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A study into the diagnosis of obesity in infants less than two years old in the state of Virginia

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A Study into the Diagnosis of Obesity in Infants

Less than Two Years Old in the State of Virginia

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Accepted by the faculty of the Department of Nursing, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Science.

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Dedication

This project is dedicated to my parents, John and Barbara Bruno, without whom I would never have had the opportunity to attend a university and achieve my academic potential.

Acknowledgement

I would like to take the time to acknowledge everyone who has helped me on this Honors Program journey. Firstly, I would like to thank my first academic advisor, Carroll Ward, for helping me start my Honors Program journey the "right" way. Dr. Babcock, thank you for pushing me to study how you knew I could, and preparing me for the reality of nursing school. I would like to thank Dr. Stephanie Stockwell for allowing me to "squeeze" into her Honors research seminar, which sparked the idea and preliminary research for this project; I would not have finished the Honors Program without that class. I would also like to extend gratitude to Dr. Erika Metzler Sawin for her help in keeping me on track to complete the Honors Program requirements by graduation!

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Abstract

In 2007, the CDC reported approximately 12.5 million children and adolescents in the U.S. were obese. Among 24-month old clinically obese children, only 23% were diagnosed as obese. The most concerning is the prevalence of obesity in 6-month olds; 16% of 6-month old infants in the U.S. are obese, of which only 14% are diagnosed as being obese. Previous research concentrates on the factors that influence infant obesity, but does not address the prevalence of diagnosing obesity in children, particularly those under two years of age. The purpose of this project was to pioneer a survey exploring the prevalence of diagnosing obesity in children less than two years of age, and to gain an understanding of why obesity is, or is not, being diagnosed in this population in the Commonwealth Virginia. Using an anonymous Qualtric survey, a mix of demographic, quantitative, and qualitative questions were asked of healthcare providers who practice pediatrics in Virginia. All practitioners agreed that they have seen obesity in patients less than two years of age, but most providers do not make clinical decisions about obesity until after the child is two years old. This descriptive, mixed-methods study demonstrated that providers are waiting until children are older than two years of age to make a diagnosis of obesity.

Introduction

Obesity has become a global epidemic, as reported by The World Health Organization (WHO), which describes obesity as a disorder of excess body fat associated with an increased risk of death ("Obesity and Overweight", 2012). The WHO reported in 2008 that 1.4 billion adults were obese or overweight ("Obesity and Overweight", 2012) and the Center for Disease Control and Prevention (CDC) reported that in 2009 one-third of U.S. adults were obese ("Overweight and Obesity", 2012). Obesity, however, is not only an issue for adults. A study conducted in over 144 countries found 43 million children were overweight or obese (Onis, Blossner, & Borghi, 2010), and according to the CDC, approximately 12.5 million U.S. children and adolescents, were obese; this has almost tripled since 1980 ("Overweight and Obesity", 2012). Most shocking of all is the commonality of obesity in 6-month old infants, in which 14% of 6-month old infants in the U.S. are obese (McCormick, Sarpong, Jordon, Ray, & Jain, 2010). The spread of obesity among newborns has quickly become an epidemic that deserves more study and intervention. The purpose of this project was to pioneer a survey to explore the prevalence of diagnosing obesity in children less than two years of age, and to gain a foundation of understanding of why obesity is, or is not, being diagnosed in this population in the Commonwealth Virginia.

Literature Review

While infants grow a considerable amount during their first months, rapid and excessive weight gain during their first months has been found to predispose children to obesity later in life (McCormick, Sarpong, Jordon, Ray, & Jain, 2010). This rapid weight gain is defined by reaching high percentiles on the weight and height growth charts in a short amount of time. Rapid weight gain, even within the first 6-weeks of an infant's life, makes him/her more likely to become obese (Eid, 1970; Ong & Loos, 2006). Additionally, while birth weight has no association with the risk for obesity later in life, rapid weight gain during the first few months of life significantly impacts obesity risk for the child in adolescence and adulthood (Ong & Loos, 2006). These findings emphasize the importance of early intervention.

A review conducted in the United States found that 16% of children between the ages of two and twelve were obese (Margellos-Anast, Shah, & Whitman, 2008). A study by McCormick, Sarpong, Jordon, Ray, and Jain (2010) found that 16% of 1,700 infants who were screened for obesity were found to be clinically obese by 6-months of age. This study went on to assess the rates of diagnosis of obesity, and found that only 14% of the clinically obese 6-month olds were actually diagnosed as obese (McCormick, Sarpong, Jordon, Ray, & Jain, 2010). Finally, only 23% of the 24-month old children in this study who were clinically obese were diagnosed as obese, which suggests that obesity in infancy is significantly under-diagnosed (McCormick, Sarpong, Jordon, Ray, & Jain, 2010).

Several factors thought to be responsible for rapid weight gain in infants have been researched. Obese mothers are less likely to breast feed, or tend to stop breastfeeding early (Lepe, Bacardi Gascon, Castaneda-Gonzalez, Perez Morales, & Jimenez Cruz, 2011). Breastfeeding has been linked to an overall healthier child, so any factor which affects the rates

of breastfeeding could influence the propensity for obesity and thus the health of the infant (Lepe, Bacardi Gascon, Castaneda-Gonzalez, Perez Morales, & Jimenez Cruz, 2011). While maternal exercise during pregnancy has no immediate effect on infant obesity, a mother who is overweight during pregnancy has a significant impact on whether the infant will become obese (Ferraro, Gaudet, & Adamo, 2012). Excessive prenatal maternal weight gain directly correlated with a higher obesity risk for the infant (Ferraro, Gaudet, & Adamo, 2012). Phelan and colleagues (2011) state that in obese pregnant mothers, a maternal diet high in "sweets" is the highest statistical predictor for infant obesity (Phelan, Hart, Phipps, Abrams, Schaffner, Adams, & Wing., 2011). Likewise, even in normal weight mothers, a diet characterized by the consumption of many soft drinks is the strongest predictor for infant obesity (Phelan *et al.*, 2011). Maternal physical activity, depression, and lack of sleep have thus far no statistically significant effect on the risk of obesity for the infant (Ferraro, Gaudet, & Adamo, 2012; 2012; Phelan *et al.,* 2011).

