

School Food Programs' Impact on Childhood Food Security:

Examining COVID-19 Social Policy, Schooling, and Childhood Hunger

Research Thesis

Presented in partial fulfillment of the requirements for graduation

with *Research Distinction* in Sociology in the undergraduate

colleges of The Ohio State University

by

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March 2023

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Schools have been the subject of much research concerning their relationship with educational inequality. However, one aspect that has received less attention is the relationship between schools and other social services. During the onset of the COVID-19 pandemic, there was much concern over the public's ability to access food, prompting a policy response. Food assistance programs in schools were expanded to ensure children had access to free lunches. However, due to school closure and subsequent changes in methods of instruction, participation in school lunch programs suffered. Whether or not a household receives food assistance from a school, and the relationship this has to child food security, are the central concepts of this analysis. By examining a new aspect of inequality in relation to schools, we can better understand the role schools play in diminishing inequalities beyond exclusively educational outcomes. The negative effects hunger has on childhood development have been well documented (e.g., Cook and Frank 2008), and combating childhood hunger is a crucial step toward reducing broader inequities. By documenting the relationship between these policies and childhood food security outcomes, we can better understand how public policy may be implemented in concert with schools to further reduce inequalities and improve outcomes for historically marginalized groups.

## INTRODUCTION

The onset of the COVID-19 pandemic had many impacts on the livelihoods of Americans. One issue that became apparent is inconsistent access to healthy food. Millions more Americans were suddenly facing hunger and households with children were faring far worse than the public at large, increasing the need for nutritional aid (Cohen 2020). As part of the federal government's pandemic response, policies meant to increase access to public nutritional aid programs were implemented. Additionally, increases in participation in private nutritional aid programs were reported throughout 2020 (Coleman-Jensen et al. 2021). The importance of these efforts in preventing a greater food crisis cannot be understated. While rates of food security across the general population remained consistent in 2020, within vulnerable subgroups rates of food insecurity rose (Coleman-Jensen et al. 2021). Of specific concern is the increase in food insecurity rates among households with children, rising to 14.8% in 2020, up from 13.6% in 2019 (Hales and Coleman-Jenson 2022). One method of combating childhood food insecurity for school-aged children is through school meal programs. As part of the 2020 pandemic response, the United States Department of Agriculture relaxed requirements for free school meals, essentially providing all children with access to such meals. As schools transitioned back to in-person and hybrid instruction in the 2020-2021 school year, children were able to receive and eat their free school meals on site. This period of transition allows for an examination of the effects of school-based food programs and method of schooling on childhood food security. How effective were COVID-19 food programs in addressing childhood hunger? What is the relationship between in-person schooling on childhood food security in comparison to remote schooling?

The goal of this paper is to examine the role schools play in alleviating food insecurity among children, with a focus on school meal programs and mode of schooling. While there has been much study into the effects of schooling in relation to social inequality, the role schools play in delivering consistent meals to underprivileged children has received little scholarly focus. Similarly, research into food insecurity has little to offer concerning schools and their relationship with child food security, beyond documenting the negative health and educational effects of food insecurity on children. However, research has shown that food insecurity is primarily caused by an increase in material hardship (Mayer and Jencks 1989), helping to explain the effect the pandemic has had on food security. By exploring this topic, we can better understand the role schools can play in lessening inequalities, not just through education but through providing vital community services. Filling this gap in the research is essential given the universality of schooling and schools' complex historical role in both facilitating and reducing social inequality through public policy implementation.

Considering the expiration of the federal free school meal policy in June 2022, I aim to determine the importance and effectiveness of schools in combating childhood food insecurity. The pandemic has disrupted a decades long trend of reduction in childhood food security (Hales and Coleman-Jensen 2022), and while these programs may have curbed the worst of the effects, their expiration could be premature. Specifically, I am looking at the importance of children being physically present in schools during the duration of nutrition policies to better access nutrition. By examining the effects of free meal policies, we can not only better understand how schools interact with childhood food security but also inform efforts to improve and further expand the inequality reducing function of schooling.

## LITERATURE REVIEW

### *Society, Schools, and Inequality*

Theoretical perspectives concerning schooling can be divided broadly into two camps: those who argue that schools reproduce social inequalities, and those who argue that schools alleviate social inequalities. Reproductionists view education as a social institution which works in the interests of society's elites, reproducing race, class, gender, and other privileges. As an example, Edward Royce (2018) outlines the many ways in which education serves as a structural obstacle to escaping poverty and further disadvantages those in poverty through their encounters with educational institutions. Of note are the various developmental disadvantages faced by young children in poverty, causing a long-term compounding of negative effects (Alexander et al. 2014). Schools in the United States are funded primarily via local property tax, causing schools in impoverished neighborhoods to have limited resources compared to those in affluent communities (Baker et al. 2017). Inadequately staffed, schools servicing the disadvantaged are not given enough resources to overcome the disadvantages, Royce argues. Additionally, schools are highly segregated by race and class, reducing the opportunities for upward mobility (Reardon 2016). These problems are exasperated in higher education, with schools serving as even greater barriers to success (Royce 2018).

Those who argue that schools have a positive effect focus on the effects of schooling on the disadvantaged. Downey, Hippel, and Broh (2004) argue that educational disparities originate outside schools, being at their greatest before schooling begins. They find that schools have a positive effect on achievement and argue that school environments partially alleviate the negative conditions faced by impoverished children in the home and community. While schools do not eliminate the achievement gap between students and could be further improved, they do

lessen inequalities and should be seen as an overall equalizing institution. Downey (2020) further argues that reducing educational inequality requires addressing their underlining causes, which necessitates providing greater social support to families and communities facing adverse material conditions. Others have mirrored the findings of Downey concerning the trends and causes of educational inequality, such as García and Weiss (2017). They find that a combination of early-childhood education programs and strong, continuous support for both students and families throughout a child's education has had success in increasing academic achievement and reducing income-based and racial-based achievement gaps.

