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# Effective communication of school health screening information: A pilot study evaluating the effect of electronic communication of BMI screening information in Elementary schools

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# **Effective Communication of School Health Screening Information**

A Pilot Study Evaluating the Effect of Electronic Communication of BMI Screening Information  
in Elementary Schools

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An Honors Program Project Presented to  
the Faculty of the Undergraduate  
College of Health and Behavioral Studies  
James Madison University

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by Kara Elizabeth Carter

May 2016

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Accepted by the faculty of the Department of Health and Behavioral Studies, James Madison University, in partial fulfillment of the requirements for the Honors Program.

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PUBLIC PRESENTATION

This work is accepted for presentation, in part or in full, at Virginia Academy of Nutrition and Dietetics Spring Conference on April 12<sup>th</sup>, 2016.

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## **Abstract**

Obesity is a growing concern surrounding today's youth. School-based health screenings are promoted as a public health strategy to identify obese children and those at high risk for becoming obese. Despite numerous programs, data is lacking in effective school to parent communication of health related information. The purpose of this research is to determine the effect of electronic communication of health screening outcomes, including parents' understanding of screening information, utilization of informational resources, and decision to seek physician follow-up. Screenings for body mass index, acanthosis nigricans and blood pressure were conducted during school hours among children in kindergarten and third grade. Parents received screening information via email or through conventional reporting, based on preference. A follow-up telephone survey was conducted to determine screening outcomes, successfully surveying only 35.8% of study population. There were no significant differences between communication method and screening outcomes indicated at follow-up. Parents who chose letter communication had a significantly higher chance of receiving the screening results, compared to parents who opted for e-mail communication (78.8% vs 47.1%;  $p=.023$ ). Small sample size, due to difficulty in parents receiving screening letter and follow-up conduction, heavily influenced research findings.

## **Acknowledgements**

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## **Chapter 1: Introduction**

Childhood obesity has become a growing concern in America, yet research has not identified a surefire way to combat its growth. School-based health screenings are one of the tools used in the fight against this obesity epidemic, but research is inconclusive on whether or not these programs are successful or effective.<sup>6 17</sup> In addition, there is a lack of research exploring how to make the communication of health screening results to parents/guardians effective at prompting further action by parents. The significance of this study was to explore the effect of different modes of communication (e-mail and conventional reporting) on making school-based health screenings effective.

This study was designed around the question: How does electronic communication (compared to a traditional letter) of health screening results influence parents' self-reported understanding of health screening information, utilization of provided informational resources, and the decision of parents to seek further follow-up from a physician?

It was predicted that electronic communication of health screening results would significantly increase parents' self-reported understanding and utilization of provided resources compared with the conventional health screening communications. Furthermore, electronic communication of health screening results would increase intended follow-up compared to conventional health screening communications.

The results of the study were limited by small sample size, unsuccessful follow-up, sample type, need for encrypted email, self-reported data and language diversity. The original sample size was ninety-two however, only thirty-four participants, reached for follow up, received the letter and contributed to research outcomes data. The sample type was a convenience sample, where parents could choose their method of communication, making the distribution uneven between communication methods. Parents who selected email

communication were sent their child's health screening results via an encrypted email service that required a password (their child's first name) to access results. During follow-up, parents self-reported each of the study outcomes, which may have led to false results. Finally, the study population had four different language preferences, creating a language barrier between letter communication and completion of the follow up survey. However, translational services were able to be provided in Arabic, Kurdish and Spanish.

### **Definitions of terms**

To clarify terminology used in this study, the following terms are defined:

Acanthosis Nigricans: A darkening and thickening of skin most commonly found around the neck that is associated with obesity and is a risk factor for type 2 diabetes.

Additional Resources: These resources are referring to the links/websites listed at the bottom of the health screening results letter.

Blood pressure: A measure of the pressure in the circulatory system.

Body Mass Index (BMI): A measure calculated using height and weight that is used to estimate body composition.

School-Based Health Screening: Tests that look for indications of disease, before symptoms occur, in a school setting. Common screening are vision and hearing.

Obesity: Defined in children as a BMI above the 94<sup>th</sup> percentile.

Overweight: Defined in children as a BMI between the 85<sup>th</sup> -94<sup>th</sup> percentiles.

Study Outcomes: Measures of parents' self-reported understanding of screening information, utilization of informational resources, and decision to seek physician follow-up

Follow up participants – participants of this study who were screened, received letter, answered follow-up call and successfully completed follow up survey

## **Chapter 2: An Evaluation of the Effectiveness of Electronic Communication of Health Screening Information in Elementary Schools**

**Obesity is a national epidemic with numerous causes which require comprehensive strategies to overcome.**

Obesity has become an increasing concern which has prompted the World Health Organization (WHO) to coin the term “globesity” to describe the current epidemic.<sup>1</sup> The current data published by WHO reports that the prevalence of obesity among adults in the United States (US) has reached 31.8%, using body mass index (BMI) criteria.<sup>2</sup> Perhaps even more staggering is that the epidemic has left 18% of American children and 21% of American adolescents obese.<sup>3</sup> With these numbers increasing, it is crucial to pinpoint contributing factors.

In the most basic terms, obesity is an imbalance between energy expenditure and energy consumption, which can lead to weight gain. Energy expenditure, standardly measured in kilocalories (kcal), consists of the energy necessary to sustain the function of organs, energy for the digestion, absorption, metabolism and storage of food (thermal effect of food), and expenditure related to physical activity. Energy consumption comes from food and drinks consumed, which are measured in kcal as well. When an individual consumes more kcal than he/she expends, weight gain occurs.<sup>1</sup> As weight continues to increase, the risks of health conditions and diseases such as heart disease and diabetes increase as well.

