

Investigating Student Academic Achievement, Discipline, and Attendance Outcomes of
Nutrition Education Programs Using State Longitudinal Data Systems

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ABSTRACT

In 2016, 12.3% of households in the United States (U.S), or 15.6 million people, were food insecure during some part of the year. Food insecurity is more prevalent among households with children, and has been shown to have adverse effects on child development, aggressive behavior, psycho-social development, and academic performance. Nutrition assistance and education programs play critical roles in alleviating food insecurity. The Virginia 365 Project (VA365) was a United States Department of Agriculture (USDA)-funded multi-level school- and home-based approach aimed at reducing food insecurity in low-income areas of Virginia through meal programs and nutrition education for parents through the Expanded Food and Nutrition Education Program (EFNEP) and the Supplemental Nutrition Assistance Program Education Program (SNAP-Ed). Impacts of coordinated nutrition assistance programs for children have generally focused on food security or nutrition outcomes, not broader impacts on academic achievement, attendance, and aggressive behavior. This study examined the feasibility of using school-level surveillance data, collected in state longitudinal data systems, to detect changes in academic and behavioral outcomes, using the VA365 program as a case study. Relevant data indicators were identified and compared from the Virginia Longitudinal Data System and from the longitudinal data systems from other Mid-Atlantic region (MARO) SNAP-Ed states (n=9) to determine generalizability to other states for broader program impacts. Results provide a greater understanding of the potential for accessing existing school-level data to document the public value of school-based nutrition programs beyond improved food security and dietary intake to include academic achievement, discipline and attendance outcomes.

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GENERAL AUDIENCE ABSTRACT

In 2016, 15.6 million Americans were food insecure, or struggled to get safe and consistent access to food, during some part of the year. Food insecurity is more common in households with children. It can have negative outcomes on a child's development, behavior, psycho-social development, and grades. The Virginia 365 Project (VA365) was a federally funded approach to reducing food insecurity in children located in low-income areas of Virginia through a combination of free school meals, food backpack programs, and nutrition education. The goal of this study was to determine the feasibility of using data already collected by schools to assess impacts of this anti-hunger program on student behavior, attendance, and academic achievement. All schools collect data as part of the Virginia Longitudinal Data System. We analyzed data that were collected as part of this system as well as other states around Virginia to determine how and if they could be used to describe the benefits of the program. The results of this study may help researchers understand the potential of this approach to investigating the broader impacts of nutrition programs beyond nutrition and food insecurity outcomes.

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LIST OF ABBREVIATIONS AND ACRONYMS

BMI: Body Mass Index	MD: Maryland
CACFP: Child and Adult Care Food Program	MLDS: Maryland Longitudinal Data System
CEDS: Common Education Data Standards	NCES: National Center for Education Statistics
DARS: Virginia Department for Aging and Rehabilitative Services	NIFA: National Institute of Food and Agriculture
DC: District of Columbia	NJ: New Jersey
DC DOE: District of Columbia Department of Education	NJ DOE: New Jersey Department of Education
DC SLED: District of Columbia State Longitudinal Education Data	NJ SMART: New Jersey Standards Measurement and Resource for Teaching
DDOE: Delaware Department of Education	NSLP: National School Lunch Program
DE: Delaware	OSSE: District of Columbia Office of the State Superintendent of Education
DHP: Virginia Department of Health Professions	PA: Pennsylvania
EFNEP: Expanded Food and Nutrition Education Program	PIMS: Pennsylvania Information Management System
ERS: Economic Research Service	PR: Puerto Rico
FNS: Food and Nutrition Service	PR DOE: Puerto Rico Department of Education
IES: Institute of Education Sciences	PSE: policy, systems, and environmental
LEA: Local Education Agency	RUDA: Restricted Data Use Agreement
MARO: Mid-Atlantic Region	

SBP: School Breakfast Program

SCHEV: State Council of Higher Education
for Virginia

SEBTC: Summer Electronic Benefit
Transfer for Children

SID: Statewide Student Identifiers

SLDS: Statewide Longitudinal Data System

SNAP: Supplemental Nutrition Assistance
Program

SNAP-Ed: Supplemental Nutrition
Assistance Program Education

SNAPFS: Supplemental Nutrition
Assistance Program Food Security

US: United States

USDA: United States Department of
Agriculture

VDOE: Virginia Department of Education

VCCS: Virginia Community College
System

VDSS: Virginia Department of Social
Services

VEC: Virginia Employment Commission

VLDS: Virginia Longitudinal Data System

VI DOE: Virgin Islands Department of
Education

WIC: Special Supplemental Nutrition
Program for Women, Infants, and Children

WV: West Virginia

WVDE: West Virginia Department of
Education

WVEIS: West Virginia Education
Information System

CHAPTER 1: Introduction

Food insecurity remains a consistent economic and social problem facing many Americans. Food insecurity, which is tied to poverty, varies by income level, household composition, and geographic area.^{1,2} Food insecurity is tied to poverty.¹ Low-income households on average have higher food insecurity rates than higher-income households (38.3% compared to 5.6% in 2016).³ Households with children often experience food insecurity and poverty at higher rates than households without children (26.2% compared to 11.1% in 2015).^{4,5} All households with children had a higher rate of food insecurity than the national average in 2016 (16.3% compared to 12.3%).³

Food insecurity also varies based on state and specific geographic regions. Families in the southern United States (U.S.) tend to have higher rates of food insecurity than families in northern states.^{1,2} Virginia's food security rate has been generally similar or lower than the national average at 11.2% in 2016,^{2,6} though some counties are disproportionately affected by food insecurity. For example, food insecurity rates in northern Virginia in 2016 ranged from 9.1% to 20.3%, whereas more rural areas in the southwest and south of the state had rates between 20.0% and 28.4%. Independent cities have also shown higher food insecurity rates than larger counties in more affluent areas.⁶

Food insecurity is highest in non-metropolitan areas due to low wages, unemployment, and large food deserts in which access to grocery stores is limited.¹ Populations in certain regions may also experience food insecurity disproportionately, as in rural Appalachia. While research on Appalachia is limited, a study on food insecurity in the Appalachian region of Ohio found that 23.0% of 1,006 individuals experienced food insecurity, with 15% of that population experiencing moderate or severe hunger.⁷ A 2004 study in the same region of rural Ohio focused

instead on families with children in the Head Start Program. Surveys were given to families at the Head Start, and researchers found that in 48.8% of those households (n=297) were food insecure and 13.8% of households experienced hunger, compared to the national average of 17.2% and 0.2 % respectively (in 2004). The authors concluded that families in the Appalachian region of Ohio experienced higher levels of food security than the state as a whole, where the food insecurity rate was below the national average.⁸ Similar trends were seen in Virginia, with counties in the Appalachian region experiencing much higher individual/household food insecurity rates than the state average.⁶

Although these trends are alarming, following the Great Recession, food insecurity has decreased overall.² Nationally, food insecurity has declined from 14.0% in 2014 to 12.7% in 2015. Very low food insecurity, considered disrupted eating and reduced food intake due to lack of money and other food resources,⁹ also decreased in 2015 from 2014.³

Potential Effects of Food Insecurity on Children

Development and Health

Children who experience food insecurity may lack sufficient nutrition they need for proper development, which could negatively affect their cognitive development, especially if occurring as early as age two.¹⁰ Child development is heavily dependent on the environment in which children are raised and the nutrition they are provided with, affecting brain development, cognitive skills, and motor skills.^{10,11} If nutritional stunting occurs early in life, as early as *in utero*, it could have a negative effect on their cognitive development, behavior, and growth.¹⁰ Food insecurity can also have a negative impact on the health status of children, who have been shown to be hospitalized more often and have poorer health outcomes than children who are not food insecure.^{12,13} Preschool and school-age children are more likely to get stomachaches and

headaches, and preschoolers are more likely to experience colds than children of the same age that are not food insecure, all of which could have negative impacts on school attendance, behavior, and academic performance.¹³

Behavior and Psychosocial Development

Food insecurity affects behavior as children age. Psychosocial development, social development, and behavior are heavily influenced by nutrition status.¹⁰ Food insecurity, and the potential symptom of hunger, may influence a child's behavior, causing them to be more frustrated or anxious, with the absence of food as a basic necessity contributing to emotional problems.¹⁴ Food insecurity may affect the entire family with economic strain contributing to stress.¹⁵

Alaimo et. al.¹⁴ studied academic achievement, psychosocial development, and behaviors of younger children (ages 6 to 11) and teenagers (ages 12 to 16). For younger children, those who were food insecure were more likely to have seen a psychologist, to have repeated a grade, and have difficulty getting along with other children than children who are food secure. Food insecure teenagers were more likely to have repeated a grade, seen a psychologist, been suspended, and have no friends than food secure teenagers. These characteristics were present in both high and low risk populations, although it was often the lower risk groups that showed a stronger association. Behavior and psychosocial developmental are complex with no single cause and many influences, and observations have shown that risk factors have additive effects. The more risk factors a child has increases the likelihood of more negative outcomes.¹⁴ Jyoti et. al.¹⁶ observed similar outcomes in their study, finding that boys who were food secure showed a decline in their social skills that boys who were food secure did not exhibit. When children

transitioned from insecurity to security over the course of the study, they showed an increase in social skills in both boys and girls, with the greatest increase in girls.

