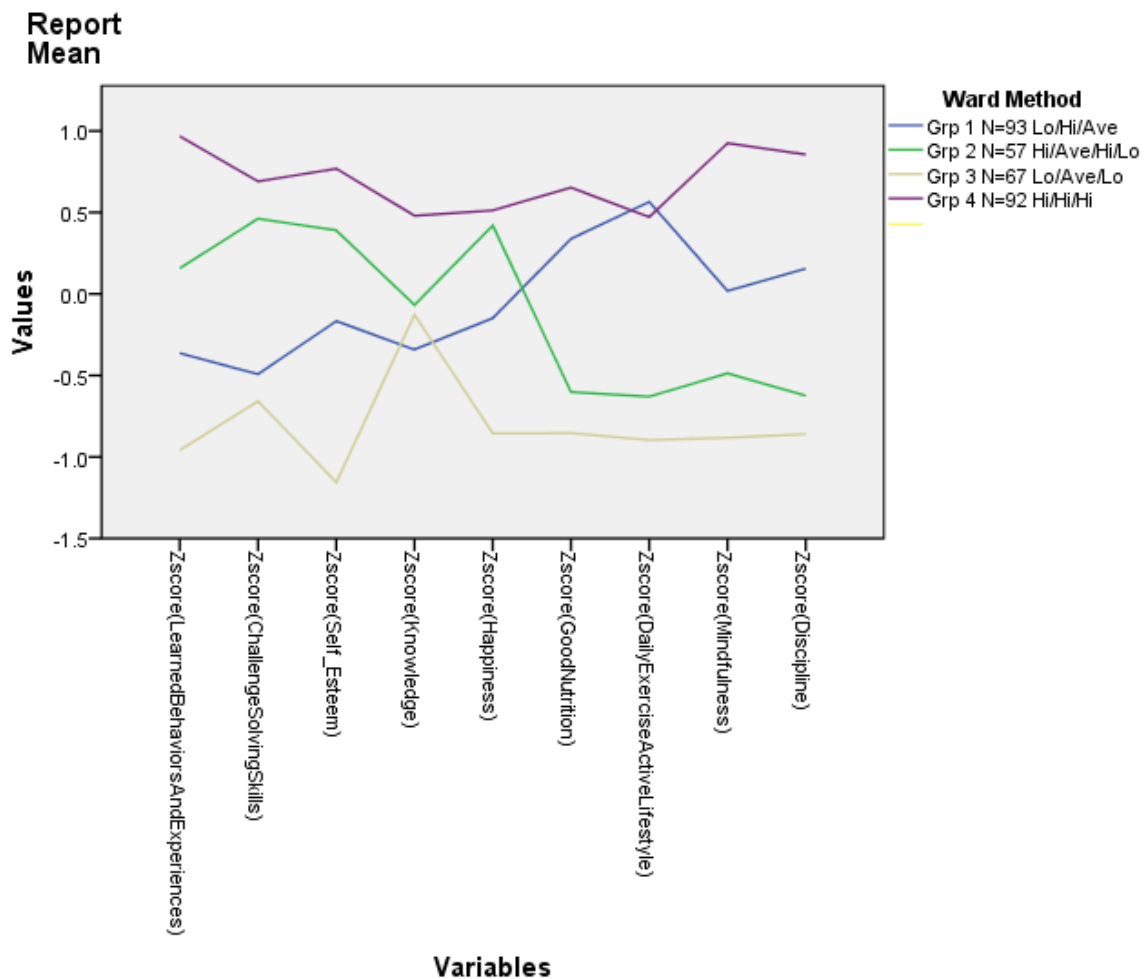


Figure 8: Line graph of cluster analysis showing “4 kinds” of healthy folks

Principle Component (PC) analysis is defined by Garbin, “‘Component’ analyses are those that are based on the full correlation matrix. ‘Principal’ analyses are those for which each successive factor accounts for maximum available variance, is orthogonal (uncorrelated, independent) with all prior factors, and full solution (as many factors as variables) accounts for all the variance.” In SPSS the correlation matrix is one way you can start a PC factor analysis.

A correlation matrix was generated for the variables, shown in Table 3.

Table 3: Correlation matrix for HPQ variables

Variable	DV	DE	CSS	M	D	SE	K	LB	GN	H
DV	1.00									
DE	.226**	1.00								
CSS	.315**	.029	1.00							
M	.229**	.267**	.129*	1.00						
D	.163**	.315**	.084	.591**	1.00					
SE	.339**	.230**	.409**	.331**	.264**	1.00				
K	.521**	.120*	.152**	.127*	.092	.158*	1.00			
LB	.399**	.162**	.666**	.374**	.322**	.417**	.217**	1.00		
GN	.394**	.595**	.077	.258**	.330**	.235**	.285**	.316**	1.00	
H	.427**	-.025	.358**	.155**	.123*	.391**	.172**	.309**	.136*	1.00

\*\* correlation is significant at the .01 level (2-tailed)

\*correlation is significant at the .05 level (2-tailed)

Key: DV=dependent variable; DE=daily exercise; CSS=challenge solving skills; M=mindfulness; D=discipline; SE=self-esteem; K=knowledge; LB=learned behaviors; GN=good nutrition; and H=happiness

The tables reviewed from the output of the PC analysis included Total Variance Explained (Table 4), Rotated Component Matrix with Varimax rotation (Table 5), and Communalities (Table 6).

**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared			
	Initial Eigenvalues			Loadings			
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	3.501	35.007	35.007	3.501	35.007	35.007	
2	1.608	16.081	51.087	1.608	16.081	51.087	
3	1.244	12.440	63.528	1.244	12.440	63.528	
4	.888	8.876	72.403				
5	.779	7.793	80.196				
6	.580	5.801	85.997				
7	.420	4.199	90.197				
8	.378	3.775	93.972				
9	.361	3.611	97.583				
10	.242	2.417	100.000				

Extraction Method: Principal Component Analysis.

Table 4: Principal component analysis total variance explained

**Rotated Component Matrix<sup>a</sup>**

	Component		
	1	2	3
Sources_Nutr_Ex_Info_C_DV_4groups	.454	.055	.717
DailyExActiveLife_4groups	-.166	.623	.471
ChallengeSolvingSkills_4groups	.826	.006	.029
Mindfulness_4groups	.273	.756	-.024
Discipline_4groups	.159	.812	-.012
Self_Esteem_4groups	.616	.330	.128
Knowledge_4groups	.190	-.079	.757
LearnedBehaviorsAndExperiences_4groups	.737	.329	.137
Good_Nutrition_4groups	-.014	.520	.656
Happiness_Creative_4groups	.663	-.050	.208

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Table 5: Principal component analysis rotated component matrix

**Communalities**

	Initial	Extraction
Sources_Nutr_Ex_Info_C_DV_4groups	1.000	.723
DailyExActiveLife_4groups	1.000	.637
ChallengeSolvingSkills_4groups	1.000	.684
Mindfulness_4groups	1.000	.647
Discipline_4groups	1.000	.684
Self_Esteem_4groups	1.000	.505
Knowledge_4groups	1.000	.615
LearnedBehaviorsAndExperiences_4groups	1.000	.671
Good_Nutrition_4groups	1.000	.701
Happiness_Creative_4groups	1.000	.486

Extraction Method: Principal Component Analysis.

Table 6: Principal component analysis communalities

Total Initial Eigenvalues from Variance Total Explained, Table 4, indicates 3 factors with  $>1.00$  total variance accounted for 68.53% of the variance in the model. The Rotated Component Matrix, Table 5, is interpreted based upon the variables that “load on” or correlate with each component. All variables were univocal in the rotated component matrix, loading on a single factor, except DV, DE, SE, and GN were multivocal variables. Inspecting the Communalities Table 6, shows nine of the variables are well accounted for with the exception of Happiness. Uncertain, why happiness was so low (.486) and noting it’s importance in the qualitative model, the researcher kept the variable in the model.

Linear Discriminant Function (LDF) analysis was performed to review the means and identify the suppressors. The standardized LDF coefficients for standardized beta weights reflect the unique contribution of each predictor to the LDF. The structure weight represented the correlation between scores on that predictor and scores on the LDF. Table 7 from the discriminant analysis for the diffuse structure based on the four groups are illustrated in the table. Looking at the bivariate results before moving on to the multivariate analysis, each of the outcome variable has significant mean differences across the groups. H, LB, SE, CSS, DE and GN show the same pattern across groups, lowest<below average<above average<highest score. D and M show a different pattern, lowest>below average<above average<highest score. When subgroups of DVs show different patterns of mean differences across groups, we expect to find that there is a diffuse multivariate structure-with different discriminating variables contributing to different between-group distinctions (Garbin, 2015).

Observing the Wilks' Lambda, Table 9, we have two significant LDFs, a diffuse structure as we anticipated from the group's mean profiles. The % of variance" values tell us that the first LDF does the bulk of the discrimination, 90.5%, and the second has a less significant contribution, 7.3%. (Table 10) Table 11 shows the structure matrix of the variables. Since the majority of the variance was in the first function, we focused on the standardized LDF coefficients in the Standardized Canonical Discriminant Function Coefficient table 12 and the structure weight in the structure matrix table 11 of only function one. The standardized LDF coefficients represent the beta weights we use with the participant's standardized predictor scores to compute their LDF score. As beta weights they reflect the unique contribution of each predictor to the LDF. Since SPSS does not provide significance tests of these beta weights, the effect size values in the +/- .3-.4 range indicating a contributing predictor. A structure weight is the correlation between scores on that predictor and scores on the LDF. Interpreting those predictors that have structure weights in the +/- .3-.4 range. Since all variables had strong bivariate relationships to the DV and other IV's, all variables were left in the model. One suppressor variable, D, bivariate  $r=.163$  (.001) and  $\beta=-.129$  (.011) was identified.