In recent history, there has been a number of factors contributing to the rise in obesity, some of which being environmentally driven. McAllister et al.<sup>4</sup>, has grouped contributing environmental factors into “the Big Two”: Food marketing practices and institutionally driven reduction of an environment to support physical activity.<sup>4</sup> Eating away from the home is an evolving trend for Americans. When accompanied with the increased portion sizes and the bombardment of



advertisements for food, these factors have resulted in a growing obesity epidemic.<sup>4,5</sup> The availability of inexpensive, energy-dense foods in fast food restaurants and vending machines is another contributing factor to the epidemic, along with lack of access to healthy, affordable foods.<sup>5</sup> This shift in food trends contributes to the consumption of an increased amount of nutrient poor calories; however, energy expenditure of Americans also plays a significant role in current obesity rates. McAllister et al.<sup>4</sup>, highlights that the built environment that surrounds Americans lack safe areas for physical activity, including walking to work, exercise and play spaces for children.<sup>4</sup> This limitation is accompanied by decreased physical education in schools and increased screen time at both work and home.<sup>5</sup>

Creating strategies to address this issue of obesity in children is complicated by methods of weight classification and the diverse opinions of parents.<sup>6</sup> The use of BMI-for-age growth charts were an addition to the health system in 2000 when the Center for Disease Control (CDC) published updated growth charts. Previously children were classified as “at risk for overweight” ( $\geq 85^{\text{th}}$  - $94^{\text{th}}$  percentile) and overweight ( $\geq 95^{\text{th}}$  percentile). As understanding of the health consequences of obesity in children began to emerge, the CDC changed the classification of BMI to overweight ( $\geq 85^{\text{th}}$  - $94^{\text{th}}$  percentile) and obese (BMI  $\geq 95^{\text{th}}$  percentile) to draw more attention to the issue<sup>1</sup>

**Obesity in childhood is troubling due to the increased risk of chronic disease and psychological disorders.**

The presence of this difficulty does not make the implications of obesity less severe or significant in children. Obesity puts children at higher risk for hypertension, asthma, joint discomfort due to weight, shortness of breath and obstructive sleep apnea. More troubling is that

childhood obesity leads to early onset of type 2 diabetes, which was formerly considered a disease of adults.<sup>1</sup> The impact of the excess weight on a child's body can alter his/her mobility, contribute to disorders of the muscle and bone, as well as impact normal patterns of growth and development.<sup>7</sup>

The effects of obesity can be more than just physical. Obese children display lower self-esteem that can be perpetuated by social discrimination and lead to risk-taking behavior. Adults play a role in creating the social stigma surrounding obesity, which can contribute to the development of depression.<sup>7</sup> These social and mental elements of obesity put obese children at risk for poorer academic and social attainment as well as a variety of mental health problems.<sup>7</sup>

With the severity of this epidemic and the implications that accompany the condition, the debate of how to address this problem is presently unfolding. In 2010, the First Lady, Michelle Obama, launched the obesity task force and Let's Move! campaign in an attempt to address childhood obesity. The objectives of her campaign are to provide children with a healthy start, empower their parents and caregivers, ensure healthy foods are provided in schools, improve the access of Americans to health, affordable foods and increase physical activity. The campaign also provides the opportunity for schools to join in the movement to fight childhood obesity.<sup>8</sup> Since the implementation of this effort, obesity prevalence in students has leveled off.<sup>9</sup> Although Michelle Obama cannot be single handily credited with this plateau, the concept of implementing alterations in schools in order to address childhood obesity may be an effective and necessary tactic.

**Using school to implement surveillance and screening programs can be a strategy to help curtail the obesity epidemic in children.**

Schools have the potential to address childhood obesity in the United States considering that 95% of minors are enrolled in schools.<sup>10</sup> While the beginning of school-based obesity policies began in 2004, only 28% of states have specific legislature regarding BMI screenings in schools, compared to the 82% of state that have legislature on vision and hearing screenings. The legislation relevant to obesity either mandates or recommends BMI surveillance or BMI screenings.<sup>11</sup>

Surveillance entails the collection of students' height and weight for the purpose for calculating BMI, to be reported to the school board or state. This data aggregation implies that no student identifiers are attached to the measurements. The data is used to prove the need for intervention programs in schools.<sup>6</sup> The lack of identity connected to data, along with the exclusion of parental notification, makes surveillance programs considerably less controversial.

BMI screenings on the other hand, report the results of measurements to parents and the aggregated data is reported to the school board or state. Communicating screening information to the parent increases the risk of lost privacy and raises concern among parents since the student's identity must be attached to the health information in order to ensure it reaches the appropriate parent.<sup>6</sup> This controversy presents a potential barrier preventing national implementation of school-based BMI screenings.

**BMI is the current standard for school-based obesity screening programs. Measuring other markers of health risk such as blood pressure and acanthosis nigricans can aid in assessing the total health risk of the child.**

There is concern from parents of the accuracy of BMI screenings as well as the impact of labeling children's weight status as overweight or obese.<sup>6</sup> BMI is an approximate measure of

body adiposity, which prompts some to view it as inaccurate. Even though this measure is an estimation, it is considered a reliable indicator of obesity in the professional health field.<sup>1</sup> Any BMI screening program should use the criteria set by the Center for Disease Control (CDC) criteria. This method evaluates BMI as a function of height and weight. BMI assumes that as the value increases, so does the proportion of fat tissue.<sup>1</sup> This dependable measure is also convenient and easy to measure on a large scale. However, with BMI measuring comes the labels of underweight, healthy weight, overweight and obese. Bullying has become an increasing concern in schools and weight is one characteristic that can cause bullying.<sup>6</sup> Parents are concerned that by labeling a child's weight as overweight or obese, it can reemphasize the view of them as "fat" and potentially prompt bullying.<sup>6</sup> Despite this concern, research has shown that BMI screenings do not increase the incidence of bullying in relation to weight, making this both a healthy and reliable measure of body composition.<sup>6</sup>

Parents who are concerned about the stigma of children being label as overweight and obese, can be one of the major contributors to the creation of the stigma. The views that parents have towards obese vs thin stereo types are reflected in their child's opinions as well. Parents of all weights and BMI status have been shown to endorse negative stereotypes of obese persons and approximately 47% of overweight girls and 34% of overweight boys report that their family members tease them about their weight.<sup>12</sup> Puhl and Latner<sup>12</sup> propose that parents create stigma towards overweight and obese persons due to the stigma they experienced as a child.<sup>12</sup> Perhaps the concern of BMI screenings reinforcing stigma should be approached by the promotion of a positive, nonjudgmental environment at both school and home.