In current practice, the American Academy of Pediatrics suggests screening for obesity in children by using national BMI (body mass index)-for-age growth charts ("Disease and Conditions", 2014*;* "Obesity in Children", 2014). BMI, in combination with growth charts, helps pediatricians to diagnosis overweight and obesity in pediatric patients. Growth charts are used to plot weight and height ("Obesity in Children", 2014). The point that is plotted is then compared to the percentile growth curves ("Obesity in Children", 2014). A point on the curve for the 70th percentile means that 70% percent of children of the same sex and age have a lower BMI ("Disease and Conditions", 2014). A BMI-for-age between the 85th and 94th percentile is indicative of being overweight (National Heart, Lung, and Blood Institute, 2012). A BMI-for-age in the 95th percentile or above is indicative of obesity ("Disease and Conditions", 2014).

The National Center for Health Statistics and the CDC recommend using the WHO provided growth charts "for children 0 to 2 years of age in the U.S." and the CDC provided growth chart "for children aged 2 and older in the U.S." ("Clinical Growth Charts", 2009, pg 1; "CDC Growth Charts", 2010, pg 1). Please refer to Figure 1, of the WHO's "Birth to 24 months: Boys weight-for-length percentiles and head circumference-for-age percentile."

There are several reasons the CDC recommends using the WHO standard from birth to 24- months. First, the WHO standards use the growth of a normal breastfed infant as the norm for growth ("CDC Growth Charts", 2010). The CDC states that breastfeeding is the standard for infant feeding, and that the WHO growth charts are standards, as "they identify how children should grow when provided optimal conditions" ("CDC Growth Charts", 2010, pg 1). The CDC growth charts are references, and show how typical U.S. children grew during a certain period, but the CDC notes that typical growth patterns may not be the ideal growth patterns ("CDC Growth Charts", 2010). The CDC also admits that the data used to make the WHO standards were much stronger for the first 6-months of age then the CDC's growth chart, which is another reason they recommend using the WHO growth chart from birth to 24-months ("CDC Growth Charts", 2010).

The CDC's growth charts, in Figure 2, "can be used continuously from age 2-19," allowing for comparative trending by the providers ("Clinical Growth Charts", 2009, pg 1; "CDC Growth Charts", 2010, pg 1). The National Center for Health Statistics also notes that the WHO growth charts are only for children up to 5 years of age ("CDC Growth Charts", 2010). The CDC growth charts come in Set 1 and Set 2 ("Clinical Growth Charts", 2009). Set 1 has the outer limits, or 5^{th} and 95^{th} percentiles, of the curves and is the chart most used by clinicians ("Clinical Growth Charts", 2009). Set 2 is for patients with special healthcare needs, and

includes the 3rd and 97th percentiles ("Clinical Growth Charts", 2009). Figure 2 is an example of Set 1 for boys, 2-20 years of age showing stature-for-age and weight-for-age percentile.

In addition to using growth charts, pediatricians also consider a child's family history, eating habits, activity level, and any other impacting health conditions ("Disease and Conditions", 2014). However, as stated previously, obesity is significantly under-diagnosed in children less than 24-months of age (McCormick, Sarpong, Jordon, Ray, & Jain, 2010). John Reilly, Professor of Paediatrics Energy Metabolism at the University of Glasgow, states "there is some evidence that even highly-trained health professionals (with a great deal of paediatric experience) make subjective clinical assessments of patient weight status that are often incorrect compared with objective methods of assessment" (Reilly, 2010).

Reilly (2010) also noted cultural barriers influence providers when recognizing pediatric obesity, thus contributing to the under-recognition of obesity in children and adolescents. For this reason, child and adolescent obesity has been referred to, graphically, as "practically invisible" (Reilly, 2010, pg 206). This article also describes a recent systematic review, which found only a small number of parents with obese children or obese adolescents actually recognize their children as overweight or obese (Reilly, 2010, pg 205). Reilly (2010) concludes by stating the under-recognition of obesity among parents and healthcare members requires change, meaning a more objective method of diagnosis to identify obesity in children and adolescents.

While formal and objective methods exist, if providers do not recognize obesity as an issue in children less than two years of age, as suggested by Reilly and McCormick, Sarpong, Jordon, Ray, and Jain (2010), no amount of screening or tools will help decrease the prevalence

of obesity in the United States. This study aims to investigate the prevalence of obesity diagnosis in children two years or age and younger.

