

Obesity, Physical Activity, and Health Implications in the Low-Income Community

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“Sedentary lifestyles are one of the most significant public health problems of the 21st century.”¹ Twenty-five percent of the budget of the United States is spent on health care.² On the current trajectory, “medical costs associated with treating preventable obesity-related diseases are estimated to increase by \$48 million to \$66 billion per year in the United States, and the loss in economic productivity could be between \$390 billion to \$580 billion annually by 2030.”³ We have a moral obligation to provide access to health, to include preventive measures like physical fitness, because the consequences of denying those benefits to the poor magnify health issues that could be avoided. Obesity is becoming a national epidemic; in the United States, obesity is increasing in adults and children with current statistics reaching 68.8% and 31.8% respectively.⁴ There is a growing trend of obesity rates rising amongst the poor. In adults, the relationship between obesity and poverty is inconsistent, but in children it is clear. Children in poverty are more likely to be overweight than children who are not in poverty. Concentrating on the poverty income ratio (PIR), boys show an increasing trend in obesity-11.9% at $\geq 350\%$ PIR, 17.4% at $130\% \leq \text{PIR} < 350\%$, and 21.1% at $< 130\%$ PIR. Girls show similar rates at 12.0%, 17.4% and 19.3% respectively.⁵ The obesity trend is also seen in rural and urban populations, with rural populations (36%) showing a greater rate of overweight children

¹ Blair et al., “Exercise Therapy-The Public Health Message”, *Scandinavian Journal of Medicine & Science in Sports* 22 (2012), e24.

² “US Federal Budget Analyst,” last modified 2013, http://www.usgovernmentsspending.com/health_care_budget_2010_1.html.

³ “F as in Fat: How Obesity Threatens America’s Future 2012,” last modified September 2012, <http://www.healthyamericans.org/report/100/>.

⁴ “Overweight and Obesity in the U.S.,” last modified 2010, <http://frac.org/initiatives/hunger-and-obesity/obesity-in-the-us/>.

⁵ Ogden et al., “Obesity and Socioeconomic Status in Children and Adolescents: United States, 2005-2008,” *National Center for Health Statistics Data Brief* 51 (December 2010).

than urban populations (30%).⁶ The Rockbridge area, the focus of this study, shows a very high instance of childhood obesity and is geographically considered a rural area. We have a moral responsibility to protect the health and opportunity of the most vulnerable populations—at the least we have an obligation to protect the health capabilities of the poor. *Healthy People 2020* states, “Our health is also determined in part by access to social and economic opportunities; the resources and supports available in our homes, neighborhoods, and communities; the quality of our schooling; the safety of our workplaces; the cleanliness of our water, food, and air; and the nature of our social interactions and relationships.”⁷ This indicates that there is an obligation for the community to provide a means of providing education on and opportunity for physical activity since community plays a role in access to physical activity. We have an obligation to promote physical activity as a preventive health measure, provide a means to participate in physical activity, and disseminate knowledge about physical activity to parents and community leaders. At a minimum, children should be instructed to participate in a minimum of 60 minutes of physical activity as this number has been shown to produce the highest ratio of benefits to risk. The long-term negative effects of childhood obesity have a wide range of effects from lowered mental health and physical health to health issues in adulthood, while an increased level of physical activity and decrease in sedentary lifestyle is shown to cause an increase in the same characteristics.⁸

⁶ “Diet, Physical Activity, and Sedentary Behaviors as Risk Factors for Childhood Obesity: An Urban and Rural Comparison,” last modified summer 2010, http://rhr.sph.sc.edu/report/SCRHRC_KF_DietandPhysicalActivity.pdf.

⁷ “Social Determinants of Health,” last modified April 10, 2013, <http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=39>.

⁸ William B. Strong et al., “Evidence based Physical Activity for School-Age Youth,” *The Journal of Pediatrics* (June 2005): 732-737. doi: 10.1016/j.jpeds.2005.01.055.

Obesity

Defining Obesity

Body mass index, or BMI, is the standard measure for obesity. BMI is a formulated measure comparing height and weight that determines the amount of body fat. I utilized the Center for Disease Control and Prevention's Children's BMI "Tool for Schools" in order to determine the BMI and BMI Index of children of a local elementary and middle school.⁹ BMI has many limitations. If a person is muscular, the BMI will not be accurate as it does not account for muscle mass. BMI also does not account for gender or age. "During growth and maturation, body proportions, bone mass, and the ratio of lean-to-fat tissue change at different times and at different rates. The timing of these body composition changes may be related to development of overweight and obesity.

Therefore, caution is necessary when BMI is used as a measure of body composition in children and adolescents."¹⁰ So, BMI percentile is used for comparison across gender and age lines. BMI percentile less than or equal to five percent is underweight, 6-84 percent is normal, equal to 85-94 is overweight, and greater than or equal to 95 percent is obese. Severe obesity is classified as greater than 99 percent on the BMI percentile range. Severe, sometimes referred to as morbid obesity, is a good indicator for future obesity in adulthood.¹¹ There are problems with monitoring BMI trends. When looking at the

⁹ "Children's BMI Tool for Schools Assessing Your Weight : Children's BMI Tool for Schools," last modified November 30, 2011,

http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/tool_for_schools.html.

¹⁰ Richard P. Troiano and Katherine M. Flegal, "Overweight Children and Adolescents: Description, Epidemiology, and Demographics," *Pediatrics* 101 (1998): 497-504.

¹¹ Joseph A. Skeleton et al., "Prevalence and Trends of Severe Obesity among US Children and Adolescents," *American Academy of Pediatrics* 9, no. 5 (2009): 322-329, doi: 10.1016/j.acap.2009.04.005.

overall trend, there is no way of distinguishing whether the entire population is growing larger or whether those at the highest weights are getting heavier.¹²

Health Costs of Obesity

The health implications of childhood obesity range from short-term to long-term consequences. The short-term consequences include mental health issues, asthma and cardiovascular risk factors. Obese children are more likely to be subjected to mental health issues, namely lowered self-esteem and behavioral problems. This problem may be amplified depending on the weight status of the parents. Children with parents that are overweight are more likely to be overweight. The cardiovascular risk factors include:

“high blood pressure, dyslipidemia, abnormalities in left ventricular mass and/or

function, and hyperinsulinemia and/or insulin resistance.”¹³ Obese children may have multiple cardiovascular risk factors in comparison to those that are not obese. Children

who are obese are at an increased risk of having a “raised diastolic blood pressure, raised systolic blood pressure, raised LDL cholesterol, low HDL cholesterol, raised triglycerides, and high fasting insulin concentration”.¹⁴ Obesity also increases the likelihood of developing asthma or the severity of diagnosed asthma. Few studies have also shown an increased risk for type I diabetes, low grade systemic inflammation, serum C reactive protein concentrations, and of abnormalities in foot structure.¹⁵

¹² Troiano and Flegal, “Overweight Children and Adolescents.”

¹³ Reilly et al., “Health Consequences of Obesity,” *Archives of Disease in Childhood* 88 (2003): 748-752.

¹⁴ Reilly et al., “Health Consequences of Obesity.”

¹⁵ Reilly et al., “Health Consequences of Obesity.”

The long-term consequences of childhood obesity are mostly caused by the increased risk of persistence of obesity into adulthood. There are social and economic implications for obesity include lower income and educational attainment. It is also associated with an increased risk of mortality.¹⁶

Costs of Obesity in Virginia

Taking a step back from the national problem, there is still a noted increasing trend of obesity in the state of Virginia. The poverty rate for Virginia is 8.9% for all ages and 12.2% for children, while the obesity rate is 29.2% for adults and 31% for children.¹⁷¹⁸ *Trust for America's Health* predicted that the obesity rate in adults in Virginia could reach 49.7% if it continues to follow the current path. Their study recommends at least a 5% decrease in the BMI of residents and shows the costs, in terms of lives and money, which could be saved if the 5% reduction is achieved. With the current state of monetary resources, the number is worthy of future review.¹⁹ As stated before a large amount of national funds are spent on health care, and a considerable amount of these funds are spent on obesity-related health problems. In Virginia, it is projected that obesity-related health costs will increase to 23.8% by 2030.²⁰ According to the study, the 5% reduction in BMI could lead to over 6 million in cumulative potential saving by 2020 and over \$18 million by 2030. Further, potential cases of the leading

¹⁶ Reilly et al, "Health Consequences of Obesity."

¹⁷ "Local Department of Social Services Profile Report 2012 SFY," last modified 2013, http://www.dss.virginia.gov/geninfo/reports/agency_wide/ldss_profile.cgi.

¹⁸ "Obesity," last modified February 1, 2013,

<http://vaperforms.virginia.gov/indicators/healthfamily/obesity.php>.

¹⁹ "Bending the Obesity Cost Curve in Virginia," last modified September 2013, <http://www.rwjf.org/content/dam/farm/reports/reports/2012/rwjf401510>.

²⁰ "Cost Curve"

obesity-related health problems could be significantly reduced. The following reductions are projected cumulatively by 2030: type 2 diabetes (209,621), coronary heart disease and stroke (183,631), hypertension (175,777), arthritis (104,689), and obesity-related cancers (13,764).²¹ This data shows that even a small decrease in BMI would show a large decrease in spending, but more importantly a substantial decrease in the number of people affected by obesity-related health problems. This indicates that steps in the right direction are within reach.

Poverty and Obesity

The lowest prevalence of obesity was found in the wealthiest populations.²² Low-income neighborhoods are plagued with accessibility issues, including ones connected to physical fitness. Low-income neighborhoods were also found to have the few free for use options for physical activity.²³ The total number of obese children in poverty does not outweigh the number of children that do not live in poverty (>130% PIR). Discrepancies with these numbers reveal a need for a consistent measure of poverty. The percentage of obese children in each racial category is still rather large in comparison to other categories. For most groups, education of the head of household is inversely related to obesity. In a comparison of obesity data in 1988-1994 and 2005-2008, obesity has increased in all income levels and all levels of education.²⁴

²¹ "Cost Curve"

²² Skeleton et al., "Trends of Severe Obesity."

²³ Paul A. Estabrooks, Rebecca E. Lee, and Nancy C. Gyurcsik, "Resources for Physical Activity Participation: Does Availability and Accessibility Differ by Neighborhood Socioeconomic Status?," *Annals of Behavioral Medicine* 25 (November 2, 2003): 100-104.

²⁴ Ogden et al., "Obesity and Socioeconomic Status."

Rural Obesity

Rural residents were shown to be slightly more likely to be in poverty than their counterpart urban residents. 29.1% of rural residents had incomes less than \$20,000, while only 20.6% of urban residents had the same income. Rural residents were shown to be more physically inactive than urban residents. In active people, 16.1% of rural residents were obese, while only 13.8% were obese. In inactive people, 21.1% of rural residents were obese, while only 19.4% of urban residents were obese. This study only looked at adults and not children.²⁵

Physical Activity

Effects of Physical Activity on Health

The benefits of physical activity include an increase in academic performance, mental health status, and biological composition. 25% of all deaths in the world can be attributed to 5 risk factors, high blood pressure, tobacco use, high blood glucose, physical inactivity, and obesity. Physical inactivity contributes to 3 of the 4 other factors. In the US, 20% of deaths are caused by or related to obesity and lack of physical activity. “A substantial portion of disability and mortality of some cancers, diabetes, and cardiovascular disease are directly attributable to inactivity-induced low levels of cardiorespiratory fitness and obesity.”²⁶ In recent years, America has been on a decline in physical activity. Some exercise is better than none, even if only for short amounts of time. It is important to just start exercising. Small benefits can be seen with the first

²⁵ Patterson et al., “Obesity and Physical Activity in Rural America,” *The Journal of Rural Health* 20, no. 2 (Spring 2004): 151-159.

²⁶ Blair et al., “Exercise Therapy,” e24.

workout, and benefits are greatest in those who are sedentary and begin an active lifestyle.²⁷

In academics, physical activity is also positive. Coe et al. cited some studies that have shown that physical activity increases academic performance and interest in scholastics. Other studies have also shown that there is a relationship between socioeconomic status and physical activity. Students of higher socioeconomic status are more likely to participate in physical activity and sports. He found that an extra hour of moderate, or regular physical education classes did not show an increase in academic performance, but it lacked a decrease in academic performance. Coe et al. did find that vigorous activity might be related to increased academic performance. Students who surpassed or achieved the recommended amount of vigorous activity suggested by

Healthy People 2020 showed an increase in academic performance, in comparison to those who did not complete any vigorous activities. Physical activity also improves

mental health. It was shown to decrease symptoms for anxiety and depression, increase self-concept, and possibly increase cognitive abilities, like memory and concentration. In addition, class behavior improves with increased physical activity. The physical effects of physical activity include an increase in muscular strength and bone mineral content and density.²⁸ Physical activity lowers the amount of fat a person carries. Vigorous activity has been shown to improve physical components of metabolic syndrome, like triglyceride level, insulin level and adiposity. Blood pressure may be decreased with a specific

²⁷ Blair et al., "Exercise Therapy."

²⁸ Coe et al, "Effects of Physical Education and Activity Levels on Academic Achievement in Children," *Medicine & Science in Sports & Exercise* (2006): 1515-1519. Doi: 10.1249/01.mss.0000227537.1375.1b.

workout regimen, in cases with of mild hypertension.²⁹ In adulthood, the benefits of physical activity continue to manifest themselves. Physical activity lowers the chances of development of coronary artery disease. The effects of physical activity in children and adults are shown to be similar. Physical activity increases HDL-C, lowers triglycerides, lowers LDL-C, lowers blood pressure, lowers hemoglobin in patients with Type II diabetes, and lowers the risk of obesity. Adults who exercise are also more likely to maintain cessation of smoking cigarettes after quitting the habit.³⁰

There are also negative aspects of physical activity, which are usually caused by improper performance of physical activity. A person should generally talk to their physician before beginning a physical activity plan to assess personal risk factors and avoid injuries. Those who are mostly physically inactive should observe gradual and progressive increase to the standard. It is suggested that a child increase their activity by 10% weekly until the requirement is reached.³¹ Consistently participating in the recommended amount lowers the risk of injury associated with isolated bouts of physical activity. Setting reasonable limits on an individual's capabilities is a factor in lowering injury.³² Children with respiratory issues, like asthma, must monitor their activities more intensely in order to lower the occurrence of symptoms.³³

²⁹ Strong et al., "Physical Activity for School-Age Youth."