While BMI is the standard measurement taken in school-based screenings, the collection of additional health information, such as blood pressure and the presence of acanthosis nigricans,

can aid in the overall assessment of a child's health status. Blood pressure is an appropriate measure in assessing risk of an individual as high blood pressure or hypertension places individuals at risk for diseases including congestive heart failure, kidney failure, myocardial infarction, stroke and aneurisms. These diseases result from untreated hypertension, and are typically seen in hypertensive adults.<sup>1</sup> Yet, the number of children with high blood pressure is increasing, which means the risk of developing serious health problems earlier in life is also increasing.<sup>13</sup> Screening for blood pressure will allow parents to be informed early if their child has developed hypertension and may result in earlier treatment.

Acanthosis nigricans is advantageous in detecting the risk or presence of obesity-related insulin resistance, a precursor for Type 2 Diabetes. The condition of acanthosis nigricans is the gradual darkening of skin in the armpit, groin and neck folds, as well as over the joints of fingers and toes. The darkened skin will ultimately become velvety with distinct markings and creases.<sup>14</sup> When insulin resistance reaches a severity where blood glucose levels are unable to be maintained at a healthy level type 2 diabetes ensues. Acanthosis nigricans can provide a better understanding of the severity of children's weight status, making it possible for children to be treated before the development of diabetes or seek early treatment of already developed diabetes. While both blood pressure and acanthosis nigricans measures are valuable when measuring health status, they are not currently a part of standard school screenings targeting obesity.<sup>6, 10, 11</sup>

**School nurses should be utilized in school-based health screenings due to their advanced education and relationships with parents, families and communities.**

A debate over the administration of surveillance and screening programs is also occurring. Most school settings have a school nurse who is in a prime position to not only facilitate the process of

measurements, but also provide a personal connection and valuable information source for the community.<sup>10</sup> The National Association of School Nurses published a position statement on nurses' role in obesity prevention, proposing that school nurses have...

“...knowledge and expertise to promote the prevention of overweight and obesity and address the needs of overweight and obese youth in schools. The school nurse collaborates with students, families, school personnel, and health care providers to promote healthy weight and identify overweight and obese youth who may be at risk for health problems. The school nurse can refer and follow up with students who may need to see a health care provider. The school nurse also educates and advocates for changes in school and district policies that promote a healthy lifestyle for all students.”<sup>15</sup>

While it may be difficult to balance already existing responsibilities of school nurses with school-based screenings, it is crucial that the role of the school nurse and their expertise are not overlooked when implementing BMI screening legislation and programs. Taking a retrospective look at BMI program implementation, Barta et al.<sup>16</sup> emphasize the necessity of collaborating with all stakeholders involved in implementations, especially the school nurse. The authors proposed that nurses have the potential to be key role models for the community by involving themselves in physical activities, healthy eating and healthy weight maintenance.<sup>16</sup>

**The success of school-based BMI screenings can be measured in numerous ways, therefore a screenings' impact on obesity prevalence should not be the only measure of success.**

Regardless of who administers school-based screenings, the general goal of screenings are to be successful. The specific goals of school-based BMI screenings are to prevent and reduce the

prevalence of obesity in a particular population, correct misperceptions parents have about their child's weight status, motivate healthy lifestyle changes, encourage parents to attain follow up care with a physician, and to make the community aware of the school's commitment to fighting obesity.<sup>6</sup> With this many goals, success is not a straightforward measure. School-based programs may be successful at achieving some of these specific goals, but still need improvements to achieve others. Present research has shown that school-based screenings are successful in increasing awareness of obesity and the disease implications, as well as correcting misperceptions of children's weight status.<sup>6</sup> Some scholars consider success of these programs as a reduction in BMI prevalence, and therefore cite programs as unable to prove positive impact on obesity.<sup>6</sup> Using this as the sole factor to determine program success may not be an adequate measure of the program's impact.. Nationwide childhood obesity rates are plateauing, indicating the first sign of changes being made and that a decrease could occur in the future.<sup>9</sup>

Lessons from the success of other school- based health screenings such as vision and hearing should be taken into account. For example, schools do not provide treatment for hearing or vision impairments found during screenings. Rather, parents are notified of the exam results and the aggregated data are reported to the school board or state. In schools, these results are used to identify areas of increased need or to demonstrate success of an intervention program in identifying children at risk. Ethan et al.<sup>17</sup> used data gathered from mandated vision screenings across New York City to identify schools to test a vision improvement program aimed at low income areas with high rates of students who failed the vision test.<sup>17</sup> Without the mandatory screening, researchers would not have a starting point for providing intervention programs.

The school-based screenings that are already in place serve as a starting point for the implementation of treatment and intervention programs; however, they are not a solution to the

conditions they identify. The implementation of school-based BMI screenings would serve the exact same purpose.