Academic Performance

Food insecurity can lead to a variety of adverse effects, especially in children, and those effects are reflected by the quality of children's school work and success in academic subjects. Poor nutrition due to food insecurity can have adverse effects on children's health and development. Nutrition is not only important for physical development, but it has also been shown to have effects on brain development and educational attainment.¹⁰

The effect may be greater for younger children than for older children,^{10,14} and may significantly affect their success in school,¹⁶ although it still negatively affects older children.¹⁴ The earlier food insecurity affects children, the more it is associated with deficits in cognitive behaviors and poorer school achievement.¹⁰ Among kindergarteners, food insecurity predicted significant changes in academic outcomes and impaired performance in reading and math scores in both boys and girls as they aged.¹⁶ Jyoti et. al.¹⁶ also examined the effects of food insecurity on mathematics, reading scores, and other effects such as body mass index (BMI) and social skills. The researchers also investigated the transition from either food insecurity to security, or security to insecurity, to determine the effect of the transition on children. Children who transitioned from food secure to food insecure status during the study showed smaller increases in reading scores, while transitioning from insecurity to security showed smaller increases in mathematics scores compared to those children who stayed food secure throughout the study.¹⁶

Examining the effects of food security in older children, Alaimo et. al.¹⁴ examined two age groups, younger children from 6 to 11 year olds and teenagers 12 to 16 years old. Younger

children aged 6 to 11 years who were identified as food insecure were more likely to have missed more school days and repeated a grade. For this age group, food insecurity was also negatively associated with math scores. When combined with other risk factors (i.e. unemployed family head, single parent, crowded dwelling, no regular source of healthcare, etc.), those children in the lower risk group (0 to 2 risks) had lower arithmetic and reading scores, and both lower risk and higher risk (more than 3 risks) were more likely to have repeated a grade. Teenagers aged 12 to 16 years were not found to have an association between food insecurity and academic outcomes, further showing developmental differences and the impact of food insecurity on younger children. When risk factors were added in (similar to the risk factors for the younger age group), no significant difference was seen between the lower and higher risk groups in regards to achievement scores, only a higher risk of suspension in both groups.¹⁴

Benefits of Nutrition Assistance Programs on Food Insecurity

Supplemental Nutrition Assistance Program

The Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program (FSP), has a long history. While the first FSP was implemented before 1939, the program has gone through several preparations and pilot-tests, including the Food Stamp Act of 1964, program expansion, the Food Stamp Act of 1977, the development of the Electronic Benefit Transfer (EBT) system, and its ultimate re-naming.¹⁷ SNAP represents the largest nutrition assistance program in the US, both in cost and reach. In 2011 alone, the SNAP program provided on average \$134 per month to around 45 million people in the US.¹⁸ Eligible households must be below the 130% monthly gross income of poverty guidelines, with specific monthly income limits for families, elderly, and disabled participants. Participants are provided

with federally funded monetary benefits in the form of EBT debit cards to be used at grocery stores, supermarkets, farmer's markets, and other qualifying businesses to buy certain food items to supplement their diets. The SNAP program has been shown to help participants increase their food intake to prevent hunger, decrease food insecurity, and increase nutritional quality.

Participants are most often children and adults with or without children, and around one-third of those children participate in both SNAP and the School Breakfast Program (SBP) or the National School Lunch Program (NSLP).¹⁸

SNAP participation is more likely among participants who experience food insecurity. It has been shown to result in reductions in food insecurity. One study used the SNAP Food Security (SNAPFS) survey to study the effects of participation in the program on food insecurity in rural and urban individuals (n=9,811) across the United States from October 2011 to September 2012. Households that were more food insecure tended to be those that had just enrolled in SNAP, and new entrant households that contained children were also more food insecure compared to households that had been enrolled in SNAP for six months. SNAP participation was linked to significant reductions in the percentage of households that were food insecure, and a longitudinal sample showed significant reduction in food insecurity across households from their entrance point into SNAP to six months later. Households that were considered very low food security also saw a significant increase in food security both cross-sectionally and longitudinally, as did households with children considered food insecure.¹⁹

A study by Mabli and Ohls²⁰ showed similar results, with participation in SNAP reducing the percentage of households that were food insecure and severely food insecure in both cross-sectional and longitudinal samples of 6,500 households nationally. Other studies have shown no association between food insecurity and SNAP participation.²¹ Food insecurity may be improved

by SNAP participation, and nutrition education along with benefits may produce a higher diet quality among SNAP participants.²¹

In recent years, a demonstration study called the Summer Electronic Benefit Transfer for Children (SEBTC) was tested. It explored the benefits of SNAP, EBT, and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) over the summer for low-income children who do not receive meals when school is out. In order to study the effects of the programs and the potential benefits, differing levels of benefits were studied in food insecure children, who were randomly selected from those who received free or reduced school meals. Those that were considered very low food security received the most benefits. Between the years of 2011 and 2014, a benefit of \$60 showed improvements in food insecurity in children with very low food security, and a benefit of \$30 reduced food insecurity in children who were considered less food insecure. Both levels of benefits increased nutritional outcomes in both populations of children. Both populations also had similar benefit usage rates.²² While this program is fairly new and largely unstudied in its other effects, its observed benefits may help reduce the effects of food insecurity that exist in students over the summer and even into the school year.²²

National School Lunch Program

The National School Lunch Program (NSLP) is a federally funded meal assistance program focusing on providing children in over 100,000 public and non-profit private schools and child care facilities with nutritious, low cost or free lunches.²³ The NSLP was established in 1946 and has been expanded over the years to include all states and territories. Each participating school receives subsidies and food from the United States Department of Agriculture (USDA) for serving meals that meet dietary requirements and meals that are free or reduced price to

qualifying children. In order to qualify for free or reduced lunch, students' families' income must be at or below 130% of the poverty line for free meals and between 130% and 185% for reduced prices. If a student is above either poverty line, students must pay the full price for lunch if they choose to participate in the program. The NSLP serves 31 million children daily.²³

Lunches served as part of the NSLP must follow the most up to date *Dietary Guidelines for Americans* and stay below calorie limits for meals that are appropriate for every age group.²³ Children who are food insecure or marginally food insecure are more likely to participate in the program than food secure children with around two-thirds of the lunches that are served daily at free or reduced price.²⁴

The NSLP has been studied extensively. There is evidence of its effects on food insecurity, behavior, and academic performance. For example, Potamites & Gordon (2010)²⁵ examined data from the USDA's third School Nutrition Dietary Assessment survey in 2005 to assess the effects of the NSLP on food insecure and marginally food secure children compared to food secure children. Food insecure and food secure children had similar daily caloric intake. Marginally secure households typically consumed fewer calories and lower amounts of other nutrients than the other two groups. Children from insecure and marginally secure families were more likely to receive a greater proportion of their daily calories from their school lunches. This result could be due to the lower participation rates of food secure children in the NSLP.²⁵

A child's participation in the NSLP can be affected by food insecurity and many other family, social, and cultural factors. Predictors of participation include race and parental education.²⁶ Participating in the NSLP has been found, after controlling for other variables such as family issues and complications of food insecurity, to increase math and reading scores in children with food insecurity and marginal food insecurity.²⁶

Some negative aspects of the NSLP are potential social stigma and a gap in food coverage/availability for children in the summer months when school is not in session. Studies have found negative effects of the NSLP on positive and externalizing behavior, which is likely due to family factors and other associations that are not directly linked to the NSLP, and in fact participation in the NSLP could benefit children in single-parent homes and in families at or below the poverty line.²⁶ While the NSLP provides children with meals during the school year, it does not provide children with access to food during the summer months when they are not attending school. A study by Huang, Barnidge, and Kim (2015)²⁷ found that food insufficiency increased during the summer months whereas they were consistent during the school year when participating in the NSLP.²⁷

