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Food Insecurity and its Association with Testing

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FOOD INSECURITY AND ITS ASSOCIATION WITH TESTING

BY

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ABSTRACT

Food insecurity is a major concern across the educational population. Even with several federal programs combating the issue, there are still students in K-12 schools as well as at college and university who do not have access to the nutrition that they need on a daily basis. This lack of necessary food can lead to detrimental educational effects due to the increase in behavioral issues and the loss of academic achievement. These harmful effects can lead students to underperform in school. In the last several years, a new federal program, the Community Eligibility Provision (CEP), has been implemented in schools in order to support the growing student population that requires assistance meeting their nutritional needs.

The focus of this thesis was to examine the CEP effects on public, private, and charter schools that have adopted it in one state in the Northeast. Several *t*-tests were conducted to determine the association between students' academic achievement on standardized tests before and after the program was implemented. Additional *t*-tests were additionally conducted to observe if the difference of academic achievement on the standardized tests was similar to those schools who were either eligible for the CEP and did not enroll and to those schools who are ineligible to enroll in the program.

Findings from this study identify a statistically significant association between the CEP and academic achievement in mathematics and add to the current literature in the field.

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DEDICATION

To my loving family: Mom, Dad, Amanda, Liza, Frank, and Pop

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CHAPTER 1

INTRODUCTION

Food insecurity is a major epidemic across the U.S., affecting 15.3 million children (Roselle & Connery, 2016). The Department of Agriculture (2016) defines food insecurity as an absence of sufficient food or food that does not meet nutritional requirements (Roselle & Connery, 2016). Further, this condition disproportionately impacts groups such as single female households with children, Black and Hispanic American households, and low income households under the federal poverty line (Maroto, Snelling, & Linck, 2014; Roselle & Connery, 2016). Students who are faced with either intermittent or prolonged food insecurity can have a wide array of symptoms associated including: irritability, trouble concentrating, lower energy, and higher risk of illness (Roselle & Connery, 2016). Additionally, individuals may experience difficulty cooperating with others and higher probability of self-isolation (Alaimo, 2001). Many studies have examined the effects of food insecurity on cognitive development in younger students (Adrouge & Orlicki, 2013; Alaimo, 2001) as well as the effects on college-age students (Bronton & Goldrick-Rab, 2016; Maroto, Snelling, & Linck, 2014). However, this does not address the levels of secondary education that are meant to prepare students for college. Research addresses that "a child who is hungry struggles to learn, and therefore, it is imperative that educators understand the impact of hunger" (Spies, Morgan, & Matsuura, 2014). This study

sought to understand one impact of hunger on students: how it affects their academic achievement.

With the likelihood of being food insecure higher among lower SES students and families (Grutzmacher & Gross, 2011; Maroto, Snelling & Linck, 2014; Roselle & Connery, 2016), one potential path to a food secure future is through a college degree. However, more research is needed on the degree to which food insecurity hinder students preparing for college in their secondary education, primarily through its effect on standardized tests such as the Partnership for Assessment of Readiness for College and Careers (PARCC) test. Recently, the federal Community Eligibility Provision (CEP) allows schools to serve free breakfast and lunch to all students without parents being required to complete applications, a yearly requirement for free and reduced priced lunches (U.S. Department of Agriculture, 2017). This is important because families may not enroll in these programs due to fear, or be ineligible for these programs due to income levels (Fram, 2014; Gunderson, 2015) There is little research as to how this program can support students in their educational pursuits. As a student who struggled with food security both before and during college and understands to an extent the effect it can have on students, I am interested in understanding the implication of food insecurity as one prepares for college or a career. The purpose of this study was to identify the association between food insecurity and performance on standardized tests and to identify the effects of a specific mitigation program, the Community Eligibility Program (CEP), on students' academic achievement.

CHAPTER 2

REVIEW OF LITERATURE

Effects of Food Insecurity in K-12 Education

Multiple programs are used to support students with their access to food. The School Lunch Program and the School Breakfast Program are implemented in more than 100,000 schools, reaching 31 million students, and providing free or reduced breakfast and lunch to more than 17 million students (Gunderson, 2015). These programs are assisted by the federal Supplemental Nutrition Assistance Program (SNAP), serving 47 million people with 80 billion dollars, to support families outside of school (Gunderson, 2015). However, these supports are not always adequate for students with prolonged or severe food insecurity; a report from the Urban Institute says that, "wages and benefits together are often insufficient to pay rent, utilities, transportation, and food expenses for a given month, particularly for large families" so students may go without food further into the month when aid runs out (Popkin, Scott, & Galvez, 2016). Breakfast is the meal that is most frequently missed by students with the greatest food insecurity (Grutzmacher & Gross, 2011). Furthermore, one in four children in food-insecure households were ineligible to enroll in food programs because their family income to high (Gunderson, 2015).

Food insecurity can adversely affect student behavior. The absence of necessary food can affect students emotionally, such as becoming more aggressive or depressed (Popkin, Scott, & Galvez, 2016; Roselle, 2016). As the full extent of hunger

hits, “students may be more irritable, have difficulty concentrating, have lower energy levels, and get sick more often [...] in addition, children who experience food insecurity may be at higher risk for truancy, behavioral issues, and social difficulties” (Roselle & Connery, 2016). Students as young as seven or eight may even take measures to feed themselves or their families by failing school in order to attend summer classes, stealing, choosing to go to jail, or selling sexual favors (Popkin, Scott, & Galvez, 2016).

Students who are food insecure may also be facing additional hardships that compound their hunger. “Food insecurity is the most frequently reported kind of material hardship and one that often signals the presence of many others, including housing instability, foregone medical care, and loss of essential services like water and heat” (Popkin, Scott, & Galvez, 2016). The hardest hit groups are single female households with children, Black and Hispanic American households, and low income households under the federal poverty line (Maroto, Snelling, & Linck, 2014; Roselle & Connery, 2016).