**School-based BMI screenings across the US are increasing, but the concern for privacy, regional differences and health literacy can create barriers in screening implementation.**

One of the main factors affecting the implementation of screenings is the support from not only legislation and administration, but also from the school community, especially the parents. How parents view the screenings is a major influence on the success of the program. As previously mentioned, confidentiality is the top concern among parents for BMI screening. Parents are apprehensive about their child's weight status being revealed because of the potential to prompt bullying. Their concern not only rests in the confidentiality of communication of information between the school and parents, but during the measuring process. Parents want to make sure that children are not measured or weighed in areas such as an open room or a hallway. The lack of privacy can be due to not having access to a private nurse room or privacy dividers. This need adds to the cost of the screenings and can influence the view of screening implementation. The weight status of children can also influence their parents' view on the screening, with parents of overweight and obese children less likely to support screenings.<sup>6</sup> Research has shown that most parents are in support of screenings once privacy for their children is assured.<sup>6</sup>

Regional differences can also influence the community's response to health screenings. In researching regional barriers in Chicago, Stalter, Chaudry and Polivka<sup>18</sup> identified three themes in regional practices: suburban discretion, rural reluctance, and urban chaos. Suburban discretion consisted of nurses having high concern for the sensitivity of weight status labels, viewing weight as too sensitive of a matter. Rural reluctance consisted of nurses being unwilling to screen



children, mostly due to the hassle of doing it themselves or taking the time to explain to someone the process in order to help aid in screening. Urban areas face numerous complications with student transfers within schools, and the reduction of nurses' ability to organized and manage the programs, resulting in urban chaos.<sup>18</sup>

Overcoming regional differences can present difficulty, as can overcoming barriers surrounding health literacy. Lambert et al.<sup>19</sup> emphasizes the importance of differentiation between health literacy and literacy, defining health literacy as “the extent to which people can access, process, understand, use and communicate health-related information (oral, print and numerical), skills and services.”<sup>19</sup> The elements of health literacy consist of literacy, comprehension and participation.

Although students' health literacy can be addressed and improved, parents' health literacy is not influenced by schools. Being able to communicate with parents of all health literacy levels is the key element in making screenings successful. Parents who have correct perceptions of their child's weight status, understand screening criteria, and recognize the severity of health implications that accompany overweight and obesity are those who are more likely to take steps towards achieving or maintaining their healthy lifestyle.

Successful screening programs should accommodate parents of all health literacy levels. According to Lambert et al.<sup>19</sup>, all parents need to be treated as if they have low health literacy, creating an environment that is welcoming to questions. Ways to accomplish this include the teach-back method which can be described as having parent put the information given to them in their own words and telling it back to the facilitator during in-person consultations. The second

method is promotion of Ask Me 3, an initiative that encourages parents to ask at least three questions at each clinical consultation.<sup>20</sup>

**The current standard for BMI screening information to parents is through paper reports, but the shift towards electronic communication provides new opportunities for communicating with parents.**

The current method of communicating screening information to parents/caretakers is typically via paper letters or BMI report cards. Research specific to effectiveness of this method is lacking, but Davis et al.<sup>21</sup> evaluated the communication of childhood vaccine information with parents. This study investigated whether or not parents actually read vaccine information sheets provided to them. The results showed that only 5% of parents read the information sheets during the duration of their visit to the clinic. However, during participant follow-up 79% of all parents enrolled in the study reported the print information increased their understanding of the vaccine. The large discrepancy in the parents who read the information at the clinic and those who reported the print information as helpful creates concern about the honesty of parents' answers to follow-up questions. Due to the proposed disconnect between these two statistics, it is suggested that not as many parents who reported the print material as helpful actually read the information provided to them.<sup>21</sup> When designing an effective way to communicate with parents, it is crucial to find a method in which the parents find most appealing.

Taking the study of Davis et al.<sup>21</sup> into consideration, using digital communication of information to parents provides potential in increasing the success of health screenings. Additional studies have shown that parents often turn to digital internet sources for information about health concerns. In studying the role of the internet in information communication of parents who have

adolescents with type 1 diabetes, Nordfeldt et al.<sup>21</sup> identified themes that indicate what parents desire from on-line information sources. Of these themes, the most applicable to this literature review is the desire for access to reliable facts/information, positive hints and advice and opportunity to identify with experiences of others.<sup>21</sup> Using an electronic method to communicate with parents may make it easy to guide them to reputable, online health information resource, therefore increasing screening success.

Research in urban primary care settings has shown that caregivers with access to email show interest in using this form of communication with their health care provider. Conversely, there are some populations, including African Americans and persons with low socioeconomic status, that do not show interest in e-mail communication.<sup>23</sup> When evaluating effective communication, the population to whom the information is being communicated to needs to be considered.

School-based screening in schools that already have an electronic communication system in place, such as a portal, would benefit from electronic communication of screening information over schools serving a population without access to electronic sources. A study on parents' perception of the use patient portals in managing their child's chronic illness discovered that the electronic communication encouraged important, but not urgent, questions to be asked. It was also reported that the ability to see results faster not only reduced the anxiety of receiving testing results, but also encouraged proactive treatment for identified problems.<sup>24</sup> Health care providers who use electronic communication with patients is not only increasing, but also has shown to be effective, and therefore possibly effective in schools as well.

## **Conclusion**

Current research lacks information in effective school to parent communication of health related information, specifically lacking in the literature is exploring the use of internet communication in school-based screenings. Literature found on school-based weight-related screenings were based solely on BMI measurements, lacking the inclusion of acanthosis nigricans identification and blood pressure readings in the screening. The health implications of the presence of acanthosis nigricans and elevated blood pressure in children make these tests an important element of weight-related health screenings. In order to fill this gap in literature, the aim of the proposed research is to evaluate the impact of using electronic and internet communication to relay information about school-based health screening, consisting of BMI and blood pressure measures, and acanthosis nigricans detection.

### **Chapter 3: Methodology**

Research took place over the course of the 2015-2016 academic year to determine how electronic communication (compared to conventional communication) of health screening results influence parents' self-reported understanding of health screening information, utilization of provided informational resources, and the decision of parents to seek further follow-up from a physician.

