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Influence of Social and Economic Factors on Elementary Student Health in Northwest Arkansas

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Influence of Social and Economic Factors on Elementary Student Health in Northwest Arkansas

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Abstract

A child's wellbeing is influenced by many factors related to the environment they are raised in. The purpose of this study was to investigate the relationship between a child's social and economic factors and his or her health. A convenience sample of 588 2nd and 4th grade children was taken from three elementary schools in Springdale Independent School District. Health status was represented by calculations of each child's body mass index (BMI) and number of days counted absent from school. Socioeconomic and demographic factors examined include the child's grade level, gender, ethnicity, number of parents over the household, number of parents employed, and income level as determined by participation in the free or reduced-price lunch program. Individual health condition was assessed based on BMI score and number of days absent from class. Correlations are analyzed among these variables, separated by grade level. The results show that children of non-white ethnicity and of lower-income homes are more likely to be overweight or obese. These results may serve to assist schools in providing targeted resources to children who display poor health outcomes.

Introduction

Poverty is a prevalent issue for children in Northwest Arkansas, with over 26,000 children in Washington and Benton counties living below the federal poverty level (Arkansas Advocates for Children and Families, 2015). It is crucial to consider income as a factor that may affect a child's health, as many families are struggling financially to provide necessities such as food and housing for each member, according to the Arkansas Advocates for Children and Families. Forty-eight percent of children are living in Arkansas households considered to be "low income," earning less than the federal poverty level. While income is the primary determinant of poverty status, it can be assumed that families who struggle to meet basic needs are more likely to experience health care disparities for reasons beyond insufficient funds in the bank account. It is becoming more prevalent to examine a variety of social and environmental factors consistent in lower income families, with the hope of explaining some of the mechanism behind poverty's toll on health status. This study addresses the correlation between a number of social and economic factors present in the homes of school-age children and their health status.

Background

Research suggests a positive correlation between income level and health status, as data shows that people of higher income level exhibit better health condition (Currie & Lin, 2007). This may be related to the fact that financial sufficiency allows families to seek quality care for prevention and treatment, develop better health literacy by being able to visit health care providers, and have access to adequate nutrition. Since children are dependent upon their parents or guardians for food and access to care, they can be directly affected by insufficient income for the household. Currie and Lin's review of the 2001-2005 National Health Interview Surveys noted that children classified as "poor" were more likely to have chronic disease conditions, and less likely to receive treatment (2007). A 2008 study (Larson, Russ, Crall, & Halfon, 2008) included low-income classification as one of eight major social risk factors that impact children, and found that children who presented with multiple risk factors (including low

income) had statistically lower health outcomes. Other income-related factors may pose concern to the status of an individual's health including diet, nutritional status, and exercise (Francis, 2014). Current literature attempts to define exactly how a person or family's level of income contributes to the people's overall health by focusing on social factors of the home. Since children are dependent, the presence of parental leadership and family structure of the home can vastly affect the household environment. A 2013 survey of single mothers found that increased levels of chaos, which is defined as a state of disorganization and unpredictability in the household and arrangement of work and childcare, are associated with decreased child health status as reported by the mother (Dush, Schmeer, & Taylor, 2013).

Another social factor that presents a significant disparity in health status is ethnicity. A 2014 study highlighted that African-American and Hispanic children have statistically higher rates of overweight and obesity status compared to white children (Ogden et al., 2014). A 2015 study confirmed that race is significantly associated with BMI, by revealing that people of lower socioeconomic status tend to have increased BMIs, and the majority of people in representing the low socioeconomic status population are African-American and Hispanic (Gance-Cleveland et al., 2015).

Obesity and Body Mass Index as Variables of Health

One of the greatest modern health concerns in the US is obesity. Approximately one-third of all American children are either overweight or obese, placing them at risk for conditions such as diabetes and hypertension (Let's Move Domestic Policy Council, 2011). Body Mass Index (BMI) is the main screening tool used to classify obesity. It is calculated using individual height and weight, and ranked into percentiles for children. Children who are at or above the 85th percentile for BMI are considered to be overweight, and those who are at or above 95th percentile are considered to be obese (CDC, 2015). A 2014 study found that self-reported quality of life was notably lower in children and adolescents who had higher BMIs (Chen et al., 2014). The study additionally found that students who were more satisfied with their overall

health reported to have regular sleeping and eating patterns, spent more time in physical activity, and less staring at a digital screen. As these behaviors all contribute to the BMI of an individual, it may be determined that BMI is a relevant value in representing quality of health.