## Group Statistics

Sources Nutr Ex Info C DV 4groups		Mean	Std. Deviation	Valid N (listwise)	
				Unweighted	Weighted
lowest sources score	Happiness_Creative_4groups	2.0870	.59643	23	23.000
	LearnedBeh4groups	1.9130	.84816	23	23.000
	Knowledge4groups	1.6087	.72232	23	23.000
	SelfEsteem4groups	2.5217	.94722	23	23.000
	Discipline4groups	<u>2.6522</u>	.48698	23	23.000
	Mindfulness4groups	<u>2.6522</u>	.48698	23	23.000
	ChallSolvSkill4groups	1.7826	.79524	23	23.000
	DailyExAcL4groups	2.4348	.99206	23	23.000
	GoodNutr4groups	1.9130	.90015	23	23.000
below average sources score	Happiness_Creative_4groups	2.7273	.58075	132	132.000
	LearnedBeh4groups	2.4773	.84226	132	132.000
	Knowledge4groups	2.3182	.68035	132	132.000
	SelfEsteem4groups	3.0000	.70980	132	132.000
	Discipline4groups	<u>2.6136</u>	.50415	132	132.000
	Mindfulness4groups	<u>2.5758</u>	.56786	132	132.000
	ChallSolvSkill4groups	2.1970	.77597	132	132.000
	DailyExAcL4groups	2.5303	.96851	132	132.000
	GoodNutr4groups	2.1742	.73616	132	132.000
above average sources score	Happiness_Creative_4groups	3.0432	.60037	139	139.000
	LearnedBeh4groups	3.0000	.84270	139	139.000
	Knowledge4groups	2.8345	.55947	139	139.000
	SelfEsteem4groups	3.3597	.61393	139	139.000
	Discipline4groups	<u>2.7554</u>	.49405	139	139.000
	Mindfulness4groups	<u>2.7626</u>	.59688	139	139.000
	ChallSolvSkill4groups	2.5252	.66301	139	139.000
	DailyExAcL4groups	2.9640	.85474	139	139.000
	GoodNutr4groups	2.7698	.75485	139	139.000
highest sources score	Happiness_Creative_4groups	3.4000	.50709	15	15.000
	LearnedBeh4groups	3.4000	.63246	15	15.000
	Knowledge4groups	3.2667	.70373	15	15.000

	SelfEsteem4groups	3.4667	.51640	15	15.000
	Discipline4groups	<u>3.0000</u>	.53452	15	15.000
	Mindfulness4groups	<u>3.4000</u>	.63246	15	15.000
	ChallSolvSkill4groups	2.8000	.67612	15	15.000
	DailyExAcL4groups	3.0000	.75593	15	15.000
	GoodNutr4groups	3.0000	.92582	15	15.000
Total	Happiness_Creative_4groups	2.8544	.65079	309	309.000
	LearnedBeh4groups	2.7152	.90622	309	309.000
	Knowledge4groups	2.5437	.74000	309	309.000
	SelfEsteem4groups	3.1489	.72334	309	309.000
	Discipline4groups	2.6990	.50648	309	309.000
	Mindfulness4groups	2.7055	.60356	309	309.000
	ChallSolvSkill4groups	2.3430	.75944	309	309.000
	DailyExAcL4groups	2.7411	.93505	309	309.000
	GoodNutr4groups	2.4628	.83515	309	309.000

Table 7: Linear discriminant function based on “4 kinds” cluster analysis

Tests of Equality of Group Means					
	Wilks' Lambda	F	df1	df2	Sig.
Happiness_Creative_4groups	.808	24.220	3	305	.000
LearnedBeh4groups	.840	19.428	3	305	.000
Knowledge4groups	.725	38.605	3	305	.000
SelfEsteem4groups	.878	14.131	3	305	.000
Discipline4groups	.964	3.754	3	305	.011
Mindfulness4groups	.911	9.921	3	305	.000
ChallSolvSkill4groups	.900	11.310	3	305	.000
DailyExAcL4groups	.941	6.395	3	305	.000
GoodNutr4groups	.835	20.039	3	305	.000

Table 8: Tests of equality of group means



Wilks' Lambda				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 3	.476	223.922	27	.000
2 through 3	.911	28.031	16	.031
3	.978	6.592	7	.473

Table 9: Wilks' Lambda

Eigenvalues				
Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.915 <sup>a</sup>	90.5	90.5	.691
2	.074 <sup>a</sup>	7.3	97.8	.262
3	.022 <sup>a</sup>	2.2	100.0	.147

a. First 3 canonical discriminant functions were used in the analysis.

Table 10: Eigenvalues

Structure Matrix			
	Function		
	1	2	3
Knowledge4groups	.644*	.017	-.117
Happiness_Creative_4groups	.504*	-.056	-.504
LearnedBeh4groups	.456*	.073	.114
SelfEsteem4groups	.387*	-.166	.106
ChallSolvSkill4groups	.349*	.034	-.016
Mindfulness4groups	.224	.837*	.047
Discipline4groups	.160	.401*	.270
GoodNutr4groups	.446	.139	.786*
DailyExAcL4groups	.241	.041	.662*

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions

Variables ordered by absolute size of correlation within function.

\*. Largest absolute correlation between each variable and any discriminant function

Table 11: Structure matrix

Standardized Canonical Discriminant Function Coefficients			
	Function		
	1	2	3
Happiness_Creative_4groups	.491	-.067	-.536
LearnedBeh4groups	.254	-.365	-.061
Knowledge4groups	.652	-.037	-.219
SelfEsteem4groups	.130	-.467	.128
Discipline4groups	-.129	-.020	.147
Mindfulness4groups	.028	1.103	-.200
ChallSolvSkill4groups	.056	.361	.168
DailyExAcL4groups	.131	-.206	.209
GoodNutr4groups	.291	.190	.677

Table 12: Standardized Canonical Discriminant Function Coefficients

*Path Analysis.* Uncertain of the thread to connect the variables based on initial EFA, Path Analysis (PA) was utilized to distinguish direct and indirect paths of relationships among the predictors. PA helps visualize the when of a variable. When a variable is manifested or when the variable comes into being for that participant (Garbin, 2015). The order of the variables and mediating variables are based on the simple path regression analysis, bivariate correlations and CFA. PA can evaluate the contribution of any path or combination of paths to the overall fit of that structural model and help identify sources of suppressor effects (indirect paths) (Garbin, 2015). Using the correlation matrix and syntax statements, multiple regression analysis was applied to each variable to determine which may be direct and/or indirect. LDF identified D as a suppressor variable. A full model (Figure 9) based on the qualitative theory was designed, then trimmed to a hypothesized model. Testing the hypothesized model (Figure 10) involves comparing how well it fits the data compared to how well the full model fits

the data (Garbin, 2015). The test of the models actually tests the average contribution of the predictors being deleted from the model, so results from dropping several predictors can be uninformative or misleading. Using the path Q computator fit of the full model, fit for the reduced model, the summary statistic ( $Q=.7396997$ ) showing the relative fit of the reduced model to the full model, and the significance test to compare the fit of the two models  $W=-90.15167$ .  $W$  is distributed as  $X^2$  with  $df = d$ , number of paths deleted. For this analysis  $X^2(df=10, p=.05) = 18.307$ . We concluded that the reduced model does not fit the data as well as the full model.

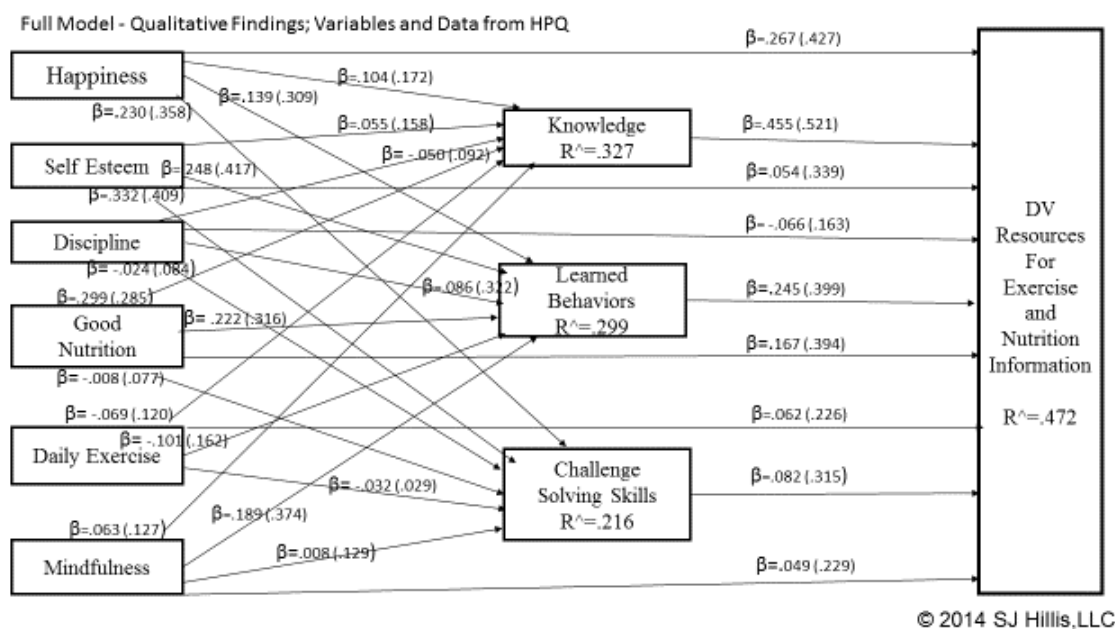


Figure 9: Path Analysis; full model of qualitative model design with variables and data from HPQ