It was predicted that electronic communication of health screening results would significantly increase parents' self-reported understanding and utilization of provided resources compared with the conventional health screening communications. Furthermore, electronic communication of health screening results would increase intended follow-up compared to conventional health screening communications.

Beginning in September, measurements of height, weight, acanthosis nigricans and blood pressure were collected by school nurses, Health Sciences faculty and students of the Dietetics Program, who will collectively be referred to as the study staff moving forward. All members of the study staff were trained using existing materials provided by the National Association of School Nurses to conduct height, weight, acanthosis nigricans and blood pressure screenings.

Study subject consisted of kindergarten and third grade students from an elementary school in Harrisonburg, Virginia. Participants were recruited in collaboration with the school nurse during back to school orientation and registration in August of 2015. Parents provided written consent for children to be in the study, and 3<sup>rd</sup> graders completed assent forms. Consent and assent applied to the entire study, which includes the specific evaluation of communication

methods. By consenting, parents allowed all members of the study staff to have access to their child's health screening and demographic information and ensured confidentiality was be maintained throughout the entire study. Within the consent form, parents selected their preferred method of communication (e-mail or conventional). Reference consent and assent forms are provided in **Appendix B**.

Consent and assent allowed access to retrieve information on child's birthdate, sex, self-reported ethnicity and preferred language from the school's records. Data collection consisted of height and weight measurements for BMI calculation, presence of acanthosis nigricans and blood pressure. Height and weight was measured using a calibrated, combined stadiometer and balance scale. BMI percentile, which requires the numeric age of the child, was calculated according to Center for Disease Control and Prevention guidelines.<sup>25</sup> Blood pressure was measured according to guidelines set forth by The Fourth Report of the National High Blood Pressure Education Program.<sup>26</sup> Blood pressure percentiles were calculated using established pediatric blood pressure reference charts.

After screenings were complete, individualized health screening results and information were sent home to parents. The conventional reporting group received a paper letter sent home with the student, while the test group received the information electronically. The electronic information was sent via an encrypted email. To retrieve their child's health screening information from the encrypted email, parents had to enter a password (their child's first name). The materials were available in English, Arabic and Spanish according to the preferred language indicated at time of consent. All procedures were approved by James Madison University Institutional Review Board (IRB).

After dissemination of communication information a follow-up survey was conducted via telephone with parents. Translational services for follow-up were available in Arabic, Kurdish and Spanish. A Microsoft Word generated data collection sheet found in **Appendix C** was used to record data. Once follow-up was completed, collected data was organized into a Microsoft Excel database. Data was analyzed using chi-squared testing to determine significant associations between to categorical variables. Statistical Package for the Social Sciences (SPSS) (Version 23) was used.

## Chapter 4: Results

Ninety -five families completed consent and assent forms to participate in the study. Ninety- two students had complete screening data on BMI, acanthosis nigricans and blood pressure. These participants were sent health screening letters and were eligible for follow-up. *Table 1* describes the demographics of the study participants (n =92). Over 77% of children enrolled in the study preferred communication in English, followed by Spanish (16.3%), Arabic (5.4%) and Tigrinya (1%). The majority of study participants were white (49%), followed by Hispanic (29.3%), Black (16.3%) and Asian (5.4%). The sex of the screened population was relatively equally distributed between male (53.2%) and females (48.9%). More than half of study participants (57.6%) were within a healthy BMI range ( $\geq 5$ -<85th percentile). Of the remaining participants, nearly five percent were classified as underweight (BMI <5), 17.4% were classified as overweight and 19.6% obese.



**Table 1 Study Population Breakdown**

N=92	Frequency	Percent
<b>Preferred Language</b>		
English	71	77.2%
Spanish	15	16.3%
Arabic	5	5.4%
Tigrinya	1	1.1%
<b>Ethnicity</b>		
White	45	49.0%
Asian	5	5.4%
Black	15	16.3%
Hispanic	27	29.3%
<b>Sex</b>		
Male	49	53.2%
Female	45	48.9%
<b>BMI Category</b>		
Underweight	5	5.4%
Healthy	53	57.6%
Overweight	16	17.4%
Obese	18	19.6%

**Table 2** describes follow-up data. Of the ninety-two eligible participants, follow-up was not completed on forty-two participants due to parents not answering when follow-up call was placed (41.3%, n=38) or providing a contact number that was not in use (3.3%, n=3). There was one eligible participant who was not contacted as there were no language resources available to communicate. The majority of participants were able to be reached for follow up (54.3%, n=50). A total of thirty- four participants opted to receive mail communication, where as sixteen selected to receive health screening information via email. However, not all of the participants reached through follow-up phone calls actually received the screening letter. Seven participants (21.2%) who opted to receive mail communication reported not receiving the letter, compared to 9 participants (53%) who opted to receive email communication reported not receiving the letter. A significant difference between likelihood to receive letter and communication method was found (p=.023). Thirty-four participants answered the follow-up call and received the letter, so were able to participate in the follow-up survey.

**Table 2 Follow-Up Data**

Population Eligible for Follow-up								
		Frequency		Percent				
No answer on follow-up		38		41.3%				
No working number		3		3.3%				
Did not call		1		1.1%				
<b>Reached for Follow-up</b>		<b>50</b>		<b>54.3%</b>				
Of Participant Reached for Follow-up								
		Mail		E-mail		P value	Totals	
		Frequency	Percent	Frequency	Percent		Frequency	Percent
Did not receive letter		7	21.2%	9	52.9%	.023	16	32.0%
Successful Follow up		26	78.8%	8	47.1%		34	68.0%
Total		34		16			50	

**Table 3** summarizes the preferred language, ethnicity, gender and BMI category of the participants who were able to successfully complete follow up surveys (n=34). English (73.5%) was the preferred language of communication followed by Spanish (26.5%). It is important to note that all Arabic speaking participants did not receive the screening letter, so were unable to participate in the follow-up survey. Of participants who completed the follow-up survey 50% (n=17) were White, 8.8% (n=3) Black and 41.2% (n=14) Hispanic. There were more males (64.7%,n=22) in the follow-up population than females (35.3%, n=12). Finally, most of the follow-up population had a healthy weight (64.7%, n=22) follow by those categorized as obese (17.6%, n=6), and then those overweight (8.8%, n=3) and underweight (8.8%, n=3).