Figure 1: WHO's Boy Weight-for-length Percentiles and Head Circumference-for-age

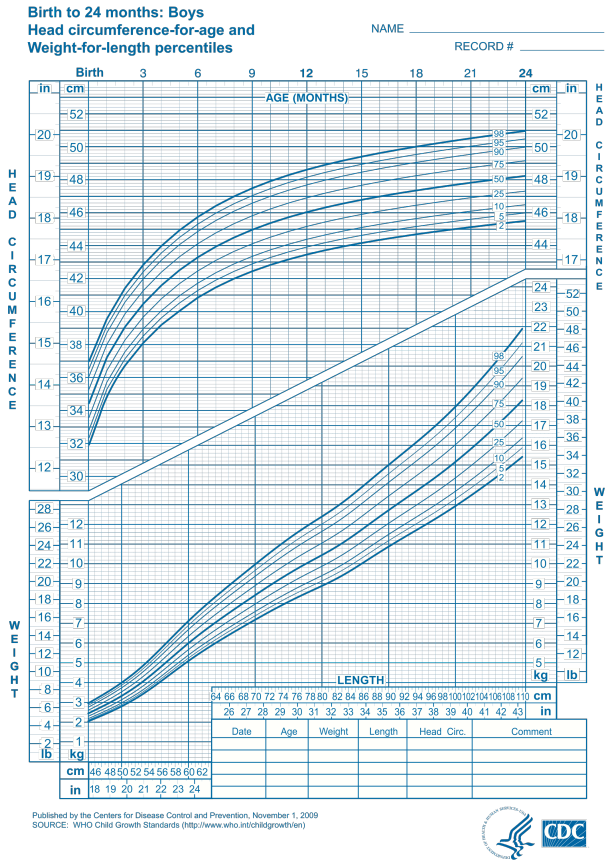
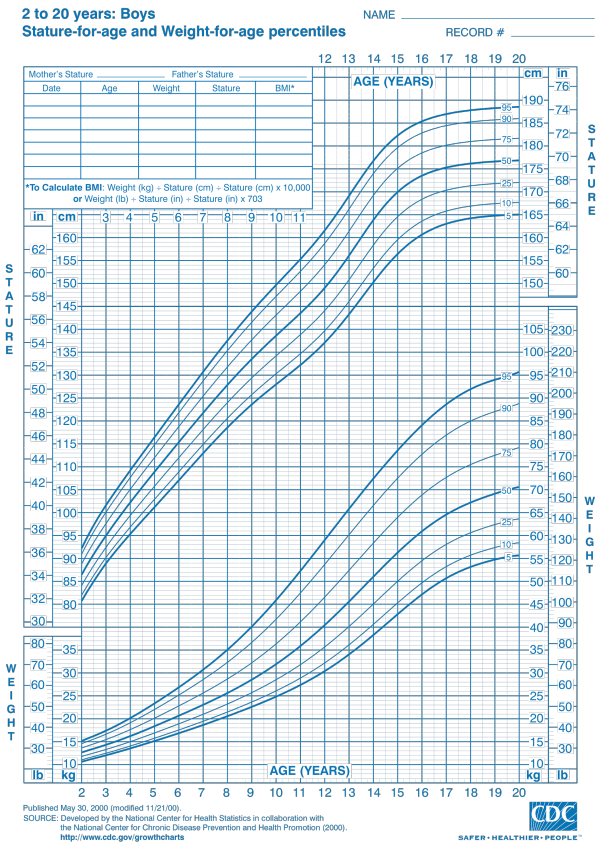


Figure 2: CDC's 2 to 20 Years, Boy Stature-for-age and Weight-for-age



Methods

Data Collection

This research study was a descriptive mixed-methods study which used an electronic survey as the basis for data collection. The study was conducted with IRB approval from March 7th, 2014 until December 1st, 2014. The data was collected using the Qualtric system. This is a system available to James Madison University (JMU) professors, to conduct anonymous online surveys. Qualtric is a sophisticated online survey software that allows a user to create a survey, anonymously collect results, and analyze the data in an organized spreadsheet. Tools used to conduct this study included two password-protected computers, the Qualtric survey software, outlook email, a cellular phone, and the Microsoft Office Suite to record data. All data was collected electronically and stored on the secure JMU Qualtric server.

The participants were purposefully selected and were advanced practice pediatric Nurse Providers and Medical Doctors in the Commonwealth of Virginia. These participants were chosen to ensure the most accurate opinions, and knowledge of statistics regarding pediatric and infant obesity were obtained from individuals who are responsible for diagnosing obesity in the pediatric population. The study was limited to Virginia, as it is where the student researcher lives, and JMU is located centrally in Virginia.

The participants were asked to provide answers to the questions listed in Figure 3. First, participants were asked to respond to demographic information. The next section of the survey was a quantitative survey which consisted of a Likert Scale that ranged from 1-5, 1 meaning completely disagree, 2 meaning mostly disagree, 3 meaning neutral, 4 meaning mostly agree, and 5 meaning completely agree. All numerical response statistics were to be analyzed using SPSS software version 21.0.

The survey contained two "fill in the blank" questions about percentages. The first asked about the percentage of obese pediatric patients the participant sees, and the second question asked about the percentage of 6-month old obese patients they see. The survey also included six "open-ended" questions, which the participants responded anonymously to, typing in their own words. This data was analyzed by reading, rereading, and identifying themes in the free-response answers.

Figure 3: Qualtrics Survey Questions

Qualtrics Survey

Demographic Questions:

1. How old are you? [enter age]
2. Male or Female [M/F]
3. What is your highest level of degree/education? [MD, NP, DNP]
4. How long have you been practicing in your current profession, in length of years? [enter number]
5. Number of years of experience in pediatric care? [enter number]
6. Number of years practicing in pediatric care in the state of Virginia? [enter number]
7. Where is your current practice? [enter location]

Please rate your response on a scale from 1-5, with
1-completely disagree **2-**mostly disagree **3**-neutral **4-**mostly agree **5-** completely agree

8. I see obesity in patients less than 2 years of age.
9. I see obesity in patients less than 1 years of age.
10. I see obesity in patients less than 6 months of age.
11. In the past year (2013) I diagnosed obesity in patients less than 2 years of age.
12. In the past year (2013) I diagnosed obesity in patients less than 6-months of age.
13. I believe obesity is an issue in people of all ages in the state of Virginia.
14. I believe obesity is an issue in children in the state of Virginia.
15. I believe obesity is an issue in infants less than 6-months of age in the state of Virginia.
16. I do not believe obesity should be diagnosed in patients less than 6-months of age.
17. I do not believe obesity should be diagnosed in patients less than 2 years of age.

