The Relationship Between Nutrition and the Success of Learning in American Elementary-Aged Students

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Introduction

Nutrition is widely known as an important factor in many of our health outcomes. It is commonly understood amongst people that poor nutrition such as fatty, sugary, and carbohydrate-filled foods will not only lead to weight gain and possibly obesity but have hurtful impacts on one's health. Poor diets are often related to heart disease, high blood pressure and cholesterol, tooth decay, type-two diabetes, and even cancer. Fortunately, healthy nutrition lowers the risks of these diseases and may help people with chronic diseases manage their disease or avoid complications. Specifically, undernutrition in children prompts a variety of health problems including extreme weight loss, stunted growth, weakened resistance to infection, and even death in severe cases (Brown & Pollitt, 1996).

Many people do not realize or consider the impacts that nutrition has on learning outcomes. It should not come as a surprise that nutrition has great effects on mental development and cognitive functioning, as food is fuel for the brain. Ensuring that an adequate amount of protein and calories are consumed in the first two years of a child's life decreases the likelihood of nutritional deficiencies that are believed to cause adverse effects on learning and behavior, which also have the potential to be permanent (Scrimshaw, 1998). Not only does sufficient protein and calorie intake improve cognitive performance in the first two years of a child's life but provides benefits that are strong enough to have continuous impacts throughout adolescence and young adulthood (Scrimshaw, 1998). This is because nutritional deficiencies caused by poor nutrition during the fundamental ages of life can have irreversible effects. Thus, nutrition is a very powerful factor for one's body, mind, and overall well-being. There is an identifiable relationship between nutrition and academic achievement in elementary-aged children in American schools. Poor nutrition is related to poor academic achievement in ways such that

mental development is hindered, cognitive functions are not optimal, test scores are low, and rates of absenteeism are high.

Breakfast is widely regarded as the most important meal of the day in America, eating breakfast is certainly important to the success that elementary-aged students will have with learning, and not eating breakfast will lead to poor academic achievement. Although knowing that starting one's day with eating a nutritious breakfast is important, many Americans skip this meal. Among school-aged minority youth, skipping breakfast is prevalent at a high and disproportionate rate (Basch, 2011). Unfortunately, but not surprisingly, skipping breakfast for elementary-aged students has negative effects on elementary-aged students' academic achievement related to cognitive functioning, test scores, and school absenteeism (Rampersaud et al, 2005). Due to the reason that eating breakfast has been recognized to hold such importance to the success of students' learning, many schools have begun to implement an in-school breakfast program, ensuring that each student begins their day by eating breakfast.

Mental Development and Cognitive Functioning

Healthful nutrition is vital for proper brain development. Therefore, what we eat matters. Different areas of the brain develop at different stages and each area corresponds to different cognitive functions (Cooper, 2019). Malnutrition in children has familiarly been believed to hinder normal mental development of the brain; severe and permanent damage to the structure of a developing child's brain may be produced by undernutrition during infancy and childhood (Brown & Pollitt, 1996). Cases of children who have excess weight or may even be obese have shown in imaging studies to have structural changes in their brains, that are associated with lower academic test scores (Cooper, 2019). Inevitably, damage to the structure of a child's brain and cognitive development can impair their intellect, showing that inadequate nutrition disrupts

cognition. These disruptions to cognition during infancy can cause cognitive deficits that have no possibility of being rectified. Cognition is a distinct area of higher mental functions, such as memory, learning, and attention, that is indicative of a child's academic achievement and future quality of life (Bleiweiss-Sande, 2019). As a whole, cognitive functioning is affected by the nutrition that a child receives, and significantly poorer cognitive functioning is associated with food insufficiency. Related to the effectiveness of a child's cognitive functioning are also verbal fluency, arithmetic skills, attention, memory, creativity, thinking, and energy levels, all of which are too impacted by nutrition (Taras, 2005). Poor concentration is also a result of malnutrition on cognitive functioning (Prangthip et al, 2018). The quality of cognitive functioning and its subcomponents, especially memory, and thinking, substantially influence the success an elementary-aged student will have with learning.