Students’ academic performance can also be affected by their food security status. It has been found that there are “small but significant benefits of food supplementation [can help students] in cognition, academic achievement, and school absence” (Alaimo, 2001, p. 48). The size of this academic impact can fluctuate based on the food’s micronutrient content (Adrouge & Orlicki, 2013). As a result of this research, the Healthy, Hunger-Free Kids Act of 2010 (HHKA) changed the requirements for meals served by the National School Lunch Program to provide more

balanced meals for students in U.S. schools (Cornish, Askelson, & Golembiewski, 2015).

Students in K-12 education can academically suffer because of food insecurity. Elementary students who are food insecure, based on socioeconomic status, score lower in mathematics, and as a result, score 16 percent lower on average than those of their food secure peers (Adrouge & Orlicki, 2013). Alaimo (2001) analyzed scores on the Wide Range Achievement Test and Wechsler Intelligence Scale for Children tests, standardized intelligence tests used for both younger and teenage students (Alaimo, 2001). They found that scores were approximately "1.3 to 2.5 points lower (out of a scale of 20) for food insufficient children than for food sufficient children" (Alaimo, 2001, p. 45). In addition, students who had food at school, either through a school or the parent-teacher partnership, had a positive and statistically significant effect on both English and mathematics test scores (Adrouge & Orlicki, 2013). Additionally, there is a strong correlation between food insecurity and students' socioeconomic status; increasing SES by one percentile can increase the math and language test scores by a significant amount (Adrouge & Orlicki, 2013).

As explained above, previous studies have conducted research into food insecurity and its association on different aged students. Existing literature discusses the physical and emotional effects of food insecurity on secondary students (Popkin, 2016; Roselle, 2016). Additionally, studies have explored food insecurity on elementary students standardized tests and on college student's GPA. Research addresses that "a child who is hungry struggles to learn, and therefore, it is imperative that educators understand the impact of hunger" (Spies, Morgan, & Matsuura, 2014).

This study sought to understand one impact of hunger on students: how it affects secondary students academic achievement.

CEP

The CEP (CEP) is a program for schools that serves low income students. This provision allows schools with a population of 40% or more students eligible for free or reduced price lunch to serve free breakfast and lunch to all students without parents being required to complete applications, a yearly requirement for free and reduced priced lunches (U.S. Department of Agriculture, 2017). In the 2016-2017 school year, there were 20,721 schools enrolled in CEP. In Rhode Island, of the 111 individual schools and the 25 Local Educational Agencies (LEAs) that were eligible or near eligible to enroll in the CEP, only 33 schools and 2 LEAs were enrolled (National School Lunch Program, 2017). This is an improvement from the 2015-2016 school year, in which only 10 schools were enrolled in the CEP (National School Lunch Program, 2017). Of the 9 high schools enrolled in the Community Eligibility Program, Central Falls High School and all Providence public high schools all enrolled in the CEP initially in the 2016-2017 school year and continue into the present (National School Lunch Program, 2017).

The CEP (CEP) is important for students because not all are eligible for free and reduced lunch because "one in four children in food-insecure households were ineligible for any type of food assistance because their income was too high" (Gunderson, 2015). This program allows for all students to receive a breakfast and lunch

One goal of this study was to identify whether there is a relationship between the CEP and academic achievement as defined by the PARCC standardized test, an area of exploration that will contribute to and expand upon existing research.

The following research questions guide the study:

1. Is there an association between school's enrollment in the CEP and student's average achievement on standardized tests?
2. Have schools that are not enrolled in the CEP seen differences in their academic achievement?

Data analyses expand upon existing research and may provide implications for further research into this subject and suggestions for schools and districts eligible for this mitigation program. This study may also provide guidance for policymakers who provide funding for schools and nutrition programs and for schools which students experiencing food insecurity.

CHAPTER 3

METHODOLOGY

This quantitative research study investigates the association between food insecurity and average student standardized test scores without a control group. The procedure for this study was chosen because of access to publicly available data and ability for expansion into future research. The main form of data collected was school level PARCC scores for the ten high schools in Rhode Island who are enrolled in the CEP. Aggregate scores were collected from three different time periods: the 2015-2016 school year, the 2016-2017 school year, and the 2017-2018 school year and analyzed for differences in achievement based on enrollment in the CEP. PARCC data from six additional schools, three that are eligible for the CEP but have not enrolled and three schools that are not eligible for the program, were analyzed for differences in achievement between the three school years to identify if differences in PARCC scores are similar for each school.

Participants

In order to determine the relationship between food insecurity and secondary students' standardized test scores, this study analyzed data from each high school enrolled in the CEP. Data was comprised of secondary, de-identified, aggregate achievement scores from the PARCC test including mean scaled scores of the schools and the percent of students that were proficient on the tests. The study was submitted to Institutional Review Board as analysis of secondary data (See Figure 1), since the

data was pre-existing, de-identified data. The Institutional Review Board determined this study does not involve human subjects. All protocols were followed. No additional information was requested from the PARCC assessment.

Setting

This study was conducted using aggregated, school-level information from the 9th grade populations of ten different schools across the state of Rhode Island that are enrolled in the Community Eligibility Program as well as six additional schools across Rhode Island that were not enrolled in the CEP: three that were eligible to enroll and three that are ineligible to enroll. This information was taken from the Rhode Island Department of Education website to determine schools' eligibility for involvement in this study. This study was completed by collecting PARCC data of selected schools from the Rhode Island Department of Education (RIDE). This data was stored on the researcher's password-protected computer.

Variables

The dependent variables are aggregate 9th grade student PARCC scores in English Language Arts /literacy and mathematics scores in both algebra and geometry. Aggregate scores will be collected from three different time periods: the 2015-2016 school year, the 2016-2017 school year, and the 2017-2018 school year. For example, aggregate PARCC scores will include mean scaled scores of the students who took the tests and the percent number of students who were proficient for each of the three tests.