### *Schooling and Community*

While scholars debate the role of schools in generating or alleviating social problems, policymakers have turned to schools to play a part in remedying social ills historically. Compensatory education measures have been commonplace in the United States since the mid-1960s, as part of Lyndon B. Johnson's Great Society programs. These programs arose as an effort to address the differential performance of students based on racial and socioeconomic status, with a particular focus on early childhood development. The success of compensatory education has been subject to much research and scrutiny, and some have argued that these programs do not do enough to address underlying social inequalities (Morton and Watson 1971). To address the shortcomings of compensatory education, some schools have adopted broader, institutional reforms. These are meant to provide community-based solutions to the issues affecting students and families, such as health, hunger, and social stability. These efforts vary, though they can be commonly understood as school-community partnerships.

There have been numerous attempts at school reform that have utilized the guiding philosophy of a school-community partnership. School-community partnerships are motivated by an understanding of the interconnected nature of student, family, and neighborhood factors in determining students' educational success. By providing services that seek to address existing inequalities in households and neighborhoods, these schools help to alleviate barriers students face to a successful education. “Advocates argue that students’ educational prospects will improve if the school can attend to a broad array of needs of students, their families, and—sometimes—the entire neighborhood” (Valli, Stefanski, and Jacobson 2016:720).

Fundamentally, school-community partnerships seek to change the role schools play within communities, turning schools into centers for education, social service, and community involvement. “In these partnerships, schools expand the traditional educational mission of the school to include health and social services for children and families and to involve the wider community” (Valli et al. 2016:719-20).

While there are varied forms of school-community partnerships, the literature has documented numerous positive outcomes of such efforts, such as improved student achievement (Warren et al. 2009; Whalen 2007; Whalen 2002; Blank, Melaville, and Shah 2003; Proscio 2004), higher rates of school attendance and graduation (Whalen 2007; Porowski and Passa 2011; Blank et al. 2003; Proscio 2004), increased community engagement and pride (Warren et al. 2009; Whalen 2002; Blank et al. 2003), and greater stability in neighborhoods and households (Blank et al. 2003; Proscio 2004). Improvements in student achievement are well-documented across all models of reform, especially regarding ability with reading and mathematics, and measures include both standardized test scores and grades (Warren et al. 2009; Whalen 2007; Whalen 2002; Blank et al. 2003; Proscio 2004). However, it should be noted that findings

concerning more ambitious goals, such as community transformation, are rather limited. This may be because of the difficult nature of measuring such things, the limited scope of studies concerning methods of implementation which emphasize these aspects of school-community partnerships, or the limited ability for these models to transform communities (Valli et al. 2016).

Although school-community partnerships focus on the novel implementation of various services which benefit students, households, and communities, schools and localities more commonly provide services to address early childhood inequality through compensatory education programs. The predominant example of compensatory education is the Head Start program, providing various services for families with children under the age of 5. The numerous services provided by Head Start are designed to assist early childhood development, health, and wellness among materially deprived families, with the goal of providing disadvantaged children the opportunity to succeed in school and life (HHS 2022). While having admirable goals, there have been many critiques of Head Start, and concerns over the efficacy of the methods used to address early childhood inequalities. An early theoretical critique by Morton and Watson (1971) contextualizes compensatory education programs within the political ideology of liberalism, arguing that compensatory education programs emphasize and address only individual deficiencies, failing to consider the structural issues which cause early childhood inequalities. Work by Puma et al. (2010) analyzes the effects of participation in Head Start, finding positive outcomes in early childhood. However, they find that these positive outcomes are short-lived, lessening over the course of a child's schooling.

Compensatory education programs, such as Head Start, are examples of commonplace services in which schools and communities provide students with additional resources needed to overcome preexisting inequalities. While these programs are not as extensive as those found in



the various models of school-community partnerships, taken together they showcase the potential schools have to act as central community institutions.

An important example of an expansion of the role of schools, I will argue, is the National School Lunch Program. Like other household and community factors, household food security (and more specifically child hunger) is an important component of child development and educational success. The operation of the National School Lunch Program (and other U.S.D.A. student meal programs), shows another aspect in which schools can serve their communities, especially considering the challenges encountered and solutions utilized during the Covid-19 pandemic.

### *Food Security and Childhood Hunger*

Household food security is defined by the United States Department of Agriculture in four levels, which can be separated into food secure and food insecure (U.S.D.A. 2022a). The first level, high food security, indicates that the household experiences no indications of food limitation. The second, marginal food security, indicates the presence of few food limitations with little-to-no changes in diet or food intake. Low food security indicates a reduction in quality or variation in food intake, with little-to-no changes in the amount of food consumed (this label was previously known as food insecurity without hunger). The status of very low food security indicates that the household is experiencing disrupted eating patterns and reduced food intake (previously known as food insecurity with hunger).

Existing literature concerning food security focuses on better understanding the processes which cause the occurrence of food insecurity. While there is a strong correlation between

income and food security, these studies have found that this relationship alone cannot explain food security (Mammen, Bauer, and Richards 2009, Connell et al. 2001). Instead, food security scholars turn to measures of economic hardship as an explanation for variation in food security. Research focuses on the effects of material hardships on the stability of households and has found that “when families encounter material hardships, they are more likely to face issues of food security as well” (Mammen et al. 2009). These scholars argue that the greatest determinant of food security is the presence of material hardship, as constrained budgets cause households to adopt various coping mechanisms including the reduction of food intake.