18. I see obesity in _____% of my pediatric patients. [please insert %]
19. I see obesity in about _____% of my 6-month patients. [please insert %]

In your own words….

20. What is your criterion for diagnosing obesity in children less than 2 years of age?
21. What is your criterion for diagnosing obesity in infants less than 6-months of age?
22. How would you describe the prevalence of obesity in patients less than 2 years of age?
23. How would you describe the prevalence of obesity in patients less than 6-months of age.
24. Please describe your beliefs about obesity in children less than 2 years and less than 6 months.
25. Please describe interventions and resources available, in your area, to parents with obese children.

Methods

Procedure

After obtaining IRB approval, the student researcher contacted providers of pediatric patients in Virginia, both advanced practice Nurse Providers (NP) and Medical Doctors (MD), via email, inquiring whether they would be willing to be a part of a research study survey and answer a few questions regarding pediatric obesity. The providers' emails proved considerably hard to locate via the internet, so the student researcher began calling pediatric offices to inquire about the survey and verbally obtain emails over the phone. Almost all of the email addresses received were generic office emails or office manager emails, so that the secretaries and office manager could then forward the survey to the NP or MD participant's email.

Once an email address was obtained, the student researcher then emailed the survey to the address. The email consisted of the consent page that included a weblink, which connected the participants with the anonymous Qualtric survey; participants were informed clicking the weblink indicated informed consent. An online survey was then administered to the individual through Qualtric. See Figure 3 for the specific questions on the survey. The survey was accessible from March 18th, 2014 to November 7th, 2014.

The student researcher randomly selected pediatric offices from Northern Virginia, the Shenandoah Valley, and the Tidewater area from the yellow pages online website, selecting every 3rd practice listed under the above mentioned locations. Once the offices were identified, the student researcher contacted them by phone in order to determine willingness to participate in the study. If an email address was obtained, the student researcher sent the survey via email the address.

Methods

Ethical Consideration

Confidentiality and data safety were vital to this study. Confidentiality of the participant data was the primary safety-related issue. To address this, JMU's IRB approval was granted for this study, labeled IRB protocol #14-0388. All data collection and analysis was done on password protected computers, accessible to only the faculty advisor and student researcher. Consent was electronically obtained from each participant. The survey tool Qualtric removed all identifiers from the data, therefore all of the data was de-identified before analysis. Printed de-identified data was stored in a locked desk, and electronic data was stored on the JMU Qualtric server.

Electronic and paper copies of the data will be kept for five years after the completion of the survey, after which time all electronic and paper files will be destroyed.

Methods

Analysis

Demographic information was analyzed using univariate analysis, including mean, maximum, and minimum, and were calculated in Microsoft Excel. All numerical response statistics from the Likert Scale were to be analyzed using SPSS software version 21.0. Due to the low yield of survey responses, discussed below, the quantitative data was deemed too small a pool for SPSS analysis. Instead, the data was entered into tables to be analyzed. The quantitative data from the "blank" answer responses were analyzed in Excel. The qualitative data, or free response section of the survey, was analyzed by reading, rereading, and identifying common descriptives that could be categorized as themes and subthemes from the participant responses.

Results

Demographics

Out of the fifty-five pediatric offices the student researcher contacted by phone, a total of 12 emails were obtained. After sending the survey via email to these 12 email addresses, 4 participants took the survey. Participants reported that their practices were located in Norfolk, Chester, and Harrisonburg, Virginia; see Table 1 below. While 4 participants was less than the student researcher had anticipated, the three different practice locations strengthened the study by representing three different areas of Virginia.

The participants included 2 males and 2 females; see Table 2. The mean age, in years, of the participants was 55.5, the maximum was 66 and the minimum was 36; see Table 2. Two of the participants were MDs, 1 was an NP, 0 were DNPs (Doctorate in Nurse Practice), and 1 was other; see Table 3. The mean of the participants' years of experience at their current level of education was 29.25, the mean number years of experience in pediatrics 29.5, and in the Commonwealth of Virginia was 25; see Table 4 for maximums and minimums.

The participant that identified as "other" did not designate a degree type. Data was traceable for the "other" participant's answers, so special consideration was made when analyzing data to designate and separate the answers from the MD and NP responses, especially with regard to the qualitative questions.