There are several confounding variables that will need to be noted as limitations when analyzing the data. Students' base cognition, motivation to complete

the test, interest in their education, current socioeconomic status, and interest in continuing their education may all be variables that cannot be accounted for in the scope of this study. These variables may differ in each school due to differences in policy, resources, individual teachers and overall faculty support. Because of CEP basic application requirements, there is limited publicly available information about the differences between schools that could better inform the study. Additionally, because of the nature of the CEP, only schools that have a higher number of low-income students were examined. While there may be students experiencing food insecurity in more affluent areas, due to the focus of this study in identifying differences in academic achievement within schools enrolled in the CEP, they are not within the scope of this study. Finally, the relatively limited sample size of this study limits the statistical power of any hypothesis tests conducted.

Instruments

The PARCC test is administered to all 9th graders enrolled in Rhode Island public and charter schools each October and is mandated by the Rhode Island Department of Education. The 2015, 2016, and 2017 PARCC data were used since the 2016-2017 school year was the first school year that the CEP was implemented in the 10 schools. The PARCC English language arts examination consists of 3 sections, comprised of 3 question types and taking 90 minutes per section. The PARCC Mathematics, both algebra 1 and geometry1, examinations consist of 3 sections, comprised 3 question types, also taking 90 minutes per section. This assessment consists of three sections based on critical reading, writing, and mathematics. Data on

the number of students tested from each school and for each test administered can be found from the Appendix.

Procedure

Schools were selected based on enrollment in the CEP based on RIDE data. Requests RIDE was sent out with an explanation of the benefits of participation in the research. Data analysis consisted of *t*-tests comparing 2015 mean scaled scores and percent proficiency to 2016 and 2017 mean scaled scores and percent proficiency with all three tests. 2016 and 2017 data was not compared due to its inability to answer the research questions. The three groups for the *t*-test are 9th graders in the 2015-2016 school year, 9th graders in the 2016-2017 school year, and 9th graders in the 2017-2018 school year. These academic years were selected because schools changed from not participating in CEP (2015-2016) to enrolling in CEP (2016-2017). The data from the 2017-2018 school year will help identify if the potential association in academic scores was based on other variables. This analysis will identify if there is a possibility that food insecurity influenced PARCC scores. Additional *t*-tests will be conducted to identify if the difference in academic scores can be found in other schools across the state as well, either in schools that were eligible for the CEP or schools that were ineligible for the program. It is suggested that further research be conducted as to additional variables that can also associate food insecurity and enrollment in CEP. Recommendations for further studies can be found in the conclusion.

Importance and Potential Significance of the Study

The purpose of this study was to examine the association between food insecurity and the scores on the PARCC. If the results of the study indicate that there is a significant relationship between food insecurity and standardized test scores, it may be important in the context of school funding, enrollment into the CEP, and student education. Students, their families, and school districts may benefit from this study by being enrolled in the CEP in order to make sure that no child is hungry. Additionally, state or regional policy on food and nutrition may be affected in order to better serve students in their pursuit of a valuable education.

CHAPTER 4

FINDINGS

Numerous combinations of variables were analyzed using jamovi to answer the research questions (jamovi project, 2018). The data were divided into three separate categories-- ELA, algebra, and Geometryscores. These categories were then separated by year. The test data from the 2016-2017 and 2017-2018 was each individually compared to the data from 2015-2016 to identify if there was any difference in either the percent of students that were proficient in each assessment or the mean scores of students. No analyses comparing 2016-2017 and 2017-2018 data was conducted since the analysis of the data would not help answer the research questions. Data analyses used a comparison of mean scaled scores via a repeated-measures parametric (*t*-tests) and non-parametric methods (Wilcoxen-Rank). The repeated-measures parametric was used because the analyses were comparing different years of the same school-level data, while non-parametric methods were conducted due to the data size. Tests of normality were used to identify if the t-tests were reliable to use. Two analyses, the percent proficient of the ELA test from 2015 to 2017 (See Table 1) and the mean scaled score of the geometry test from 2015 to 2017 (See Table 2) are suggested to have violated the assumption of normality.

Is there an association between school's enrollment in the CEP and student's average achievement on a standardized test?

Several *t*-tests were conducted to determine whether there is any associations between the adoption of the CEP and academic scores from the PARCC assessment. Tests were run for each part of the PARCC assessment analyzed (9th grade ELA, algebra 1, and geometry1). The *t*-tests identified that there was a statistically significant relationship between the CEP and the Geometryassessment and a marginally significant association between the CEP and the Algebra test. The other *t*-tests showed little to no association between the program and the assessments.

2015 and 2016 Comparison

The number of 9th grade students in 2015 who completed the Algebra test in CEP schools was over 1,300 and increased to more than 1,500 in 2016 (See Table 1). The 2015 mean number of students in the schools enrolled in the CEP who were proficient on Algebra test scores was 9.2, and increased to 12.11 in 2016 while the mean scores for students who took this assessment remain as 711 throughout both years of taking the tests, with the 2016 score slightly increasing from 711.44 to 711.79 (See Table 2). The percent proficient was marginally significant between the two years ($p = 0.063$) while the mean scaled score was not significant ($p = 0.844$) (See Table 3). Overall eight of the ten CEP schools increased the percent of students that were proficient on their tests and six schools increased their mean scaled scores on the test (See Table 5).

The number of students in 2015 who completed the geometry test in CEP schools was over 1,300 and increased to more than 1,500 in 2016 (See Table 6). The mean percent proficient in Geometryfor schools in 2015 was 4.41 and increased to 5.65 in 2016 while the mean score for students during 2015 was 707.57, increasing to

712.79 in 2016 (See Table 7). The percent of students proficient was not significant (p = 0.194) whereas the mean scaled score for students was statistically significant (p = .008) (See Table 8). The percent of students proficient on the geometry test increased at six of the schools eligible for the CEP, while two of the three remaining schools' mean scaled scores decreased and one remained the same (See Table 10). During the same time, eight of the ten CEP schools mean scaled scores increased while two decreased (See Table 10).