³⁰ Thompson et al., "Exercise and Physical Activity in the Prevention and Treatment of Atherosclerotic Cardiovascular Disease," *Circulation* 107 (2003): 3109-3116.

³¹ Reilly et al., "Health Consequences of Obesity."

³² Thompson et al., "Exercise and Physical Activity."

³³ Strong et al., "Physical Activity for School-Age Youth."

Appropriate Physical Activity

The trends in physical activity are not related to an increase in caloric intake but instead to a shift towards a sedentary, or inactive, lifestyle.³⁴ The U.S. Department of Health and Human Services recommends that children receive 60 minutes of physical activity per day. Children should participate in mostly aerobic exercise, but also muscle and bone strengthening exercises. The activities should be both moderate and vigorous in intensity. The activities should be age-appropriate and enjoyable.³⁵ It is important to meet these recommendations in order to see the health benefits mentioned in the previous section. Some require specific guidelines about the amount of vigorous versus moderate activity necessary, but generally meeting the guidelines with some vigorous activity will suffice. It is important to be consistent with the activity in order to sustain the benefits garnered from previous physical activity. This number also contributes to the wanted behavioral outcomes. This amount of physical activity also sets up children to be in a good position developmental motor skills.³⁶

Rockbridge Area

Lexington and Buena Vista are small cities (the population of each hovers around 7,000 from year to year). Both are surrounded by Rockbridge County, a rural area set in the Shenandoah Valley and surrounded by the Alleghany and Blue Ridge Mountains. According to the Virginia Department of Social Services' 2012 data, the total population of Lexington, Buena Vista, and Rockbridge is 36,006. The population of children under

³⁴ Troiano and Flegal, "Overweight Children and Adolescents."

³⁵ "Physical Activity Guidelines for Americans," last modified October 16, 2008, <http://www.health.gov/paguidelines/guidelines/chapter3.aspx>.

³⁶ Strong et al., "Physical Activity for School-Age Youth."

the age of 17 here is 6,207. The poverty rate in the combined Lexington/Rockbridge/Buena Vista area is 14.7% for all ages and 18.9% for children. Statewide the poverty rate is 11.6% for all ages and 15.6% for children. The area has seen a slight increasing trend in the poverty rate, in both categories, since 2001.³⁷

BMI Results

Harrington Waddell Elementary School

Harrington Waddell Elementary School, known locally as Waddell Elementary, is the city of Lexington's only elementary school. The school houses grades K-5 (as well as a federally funded HeadStart program). The BMI data for Waddell Elementary can be found in Appendix A. Figure A1 shows the distribution of the BMI indexes for all

students. The concentration of BMI indexes is on the higher side, 65% of all students are in the normal weight range, while 35% of all students are overweight. Only one student

was underweight. Next, the overweight category was broken down into overweight, obese, and severe obesity. Most overweight students are simply overweight (17%), followed by obese (14%) with a few registering as severely obese (5%). The number of severely obese children, while small in absolute terms, is nevertheless alarming. Data for both sexes tended to be fairly equal and can be seen in Appendix A.

Next, the total number of all overweight students (all students with BMI Index $\geq 85^{\text{th}}$ percentile), overweight students (85^{th} - 94^{th} percentile), and obese ($\geq 95^{\text{th}}$ percentile) were compared to the number of free and reduced lunches to look at comparisons about obesity and poverty. Twenty-one percent of students participate in the free or reduced

³⁷ "Social Services Profile"

lunch programs. Looking at the number of free or reduced lunches can give insight to the amount of poverty within the school. The number of obese students and the number of students that receive free or reduced lunch are almost identical. This can be seen in Figure A4 of the Appendix. The Department of Social Services reported that 19% of all children in Rockbridge, Lexington and Buena Vista are in poverty. The comparison between the weight categories and this poverty rate are seen in Figure A5. The number of obese students is identical to the poverty rate. Nothing can be definitely inferred from this part of the data, but it is similar to studies of national trends. National trends indicate that students on free or reduced lunch are more likely to be obese than other students.

Lylburn Downing Middle School

Lylburn Downing Middle School is the only middle school within the Lexington city limits. It houses grades 6-8. The data for Lylburn Downing Middle School is very similar to that of Waddell Elementary School and can be found in Appendix B.

The distribution of BMI indexes is not as one-sided as the elementary school. Lylburn Downing did have a slight increase in the number of underweight students (2%). The percentage of students in the normal range is 66% and the percentage of overweight students is 33%. The percentage of boys in the normal range (58%) was lower than the number of girls (73%), while the percentage of boys in the overweight range (40%) was higher than the percentage of girls (26%). The percentage of overweight students was 20%, the number of obese students was 10% and the number of severely obese was 3%. The boys and girls were fairly equal in the separation of obesity parameters.

Fourteen percent of students at Lylburn Downing Middle School received free or reduced lunches. The number of overweight students exceeds the percentage of students that receive free lunch. Again, the number of obese students is very similar to the national trend.

Comparison of Both Schools

Next, the data for both schools was combined and compared. Sorting the data by age (Figure 1C) showed no pattern.

Boys and girls from Lexington were compared to state and national numbers. Both girls and boys from Lexington were less likely to be underweight than the average child in the state of Virginia or nationally. In all other categories, Lexington boys and girls had a higher percentage of children that fell into the normal, overweight and obese categories, except one category. The percentage of obese boys in Lexington is less than the percentage of boys on the national level. Using this as a comparison, Rockbridge children are slightly more overweight and obese than other children in the state and nation.

Survey Results

Parents

Surveys were distributed to parents of students at Waddell Elementary via email. Each parent was asked to fill out a short survey that could be accessed through a link

connecting him or her to Survey Monkey.³⁸ The survey was distributed with a permission letter that described the research and conditions of the survey. A total of 88 surveys were received with responses. Parents were allowed to answer or skip as many questions as they desired. A detailed summary of responses for questions one through seven of the survey can be found in Appendix. Generally, the survey indicated that students are receiving the correct amount of physical activity. Parents also indicate that there is an inability to adequately utilize available space in Lexington, considering most facilities are unavailable for a variety of reasons. Most parents do feel that there is a variety of available resources for physical activity for their children to use, but the increased amount of obesity may be an indicator that the types of physical activity may need to be altered.

Question one asked the parents about their knowledge concerning physical activity requirements for their children. While 59% of parents responded correctly with the American Heart Association recommendation of 60 minutes, the responses ranged from 30 minutes to 4 hours. It is important that parents are first informed of the amount of physical activity their child should receive in order to be in position to provide the correct amount. Question two asked about the amount of physical activity his/her individual child (or children) participated in daily. 17% of children participate in less than an hour of physical activity on a typical day, 69% participated in an hour to two hours of physical activity per day, and 14% participated in more than two hours of physical activity per day. According to this, over 83% of children are receiving at least the minimum required amount of physical activity.

³⁸ The survey can be found in Appendix D or by following the link (<https://www.surveymonkey.com/s/KG26RMW>).

Question three asked about specific activities that children participate on the average day. The majority of children (98.8%) played outside regularly. Playing outside was the most popular followed by organized sports (79.5%), riding bicycles (63.6%), chores that require physical activity (62.5%), dancing (61.3%), and swimming (60.2%). Of the high intensity activities, organized sports (29.6%) lead followed by plying outside (20.4%) and both were a considerable difference from the next activity. Most activities were of moderate intensity (37.2%), followed by low intensity (35.5%), and high intensity (27.3%). A blank was left for parents to fill in activities that were not on the list. Most answers included responses that could have fallen under one of the categories, and therefore all may be more frequent than they appear. Other activities included gymnastics, outdoor activities like hiking, horseback riding, and weightlifting.

Question four asked about the organizations and facilities utilized as a means of participating in physical activity. The YMCA was utilized the least of all facilities. 78% of respondents do not use the local YMCA for physical activity for their children. Most (64%) do not use local churches as a means of physical activity. After-school programs and dance studios were split in half as to whether they were used at all. Local parks (94%) were utilized the most of all given options. A large proportion, 63%, utilized RARO at some point during the month. Of those who utilized any of the facilities, 81% used them once or more a week. In the other section left for specific names of places utilized, it was noted that some people travel to Roanoke, VA and Staunton, VA, both over 30 miles from Lexington, VA, in order to participate in physical activity programs.

Question five asked parents about the obstacles to their child's physical activity in Lexington. 17% stated that they saw no barriers to physical activity in Lexington. The top

obstacles were time (38%), lack of resources (15%), and weather (15%). Time is generally an inability to complete physical activity due to other constraints or priorities. Time included multiple responses like homework, parent's work and busy schedules, and participation in too many other activities. Lack of resources is also a generalized response for a variety of responses. It included a lack of programs designed for young children, a lack of variety in activities offered, a lack of facilities, and a lack of teams in specific sports. Weather could have also been included under lack of resources. There is not an open facility for children to participate in physical activity after school if the weather does not permit outdoor play. Lack of interest (5%) includes a stronger desire to participate in sedentary activities like watching television and playing video games. Another parent also pointed out that the lack of sidewalks in some areas removes the option of children walking/running along the sidewalks or riding bicycles.

Question six asked about the accessible options for physical activity in Lexington.

Generally, most people (69%) stated that there were a variety of accessible options for physical activity in Lexington. Only one person explicitly answered no to the question. A considerable number of others did however mention the limited number of facilities as an issue with accessibility. Cost and distance were mentioned as making options inaccessible.

Question seven asked about future opportunities and improvements in Lexington opportunities for physical activity for children. 12% stated that they were content with the current amenities and offered no ideas for change. The suggestions included more programs (30%), better facilities (21%), more after-school programs (16%), more facilities (13%), physical education and recess offered more (6%), and lower cost. Most

people desire a wider variety in the programs offered. For instance, outdoor activities like hiking were mentioned very often and also a variety of sports options. Parents would also like to see an increase in family-oriented programs that help the entire family to stay fit. An indoor facility is one of the biggest issues with the area. Parents would also like to see an increase in the options available to younger children and gender-specific activities. Better facilities, and maintenance of current facilities was a major point. Parents would like to see RARO increase their presence and option availability. The competition level of the area is thought to be very low and parents feel that changes to the way organizations are currently operating could increase this. Increasing the competition also sets children up to be more competitive at higher-level sports later in school. There is also a desire for parks to be maintained better. A lot of parents would like to see the schools, or even an organization like RARO, offer an after-school program that children could participate in with an academic and active aspect. This would also help lessen the pressures on working parents.

Discussion of Parent Survey

This survey on the surface seems to suggest that children are getting the appropriate amount of physical activity. The leading daily activities are playing outside, organized sports (most notably through RARO and other seasonal sports programs), and riding bicycles. Two of the activities are completed mostly outdoors and it would seem that the weather would prevent children from participating in either very frequently. Without the option of an indoor facility in Lexington, it does seem unlikely that these children are participating in the activities as often as it seems. On the same note, RARO,

and other local sports teams for young children, are a help seasonally. Most activities offered by RARO are offered for 6 week terms and the swim team continuing throughout the summer. Practice for these teams tends to be 1-2 days a week with one day of competition. The consistency in children receiving the correct amount of physical activity is slightly questionable. Like others, I question how much elementary homework could affect the ability to participate in physical activity. The lack of decrease in physical activity is a positive sign. Physical activity through physical education is known to promote lasting physical activity patterns, but it is important that instructors include activities in addition to sports in their curriculum.³⁹

To be sure, there were limitations to this survey. Most notably, the survey was only distributed to one school. Extending the range to the adjacent city and county will give a better idea of physical activity in the local area. The survey was distributed by email for convenience purposes. This decision limits the population that receives the survey to those with computers and may not include a large amount of the lower-income community. All parents on the email list received the survey, allowing for the possibility of both parents to complete the survey. In addition, with surveys, self-reporting tends to be of questionable accuracy. People may exaggerate or play down responses in order to be viewed in a particular way. The survey did not leave a section for determining what activities children participated in during different seasons. School and weather could play a factor in the exercises children participate in daily. It would be worth noting as to how children received the standard amount of physical activity during this time period, or if they were receiving the recommended amount at all. The lack of a definition of

³⁹ Troiano and Flegal, "Overweight Children and Adolescents."

accessible also may have created some inconsistency among the answers. Had the survey been specific about costs related to using facilities, accessing facilities during specific times, and participation during different times of the year, parents may have looked at the question differently.

Professionals

I also conducted interviews with a variety of professionals within the school system ranging from principals to nurses to physical education instructors. Five completed a survey that was sent to them through Survey Monkey.⁴⁰ Although this number is low, others were asked similar questions during interviews. The different perspectives were also beneficial in getting a better idea of physical activity in schools.

Most professionals were aware of the general standards for physical activity for children. Most also agreed that the school was responsible for providing most, if not all, of the daily physical activity. Students spend a large portion of the day, especially of their awake hours, at school. Parents must also encourage some form of physical activity in the home also. There are no mandates on physical education, but there are Standards of Learning in place advising on the physical education curricula.⁴¹ The children receive a

⁴⁰ The survey can be found by following the link <https://www.surveymonkey.com/s/KHVFG9J>.

⁴¹ The Physical Education Standards of Learning for Virginia Public Schools identifies the concepts, processes, and skills for physical education in kindergarten through grade twelve. This framework provides school divisions and teachers with a guide for creating aligned curricula and learning experiences in physical education. The intent of physical education is to help students learn the skills necessary for performing a variety of physical activities and understand the benefits of achieving and maintaining a physically active lifestyle. (http://www.doe.virginia.gov/testing/sol/standards_docs/physical_education/complete/standards_physedk-12.pdf)

varying amount of physical education classes. Typically, students receive approximately 30-50 minute sessions. The number of sessions per week varies from two to five days per week. It is dependent on the curriculum, the facilities, number of instructors, and time.

The younger children are also offered recess. The students choose the activities completed during recess and the degree of intensity varies greatly. The schools' physical education programs have reportedly not been affected by recent budget cuts. One of the schools has stressed not removing a student from recess for behavioral misconduct, in order to promote participation in physical activity. Although not followed by all faculty, teachers are encouraged to engage students with physical activity in the classroom.

Incorporating some form of activity into the classroom accomplishes this task. Waddell, in addition to physical education and recess, offers a walking club for twenty minutes

three times a week. Children are receptive to different types of activities, so the curriculum for physical education has to be varied.