While there is an association between material hardship and food insecurity, other factors help to explain this relationship, as “hunger resulting from constrained resources is a progressive series of events that occurs at the household and individual levels” (Connell et al. 2001). Factors of importance noted by Connell et al. include minority race status, educational status (with high school graduation being of specific importance), limited participation in food assistance programs, and the gender of the head of household (with female-headed households experiencing greater food insecurity).

Explorations of economic hardship have examined various individual and household level determinates. As an example, high housing costs may require households to “make a trade-off between housing and food” (Mammen et al. 2009). Theoretically, scholars argue that children require greater resource investment than adults, while adults can provide resources to the household, with “children [magnifying] the effect of low income on economic hardship” and “other adults in the household [acting] as resources” (Mirowsky and Ross 1999). Special attention is paid to the status of marriage, as it is found that marriage reduces economic hardship while controlling for household income and the number of children (Mirowsky and Ross 1999).

Mirowsky and Ross specifically find that the number of adults in a household alone does not have an association with economic hardship when controlling for the previously mentioned factors. This suggests that the status of marriage is theoretically important, as it potentially changes household dynamics and the distribution of household resources, while the number of adults in a household does not necessarily indicate household dynamics.

### *Public Policy Addressing Food Insecurity and Childhood Hunger*

Due to the ubiquity of schooling in the United States, schools have played a central role in delivering meals and meal assistance to children in low-income households. The federal government, through the Department of Agriculture, provides funding for and eligibility guidelines for several meal assistance programs. Primary among these is the National School Lunch Program (NSLP), which provides qualifying children with free or reduced-priced lunches during school days (U.S.D.A. 2019). Functioning similarly to the NSLP is the School Breakfast Program (SBP), which provides free or reduced-priced breakfasts to children who qualify. These programs operate in public schools, non-profit private schools, and other residential childcare institutions. Program eligibility is determined by household income and is defined in relation to federal income poverty guidelines (U.S.D.A. 2022b). Income thresholds are defined separately for determining eligibility for free meals and reduced-priced meals, with those with a household income of 1.30 times or less than the federal poverty level qualifying for free meals and those with a household income of 1.85 or less than the federal poverty level qualifying for reduced-priced meals.

Since traditional school is not in session during the summer months, the federal government provides schools with several program options to provide free meals for children. The Seamless Summer Option (SSO) allows federal funds to be used to provide free meals during summer months (U.S.D.A. 2013b). This program is meant to target low-income areas, and meals are delivered at various community centers, including schools, churches, and libraries (U.S.D.A. 2013a; U.S.D.A. 2015). The Summer Food Service Program (SFSP) provides funds for free meals at school-sponsored summer enrichment programs. Additionally, when schools host summer school programs, NSLP can be utilized throughout the summer months (U.S.D.A. 2013b). While implementation varies by state and school district, eligibility guidelines generally mirror those of the NSLP.

#### *COVID-19 Pandemic, Schooling, and Access to Food*

The Covid-19 pandemic caused extreme disruptions in all aspects of life, including the ability of households to access food and the ability of schools to operate safely. It should be especially noted that the “profound disruptions from the pandemic such as the closures of schools, stores, churches, and other facilities, the uncertainty about future income streams, concerns about the health of family and friends, and other disruptions” are factors which could cause or worsen economic hardship, leading to greater risk of food insecurity (Han, Meyer, and Sullivan 2020). Research finds that, within the United States, the pandemic has had negative food-related outcomes among vulnerable subpopulations. Children were not spared from these negative circumstances, as in 2020 “food insecurity and very low food security [among children] increased significantly from 2019” (Coleman-Jensen et al. 2021).

These extreme circumstances prompted an unprecedented policy response regarding food assistance. This included a general relaxing of eligibility requirements of food assistance programs run by the U.S.D.A. Schooling-based food assistance was included and, starting in 2020, NSLP requirements were lifted, allowing schools to provide free meals to all children regardless of eligibility. Additionally, SSO and SFSP were permitted to operate during the regular school year, providing students with free school meals while schools were closed or operating remotely (U.S.D.A. 2020). Other restrictions were lifted as well in order to accommodate social distancing and remote schooling, such as allowing meals to be picked up or delivered. Finally, EBT cards were provided to school children who were unable to receive NSLP meals because of reduced school hours or closures, allowing households to purchase food items in lieu of school meals (U.S.D.A. 2023). These changes continued through the 2021-2022 school year (U.S.D.A. 2021), before expiring in the 2022-2023 school year.

While these changes likely helped school-aged children, as noted before, food insecurity among children saw significant increases in 2020, compared to the prior year. Part of this may be attributed to the difficulties households faced in navigating these changes. In 2020, the number of school-aged children receiving meals through the NSLP decreased significantly (Coleman-Jensen et al. 2021). While meals being served through the SFSP were reported separately (Coleman-Jensen et al. 2021), this decline could be explained by pandemic factors limiting access to school meals, confusion regarding policy and implementation, and other complicating household factors. There is additionally the potential for confusion in the tracking and reporting of meals within surveys and academic analysis, as there exists some ambiguity among respondents concerning which meals should be considered (Coleman-Jensen et al. 2021).

### *Research Contribution*

This paper examines the novel implementation of the National School Lunch Program, and other forms of school-based food assistance, during the COVID-19 pandemic. By examining the effects of the reciprocity of school-based meals on childhood hunger, we can better understand the effectiveness of such policies and how to further improve them. Furthermore, this study combines policy factors, household factors, and schooling factors in order to better understand their individual effects in context of one another. This allows us to further examine the role schools play in providing support for disadvantaged children, specifically regarding hunger, with implications for the role schools can play in addressing social issues. Finally, the COVID-19 pandemic caused disruption to normal school operation, resulting in many schools adopting remote or hybrid schooling arrangements. By examining these unique arrangements, we can draw unique insights into the effects of the pandemic on the implementation of expanded meal programs.