School Breakfast Program

The School Breakfast Program (SBP) is a federally funded meal assistance program that was fully established in 1975 to help provide needy children with adequate nutrition.²⁸ The program served over 89,000 schools around the country in 2013. Participating schools receive subsidies from the USDA in return for following federal requirements and offering free or reduced price meals to income eligible students. The SBP uses the same parameters as the NSLP for poverty, but has lower participation rates.²⁸

In 2012, over 12.9 million children participated every day in the SBP daily, with over 10.1 million of those children receiving free or reduced meals.²⁸ The SBP has been used much less nationally than the NSLP. Though participation is much more common among students who show lower income and more vulnerability to food insecurity, of the students who are vulnerable, many do not participate in the SBP even if they have access. Of those who do not participate it is estimated that 38% of them are food insecure.²⁹ Strategies for increasing participation in the SBP

include increasing the convenience of the meal to students, offering breakfast in the classroom, or increasing the amount of time available for students to consume breakfast.²⁹

Research regarding the effects of the SBP on food insecurity is inconclusive.. Bartfield et. al.²⁹ suggested that the availability of the SBP shows a lowered probability of marginal food insecurity. At risk children are more largely affected than those who are already considered food insecure. The SBP does increase the chances of children eating breakfast, and as shown by the large amount of participants in the SBP that receive free or reduced prices, the program may help feed lower income children who experience higher rates of food insecurity.²⁹

Studies on the benefits of breakfast and SBPs on behavior, cognitive performance, and academic outcomes have shown varying results, mainly due to the differing methodologies and the composition of breakfasts between studies.^{29,30} There is also little research in the areas of acute effects of breakfast on behavior in the classroom, and larger academic outcomes such as achievement test scores and final grades. Complicated measurements and differences between composition and baseline child nutritional status could be large confounding variables in these areas, and confounders have led to mixed results in studies.³⁰

Adolphus et. al.³⁰ looked at studies regarding the effects of breakfast on childhood behavior and academic performance. In general, a majority of the studies showed a positive association between breakfast consumption and classroom behavior, regardless of socioeconomic status, nourishment, or background of the child. However, many of the studies had limiting factors such as low SBP participation, differing evaluation methods, or low participation numbers that limited generalizability of results. Many of the studies on academic achievement also showed a general positive association between habitual breakfast consumption and grades, with some of the studies showing greater effects in children who were undernourished or low

socioeconomic status. There were also many confounding variables and measurement differences in these studies, and varying results were seen. Despite this, the general findings showed that breakfast consumption may improve child behavior in the classroom, and habitual breakfast may be associated with academic performance in math scores and overall grades in all subjects.³⁰

Other Nutrition Assistance Programs

Child and Adult Care Food Program

The Child and Adult Care Food Program (CACFP) is a federally-funded nutrition assistance program established in 1968 as a way to provide low-income children at daycare and recreation centers, as well as adults at care centers, with nutritious meals. The program has since expanded to include other licensed child-care centers, adult care centers, emergency shelters, and most recently, after school programs. The program focuses on disadvantaged and needy populations around the United States. Around 3 million children and adults participate in the program annually. The afterschool programs that used CACFP provide free snacks and dinner meals to at-risk children in certain states. In order for a school to qualify for CACFP afterschool programs, the area must have at least 50% of its children eligible for free or reduced school meals. Similar to both the SBP and the NSLP, CACFP after school programs must follow prescribed meal patterns in order for the school or organization to receive reimbursements.³³

Because the CACFP focuses on portions of the population that are at generally higher risk of being food insecure or developing food insecurity, there is a high possibility that the program could help reduce the effects of food insecurity and provide children with food and nutrients in addition to what they get at home and at school in the NSLP or SBP. While programs

that only provide children with a snack afterschool do not contribute significantly to the caloric requirements or nutritional requirements needed by a child, there is the potential to expand the dinner program in order to provide more assistance to those children who need it most. It has been shown in other areas of the program, such as those found in day care centers, that the combination of breakfast, lunch, and two snacks provided children with around two-thirds of their daily energy requirements, which shows the potential of providing low income children with extra sources of a balanced diet.³³

The afterschool portion of the CACFP is relatively new, and therefore lacking evidence of long term impacts on child nutrition. A limited amount of research exists on the other aspects of the CACFP in regards to children's nutrition impacts. CACFP participation was shown to reduce the chance of being overweight for a sample of low income preschool children. This was accompanied by a non-significant increase in milk and vegetable consumption.³⁴ There is very little research regarding the effects of the CACFP on childhood nutrition, nutritional outcomes, and effects of food insecurity, which may point to the possibilities of future research in these areas.

Backpack Programs

Backpack programs are important to both children and their families as a source of food over the weekend when a child is not attending school.³¹ Many communities supply their own backpack programs through local food pantries or churches, who distribute bags of food items to children when they are at school to take home with them over the weekend. One of the largest organizations that provide backpack programs in the United States is Feeding America, who not only supplies their own backpacks but also partners with local food banks in order to reduce hunger, reaching 450,000 children per week.³¹ In a recent evaluation of one of Feeding

America's Backpack Programs in Eastern Illinois, 73% of the children in their program experienced food insecurity and 78% reported using SNAP benefits in the last thirty days. Thirteen percent of the families who participated saw a significant increase in food security, moving from food insecure to food secure status. Over 50% of the families that participated remained food insecure, which could be an indication that backpack programs are not a long-term solution to food insecurity, but still provide a helpful service for children. This could be due to many factors, such as poor transportation access, family coping with food insecurity, inability to access other resources, or health of family members.³²

Nutrition Education Programs—SNAP-Ed and EFNEP

Two of the largest nutrition education programs in the U.S. are the Supplemental Nutrition Assistance Program – Education Program (SNAP-Ed) and the Expanded Food and Nutrition Education Program (EFNEP). SNAP-Ed seeks to improve nutrition knowledge and healthy, budget-friendly food choices among SNAP participants and SNAP-eligible individuals. The program has grown over the past 20 years since its inception in participation and funding, and focuses on key nutrition objectives across the lifespan, as well as physical activity.¹⁸ The SNAP-Ed program started in 1988 and was initially named the Food Stamp Nutrition Education Program. The educational component is generally directed through the Land-Grant University System and State Cooperative Extension Systems.³⁵ SNAP-Ed is designed to utilize evidence-based programs and initiatives, tailored to the state or territory's needs. These programs involve direct education along with public health and community-based interventions to help SNAP participants and SNAP-eligible individuals and families improve their eating habits. The program is maintained through the USDA's Food and Nutrition Service (FNS) and the National Institute of Food and Agriculture (NIFA).³⁵

EFNEP was established in 1969 to provide nutrition and physical activity education to low income families using a para-professional or peer education model. The program is administered and implemented through Land-Grant Universities across the nation. Community or indigenous members are recruited and trained to deliver evidence-based programs to young families, with a focus on interactive learning and life skills. EFNEP has been shown to improve diet quality and nutrition practices, help participants eat on a lower budget, and improve food safety and physical activity practices.³⁶

While both EFNEP and SNAP-Ed provide nutrition education to low-income, food insecure individuals and families,^{18,36} SNAP-Ed expands beyond nutrition education for individuals to include policy, systems, and environmental (PSE) activities. Many of these activities and initiatives focus on improving access and availability to more nutritious foods and beverages among youth populations, particularly in school-based settings and other nutrition assistance programs (NSBP, NSLP, CACFP, etc.) to complement their efforts.³⁷ Both EFNEP and SNAP-Ed are required to evaluate and report outcomes from their programs. EFNEP utilizes a standard evaluation protocol whereas SNAP-Ed has more flexibility in order to be tailored to specific interventions, as long the evaluation metrics align with the SNAP-Ed evaluation framework.³⁷ The focus of evaluation efforts of these programs, as well as the PSE activities, concentrate on food resource management, food security, and dietary outcomes in children and adults. Given the research showing potential effects of food insecurity on child behavior and academic performance, these programs may also impact other school-level factors, such as academic achievement, attendance, and behavior.^{36,37,38}

Currently, there are school-level surveillance systems that could be appropriate for use by SNAP-Ed in documenting these broader impacts. For example, states have been encouraged to

develop longitudinal data systems through the American Recovery and Reinvestment Act grant program³⁹ to collect and use student school-level data to identify areas of need and areas that are succeeding. While these longitudinal data systems are unique to each state, each state is required by the grant program to develop a data system that collects twelve specific elements to assess their schools, as described in the America COMPETES Act.³⁹ These longitudinal data systems provide an opportunity for SNAP-Education programs to gather other information besides dietary outcomes without directly collecting it.