The number of students in 2015 who completed the ELA test in CEP schools was over 1,200 and increased to more than 1,400 in 2016 (See Table 11). The ELA percent of students that were proficient from schools in 2015 was 18.5, which decreased to 18.3 in 2016 (See Table 12). Similarly, the mean scaled score on the ELA assessment dropped from 716.4 in 2015 to 714.7 in 2016 (See Table 12). Neither the difference in proficiency (p = .995) nor in mean scaled score (p = 0.690) were significant (See Table 13). Overall five of the ten CEP schools increased the percent of students that were proficient on their tests and five schools increased their mean scaled scores on the test (See Table 15).

2015 and 2017 Comparison

The number of students who took the Algebra PARCC test in CEP schools continued to slightly increase in 2017 to almost 1,600 students (See Table 1). The percentage of students in the schools enrolled in the CEP who were proficient on Algebra test in 2015 was 9.2, and to decreases in 2017 to 8.65 (See Table 16). The mean scaled scores for students who took this assessment remain as 711 throughout all three years of taking the tests, with the 2017 score slightly decreasing from 711.44 to

711.58 (See Table 16). Neither the percent proficient (p = .178) nor the mean scaled score (p = 0.684) were significant (See Table 17). Overall, only two CEP schools had a higher percent of students who were proficient on the Algebra test than in 2015, and only three schools had a higher mean scaled score than in 2015 (See Table 5).

The number of students who took the GeometryPARCC test in 2017 decreases from the previous two years from more than 1,000 students to less than 300 (See Table 6). The percent of students proficient in Geometryfor schools in 2015 was 4.41 and increases in 2017 to 12.03 while the mean scaled score for students during 2015 was 707.57, increasing to 718.08 in 2017 (See Table 19) Neither the percent of students who are proficient on the test (p = 0.496) nor the mean scaled score (p=0.345) were significant (See Table 20). Overall, three of the CEP schools increased their percent of students proficient on the test and their mean scaled scores, three decreased these scores, and four did not have data available (See Table 10).

The number of students who took the ELA PARCC test in 2017 increases from the previous two years from more than 1,500 students (See Table 11). The ELA percent proficient from schools was 18.5 in 2015 and decreases in 2017 to 14 (See Table 22). Similarly, the mean scaled score on the ELA assessment dropped from 716.4 in 2015 to 712.4 in 2017 (See Table 22). Neither the percent proficient (p = .223) or the mean scaled scores (p = 0.292) analyzed were significant (See Table 23). Overall, five of the CEP schools increased their percent of students proficient on the ELA test and four increased their mean scaled score (See Table 15).

Have schools that are not enrolled in the CEP seen differences in their academic achievement?

Additional *t*-tests were conducted on three schools that were eligible to enroll in the CEP and three schools that were did not meet the requirements in order to identify if there was a similar difference to the test scores as those of CEP schools. Tests were run for each part of the PARCC assessment analyzed (9th grade ELA, Algebra 1, and Geometry1) comparing 2015 school year to the 2016 and the 2017 school year. The analysis of these six other schools showed little to no difference in percent of students proficient or mean scaled scores during the three-year time span.

2015 and 2016 Comparison

In CEP eligible schools, the mean percent proficient on the Algebra test rose from 5.85 in 2015 to 7.21 in 2016 and during the same time frame the mean scaled score increased slightly from 708.41 to 708.56 (See Table 25). In comparison, the mean percent proficient in schools' ineligible to enroll in the CEP rose from 38.1 in 2015 to 48.9 in 2016 and the mean scaled score increased from 742.3 to 744.3 (See Table 26). Overall the CEP eligible schools decreased their percent proficient and slightly increased their mean scaled scores (See Table 27). In the ineligible schools both percent proficient and mean scaled scores increased (See Table 28).

In CEP eligible schools, the mean percent proficient on the geometry test rose from 4.76 in 2015 to 6.77 in 2016 and during the same time frame the mean scaled score increased slightly from 713.88to 713.97 (See Table 29). The mean percent proficient in school's ineligible to enroll in the CEP fell from 49.5 in 2015 to 48.9 in 2016 and the mean scaled score decreased from 749.2to 748.2 (See Table 30). Overall the CEP eligible schools increased both their percent proficient and mean scaled

scores (See Table 31). Overall, the ineligible schools saw a decrease in both percent proficient and mean scaled scores (See Table 32).

The schools that were eligible for the CEP increased their percent of students proficient on the ELA test from 19.1 to 21.7 and increased the mean scaled score from 714.7 to 719 (See Table 33). The schools that were not eligible for the CEP increased their percent of students proficient from 65.5 to 68.4 and increased the mean scaled score from 760.9 to 764.3 (See Table 34). Two of the schools eligible yet not enrolled for the CEP showed a decrease in the number of percent proficient students from 2015 to 2017 (See Table 35) and two of the schools that were not eligible for the CEP slightly increased their percent proficiency (See Table 36).

2015 and 2017 Comparison

In CEP eligible schools, the mean percent proficient on the algeba fell from 5.85 in 2015 to 4.63 in 2016 and during the same time frame the mean scaled score also fell from 708.41 to 708.10 (See Table 37). In comparison, the mean percent proficient in schools ineligible to enroll in the CEP rose from 38.1 in 2015 to 41.9 in 2016 and the mean scaled score decreased from 742.3 to 741.2 (See Table 38). Overall the CEP eligible schools decreased their percent proficient and slightly increased their mean scaled scores (See Table 27). In the ineligible schools, both percent proficient and mean scaled scores increased (See Table 28).