It is a well-known concept that what happens early in life will have a significant impact on personal events later in life. The care that a child receives early in life will be significant in the health outcomes they experience throughout their development years and through adulthood. Similarly, the nutrition that a child receives early in life will be significant in the learning outcomes experienced throughout their fundamental years, when learning is molding a child's brain, and through adulthood as well. Therefore, it has been established that undernutrition early in life can limit long-term intellectual development (Brown & Pollitt, 1996). Undernutrition is commonly caused by limited access to nutrient-adequate and safe foods. Not only does undernutrition affect intellectual development but the consumption of fats and food additives can also affect cognition; high-fat diets have been seen to demonstrate both long-term and short-term cognitive impairments (Tobin, 2011). Furthermore, diets of children that are high-fat and high-fructose contribute to negative effects on tier cognitive learning abilities (Li & O'Connell, 2012).

Fast foods are foods that are known for containing food additives and that are also high in fat and fructose content, the same types of foods that demonstrate negative effects on a child's cognitive abilities and are linked to cognitive impairments. That being so, a study examining the connection between nutrition and academic achieving among children in the United States emphasized the probability that the types of foods that are served in fast food restaurants cause cognitive difficulties, to the extent that lower test scores result from the correlation (Tobin, 2011).

Skipping breakfast adversely affects various aspects of a student's cognitive performance, in ways such as alertness, attention, memory, processing complex visual displays, problem-solving, and mathematics (Basch, 2011). A day in any person's life, but certainly a student's, is filled with tasks that require the skills that have been noted to be adversely affected by skipping breakfast. Therefore, by skipping breakfast in itself, an elementary-aged student is already on course to have less successful learning outcomes compared to children who are properly nourished and have eaten breakfast. Moreover, by alleviating hunger, cognitive performance may be improved (Rampersaud et al, 2005). For anyone, it is hard to focus when experiencing the pains of hunger, especially elementary-aged children who have a harder time dealing with feelings of hunger or distracting themselves from such feelings to maintain focus on their learning. Feeling hungry may also make students worry about when they will next be given food, rather than allowing their minds to properly think and retain information about what they are learning, diminishing their success in learning. By fulfilling child hunger and reducing nutritional gaps through school breakfast programs, more elementary-aged students will have better cognition and more energy to learn (Cooper, 2019).

Breakfast consumption has also been correlated to have beneficial effects on aspects of memory, concentration, and attention. Memory functions including recall, episodic memory, and both short-term and long-term memory benefited from eating breakfast (Rampersaud, 2005). Along with memory improvements are improvements in students' attention as a result of eating breakfast. Attention problems were seen in children who did not eat a proper breakfast either at home or at school in the morning (Prangthip et al, 2018). Without being alert in school, successful academic achievements will not be reached.

Academic Performance and Test Scores

Academic achievement and performance, as well as a child's learning process, are hindered by poor and malnutrition. "Academic achievement is the outcome or performance related to education that indicates the extent to which a child has accomplished specific goals…" (Prangthip, 2018). A lasting consequence of malnutrition is impaired academic performance and poor academic achievement scores (Prangthip et al, 2018). Malnutrition is oftentimes the result of food insecurity caused by a lack of access to safe and nutritious foods for reasons such that nutritious foods are expensive for parents and guardians to afford or because they may be living in a food mirage where food stores are not close by and transportation to them is limited. Children who are food-insecure experience smaller increases in reading and mathematics performances compared to children who do not lack access to nutritious foods (Cooper, 2019). Simply by having decreased access to nutritious foods, some elementary-aged students are automatically on course to have poorer academic achievement compared to their schoolmates who do not struggle to receive adequate nutrition. Furthermore, poor nutrition in young children often means that the child is not eating enough of the foods that supply them with healthy vitamins and nutrients. These nutrients are not only vital for their physical and mental growth

and development but for having successful learning outcomes. Children with nutrient intake deficiencies have been linked with learning deficiencies, lower arithmetic grades, and the likelihood of having to repeat a grade (Basch, 2011). Naturally, having deficiencies in learning abilities will result in lower grades as grades are an assessment of academic performance. Being that the majority of American schools focus on grades as a tool for assessing whether or not a student is prepared to advance to the next grade, many students with learning deficiencies and poor grades are obligated to retake the same grade level.