Study Rationale

Virginia 365 Project (VA365)

The Virginia 365 Project (VA365), launched in the summer of 2016, is a USDA-funded demonstration project directed by the Virginia Department of Education (VDOE) in partnership with numerous state agencies. The goal of VA365 is to reduce food insecurity in low-income households with children located in areas of the state with higher rates of food insecurity.⁴⁰ The project focuses on creating ‘food hubs’ within schools to eliminate child food insecurity by providing children within these regions with three meals a day, 365 days of the year. Children are provided with school meals through the SBP and the NSLP, after-school dinner meals, weekend food (through backpack programs), and SNAP benefits during the summer when school is not in session. The project provides a SNAP benefits of \$60 per summer per SNAP household in addition to any other SNAP benefits families were currently receiving. Parents are also provided with lessons on how to shop and cook healthy food on a budget through nutrition education classes offered by the Virginia Family Nutrition Program, which administers EFNEP and SNAP-Education.⁴⁰ Schools within southwest Virginia and Richmond City were chosen to participate in VA365 based on high student participation in the free and reduced lunch program

and accreditation status. A nearby accredited school serves as a comparison school for each participating school.

States Longitudinal Data System

The States Longitudinal Data System (SLDS) provides states with grants to expand and develop statewide longitudinal data systems in order to improve reporting and analyses of school-level and workforce data across the nation. The Institute of Education Sciences (IES), created under the Educational Technical Assistance Act of 2002, has awarded grants to states since 2005. Grantees deliver annual reports and final reports on development and implementation.⁴¹

As of 2017, only three states and two territories had not received a grant from the SLDS.⁴² While states do not report data collected through longitudinal data systems directly to the SLDS Grant Program, they are required by the America COMPETES Act to collect 12 core elements with the grants provided to create their statewide data systems. Among these 12 elements, student enrollment, program participation, test scores (as required by the Elementary and Secondary Education Act), and demographic characteristics are collected.³⁹ In addition to these elements, states collect data for the Common Education Data Standards (CEDS), which is supported by the National Center for Education Statistics (NCES). These standards help create more streamlined data sharing, and provide additional student-level information at the state level.⁴³

Virginia Longitudinal Data System

In Virginia, the Virginia Longitudinal Data System (VLDS) collects student level data across the state within schools that may be relevant to the VA365 Project. The VLDS is a private data system that provides educational and workforce training data from sources in the state of

Virginia. It supports reporting of public education quality as well as rates of graduation and dropout that can be used to inform policy decisions and programs in Virginia. Data included in the VLDS protects private student information, and is collected from seven different agencies in the state of Virginia, including the Virginia Department of Education (VDOE).⁴⁴ The data system is not centralized to help maintain privacy, and the creation of the VLDS was funded through a federal Longitudinal Data Systems Grant under the American Recovery and Reinvestment Act of 2009⁴⁵ and through the SLDS Grant Program.

STUDY OBJECTIVES

The purpose of this study was to understand how the VLDS and other SLDS systems can be used to study the impacts of federal nutrition assistance programs, particularly SNAP-Ed, behind dietary outcomes, to help guide programing or demonstrate public value of programs. Data collected in statewide school longitudinal data systems include indicators of students' academic achievement, attendance, and other school-related behaviors. This study will explore the feasibility of using these data to study impacts of food assistance programs on academic outcomes.

Study Objective 1: To determine the feasibility of using the VLDS system for the evaluation of SNAP-Ed programs, a process evaluation of initiating a data request was explored.

Study Objective 2: To compare indicators included in longitudinal data system across states located in the Mid-Atlantic region of SNAP-Ed were identified and compared to indicators collected in the VLDS to explore generalizability of indicators and feasibility of using these data for SNAP-Ed evaluation.

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CHAPTER 2: Investigating Student Academic Achievement, Discipline, and Attendance Outcomes of Nutrition Education Programs Using State Longitudinal Data Systems

ABSTRACT

Nutrition intervention evaluation has generally focused on food security or nutrition outcomes, rather than broader impacts on academic achievement, attendance, and aggressive and/or violent behavior. School-based data collected in statewide longitudinal data systems (SLDS) include indicators that are relevant to the evaluation of nutrition interventions. The goal of this study was to explore the use of SLDS data in assessing change in student- and school-level indicators, using the Virginia 365 Project (VA365), a United States Department of Agriculture (USDA)-funded nutrition program targeting food insecurity in low-income areas of Virginia, as a case study. First, relevant indicators for sociodemographics (n=21), academic achievement (n=20), discipline (n=13), and attendance (n=3) were identified from the Virginia Longitudinal Data System (VLDS), and the data request process was described. Second, relevant indicators from the nine Mid-Atlantic region (MARO) states of SNAP-Ed were identified and seven were compared to the VLDS for percent agreement and average number of shared indicators. Across included MARO states, average percent agreement for sociodemographic indicators was 49.2%, with 10.3 average shared indicators. Academic achievement showed the highest average percent agreement (57.5%) and shared indicators (11.5). Discipline indicators showed the lowest shared indicators (3.5) and lowest percent agreement (40.4%). Attendance indicators showed an average percent agreement of 44.4%, and average of 1.3 shared indicators. While SLDS data shows promise for nutrition program evaluation for long-term and holistic evaluation, limitations exist with this method of data collection. Time and resource allocation, variability of indicators, and access to data limit the usability of SLDS data.

Keywords: food insecurity; children; school performance; behavior; nutrition; SNAP-Ed; evaluation; intervention

INTRODUCTION

In 2016, 12.3% of households in the United States, or 15.6 million people, were food insecure during some part of the year.¹ Food insecurity is more prevalent among households with children,^{1,2,3} and it can also have more devastating impacts on children. For example, food insecurity has been shown to have adverse effects on child development,^{4,5,6,7} behavior,^{4,8,9} psychosocial development,^{4,8,9,10} and academic performance.^{4,8,10}

Federal nutrition assistance programs play critical roles in alleviating food insecurity. The Supplemental Nutrition Assistance Program (SNAP), the National School Breakfast Program (NSBP), and the National School Lunch Program (NSLP) have all been shown to contribute to reductions in food insecurity, as well as adverse effects of food insecurity, among participating children.^{11,12,13,14} The Expanded Food and Nutrition Education Program (EFNEP), and the Supplemental Nutrition Assistance Program Education Program (SNAP-Ed) offer programs and initiatives that seek to improve nutrition knowledge and food choices in the populations they serve.^{15,16} SNAP-Ed expands beyond nutrition education programs to include evidence-based programs and initiatives that are tailored to the state or territory's needs such as policy, systems, and environmental change (PSE) activities. Many of these initiatives focus on improving access and availability to more nutritious foods and beverages among youth populations, particularly in school-based settings and other nutrition assistance programs (NSBP, NSLP, etc.).¹⁷ EFNEP and SNAP-Ed are both required to evaluate and report outcomes of their programs, with EFNEP having more strict requirements for evaluation and SNAP-Ed more flexibility.¹⁸

A focus of the USDA's Food and Nutrition Service (FNS), and the new SNAP-Ed evaluation framework, is increasing consistency of evaluative impacts and outcomes of programs.^{18,19} The SNAP-Ed evaluation framework, released in 2016, focuses on allowing

SNAP-Ed professionals and programs nationwide to share information more easily, with approaches at the individual, environmental, and population level for short-, medium-, and long-term changes.¹⁸ The primary focuses of the individual level of evaluation are related to food resource management, food security, dietary outcomes, and physical activity, which are often what is evaluated in school settings. Long-term changes can range from decreases in the proportion of community members who have low Healthy Eating Index scores to documented improvements in academic performance, disruptive and aggressive behavior, and attendance in schools.²⁰ However, these are generally not evaluated due to resource constraints, including staff time and the need to follow participants over longer periods of time.