Listed below are the null and alternative hypotheses I aim to test with this analysis. First, I wish to examine the effectiveness of the free-lunch policy implemented in school districts during the early pandemic. This will be determined by the significance and direction of the relationship between school food assistance reciprocity and child food security. I expect to find a significant positive relationship between school food assistance reciprocity and child food security because they would be receiving additional meal security via school meals.

***H*<sub>0</sub>**: Households receiving any food relief from their school district does not have a significant and positive association with child food security.

***H*<sub>1</sub>**: Households receiving any food relief from their school district has a significant and positive association with child food security.

Second, I wish to determine if physical location, or mode of schooling, has a significant relationship with child food security. I hypothesize that children physically present in school will have greater access to free school lunches than those not physically present, resulting in a positive association between in-person schooling and child food security. Similarly, given separation from schools, and therefore free school meals, I expect hybrid schooling to be negatively associated with child food security.

***H*<sub>0</sub>**: In-person schooling does not have a significant positive association with child food security.

***H*<sub>2</sub>**: In-person schooling has a significant positive association with child food security.

***H*<sub>0</sub>**: Hybrid schooling does not have a significant negative association with child food security.

***H*<sub>3</sub>**: Hybrid schooling has a significant negative association with child food security.

## DATA AND METHODS

### *PULSE Survey*

The examination of the effects of the relaxation of eligibility requirements for free school lunch programs requires a nationally representative dataset containing information on child and household food outcomes, as well as schooling, family, and household factors (such as

household composition and income). Thankfully, such a dataset exists in the publicly available Household Pulse Survey conducted by the Census Bureau in collaboration with other federal agencies. The collaborative nature of this survey gives it unique strengths compared to other datasets; namely that the survey employs standardized operationalization of variables and replicates survey questions found in previous works done by various federal agencies. This survey's intent is to measure "the social and economic effects of coronavirus and other emergent issues on American households" (U.S. Census Bureau 2023). It is designed to allow researchers and policymakers to understand the impacts of the pandemic and organize pandemic response policies, with rapid deployment and publication of data. This rapid nature is yet another strength of this dataset, as it allows researchers the ability to work with data quickly after it is collected while incorporating new variables concerning relevant emergent social issues. Data collection began in late April 2020, with weekly and later bi-weekly surveys conducted, and is still ongoing (U.S. Census Bureau 2023).

Participants for the survey are selected based on their address, with addresses being "scientifically selected to represent the entire population" (U.S. Census Bureau 2023). The Household Pulse Survey contains information on both individual and household level demographics and pandemic related factors, with sections concerning food security, k-12 education, and other relevant factors. The Household Pulse Survey is conducted primarily to better inform government response initiatives to the pandemic. To that end, the survey has been continuously updated with new or refined questions as pandemic-related issues emerge, with each version of the survey being organized into phases.

For the purposes of this analysis, I have selected data from phase 3.1, which contains refined and relevant questions concerning food outcomes and schooling. The data I have selected



ranges from the time period of mid-April to late May 2021, labeled as week 28, week 29, and week 30. I chose this period because of the availability of survey questions, the school year's timing, the diverse schooling methods employed during this period, and the changes to school lunch policies being in effect. Within this period, I have selected respondents with children under the age of 18 and valid responses to the dependent variable, which reduces the actual sample to 15,509 valid cases. Limiting the sample in this way threatens the representativeness of the data, a point to which I will return in the discussion. I handle missing data with listwise deletion.

### *Variables*

The primary dependent variable in this study is *childhood food security*. The original variable in the Pulse survey asks respondents to rate the food security of children under the age of 18 within their household during the past 7 days. More specifically, the question asks respondents to rate the following statement as often true, sometimes true, or never true: "The children were not eating enough because we just couldn't afford enough food." Responses are coded as either 1, 2, or 3 with a value of 1 representing children often not eating enough, a value of 2 representing children sometimes not eating enough, and a value of 3 representing children always eating enough. This ordinal measure is treated as continuous for analytic purposes.

Regarding the independent variables, several key theoretical factors need to be considered. First, I wish to consider the effect of the changes to free school lunch requirements by including the school food assistance variable, which measures whether a child received free food from a school. Secondly, I wish to measure the effects of the mode of schooling on childhood food security outcomes. By analyzing the effects of how children engage in schooling

on childhood food security, we can better understand the role schools play in alleviating various dimensions of social inequalities among children. Finally, I wish to consider the effects of overall household food security on childhood food security outcomes, as a means of controlling for the effects of household-level inequalities on childhood food security outcomes and as a method of inviting discussion concerning the potential role schools could play in combating negative social outcomes within their community.

The *school food assistance* variable contains information concerning whether the students in the respondent's household received food assistance from a school. Specifically, the survey question asks whether school food assistance was received in the past 7 days. This variable is a simple binary, with respondents indicating yes or no. Within the analysis, this variable is treated as a dummy variable, with the reference category being those who did not receive school food assistance.

The *mode of schooling* variable indicates how the children in the household received their education. Within the Pulse Survey, respondents are asked to indicate all modes of schooling in which children in the household participated over the past 7 days, including in-person education, several remote options, and hybrid options. These options are non-exclusive, and respondents choose all which apply. From this variable, I constructed a mutually exclusive categorical variable in which responses are separated into exclusively in-person, exclusively remote, and hybrid schooling options. From this variable, I created a series of binary dummy variables to use in the analysis, with variables representing in-person, remote, and hybrid schooling arrangements separately. Within the analysis, children who received their education remotely are treated as the reference category.