A routine way to measure a student's level of academic achievement and performance in an area of learning is through grades, acquired by tests and test scores. Thus, grades are intended to reflect academic performance toward learning goals (Prangthip, 2018). High grades and test scores represent a high level of academic achievement of a specific learning goal and low grades and test scores consequently represent the opposite. To examine the relationship between the intake of healthful versus less-healthful food group intake on academic achievement in urban schoolchildren, a study was done using standardized test scores to assess academic achievement. The study demonstrated that a greater intake of less-healthful foods, such as sweet and salty snacks, was associated with lower standardized math and English language arts standardized test scores, suggesting that nutrient-poor foods are correlated with lower academic achievement in this population (Bleiweiss-Sande, 2019). Additionally, the findings of the study found a positive relationship between vegetable consumption and verbal test scores. A related later study also found positive associations between consuming healthy diets in early life, diets rich in fresh fruits, vegetables, and whole grains, to higher intelligence quotients later in life (Bleiweiss-Sande, 2019). This shows that the benefits of healthful nutrition are not exclusively related to

improving academic test scores but overall academic achievement throughout life through increased intelligence quotients.

Fast food is inarguably considered a less healthful food. Fast food is also a regular food source for elementary-aged children as it is quick, easy, and inexpensive for parents to feed their children. Having already established that less healthful foods such as foods that are high in salt or fat content contribute to the poor academic achievement of elementary-aged children demonstrated in the relationship between less healthful foods and low test scores, it is presumable that fast food will have a similar relationship to test scores and overall academic achievement for elementary-aged children. A negative relationship was found in a study done to examine the relationship between students' fast food consumption and their mathematics and reading test scores, such that test scores decreased as fast food consumption increased (Tobin, 2011). Frequent consumption of fast and less healthful foods can lead to overweight or obesity among elementary-aged children. A study done to investigate the relationship between fifth graders' self-reported high-calorie food intake to trends in obesity and ultimately academic achievement found that frequent fast food consumption was related to negative patterns in the student's mathematic achievement patterns and significantly lower test scores for mathematics as well as reading (Li & O'Connell, 2012). Increased frequency of fast food consumption among students also displayed a tendency for slower growth in mathematics (Li & O'Connell, 2012). Therefore, an elementary-aged student's increased body weight and overweight due to poor nutrition are related to poor academic achievement.

Concluding that there are significant findings to show the negative relationship that poor nutrition has on academic achievement through lower test scores and poor academic achievement, it may also be presumed that healthy nutrition may be related to higher test scores

and academic performance and overall better academic achievement. Improved nutrition among students was positively associated with academic achievement (Prangthip et al, 2018). Satisfactory nutrition can enhance a student's academic performance and learning, allowing them to perform better on tests and complete their assigned tasks thoroughly (Prangthip et al, 2018). Effects such as these are amplified when comparing students who receive healthy nutrition to those who receive poor nutrition. To combat the negative outcomes that poor nutrition has on academic achievement among elementary-aged students, parents, and schools must improve the nutrition that the children are receiving. The Healthier Options for Public Schoolchildren (HOPS) intervention was implemented to so, aiming at changing school policies regarding the nutrition content of school-provided meals and other school-based wellness activities, and the effects of doing such on students' academic achievement, as well as attendance and behaviors, were examined (Kopkin et al, 2017). The development and implementation of this program come with the preconceived notion that nutrition in schools influences not only the health but academic achievement of elementary-aged students. With the implementation of HOPS, results found notable improvements in both mathematics and English test scores for students (Kopkin et al, 2017). This comes with findings of lower standardized test scores on average in mathematics and English before and after the implementation of the program (Kopkin et al, 2017). This supports the idea that improving nutrition for students through school-based programs will have positive effects on improving test scores, thus improving academic achievement.

School breakfast programs serve as more than just a way of guaranteeing that students start their day with a nutritious meal. School breakfast programs provide students with an opportunity to begin their day on a positive and relaxing note; some schools use the same time when breakfast is being fed to students as a time to allow students to socialize and enjoy

