Nutrition for the Future

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PSYC 2207-090: Introduction to Educational Psychology

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February 28, 2021

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Nutrition is the essential fuel that our bodies, most importantly our brains, use to function. However, students tend not to realize its significance. Students require the right nutrients to allow their brains to function, allowing them to focus more attentively and be more successful in their academic careers. Children often do not meet their daily nutrient recommendations or recommended meals per day, resulting in many academic struggles. To combat this issue, programs must be integrated into schools to promote healthier and more frequent meals.

Breakfast and lunch are crucial for a successful student as schools mainly run from the morning to the afternoon. A study by Bartfeld et al. (2019) and Terry-McElrath et al. (2015) shows a program indicating what benefits arise from adding a school breakfast and lunch program. This also benefits those who do not have the resources at home to consume these daily meals as they have a safe space to eat. Frequent meals are not the only concern of nutrition; getting the right amount of fruits and vegetables is most important in maintaining a healthy body and mind. The study by Kropp et al. (2018) shows that integrating schools with local farms can benefit students' by increasing their daily intake of fruits and vegetables. To be a successful student, academics are not the only focus; physical activity also plays a part. To participate in physical activity, milk intake is needed to increase calcium in the bones. A study by Henry et al. (2015) shows the benefits of increasing students' milk intake by providing a school program. Poor nutrition can occur due to many factors and lead to later problems such as diabetes and heart disease. This, however, can be preventable by incorporating a program that targets both the nutrition and physical activity of a student, which is seen in a study by Centeio et al. 2018. Nutrition is one of the key elements of being a successful student, and incorporating select programs into B.C. schools, can promote a healthy body and a healthy mind.

School Breakfast Program

The School Breakfast Program has provided free or reduced-cost meals to millions of children. It has been shown to increase the likelihood of eating breakfast and consuming food of nutritional quality. It's also associated with lowering household food insecurities' risk (Bartfeld & Ahn, 2011; Bartfeld & Men, 2017; Fletcher & Frisvold, 2017, as cited in Bartfeld et al., 2019). Based on the research by Bartfeld et al. (2019), the School Breakfast Program is available to 92% of schools already participating in the National School Lunch Program. The purpose of this study was to examine if the School Breakfast Program impacts attendance and test scores in the entire state of Wisconsin. Also, the study compares other programs such as the Universal free breakfast (UFB) or Breakfast in the Classroom (BIC) to evaluate costs and location concerning the traditional School Breakfast Program.

Data was collected from 1000 public elementary schools located in Wisconsin, USA, except for students attending school in the Milwaukee Public School District. Administrative data was analyzed from 2009-2014, and within this time period, 168 schools were introduced to a new School Breakfast Program or modifications were made to those who already had access to the program. The modifications that were implemented varied from changing the location of the program to altering the payment structure. Participants ranged from grade one to five depending on the variable being analyzed. The attendance analysis included 481,799 students in grades one to five, and the test score analysis included grades three to five, totaling 248,328 students. The samples consisted of both male and female students.

The UFB is meant to decrease financial barriers and has been linked to greater participation (Ribar & Haldeman, 2013; Leos-Urbel et al., 2013; Anzman-Frasca et al., 2015; Schanzenbach & Zaki, 2014; Wong & Emerson, 2006, as cited in Bartfeld et al., 2019). In 2019, Bartfeld et al. were aware of the benefits of the traditional School Breakfast Program, but they wanted to examine further the impacts of cost and location by identifying student characteristics and differences between existing programs. The study compared schools that have always been offered the School Breakfast Program, schools that have

never been offered the program, and schools with the program implemented during the observation period. The findings support that the UFB promotes increased attendance compared to the traditional School Breakfast Program. The results indicated that offering breakfast at no cost has a positive impact, especially for individuals enrolled in the Supplemental Nutrition Assistance Program. In addition to differences in cost, the School Breakfast Program is structured differently than the BIC Program. This study measured attendance scores when breakfast is served in a cafeteria (this is traditionally done in the School Breakfast Program) in comparison to when breakfast is offered in the classroom.