A number of studies assert findings that there is greater prevalence of obesity among children of low income and poverty status (Davidson, 2016; Francis, 2014). A study on child health in American Indian Reservations, a historically economically-disadvantaged population, revealed that increases in income corresponded to decreases in BMI, consistently over a period of 12 years (Jones-Smith, Dow, & Chichlowska, 2014). Additionally, a study by Murasko (2014) on child BMI revealed a strong negative association between household income and BMI, that increased over time with the age of the child, which suggests that children of lower income families are more likely to be overweight or obese.

<center>School Attendance and its Association to Health</center>

Another determinant of the health status of a child is the number of days he or she is reported to be absent from class. School attendance reflects a deeper set of factors, such as a child's family stability, transportation, single or dual-parent household, parent work schedules, in addition to health status (Morissey, Hutchison, & Winsler, 2013). A study by Weismuller et al. (2007) demonstrated that elementary school students who were reported to be in poor health were 7 times more likely to miss 11 or more days of school; whereas students who showed improving health status were absent less (Weismuller et al., 2007). Morissey, Hutchison, and Winsler (2013) also found an association between income status of a child (information obtained by examining participation in the free or reduced-cost lunch) and school attendance, with lower income students being absent more often (Morissey et. al, 2013). Another study found children with higher BMIs were absent more often, and speculated that early onset of obesity contributes to detrimental damage in the brain (Li, Raychowdhury, Lyn, Lopez-De Fede, & Zhang, 2012). These studies support using school absences as a variable reflecting the child's health status.

The present study will investigate the BMI and number of school absences as two significant factors that represent child health status.

Research Question

What social and economic factors in a child's home have the strongest relationship to body mass index?

What social and economic factors in a child's home have the strongest relationship to number of school absences?

Significance of Study

The purpose of this study is to determine if there is a relationship between social factors that affect children and health status measured by BMI and number of school absences of Northwest Arkansas school-age children. Broad suppositions exist in the United States and elsewhere that lower-income individuals and families exhibit poorer health status than those whose income is considered to be average or high (Currie & Lin, 2007). Focusing specifically on the Springdale Independent School District in Arkansas, the outcomes of this research will serve to highlight which of a variety of social and economic factors are most strongly associated with variations in children's health status. Income, ethnicity, parental employment, and relationships are all multifaceted circumstances that cannot be easily changed, and if they do function as risk factors for poorer health, it can be a particularly sensitive matter for the individuals.

To examine whether there are relationships between the health of Northwest Arkansas children and social and economic factors (grade level, gender, ethnicity, number of parents over the household, number of parents employed, and income level) will provide a key foundation of insight into the specific populations at risk. Schools may be able to provide targeted resources and health-related programming to populations within the community identified as being potentially in need. These resources could include health education from a school nurse on topics such as nutrition, exercise, spread of infection; in-class or after-school fitness programs that promote active play for children as opposed to sedentary activities; information on flu shots

being offered for the community in a convenient location; or other targeted health programs. It is essential to understanding whether there are concordances between socioeconomic factors and health in order to investigate more abstract matters, such as what aspects of a low-income household or cultural upbringing contribute to the poor health of a family, or how health status is distributed among different ethnic groups within income brackets. The elemental nature of this study provides the framework upon which future research for this population can be conducted.

Research Design and Methods

The purpose of this study was to examine if socioeconomics influence health in school age children in Northwest Arkansas. This study was completed after review and approval by the University of Arkansas Institutional Review Board. A retrospective record review of three elementary schools using data from the 2016-2017 school year was completed. The elementary schools are located in the Springdale School District, in Northwest Arkansas. A convenience sample was utilized with support from the school nurse coordinator for the district. Data for income level was collected by examining the percentage of students who are receiving free or reduced-cost lunch from the National School Lunch Program (NSLP). Each student was grouped into one of two brackets of income level for research analysis: "sufficient" income, meaning that the student is not qualified to receive aid from the NSLP; "less than sufficient" income, including the students that receive reduced-price and free lunches. Parental employment status, number of parents over the home, and ethnicity were obtained from the standardized district health card, which is filled out and updated yearly by each student's parents. Health status was measured by two variables: the number of missed school days per child, and student body mass index (BMI), which is routinely measured in the selected district every even-numbered grade level (kindergarten through tenth grade). Parental employment status, number of parents over the household, ethnicity, participation in the free or reduced lunch program, and school of attendance were assessed as variables which could impact

health. Each grade level was then compared to BMI and number of school absences, potential predictors of health status.