themselves (Basch, 2011). This may include reading, being read to, or socializing with their friends. Many people would agree that having a minute to collect oneself at the beginning of their day would be beneficial, as having a hectic start to the day can make the rest of the day feel stressful and less enjoyable. The same feelings apply to children at school; having time each morning to eat a good breakfast and enjoy oneself and the company of others before the day runs its course can be just as beneficial for elementary-age students who may frequently feel stressed while learning. By starting a student's day on a positive note this way, participation in learning will be more enjoyable, thus enhancing student participation in learning (Basch, 2011). Through participating in learning, it is likely that students will have more success with learning and enjoy the learning process more at the same time. Children believed that eating breakfast made them more active and participative in school, contributing to their performance in school (Prangthip et al, 2019). Through greater activity and participation in school and thus performance, students will subsequently have improved test scores and overall academic achievement. In a California study, a strong association has been found between the percentages of students who eat breakfast and schools with higher academic scores (Taras, 2005). As cognitive functioning is improved by consuming a nutritional breakfast, students were able to earn better test scores. By implementing the school breakfast program and providing breakfast to students in the classroom, it can be guaranteed that each child will be given breakfast that provides them with the necessary nutrients that will foster their ability to successfully learn that day, and perform well on tests.

School Attendance

Attending school and attending school on time is undeniably impactful on the success an elementary-aged student will have with academic achievements. Especially at the young age of elementary-aged students, consistent practice of already-learned skills such as reading, writing,

and mathematics is imperative to maintaining such skills, as well as building upon them to advance their skills and learning abilities. Therefore, it is important that students do not miss days of school or arrive to school late and miss lessons that will allow them to further advance their learning and achieve increased levels of academic success. However, when a child is not receiving proper nutrition, they tend to miss days of school or arrive at school late. Food insufficiency was associated with decreased school attendance in a study that assessed the relationship between nutrition among elementary-aged children and their performance in school (Taras, 2005). It is foreseeable that elementary-aged children who are not receiving the nutrition that is necessary for them to feel healthy, energized, and ready to learn, would begin to miss school frequently. Similarly, food insecurity is also a major contributor to the poor nutrition that children receive. Food insecurity, an overall lack of enough foods or nutritious foods, contributes to school absences (Cooper, 2019). By missing school because of poor nutrition, a student may fall behind on the track they are intended to be on with their learning and academic performance. Certainly, attending school consistently will increase the success that an elementary-aged student has with academic achievement and learning outcomes.

Arriving at school and being ready to learn is surely something that requires a great deal of energy, especially for an elementary-aged student who exerts energy at a quick rate. In order to begin learning early in the day and have the energy to remain focused and concentrated throughout the day, a child must begin their day with breakfast. However, many children, commonly children from low-income homes, are not given a nutritious breakfast in the morning, relating to high rates of absenteeism in schools. Fortunately, school breakfast programs have been associated with reduced absenteeism (Basch, 2011). Along with being more likely to attend school, students who are offered breakfast at school have lower rates of tardiness (Taras, 2005).

School breakfast programs create the opportunity for students to eat a nourishing breakfast at no cost. This may serve as motivation for parents and their children to attend school and arrive on time (Basch, 2011). This also can eliminate a great deal of stress for low-income families where parents are stressed to afford the cost of putting meals on the table and children worry about when they will eat their next meal. By being motivated to attend school to receive free breakfast, more children will be at school on time, thus also being at school on time to begin learning. Being at school when the learning begins is a sure way to increase the success elementary-aged students will have with learning.

Conclusion

High levels of academic achievement are obstructed by poor nutrition in that poor nutrition hinders proper mental development, prevents optimal cognitive functions, decreases test scores, and increases rates of absenteeism and tardiness in schools. Especially during the younger years of life when a child is an elementary-aged student, there is a great amount of cognitive development taking place that is influenced by what a child eats. The development of a young child's mind will shape their ability to learn at a young age and throughout their lifetime. Therefore, improving nutrition and terminating poor nutrition among elementary-aged students consequently improves their academic achievement. In elementary-aged children, it is equally as important to limit the intake of unhealthful foods as it is to eat plenty of healthful foods for a positive impact on their cognition and school performance to be seen (Cooper, 2019). This is because the negative effects of less-healthful foods are as significant as the benefits of healthful foods. Nutritionally balanced meals are a significant benefit and a major requirement in aiding elementary-aged students with improving their learning (Prangthip et al, 2018). In due course, good education leads to better productivity (Prangthip et al, 2018). Thus, an elementary-aged

student's nutrition is a significant guide in the success they will have in academic achievement which can be measured through their mental development, cognitive functions, test scores, and attendance rates.

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