The discoveries found in this study suggested no association between BIC and attendance scores; however, further research should be conducted as concerns arise about the program taking away from academic time. This study demonstrates the School Breakfast Program and the Universal free breakfast to be beneficial to many students and contribute to higher attendance and test scores. If feasible, schools within B.C. should encourage these programs within their curriculum as providing breakfast at school improves engagement and academic performance for students of all ages.

National School Lunch Program

The National School Lunch Program gives an opportunity for students to receive a nutritious lunch at a reduced cost or free every school day. This program is federally-assisted and plays a crucial role in providing children from low-income families with adequate nutrition (Terry-McElrath et al., 2015). During the 2012 school year, the National School Lunch Program provided lunch to over 31 million children in the United States. Due to the adolescent obesity rate rapidly increasing and nutrition disparities across schools, the United States Department of Agriculture updated the National School Lunch Program's nutrition standards in 2012 (Terry-McElrath et al., 2015). Nutrition standards were put into place at the start of the school year and required schools in the program to offer “fruit and vegetables daily, half of the grains must be whole grain-rich, weekly range of meat/meat alternatives,

only fat-free and low-fat milk, zero grams of trans fat per portion and they must enforce calorie and fat limits" (Terry-McElrath et al., 2015). The study by Terry-McElrath et al. (2015) aims to find food and beverage trends throughout the program, analyzing data from before and after the new standards were implemented. Specifically, looking to measure nutrition disparities and identify if they are evident based on school characteristics and if improvements can be incorporated into the National Lunch School Program.

Data was collected using a rotating sample design. There were seven dichotomous National School Lunch Program measures used as dependent variables, and school characteristics were independent measures. Students were offered a $100 incentive to complete a mailed questionnaire and were invited to participate for three years (Terry-McElrath et al., 2015). From 2011 to 2013, research took place and represented students nationally in grades 8, 10 and 12. In the United States, data was comprised of both genders and collected from 792 middle schools and 751 high schools. Although there were initial complaints, most students reported they liked the meals to some degree (Terry-McElrath et al., 2014; Turner & Chaloupka, 2014, as cited in Terry-McElrath et al., 2015). Research indicates that schools reported increased plate waste, but the new requirements were associated with increased fruit and vegetable consumption. All students showed significant increases in at least four of the National School Lunch Program measures. School characteristics such as predominate race/ethnicity, school size and geographic location played a role in several measure differences.

Overall, the research presents the program offers more benefits for small schools, but all schools have shown significant nutritional improvements, and by 2013 school district disparities were largely eliminated (Terry-McElrath et al., 2015). Meaningful improvements have reduced meal disparities, and the positive outcomes from Terry McElrath et al. (2015) study strengthen the need to implement nutritional standards within the National School Lunch Program. Sadly, many children in

Canada don't meet the recommended dietary intake; based on the benefits detailed above, B.C. schools should implement similar standards to promote healthier meal choices for secondary students.

Farm to School Program

Often it can be very troubling for students to get in their daily recommendation of fruits and vegetables due to lack of time or lack of resources. Whether the student is too busy or cannot afford to incorporate fruits and vegetables into their diet, it should be a right to promote a healthier body and, most importantly, a healthy mind. To tackle this problem of lack of fruits and vegetables in a student's diet, Kropp et al. (2018) investigated the Farm to School (FTS) program's implementation and its impact on the students. This study's main purpose was to increase the cafeteria's local food serving amount and increase students' exposure to vegetables and fruits (Kropp et al., 2018). By implementing this program, the hope is that students will internalize their knowledge and continue to eat healthier. If there are students that cannot afford to continue this diet at home, at least provide a space for them to. The Farm to School program consists of more than just providing cafeterias with local fruits and vegetables and hands-on learning such as nutritional education or a school garden (Kropp et al., 2018).

For this particular study, Kropp et al. (2018) decided to mainly focus on the cafeteria supplying local fruits and vegetables rather than the program's education or hands-on learning aspect. The study was set in Florida, USA, observing six elementary grades one to five enrolled in the National School Lunch Program (NSLP). Those enrolled in the NSLP meant that students are low income and are less likely to have fresh fruits and vegetables at home. The study observed 11,262 meals using three control schools and three treatment schools. For the treatment schools, the hypothesis was that the FTS program would increase fruit and vegetable consumption. Rather than using methods such as self-reporting both pre-intervention and post-intervention, plate waste methodologies were used instead.