Data Analysis

Chi-square tests were conducted for each grade level on the following variables as predictors of BMI: free or reduced lunch status, ethnicity, number of parents living in the house, number of parents employed, and school of enrollment. For each test, the alpha level was 0.05 and p-value wa

s 0.01. The strength of each association was judged using Rea & Parker's (1992) categories, which range from 0.00-0.10, deemed a *negligible* association, to 0.80-1.00, deemed a *very strong* association. The One-Way Analysis of Variance (ANOVA) test and the F-test were used to measure the relationship between school absences and each of the five social variables, with an alpha level of 0.05 and p-value of 0.01.

Results

A total of 588 students were included in the study after exclusions were made for students for whom full data sets could not be obtained. There were 297 students were in second grade and 291 students were in fourth grade. The results for grade two and grade four are recorded and analyzed separately, as there are distinct confounding variables present such as physical development and metabolism.

Body Mass Index: Grade Two

Of the five social factors tested, two were significantly associated with overweight and obese classification of BMIs in second-grade children: participation in the free and reduced lunch program, and ethnicity. The population of disadvantaged children

displays a considerable difference in BMI category. Approximately 50 percent of second graders receiving free or reduced lunches are had BMIs in the obese/overweight range, and the other half had BMIs in the Normal range. For second graders whose families earn enough money to disqualify them from the free and reduced lunch program, only one-third had BMIs in the obese/overweight range. When considering ethnicity, just over half of non-white second grade children have a BMI categorized as overweight or obese. Only one-third of white second graders, however, have BMIs categorized as overweight or obese. Therefore, it can be assumed that second graders who have less sufficient incomes are more likely to be overweight or obese than second graders who have sufficient income to not qualify for subsidized lunch. The results are shown in Table 1.

Table 1   Chi-Square Tests of Independence – Social Factors and Body Mass Index of Second Graders

Variables	Obese/Overweight N (%)	Average/Normal N (%)	df	Chi-Sq.	p-value	Cramers V
Free/Reduced Lunch	74 (53.6)	64 (46.4)	1	11.95	<0.001	0.22
Full Price Lunch	36 (31.9)	77 (68.1)				
Non-White	69 (54.3)	58 (45.7)	1	11.53	<0.001	0.21
White	41 (33.1)	83 (66.9)				
One Parent	40 (47.1)	45 (52.9)	1	0.56	0.452	0.05
Two Parents	69 (42.1)	95 (57.9)				
None Employed	12 (63.2)	7 (36.8)	2	4.87	0.088	0.14
One Employed	54 (46.6)	62 (53.5)				
Both Employed	44 (37.9)	72 (62.1)				
School 1	36 (48.0)	39 (25.0)	2	5.08	0.079	0.14
School 2	43 (50.0)	43 (50.0)				
School 3	31 (34.4)	59 (65.6)				

Body Mass Index: Grade Four

The same five social factors were tested for association to body mass index in fourth grade children. Significant associations were seen in the variables of free or reduced lunch status, ethnicity, and number of parents in the home. Overall, the percentage of children considered overweight and obese according to their BMIs was higher in fourth grade than in second grade. Of the children receiving free or reduced lunch, approximately 60 percent were considered overweight or obese, compared to over 40 percent of those who were not receiving subsidized lunch were overweight or

obese. The association between lunch subsidy and obesity was significant, although not at a very strong level, as indicated by a Cramer's V of 0.18. The same relationship was found between ethnicity and BMI, where just over sixty-percent of non-white fourth graders were obese/overweight, while only forty percent of White fourth graders were obese/overweight. Finally, over two-thirds of fourth graders with only one parent in the home were obese/overweight. Less than half of fourth graders with two parents in the home were obese/overweight. The results are shown in Table 2.

Table 2   Chi-Square Tests of Independence – Social Factors and Body Mass Index of Fourth Graders

Variables	Obese/Overweight N (%)	Average/Normal N (%)	df	Chi-Sq.	p-value	Cramers V
Free/Reduced Lunch	82 (59.4)	56 (40.6)	1	7.76	<0.01	0.18
Full Price Lunch	43 (41.4)	61 (58.7)				
Non-White	77 (62.1)	47 (37.9)	1	11.19	<0.001	0.21
White	48 (40.7)	70 (59.3)				
One Parent	53 (67.1)	26 (32.9)	1	11.19	<0.001	0.22
Two Parents	72 (44.2)	91 (55.8)				
None Employed	12 (80.0)	3 (20.0)	2	5.69	0.058	0.15
One Employed	63 (52.1)	58 (47.9)				
Both Employed	50 (47.2)	56 (52.8)				
School 1	27 (39.1)	42 (60.9)	2	9.07	0.011	0.19
School 2	51 (63.8)	29 (36.2)				
School 3	47 (50.5)	46 (49.5)				

School Absences: Grade Two and Grade Four

Of the five social factors examined, free or reduced lunch status, number of parents living in the home, and number of parents employed displayed no significant relationship to a child's number of school absences. Among fourth grade children only, ethnically non-white children accrued a significantly higher number of absences than white children. The results for number of school absences for second and fourth grade children is displayed in Table 3.