In order to test if school food assistance operates differently across different modes of schooling, I created two interaction variables for analytic use. These variables represent the interaction between school food assistance and mode of schooling, with one variable representing the interaction between food reciprocity and in-person schooling and the other representing the interaction between food reciprocity and hybrid schooling.

The *household food security* variable represents the respondent's self-rating of their household's overall food security. The respondent is given four options and asked to select which option best describes the food situation within their household during the last 7 days. The options roughly correlate with the four levels of food security as defined by the United States Department of Agriculture (U.S.D.A. 2022a). The options are coded 1 through 4, with 1 being the highest level of food security and 4 being the lowest. Like the dependent variable, this variable is treated as continuous for analytic purposes.

There are several other variables included in the analysis as control variables. First, several individual-level variables are included, which concern the social traits of the survey respondent. The *week* variable indicates when the respondent took the survey, indicating which survey week the responses come from. The *sex* variable records whether the respondent is male or female and is treated as a dummy variable within the analysis with male as the reference category. The Pulse *race* variable records whether the respondent is white, black, Asian, or belongs to any other racial categories (including multi-racial identities). From this variable, I constructed a series of dichotomous dummy variables: white, black, Asian, and other. Within the analysis, white is treated as the reference category. Separately, there is the *ethnicity* variable, a binary variable that records the respondents' Hispanic heritage. This variable is treated as a dummy variable, with non-Hispanic being the reference category. The *educational attainment*

variable is the result of recoding the original education variable included in the Pulse survey. Respondents are recorded as having less than a high school education, only a high school education, or having completed any college degree (including two-year degrees). From this, I constructed yet another series of binary dummy variables and treat high school graduates as the reference category. *Marital status* is a variable I constructed that separates respondents into partnered and non-partnered, with each option being represented by a dichotomous dummy variable and partnered respondents being treated as the reference category. *Employment status* is a simple binary variable, with respondents indicating whether they have worked in the past 7 days. This variable is treated as a dummy variable, with employed respondents being the reference category.

Additionally, there are several household-level controls included in the analysis. First, the *number of adults in the household* variable measures the number of household members over the age of 18 as a number. Second, the *number of children in the household* variable similarly measures the number of household members under the age of 18 as a number. The *household income* is measured in brackets and is treated as continuous for analytic purposes.

### *Analytic Strategy*

In order to test my hypotheses, I constructed a series of six Ordinary Least Squares Regression (OLS) models, centered around the school food assistance and mode of schooling variables. In the first model, I regress childhood food security on school food assistance in order to determine the correlation between the two variables and the proportion of variation in childhood food security which could be explained by school food assistance. In the second

model, I expand upon this by adding my previously outlined control variables, including household food security. The third model includes only the two mode of schooling dummy variables and the dependent variable, like the first model. In the fourth model, I once again add my control variables in order to contextualize the effects of mode of schooling. The fifth model includes both school food assistance and mode of schooling, as well as all control variables. Finally, the sixth model expands upon the fifth with the inclusion of interaction variables between school food assistance and mode of schooling.

Finally, given the nature of the dependent variable measuring childhood food security, I conducted additional logistic regression models. This was done by transforming the childhood food security variable into a binary variable, with answers being sorted into “hungry” and “not hungry” categories. Additionally, within these models, the household food security variable was treated in a similar way with this variable becoming a dummy variable with households who were hungry being the reference category. The logit analysis consisted of 5 models, which follow the same pattern as the OLS models listed above, with the exclusion of the final model which incorporates interaction terms. This series of models is included in the appendix. The findings are generally consistent with those reported from the OLS models.

### *Descriptive Findings*

Descriptive findings show that among households with school aged children, childhood food security is at concerning levels. Within the sample, 70.2% of respondents stated that their children were always eating enough within the past 7 days, while 24.5% of respondents and

5.3% of respondents stated that their children were sometimes not eating enough and often not eating enough respectively.

\*Insert Table 1 Here\*

Regarding school food assistance, only 35.2% of respondents indicated that the children in their household received food assistance from their school, while the remaining 64.8% of respondents indicated that the children in their household did not receive food assistance from their school. Concerning mode of schooling, 24.7% of respondents indicated that the children in their household attended school in-person exclusively, while 26.9% of respondents indicated that the children in their household attended school exclusively using remote teaching methods. The remaining 48.4% of respondents indicated that the children in their household engaged in hybrid education, with their schools utilizing a combination of in-person and remote teaching methods. Roughly three-fourths (73%) of respondents reported the household having marginal levels of food security, 21.7% of respondents reported low levels of household food security, and 5.2% of respondents reported being at lowest levels of food security. Within the analytic sample, no respondents reported being at the highest level of food security.

As stated before, those that comprise the sample are not nationally representative due to how the sample was selected. As an example, a vast majority of respondents (69.4%) are female. This sample is representative of national education trends, with nearly half (47%) of respondents having some sort of college degree (associate, bachelor's, or graduate). Yet unemployed individuals were over-represented in the sample, making up 40.2% of respondents. Almost half

(47.5%) of households had two adults (people aged 18 years and over) living in them, while 19.8% of households had a single adult and the remaining 32.7% of households had three or more adults living in them. Roughly half (45.5%) of households had one child living in them, 31.7% had two children living in them, and the remaining 22.8% of households had three, four, or five children living in them.

### *Analytic Findings*

Table 2 presents findings from OLS regression models predicting childhood food insecurity. Model 1 showcases the bivariate relationship between childhood food security and school food assistance. Results show that there is a small, negative association between receiving school food assistance and childhood food security outcomes and that this relationship is statistically significant ( $B = -.043$ ,  $SE = .013$ ,  $p < .001$ ). However, the adjusted  $R^2$  (0.001) suggests that this regression model based solely on school food assistance explains hardly any of the variation in childhood food security. With the addition of control variables included in Model 2, the association between childhood food security and school food assistance is slightly weakened, but otherwise unchanged ( $B = -.025$ ,  $SE = .011$ ,  $p < .05$ ). This suggests that children who are receiving school food relief are slightly more likely to be food insufficient, controlling for other variables.