The aims of these existing longitudinal data systems are to collect, report, and analyze school-level and workforce data across the nation.²¹ As of 2017, only three states and two territories had not received grant funding from the States Longitudinal Data System (SLDS) to develop or expand statewide longitudinal data systems,²² indicating that most states have created longitudinal data systems. An example of these data systems is the Virginia Longitudinal Data System (VLDS), a private data system that provides educational and workforce training data from sources across the state, including the Virginia Department of Education (VDOE). Not only does it report public education quality, but also indicators such as rates of graduation and dropout that can inform policy decisions and programs in Virginia.²³ Data dictionaries from SLDS systems can be used by researchers to determine what data information is available in longitudinal data systems, the definitions of indicators (in some cases), and which indicators may be of use for research studies. Identification of relevant data indicators through data dictionaries for research studies can speed the data request process at the state level, and allow research approvals to be more quickly processed and approved. Data from school-level surveillance

systems, such as statewide longitudinal data systems, have potential to enable SNAP-Ed and EFNEP to document these broader impacts, without requiring the commitment of extensive resources.

The overall goal of this study is to explore the use of the VLDS in assessing changes in student-level behaviors, outside of traditional dietary and health outcomes, associated with participation in SNAP-Ed (and EFNEP) programs. The study describes the process of requesting data from longitudinal data systems, using the VLDS as a case study. Similarities between different state data dictionary indicators are also described, using the states located in the Mid-Atlantic region (MARO) of SNAP-Ed.

METHODS

MARO State Data Dictionaries

Data dictionaries for information and data for K-12 youth were obtained from MARO states and evaluated for similar data indicators as compared to Virginia as a reference state. MARO states, besides Virginia, included Maryland, West Virginia, District of Columbia, Delaware, Pennsylvania, New Jersey, Virgin Islands and Puerto Rico. Dictionaries and databases were located online, through email and/or phone contact with individuals at state Departments of Education. Data dictionaries, as they existed in most states investigated, listed most, if not all of the types of educational data that longitudinal data systems collect.

Indicators from relevant datasets from each state were condensed from all indicators to indicators relevant to nutrition programs and categorized into four categories: sociodemographic, academic achievement, discipline, and attendance. Relevant nutrition indicators were then matched to those available within the VLDS. Percent agreement and average number of shared

indicators between each state and the data available in the VLDS was calculated to determine and assess similarities between indicators and states compared for similarity.

RESULTS

VLDS Data Request Process

Data dictionaries from the VLDS were obtained via the VLDS website.²³ Indicators were available from all eight participating Virginia agencies: the VDOE, the State Council of Higher Education for Virginia (SCHEV), the Virginia Employment Commission (VEC), the Virginia Department of Social Services (VDSS), the Virginia Community College System (VCCS), the Virginia Department for Aging and Rehabilitative Services (DARS), and the Virginia Department of Health Professions (DHP).²³ Indicators relevant to the VA365 Project were identified out of those available from the VDOE only. See Table 1 for indicators relevant to school-based projects.

To gain access to the VLDS system, researchers contacted an agency member at the VDOE and were then put in contact with the Senior Data Analyst, who granted the research team access to the VLDS system. Once access was established, the research team provided requested research project information, such as researcher names, purpose of the research, and research objectives, which needed to be matched to the VDOE listed research objectives. Research project information was approved through the VDOE, and research team members filled out individual nondisclosure agreements along with a Restricted Use Data Agreement (RUDA) due to the sensitive nature of the student-level data. The research team also established a Data Security Plan, secured a non-mobile desktop computer device encrypted for the de-identified data, and completed an affidavit prior to RUDA approval. Following RUDA approval, the data section of the VLDS system became available for indicator request.

Table 1: Data Indicators for Sociodemographic, Academic Achievement, Discipline, and Attendance for Virginia (VLDS)

Virginia Indicators			
Sociodemographic	Academic Achievement	Discipline	Attendance
Birth Date	Division (school)	Student's Date of Birth	Aggregate Days Absent
Country of Birth	English Language Learners (ELL) Composite Score	Disability Code	Aggregate Days Present
Disability Status	Final Grade	Enrolled Division Number	Unexcused Absent Days
Disadvantaged Status	Formerly Limited English Proficiency (LEP)	Enrolled School Number	
Ethnicity	Gifted	Expulsion	
Ethnicity: Hispanic or Latino	Gifted Referral	Gender	
Gender	Grade	Grade	
Home Language	Grade Level	Hispanic Question	
Immigrant Status	Limited English Proficiency (LEP)	Incident Code	
Initial Primary Nighttime Residence	Nonstandard Accommodation	Incident Date	
Language Spoken	Post Special Education	Number of Days Suspended or Expelled	
Migrant Status	School	Number of Victims	
Military Connected Students	School Year	Offense Code 1-3	
N-code/Economically disadvantaged	Special Ed Primary Service		
Neglected/Delinquent	Special Ed Student Placement		
Primary Disability	Special Ed Student Regular Class		
Race	Special Ed Weekly Time		
Secondary Disability	Test Code		
Student Category-Homeless	Test Date		
Student Category-Neglected or Delinquent	Test Standard Grade		
Unaccompanied Homeless Youth			

Maryland

Data were obtained online for the Maryland Longitudinal Data System (MLDS) Center.²⁴ Data available through the MLDS included indicators related to sociodemographic information, academic achievement, and attendance. Contact with the Data Management Coordinator at the MLDS Center confirmed that discipline, crime, and violence data were not included in the MLDS per Maryland state law, which prohibits the MLDS from containing data on students from juvenile delinquency records, criminal and Child in Need of Assistance records, medical and health records, and discipline records. Relevant data from the MLDS are listed in Table 2.

Table 2: Data Indicators for Sociodemographic, Academic Achievement, Discipline, and Attendance for Maryland (MLDS)

Maryland Indicators			
Sociodemographic	Academic Achievement	Discipline	Attendance
Homeless Serviced Indicator	Cohort Year		Number of Days Absent
Homelessness Status	Enrollment Status		Number of Days in Attendance
Life Status	Enrollment Entry Date		
Birthdate	Entry Type		
First Name	Entry Grade Level		
Generation Code or Suffix	Exit Date		
Last Name	Exit or Withdrawal Status		
Middle Name	Exit or Withdrawal Type		
Migrant Status	Limited English Proficiency Exit Date		
Gender	Cohort Graduation Year		
Social Security Number (SSN)	Academic Year		
ADA Status	Student's Grade		
Foreign Exchange Student	Special Education Status		
Foster Care	English Learner Exempt Flag		
Homeless	English Learner Indicator		

Maryland Indicators (cont.)			
Sociodemographic	Academic Achievement	Discipline	Attendance
Census Region	Special Education End Date		
Address City	Grade		
City Code	Special Education Certificate		
Country Code	Special Education		
County Name	Assessment Academic Subject		
American Indian or Alaska Native	Assessment Title		
Asian	Grade Level When Assessed		
Black or African American	Proficiency Status		
Hispanic or Latino Ethnicity	Assessment Test Date		
Native Hawaiian or Other Pacific Islander	School Identifier		
White	Limited English Proficiency Status		
Demographic Race Two or More Races			

*Gray shading indicates data indicator agreement with the VLDS.

West Virginia

Longitudinal data in West Virginia were found in two different longitudinal data systems. The West Virginia Department of Education (WVDE) administers the West Virginia Education Information System (WVEIS), which utilized a public reporting tool called ZoomWV for PK-12 data. WVEIS did not contain higher education data like the VLDS system. The other data system in West Virginia was the P-20W SLDS, which contained WVDE data as well as public higher education data and workforce data, similar in structure to the VLDS. According to WVDE staff, this data system was authorized by legislation to allow workforce and higher education data into a longitudinal data set that focuses on the translation of school-level data to higher education and workforce. Discipline, crime, and violence data are not available through the P-20W system, which was confirmed through phone conversation to WVDE. In order to request discipline,

crime, and violence data, researchers must submit a data agreement and request relevant indicators from the WVEIS, within which discipline data is contained. WVEIS, while a partner of the P-20W system, does not grant access to discipline indicators to the P-20W system. A summary of relevant indicators were found for the WVEIS online²⁵ and listed in Table 3.