Table 1: Location of Practice

Area	Number or Practices
Norfolk, VA	2
Chester, VA	1
Harrisonburg, VA	1

Table 2: Demographics of Participants Age and Gender

Mean Age	Max Age	Minimum Age
55.5	66	36
Females	**Males**	
2	2	

Table 3: Demographics of Participants Degree Level

MD	NP	DNP	Other
2	1	0	1

Table 4: Years of Experience

Years of Experience	Mean	Maximum	Minimum
In Current Degree	29.25	38	8
In Pediatrics	29.5	41	6
In the Commonwealth of Virginia	25	41	1

Results

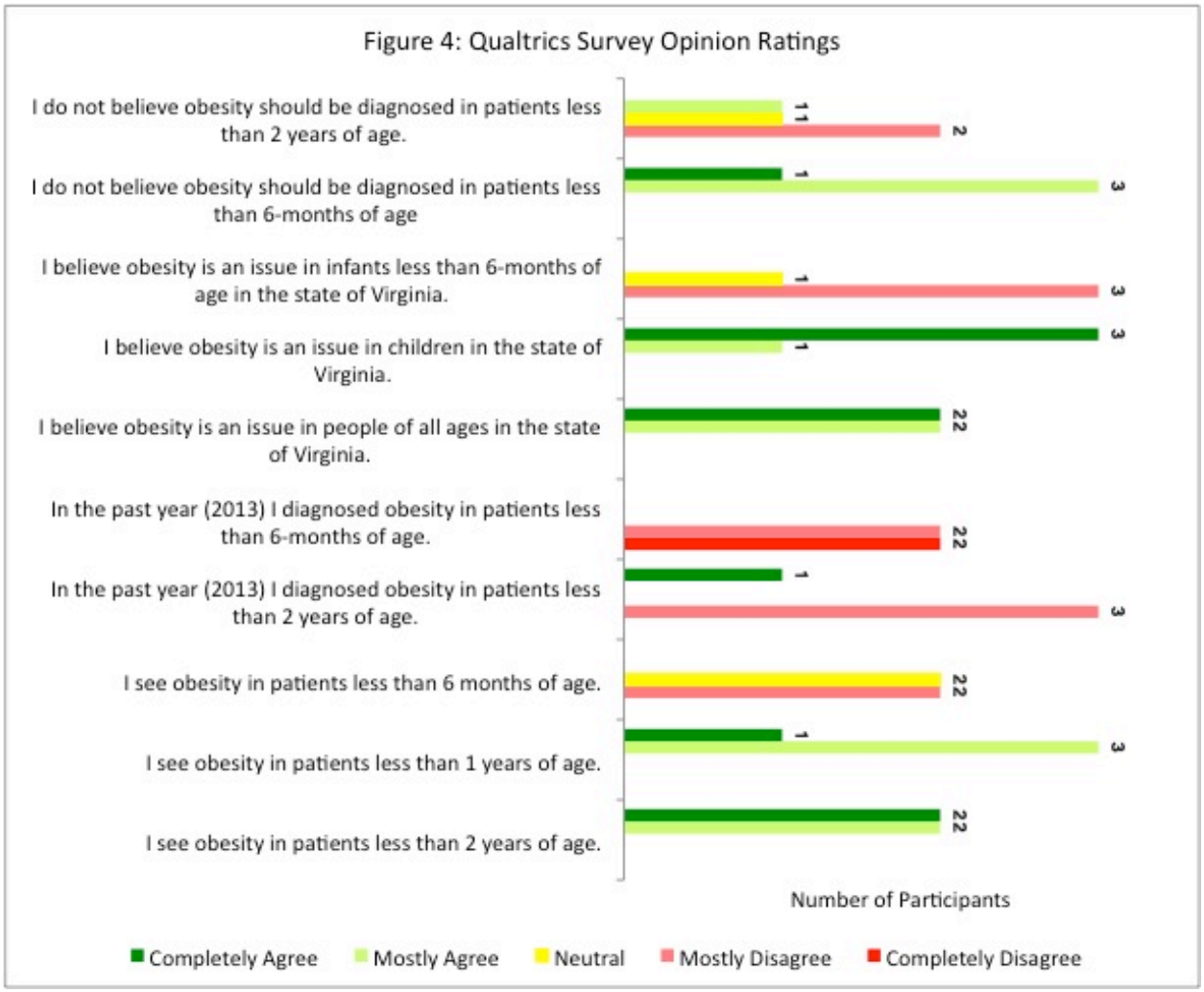
Quantitative Data

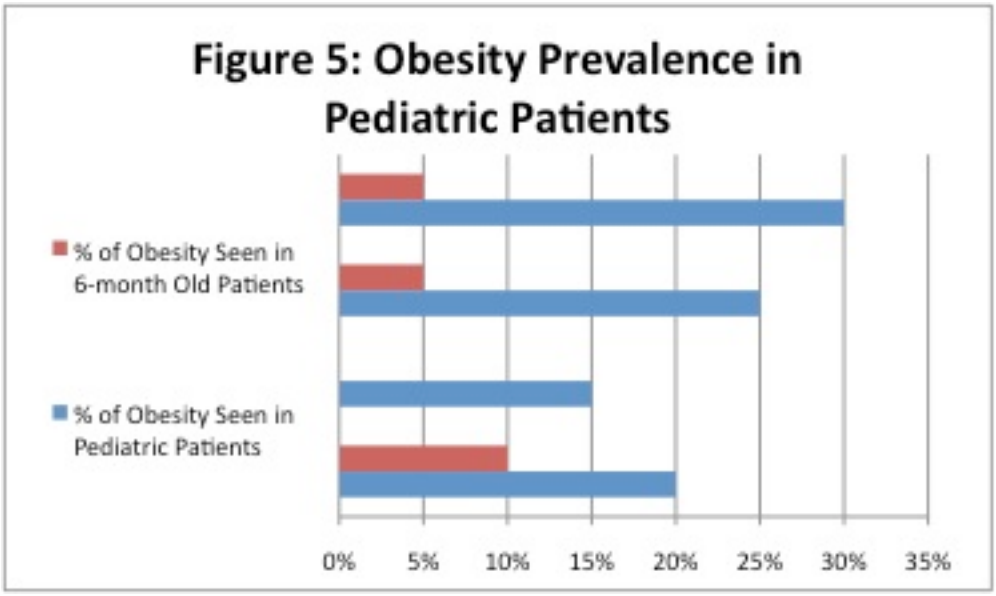
Quantitative data was collected with a Likert Scale in the Qualtric survey. However, due to the low yield of survey responses, the quantitative data was deemed too small a pool for SPSS analysis. Instead, data was entered into an excel spreadsheet to be analyzed. Figure 4 was created to visualize the data. There was also a section of the Qualtric survey with a "blank" answer option. This data was taken and inserted into Excel to be analyzed. The data was then used to create bar graphs to illustrate the data, see Figure 5.