**Table 3 Successful Follow-Up Population Breakdown**

N=34	Frequency	Percent
<b>Preferred Language</b>		
English	25	73.5%
Spanish	9	26.5%
<b>Ethnicity</b>		
White	17	50.0%
Black	3	8.8%
Hispanic	14	41.2%
<b>Gender</b>		
Male	22	64.7%
Female	12	35.3%
<b>BMI Category</b>		
Underweight	3	8.8%
Healthy	22	64.7%
Overweight	3	8.8%
Obese	6	17.6%

**Table 4** displays the study outcomes (understanding, resource use, and physician follow-up) within the different communication methods selected (mail vs. email). Most participants, irrespective of their preferred communication method reported complete understanding of the health screening letter. One email participant reported they did not have complete understanding of the letter and three mail participants reported they did not have complete understanding of the letter. No significant differences between mail vs. email communication and outcomes of letter understanding were found ( $p=.408$ ). Of participants receiving email communication, one participant reported intention to following up with a child's physician, while two other reported no intentions at all. Of those receiving mail communications, five indicated that they would follow up with their physician, while two reported that maybe they would follow-up. Fourteen specified no intention to follow-up with a physician. No significant differences between mail vs. email communication and outcomes of intention to follow-up with a physician were found ( $p=.386$ ). There were no participants, in either group who reported use of letter resources, so this data were excluded from the table..

**Table 4 Study Outcome Measures\***

	Email	Mail	<i>p</i> value
<b>Understanding of letter Information</b>			
Some understanding	1	3	.408
Complete understanding	2	18	
<b>Indication of Physician Follow Up</b>			
Yes	1	5	.386
Maybe	0	2	
No	2	14	

\*No participants reported use of resources

*Table 5* outlines the qualitative themes that during completion of follow-up surveys.

*Table 5 Qualitative Themes*

<b>Reasons for (not) using resources</b>
<ul style="list-style-type: none"><li>• Did not have time to look at links</li><li>• Did not see the resources</li><li>• Child had healthy screening results</li></ul>
<b>Reason for (not) following up with physician</b>
<ul style="list-style-type: none"><li>• Parent had not thought about sharing results with doctor</li><li>• Child had healthy screening results</li><li>• Doctor had reported that child was healthy/was not concerned about child's weight</li></ul>

## Chapter 5: Discussion and Conclusions

This pilot study set out to evaluate the effect of electronic communication (compared to a conventional letter) of health screening results on outcomes of 1) parents' self-reported understanding of health screening information, 2) utilization of provided informational resources, and 3) the decision of parents to seek physician follow-up. It was hypothesized that electronic communication would significantly increase parents' self-reported understanding and utilization of provided resources. It was also predicted that electronic communication would increase intended follow-up compared to traditional health screening communications. Results showed that there was no significant difference between communication methods on study outcomes, consistent with data reported in *Table 4*.

Most participants who were reached for successful follow-up (defined as follow up participants) reported complete understanding of the letter information, yet four follow-up participants did indicate less than complete understanding of the letter information. Overall, results potentially suggest that the letter was written at an appropriate readability level for the literacy and health literacy of the study population. In addition to parents reporting full understanding of letter contents, all parents reported that they did not use additional resources included in the letter. Qualitative data selected around this outcome (Table 5) indicated a lack of time to look at resources and lack of concern due to healthy screening results as reasons why additional resources provided in the letter were not used. These findings highlight the importance of convenience when it comes to information delivery.

Furthermore, there was no significant association in intention to follow-up with physician and communication method. Physician follow-up is a desired outcome of any screening program.<sup>6</sup> It is important to note that among the thirty-four families successfully surveyed, nine

had children who were overweight or obese. Five of these participants reported intention to follow-up with their child's physician. Qualitative reports from two of the four participants who indicated they have no intention of following up with a pediatrician (and their child identified as obese) cited that their child's doctor has not indicated the child as having a weight problem. This incongruence between the weight status reported to parents during this study and that reported by physicians might be an indicator of a larger picture in the fight against obesity. Haung et. al.,<sup>27</sup> set out to study the weight-related care of children in the US given by pediatricians and family physicians, concluding that the healthcare provider's role in assessing or managing childhood obesity in the primary care setting is very low.<sup>27</sup> If a child's primary care physician is not discussing the implications of a child's unhealthy weight status with parents, the issue cannot be addressed.

It is important to note that most parents with children of a healthy weight indicated no intention of follow-up with their child's physician. Qualitative reports suggest that parents did not think to share screening results with their child's physician or that they did not see a benefit in doing so since the results indicated good health. While it is necessary for parents to be continually aware of their child's weight status, parents of normal weight children who report no intention of following up with a physician should not label the screening a failure. This information can still be useful to help parents monitor their child's weight status over time.

Small sample size was likely to influence research findings. A total of ninety-two students were screened, yet study staff were only able to reach fifty families for follow-up.

Additionally, the email communication method appeared to be ineffective since email letters were significantly less likely to be received. Among the fifty families, only thirty-four families

received the health screening letter and were able to successfully complete the follow-up survey.

The inability to reach families for follow-up and the lack of ability for email communication to be received by parents had reduced our study population from ninety-two to thirty-two. Data indicated that parents who opted for health screening result delivery via conventional reporting were more likely to receive those screening results compared to families who opted for email communication. These findings were significant, 78.8% vs 47.1% ( $p=.023$ ).