Table 3: Data Indicators for Sociodemographic, Academic Achievement, Discipline, and Attendance for West Virginia (WVEIS)

West Virginia Indicators			
Sociodemographic	Academic Achievement	Discipline	Attendance
Name	Grade Level	Discipline Incidents	Attendance
Physical Address	Enrolled Location District	Discipline Actions	Tardy
Mailing Address	Enrolled Location School		
Sex	Enrollment Date		
Birth Date	Individualized Education Program (IEP)		
Country of Birth	Limited English Proficient		
WVEIS ID Number	Accommodations for Students with Disabilities		
Social Security Number	Special Education Status		
Race	Special Education Exit Date		
Ethnicity	Limited English Proficient (LEP) Status		
Low SES	LEP Exit Date		
Homeless	Formerly Limited English Proficient Status		
Migrant	Assessment Type		
Immigrant	Assessment Participation Status		
Disability/Exceptionality Types	Assessment Location		
Native/Home Language	Assessment Accommodations		
	Assessment Results		
	Scores by Subject		
	Transcribed Grades		

*Gray shading indicates data indicator agreement with the VLDS.

District of Columbia

The District of Columbia’s (DC) Office of the State Superintendent of Education (OSSE) compiles data from each local education agency (LEA) within the district into the DC Statewide Longitudinal Education Data (SLED) system.²⁶ Research on the OSSE website and contact with OSSE individuals confirmed that an overall data dictionary does not exist. A guidance sheet of the types of data collected in the DC SLED is available on the OSSE website,²⁷ however it is outdated. These indicators still exist within the DC SLED, and additional indicators are available. Unlike other MARO states, a data dictionary cannot be assessed before a data request is made through the District of Columbia Department of Education (DC DOE). Phone conversation with the SLED director at the DC DOE confirmed this and provided information on discipline indicators though the SLED system. While discipline indicators are contained within SLED, they are unavailable for researchers to use and research cannot be conducted on any discipline indicators. Indicators provided online by the OSSE office, though outdated and incomplete, are listed in Table 4. Discipline indicators and attendance indicators were not available.

Table 4: Data Indicators for Sociodemographic, Academic Achievement, Discipline, and Attendance for the District of Columbia (DC SLED)

District of Columbia Indicators			
Sociodemographic	Academic Achievement	Discipline	Attendance
Last Name	School Year		
First Name	LEA Name		
Date of Birth	School Code		
Race/ Ethnicity	School Name		
Gender	ELL 2012-2013		
Homeless Indicator in 2015-2016	ELL 2013-2014		

District of Columbia Indicators (cont.)			
Sociodemographic	Academic Achievement	Discipline	Attendance
New to US in 2015-2016	ELL 2014-2015		
	ELL 2015-2016		
	Monitored ELL during 2015-2016		
	Highest SPED level in 2012-2013		
	Highest SPED level in in 2013-2014		
	Highest SPED level in 2014-2015		
	Highest SPED level in 2015-2016		
	SPED Level as of Mar 28, 2016		
	SPED Monitored as of Mar 28, 2016		
	Grade Level in 2015-2016		
	Grade as of Mar. 28, 2016		

*Gray shading indicates data indicator agreement with the VLDS.

Delaware

The Delaware Department of Education (DDOE) utilizes a longitudinal data system called EdInsight, which is a private system created by an outside company. EdInsight is part of a larger longitudinal data system for the DDOE. A data dictionary is available for EdInsight,^{28,29} which was provided to the DDOE upon completion of the EdInsight data system. A data dictionary does not exist for the larger overall system that exists for the DDOE. Data indicators listed in the EdInsight data dictionary are available through the larger SLDS system, and this dictionary can be utilized by researchers to determine which data indicators may be useful to request through the larger SLDS system. Individuals at the DDOE assist with indicator selection once a data request has been submitted and approved. Most data available through the DDOE is school or district level, and special permission is required to collect student level data due to privacy concerns. Evaluation of the EdInsight Data Dictionary are listed in Table 5.

Table 5: Data Indicators for Sociodemographic, Academic Achievement, Discipline, and Attendance for Delaware (EdInsight)

Delaware Indicators			
Sociodemographic	Academic Achievement	Discipline	Attendance
Disability Descriptor	School Year	Incident Identifier	Total Instructional Days
Disability Diagnosis	Assessment Title	Discipline Action Identifier	Number of Days Absent
Order of Disability [Primary, Secondary, Tertiary]	Academic Subject Type ID	Discipline Date	Number of Days in Attendance
Language Type ID [language student uses to communicate]	Minimum Score [Assessments]	Discipline Action Length	Number of Days Tardy
Race Type ID	Maximum Score [Assessments]	Incident Time	
First Name	Class Period Name	Incident Location Type ID	
Middle Name	Local Course Code	Reported to Law Enforcement	
Last Surname	School ID	Behavior Descriptor ID	
Maiden Name	Class Rank	Behavior Category Type ID	
Personal Information Verification Type ID	Total Number in Class	Secondary Behavior	
Sex Type ID [gender]	Grade Type [ex: exam, final]	Weapon Descriptor	
Birth Date	Letter Grade Earned	Weapons Type ID	
City of Birth	Numeric Grade Earned		
State of Birth Abbreviation Type ID	Grade Level Type ID		
Country of Birth Code Type ID	GPA Given Grading Period		
Date Entered US	GPA Cumulative		

Delaware Indicators (cont.)			
Sociodemographic	Academic Achievement	Discipline	Attendance
Multiple Birth Status [i.e. do they have siblings]	Educational Environment Type ID [ie home-based, hospital class, mainstream]		
Hispanic Latino Ethnicity	Special Education Setting Descriptor ID		
Economic Disadvantaged	Special Education Setting Type ID		
Address Type ID	Retest Indicator Type ID		
Language Descriptor ID	Visual Learning		
Lives With [if the student lives with the parent]	Auditory Learning		
Multiply Disabled	Tactile Learning		
Medically Fragile	Special Education Hours Per Week		
	School Hours Per Week		
	Limited English Proficiency Type ID		
	Accommodation Descriptor		

*Gray shading indicates data indicator agreement with the VLDS.

Pennsylvania

The Pennsylvania Information Management System (PIMS) is the longitudinal data system for K-12 youth data in Pennsylvania with data indicators reported in the PIMS User Manual, Volume 1 Version 3.1.³⁰ The PIMS User Manual is a 355 page manual outlining each data template under reporting domain, including the Course and Grades Domain, Discipline Domain, and Student Domain. Similar indicators between the different template data sets tie the templates together to validate the information across data sets. Relevant data is recorded in Table 6.

Unlike the VLDS, PIMS allows for direct connection between discipline, crime, and violence data and the offenders and victims, both student offenders/victims and public offenders/victims. The discipline information in the Person Template connects a name and/or ID number to an offender or victim of violence. Gender and ethnicity are required to be reported if known. LEAs can elect to keep victims anonymous, but must report student ID numbers for student offenders.

Table 6: Data Indicators for Sociodemographic, Academic Achievement, Discipline, and Attendance for Pennsylvania (PIMS)

Pennsylvania Indicators			
Sociodemographic	Academic Achievement	Discipline	Attendance
Hispanic/Latino	English Language Learner	Submitting District Code	Days Enrolled
Not Hispanic/Latino	Course Name	Person ID	Days Present
Birth Date	Honors Indicator	School Year Date	Percentage of Time Enrolled for Calendar
Gender Code	Gifted Indicator	Person District Code	
Race or Ethnicity Code	Assessment District Code	Student ID	
Challenge Type [Primary Disability]	Test Description	Local Person ID	
Economic Disadvantaged Status Code	Assessment School Year Date	First Name	
ADA Status Indicator	District Code	Last Name	
District Code of Residence	Location Code	Race or Ethnicity Code	
Student is a Single Parent	School Year Date	Gender Code	
Home Language Code	Student ID	Incident ID	
Name Suffix	Current Grade Level	Offender ID	
Last Name Long	Home Room	Offender Type	
First Name Long	Special Education	Age at Time of Incident	

Pennsylvania Indicators (cont.)			
Sociodemographic	Academic Achievement	Discipline	Attendance
Middle Name	LEP/ELL Status	Grade Level Code at Time of Incident	
Address 3	LEP/ELL Eligibility	Arrested Code	
Location Code of Residence	Special Education Referral	Adjudication Code	
Displaced Homemaker	Amount of Special Education Services	Assigned to Alternative Education Indicator	
Home Address State County Code	Type of [Special Education] Support	Infraction Code	
Primary Disability	Date Exited Special Education	Disciplinary Action Code	
Secondary Disability	Educational Environment Percentage (School Age Program)	Original Disciplinary Action Duration	
		Received Services Indicator	
		Victim ID	
		Victim Type	
		Age at Time of Incident	
		Grade Level Code at Time of Incident	

*Gray shading indicates data indicator agreement with the VLDS.