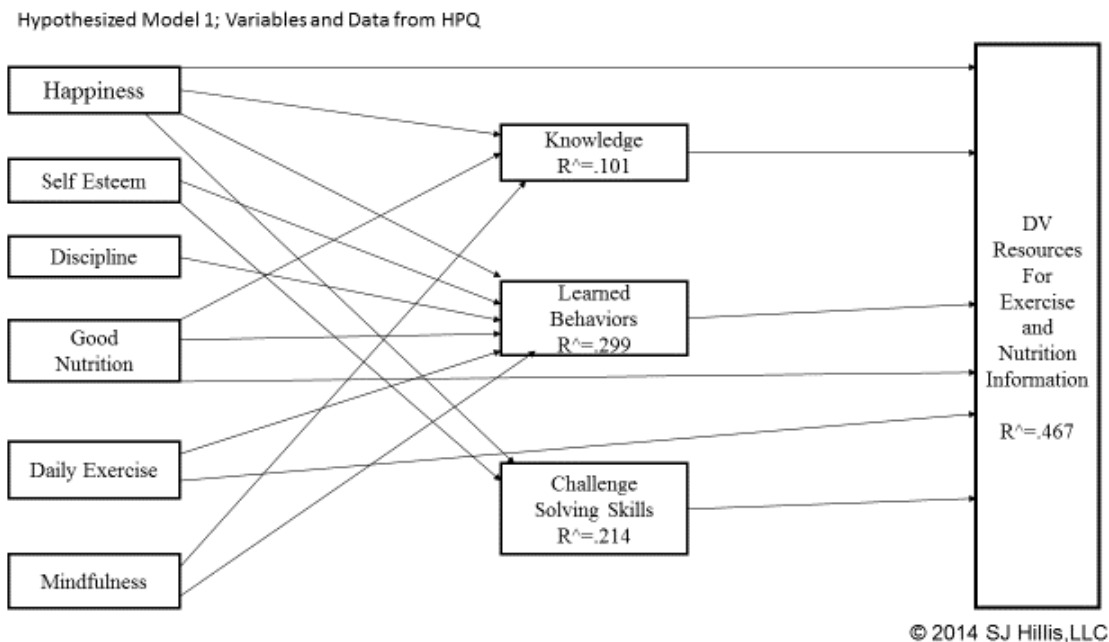


Figure 10: Hypothesized Model 1; variables and data from HPQ

Next, the researcher proposed a Post Hoc model (Figure 11). Rearranging the I.V.'s we capture more variance in this model and would suggest further exploration deleting paths to clarify the interconnectedness of the variables.

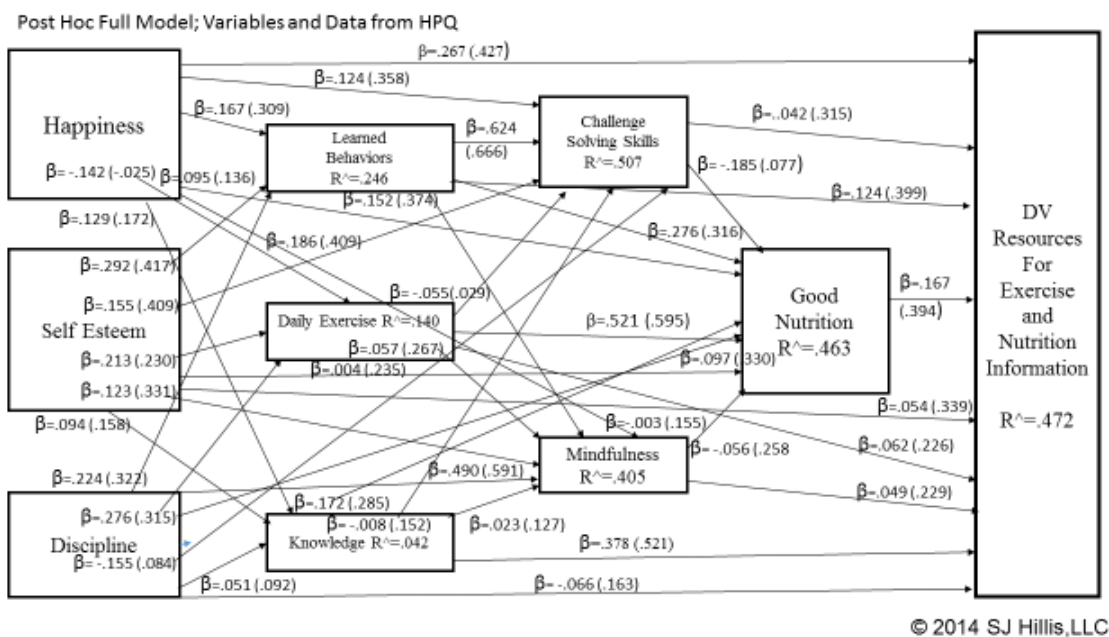


Figure 11: Post Hoc Path Analysis Model 1; variables and data from HPQ

A brief summary of the results from the HPQ criteria questions and nutrition and exercise sources are represented in bar graphs and tables in appendices T-AA.

Returning to the quantitative research questions we now develop research hypothesis to test the variables taken from model with data collected on the survey. Determining the kind of variables, qualitative or quantitative representing the data helps determine the appropriate statistical tools to use in data analysis. The research questions for this study all involve quantitative variables, therefore a series of correlations were used to test the research hypotheses.

RQ 1: Do the characteristics of mindfulness, discipline, self-esteem and happiness describing a healthy population affect their decision making process when seeking nutrition and exercise information?

H0: The characteristics of mindfulness, discipline, self-esteem and happiness describing a healthy population are NOT related to their decision making process when seeking nutrition and exercise information.

RH: The characteristics of mindfulness, discipline, self-esteem and happiness describing a healthy population are related to their decision making process when seeking nutrition and exercise information.

RQ 2: Do prior learning experiences, our own knowledge or challenge solving skills affect the choices when seeking nutrition and exercise information?

H0: Prior learning experiences, our own knowledge or challenge solving skills are not related to the resources when seeking nutrition and exercise information?

RH: Prior learning experiences, our own knowledge or challenge solving skills are related to the resources when seeking nutrition and exercise information?

RQ3: Does daily exercise (active lifestyle) and good nutrition (limited processed foods) affect resources for nutrition and exercise information?

H0: Daily exercise and good nutrition are NOT related to resources for nutrition and exercise information.

RH: Daily exercise and good nutrition are related to resources for nutrition and exercise information

## **Chapter 5: Discussion and Implications for Practice**

Overall, the findings and results from the qualitative and quantitative phases in this research reflect an association between characterological traits, decision-making processes and resources for nutrition and exercise information in a healthy population. The use of exploratory factor analysis led us to Using Path Analysis we explored the temporal precedence of the independent variables, and illustrated a post hoc model for further exploration.

### **Phase I: Qualitative Grounded Theory Summary**

An interpretive constructivist approach utilizing interviews from eight participants (N=8), as well as, five days of their exercise and food logs generated rich data exploring the information-seeking process, characterological traits, and sources of nutrition and exercise information in a criteria specified healthy population. Using a grounded theory approach the PI was able to develop a theoretical model (Figure 12) that refines and advances the understanding of this information seeking process. The findings help fill a gap in existing literature related to a criteria specified healthy population and how and where they seek nutrition and exercise information. In addition, the emerging themes were utilized in development of a new instrument.

### **Phase II: Instrument Development Summary**

Lacking a tool to quantify how and where a criteria specified healthy population acquires nutrition and exercise information, development of an instrument was critical to this study. The grounded theory developed in phase I was built into a survey for collection of data from a national sample. Using forced response questions prior to the survey items, helped identify a healthy population as specified by the researcher's criteria

for this study. The use of Qualtrics services facilitated data collection in a professional and timely manner. The internet administered survey yielded three hundred and nine (N=309) completed responses over four days of live collection from across our nation. Requested stratifications were met for geography, gender and age.

### **Phase III: Quantitative Summary**

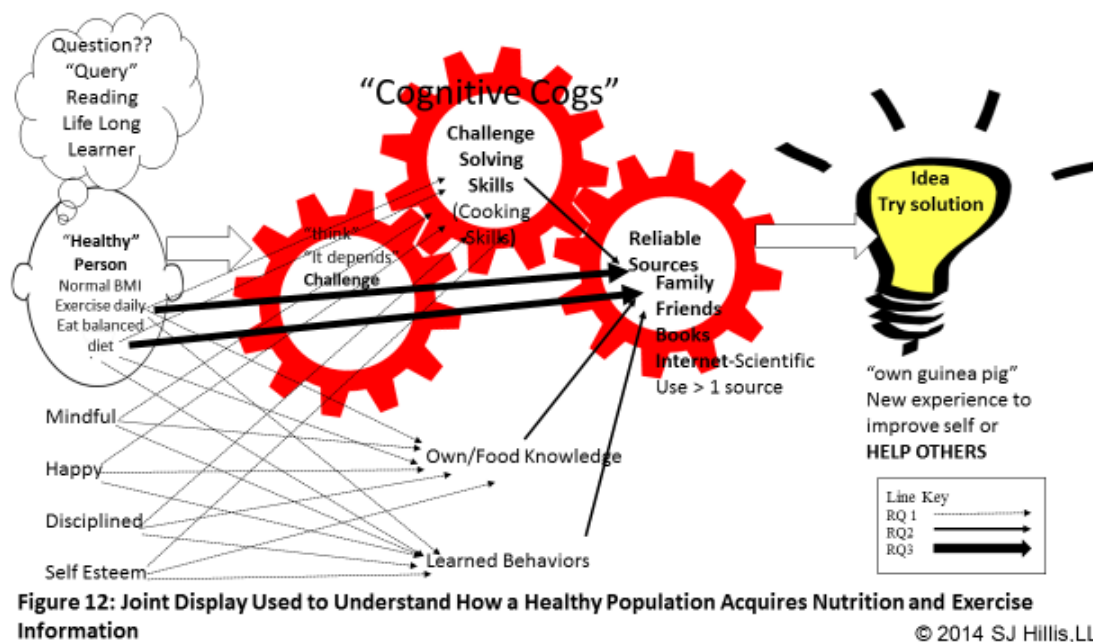
Exploratory factor analysis became a key tool for the researchers to become familiar with the data. Cluster analysis indicated four kinds of respondents based on the factors in our survey results. Principle component analysis guided the researcher into retaining all independent variables, mindfulness, self-esteem, discipline, happiness, challenge solving skills, learned behaviors, and knowledge in our model. The dependent variable for this study was sources of nutrition and exercise information. Through path analysis we attempted a hypothesize model, as fit as full models, but were not successful. A post hoc path analysis model was suggested to continue to explore the HPQ data. Using bivariate Pearson's correlations we found a significant relation between the characterological traits and the decision-making process, as hypothesized in research question one. Research question two inquired if there was a relationship between the decision-making process and the resources a healthy population utilized when seeking exercise and nutrition information. Again, a significant association was found. And finally, research question three questioned the relationship between sources of nutrition and exercise information and good nutrition-daily exercise. The results support the research hypothesis that good nutrition and daily exercise are related to the sources of nutrition and exercise information in this study.