### **Other Study Findings**

While study findings did not show expected results, there is an abundance of pertinent information outside of primary study outcomes. The greatest surprise in the research was the low rate of successful follow-up with participants. In reflecting on the study, three major influences were identified: lack of school nurse assistance, calling from a phone outside of the school, and limited time to make multiple follow-up calls, including the completion of a six item survey. In reviewing current literature, it was evident that the school nurse plays a major role in screening programs. This pilot study had the aid of the school nurse in the coordination and facilitation of screenings, but not during the follow-up stage of the study. It is possible that follow-up calls by the school nurse would have result in a higher follow-up success rate.

Another small change that could have increased the follow-up success rate was to make the follow-up calls from the elementary school. The follow-up calls were completed from James Madison University campus, and therefore from a number unfamiliar to parents. Assuming parents are familiar with the elementary school's phone number, they may be more likely to answer.



Finally, successful follow-up rates could have been increased if there was enough time for researchers to make multiple call attempts to reach parents. Due to restraints of time and resources, study participants only received an attempted follow-up call. A voicemail box was not available for callbacks from participants. Follow-up calls, even when unsuccessful were extremely time consuming with call times ranging from one to six minutes.

Two other factors were identified as major influences on study results: e-mail confidentiality policy and language diversity. In order to ensure that screening results were confidential for e-mail reporting, results were sent using an encrypted e-mail requiring the child's first name to be entered before viewing results. One contributing factor may have been the impact of this encryption process on the parents likelihood to open results.

Parents' language diversity was an unforeseen barrier at the commencement of the study. Participant recruitment made evident that several translation letters would be necessary for the study population. There were multiple families who could not enroll in the study because the language barrier left them unable to give informed consent. For enrolled participants, translation services available in Arabic, Kurdish and Spanish. Without these available resources, 26% of the study population would not have been able to participate. Even with these resources, there were still families who were unable to be reached, speaking languages such as Tigrinya. The language diversity also significantly influenced the follow-up success with parents.

## **Conclusions**

In conclusion, this study showed that parents who chose conventional communication had a significantly higher chance of receiving the screening results, compared to those who received screening results by e-mail communication. However, no significant influence on study

outcomes were found. The minor role of the school nurse, completion of follow-up calls from an unfamiliar number, lack of time for multiple follow-up attempts, requirement of encrypted email communication and language diversity influenced the study success and results. Further studies in this area should consider these factors.

## Appendices

### Appendix A: Bibliography

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## **Appendix B: Consent and Assent Forms Parent/Guardian Informed Consent**

### **Identification of Investigators & Purpose of Study**

Your child is being asked to participate in a research study conducted by Michelle Hesse PhD RD, Andy Peachy, PhD, and Kara Carter from James Madison University. The purpose of this study is to conduct health screenings to identify health risks among elementary age children. We will be working with Stone Spring Elementary School to screen children in Kindergarten, 1<sup>st</sup> and 3<sup>rd</sup> grade for height, weight and calculate body mass index (BMI). BMI will help us to identify children who are underweight, normal weight, overweight or obese. We will also screen for acanthosis nigricans (ak-an-THOE-sis NIE-grih-kuns) around the neck. Acanthosis nigricans is a risk factor for insulin resistance. Acanthosis nigricans screening is simple, they just need to tilt their heads forward so we can look at the back of their neck. Among 3<sup>rd</sup> grade children only, we will evaluate blood pressure. Your child's individual screening results will be reported to you after the screening, either sent home with your child or through email. You get to choose which way you would like to receive your child's health information. We will also provide you with information on what you should do if your child has one or more identified health risks. School based health screenings are not intended to diagnose a health condition, rather raise awareness about health risks which require further evaluation by a doctor. Study staff from James Madison University will follow- up with you after you have received the health screening information to ask you some questions. This study will contribute to the researchers' further knowledge of health risks among elementary age children and will also contribute to the completion of Kara Carter's senior honors thesis requirements.

### **Research Procedures**

Should you decide to allow your child to participate in this research study, you will be asked to sign this consent form once all your questions have been answered to your satisfaction. This study consists of a demographic questionnaire, a health screening evaluation and follow-up questions regarding your child's health screening letter. Your child's height and weight will be measured. We will also screen for acanthosis nigricans around your child's neck. If they are in the 3<sup>rd</sup> grade we will also evaluate blood pressure. We will also collect demographic information on your child's age, birthdate, gender, and race/ethnicity as well as email address and telephone contact information of the parent/guardian. We will access this information from your child's school records. The health screenings will be conducted at Stone Spring Elementary School with your child's school nurse. Your child's individual health screening results will be reported back to you by either sending home screening results with your child or through email. You have the option of choosing which way you would like to receive your child's health information. We will also provide you with information on what you should do if your child has one or more health risks. Once you have received your child's health screening information, JMU researchers will contact you to ask you some questions about the health screening letter.

**Time Required**

Participation in this study will require about 10 minutes of your child's time to conduct the health screening and about 20 minutes of your (parent/guardian) time to complete the demographic information and answer follow-up questions.

**Risks**

The investigators do not perceive more than minimal risks from your child's involvement in this study (that is, no risks beyond the risks associated with everyday life). Some information that we report to you about your child's weight and health status may be sensitive information and may be upsetting to you. We will not show or tell your child their health screening results. Also there is a possibility of a breach in privacy of your child's health screening information. We will go to great lengths to prevent this from happening by conducting screenings in a private room or in a curtained area in the school building. Also, due to human error, it is possible that the health screening results can be sent to an incorrect email address or home. We will go to great lengths to prevent this from happening by keeping detailed and organized records. We have also given you the option to have either your child's full name reported on the health screening form or just their initials. To ensure the safety of sharing health information over email (if you choose this option of receiving health screening information), we will use a service called Hush Mail to send you electronic health screening results. The only people that will have access to your child's health screening information are the study staff (Michelle Hesse PhD RD, Andy Peachy, PhD, and Kara Carter) and your child's school nurse.