There were barriers to children participating in physical education noted for during school and outside of school. During school, limited space, shortage of faculty, and time are the biggest factors. Outside of school, lack of facilities, finances and transportation are the biggest barriers. The professionals of the schools described future plans of Lexington include a recreational center that offers some form of transportation, but money, space, and leaders are all challenges to implementing the center. The center would provide instruction on fundamentals of sports, allow for equipment checkout and use, and be supervised.

Health classes are beneficial in teaching children about the importance of physical activity; however, most students do not receive a health class until late middle school or high school. Patterns like these must be taught from a very early age.

MAPP Project

The MAPP Project looked into the status of health in Lexington, Buena Vista and Rockbridge County. During 2011-2012, the Rockbridge Area Free Clinic, along with Carilion Stonewall Jackson Hospital and Shenandoah Health District, received a grant and conducted the project known as “The Rockbridge Area MAPP Project”. MAPP, Mobilizing for Action through Planning and Partnerships, “is a community-driven visioning and planning process that assess needs, prioritizes public health issues, and strategically plans for the use of available resources.”⁴² The outcome of the project was to develop an approach for refining and improving the local community’s future health.

Using the *Healthy People 2020* Leading Health Indicators, the steering committee determined the most vital issues for the Rockbridge area were Access to Health Services, Nutrition, Physical Activity & Obesity, Oral Health, and Mental Health.⁴³

The second goal listed in the *Rockbridge Area Community Health Improvement Plan* is to “reduce the rate of obesity in the Rockbridge area.”⁴⁴ For children and adolescents, the target percentage for children who are obese is 14.6 percent. The

⁴² “Rockbridge Area Community Health Needs Assessment,” last modified 2012, http://www.rockbridgefreeclinic.org/resources/Updates/Rockbridge%20Area%20CHNA_2012_Final.pdf.

⁴³ “CHNA.”

⁴⁴ “Rockbridge Area Community Health Improvement Plan,” last modified 2012, <http://www.rockbridgefreeclinic.org/resources/Updates/Rockbridge%20Area%20Community%20Health%20Improvement%20Plan.pdf>.

suggested avenue of approach for physical activity is to use already established groups to help train and promote the meeting of physical activity goals.⁴⁵ This is a strong foundation for trying to meet this end. The organization's currently in Lexington have an idea about how the community works and what future plans would be conducive to improvement. I would now like to further the recommendations for the community. Following the CHNA and CHIP assessments, the Rockbridge Area 2020 group was formed. This group is responsible for coordinating ongoing health improvement efforts brought out in the study.⁴⁶

Possible Recommendations

The obesity problem in the Rockbridge Area poses a not insignificant threat to the children in this vicinity. Although BMI data for Buena Vista is not available in the current study, during the 2011-2012 school year 53.5% of elementary school students, 42% of middle school students, and 35% of high school students were overweight.⁴⁷ These alarming rates need immediate action. Although it is important that health care providers participate actively by encouraging their patients to participate in physical activity, public health leaders should play a visible role. Those involved in public health are better equipped to tackle inequalities in the social determinants of health, which seem to be an issue in Lexington. They are more involved with the community and can provide support and guidance. The Task Force on Preventive Community Services has conducted an evidence-based review and determined 6 effective strategies to increase physical

⁴⁵ "CHNA"

⁴⁶ Interview with Laura Simpson.

⁴⁷ "CHNA."

activity. The six steps are: community-wide campaigns, point-of-decision prompts to encourage using stairs, school-based physical education, social support interventions in community settings, individually adapted health behavior change, and creation of or enhanced access to places for physical activity combined with informational outreach activities. The end goal is increased physical fitness throughout the community.⁴⁸ The key points will be community involvement and utilization of current resources. Applying each of the interventions to the Rockbridge Area provides a pathway for future improvement of physical fitness. Rockbridge Area 2020 group would be a valuable resource for coordinating and tracking ongoing community-wide efforts.

With the target of reducing childhood obesity, the school should take the lead in efforts. Children spend a majority of their day at school. The school should combine efforts with local community organizations and local government agencies. The School Health Advisory Board is presently working at the school level to increase physical activity for children during school hours. *Let's Move Lexington* is currently working in the community towards this effort. *Let's Move* is a “comprehensive initiative, launched by the First Lady, dedicated to solving the challenge of childhood obesity within a generation, so that children born today will grow up healthier and able to pursue their dreams”.⁴⁹ The program is currently only in Lexington, but the current leaders could help both Buena Vista and Rockbridge County to start similar initiatives. The efforts must be “large-scale, high-intensity, community-wide campaigns with sustained high visibility”.⁵⁰

A community wide effort is successful at increasing physical activity by increasing the

⁴⁸ “Increasing Physical Activity,” last modified October 29, 2001, <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5018a1.htm>.

⁴⁹ “Let’s Move,” last modified 2013, <http://www.letsmove.gov>.

⁵⁰ “Increasing Physical Activity.”

number of persons active, energy expenditure, and time spent completing physical activity. A community wide effort is imperative for increasing physical activity.

Point-of-decision prompts promoting people to use stairs were also proven to be effective. The study found that people were more likely to use the stairs instead of an elevator if a sign was posted next to the elevators. School leaders could work with the Chamber of Commerce to encourage local business participation. The signs could be posted at businesses, schools, and the local hospital. Waddell Elementary presently has a Walking Club that meets three times a week. Increasing the number of programs like this would increase physical activity among children. The children are given small rewards to encourage participation. The Lexington City School Health Advisory Board could meet with the other two School Health Advisory Boards and exchange ideas. If the walking club is successful, they could discuss methods of implementing the program at other schools.

The third intervention is an increase in school-based physical education. This study suggested that increasing the amount of physical activity in physical education classes, at both moderate and vigorous levels, and increasing the length of physical education classes will increase the amount of access children have to participation in vigorous physical activity and energy expenditure. In Lexington, it would be more beneficial to add additional after-school programs. Programs like *Beyond* are already in place in local schools, but an extension to programs that are evidence-based may be more beneficial. *We Can!*, ways to enhance children's activity and nutrition, "offers organizations, community groups, and health professionals a centralized resource to promote a healthy weight in youth through community outreach, partnership

development, and media activities that can be adapted to meet the needs of diverse populations.”⁵¹ Programs like this provide parents with education on how to appropriately engage their children in physical activity. Since, the data collected in the surveys show that most children are receiving the appropriate amount of physical activity, adjustments to activities may change the state of obesity in the Rockbridge Area.

A social support intervention in community settings is another option. The focus of this intervention is “changing physical activity behavior through building, strengthening, and maintaining social networks that provide supportive relationships for behavior change, specifically physical activity.”⁵² This was shown to increase the amount of time spent participating in physical activity and frequency of exercise. Walking buddies or workout buddies are methods of implementation. This could also be tied in with the walking clubs. Pairing younger children, kindergarten through second grade, with older children, third through fifth graders could be an idea. The older children could serve as a mentor, while also providing the younger child with motivation to participate in supervised physical activity.

Individually adapted health behavior change is the fifth intervention option. This intervention was shown to increase the amount of time spent participating in physical activity and energy expenditure. The importance of this is to teach goal-setting, social support, self-reward, positive reinforcement, and relapse prevention. This would be an important aspect of each program that is started. It is important to encourage this type of behavior in order to encourage future participation in physical activity.

⁵¹ “About *We Can!*,” last modified February 13, 2013, <http://www.nhlbi.nih.gov/health/public/heart/obesity/wecan/about-wecan/index.htm>.

⁵² “Increasing Physical Activity.”

Creation of, or enhanced access to, places for physical activity combined with informational outreach activities is the last intervention method, and one of the most relevant to Lexington. This intervention increases opportunities for physical activity and provides education on how to properly use equipment. It was shown to increase the number of people that participate in physical activity and energy expenditure. It is important that programs are made available to children outside of Lexington. Most organizations base their focus on Lexington, and tend to exclude, sometimes unintentionally, the children of Buena Vista and Rockbridge County. Extending the range of *Let's Move Lexington* to serve all children in the Rockbridge Area would be very beneficial at overcoming this issue. It is also important to better utilize the spaces that are available in Lexington. Existing possibilities include the YMCA, school gyms, and churches. The YMCA does not currently offer a large number of programs targeted at children. Increasing these activities and the opportunities for children would increase the frequency of children participating in safe and supervised physical activity.⁵³

Moral Argument

The World Health Organization defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”⁵⁴ Health is not only dependent upon a person’s genetics or choices. Multiple factors play a role in a person’s health outcomes. Appendix F shows a flowchart describing a framework for health equity. The table is broken into a socio-ecological and medical

⁵³ “Increasing Physical Activity.”

⁵⁴ “WHO Definition of Health,” last modified 2003,
<http://www.who.int/about/definition/en/print.html>.

model. The socio-ecological component is upstream of the medical model. Social factors like discriminatory beliefs, institutional power, and social inequities make up the socio-ecological component. Discriminatory beliefs consist of classifications like race, class, gender, and disability. Institutional power is composed of corporations, businesses, government agencies, and schools. Social inequities consist of social and physical neighborhood conditions, residential segregation and workplace conditions. This category is also known as the social determinants of health. The World Health Organization defines the social determinants of health as:

“the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels. The social determinants of health are mostly responsible for health inequities.”⁵⁵

Health inequity refers to “differences which are unnecessary and avoidable but, in addition, are also considered unjust and unfair.”⁵⁶ Because these conditions are unjust and unfair, there is an obligation for something to be done.

Dr. Dale S. Benson describes poverty as the largest barrier to health.⁵⁷ “Poor people have lower life expectancies, higher prevalence of chronic illnesses and health conditions, and more unmet health needs than people with middle-class and high incomes.”⁵⁸ The link between poverty and lowered health is cyclic, like many aspects of

⁵⁵ “Social Determinants of Health,” last modified 2013, http://www.who.int/social_determinants/en/.

⁵⁶ Whitehead, Margaret, “The concepts and principles of equity and health,” 1992.

⁵⁷ Benson, Dale S, “Providing Health Care to Human Being Trapped in the Poverty Culture,” *The Physician Executive* (March-April 2000):28-32.

⁵⁸ Katherine Swartz, “Health Care for the Poor: For whom, what care, and whose responsibility?”, *Focus* 26, no.2 (Fall 2009):69.

poverty. People who are chronically ill or take sudden illness are likely to not be able to support themselves. In addition, children who are poor are limited in terms of education. In a sense the snowball continues to grow as it travels downhill, the effects are seen in lowered health status in the future. Thus it is important to not only to overcome the issue of poor health in the lower income but the reasons as to why their health is lower.⁵⁹ State control of who receives assistance has lead to discrepancies in eligibility and funding. In addition, the issue of the deserving poor has amplified the unequal distribution of health services. Some distinct groups of the poor are determined to be more deserving than others and receive more of the funds allotted to health care, causing issue with providing constant medical care.⁶⁰

Estabrooks et al. point out a phenomenon called “deprivation amplification.” In this situation, areas where people are less likely to have their own personal resources, the community is less likely to provide public resources for their use. This means that those who are poor are less likely to get the help that they need from the surrounding community. He also determined that communities with lower socioeconomic status not only had fewer resources for physical activity, those communities also had fewer free resources for use. He also determined that social determinants played a factor in access to physical activity.⁶¹

Troiano et al. suggest that we should tackle the issue from a public health stance because societal factors may be contributors in the general worldwide trend of obesity.⁶² Many scholars have noted the public health approach. Minority populations are

⁵⁹ Swartz, “Health Care for the Poor.”

⁶⁰ Swartz, “Health Care for the Poor.”

⁶¹ Estabrooks, Lee, and Gyurcsik, “Resources for Physical Activity Participation.”

⁶² Troiano and Flegal, “Overweight Children and Adolescents.”

experiencing greater increases than other populations that have remained fairly stable.⁶³ The “higher prevalence of severe childhood obesity among generally disadvantaged sectors of society heightens the need for greater research, prevention, and treatment efforts, as well as a coordinated approach to public health efforts.”⁶⁴ The choice of available occupations to those of lower-income is an example of this problem. There is a link between occupation and health, with the poorer health associated with jobs of lower classes. These jobs are plagued with lower environmental protections, lowered access to medical insurance and lowered pay. This limits other choices in life like housing location, which affects travel choices, school districts, and safety.⁶⁵ One study showed an increased chance of obesity when the neighborhood was perceived as unsafe.⁶⁶ The behavior is cyclic and in some ways out of the control of the citizen.

Turning to Norman Daniels’ *Just Health*, where he discusses health inequalities, Daniels states that the answer to the focal question is that “a health inequality is an inequity if it is the result of an unjust distribution of the socially controllable factors affecting population health and its distribution.”⁶⁷ We need to look past medical assistance as the only answer to the issue of health, when in fact multiple other social determinants are factors. Social justice is an underlying player in health inequality. According to Rawls, who Daniels uses to discuss his points on health inequality, health inequalities are just when the procedures that caused them are just. They are also just when all inequalities have been evenly distributed and the health inequalities still arise.

⁶³ Skeleton et al., “Trends of Severe Obesity.”

⁶⁴ Skeleton et al., “Trends of Severe Obesity,” 6.

⁶⁵ Skeleton et al., “Trends of Severe Obesity.”

⁶⁶ Skeleton et al., “Trends of Severe Obesity.”

⁶⁷ Norman Daniels, *Just Health: Meeting Health Needs Fairly*, Cambridge: Cambridge University Press, 2008, 101.

Daniels' analysis of health, from a Rawlsian perspective, states "inequalities allowed by the difference principle should not undermine the value of political liberty or the requirements of fair equality of opportunity."⁶⁸ The difference does not call for a trickle down affect to help the poorest, but more of a straightforward, max flow. Also, their wellness will be judged based on social goods. One of the more important points is that income is not a single corrector for health inequality. In addition to lessening the effects of inequalities, discrimination is also prohibited by the principle. It would also include comprehensive health care. It is unjust to not provide health well being of citizens when providing these opportunities are within our powers. This is preventing the person's opportunities and capabilities.⁶⁹

Most of the social determinants of health are caused by neighborhood conditions, so local governments have an obligation to provide or create opportunities to its citizens. Local organizations don't have an obligation, but the connection to the community and its members should encourage them to participate and help with the efforts of the local government. With a combined effort, most problems, like physical activity, are easier to tackle. It is important that all members of a community be afforded the opportunity to participate in physical activity opportunities. Not only should the community provide opportunities, but they should go a step further and provide information on how to properly participate in physical activity opportunities.

⁶⁸ Norman Daniels, "*Just Health*," 93.

⁶⁹ Norman Daniels, "*Just Health*."