Two participants reported they completely agreed and two reported mostly agreeing, saying they saw obesity in their patients less than two years of age. Three participants reported mostly agreeing and one reported completely agreeing, saying they saw obesity in patients less than one year old. Two participants reported mostly disagreeing and two reported neutral, saying that they saw obesity in their patients less than 6-months old. Three participants mostly disagreed with diagnosing in patients less than two years old obesity in the year 2013, while one participant mostly agreed. Two participants mostly disagreed, and two participants completely disagreed with diagnosing obesity in patients less than 6-months old in the year 2013. Two participants completely agreed, and two participants mostly agreed, to believing obesity is an issue for people of all ages in the Commonwealth of Virginia. Three participants completely agreed, and one mostly agreed that obesity is an issue for children in the Commonwealth of Virginia. One participant reported neutral, and three participants reported mostly disagreeing, that obesity is an issue in 6-month olds in the Commonwealth of Virginia. One participant completely agreed, and three participants mostly agreed, that they did not believe obesity should be diagnosed in patients less than 6-months of age. One participant reported neutral, one participant reported mostly

agreeing, and two participants reported mostly disagreeing that they did not believe obesity should be diagnosed in patient less than two years old.

The two "fill in the blank" responses yielded a response from one of the MD participants who reported seeing obesity in 15% of pediatric patients, and did not respond to the second "blank". The second MD participant reported seeing obesity in 20% of pediatric patients, and in 10% of 6-month old patients. The NP participant reported seeing obesity in 25% of pediatric patients, and in 5% of 6-month old patients. The "other" participant reported seeing obesity in 30% of pediatric patients, and in 5% of his 6-month old patients. See Figure 5 for a bar graph illustrating these results.





Results

Themes

After careful analysis, several themes were identified. From the first question, see Figure 4, all four providers described using growth charts as their criterion for diagnosing obesity in pediatric patients less than two years old. Two providers used the same method, diagnosing obesity when weight was in a higher percentile than that of height. One described diagnosing obesity when weight crossed two percentile lines while height remained the same, while the other stated diagnosing when weight was above the 99th percentile. Another provider described diagnosing obesity when weight and height were both above the 95th percentile. The last provider described using growth charts, eating habits, and family history to make their diagnosis.

In response to the question "what is your criterion for diagnosing obesity in infants less than 6-months of age," three of the providers stated they do not have a criterion for diagnosing obesity in patients less than 6-months old. However, one of these providers also noted that while they do not have a criterion, if the patient is "off the growth chart for weight," they counsel the family about nutrition. The fourth provider used the same method as they did for less than two years old, diagnosing obesity when weight crossed two percentile lines with height remaining the same. Question 22, "how would you describe the prevalence of obesity in patients less than two years of age?" asked the participants to describe the prevalence of obesity in patients less than two years of age. Two of the providers described the prevalence as "increasing". One of the providers described obesity in patients less than two years of age as being present, but not as prevalent as over two years of age. The other participant described it as less than 10%.

There was not a theme that emerged from question 23, "How would you describe the prevalence of obesity in patients less than 6-months of age?" Each provider had a different

opinion: one stated obesity in 6-month olds is increasing, one answered they do not make that judgment, one answered that there is little to no obesity present, and one answered that it stays about the same.

Question 24, "please describe your beliefs about obesity in children less than two years and less than 6-months," also did not exhibit any themes. The question asked the providers about their beliefs about obesity in children less than two years and less than 6-months of age. One provider described that there is "too much oral gratification via sippy cups and bottles, and too much reliance on passive entertainment such as TV and videos." A second provider said that "the focus is not on diagnosis or prognosis, but on revealing patterns that may be contributing and parental risk factors." A third practitioner stated that obesity is more accurately diagnosed after 1 year of age. A fourth provider stated, "I believe that catching children (with a possibility of becoming overweight at an age) early and counseling the family may avert obesity in the child."

The last question, "please describe interventions and resources available, in your area, to parents with obese children," asked the practitioners about intervention resources available in their area to parents with obese children. One of the participants from Norfolk noted the weight loss programs at Children's Hospital of the Kings Daughters. Another participant described registered dieticians, recreational programs, provider counseling, and endocrine clinics. The third participant described using "anticipatory guidance on proper nutrition and activity in children >12-months." The last participant stated that "nutrition counseling is available with a provider order, unfortunately, the family usually must pay out of pocket for these services. Richmond (VCU) has a program for overweight youth that encourages eating and nutritional habits and exercise."

Discussion

From the review of the literature, it was concluded the pediatricians and nurse providers must have a reason for waiting to diagnosis obesity until after age two. The growth charts are an effective tool to trend and chart excessive weight gain, but the diagnosis rate of patients less than 24-months as obese was still only 23% of the patients that were technically clinically obese from the results of the growth charts (McCormick, Sarpong, Jordon, Ray, & Jain, 2010). Rapid weight gain in the first 6-weeks of life makes the child more likely to become obese in adolescence and adulthood (Eid, 1970; Ong & Loos, 2006). Rapid weight gain during the first few months of life significantly impacts obesity risks later in life (Ong & Loos, 2006). Early intervention is key to avoiding this risk, yet diagnosis of obesity at 6-months and two years remains extremely low. The objective of this study was to explore to the prevalence of diagnosing obesity in infants less than two years of age, and to gain an understanding of the reasons why obesity is, or is not, being diagnosed in infants and children in the Commonwealth of Virginia.