\*Insert Table 2 Here\*

Model 3 considers the relationship between childhood food security and mode of schooling. This model suggests that there is a small, positive association between in-person schooling and childhood food security that is statistically significant ( $B = .087$ ,  $SE = .017$ ,  $p < .001$ ); however, the relationship between hybrid schooling and the dependent variable is nonsignificant. The mode of schooling model explains less than 1 percent of the variation in childhood food security (adjusted  $R^2 = 0.005$ ). Adding control variables in Model 4, we find that in-person schooling is no longer a significant predictor, and hybrid schooling becomes significant, with a negative association ( $B = -.031$ ,  $SE = .013$ ,  $p < .01$ ). Taken together, these findings suggest that the effects of the mode of schooling on child food security are inconsistent, when controlling for other variables.

Model 5 considers both school food assistance and mode of schooling, in addition to control variables. This model shows that school food assistance is a significant variable, consistent with previous models ( $B = -.027$ ,  $SE = .011$ ,  $p < .01$ ). Both in-person schooling ( $B = .026$ ,  $SE = .015$ ,  $p < .05$ ) and hybrid schooling ( $B = -.026$ ,  $SE = .013$ ,  $p < .05$ ) are significant predictors in this model. This full model suggests that children receiving school food assistance and children who engage in in-person schooling arrangements are slightly more likely to be food secure while children who engage in hybrid schooling arrangements are slightly more likely to be food insecure, controlling for other variables.

Model 6 builds upon Model 5 with the addition of interaction terms between school food assistance and mode of schooling. However, this model shows that the interaction terms are nonsignificant. This suggests that school food assistance does not operate differently across different modes of schooling.



While my primary interests are in the effects of school food assistance and mode of schooling variables, within the models which include control variables, there are several other independent variables that are consistently significant and greatly contribute to model fit. Among the significant controls, there are the number of children in the household, income, educational attainment (specifically no high school degree), the race dummy variables, and household food security. Other control variables are found to be nonsignificant, which is consistent across models. The inclusion of control variables increases model fit greatly, with Model 2 having an adjusted R-squared of .294 and Model 3 and Model 5 having an adjusted R-squared of .293.

## DISCUSSION

### *Interpretation*

Contrary to my hypothesis, results show that usage of school assistance programs is associated with negative childhood food security outcomes. There is more support for the hypotheses related to mode of schooling. The significance of the effects of mode of schooling are somewhat inconsistent across models but suggest that children engaged in in-person schooling are more food secure than children engaged in hybrid schooling. Additionally, the lack of a significant interaction between school food assistance and mode of schooling suggests that school food assistance did not have differing effects across modes of schooling. One may interpret these findings as implying that school food assistance results in hungrier children. I would instead argue the relationship is not causal, and instead indicates unmet need.

This study suggests that school food assistance during COVID-19 was not sufficient to meet the needs of students, as reciprocity of school food assistance was found to have a negative

association with childhood food security. This is consistent with early work on childhood food security during the pandemic, which saw an increase in food insecurity among children in 2020 (Coleman-Jensen et al. 2021). While the expansion of school meal programs was meant to ensure that vulnerable children were able to consistently receive school meals, the implementation of such programs has left many wanting. It is reported that in 2020, “children in 19.5 percent of food-insecure households received free or reduced-price school lunches” (Coleman-Jensen et al. 2021). Additionally, “in 2020, an estimated... 36.7 percent of households that received free or reduced-price school lunches [were food insecure]” (Coleman-Jensen et al. 2021). While the COVID-19 expansion of school meal programs was able to provide many children with meals they otherwise would have been unable to receive, the implementation of this program was unable to effectively provide meals to those who needed them most.

Another factor to consider is the role schools can play in addressing social issues, in this case food security, but also more generally. Modeling shows consistently that the most important factors in determining childhood food security are household level factors, such as overall household food security, income, and racial composition. As noted by Downey (2020), schools alone are unable to overcome the multitude of factors which cause children to be disadvantaged. He argues that educational inequality should be addressed at its roots, advocating for an expansion of social welfare programs. While this conclusion was regarding educational outcomes, the same arguments can be applied to other issues faced by children in schools, such as hunger.

Certainly, addressing large-scale social issues, such as poverty and hunger, requires large-scale efforts. The results of this analysis would suggest that school-based food assistance was insufficient, despite pandemic expansions. This may be unsurprising to some, as schools in

their current form are limited in the ways they can impact students. In terms of food assistance, schools currently are only able to provide students with up to two meals per school day. While schools' compulsory nature gives them potential to reduce inequities, current models of schooling are limited.

Yet, it is still possible schools can be reimagined to serve as an access point for various social services. They can do this by connecting households to resources through information campaigns or providing them directly on-site in an integrated, comprehensive fashion. School-community partnerships showcase ways in which such school reform can be enacted to effect positive change. These schools adopt a holistic approach to both children and the communities they live in, providing education and support to both students and parents. By transforming schools into community centers, reformers can provide comprehensive assistance to students and parents in a safe, central environment in tandem with the traditional educational function of schools.

García and Weiss (2017) identify specific strategies utilized by schools implementing such reforms, including large investments in pre-kindergarten education and kindergarten readiness programs, parental education programs and increased parental engagement, afterschool enrichment, tutoring programs, college preparation programs, and investments in health and wellness through health clinics and meal programs. García and Weiss (2017) also identify numerous positive outcomes associated with these changes, including increased academic performance, increased graduation rates, and college attendance rates. While it is certain that the problems faced by the disadvantaged require structural efforts to address them, this research shows the potential that compensatory education measures, in tandem with school-community partnerships, have in effecting positive change.