#### **Phase IV: Mixed Method Inference**

Once analysis is completed, making an assessment of how the information addresses the mixed methods question in the study is called inference in mixed methods research. At this phase in a mixed method study, Creswell (2011) encourages the researcher to step back from the detailed results and advancing their larger meaning in view of the research problems, questions in a study, the existing literature, and perhaps personal experiences.

Employing a mixed methods approach strengthened both research paradigms by refining and expanding the qualitative grounded theory through a rich, deep understanding, then constructing a quantitative instrument to test the theory with a larger sample from the healthy population. The mixed method joint display consists of the quantitative path analysis and qualitative theoretical models depicting the characterological traits, challenge solving processes, and sources of information (Figure 12). The diagram expresses the “echo” of findings and results, reiterating the complexity and association of the factors surrounding the understanding of how a healthy population acquires exercise and nutrition information.



## Limitations

This study was a first attempt at developing an instrument to quantify the nutrition and exercise information seeking process for a healthy population. Therefore, replication and convergence with other similar studies would be helpful. The quantitative interviews were collected over nine months, over half of the participants were recording food and exercise logs during the winter months which could have impacted the information. Due to the schedule of the PI, some of the second interviews were months after the first interview. Having a single coder on interviews and qualitative data may have limited theme development. A little difficulty was experienced in the limitation on information extracted from the survey. Due to the nature of data collection on multiple multiple answer questions, we were unable to gain full benefit from these items. Unable to recruit more culturally diverse participants may have limited the generalizability of the information. Since this study was self-funded, the budget available was limited. Novice research skills of the PI may limit full extraction of findings from this study. The PI

acknowledges fitting the criteria of a healthy population, therefore some information may have been included with unknown bias.

## **Conclusions**

In conclusion, the information presented in this study advances our understanding of not only the characterological traits, process and sources of nutrition and exercise seeking information, but the complexity, interconnectedness, and relationships of these concepts. Interested in creating the most complete story of the lifestyle of a healthy population, this research provides a substantive study using Mixed Methods research to achieve this goal. This study is a transformation of knowledge that warrants future research, as well as replication and convergence with additional studies.

## **Future Research**

Studying the synergy of good nutrition and daily exercise related to challenge solving skills and information-seeking behavior warrants further investigation because it seems to have the potential to provide useful insights for both inquiry and practice. As mentioned earlier and highlighted here, replication and convergence will strengthen these findings and probably reveal more information about all aspects of this concept. On the data gathered from this study, further analysis to uncover post hoc path analysis to fit the data. Additional research on the cluster analysis to provide more information about this unique population. Comparing this study on a healthy population to other populations. Further research on all variables and their interactions. Exploring non-linear relationships of the variables presented in this study will help develop the most complete picture of this phenomenon as represented by multiple regression or path analysis. Within the healthy population, study the association of foods to wellness, circadian neurobiology, dietary

patterns and foods associated with brain health, fermented foods associated with microbiome and the concept of psychobiotics. Studies including gender differences within the healthy population. Additional longitudinal studies stemming from this research. Intervention programs and psychometric tools focusing on changes in lifestyle to include the concepts of good nutrition and daily exercise to empower individuals to control their choices and decision-making process.

## Appendix A

## Food, Beverage, Supplement, Vitamin Intake Log

Date:

Hours of Sleep:

Time of Day:

Food/Supplement/Vitamin:

Amount:

Beverage:

Amount:

Time of Day:

Food/Supplement/Vitamin:

Amount:

Beverage:

Amount:

Time of Day:

Food/Supplement/Vitamin:

Amount:

Beverage:

Amount:

Time of Day:

Food/Supplement/Vitamin:

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Beverage:

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Time of Day:

Food/Supplement/Vitamin:

Amount:

Beverage:

Amount:

Time of Day:

Food/Supplement/Vitamin:

Amount:

Beverage:

Amount:

Time of Day:

Food/Supplement/Vitamin:

Amount:

Beverage:

Amount:

Comments:

## Appendix B

Exercise Log  
Date

Type of Exercise-1:  
Time of Day:  
Time Exercising:  
Distance:  
Intensity: Easy/Moderate/Hard/Very Hard  
Overall feeling:  
Comments:

Type of Exercise-2  
Time of Day:  
Time Exercising:  
Distance:  
Intensity: Easy/Moderate/Hard/Very Hard  
Overall feeling:  
Comments:

Type of Exercise-3:  
Time of Day:  
Time Exercising:  
Distance:  
Intensity: Easy/Moderate/Hard/Very Hard  
Overall feeling:  
Comments:

Type of Exercise-4:  
Time of Day:  
Time Exercising:  
Distance:  
Intensity: Easy/Moderate/Hard/Very Hard  
Overall feeling:  
Comments:

Type of Exercise-5:  
Time of Day:  
Time Exercising:  
Distance:  
Intensity: Easy/Moderate/Hard/Very Hard  
Overall feeling:  
Comments:

Type of Exercise-6:  
Time of Day:  
Time Exercising:  
Distance:  
Intensity: Easy/Moderate/Hard/Very Hard  
Overall feeling:  
Comments:

## Appendix C

### Grounded Theory Article Critique Checklist\*

#### General:

- ☐ Explain that qualitative research will be used
- ☐ Provide a rationale for why qualitative research is well-suited for studying the research problem (e.g. participant views, context, complex understanding, lack of knowing variables, capture voices)
- ☐ Define grounded theory
- ☐ Justify use of grounded theory
- ☐ Discuss specific grounded theory approach (e.g. Glaser & Strauss, 1967; Glaser, 1978; Corbin & Strauss, 1990; Clarke, 2005; Charmaz, 2006)
- ☐ Discuss the role of literature

#### Qualitative data collection methods:

- ☐ Discuss the site that will be studied
- ☐ Identify permissions that have been granted (include something about IRB permissions)
- ☐ Indicate how participants will be recruited to the study
- ☐ N of participants
- ☐ Discuss use of theoretical sampling
- ☐ Demographics of participants
- ☐ Indicate how participants will benefit from study (reciprocity)
- ☐ Indicate types of data to be collected (e.g. interviews, observations)
- ☐ Indicate extent of data collection
- ☐ Mention use of protocols (e.g. interview, observations, records) used to record the data
- ☐ State research questions that will be asked (if interviews)

#### Data analysis methods:

- ☐ Discuss preparing the data (transcriptions)
- ☐ Indicate general procedure of data analysis (reading through data and memoing, coding the data, description, developing themes, interrelating the themes)
- ☐ Indicate specific details of data coding procedures (e.g. open, axial, selective, etc.)
- ☐ Discuss the use of qualitative data analysis software to help analyze the data (e.g. Atlas.ti, MAXqda, etc.)
- ☐ Discuss use of multiple coders (i.e. intercoder agreement) if used in the study and how this process was accomplished with % agreement
- ☐ Discuss validity strategies (e.g. member checking, triangulation, negative case analysis, peer audit, external audit, immersion in the field)
- ☐ Discuss reflexivity – how researchers' experiences and role will influence the interpretation of findings
- ☐ Discuss saturation of the data

#### Outcome:

- ☐ Describe the results in narrative, rather than numerical format (e.g. themes)
- ☐ Allow grounded theory to emerge from the data
- ☐ Outline how well research goal was met

\*Adapted by Manijeh Badiiee from Checklist for Writing a Qualitative Methods Section for a Journal Article or Proposal for Extramural Funding (prepared by Dr. John Creswell, April 21, 2008) and Research Articles Critique, Evaluation, and Presentation (Dr. Wayne Babchuk, Strategies of Social Research: Qualitative Methods 407/807 syllabus, Spring 2009).

## Appendix D:

## INTERVIEW PROTOCOL/QUESTIONS: HEALTH INFORMATION RESOURCES

Day and Date: \_\_\_\_\_

Location: \_\_\_\_\_

Interviewer: \_\_\_\_\_

Interviewee: \_\_\_\_\_

Time of Interview: Start \_\_\_\_\_ End \_\_\_\_\_

Thank you for agreeing to meet with me (us) today for this interview. Qualitative researchers often view the interview process as a focused conversation about the central phenomenon of interest they are studying. I (we) intend for this interview to be a conversation and want you to feel comfortable throughout our meeting and feel free to ask questions as we go. Before we get started with a few demographic questions, we need to go over the informed consent form and have you sign it. As you are aware, this form provides some basic information as to how we will proceed, what the study is about, our role, my role, etc...