In CEP eligible schools, the mean percent proficient on the geometry test from 4.76 in 2015 to 24.2 in 2017 and during the same time frame the mean scaled score increased slightly from 713.88 to 729.47 (See Table 39). The mean percent proficient in schools ineligible to enroll in the CEP increased from 49.5 in 2015 to 81.6 in 2017

and the mean scaled score decreased from 749.2 to 765.3 (See Table 40). Overall the CEP eligible schools increased both their percent proficient and mean scaled scores (See Table 31). and the ineligible schools saw an increase in both percent proficient and mean scaled scores (See Table 32).

The schools that were eligible for the CEP decreased their percent of students proficient on the ELA test from 19.1 to 15.6 and increased the mean scaled score from 714.7 to 716.8 (See Table 41). The schools that were not eligible for the CEP increased their percent of students proficient from 65.5 to 69.5 and increased the mean scaled score from 760.9 to 762.4 (See Table 42). Two of the schools eligible yet not enrolled for the CEP showed a decrease in the number of percent proficient students and the mean scaled scores from 2015 to 2017 (See Table 35) and the schools that were not eligible for the CEP slightly increase overall (See Table 36).

CHAPTER 5

CONCLUSION

This study examined associations between school participation in the CEP and academic achievement as determined by the PARCC assessment.

While there are many studies addressing food insecurity during student's primary education or during their college careers, more research should be done during the important period of student's secondary education (Adrouge & Orlicki, 2013; Alaimo, 2001). Research shows that there is a difference between food secure and food insecure primary students' standardized tests scores (Adrouge & Orlicki, 2013; Alaimo, 2001) as well as college students' GPAs (Maroto, Snelling & Linck, 2014). Existing research does show some initial understanding of the answers to these questions and this research expanded upon this understanding. Prior research has shown a variety of data showing that food insecurity decreases academic achievement on tests, yet the size of the decrease in academic achievement varies by the research. In one study from Alaimo (2001), he identifies a decrease of 1.3 to 2.5 points (on a scale of 20) whereas Adrouge & Orlicki found statistically significant effect on both ELA and mathematics test scores, as much as 16 percent lower scores for those students who are food insecure (2013).

Is there an association between school's enrollment in the CEP and student's average achievement on a standardized test?

One *t*-test identified that there was a statistically significant connection between the CEP and the GeometryPARCC mean scores of the schools that enrolled in the program ($p = .008$). Another test also identified that there was a marginally significant association between the CEP and the Algebra PARCC This finding supports the previous research that food security can increase students' academic achievement. The findings in this research show that, overall, the schools that enrolled in the CEP had an increase in their percent of students proficient on mathematics tests and mean scaled scores on these tests.

Have schools that are not enrolled in the CEP seen differences in their academic achievement?

Additional analyses were conducted on data from three schools that were eligible to but did not choose to enroll in the CEP and three schools that were ineligible in order to identify if there was a similar difference to the test scores as those of CEP schools. The analysis of these six other schools showed little to no difference in percent of students proficient or mean scaled scores during the three-year time span. The data identified there were no significant difference in academic achievement on any of the PARCC tests as compared to the 2015 data. One area to note is the large difference between the eligible and ineligible schools in scores. Schools that were ineligible for the CEP has both higher percent of students proficient and mean scaled scores, ranging between 10 to 60 percent than their eligible counterparts.

Limitations

There were a limited number of schools that could be tested due to the low enrollment of Rhode Island public schools in the CEP. Due to the decision from the Rhode Island Department of Education to end its use of the PARCC assessment and begin using the Rhode Island Comprehensive Assessment System (RICAS), the PARCC test will be unavailable for future studies. This study, although encompassing nine different schools in the state of Rhode Island, is still small in comparison to other studies in the same field and, therefore, will need additional supportive research in order to validate this study's findings. Additionally, it is difficult to identify students who are food insecure. The definition of food insecurity from the Department of Agriculture (2016) defines it as an absence of sufficient food or food that does not meet nutritional requirements (Roselle & Connery, 2016). Yet students who are facing food insecurity are also usually faced with other hardships: students have a higher chance of being from a lower socioeconomic status (Adrouge & Orlicki, 2013) and can also deal with "housing instability, foregone medical care, and loss of essential services like water and heat "(Popkin, Scott, & Galvez, 2016).

Importance of Research and Future Studies

Additional research can be derived from this study into secondary students' food insecurity. Educators and supplemental nutrition program personnel may be interested in this proposed study because it could possibly identify additional areas of support or a higher need for supplemental programming. These findings will be shared, firstly, with the school and districts in the study to assist them in procuring additional resources for their students. The findings will also be shared with programs

such as the SNAP, School Lunch Program, and School Breakfast Program in order to support their requests for additional funding or expansions of their programs. Colleges and universities may also be interested in this research because of its implications in their admissions process and as criteria. Further, there may be other local or state organizations that may benefit from this research as well because they also support families' and students' food needs. The study's findings could be published in either an educational or nutritional scholarly publication.

There is an opportunity to complete another study using the new RICAS assessment. The study can be completed over a four-year process. Data would be comprised of de-identified, student level RICAS scores and SES information. This potential study can collect data from schools that have already enrolled in the CEP, schools that decide to enroll in the CEP during the timespan of the study, schools that are eligible but do not enroll in the program, and ineligible schools. The different student level data can be individually analyzed to see if there are any changes in their academic achievement on standardized tests, and then grouped by schools to find if there was any difference in achievement based on enrollment in the CEP.

This study also provides a basis for additional research on secondary students experiencing food insecurity. Quantitative studies that could be completed include analyzing student level scores in the schools that have not enrolled in the CEP yet but plan to in the next several years, using data to identify the differences in academic achievement in schools that already are enrolled in the CEP, or analyzing the differences between CEP schools, academic achievement and those similar schools

that have not enrolled in the CEP. Qualitative research that could be completed includes identifying longitudinal data, such as surveys, for students experiencing food insecurity, or a study identifying how the CEP has affected students and teachers who have access to the program.