Conclusion

What precedes this conclusion is only a portion of what needs to be done. The true solution extends far beyond physical activity. Tackling obesity related poverty, specifically found in rural communities, is a larger problem than simply increasing physical activity. However, starting at physical activity allows for an opportunity to tackle problems that not only deal with the superficial aspect of obesity. Being obese is not an appealing physical attribute, but the health consequences of obesity extend into many aspects of one's future life. Physical activity lowers the incidence of complications due to obesity. It is important to tackle this health problem in lower income communities, in particular, in order to provide a fair opportunity for a prosperous life.

Washington and Lee University

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Appendix A
Waddell Elementary Data

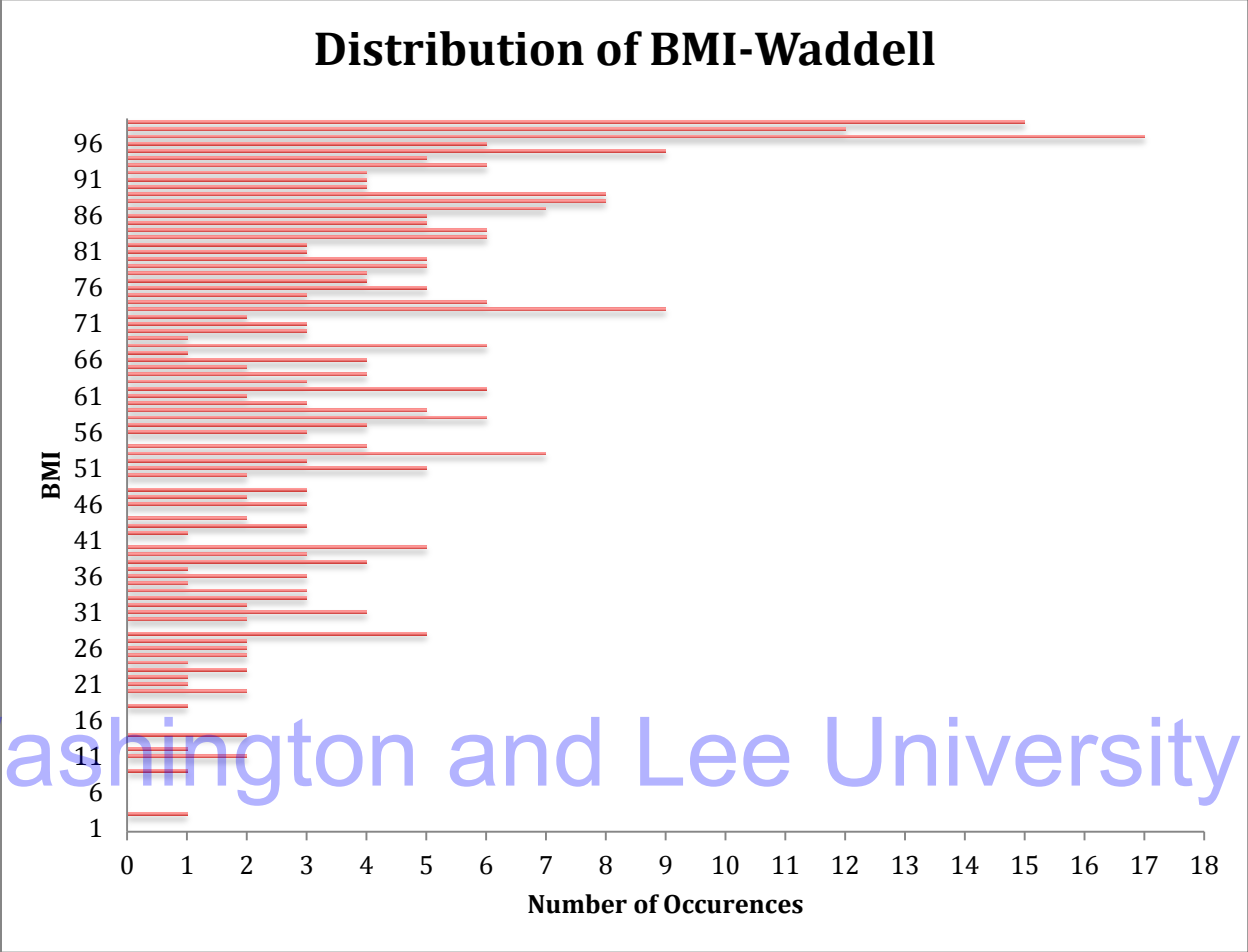


Figure A1. Distribution of BMI at Waddell Elementary School. This graph shows the occurrence of each BMI.

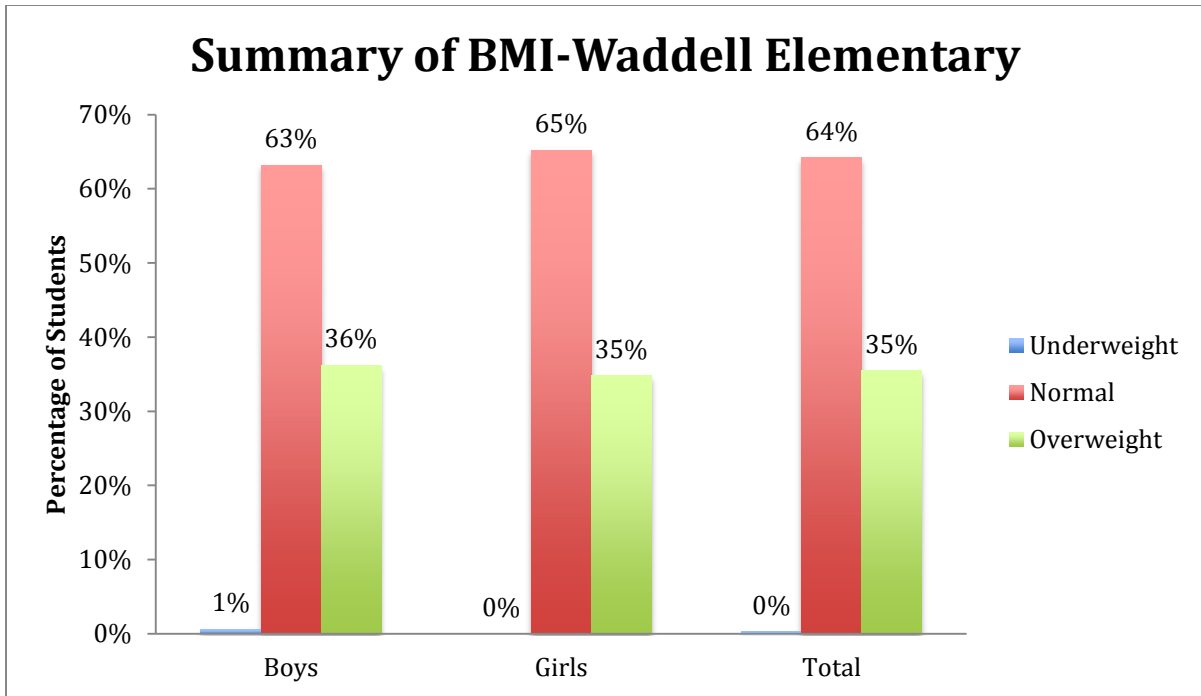


Figure A2 . Summary of BMI-Waddell Elementary. This figure illustrates a summary of the BMI collected from Waddell based on the percentage of students. The data is grouped according to boys and girls, with a comparison figure showing the total.

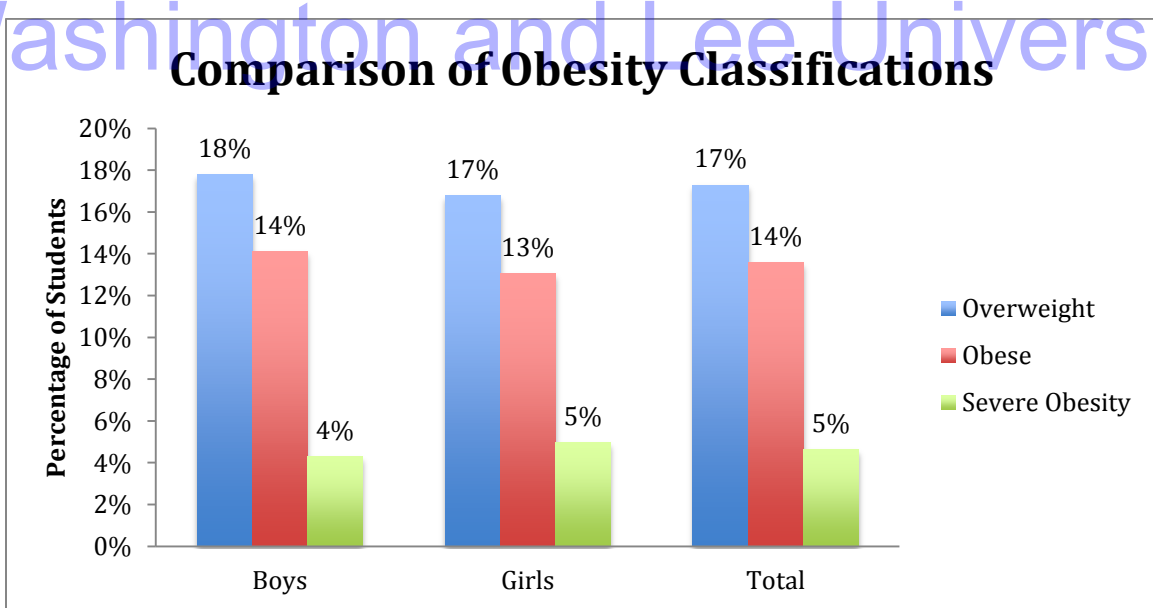


Figure A3. Comparison of Obesity Classifications at Waddell Elementary. This figure illustrates three of the classifications of obesity: overweight (85th-94th percentile), obese (95th-98th percentile), and severe obesity (99th percentile or greater).

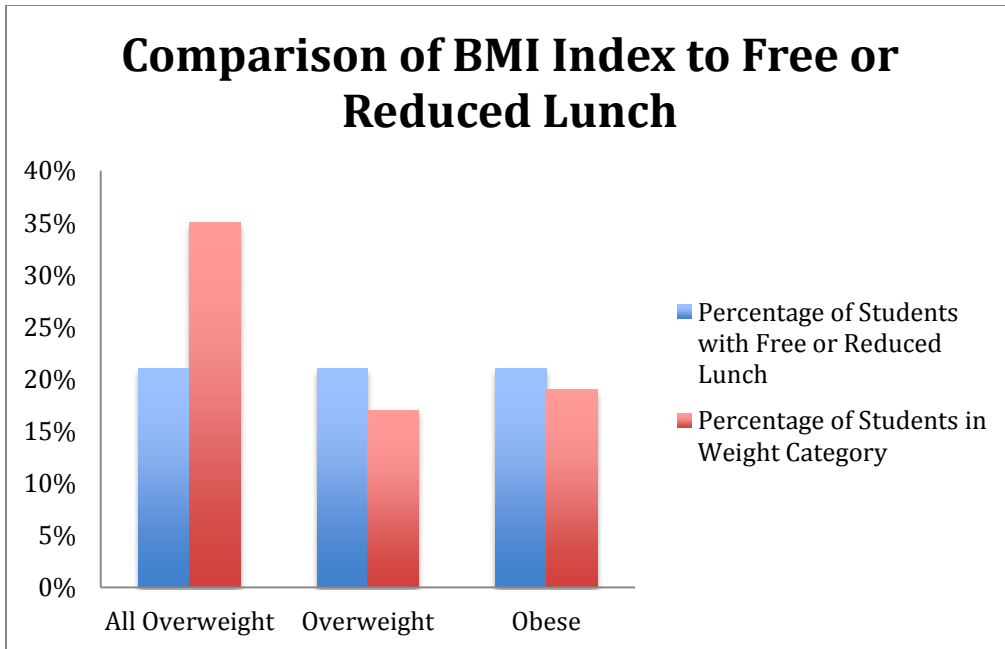


Figure A4. Comparison of BMI index for varying weight categories to the number of free and reduced lunches. All overweight students (all students with BMI Index $\geq 85^{\text{th}}$ percentile), overweight students (85^{th} - 94^{th} percentile), and obese ($\geq 95^{\text{th}}$ percentile).

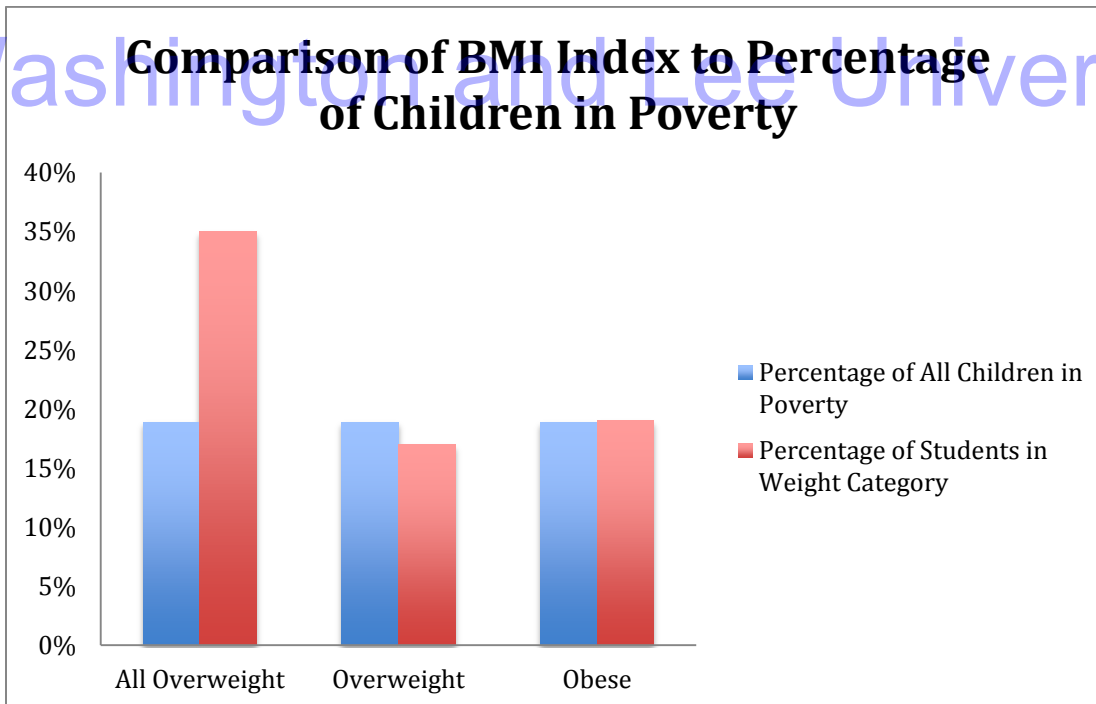


Figure A5. Comparison of BMI index for varying weight categories to the number of children in poverty (as reported by Social Services department). All overweight students (all students with BMI Index $\geq 85^{\text{th}}$ percentile), overweight students (85^{th} - 94^{th} percentile), and obese ($\geq 95^{\text{th}}$ percentile).