New Jersey

The New Jersey Standards Measurement and Resource for Teaching (NJ SMART) longitudinal data system serves to house, report, and analyze educational as well as staff data for the state of New Jersey (NJ).³¹ Data for NJ SMART is collected in submissions, and data indicators are located in several data handbooks located on the NJ Department of Education (NJ DOE) website.³² NJ SMART is a private consulting firm that works with the NJ DOE to provide the state's longitudinal data system for education data. Relevant data handbooks were identified, including the Statewide Student Identifiers (SID) Management handbook,³³ the Special Education Data Submission handbook,³⁴ State Data Submission handbook,³⁵ and the State

Assessment Registration Student Data handbook.³⁶ All handbooks contain five common data elements: First Name, Last Name, Birth Date, Student ID (which is assigned at the state level), and Local ID (which is assigned at the district level). Other common indicators (ex: gender) across handbooks can be used to connect the handbooks, as they provide the same information in each data dictionary. Discipline, crime, and violence data were not recorded in NJ SMART, but were reported by districts to the NJ DOE and housed in its own longitudinal data system. While a discipline data dictionary was not available, representatives from NJ DOE provided a Student Safety Data System Collection Form,³⁷ which schools provide to NJ DOE for discipline information. Requests for discipline data must go through the NJ DOE, and is separated from NJ SMART. Data from NJ SMART is recorded in Table 7.

Table 7: Data Indicators for Sociodemographic, Academic Achievement, Discipline, and Attendance for New Jersey (NJ SMART)

New Jersey Indicators			
Sociodemographic	Academic Achievement	Discipline	Attendance
First Name	County Code Resident		Cumulative Days in Membership
Middle Name	District Code Resident		Cumulative Days Present
Last Name	School Code Resident		Cumulative Days Towards Truancy
Generation Code Suffix	District Entry Date		
Gender	School Entry Date		
Date of Birth	School Exit Date		
City of Birth	Grade Level		
State of Birth	LEP Program Start Date		
Country of Birth	LEP Program Completion Date		
Ethnicity	Special Education Classification		
Race American Indian	Special Education Placement		

New Jersey Indicators (cont.)			
Sociodemographic	Academic Achievement	Discipline	Attendance
Race Asian	[Special Education] Time in Regular Program		
Race Black	English Learner		
Race Pacific	Title III ELL Status		
Race White	Gifted and Talented		
Military Connected Student Indicator	NJ ELL Status		
City of Residence	State Assessment Name		
Migrant Status	ELL Accommodation		
Home Language	Class Name		
Immigrant Status	Test Code		
Homeless	Test Format		
Homeless Primary Nighttime Residence	Time of Day		
Economic Disadvantage Status			
Students with Disabilities 504 Eligibility			
Primary Disability Type			

*Gray shading indicates data indicator agreement with the VLDS.

Virgin Islands

Data collection through the Virgin Islands Department of Education (VI DOE), while formalized, does not exist yet as a longitudinal data system. The U.S. territory has received funding for a SLDS,²² but as of May 2017 had not yet implemented a system. Contact with specialists at the St. Thomas division of the VI DOE confirmed the status of the SLDS. The VI DOE collected student data related to assessment (grades and Smarter Balanced test scores, a core assessment of English language arts, literacy, and mathematics offered by VI DOE³⁸), enrollment data, retainment data, attendance data, and dropout data. The VI DOE was in the process of planning for SLDS implementation.

Puerto Rico

Due to the 2017 hurricane season, during which Puerto Rico was hit by two major hurricanes,³⁹ contact with the Puerto Rico public school Department of Education (PR DOE) was unsuccessful. Data collection information is unavailable on the PR DOE website, and contact with the Federal Department of Education revealed no information about public school data collection for Puerto Rico.

Percent agreement and Shared Indicators

Across states, excluding the Virgin Islands and Puerto Rico, some dictionaries contained more or less relevant indicators than the VLDS, as shown in Table 8 and Tables 9-12. New Jersey had the highest percent agreement with Virginia compared to other states for sociodemographic indicators (66.7%), while Maryland had the highest percent agreement for academic achievement indicators (75.0%). Discipline indicators were the most difficult to find among MARO states, with only half of the MARO states reporting any discipline indicators. Of those that reported discipline indicators, Pennsylvania had the highest percent agreement (76.9%) with Virginia. Attendance indicators were common, with Maryland, Delaware, and New Jersey having the highest percent agreement (66.7%).

Table 8: Percent Agreement in Sociodemographic, Academic Achievement, Discipline, and Attendance Indicators between Virginia (VLDS) and other States in the Mid-Atlantic Regional Office (MARO)

Percent agreement with Virginia	MD	WV	DC	DE	PA	NJ	Avg.
Sociodemographic	42.9%	52.4%	28.6%	52.4%	52.4%	66.7%	49.2%
Academic Achievement	75.0%	60.0%	40.0%	55.0%	65.0%	50.0%	57.5%
Discipline	0.0%	15.4%	0.0%	15.4%	76.9%	53.8%	40.4%
Attendance	66.7%	33.3%	0.0%	66.7%	33.3%	66.7%	44.4%

The average number of shared sociodemographic indicators between Virginia (n=21 indicators) and other MARO states (range = 6 to 14 indicators) was 10.3, and the average percent agreement with Virginia for other MARO states was 49.2%. For academic achievement indicators (VLDS n=20), the average shared indicators was n=11.5 (range = 8 to 15 indicators), with the average percent agreement at 57.5%. Discipline indicators (VLDS n=13) showed the lowest shared indicators (n=3.5, range = 0 to 10 indicators) and the lowest percent agreement (40.4%), ranging from Pennsylvania (76.9%) to West Virginia and Delaware (15.4%). Attendance indicators (VLDS n=3) had an average shared of n=1.3 (range = 0 to 2), and an average percent agreement at 44.4%.

Table 9: Comparison of Sociodemographic Indicators across Mid-Atlantic Regional Office State Surveillance Systems

Sociodemographic Indicator Name	VLDS	MD	WV	DC	DE	PA	NJ	Total
Birth Date	1	1	1	1	1	1	1	7
Country of Birth	1	1	1		1		1	5
Disability Status	1	1	1		1	1	1	6
Disadvantaged Status	1					1		2
Ethnicity	1		1	1		1	1	5
Ethnicity: Hispanic or Latino	1	1			1	1		4
Gender	1	1	1	1	1	1	1	7
Home Language	1				1	1	1	4
Immigrant Status	1	1	1	1			1	5
Initial Primary Nighttime Residence	1						1	2
Language Spoken	1		1		1			3
Migrant Status	1	1	1				1	4
Military Connected Students	1						1	2
N-code/Economically disadvantaged	1		1		1	1	1	5
Neglected/Delinquent	1							1

Sociodemographic Indicator Name	VLDS	MD	WV	DC	DE	PA	NJ	Total
Primary Disability	1				1	1	1	4
Race	1	1	1	1	1	1	1	7
Secondary Disability	1				1	1		3
Student Category-Homeless	1	1	1	1			1	5
Student Category-Neglected or Delinquent	1							1
Unaccompanied Homeless Youth	1							1
Total	21	9	11	6	11	11	14	83
% agreement with Virginia		42.9%	52.4%	28.6%	52.4%	52.4%	66.7%	

Table 10: Comparison of Academic Achievement Indicators across Mid-Atlantic Regional Office State Surveillance Systems

Academic Achievement Indicator Name	VLDS	MD	WV	DC	DE	PA	NJ	Total
Division (school)	1	1	1	1	1	1	1	7
English Language Learners (ELL) Composite Score	1	1		1				3
Final Grade	1	1	1		1			4
Formerly Limited English Proficiency (LEP)	1	1	1					3
Gifted	1					1	1	3
Gifted Referral	1							1
Grade	1	1	1	1	1			5
Grade Level	1	1	1	1		1	1	6
Limited English Proficiency (LEP)	1	1	1		1	1	1	6
Nonstandard Accommodation	1		1		1			3
Post Special Education	1	1	1	1		1		5
School	1	1	1	1	1	1	1	7
School Year	1	1	1	1	1	1		6
Special Ed Primary Service	1	1				1		3
Special Ed Student Placement	1	1		1	1	1	1	6