Food insecurity is still an issue across the United States, affecting 9.4 percent of households, or 48.1 million people (Roselle & Connery, 2016). Roselle and Connery assert, "If the health of our democracy is directly tied to the health of our public schools […] it only follows that the nutritional health of our children and their access to healthy foods should be part of the current social justice conversations" (2016). If the CEP can help assist in the health and well-being of schools and the students within them, then it should also be included in these conversation. In Rhode Island, there are more than 80 schools and 25 LEA's that are eligible or near eligible to enroll in the CEP (National School Lunch Program, 2017). This research may help schools and administration decide to enroll in the program and assist their students in obtaining the nutrition they need to be successful in school.

APPENDICES

Appendix A

List of Tables

Table 1: Test of Normality of Paired Sample t-tests between ELA 2015 and 2017 Scores

Test of Normality (Shapiro-Wilk)

			W	p
pp.ela15	-	pp.ela17	0.837	0.041
ela15	-	ela17	0.969	0.885

Note. A low p-value suggests a violation of the assumption of normality

Table2: Test of Normality of Paired Sample t-tests between GEO 1 2015 and 2017 Scores

Test of Normality (Shapiro-Wilk)

			W	p
pp.geo15	-	pp.geo17	0.929	0.569
geo15	-	geo17	0.802	0.062

Note. A low p-value suggests a violation of the assumption of normality

Table 3: Number of Students Taking ALG 1 PARCC Test in CEP Schools

School Name	2015 ALG 1 Number Tested	2016 ALG 1 Number Tested	2017 ALG 1 Number Tested
(ACES)	46	52	49
Central Falls Senior HS	119	165	159
Central HS	246	254	384
Classical HS	141	179	144
Alvarez HS	76	125	138
E-Cubed Academy	76	92	93
Hope HS	147	149	192
Mt. Pleasant HS	197	257	233
Prov. CTA	185	203	176
Times2 Academy	80	106	26

Table 4: Descriptives of Paired Sample t-tests between ALG 1 2015 and 2016 Scores

Descriptives

	N	Mean	Median	SD	SE
pp.alg15	11	9.20	3.05	19.5	5.87
pp.alg16	11	12.11	3.64	22.2	6.68
alg15	11	711.44	709.82	17.9	5.41
alg16	11	711.79	705.74	19.6	5.92

Table 5: Paired Sample t-tests between ALG 1 2015 and 2016 Scores

Paired Samples T-Test

			statistic	df	p
pp.alg15	pp.alg16	Student's t	–2.087	10.0	0.063
		Wilcoxon W	13.0		0.083
alg15	alg16	Student's t	–0.202	10.0	0.844
		Wilcoxon W	30.0		0.831

Table 6: Schools Level PARCC Scores and Percent Proficient in ALG 1 in CEP Schools

School Name	2015 ALG 1 Percent Proficient	2015 ALG 1 Mean Scaled Score	2016 ALG 1 Percent Proficient	2016 ALG 1 Mean Scaled Score	2017 ALG 1 Percent Proficient	2017 ALG 1 Mean Scaled Score
(ACES)	4.347826087	714.3043478	1.92	711.52	4.1	717.8
Central Falls Senior HS	1.680672269	694.6470588	3.64	701.1	5.7	705.2
Central HS	4.471544715	711.9308943	9.84	704.91	1.8	701.1
Classical HS	67.37588652	759.5460993	77.09	763.98	62.5	757
Alvarez HS	1.315789474	704.2631579	1.6	705.9	0.7	699.7
E-Cubed Academy	2.631578947	709.8157895	3.26	705.74	2.2	707.1
Hope HS	0.680272109	693.6258503	2.01	697.47	1	703
Mt. Pleasant HS	3.045685279	703.9746193	0.78	694.47	3	703.8
Prov. CTA	4.324324324	712.9945946	16.75	721.4	1.7	708.6
Times2 Academy	10	719.8875	12.26	723.83	3.8	712.5

Table 7: Number of Students Taking GEO 1 PARCC Test in CEP Schools

School Name	2015 GEO 1 Number Tested	2016 GEO 1 Number Tested	2017 GEO 1 Number Tested
(ACES)	51	49	*
Central Falls Senior HS	80	127	*
Central HS	327	237	13
Classical HS	101	276	105
Alvarez HS	78	100	43
E-Cubed Academy	86	79	17
Hope HS	114	135	42
Mt. Pleasant HS	206	174	*
Prov. CTA	168	158	*
Times2 Academy	47	64	43

Table 8: Descriptives of Paired Sample t-tests between GEO 1 2015 and 2016 Scores

Descriptives

	N	Mean	Median	SD	SE
pp.geo15	11	4.41	1.16	10.8	3.24
pp.geo16	11	5.65	1.48	12.4	3.75
geo15	11	707.57	702.41	12.6	3.81
geo16	11	712.79	711.41	11.5	3.48

Table 9: Paired Sample t-tests between GEO 1 2015 and 2016 Scores

Paired Samples T-Test

			statistic	df	p
pp.geo15	pp.geo16	Student's t	−1.39	10.0	0.194
		Wilcoxon W	15.00		0.221
geo15	geo16	Student's t	−3.29	10.0	0.008
		Wilcoxon W	6.00		0.014

Table 10: Schools Level PARCC Scores and Percent Proficient in GEO 1 in CEP Schools