Source: Local Department of Social Services Profile Report, SFY 2012

Appendix B
Lylburn Downing Middle School Data

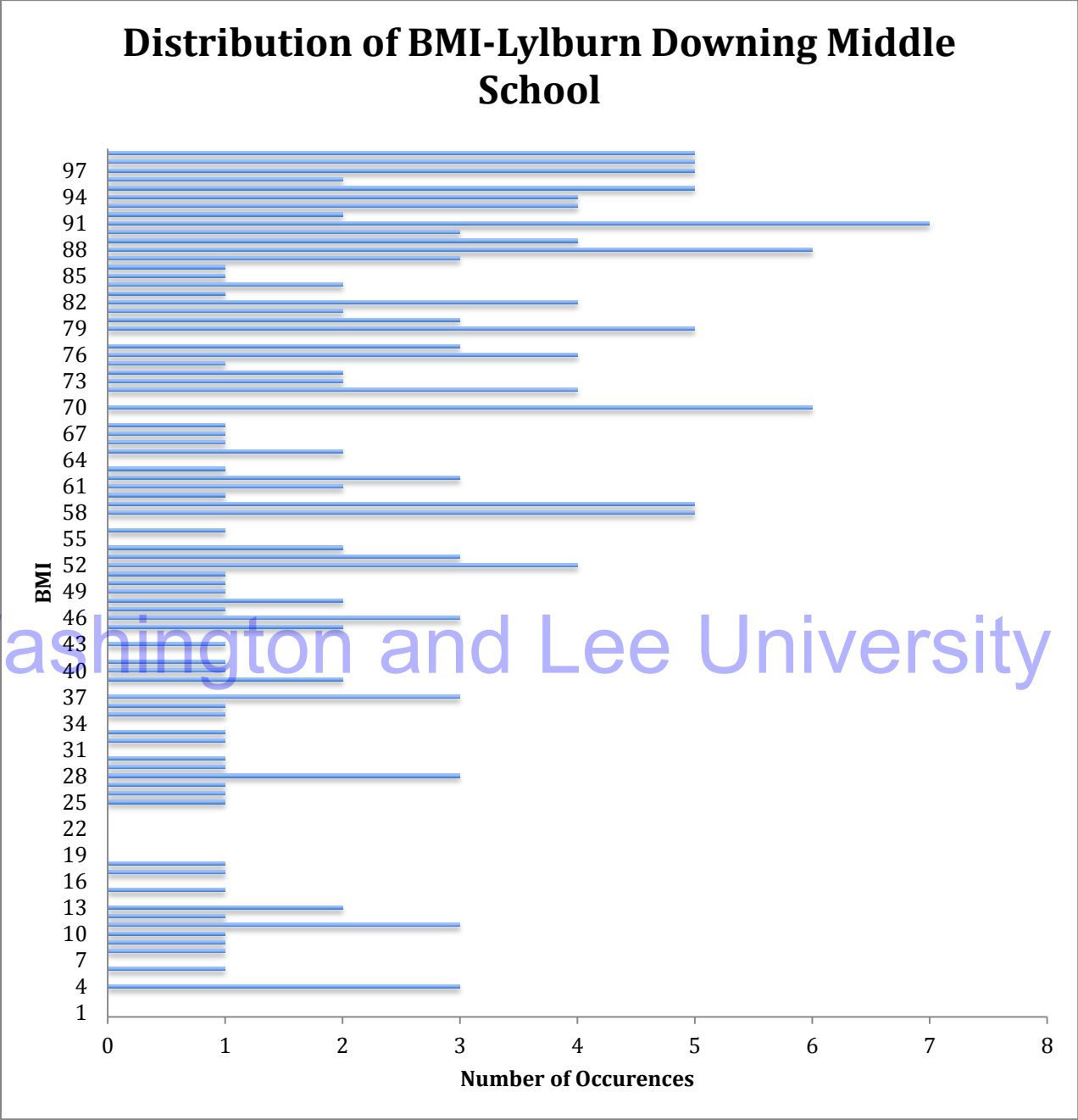


Figure 1B. Distribution of BMI at Lylburn Downing Middle School. This graph shows the occurrence of each BMI.

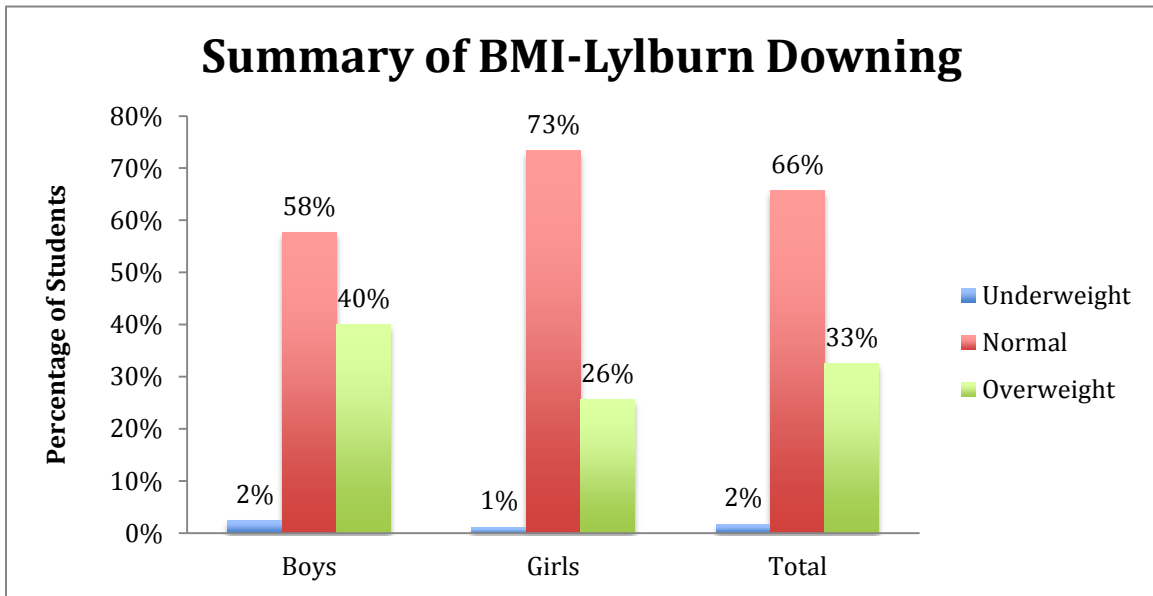


Figure 2B. Summary of BMI-Lylburn Downing. This figure illustrates a summary of the BMI collected from Waddell based on the percentage of students. The data is grouped according to boys and girls, with a comparison figure showing the total.

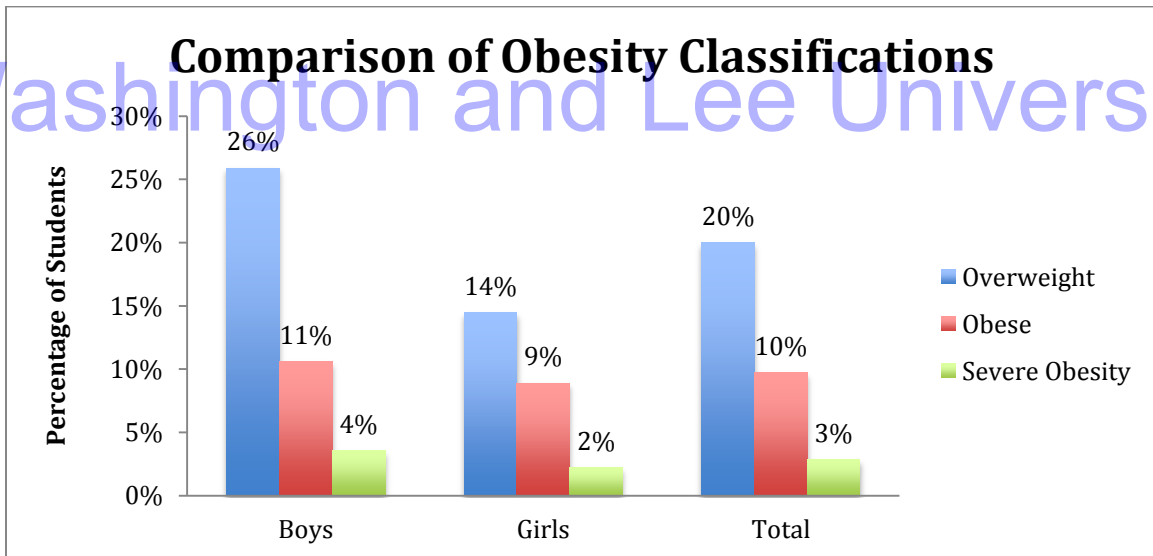


Figure 3B. Comparison of Obesity Classifications at Lylburn Downing. This figure illustrates three of the classifications of obesity: overweight (85th-94th percentile), obese (95th-98th percentile), and morbid obesity (99th percentile or greater).

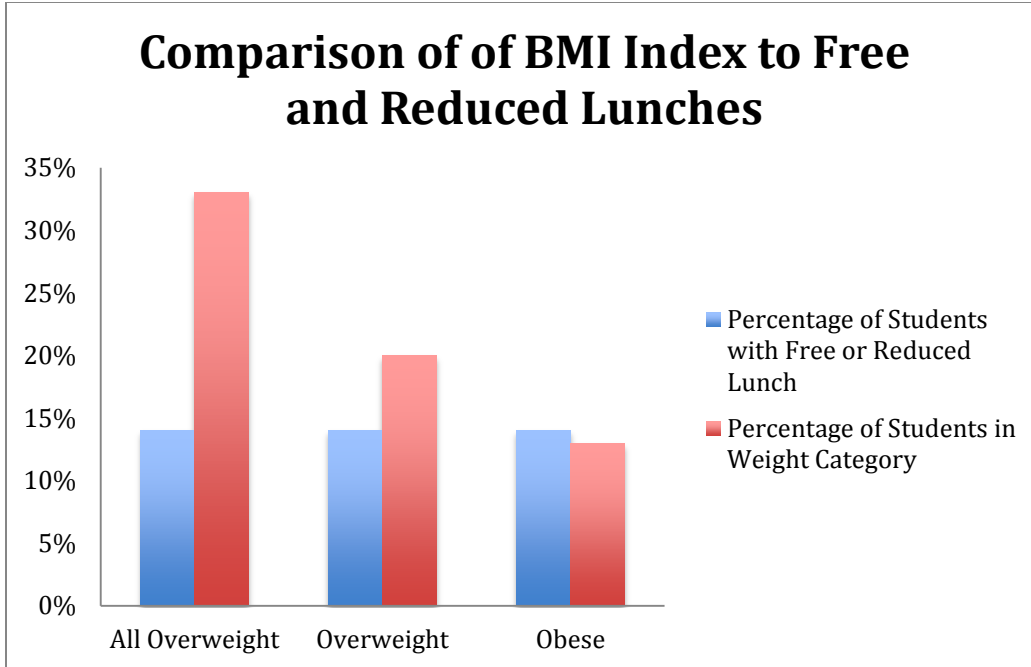


Figure B4. Comparison of BMI index for varying weight categories to the number of free and reduced lunches. All overweight students (all students with BMI Index $\geq 85^{\text{th}}$ percentile), overweight students (85^{th} - 94^{th} percentile), and obese ($\geq 95^{\text{th}}$ percentile).

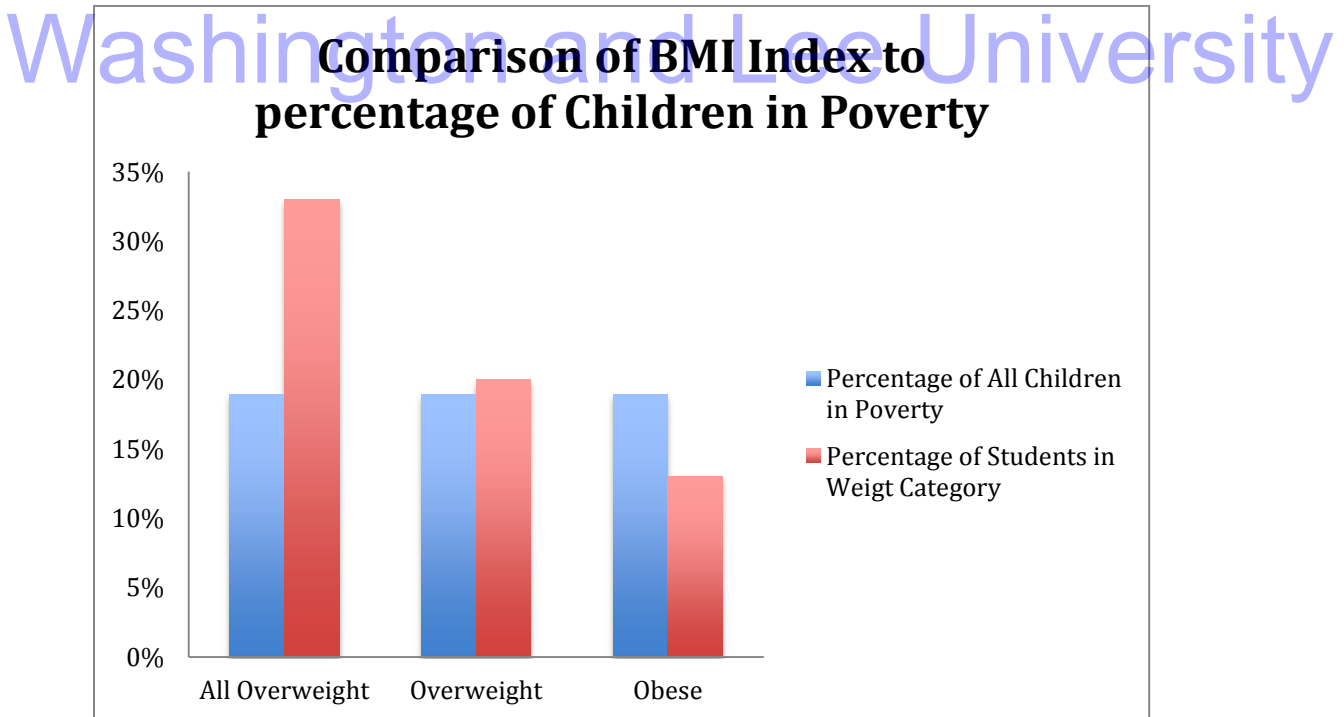


Figure B5. Comparison of BMI index for varying weight categories to the number of children in poverty (as reported by Social Services department). All overweight students (all students with BMI Index $\geq 85^{\text{th}}$ percentile), overweight students (85^{th} - 94^{th} percentile), and obese ($\geq 95^{\text{th}}$ percentile).