Academic Achievement Indicator Name	VLDS	MD	WV	DC	DE	PA	NJ	Total
Special Ed Student Regular Class	1	1			1	1	1	5
Special Ed Weekly Time	1	1			1	1	1	5
Test Code	1		1		1	1	1	5
Test Date	1	1				1	1	4
Test Standard Grade	1		1					2
Total	20	15	12	8	11	13	10	89
% agreement with Virginia		75.0%	60.0%	40.0%	55.0%	65.0%	50.0%	

Table 11: Comparison of Discipline Indicators across Mid-Atlantic Regional Office State Surveillance Systems

Discipline Indicator Name	VLDS	MD	WV	DC	DE	PA	NJ	Total
Student's Date of Birth	1					1		2
Disability Code	1						1	2
Enrolled Division Number	1					1		2
Enrolled School Number	1					1	1	3
Expulsion	1						1	2
Gender	1					1	1	3
Grade	1					1		2
Hispanic Question	1					1		2
Incident Code	1		1		1	1	1	5
Incident Date	1				1	1	1	4
Number of Days Suspended or Expelled	1		1			1		3
Number of Victims	1					1	1	3
Offense Code 1-3	1							1
Total	13	0	2	0	2	10	7	34
% agreement with Virginia		0%	15.4%	0%	15.4%	76.9%	53.8%	

Table 12: Comparison of Attendance Indicators across Mid-Atlantic Regional Office State Surveillance Systems

Attendance Indicator Name	VLDS	MD	WV	DC	DE	PA	NJ	Total
Aggregate Days Absent	1	1			1		1	4
Aggregate Days Present	1	1	1		1	1	1	6
Unexcused Absent Days	1							1
Total	3	2	1	0	2	1	2	11
% agreement with Virginia		66.7%	33.3%	0%	66.7%	33.3%	66.7%	

DISCUSSION

VLDS Data Request

Longitudinal data indicators available through the VLDS showed promise for Virginia researchers seeking to determine the impact of SNAP-Ed programs on academic achievement, attendance, and discipline at the school-level without requiring assessment teams at the school. Availability of longitudinal data also offers researchers the opportunity to conduct large longitudinal studies before, during, and after implementation of SNAP-Ed programs. It should be noted that this process is only warranted for coordinated, comprehensive, ongoing, and multi-channel programs that study changes over long periods of time, not for short-term or isolated programs.

Limitations to VLDS data include several factors. Time is the biggest limitation and largest investment to data request through the VLDS due to the sensitive nature of student data. Legal requirements and binding contracts may make it difficult to gain access quickly, depending on the research organization. The current study began the process for data request in late December 2017 and early January 2018, and as of the publication of this thesis, the research team has not yet been granted access to VLDS data. Acquisition of necessary equipment was

also a time and resource factor, as researchers who wish to utilize VLDS data must have an encrypted desktop computer on which to store any VLDS data, despite the fact that the data are de-identified when stored in the VLDS. Researchers who wish to request data must consider the amount of time and resources needed to gain access to, request, organize, and analyze VLDS data.

Another limitation to VLDS data is the usefulness of data to certain research designs. The VA365 Project, and thus the relevant SNAP-Ed intervention, was conducted in entire schools within Southwest Virginia and Richmond City. Interventions that use randomized study groups within an individual school would not be able to use the VLDS to determine changes between individual student groups because data is de-identified, and primarily at the school-level. Differences between schools may also be difficult to determine depending on the type of experimental design. VLDS data is useful for observational or longitudinal studies. Experimental studies that randomize treatment within schools, not between them, may find it difficult to use or not benefit from this system.

MARO State Data Dictionaries

Across MARO states, data dictionaries were available for all continental states. The Virgin Islands did not have a formalized SLDS system, and Puerto Rico could not be contacted, so these territories were excluded from analysis. Overall, available data dictionaries are useful for researchers who may be requesting longitudinal education data in those states, and may show that other states may have similar systems.

Across MARO states, there were different numbers of shared indicators between those states and the VLDS. Some states had high numbers of shared indicators and percent agreement for certain categories of indicators, while other states had very few indicators that matched those

found in the VLDS. Some states also contained additional indicators that may be relevant and useful to SNAP-Ed programs that the VLDS did not include. Many factors may have caused these differences, such as time, available resources in each state, and differing levels of focus on school evaluation between states. Differences may have also been due to the use of outside companies to develop SLDS systems versus systems that were developed by the state's Department of Education, such as that of Virginia's. States that have had a past focus with certain indicators, such as discipline or attendance, may also collect those indicators more than states that have not had a large focus in those areas. The culture of education, and evaluation of education, may have large influences on indicators collected and reported for research purposes in each state.

Similar to the VLDS, the biggest limitation to utilizing SLDS data for research is time. It can be difficult to contact individuals at each states' respective DOE, and it was often a low priority to help explain the data dictionaries or how data were collected. Some states warned specifically against requesting data, as it may take long to acquire, or the study could even be rejected due to lack of resources and personnel at state level DOE offices. If research proposals are accepted, time is also required to request the actual data, to clean the data to research specifications, to analyze, and report it.

Incorrect information was available online. Several data dictionaries had different versions available online that were either outdated, incorrect, or no longer in use, including West Virginia, Delaware, and Pennsylvania. Another limitation to data dictionaries included the re-naming of indicators. Some indicators available through different states used different titles, making it unclear what the indicator was measuring without reviewing the dictionary. Websites and data dictionaries must also be relatively self-navigated, and some data dictionaries are not

intuitive and require more thorough explanation than what is available online. Discipline indicators were also a limitation, as several states did not collect information in their SLDS systems due to prohibitive legislation, or did not allow researchers to utilize the existing data. The sensitive nature of discipline indicators may be a factor to consider when utilizing them for research.

For those interested in using these surveillance systems both in and outside of MARO, it appears that the following data are consistently collected for most states: for sociodemographic, birth date, gender, and race; for academic achievement, school division and school; for discipline, incident code and incident date; and for attendance, days present.

Finally, across the different longitudinal systems many data dictionaries existed. Data dictionaries serve the purpose of reporting the type of data contained in longitudinal data systems, and allows researchers to determine relevant indicators and data sets for their research studies. Some states, such as Pennsylvania or New Jersey, provided large handbooks or multiple handbooks to find indicators. Deciphering the different handbooks and dictionaries can be challenging; ideally this study helps outline which ones would be most valuable for school-based nutrition programs.

CONCLUSION

Statewide longitudinal data systems show promise for nutrition and SNAP-Ed research located within a school-based setting, assuming the indicators match program and research goals. Utilizing longitudinal data indicators may provide researchers with long-term sociodemographic, academic achievement, discipline, and attendance data that can help more holistically describe the effects of nutrition intervention programs within schools. However, many challenges were discovered when utilizing the VLDS system or obtaining information about other states' SLDS

data. Data dictionaries from MARO states were difficult to find and analyze for relevant indicators, and priority for research utilizing longitudinal data was low. Researchers should allow ample time for data requests as this process from the VLDS took longer than expected, and showcased the expected time constraints with utilizing DOE longitudinal data. Data indicators were also difficult to match or locate within MARO data dictionaries, and percent agreement between states varied greatly for the different categories of indicators. Researchers looking to utilize longitudinal data must be aware of the constraints associated with longitudinal systems, and the possibility of utilization of these indicators for nutrition intervention programs. This study also highlights the need for consistent inclusion of variables, including definitions, across SLDS systems.

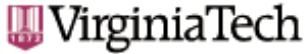
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APPENDIX A: Institutional Review Board Approval



Office of Research Compliance
Institutional Review Board
North End Center, Suite 4120, Virginia Tech
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-4606 Fax 540/231-0959
email irb@vt.edu
website <http://www.irb.vt.edu>

MEMORANDUM

DATE: February 23, 2018
TO: Elena L Serrano, Sarah Anne Misyak, Stephanie Lynn Edwards, Judith L Midkiff
FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)
PROTOCOL TITLE: Virginia 365 Project
IRB NUMBER: 16-640

Effective February 23, 2018, the Virginia Tech Institution Review Board (IRB) approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at: <http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Exempt, under 45 CFR 46.110 category(ies) 2,4**
Protocol Approval Date: **August 2, 2016**
Protocol Expiration Date: **N/A**
Continuing Review Due Date*: **N/A**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Invent the Future

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An equal opportunity, affirmative action institution

Date*	OSP Number	Sponsor	Grant Comparison Conducted?
07/25/2016	PN34TAET	VA Department of Education (Title: Project 365 Virginia Cooperative Family Nutrition Program)	Compared on 08/02/2016

* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.