The results from the Likert Scale both support and oppose the literature. All of the participants agreed that obesity is an issue for adults in the Commonwealth of Virginia, aligned with the CDCs report that in 2009, 1/3 of adults in the U.S. were obese (2012). All of the participants agreed that they saw obesity in patients less than two years of age and less than one year of age, and that obesity is an issue for children in the Commonwealth of Virginia. This concurs with the CDC report that 17%, approximately 12.5 million children and adolescents in the U.S., were obese in 2007 (CDC 2012).

Three participants mostly disagreed with diagnosing obesity in patients less than two years of age in the year 2013, which is similar to the findings of McCormick, Sarpong, Jordon, Ray, and Jain's (2010) study, which found that the diagnosis of patients less than 24-months was

still only 23% of those patients who were technically clinically obese from the results of the growth charts (McCormick, Sarpong, Jordon, Ray, & Jain, 2010). All four participants also disagreed with diagnosing obesity in patients less than 6-months of age, and that obesity is an issue for patients 6-months and younger with one participant remaining neutral. This correlates with McCormick, Sarpong, Jordon, Ray, and Jain's (2010) finding in which only 14% of the clinically obese 6-month olds were actually diagnosed as obese. All four participants also agreed that they do not believe obesity should be diagnosed in patients who are less than 6-months of age.

Two participants responded neutrally, and two responded mostly disagree, to seeing obesity in patients less than 6-months of age, which conflicts with the findings of McCormick, Sarpong, Jordon, Ray, and Jain (2010), that 14% of 6-month old infants in the U.S. are obese. There was also disagreement in whether obesity should be diagnosed in patients two years of age and younger, with two participants answering mostly disagree, and the other two answering completely agree and mostly agree.

From the qualitative data, a few themes emerged which correlated with the literature. First, all four participants reported using growth charts and curve percentiles to diagnose obesity in patients less than two years of age, which agrees with the National Center for Health Statistics and the CDC's recommendation for using the CDC provided growth chart "for children aged 2 and older in the U.S." (National Center for Health Statistics 2010). The qualitative questions also found that two of the participants did not have criterion for diagnosing obesity in less than 6-months of age, while two used the same growth chart as for the two years and older patients. These reports specifically disagree with the CDCs recommendation of using the WHO provided growth charts "for children 0 to 2 years of age in the U.S." (National Center for Health Statistics

2010). The last theme that emerged from the qualitative data was that each provider had a wealth of resources and lifestyle changes to offer parents with children who are obese.

This pilot study was conducted to inform future research that focuses on the diagnosis of obesity in children less than two years of age. This descriptive, mixed-methods study demonstrated that providers are indeed waiting until children are older than two years of age to make a diagnosis of obesity. It seems some providers are trending growth during the first 24-months, but are not making clinical decisions about obesity until after two years, while some providers are not even screening for obesity until after two years. All four practitoners completely agreed, or mostly agreed, that they have seen obesity in patients less than two years and less than one year old.

If the providers are seeing obesity in this population and they identify obesity as a large problem for children in the Commonwealth of Virginia, why are they waiting until after two years to diagnose? The literature points to biases and cultural barriers of parents and healthcare providers that impedes their ability to recognize obesity in children (Reilly 206). Could it be that the "fat baby is a healthy baby" cultural norm is making healthcare providers ignore signs of obesity until age two, when parents can begin to see their child visually as overweight?

If this study were to be repeated, visits to each office would be scheduled, to deliver a paper copy of the survey. Then I would wait at the office to collect the completed survey. I would suggest attempting at least one participant from each county in Virginia to try and get a better understanding of the incidence of childhood obesity in the Commonwealth of Virginia. I would also rewrite the mixed-method survey to include questions that could provide additional insight into some of the questions above. One of the providers mentioned that it was more "accurate" to diagnosis obesity after age two. Why is that? Do providers really feel that an infant

gaining weight in the 95th and above percentiles the first year of life is "healthy" or that they will "grow out of it" and "lose the baby fat"? Would enacting preventative obesity measures at 6-months or before two years hurt? Perhaps the impact on insurance of being clinically diagnosed with obesity so early, or perhaps providers are afraid of losing patients at such an early stage because they would insult the parents? These are all questions that would provide insight into the providers' thinking if this study were to be repeated in the future.

There were several limitations to this study. The first, and most obvious, is the small sample size of participants. With such a small sample pool, I was unable to perform accurate SPSS t-test analysis. The small sample size also diminished the scope of providers throughout Virginia, and does not give an accurate a range of Virginia pediatric providers. One of the participants also reported as "other," meaning they could not have been a nurse practitioner or medical doctor, although they did report diagnosing obesity in patients. This is unlikely as they reported patient statistics, but could still be possible. Use of the Qualtric survey also allows for any person with access to the survey to take it. While care was taken to only reach nurse practitioners and medical doctors, there was still room for error. I also collected self-reported data which has an aspect of bias in and of itself. There was also lack of prior research on this topic. The only well designed study on diagnosis of obesity in 6-month olds was the McCormick, Sarpong, Jordon, Ray, and Jain (2010) study.