Source: Local Department of Social Services Profile Report, SFY 2012

Appendix C
 Comparison of Waddell Elementary and Lylburn Downing Middle Schools

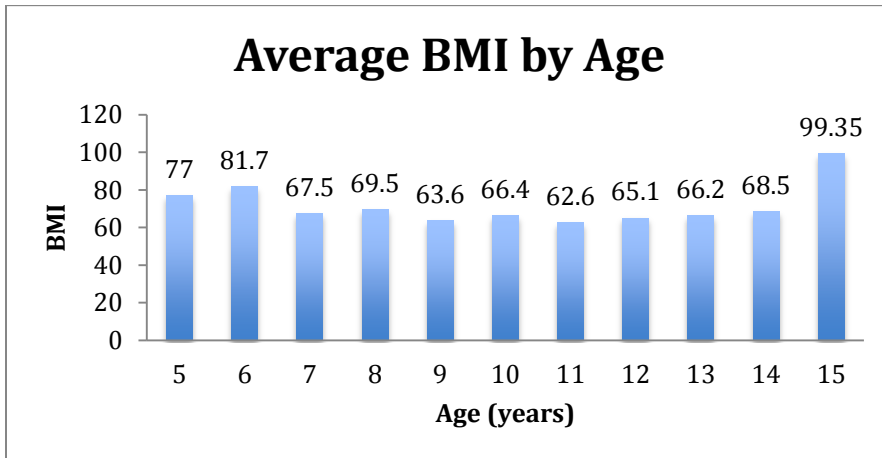


Figure 1C. This figure shows the average BMI grouped according to age for both the elementary and middle school. The age of 15 is an outlier because there were only 2 students who were of the age of 15 and both had a BMI of 99.

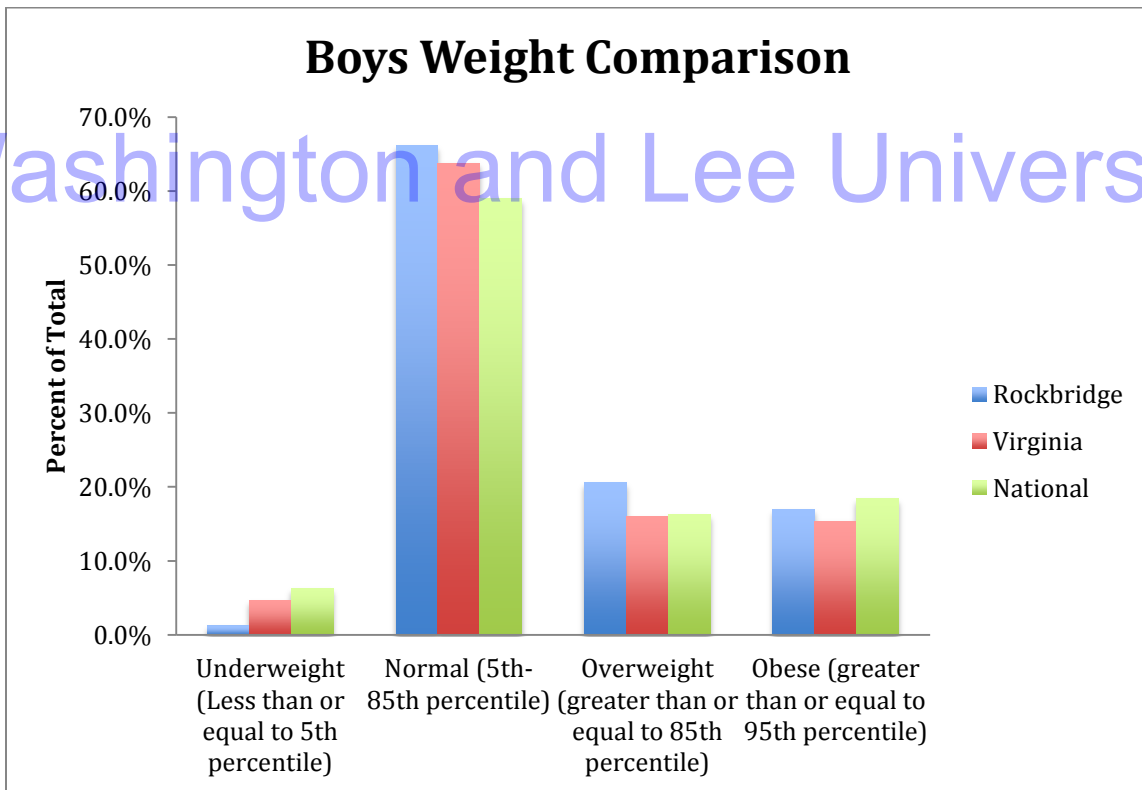


Figure 2B. Boys Weight Comparison. This is a comparison of the BMI index categories of boys in Rockbridge (both Lylburn Downing and Waddell), Virginia, and nationally.

Source: <http://childhealthdata.org/browse/survey/results?q=218&r=1&r2=48>

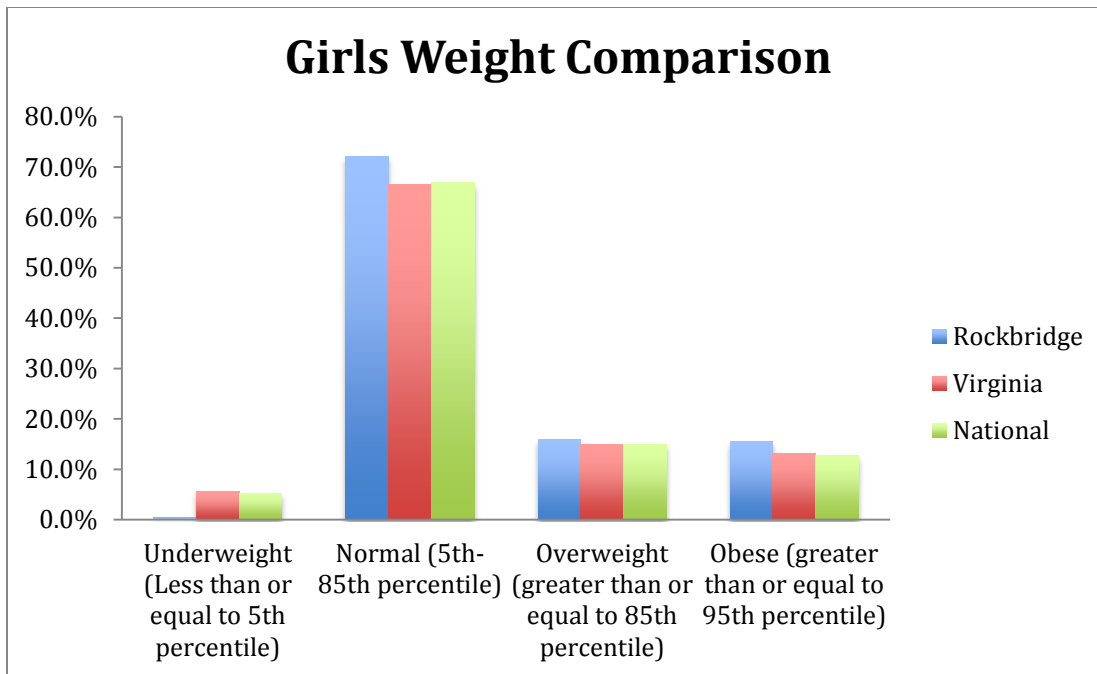


Figure 2C. Girls Weight Comparison. This is a comparison of the BMI index categories of boys in Rockbridge (both Lylburn Downing and Waddell), Virginia, and nationally.

Source: <http://childhealthdata.org/browse/survey/results?q=218&r=1&r2=48>

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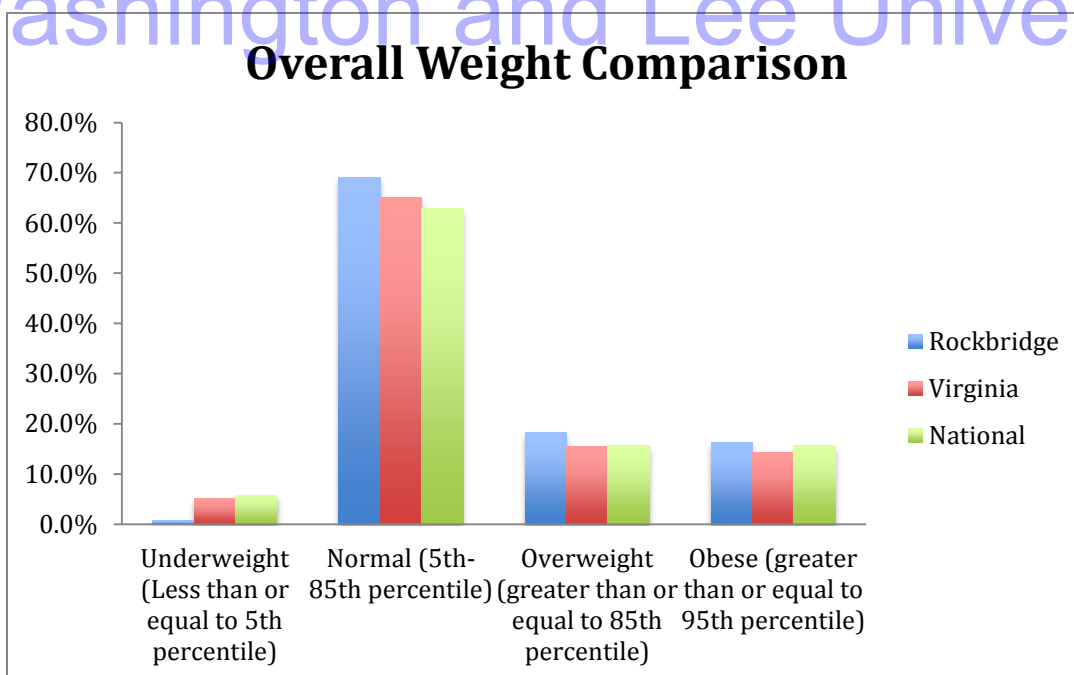


Figure 2D. Overall Weight Comparison. This is a comparison of the BMI index categories of boys in Rockbridge (both Lylburn Downing and Waddell), Virginia, and nationally.

Source: <http://childhealthdata.org/browse/survey/results?q=218&r=1&r2=48>

Appendix D
Parent Survey

CONSENT TO PARTICIPATE IN HUMAN RESEARCH PROJECT
Washington and Lee University
Shepherd Poverty Program

How does poverty impact access to physical activity and therefore contribute to childhood obesity in rural communities, namely Rockbridge County and Lexington?

Marissa Thompson
Poverty and Human Capability: A Research Seminar POV 423

You have been asked to participate in a research study at Washington and Lee University. The purpose of this study is to examine physical activity levels in children in Rockbridge County.

The **purpose** of this study, in terms of your participation, as well as any **expected risks** and **benefits**, must be fully explained to you before you sign this form and give your consent to participate.

You have been asked to participate in a short written survey on your child's physical activity patterns and how you would like to see changes to physical activity opportunities in Lexington and Rockbridge County. There are some minimal risks involved with completing this survey; you may feel some uneasiness or embarrassment related to questions about or your responses to your child's physical activity level. The benefits of participating in this study include an increased awareness of the physical activity level of members of the community, an increased knowledge of accessibility of physical activity opportunities geared towards children, and an increased awareness of the activities children would benefit from having in the community.

Participation in research is entirely voluntary. The survey will take approximately 10 minutes to complete. You may refuse to participate or may withdraw from participation at any time without penalty.

The investigator may withdraw you from participation at his/her professional discretion.

If, during the course of this study, significant new information becomes available, which may relate to your willingness to continue to participate, this information will be provided to you by the investigator.

Any information derived from this research project which personally identifies you will not be voluntarily released or disclosed without your separate consent, except as specifically required by law.

If at any time you have questions regarding this research or your participation in it, you should contact the investigator, Marissa Thompson (thompsonm13@mail.wlu.edu), who must answer your questions.

If, at any time, you have questions regarding the conduct of this research, or if you wish to discuss your rights as a research participant, you may contact the IRB chair, Julie Woodzicka, at woodzickaj@wlu.edu or 458-8834.

You can keep this copy of the consent form.

I consent to participate in this survey.

By completing and returning this survey, you consent that the above statement is true and that you have read the consent form and understand the risks and benefits associated with this study.

You may choose to complete the paper form of this survey or follow the link and submit the online version.
(<https://www.surveymonkey.com/s/KG26RMW>)

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What is the recommended amount of physical activity your child should participate in daily?

—

On average, what is the total amount of physical activity your child participates in daily?

—

What type of physical activity does your child participate in normally? Check all that apply?

For each activity that your child partakes in, what is the typical intensity level of each activity: low, moderate, or high.

- Walking to school low moderate high
- Organized sports low moderate high
- Playing outside low moderate high
- Wii Fit (or equivalent gaming system) low moderate high
- Stretching-Yoga low moderate high
- Swimming low moderate high
- Dancing low moderate high
- Martial arts low moderate high
- Fitness Classes low moderate high
- Walking pets low moderate high
- Riding bicycles low moderate high
- Chores that require physical activity low moderate high
- Other? Please be specific.

What local organizations or facilities does your child use as a means of physical activity?

How often?

1-never

2-multiple times per week

3-once a week

4- 1-2 a month

YMCA	1	2	3	4	
Rockbridge Area Recreational Organization	1	2	3	4	
Local Parks	1	2	3	4	
After-school programs		1	2	3	4
Churches	1	2	3	4	
Dance Studio	1	2	3	4	
Specific names of organizations					

Other organizations or facilities

What are the obstacles to your child's participation in physical activity?