School Name	2015 GEO 1 Percent Proficient	2015 GEO 1 Mean Scaled Score	2016 GEO 1 Percent Proficient	2016 GEO 1 Mean Scaled Score	2017 GEO 1 Percent Proficient	2017 GEO 1 Mean Scaled Score
(ACES)	1.960784314	706.745098	2.04	705.51	NA	NA
Central Falls Senior HS	0	700.2	0	705.8	NA	NA
Central HS	0.917431193	704.2629969	6.33	714.51	30.8	739.2
Classical HS	36.63366337	741.7821782	42.75	744.36	24.8	739.4
Alvarez HS	1.282051282	701	1	707.85	0	699.5
E-Cubed Academy	1.162790698	702.4069767	1.27	712.16	11.8	721.7
Hope HS	1.754385965	698.7105263	1.48	704.73	4.8	697.3
Mt. Pleasant HS	0	701.315534	1.15	702.4	NA	NA
Prov. CTA	0.595238095	708.7321429	2.53	718.47	0	711.4
Times2 Academy	4.255319149	718.2765957	0	713.48	NA	NA

Table 11: Number of Students Taking ELA PARCC Test in CEP Schools

School Name	2015 ELA Number Tested	2016 ELA Number Tested	2017 ELA Number Tested
(ACES)	45	56	48
Central Falls Senior HS	60	141	132
Central HS	243	242	238
Classical HS	219	275	271
Alvarez HS	65	103	145
E-Cubed Academy	74	89	81
Hope HS	118	109	175
Mt. Pleasant HS	165	185	172
Prov. CTA	182	203	182
Times2 Academy	40	45	67

Table 12: Descriptives of Paired Sample t-tests between ELA 2015 and 2016 Scores

Descriptives

	N	Mean	Median	SD	SE
pp.ela15	11	18.5	5.49	27.6	8.33
pp.ela16	11	18.3	10.48	19.3	5.83
ela15	11	716.4	708.74	27.9	8.41
ela16	11	714.7	703.44	23.3	7.01

Table 13: Paired Sample t-tests between ELA 2015 and 2016 Scores

Paired Samples T-Test

			statistic	df	p
pp.ela15	pp.ela16	Student's t	0.0582	10.0	0.955
		Wilcoxon W	34.0		0.966
ela15	ela16	Student's t	0.4108	10.0	0.690
		Wilcoxon W	37.0		0.765

Table 14: Schools Level PARCC Scores and Percent Proficient in ELA in CEP Schools

School Name	2015 ELA Percent Proficient	2015 ELA Mean Scaled Score	2016 ELA Percent Proficient	2016 ELA Mean Scaled Score	2017 ELA Percent Proficient	2017 ELA Mean Scaled Score
(ACES)	8.888888889	727.7333333	35.71	736.61	16.7	725
Central Falls Senior HS	3.333333333	685.85	8.51	706.91	11.4	705.8
Central HS	3.703703704	696.6049383	11.16	702.4	5.9	696.4
Classical HS	91.78082192	778.1598174	66.91	765.49	57.2	758.5
Alvarez HS	16.92307692	723.9538462	5.83	695.97	2.1	689.2
E-Cubed Academy	16.21621622	717.7027027	7.87	703.44	12.3	702.2
Hope HS	2.542372881	694.5932203	5.5	697.36	2.9	700.4
Mt. Pleasant HS	4.848484848	696.4545455	2.16	693.36	7	704.6
Prov. CTA	5.494505495	708.7362637	15.76	715.7	4.9	708.9
Times2 Academy	47.5	751.45	31.11	742.24	19.4	733.1

Table 15: Descriptives of Paired Sample t-tests between ALG 1 2015 and 2017 Scores

Descriptives

	N	Mean	Median	SD	SE
pp.alg15	10	9.99	3.69	20.3	6.43
pp.alg17	10	8.65	2.60	19.0	6.00
alg15	10	712.50	710.87	18.5	5.86
alg17	10	711.58	706.15	16.9	5.33

Table 16: Paired Sample t-tests between ALG 1 2015 and 2017 Scores

Paired Samples T-Test

			statistic	df	p
pp.alg15	pp.alg17	Student's t	1.463	9.00	0.178
		Wilcoxon W	44.0		0.105
alg15	alg17	Student's t	0.421	9.00	0.684
		Wilcoxon W	34.0		0.557

Table 17: Descriptives of Paired Sample t-tests between GEO 1 2015 and 2017 Scores

Descriptives

	N	Mean	Median	SD	SE
pp.geo15	6	7.67	1.52	14.2	5.81
pp.geo17	6	12.03	8.30	13.1	5.35
geo15	6	711.07	703.33	16.6	6.76
geo17	6	718.08	716.55	18.6	7.61

Table 18: Paired Sample t-tests between GEO 1 2015 and 2017 Scores

Paired Samples T-Test

			statistic	df	p
pp.geo15	pp.geo17	Student's t	–0.734	5.00	0.496
		Wilcoxon W	9.00		0.844
geo15	geo17	Student's t	–1.043	5.00	0.345
		Wilcoxon W	10.00		1.000

Table 19: Descriptives of Paired Sample t-tests between ELA 2015 and 2017 Scores

Descriptives

	N	Mean	Median	SD	SE
pp.ela15	10	20.1	7.19	28.6	9.03
pp.ela17	10	14.0	9.20	16.2	5.14
ela15	10	718.1	713.22	28.8	9.10
ela17	10	712.4	705.20	20.7	6.56

Table 20: Paired Sample t-tests between ELA 2015 and 2017 Scores

Paired Samples T-Test

			statistic	df	p
pp.ela15	pp.ela17	Student's t	1.31	9.00	0.223
		Wilcoxon W	34.0		0.557
ela15	ela17	Student's t	1.12	9.00	0.292
		Wilcoxon W	36.0		0.432

Table 21: Descriptives of Paired Sample t-tests between ALG 1 2015 and 2016 Eligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.alg15	3	5.85	5.71	4.95	2.86
pp.alg16	3	7.21	3.57	9.07	5.24
alg15	3	708.41	708.87	6.58	3.80
alg16	3	708.56	704.34	10.07	5.81