*Review Informed Form/Sign* **Do you have any questions before we move forward and record our conversation?**

*Turn On Tape Recorder*

**To start with, will you please answer a few broad demographic questions about yourself and your educational background?**

**Current job position?**

**How long in present position?**

**What is your highest level of education?**

**What field(s) is (are) your academic degree(s) in?**

**Age?**

**Gender?**

**Ethnic Background?**

**Would you describe your current health as excellent, average, or poor?**

### **Interview Questions**

#### **Initial Questions**

1. When you have an inquiry about nutrition or health information, tell me how you look for an answer to your question(s)?
  - Probe 1: Give me an example?
  - Probe 2: How do you use this information?
  - Probe 3: How satisfied are you with information from a single source?
  - Probe 4: If conflicting information is found, how do you interpret the information?
2. Throughout your lifetime, what sources have you utilized for this information?
  - Probe 1: How do you feel about the quality of the resources available today?
  - Probe 2: Describe how anything or anyone has influenced your choices?
  - Probe 3: Which source(s) do you feel have been the best?
3. What are the major challenges you face when using these resources?
  - Probe 1: How do you use information from more than one source?
  - Probe 2: How do you identify reliable sources?



## Appendix E

May 16, 2014

Sally Hillis

Department of Nutrition and Health Sciences

Wayne Babchuk

Department of Anthropology

903 OLDH, UNL, 68588-0368

IRB Number:

Project ID: 13706

Project Title: Nutrition and Exercise Information Resources of Healthy Population

Dear Sally:

The Institutional Review Board for the Protection of Human Subjects has completed its review of the Request for Change in Protocol submitted to the IRB.

1. It has been approved to recruit an additional 20-30 participants for the study.

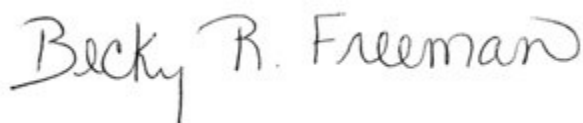
We wish to remind you that the principal investigator is responsible for reporting to this Board any of the following events within 48 hours of the event:

- \* Any serious event (including on-site and off-site adverse events, injuries, side effects, deaths, or other problems) which in the opinion of the local investigator was unanticipated, involved risk to subjects or others, and was possibly related to the research procedures;
- \* Any serious accidental or unintentional change to the IRB-approved protocol that involves risk or has the potential to recur;
- \* Any publication in the literature, safety monitoring report, interim result or other finding that indicates an unexpected change to the risk/benefit ratio of the research;
- \* Any breach in confidentiality or compromise in data privacy related to the subject or others; or
- \* Any complaint of a subject that indicates an unanticipated risk or that cannot be resolved by the research staff.

This letter constitutes official notification of the approval of the protocol change. You are therefore authorized to implement this change accordingly.

If you have any questions, please contact the IRB office at 472-6965.

Sincerely,



Becky R. Freeman, CIP  
for the IRB



## Appendix F



COLLEGE OF EDUCATION AND HUMAN SCIENCES

Department of Nutrition &amp; Health Sciences

## INFORMED CONSENT FORM

IRB# 20130913706EX

**Title of Project:**

Nutrition and Exercise Information Resources of the Healthy Population.

**Purpose of the Research:**

The purpose of this qualitative research is to develop a theory explaining the process by which individuals acquire health-related information, specifically in the areas of nutrition and exercise. This research is to assist educators in designing and facilitating curriculum. Participants must have a self-reported BMI ranging between 18.5-24.9 kg/m<sup>2</sup>, moderate exercise a minimum of one hour each day, and eat a healthy well-balanced diet. You must be at least 19 years of age or older to participate.

**Procedures:**

Participation in this study will require approximately 5 hours of your time. You will be asked to complete an interview protocol, food and exercise diaries, and a semi-structured interview. The interview will be audio taped. The interview will take place in location of your choice. You may be contacted a second time if clarification is needed, which may require up to an additional one hour of your time. You may also be presented with the transcript from your interview.

**Risks and/or discomforts:**

There are no known risks to participating

**Benefits:**

There are no direct benefits to participants, but information gained may be used to develop curriculum to assist with the process of acquiring health information.

**Confidentiality:**

Information about who participated will be kept confidential by the researchers. Any identifying information obtained from the interviews will be de-identified and will only be reported in aggregate form. Random pseudonyms selected by the PI will be used on transcripts, exercise and food logs to protect participants and keep information confidential. Results may




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 COLLEGE OF EDUCATION AND HUMAN SCIENCES

Department of Nutrition &amp; Health Sciences

also be published in scientific journals or conferences. Audio tapes and transcripts will only be available to the researchers.

### **Opportunity to Ask Questions:**

You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the study. You may contact the primary investigator at any time by contacting Sally Hillis at [sjhillis@huskers.unl.edu](mailto:sjhillis@huskers.unl.edu) or 402-560-2052. You may also direct questions about being a research participant to the University of Nebraska-Lincoln Institutional Review Board at 402-472-6965.

### **Voluntary Participation and Freedom to Withdraw:**

Your participation in this study is completely voluntary. You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the investigators or the University of Nebraska.

### **Consent, Right to Receive a Copy:**

You are voluntarily making a decision whether or not to participate in thesis research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form to keep.

\_\_\_\_\_ Check if you agree to be audio taped during the interview.

### **Signature of Participant:**

\_\_\_\_\_  
Signature of Research Participant

\_\_\_\_\_  
Date

### **Name and Phone number of investigator(s)**

Sally Hillis, Principal Investigator 402-560-2052

Wayne Babchuk, Secondary Investigator 402-472-7942

## Appendix G

Characterological traits	Memo or in vivo code	Item
mindfulness	<p><i>I have to exercise more and eat less and be more mindful about what I eat.</i></p> <p><i>She was just trying to be very mindful about keeping her heart healthy.</i></p> <p><i>The last three or four years I've been more cognizant about looking at the labels.</i></p> <p><i>...she's more conscious about her food choices.</i></p>	Items with “consciously” and pertaining to personal questions, i.e. weighing self
Happy	<p><i>They seem to be happy about the meals they cook, it doesn't seem to be stressful.</i></p> <p><i>I know that I'm in a good mood, I am happy.....</i></p>	Do you consciously think you are a happy person?
Self-esteem	<p><i>I want to hold myself accountable ...I feel better when I do those things.</i></p>	Ranking current health and for how long. Compliments from your friends make you feel uneasy. Proud of yourself.
Disciplined	<p><i>One of the most important things is discipline. I think I have to be able to discipline myself to eat the right foods and get the right exercise.</i></p>	Would your friends say you're disciplined?
Population criteria -exercise	<p><i>I do exercise on the weekends, but usually just one of the days.</i></p> <p><i>I try to exercise at 85% of my maximum heart rate and that's 220 minus my age, and then 85% of that.</i></p> <p><i>I exercise to a pint of complete exhaustion.</i></p>	Block one items, criteria to participate in survey. Item for types of exercise.
-healthy diet	<p><i>Everything else is after exercise. That's number one with me. I exercise every morning.</i></p> <p><i>I guess my biggest thing is you just start eating whole foods. If it's in a package avoid it. If it's in its real state, real form eat it, start there.</i></p>	Items about fruits, vegetables, beverages, snacks, family meals, different types of foods.

## Appendix H

Try solution/implementation	Memo or in vivo code	Item
New experience	<i>I guess I'm also willing to be kind of my own guinea pig and try some things out on my own. And not do things that are harmful to my health.</i>	Items asking new foods, cooking techniques.
Lifelong learner	<i>I've always been interested in nutrition and what I eat, so when someone asks me a question I have an opinion because I've been studying it all my life. The answer is on my experience and what I've learned throughout my lifetime.</i>	Life rewarding. Prior knowledge. Own knowledge.
Help others	<i>I also need to practice what I preach, I need to be a good example for them. ...to encourage them all the time to surround yourself with healthy people and be a good example for your children. Most people want to do the right thing.</i>	Trustworthy. Good listener.

## Appendix I

Challenge-solving skills	Memo or in vivo code	Item
Experience	<i>The things that sound too good to be true probably are. ...it's a value system isn't it? You know it's what do you value? Do you value maintaining good health or do you value how you look? ....I do worry that everything is fast food...I think we as American's are on the cusp of not taking very good care of ourselves, because of the way we eat.</i>	Items comparing to others, ie watching TV, education, intuition, trying new foods. Celebrity influence.
Knowledge	<i>I will reference sources from publications I read... Because questions in my mind, it's about the validity about what I'm seeing and reading. I wish I would have known then what I know now...that's part of like, definitely, so that's why you pass it on and share it with other people.</i>	Items about probiotics, low glycemic index, and fast food. Items asking information sources.
Learned behavior	<i>Goal setter. So, I guess I always try to play devil's advocate a little bit. Look at the other factors that could maybe come in and make that...conflict so it's not always a straight path.</i>	Miss appointments. Absent from school or work. Items asking about routine. Volunteer.
Cooking skills	<i>Yes, I do have lots of cookbooks. I have sticky notes or fold the corner...I kinda know where my "go tos" are I happen to take time to cook and I take time to do exercise.</i>	Self-assessment, magazine choices, sources of information
More than one source	<i>The challenge is deciphering which is the best source...but then sometimes you get conflicting information...then it's hard to decipher what's right and what's not.</i>	Items asking finding information from more than one source.
Reliable sources	<i>People who I know who live healthy lifestyles also and see what they do. My mother, cookbooks, and interesting articles in the paper.</i>	

## Appendix J

### Healthy Population Questionnaire

Q145 This survey consists of two parts. The first part explains the purpose of the survey and includes criteria questions to help us identify the target population. After completing the question about your age, the first set of questions are quickly analyzed. The next screen will either be brief instructions for the remaining questions or a note ending the survey.