These efforts show promise, but it should be noted that implementing such reforms is no easy task. There is currently little popular demand for reforming schools in such a way, and the campaign necessary to create the political will for such massive school reforms would be long and hard. The implementation of school-community partnerships would be costly and would require greater financial and logistical support from state and federal bodies to become widespread, in addition to partnerships with community-based non-profit organizations. We should question the feasibility of such reforms, as well as their effectiveness in comparison to the expansion of existing social programs. Despite these limitations, I will suggest that we explore school-community partnerships further and pursue them whenever possible, in tandem with a broader push for the implementation of greater social welfare programs.

### *Limitations*

All studies have limitations, and this one is no exception. There was much confusion concerning schools and school meal programs, especially during the initial months of the COVID-19 pandemic. Implementation of school meal programs is dependent on school districts, especially in regard to delivery of school meals when schools were not operating in person. It is possible that information concerning the availability of school meal assistance was not effectively delivered, causing many to miss out on meals they otherwise would have been entitled to receive. If this were true, we would expect in-person schooling to be associated with a positive effect on childhood food security. While the variable accounting for this is significant in some models, it is found to be non-significant in one model. In-person and hybrid schooling is found to be marginally significant in the full model, but there is a lack of an interaction term between school food assistance and mode of schooling, suggesting that food assistance operated

similarly across differing methods of schooling. It may be possible that mode of schooling is instead indicating other impactful, otherwise unmeasured factors, rather than indicating a causal relationship between mode of schooling and childhood food security outcomes.

It is possible that reporting concerning school meal reciprocity is flawed. The wording of survey questions concerning school meal reciprocity should be carefully considered, as respondents could easily misinterpret the intent of the question. This problem has been encountered before. “It is possible that respondents did not report receipt of free or reduced-price meals delivered in these nontraditional formats, since the question asks about meals received ‘at school’” (Coleman-Jensen et al. 2021). If more definitive conclusions are to be drawn concerning school meal programs, especially during periods of disruption, a direct survey of students, school administrators, and households would be required. This dataset would require more nuanced measures of critical factors, such as more rigorous measures of childhood food security and household food security. More detailed information concerning schools, their implementation of meal assistance programs, and how households interact with these programs would be instrumental in drawing greater conclusions. The ability to examine community contexts, such as other systems of material support and their availability, would be ideal. Finally, the ability to control for self-selection into food assistance programs would result in more valid findings. Previous work concerning food assistance and its effects on food security has found that controlling for self-selection is an important step in determining the impact of such programs (Coleman-Jensen et al. 2021).

It should also be noted that the sample utilized for the analysis differs greatly from the PULSE survey’s nationally representative sample. By selecting respondents with school-aged children in their households, the analytic sample became unrepresentative in several aspects.

First, the unemployed were highly overrepresented in the analytic sample. This indicates that the households in the sample may have been disproportionately materially deprived, affecting experiences of food security. Female respondents were overrepresented, although this may be more indicative of who in the household completed the survey than household composition. Additionally, descriptive statistics concerning race and ethnicity are indicative of the respondent of the survey and not of other household members, including children. Future efforts should take care to ensure that the children surveyed are representative of the population, in addition to the representativeness of primary caretakers.

## CONCLUSIONS

The negative relationship between school food assistance and childhood food security suggests that expanded pandemic food assistance in schools was unable to meet the needs of vulnerable children, leaving them hungry despite assistance. The inconsistent significance of the child's mode of schooling, as well as the lack of a significant interaction term, indicates that whether a child was receiving education on-site did not have a driving effect on their food security. We are left to speculate how schools can improve their response to childhood hunger, especially considering the effects of child hunger on health and educational outcomes, and the heightened rates of childhood hunger across impoverished and minority-status populations. Acknowledging the need for large-scale social reforms to address the causes of poverty, hunger, and differential treatment, the case for improving schools is persistent as schools are an important deliverer of nutrition to children, among other functions. School-community partnerships provide an example of an alternative schooling method that shows the potential to improve many of the inadequacies of current schooling arrangements, not limited to food

assistance. By expanding the positive function of schools within communities, we can take the first steps towards creating a more just society; one where no child would be faced with hunger in the home or the classroom.

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Table 1: Descriptive Statistics

Variable	N	Mean	SD	Min	Max
Child Food Security	15,509	2.65	0.578	1	3
School Food Assistance	8,872	0.352		0	1
In-Person Schooling	2,158	0.247		0	1
Hybrid Schooling	2,350	0.484		0	1
Remote Schooling (ref.)	4,221	0.269		0	1
Week of Interview	15,509	29.04	0.799	28	30
Children In Household	15,509	1.89	1.035	1	5
Adults in Household	15,509	2.35	1.143	1	9
Income	12,353	3.43	1.901	1	8
Male (ref.)	4,742	0.306		0	1
Female	10,757	0.694		0	1
Married (ref.)	8,333	0.54		0	1
Nonpartnered	7,098	0.46		0	1
No High School Degree	958	0.062		0	1
High School Degree (ref.)	7,256	0.468		0	1
Any College Degree	7,295	0.47		0	1
Non-Hispanic (ref.)	12,503	0.806		0	1
Hispanic	3,006	0.194		0	1
White (ref.)	10,758	0.694		0	1
Black	2,444	0.158		0	1
Asian	901	0.058		0	1
Other	1,406	0.091		0	1
Employed (ref.)	9,258	0.598		0	1
Unemployed	6,235	0.402		0	1
Household Food Security	15,509	2.32	0.568	2	4