Are there accessible options for physical activity in Rockbridge County/Lexington?

What types of programming, activities, or opportunities would you like to see offered to or available to local children?

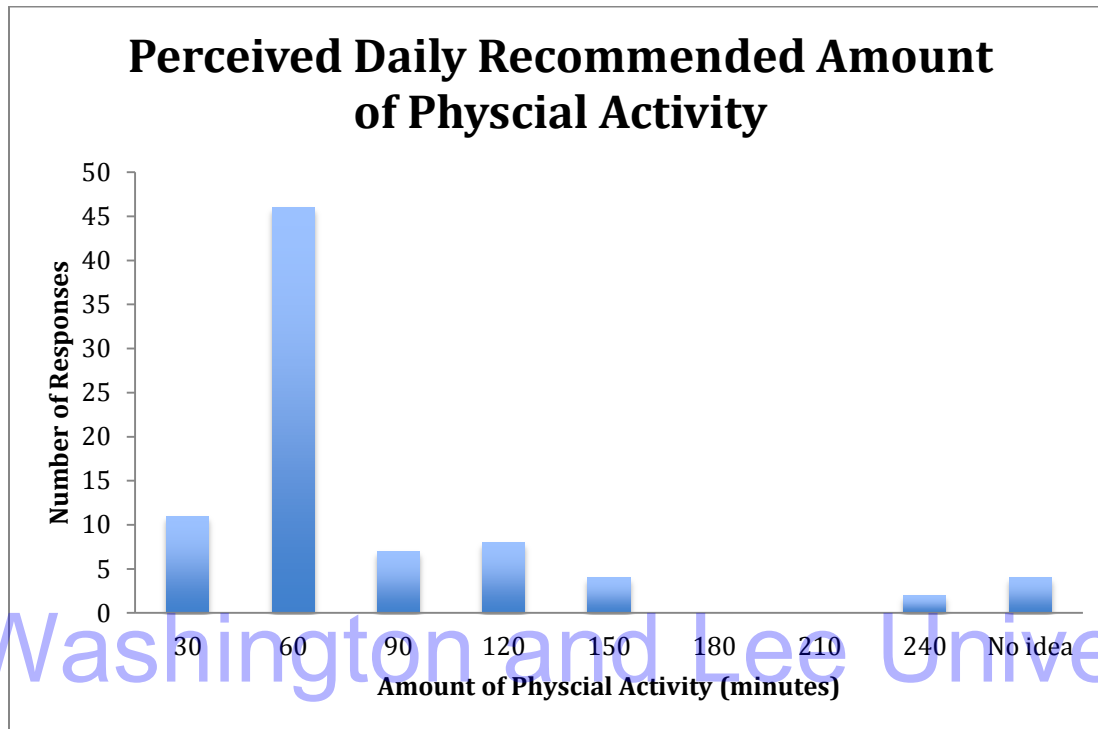
Do you have any additional concerns about fitness opportunities at your child's school or in our area?

-

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Appendix E
Parent Survey Responses

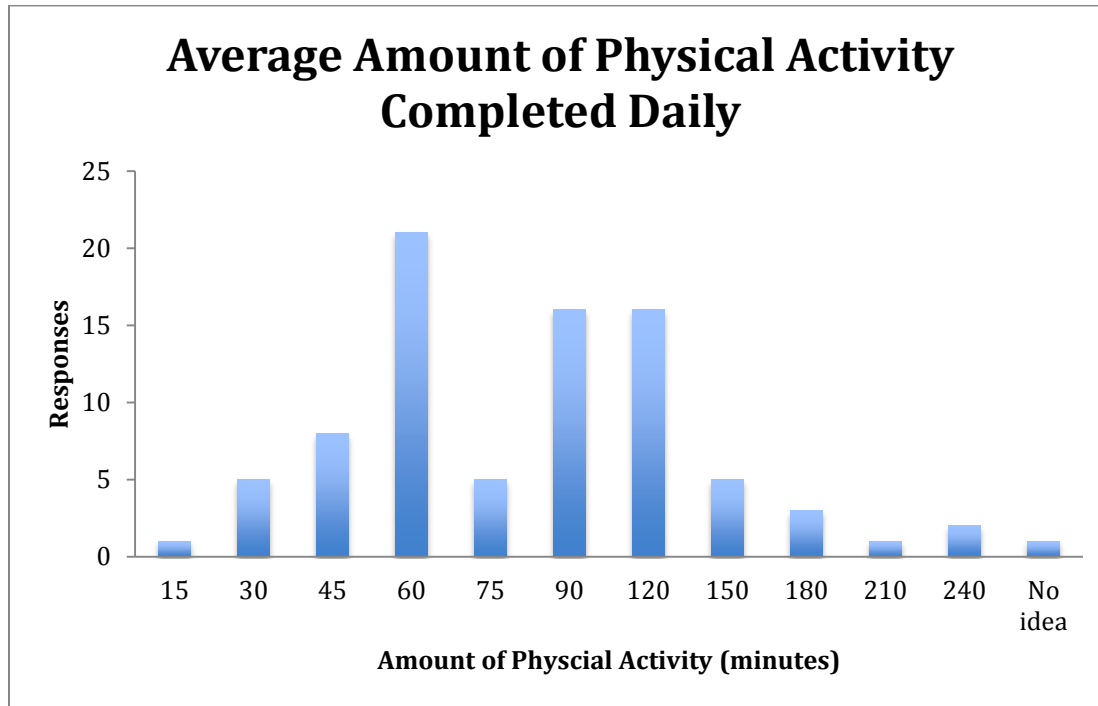
Question 1. What is the recommended amount of physical activity your child should participate in daily?



Perceived Daily Recommended Amount of Physical Activity	
Amount of Physical Activity (minutes)	Number of Responses
30	10
60	48
90	9
120	8
150	3
180	0
210	0
240	2
No idea	4

Total Respondents: 82

Question 2. On average, what is the total amount of physical activity your child participates in daily?

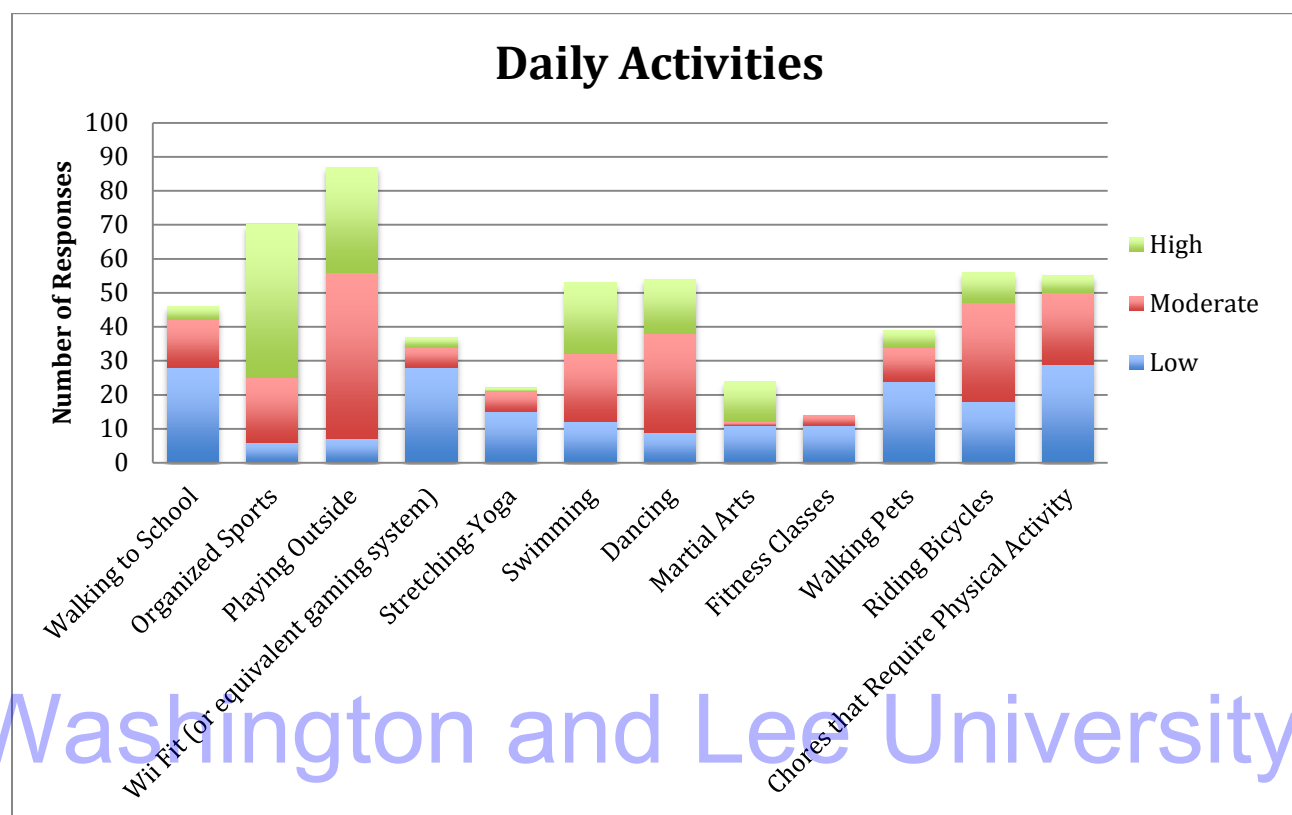


Average Amount of Physical Activity Completed Daily

Amount of Physical Activity (minutes)	Number of Responses
15	1
30	5
45	8
60	21
75	5
90	16
120	16
150	5
180	3
210	1
240	2
No idea	1

Total Respondents: 84

Question 3. What type of physical activity does your child participate in normally? Check all that apply. For each activity that your child participates in, what is the typical intensity level of each activity: low, moderate, or high.



Daily Activities				
Activity	Low	Moderate	High	Response Count
Walking to School	28	14	4	46
Organized Sports	6	19	45	70
Playing Outside	7	49	31	87
Wii Fit (or equivalent gaming system)	28	6	3	37
Stretching-Yoga	15	6	1	22
Swimming	12	20	21	53
Dancing	9	29	16	54
Martial Arts	11	1	12	24
Fitness Classes	11	3	0	14
Walking Pets	24	10	5	39
Riding Bicycles	18	29	9	56
Chores that Require Physical Activity	29	21	5	55
Total	198	207	152	557

Total Respondents: 88

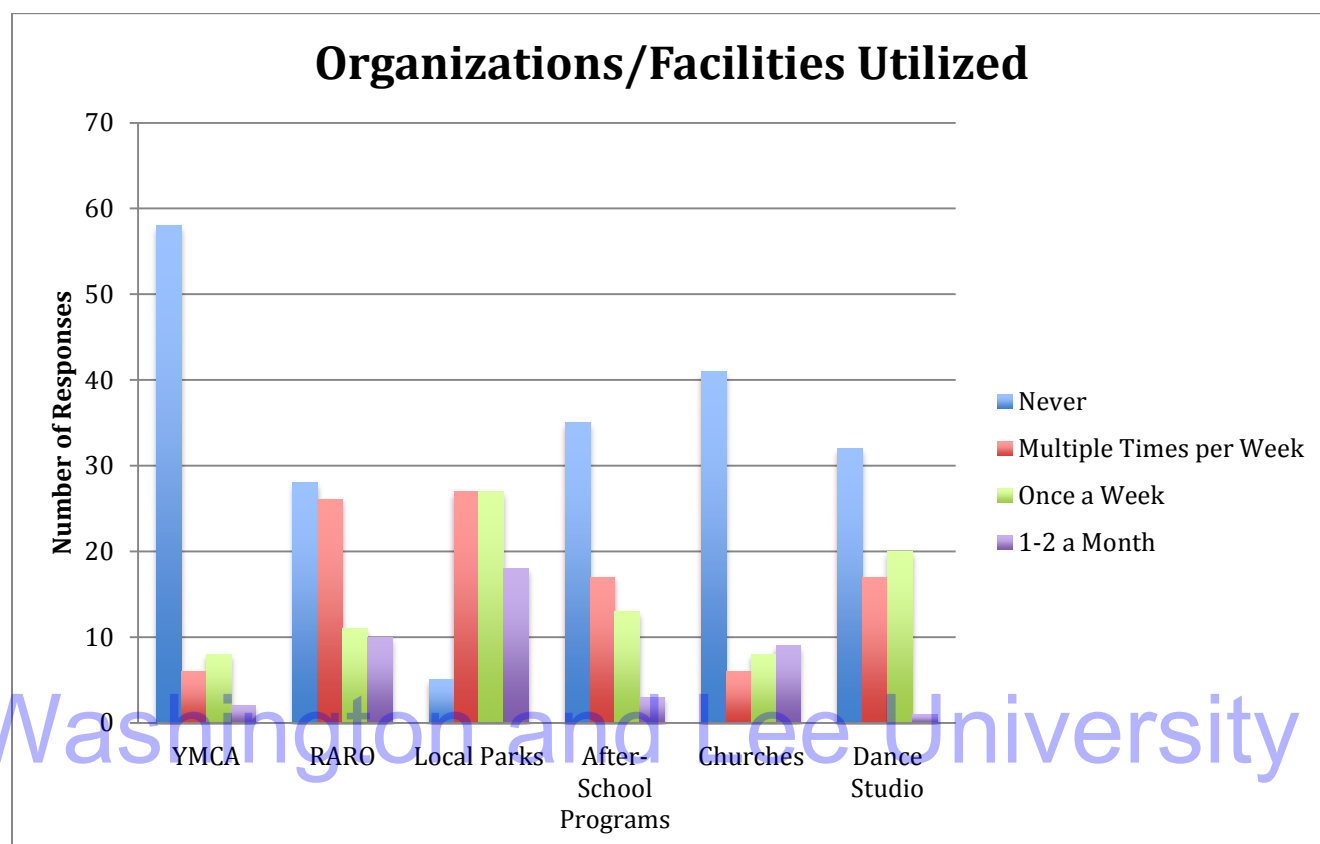
Other? Please be specific.

Gymnastics (4), playing (4) River Runners (2), hiking (2), swimming (2), horse-back riding (2), chasing pets, plays in the yard, dances, canoeing/kayaking, walking around town, sleep away camp, bike riding, aerobic stationary bike, weightlifting, and scooter.

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Question 4. What local organizations or facilities does your child use as a means of physical activity? How often?