Q143



Q140 INFORMED CONSENT FORM

IRB#20150915606 EX

Title of Project: Nutrition and Exercise Information Resources of the Healthy Population.

Purpose of the Research: The purpose of the research is identify key factors that shape a healthy lifestyle, specifically in the areas of nutrition and exercise. This research is to assist educators in designing and facilitating curriculum. Participants must have a self-reported BMI ranging between 18.5-24.9 kg/m<sup>2</sup>, on average moderate exercise a minimum of one hour each day, and eat a healthy well-balanced diet. You must be at least 21 years of age or older to participate.

Procedures: Participation in this study will require approximately 10-15 minutes of your time. You will be asked to complete a web-based survey.

Risks and/or discomforts: There are no known risks or discomforts associated with this research.

Benefits: There are no direct research benefits to participants. Qualtrics is responsible for compensating you with reward points for your completion of this survey.

Confidentiality: Information about who participated will be kept confidential by Qualtrics. Any identifying information obtained from the survey will be de-identified by Qualtrics and will only be reported to the investigators in aggregate form. No data will be identified with name or other personal identifiers. A number will be used when reporting the data. The electronic records and data will be stored on Qualtrics secure servers. The project records will be kept for 5 years. Results will be reported in Primary Investigator's dissertation and may also be published in scientific journals or presented at scientific conferences.

Opportunity to Ask Questions: You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the study. You may contact

the primary investigator at any time by contacting Sally Hillis at sjhillis@earthlink.net or 402-560-2052. You may also direct questions about being a research participant to the University of Nebraska-Lincoln Institutional Review Board at 402-472-6965.

**Voluntary Participation and Freedom to Withdraw:** Your participation in this study is completely voluntary. You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the investigators or the University of Nebraska.

#### Consent, Right to Receive a Copy

You are voluntarily making a decision whether or not to participate in this research study. By completing the survey, your consent to participate is implied. You may wish to print a copy of this form for your records.

Q141 By checking yes, you understand and accept the articles in the above informed consent form, IRB #20150915606EX, and wish to voluntarily participate in the Nutrition and Exercise Information Resources of the Healthy Population by completing the Healthy Population Questionnaire.

- ☐ yes (1)
- ☐ No (2)

If No Is Selected, Then Skip To End of Block

#### Q1 Calculate BMI (Body Mass Index)

(The PI built a BMI computator into the HPQ; first height was selected, then weight. If BMI was < or > than normal BMI, "end of survey" appeared.)

Height in inches\_\_\_\_\_

Weight in pounds\_\_\_\_\_



Q2 How often do you consciously exercise each day? (some examples of exercise are walking, jogging, running, biking, gym workout, yoga, golfing, playing tennis, roller blading, throwing a Frisbee, gardening, mowing, sweeping, etc...)

Q3 On average, for how long do you exercise each day? (total time for all exercise throughout the day)

Q4 Do you eat balanced meals? (eating a variety of foods from most food groups)

Q137 Current Age in Years

Q139 Read each of the following statements or questions carefully. Each statement or question is followed by a number of answer options. After reading each statement or question carefully, choose the option or options which most applies to you. Each statement or question requires an answer before survey is considered a completed survey.

Q136 Which State do you currently live in?

Q11 Gender

Q6 Population of the community you reside in?

Q21 Do you exercise with a family member?

Q22 Do you consciously exercise to exhaustion?

Q23 Do your friends describe your lifestyle as active

Q24 Do you consciously take time each day to take care of yourself?

Q25 Do you perspire when you exercise?

Q26 Do you participate in exercise classes?

Q27 Do you wear a mobile device while exercising?

Q7 Do you live on a farm?

Q8 Do you live in a rural community?

Q9 Do you live in a suburban area?

Q10 Do you live in an urban area?

Q12 Ethnicity-Heritage

Q13 Education- What is the highest degree or level of school you have completed?

Q14 Field of Study

Q15 Current Marital Status

Q138 Average number of hours of sleep per night?

Q16 How would you describe your current health? (please mark the slide with 1 indicating poor health and 9 being excellent health)

Q147 How many years has your current health been the level you choose in the previous question?

Q148 When you exercise, what do you usually do? (check all that apply)

Q17 How often do you not feel well?

Q18 How often do you miss appointments?

Q19 How often are you absent from school or work?

Q20 Do you exercise with a friend(s)?

- Q28 How do you feel after you exercise? (Mark all that apply)
- Q29 How often do you make time for physical activities?
- Q30 How often do you make time to be with friends?
- Q31 Do you exercise outdoors?
- Q32 Would your friends say you're disciplined?
- Q33 Do you consciously think you are a happy person?
- Q34 When you wake up in the morning, do you feel rested?
- Q35 Does your alarm clock wake you up?
- Q36 Do you work outdoors?
- Q37 Do you get up the same time each day?
- Q38 Are you hungry when you wake up in the morning?
- Q39 Do you exercise in the morning?
- Q40 Do you exercise in the evening?
- Q41 Your friends would say you're dependable.
- Q42 Compliments from your friends make you feel uneasy.
- Q44 Would your friends say you're trustworthy?
- Q45 Do you feel that life is very rewarding?
- Q46 Would your friends say you're a good listener?
- Q47 How often do you do things as well as other people?
- Q48 Do you think you laugh a lot?
- Q49 How often do you feel proud of yourself?
- Q50 Do you eat balanced meals (eating a variety of foods from all food groups)?
- Q51 Do you find it easy to make decisions?
- Q52 How often do you feel useless?
- Q53 Do you eat meals with your family?
- Q54 Do you eat meals with friends?
- Q55 Do you eat meals with colleagues?
- Q56 Do you eat fruit (fresh, frozen, canned, or dried)? (1 serving is approximately 1/2 cup)
- Q57 Do you eat vegetables (fresh, frozen, canned or dried)? (1 serving is approximately 1/2 cup)

- Q58 Would your friends say you're a good Listener?
- Q59 Do you have favorite foods and recipes you cook?
- Q60 How many servings of fruits and vegetables do you eat each day? (approximately 1/2 cup is 1 serving)
- Q61 How often do you eat chips or snacks?
- Q62 Which of the following chips or snacks do you eat? (mark all that apply)
- Q63 Do you consume alcoholic beverages?
- Q64 Which of the following sodas do you drink? (mark all that apply)
- Q65 How many sodas do you consume? (1 is equal to 12 ounces)
- Q66 Do you drink tea (hot or iced)?
- Q67 Do you eat fresh fruit for a snack or with a meal? (one serving is approximately 1/2 cup)
- Q68 Do you eat nuts or nut butters for a snack or with a meal? (1 serving is 1/3 cup nuts or 2 tablespoons nut butters)
- Q69 Do you eat foods with a low glycemic index?
- Q71 Which of the following do you eat? (mark all that apply)
- Q72 Do you drink juice?
- Q73 Which of the following juices do you drink? (mark all that apply)
- Q74 How many total servings of water and liquid beverages, do you drink per day? (a serving is approximately 8 ounces)
- Q75 Do you consciously eat a leafy green salad?
- Q76 How often to you eat an egg?
- Q77 How often do you eat or drink foods containing probiotics?
- Q78 Do you consciously read the nutrition facts label on foods?
- Q79 Do you work in a garden?
- Q80 Do you consciously weigh yourself on a daily basis?
- Q81 Do you consciously know when you have eaten too much?
- Q82 How often do you eat fast food?
- Q83 Do you feel good when you cook?
- Q84 Do you eat faster than most people?
- Q85 When you were growing up, did you eat meals while watching T. V.?

Q86 When you are served a larger portion of food than you usually eat, do you continue to eat even after you are full?

Q87 Do you consciously know when something is bothering you?

Q88 Do you remember what and when you ate each day?

Q89 Do you record your exercise each day?

Q90 Do you consciously know when your weight fluctuates?

Q91 Do you consciously plan your snacks each day?

Q92 Do your thoughts wander when you are exercising?

Q93 Do food advertisements make you want to eat?

Q94 Do programs or movies showing actors snacking or food scenes make you want to eat?

Q95 Mark all the responses which best describes you:

Q96 Which of the following foods do you eat or drink? (mark all that apply)

Q97 Do you arrive at appointments later than scheduled?

Q98 Do you consciously use your education to answer your nutrition questions?

Q99 Do you consciously use your education to answer your exercise questions?

Q100 Do you consciously use your intuition to answer your exercise and nutrition questions?

Q101 Does looking for nutrition information on the Internet confuse you?

Q102 Does looking for exercise information on the Internet confuse you?

Q103 Do you feel good when you cook for others?

Q104 Do you feel good when you help others?

Q105 Do you consciously look at the price of food when you shop for groceries?

Q106 Do you buy your food at a farmer's market (when in season)?

Q107 Do you like to cook new recipes?

Q108 Are you satisfied with nutrition information from a single source?

Q109 Are you satisfied with exercise information from a single source?

Q110 Do you like to try new foods?

Q111 Which popular magazines do you enjoy reading? (mark all that apply)

Q112 Do you enjoy watching T.V. shows (programs)?

Q113 Do you smoke?