**Table 2: OLS Regression Predicting Childhood Food Security**

Variable Name	<u>Model 1</u>		<u>Model 2</u>		<u>Model 3</u>	
	B	SE	B	SE	B	SE
School Food Assistance	-0.043***	0.013	-0.025*	0.011		
In-Person Schooling					0.087***	0.017
Hybrid Schooling					-0.013	0.015
School Food X In-Person						
School Food X Hybrid						
Week of Interview			0.002	0.007		
Children In Household			-0.019***	0.005		
Adults in Household			-0.001	0.005		
Income			0.031***	0.003		
Female			-0.013	0.012		
Nonpartnered			-0.002	0.012		
No High School Degree			-0.087***	0.025		
Any College Degree			-0.015	0.011		
Hispanic			-0.07***	0.014		
Black			-0.122***	0.015		
Asian			-0.164***	0.024		
Other			-0.055**	0.019		
Unemployed			-0.007	0.011		
Household Food Security			0.502***	0.01		
Constant	2.664	0.008	3.76	0.193	2.635	0.012
N	8872		8523		8712	
Adjusted R <sup>2</sup>	0.001		0.294		0.005	

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; one-tailed tests of significance

**Table 2 Continued: OLS Regression Predicting Childhood Food Security**

Variable Name	<u>Model 4</u>		<u>Model 5</u>		<u>Model 6</u>	
	B	SE	B	SE	B	SE
School Food Assistance			-0.027***	0.011	-0.024	0.026
In-Person Schooling	0.019	0.015	0.026*	0.015	0.021	0.019
Hybrid Schooling	-0.031**	0.013	-0.026*	0.013	-0.022	0.015
School Food X In-Person					0.01	0.033
School Food X Hybrid					-0.01	0.03
Week of Interview	0	0.007	0	0.007	0	0.007
Children In Household	-0.019***	0.005	-0.017***	0.005	-0.017***	0.005
Adults in Household	0.001	0.005	0.001	0.005	0.001	0.005
Income	0.032***	0.003	0.031***	0.003	0.031***	0.003
Female	-0.013	0.012	-0.012	0.012	-0.012	0.012
Nonpartnered	-0.001	0.012	-0.001	0.012	-0.001	0.012
No High School Degree	-0.08**	0.025	-0.079**	0.025	-0.079**	0.025
Any College Degree	-0.015	0.011	-0.015	0.011	-0.015	0.011
Hispanic	-0.066***	0.014	-0.067***	0.014	-0.067***	0.014
Black	-0.12***	0.016	-0.123***	0.016	-0.123***	0.016
Asian	-0.152***	0.024	-0.154***	0.024	-0.154***	0.024
Other	-0.053**	0.019	-0.056**	0.019	-0.056**	0.019
Unemployed	-0.01	0.011	-0.01	0.011	-0.01	0.011
Household Food Security	0.499***	0.01	0.499***	0.01	0.499***	0.01
Constant	3.787	0.196	3.789	0.196	3.792	0.196
N	8878		8260		8260	
Adjusted R <sup>2</sup>	0.293		0.293		0.293	

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; one-tailed tests of significance



Appendix 1: Logit Models

**Logistic Regression Predicting Childhood Food Security**

Variable Name	<u>Model 1</u>		<u>Model 2</u>		<u>Model 3</u>	
	B	SE	B	SE	B	SE
School Food Assistance	-0.199***	0.048	-0.177**	0.058		
In-Person Schooling					0.367***	0.067
Hybrid Schooling					-0.036	0.056
School Food X In-Person						
School Food X Hybrid						
Week of Interview			-0.002	0.034		
Children In Household			-0.078**	0.026		
Adults in Household			-0.001	0.026		
Income			0.182***	0.018		
Female			-0.132*	0.064		
Nonpartnered			-0.001	0.062		
No High School Degree			-0.248*	0.123		
Any College Degree			-0.082	0.059		
Hispanic			-0.342***	0.071		
Black			-0.588***	0.077		
Asian			-0.854***	0.121		
Other			-0.312**	0.095		
Unemployed			-0.02	0.058		
Household Food Security			2.153***	0.059		
Constant	0.91	0.029	-0.5575	1.011	0.775	0.045
N	8872		8523		8712	
Pseudo R <sup>2</sup>	0.003		0.317		0.008	

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; one-tailed tests of significance

### Logistic Regression Predicting Childhood Food Security (Continued)

Variable Name	Model 4		Model 5	
	B	SE	B	SE
School Food Assistance			-0.201***	0.06
In-Person Schooling	0.148	0.081	0.201*	0.083
Hybrid Schooling	-0.106	0.066	-0.067	0.067
School Food X In-Person				
School Food X Hybrid				
Week of Interview	-0.02	0.035	-0.017	0.035
Children In Household	-0.082**	0.027	-0.073**	0.027
Adults in Household	0.006	0.026	0.006	0.026
Income	0.189***	0.018	0.183***	0.018
Female	-0.134*	0.065	-0.123	0.066
Nonpartnered	-0.006	0.063	-0.008	0.063
No High School Degree	-0.24	0.125	-0.231	0.125
Any College Degree	-0.089	0.06	-0.089	0.06
Hispanic	-0.33***	0.072	-0.333***	0.072
Black	-0.56***	0.079	-0.579***	0.079
Asian	-0.802***	0.122	-0.819***	0.123
Other	-0.302**	0.097	-0.315**	0.097
Unemployed	-0.026	0.059	-0.023	0.059
Household Food Security	2.138***	0.06	2.143***	0.06
Constant	-0.14	1.028	-0.18	1.03
N	8878		8260	
Pseudo R <sup>2</sup>	0.317		0.317	

\*p<0.05; \*\*p<0.01; \*\*\*p<0.001; one-tailed tests of significance