Table 3

Descriptive Statistics and One-Way Analysis of Variance Tests for the Effects of Free/Reduced Lunch, Ethnicity, Number of Parents, Parent Employment, and School Attended on Number of Absences among Second Graders and Fourth Graders

Grade/Group	N	Mean	Std. Dev.	df	F	R^2
Grade 2						
Free/Reduced Lunch	113	3.13	2.31	1	0.03	0.0
Full Price Lunch	138	3.36	2.87			
Non-White	127	3.22	4.01	1	0.26	0.0
White	124	3.44	2.87			
One Parent	85	3.42	3.98	1	0.09	0.0
Two Parents	164	3.28	3.23			
None Employed	19	4.03	3.83	2	0.50	0.0
One Employed	116	3.17	3.78			
Both Employed	116	3.38	3.12			
School 1	75	5.08	4.43	2	**18.2	0.13
School 2	86	1.97	2.61			
School 3	90	3.17	2.62			
Grade 4						
Free/Reduced Lunch	138	3.62	3.94	1	1.73	0.00
Full Price Lunch	104	4.26	3.49			
Non-White	124	3.12	3.18	1	**11.34	0.05
White	118	4.72	4.13			
One Parent	79	3.32	3.62	1	2.77	0.01
Two Parents	163	4.18	3.81			
None Employed	15	4.33	3.84	2	0.76	0.01
One Employed	121	3.60	3.66			
Both Employed	106	4.17	3.88			
School 1	69	4.92	3.39	2	**23.23	0.16
School 2	80	1.74	1.99			
School 3	93	4.99	4.37			

*$p<.01$ **$p<.001$

Discussion

Among all students in 2nd and 4th grade at three different schools, children who represent less favorable social variables were found to be more likely to have a BMI classification as overweight or obese. Lower income level and non-white ethnicity were the factors most significantly associated with overweight and obese BMIs in both second and fourth grade, while only having one parent in the home was also found to be associated with elevated BMI in fourth grade students.

The increased BMI status of students in low-income households may be affected by poor access to nutritious foods at home, as the products most readily available and inexpensive at grocery and convenience stores are high in refined carbohydrates, sugar, salt, and fat. Lower-income children may also be more likely to have a home lifestyle that contributes to poor eating and exercise habits. Many of these children's parents work long shifts at local chicken processing plants in Springdale, as revealed on the school district health card; if the child returns home after school without supervision, they may be more likely to eat whatever food is readily available to them, and sit on the couch until the parent gets home. This reasoning could additionally be applied to why more than two-thirds of fourth grade children with only one parent over the household had elevated BMIs, versus less than half of children in two-parent homes having elevated BMIs. The single mother or father likely needs to work during the day, and may not be able to provide transportation to after-school activities or prepare nutritious meals

until later in the evening. If a parent is required to be the primary breadwinner as well as the primary caregiver, the child's health may be impacted.

The finding that more ethnically non-white children were classified as overweight or obese when compared to white children is consistent with other literature, which asserts that Hispanic and African-American children have higher BMIs than white children (Ogden et al., 2014). This is also consistent with the 2015 study by Gance-Cleveland et al, which revealed that the lower socioeconomic population examined consisted primarily of non-white ethnic minorities, and represented significantly higher BMIs than the more economically stable population. Of the children surveyed in this study, it is possible that more of the non-white children are additionally more economically disadvantaged, which could contribute to increased BMI values.

Since there were no significant relationships between any of the social factors we tested to school absences, no meaningful conclusions can be drawn from the use of school absences as an indicator of health status. In other words, a child of any demographic or home-life situation is just as likely to have an abnormal number of days missed from school.

Conclusion

The results of this study display that children who are economically disadvantaged and of ethnic minority are more likely to be overweight or obese, which increases their risk for health problems now and in the future as they get older. Schools can take this evidence into consideration when developing programming for physical

activity, child nutrition, and community education. These resources can be used to meet

the needs of a diverse population, and positively impact the health in communities.

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