This project was meant to describe the scope of the issue, and the need for future study. For future studies, a method to more efficiently distribute the survey in a way that would result in higher recruitment of participants should be developed. I would expand this study nationally rather than limiting to the Commonwealth of Virginia, by selecting several different areas to distribute the study. I would also expand the survey question to include more qualitative data,

and perhaps conduct interviews to gather more detailed responses from providers. This small study supports the need for further research into the diagnosis of obesity in children less than the age of two. Researchers have the opportunity to influence healthier outcomes for infants at a crucial time in their life, by directing the attention of pediatric healthcare providers to this serious and growing obesity issue in young children.

Bibliography

2 to 20 years: Boys Stature-for-age and Weight-for-age percentiles [chart]. (2000). Retrieved from http://www.cdc.gov/growthcharts/data/set1clinical/cj41c021.pdf

American Academy of Pediatrics: Virginia Chapter. *Obesity in Children*. (2014). Retrieved from http://www.virginiapediatrics.org/obesity-in-children/

Birth to 24 months: Boys Head circumference-for-age and Weight-for-length percentiles [chart]. (2009). Retrieved from http://www.cdc.gov/growthcharts/data/who/grchrt_boys_24hdcirc-l4w_rev90910.pdf

Centers for Disease Control and Prevention. (2012). *Overweight and Obesity: Adulthood*. Retrieved from: http://www.cdc.gov/obesity/data/adult.html

Centers for Disease Control and Prevention. (2012). *Overweight and Obesity: Childhood*. Retrieved from: http://www.cdc.gov/obesity/data/childhood.html

Eid, E. E. (1970). Follow-up study of physical growth of children who had excessive weight gain in first six months of life. *British Medical Journal, 2*(701), 74-76.

Ferraro, Z. M., Gaudet, L., & Adamo, K. B. (2012). The potential impact of physical activity during pregnancy on maternal and neonatal outcomes. *Obstetrical & Gynecological Survey, 67*(2), 99-110.

Lepe, M., Bacardi Gascon, M., Castaneda-Gonzalez, L. M., Perez Morales, M. E., & Jimenez Cruz, A. (2011). Effect of maternal obesity on lactation: Systematic review. *Nutricion Hospitalaria : Organo Oficial De La Sociedad Espanola De Nutricion Parenteral y Enteral, 26*(6), 1266-1269.

Margellos-Anast, H., Shah, A. M., & Whitman, S. (2008). Prevalence of obesity among children in six Chicago communities: Findings from a health survey. *Public Health Reports, 123*(2), 117-125. Retrieved from www.scopus.com

Mayo Clinic. (2014). *Disease and Conditions: Childhood Obesity*. Retrieved November 13, 2014, from http://www.mayoclinic.org/diseases-conditions/childhood-obesity/basics/tests-diagnosis/con-20027428

McCormick, D., Sarpong, K., Jordon, L., Ray, L., & Jain, S. (2010). Original Article: Infant Obesity: Are We Ready to Make this Diagnosis?. *The Journal Of Pediatrics*, 15715-19.

National Center for Health Statistics. (2009). *Clinical Growth Charts*. Retrieved from http://www.cdc.gov/growthcharts/clinical_charts.htm

National Center for Health Statistics. (2010). *CDC Growth Charts*. Retrieved from http://www .cdc.gov/growthcharts/who_charts.htm

National Center for Health Statistics. (2010). *Why WHO standards for infants and children ages 0 to 2 years od age?*. Retrieved from http://www.cdc.gov/growthcharts/who_charts. htm#The%20WHO%20Growth%20Charts

National Heart, Lung, and Blood Institute. (2012). Retrieved from http://www.nhlbi.nih. gov/health/health-topics/topics/obe/diagnosis.html

Ong, K., Loos, R. (2006). Rapid infancy weight gain and subsequent obesity: Systematic reviews and hopeful suggestions. *Acta Pediatrica*. 95 : 904-908. Retrieved from:http://online library.wiley.com/store/10.1080/08035250600719754/asset/08035250600719754.pdf?v= 1&t=h8q0ajb5&s=588b0fb024b428ae014d0d4530e630e03c98dc74&systemMessage=Wi ley+Online+Library+will+be+disrupted+on+27+October+from+10%3A0012%3A00+BS T+%2805%3A00-07%3A00+EDT%29+for+essential+maintenance

De Onis, M., Blössner, M., & Borghi, E. (2010). Global prevalence and trends of overweight and obesity among preschool children. *The American journal of clinical nutrition*, *92*(5), 1257-1264.

Phelan, S., Hart, C., Phipps, M., Abrams, B., Schaffner, A., Adams, A., & Wing, R. (2011). Maternal Behaviors during Pregnancy Impact Offspring Obesity Risk. *Experimental Diabetes Research*, *2011*. Retrieved from: http://www.ncbi.nlm.nih.gov/pmc/ articles/PMC3205727/

Reilly, J.J. (2010). Assessment of obesity in children and adolescents: synthesis of recent systematic reviews and clinical guidelines. *Journal of Human Nutrition and Dietetics, 23,* 205-211. DOI: 10.1111/j.1365-277X.2010.01054.x

University of Texas Medical Branch at Galveston (2010, April 7). Obesity in infants can be diagnosed at 6 months, study shows. *ScienceDaily*. Retrieved October 1, 2012, from http://www.sciencedaily.com- /releases/2010/04/100406093632.htm

United States Department of Agriculture (2012). *ChooseMyPlate.gov*. Retrieved from: http://www.choosemyplate.gov/

World Health Organization. (2012). *Obesity and Overweight*. Retrieved from: http://www.who.int/mediacentre/factsheets/fs311/en/