First, data was collected at all six elementary schools for pre-intervention data. This study's produce was primarily raw vegetables; this included cucumbers, peppers, and leafy greens. They were using the plate methodologies, either through examining the trays and estimating the amount of food wasted or taking pictures for reliability (Kropp et al., 2018). However, the picture-taking method was more inaccurate. Lastly, a four-point scale was used to determine how much was wasted, 0 meaning nothing was wasted, and four representing the whole meal was wasted. The data was analyzed through Mann-Whitney U tests to determine if there was a significance in consuming vegetables and fruits after implementing the program. The results indicated that those schools participating in the Farm to School program did, in fact, increase their intake compared to the control schools. It was a small significance, but an increase in 37% of vegetables and 11% of fruits.

Implementing this program to British Columbia schools throughout elementary, middle and high schools could be very beneficial. Although this study focused on elementary schools, it can be applied to middle schools and high schools. Students struggling in low-income families often do not have the resources to incorporate enough fruits and vegetables into their diets. This can be a struggle for students as it can disrupt their overall growth and school performance. Students in this position will also less likely come forth and be open about their at-home struggles; this makes it harder to spot those in need. The implementation of this program can give every student a chance to grow and thrive in school.

School Milk Program

Milk provides children and youth with their key sources of protein, calcium, and vitamin D (Vatanparast & Whiting, 2007, as cited in Henry et al., 2015). These nutrients are crucial for bone development and preventing osteoporosis when they get older. Canada's Food Guide to Healthy Eating recommends children ages four to eight consume two servings of milk and alternatives. Servings are increased to three-four for children between the ages of nine to thirteen. Although more servings are

required for children moving into adolescence, research supports their calcium intake declines (Iuliano-Burns et al., 1999; Vatanparast & Whiting, 2006, 2007, cited in Henry et al., 2015). This study aimed to measure milk consumption, milk waste and assess factors that contribute to students' milk choice.

The study was completed at six (four urban and two rural) Catholic Schools in Saskatoon, Saskatchewan, Canada, over a 12-week period. A total of 1205 students participated, consisting of males and females, and students ranged from grade one to eight. Researchers used a mixed-method research design, the study was divided into three phases, and each phase lasted four weeks. Phase one and three served plain and chocolate milk, but phase two was restricted to serving only plain milk. Students in grades five to eight completed Beverage Frequency Questionnaires so researchers could measure milk consumption. Plus, focus groups were conducted to determine the influences of student's milk choices. Results showed students preferred chocolate milk over plain milk, and in phase two, when chocolate milk wasn't offered, milk consumption decreased by 12.3%. Overall, students consumed more milk in rural schools, and schools in urban areas had greater waste. Also, plain milk had a greater amount of wastage. On average, students in grade five consumed the most milk, and grade seven students had the lowest milk consumption. The cost was an additional factor; individuals that paid for milk with their own money didn't consume as much as those who received the milk for free.

Unfortunately, many studies have found that children do not meet the daily milk recommendations set out by Canada's Food Guide. Furthermore, at school, less than half of children's nutritional needs are being met. It's imperative that B.C. schools encourage and promote healthy food and beverage environments for students attending elementary through high school. Findings indicate that flavoured milk is an option to meet the daily dairy recommendations and, in this study, when chocolate milk wasn't present, the number of students choosing to drink milk reduced by 41%; therefore, considering these factors, B.C. schools should offer a variety of milk options to assist with increasing students' milk intake.

Building Healthy Communities

Obesity is something that can be extremely harmful to the body, especially when growing up. It is something that has increased over the years with youth. This not only affects students with physical limitations but can be harmful to mental health. Obesity can be a source of bullying, which can cause low self-esteem and deter students from actively going to school. A program that can help tackle both of these problems is the Building Healthy Communities (BHC) program developed using the socio-ecological model. A study done by Centeio et al. (2018) decided to examine the impact of implementing both physical activity (PA) and health education (HE) in the school system. With both PA and HE, the program hopes to change food culture by giving students tools such as knowledge and healthy living behaviours.