**Benefits**

Potential benefits from participation in this study include knowing if your child has any health risks. This project will also help the investigators better understand the number of children with adverse health risks as well as the best way to communicate health screening information to parents/ guardians.

**Payment for participation**

There is no payment or compensation for participating in this study.

**Sending home health screening information (Please complete this portion)**

1) How would you like us to send you your child’s health screening information? (Check one)

\_\_\_\_\_ Sent home with my child.

\_\_\_\_\_ Email

\_\_\_\_\_ (please add a current email address here if you would like us to send your child’s information through email)

\_\_\_\_\_ It does not matter which way you send the information to me.

2) How would you like us to write your child’s name on the form where you will receive their health screening results? (Check one)

\_\_\_\_\_ Full Name      \_\_\_\_\_ Initials

**Confidentiality**

The investigators will go to great lengths to protect the privacy of the participants in the research study. All screenings will be conducted in privacy either in a private room or in a curtained area in the school building. This procedure is in place to prevent stigmatism or from other students seeing a participant’s screening outcome (i.e.: weight, height, etc.). We will also store any study data on protected, encrypted flash drives that will only be accessed by the investigators.

We intend for the results of this study to be published in a professional research journal or at a national or state wide conference. Your child will be identified in the research records by a number. This is call non-identifiable data. The researchers retain the right to use and publish non-identifiable data. When the results of this research are published or discussed in conferences, no information will be included that would reveal your child’s identity. All data will be stored on password protected, encrypted flash drive that will only be accessible to the researchers. Upon completion of the study, all information that matches up individual respondents with their answers will be destroyed.



There is one exception to confidentiality we need to make you aware of. In certain research studies, it is our ethical responsibility to report situations of child abuse, child neglect, or any life-threatening situation to appropriate authorities. However, we are not seeking this type of information in our study nor will you be asked questions about these issues.

**Participation & Withdrawal**

Your child’s participation is entirely voluntary. He/she is free to choose not to participate. Should you and your child choose to participate, he/she can withdraw at any time without consequences of any kind.

**Questions about the Study**

If you have questions or concerns during the time of your child’s participation in this study, or after its completion or you would like to receive a copy of the final aggregate results of this study, please contact:

Michelle Hesse PhD RD  
Health Sciences  
James Madison University  
hessemx@jmu.edu  
Telephone: (540)568-6570

**Questions about Your Rights as a Research Subject**

Dr. David Cockley  
Chair, Institutional Review Board  
James Madison University  
(540) 568-2834  
[cocklede@jmu.edu](mailto:cocklede@jmu.edu)

**Giving of Consent**

I have read this consent form and I understand what is being requested of my child as a participant in this study. I freely consent for my child to participate. I have been given satisfactory answers to my questions. The investigator provided me with a copy of this form. I certify that I am at least 18 years of age.

\_\_\_\_\_  
Name of Child (Printed)

\_\_\_\_\_  
Name of Parent/Guardian (Printed)

\_\_\_\_\_  
Name of Parent/Guardian (Signed)                      \_\_\_\_\_  
Date

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Name of Researcher (Signed)

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Date

**CHILD ASSENT FORM (Ages 7-12)**

**IRB # 02-XXAA**

School Based Health Screening & Communication among Elementary Age Children at Harrisonburg City Schools- A Pilot Project

We would like to invite you to take part in this study. We are asking you to take part since you are a student at Stone Spring Elementary School in 1<sup>st</sup> or 3<sup>rd</sup> grade.

In this study we will try to learn more about the types of health risks that children have. We also want to know how to share this information with your parent or guardian. The study will happen at your school. We will ask your parents a few questions about you. We will then have you stand on a scale and see how much you weigh. We will also see how tall you are. We are also going to look at your neck. If you are in the 3<sup>rd</sup> grade we will place a cuff around your arm and measure your blood pressure.

Participating in this study will not hurt you in any way.

Your parents have been asked to give their permission for you to take part in this study. Please talk this over with your parents before you decide whether or not to be a part of this study.

You do not have to be in this study if you do not want to. If you decide to not take part in the study, you can stop at any time.

If you have any questions at any time, please ask one of the researchers.

**IF YOU PRINT YOUR NAME ON THIS FORM IT MEANS THAT YOU HAVE DECIDED TO PARTICIPATE AND HAVE READ EVERYTHING THAT IS ON THIS FORM. YOU AND YOUR PARENTS WILL BE GIVEN A COPY OF THIS FORM TO KEEP.**

\_\_\_\_\_  
Name of Child (printed)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Investigator

\_\_\_\_\_  
Date

Michelle Hesse PhD RD  
Health Sciences  
James Madison University  
hessemx@jmu.edu  
Telephone: (540)568-6570

## Appendix C: Follow-up Survey

School Health Screening Follow-up Survey

ID # \_\_\_\_\_

1. What sections of your child's health screening letter did you read? (check all that apply)

- All
- None
- Child's Results
- BMI
- Blood Pressure
- Acanthosis Nigricans
- Resources
- What made you read or not read those sections?

2. On a scale of 1 – 10 (1 meaning not at all and 10 meaning completely) did you understand the information in the letter?

1      2      3      4      5      6      7      8      9      10

• [If not a 10] What information did you not completely understand?

3. Did you use any of the resource links provided to you in the letter? Yes    No

• If yes, which ones?

4. Do you have a primary care physician?      Yes    No

• If not would you like us to refer you to one?    Yes    No

5. Do you have plans to or have you already followed up with a physician about your results? Yes    No

6. Do you have any further questions? Yes    No

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