- Q114 Do your friends live healthy lifestyles?
- Q115 Do your friends smoke?
- Q116 Are you a volunteer?
- Q117 Do your friends drink alcohol?
- Q118 Do celebrities influence your decisions?
- Q119 Do your friends offer you advice when you have a question about health concerns?
- Q120 Does your family offer you advice when you have a question about health concerns?
- Q121 Do you use the library or library website to find exercise and nutrition information?
- Q122 Do you find reliable information on blogs?
- Q123 Have you learned information about nutrition from your parents or a family member?
- Q124 Have you learned information about exercise from your parents or a family member?
- Q125 Do you find reliable information through social media (twitter, Facebook, Pinterest, etc...)?
- Q126 Do you try new foods to "see what they are like" before recommending to a friend or family member?
- Q127 Do you try new cooking techniques to improve the flavor of food?
- Q128 Would you eat a "cricket bar" (a snack bar with insects as part of the ingredients) to consume more protein?
- Q129 Do your friends describe you as a lifelong learner?
- Q130 Do you use your prior knowledge to help you find solutions?
- Q131 Do you take any of the following vitamins? (mark all that apply)
- Q132 Do you take medication for any of the following conditions? (mark all that apply)
- Q133 Do you take any of the following supplements? (mark all that apply)
- Q134 Mark all the sources you currently use or have used to find nutrition and exercise information. Then choose the 3-5 MOST reliable sources for you and mark the text box with an "R".
- Q144 Thank you for taking the time to complete our survey. We appreciate your input on our research topic, Nutrition and Exercise Information Resources of the Healthy Population. If you have any questions concerning this research, you may contact the primary investigator at any time by contacting Sally Hillis at  
sjhillis@earthlink.net
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## Appendix K

### Table of Survey Items in each variable

#### **Dependent Variable, Resources of Nutrition and Exercise Information**

##### More than one source

Number\_scores (computed by adding together responses on Q134)

Q108 Satisfied with nutrition information from a single source?

Q109 Satisfied with exercise information from a single source?

##### Reliable

Q122 Blogs

Q125 Social Media

##### Own Knowledge/education

Q130 Own knowledge to find solutions?

Q100 Intuition to find answers?

Q78 Reading food labels

Q129 Lifelong learner?

Q13 Level of highest education

Q98 Use your education for nutrition questions?

Q99 Use your education for exercise questions?

Q107 New recipes

Q110 New foods

Q127 New cooking techniques

Q126 New foods try before recommending

Q105 Look at price of food

Q138 Sleep

Q24 Self care

Q51 Easy decisions

Q47 Do things well

Q104 Help others

Q46 Good listener

Q29 Time for physical activities

##### Family

Q120 Family offer advice?

Q123 Learned about nutrition from parents or family member?

Q124 Learned about exercise from parents or family member?

Q53 Family Meals

##### Friends

Q119 Friends offer advice?

Q54 Friends Meals

##### Other Sources

Q118 Celebrities

Q112 Hours watching TV

Q85 Watch TV while eating

Q93 Advertisements make you want to eat?

Q94 Programs make you want to eat?

Q69 Recipes everyday

**Independent Variables****Discipline**

- Q2 Daily exercise
- Q4 Number of balanced meals
- Q138 Sleep per night
- Q17 How often not well?
- Q18 How often miss appointments?
- Q19 How often are you absent from school or work?
- Q32 Friends say you are disciplined?

**Self Esteem**

- Q16 Current health
- Q147 Number of years current health
- Q42 Compliments from others
- Q45 Life rewarding
- Q47 Do things well
- Q52 Useless
- Q83 Feel good when cook
- Q103 Feel good cooking for others
- Q104 Feel good when help others

**Mindfulness**

- Q138 Sleep
- Q17 How often not well?
- Q18 How often miss appointments?
- Q19 How often are you absent from school or work?
- Q24 Self care
- Q51 Easy Decisions
- Q81 Know eaten too much
- Q84 Eat faster than most people
- Q87 Know something bothering you
- Q88 Remember what ate
- Q94 TV shows make you want to eat
- Q105 Look at price of food

**Challenge Solving Skills**

- Q47 Good listener
- Q83 Feel good when cook
- Q95 Cooking Skills
- Q129 Lifelong learner

**Daily Exercise**

- Q2 Daily exercise
- Q3 How long exercise each day
- Q16 Current health
- Q147 How long current health
- Q23 Describe lifestyle as active
- Q25 Perspire when you exercise
- Q29 Make time for physical activities



**Good Nutrition**

Q4 Balance meals  
Q16 Current health  
Q147 How long current health  
Q50 Balanced meals  
Q56 Fruit  
Q57 Vegetables  
Q60 Fruit and vegetables  
Q61 Snacks  
Q63 Alcohol  
Q65 Sodas  
Q57 Fruit  
Q68 Nuts  
Q75 Leafy greens  
Q82 Fast food

**Happiness (imagination)**

Q33 Happy person  
Q48 Laugh  
Q107 New recipes  
Q110 New foods  
Q127 New cooking techniques  
Q126 Try new foods before recommending

**Knowledge**

Q13 Highest level of education  
Q78 Read nutritional labels  
Q105 Look at food prices  
Q129 Lifelong learner  
Q130 Use own knowledge

**Learned Behaviors/Learned Experiences**

Q138 Sleep  
Q17 How often not well?  
Q18 How often miss appointments?  
Q19 How often are you absent from school or work?  
Q41 Dependable  
Q44 Trustworthy  
Q46 Good listener  
Q53 Family meals  
Q54 Friends meals  
Q59 Recipes  
Q82 Fast food  
Q83 Feel good when cook  
Q95 Cooking skills  
Q103 Cook for others  
Q105 Price of food  
Q112 Do you smoke

## Appendix L



September 18, 2015

Sally Hillis

Department of Nutrition and Health Sciences

Fayrene Hamouz

Department of Nutrition and Health Sciences

LEV 202K, UNL, 68583-0806

IRB Number: 20150915606 EX

Project ID: 15606

Project Title: Nutrition and Exercise Information Resources of Healthy Population

Dear Sally:

This letter is to officially notify you of the certification of exemption of your project by the Institutional Review Board (IRB) for the Protection of Human Subjects. Your proposal is in compliance with this institution's Federal Wide Assurance 00002258 and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46) and has been classified as exempt.

You are authorized to implement this study as of the Date of Exemption Determination: 09/18/2015.

1. Since your informed consent form will appear on-line, please include the IRB approval number (IRB#20150915606 EX) in the on-line consent document. If you need to make changes to the document, please submit the revised document to the IRB for review and approval prior to using it.

We wish to remind you that the principal investigator is responsible for reporting to this Board any of the following events within 48 hours of the event:

- \* Any serious event (including on-site and off-site adverse events, injuries, side effects, deaths, or other problems) which in the opinion of the local investigator was unanticipated, involved risk to subjects or others, and was possibly related to the research procedures;
- \* Any serious accidental or unintentional change to the IRB-approved protocol that involves risk or has the potential to recur;
- \* Any publication in the literature, safety monitoring report, interim result or other finding that indicates an unexpected change to the risk/benefit ratio of the research;
- \* Any breach in confidentiality or compromise in data privacy related to the subject or others; or
- \* Any complaint of a subject that indicates an unanticipated risk or that cannot be resolved by the research staff.

This project should be conducted in full accordance with all applicable sections of the IRB Guidelines and you should notify the IRB immediately of any proposed changes that may affect the exempt status of your research project. You should report any unanticipated problems involving risks to the participants or others to the Board.

*Becky R. Freeman*

Becky R. Freeman, CIP  
for the IRB



## Appendix M:

Participant Month	<b>A</b> Sept	<b>B</b> August	<b>C</b> August	<b>D</b> February	<b>E</b> February	<b>F</b> February	<b>G</b> February	<b>H</b> February
<u>Interview- Daily</u> Servings V/Fruit/Fruit Juice (Verified with food logs)	4-7	4-7	6-12	3-4	6-7	6-7	4-5	4-5
<u>Food Logs</u> Bananas	*	*	*	* 1/DAY	*	1/DAY	1/DAY	
Citrus	*	*		* Orange J 2x daily		* Orange J daily		Clementine Mandarin orange
Dried Fruit			* Apples					* cranberries
Apples	*		*	Fruit Salad	*	*		
Peaches		*	*					
Figs		*	*					

Example notecard used to record information from interviews and food and exercise logs (44)

## Appendix N:

## Qualitative Findings

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### Exercise Logs

- Range of time exercising per day 30 minutes-5 hours 20 minutes
- Average time exercising per day=2 hours 35 minutes
- Distance varied, running or walking 1-19 miles, biking 2-28 miles
- Range of number of exercise sessions per day 1 to 5
- Average number of exercise sessions per day=2
- Type of exercises: running, biking, lifting, workouts, power walking, raking the yard, cleaning the barn, playing with kids, gardening, and yoga
- Self-reported intensity from easy to moderately hard depending on type and length of exercise
- Participants planned exercise as part of their daily routine
- Participants felt better on days with moderate exercise
- Comments, "Good, Great, Rejuvenated, Alive!, Enjoyed the weather! Pretty darn good! Refreshed!"