The study decided to use six schools of grade five students, four as treatment and two as a comparison in the suburbs of midwestern U.S. cities (Centeio et al., 2018). The implementation of the program took eight months and focused on six components: 1) healthy kids club, 2) active recess, 3) principal engagement, 4) student leadership program, 5) classroom engagement, and 6) quality P.E. All components of the program play a critical role. The healthy kids club consists of an afterschool club with healthy snacks and PA opportunities such as a running/ walking club. Active recess was another PA focused component where recess is filled with numerous options that encourage physical activity, such as hula hoops, basketballs, and jump ropes (Centeio et al., 2018). The PA component is quality P.E., where schools receive a curriculum that promotes quality physical education and equipment to teach it. Other than physical activity, healthy eating is the other focus of the program. The classroom engagement component focuses on six lessons that should be integrated throughout the year regarding PA and HE. Student leadership programs include students that build teams and hold kickoffs to promote PA and HE. Lastly, it is critical that the principal is involved in this program by supporting the policies and focusing on distributing messages through newsletters and announcements.

Data was collected through both self-report and by research assistants measuring both BMI and waist-to-height ratio. The pre-intervention data, such as general information on the student, was through self-report, where the research assistants collected physical data such as measurements and health (Centeio et al., 2018). The hypothesis was that the BHC program would decrease both the Body Mass Index (BMI) and Waist-to-Height (WHtR) in the treatment group while the comparison group would maintain/increase their BMI and WHtR. Through the use of ANCOVA, the results indicated that there was a significantly lower BMI and WHtR of treatment schools compared to the comparison group (Centeio et al., 2018). These results lowered both measurements and positively changed behaviours towards healthy eating, increasing the consumption of vegetables and fruits and increased physical activity.

This could be a great program to implement in British Columbian schools. It could be a great way for elementary schools to start physical activity early, especially during recess, and provide information on eating healthy. Starting this program increases the likeliness that it will continue onto later years. In middle schools and high schools, there is not much education on healthy eating incorporated. This program can promote healthier eating, which students can eventually carry with them after graduating. This program has been shown to improve BMI and WHtR, which can benefit students by preventing obesity, resulting in higher self-esteem and better school performance.

Discussion

Although these five programs bring many benefits to children regarding their nutrition, the studies do possess limitations. The study done by Bartfeld et al. (2019) struggled with generalizability, as the study covers statewide rather than district or city-wide data, which can cause the program to not apply to other areas. Along with generalizability, the study also has the limitation that it is a within-school variation which results in the program being only applicable to schools that are willing or

available to change their school problems. Also, the study did not contain individual data on students' information to help predict future attendance and test scores. Similarly, the study by Terry-McElrath et al. (2015) limits schools that report NSLP participation which cannot be generalized to those outside of this program. Another limitation is the study's validity; due to the study relying on student's self-reporting, the results can be inaccurate. The limitation in Kropp et al. (2018) study is the inability to understand what drives the behaviour of change in consumption which can be due to either the freshness of the fruits and vegetables or the nudging from cafeteria workers; for future studies, this should be determined. This study also relied on self-reporting as a portion of the data, which can be invalid. The study by Henry et al. (2015) had the assumption that one milk carton was consumed daily by each student since there was no limitation on how many a student could purchase a day. The study done by Centeio et al. (2018) had a similar issue to the other studies of generalizability since the program only collected fifth graders' data, making it less applicable to older students.

For future researchers replicating these studies, generalizability is a crucial limitation that should be considered. The majority of these studies focused on either a certain grade of students or a geographical area. For these programs to be even more successful, studying older students would be beneficial. The program's cost should also be considered to determine if the program's benefits outweigh the costs. Specifically, it can be quite expensive for these programs when dealing with nutrition, especially if students waste the food. The sustainability of the programs should be studied to establish if the programs cause any long-lasting changes in students or simply for the range of time that they are implicated in the school. These studies can be applied to the future work of an educator. Seeing the importance of nutrition on students regarding their health and overall success as students, it is important to incorporate these views in the classroom. This can be done by integrating healthy nutritional facts and tips into the curriculum, creating a unit or project-based around health. Most importantly, modelling good nutrition in front of the students by trying to eat healthier around them.

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