1-never 2-multiple times per week 3-once a week 4- 1-2 a month



Organizations/Facilities Used					
Organizations/Facilities	Never	Multiple Times per Week	Once a Week	1-2 a Month	Total Responses
YMCA	58	6	8	2	74
Rockbridge Area Recreational Organization	28	26	11	10	75
Local Parks	5	27	27	18	77
After-School Programs	35	17	13	3	68
Churches	41	6	8	9	64
Dance Studio	32	17	20	1	70
Total	199	99	87	43	428

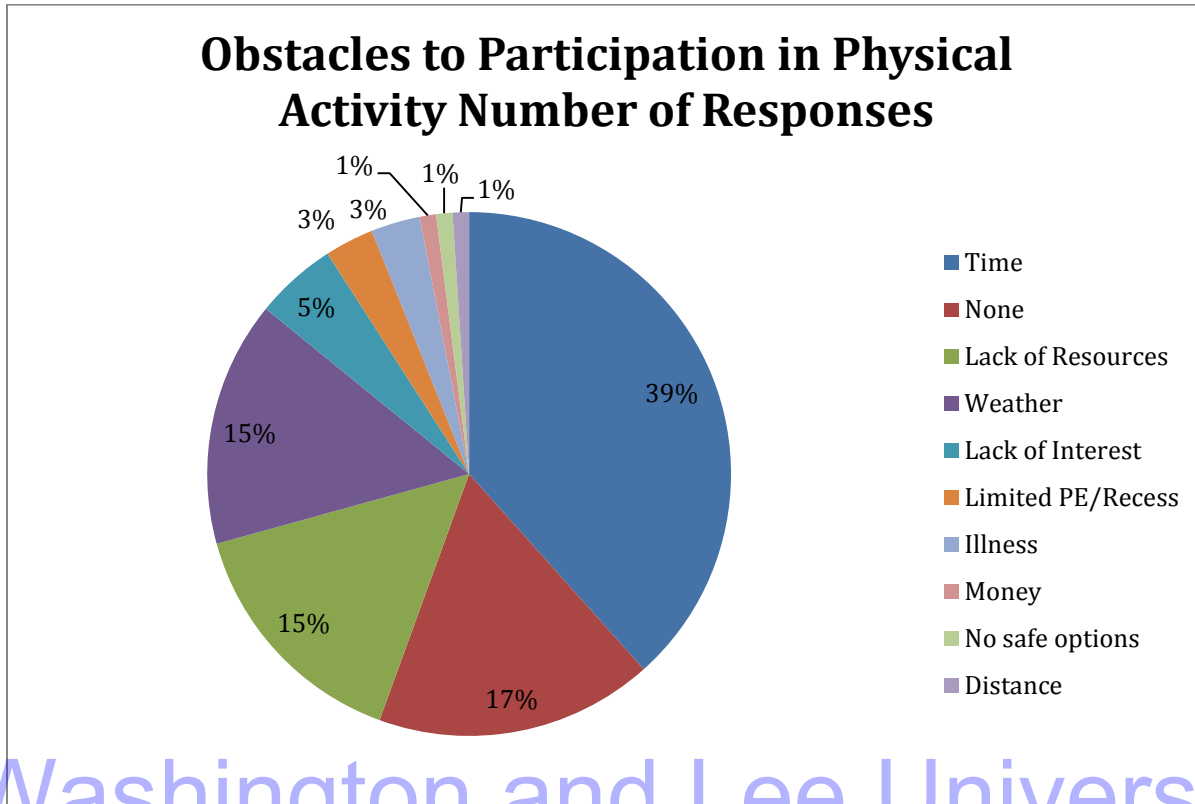
Total Respondents: 87

Specific name of organizations used or other organizations used: (58)

Halestone Dance Studio (19), American Freestyle Karate (7), RARO (7), city/community pool (7), River Runners (6), Rockbridge Storm swim team (6), Garrett's School of Karate (3), Lexington Soccer Club (2), Lexington Golf and Country Club (2), Tish Vest Riding Stable (2), travel soccer (2), Lexington Baptist Church, Head Over Heels Gymnastics, Prestige Gymnastics Academy, parenting (get your butt outside and play), VMI gym, Lexington lacrosse, Camp Mount Shenandoah, YMCA, Rockbridge Extreme, tennis, Girl Scouts, Boy Scouts, after-school programs, Nighthawks soccer, travel basketball, Kid's Playce, Boxerwood Gardens, Waddell Playground, Lime Kiln Park, Blue Ridge soccer, Roanoke Star soccer, Spectrum Sports Academy, Waddell's Walking Club, Hoof Beats, and SNAP Fitness Center.

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Question 5. What are the obstacles to your child's participation in physical activity?

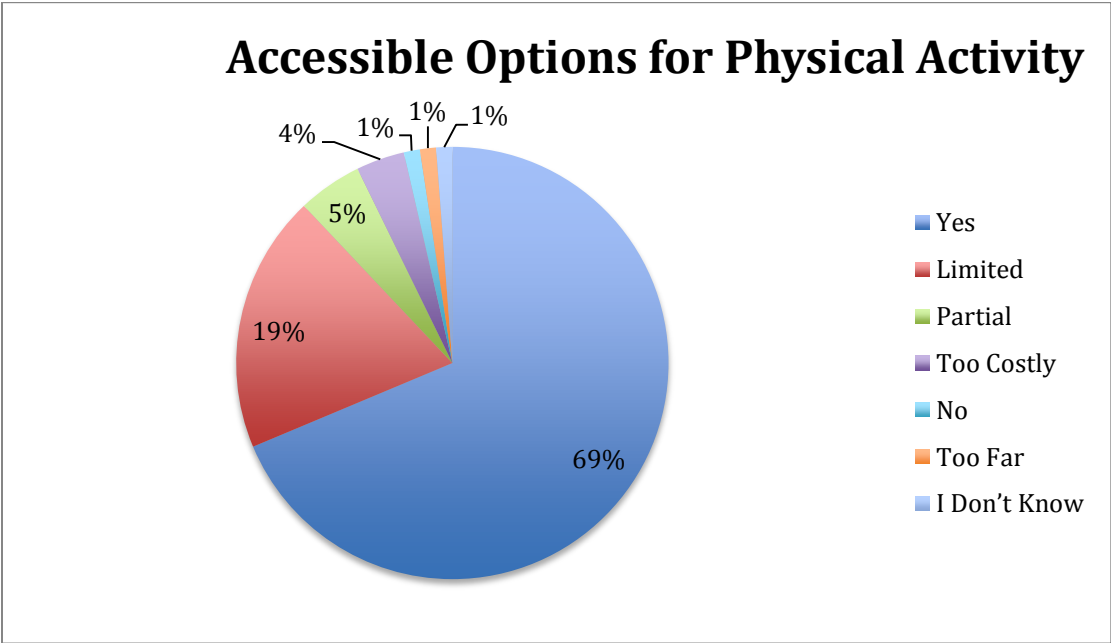


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Obstacles to Participation in Physical Activity	
Obstacle	Number of Responses
Time	38
None	17
Lack of Resources	15
Weather	15
Lack of Interest	5
Limited PE/Recess	3
Illness	3
Money	1
No safe options	1
Distance	1

Total Respondents: 77

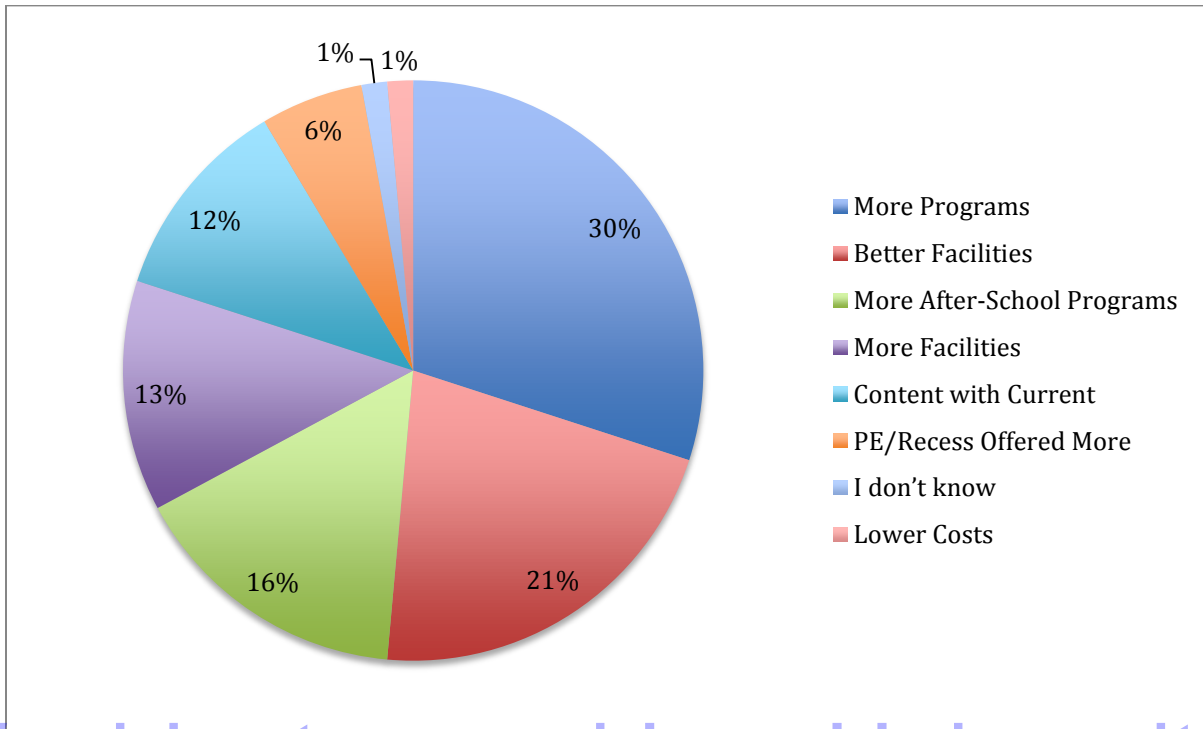
Question 6. Are there accessible options for physical activity in Rockbridge County/Lexington?



Accessible Options	
Response	Number of Responses
Yes	57
Limited	16
Partial	4
Too Costly	3
No	1
Too Far	1
I Don't Know	1

Total Respondents: 76

Question 7. What types of programming, activities, or opportunities would you like to see offered to or available to local children?

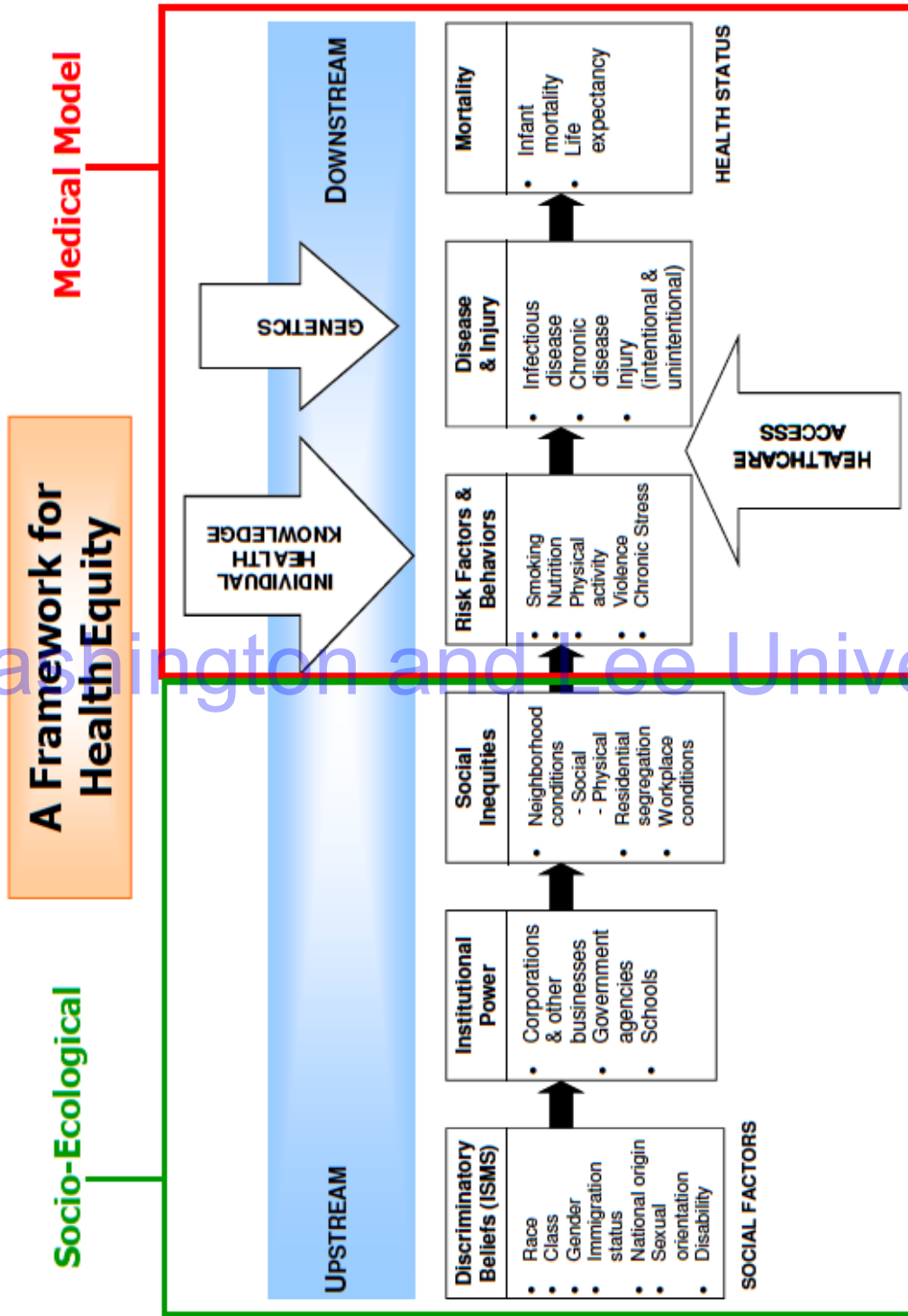


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Future Opportunities in Lexington	
Responses	Number of Responses
More Programs	21
Better Facilities	15
More After-School Programs	11
More Facilities	9
Content with Current	8
PE/Recess Offered More	4
I don't know	1
Lower Costs	1

Total Respondents: 58

Appendix F
A Framework for Health Equity



- Adapted by ACPHD from the Bay Area Regional Health Inequities Initiative, Summer 2008