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## Appendix O:

## Qualitative Findings

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### Food Logs

- Most participants ate 3 balanced meals at the same time each day
- Meals recorded contained a variety of foods from all food groups
- 2-4 planned daily snacks of fruit, nuts, yogurt, multi-grain bars, fruit juice or chocolate
- 3 recorded alcoholic beverage consumption of one drink per week, the others did not consume alcohol
- 3 recorded processed foods, but minimal consumption (with one consuming only organic processed)
- Water consumption throughout day
- No sugary sodas
- 3 drank occasional diet soda, 1-3 per week
- All logs showed a routine in meal consumption
- Sleep recorded 6.5-9 hours per night, with 8 hours average sleep per night

## Appendix P:

## Instrument Development

Purpose: to verify the themes identified in the qualitative research from a larger sample of the national population meeting the criteria for a healthy population

The 10 themes-variables, Daily Exercise, Good Nutrition, Mindfulness, Happiness, Disciplined, Self-Esteem, Challenge Solving Skills, Knowledge, Learned Behaviors, Sources of Nutrition and Exercise information

Generate Item Pool, 187 items

Determine format for measurement

Item pool reviewed by experts

Name instrument-Healthy Population Questionnaire (HPQ)

Review and select a panel company to administer survey (Qualtrics)

Work with panel company on limitations and question formatting, get estimate for cost of completes, supply national zip code list for sampling

Finalize instrument, 135 item forced response items (criteria, demographics, characterological traits, challenge solving skills, sources)

IRB approval

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## Appendix Q:

## Prepare HPQ for Launching

---

Retype HPQ into panel company program and upload IRB information

Adjust responses so HPQ could be completed on computers and mobile devices

Add quality check items to HPQ

Specify stratification – gender, age, geographic areas, and set N (N=300)

Test HPQ-5 qualitative participants completed the survey online and gave feedback

Soft Launch-30 completes

HPQ goes “live”, remain in close contact with panel company representatives

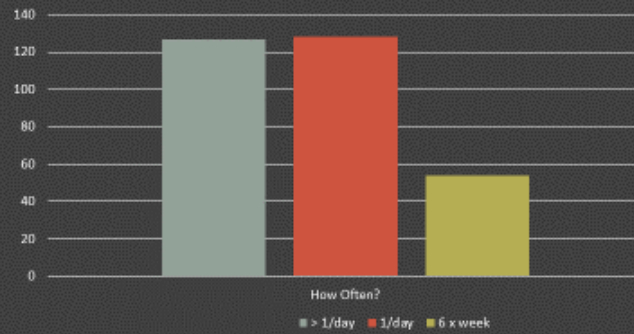
Launched on Tuesday afternoon and by Friday afternoon, 2799 responses with 309 completes meeting BMI, minimum daily exercise, nutrition, and age criteria and stratification requests

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## Appendix R:

## Summary of Criteria Questions

How often do you consciously exercise each day?

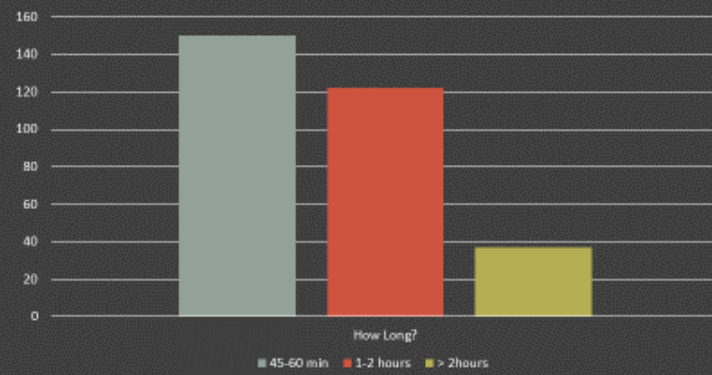


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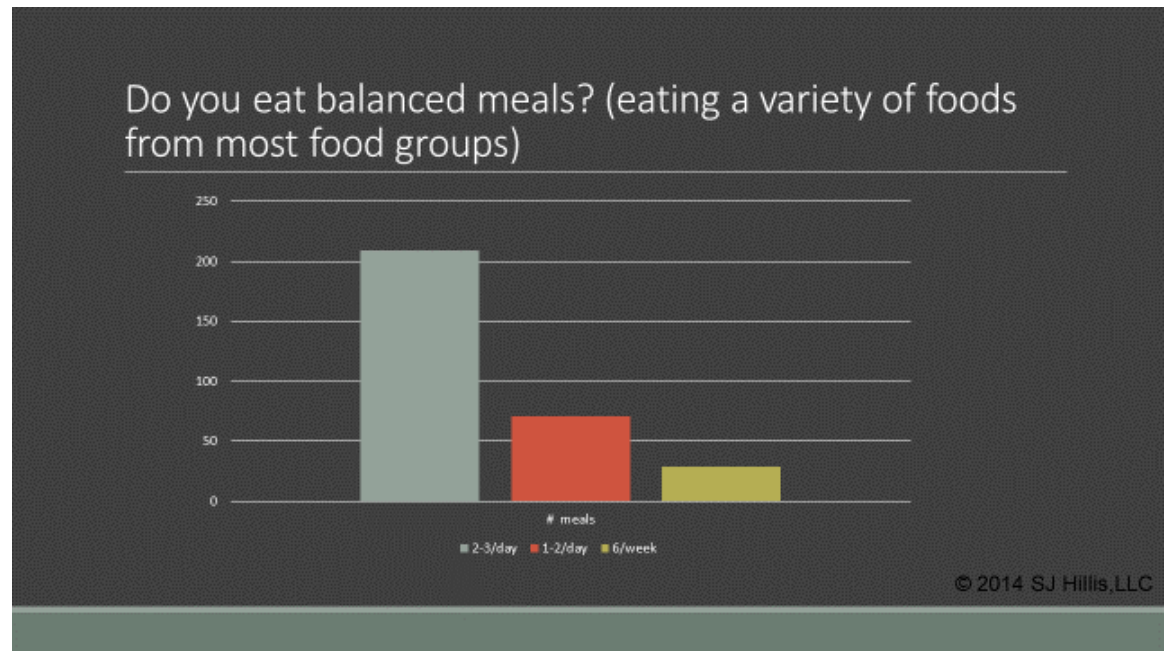
## Appendix S:

On average, for how long do you exercise each day?



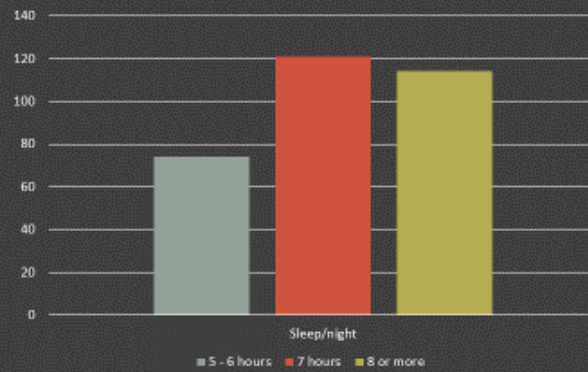
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## Appendix T:



## Appendix U:

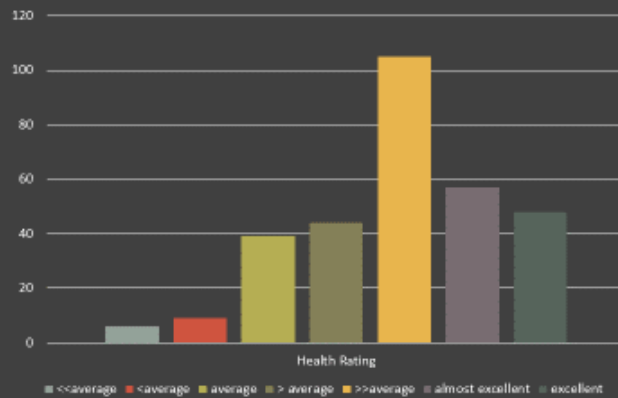
## Average Sleep per Night



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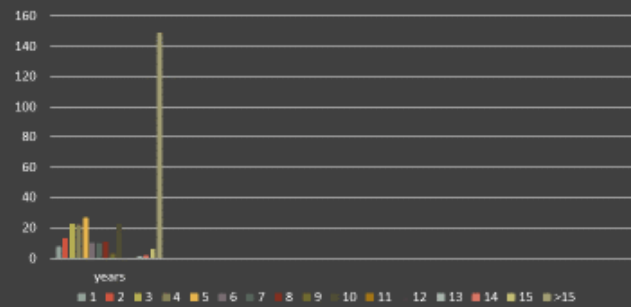
## Appendix V:

### How would you describe your current health?



## Appendix W:

How many years has your current health been the level you chose in the previous question?



## Appendix X:

Mark **ALL** the sources you currently use or have used to find nutrition and exercise information.

Source	responses/%	Source	responses/%	Source	responses/%
Physician	143 46	Books	84 27	Internet-Blogs	49 16
Family Members	122 39	Television	73 24	Internet-social media	43 14
Internet-scientific research	118 38	Formal Education	68 27	Libraries	35 11
Self-Knowledge	115 37	Dietitians	64 21	Sports Coach	33 11
Mother	113 37	Internet-Library website	64 21	Sports Magazine	29 9
Friends	92 30	Friends in Health Prof	63 20		
Internet-reliable websites like Mayo Clinic	92 30	Father	61 20		
Own cooking knowledge	87 28	Trainer	58 19		

## Appendix Y:

Then choose the 3-5 sources you **MOST rely on** and mark the text box with an “R”.

1. Mother	65	21%	9. Friends in Health Prof	13	4	17. Television	9	3
2. Physician	44	14	10. Dietitians	13	4	18. Internet-library website	8	2.5
3. Self-knowledge	31	10	11. Trainer	12	4	19. Internet-social media	8	2.5
4. Family Mem	25	8	12. Formal Ed	11	3.5	20. Cooking mag	6	2
5. Internet-scientific research articles	21	7	13. Books	11	3.5	21. Sports Coach	6	2
6. Father	17	5.5	14. Popular Mag	10	3	22. Sports mag	2	
7. Internet-reliable websites like Mayo Clinic	14	4.5	15. Own Cooking Knowledge	9	3	23. Libraries	1	
8. Friends	13	4	16. Internet-blogs	9	3			

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