Table 22: Descriptives of Paired Sample t-tests between ALG 1 2015 and 2016 Ineligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.alg15	3	38.1	46.8	15.64	9.03
pp.alg16	3	48.9	60.6	31.07	17.94
alg15	3	742.3	746.4	7.14	4.12
alg16	3	744.3	753.6	18.11	10.46

Table 23: Schools Level PARCC Scores and Percent Proficient in ALG 1 in CEP Eligible Schools

School Name	2015 ALG 1 Percent Proficient	2015 ALG 1 Mean Scaled Score	2016 ALG 1 Percent Proficient	2016 ALG 1 Mean Scaled Score	2017 ALG 1 Percent Proficient	2017 ALG 1 Mean Scaled Score
Rogers HS	5.71	708.87	3.57	701.29	5.7	709.7
Shea HS	0.97	701.61	0.52	704.34	3.1	706.1
Woonsocket HS	10.87	714.74	17.53	720.05	5.1	708.5

Table 24: Schools Level PARCC Scores and Percent Proficient in ALG 1 in Non-CEP Eligible Schools

School Name	2015 ALG 1 Percent Proficient	2015 ALG 1 Mean Scaled Score	2016 ALG 1 Percent Proficient	2016 ALG 1 Mean Scaled Score	2017 ALG 1 Percent Proficient	2017 ALG 1 Mean Scaled Score
Barrington HS	47.40	746.40	60.61	753.65	53.8	747.5
East Greenwich HS	46.75	746.36	72.46	755.88	52.9	746.6
Narragansett HS	20.00	734.02	13.70	723.45	19.0	729.5

Table 25: Descriptives of Paired Sample t-tests between GEO1 2015 and 2016 Eligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.geo15	3	4.76	4.43	4.26	2.46
pp.geo16	3	6.77	5.45	3.17	1.83
geo15	3	713.88	716.62	5.77	3.33
geo16	3	713.97	711.12	6.04	3.49

Table 26: Descriptives of Paired Sample t-tests between GEO 1 2015 and 2016 Ineligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.geo15	3	49.5	45.9	15.89	9.18
pp.geo16	3	48.9	50.2	17.02	9.83
geo15	3	749.2	746.3	7.58	4.38
geo16	3	748.2	748.1	7.96	4.59

Table 27: Schools Level PARCC Scores and Percent Proficient in GEO 1 in CEP Eligible Schools

School Name	2015 GEO 1 Percent Proficient	2015 GEO 1 Mean Scaled Score	2016 GEO 1 Percent Proficient	2016 GEO 1 Mean Scaled Score	2017 GEO 1 Percent Proficient	2017 GEO 1 Mean Scaled Score
Rogers HS	9.18	717.78	5.45	711.12	17.0	728.4
Shea HS	0.68	707.26	4.47	709.89	31.6	738.1
Woonsocket HS	4.43	716.62	10.38	720.91	24.0	721.9

Table 28: Schools Level PARCC Scores and Percent Proficient in GEO 1 in Non-CEP Eligible Schools

School Name	2015 GEO 1 Percent Proficient	2015 GEO 1 Mean Scaled Score	2016 GEO 1 Percent Proficient	2016 GEO 1 Mean Scaled Score	2017 GEO 1 Percent Proficient	2017 GEO 1 Mean Scaled Score
Barrington HS	45.85	746.35	50.19	748.14	92.6	768.8
East Greenwich HS	66.94	757.83	65.22	756.25	90.0	769.3
Narragansett HS	35.80	743.51	31.25	740.34	62.2	757.8

Table 29: Descriptives of Paired Sample t-tests between ELA 2015 and 2016 Eligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.ela15	3	19.1	21.3	9.12	5.27
pp.ela16	3	21.7	23.7	3.72	2.15
ela15	3	714.7	714.4	10.56	6.10
ela16	3	719.0	723.3	7.75	4.48

Table 30: Descriptives of Paired Sample t-tests between ELA 2015 and 2016 Ineligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.ela15	3	65.5	72.0	17.5	10.09
pp.ela16	3	68.4	72.3	15.0	8.66
ela15	3	760.9	764.9	14.8	8.56
ela16	3	764.3	771.6	15.4	8.89

Table 31: Schools Level PARCC Scores and Percent Proficient in ELA in CEP Eligible Schools

School Name	2015 ELA Percent Proficient	2015 ELA Mean Scaled Score	2016 ELA Percent Proficient	2016 ELA Mean Scaled Score	2017 ELA Percent Proficient	2017 ELA Mean Scaled Score
Rogers HS	21.33	714.37	17.39	710.09	12.2	712.7
Shea HS	9.09	704.32	23.94	723.71	20.4	721.8
Woonsocket HS	26.92	725.44	23.71	723.32	14.3	715.8

Table 32: Schools Level PARCC Scores and Percent Proficient in ELA in Non-CEP Eligible Schools

School Name	2015 ELA Percent Proficient	2015 ELA Mean Scaled Score	2016 ELA Percent Proficient	2016 ELA Mean Scaled Score	2017 ELA Percent Proficient	2017 ELA Mean Scaled Score
Barrington HS	78.84	773.28	81.08	774.59	79.3	770.3
East Greenwich HS	71.97	764.85	72.28	771.61	70.3	765.2
Narragansett HS	45.71	744.46	51.85	746.55	58.9	751.6

Table 33: Descriptives of Paired Sample t-tests between ALG 1 2015 and 2017 Eligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.alg15	3	5.85	5.71	4.95	2.858
pp.alg17	3	4.63	5.10	1.36	0.786
alg15	3	708.41	708.87	6.58	3.798
alg17	3	708.10	708.50	1.83	1.058

Table 34: Descriptives of Paired Sample t-tests between ALG 1 2015 and 2017 Ineligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.alg15	3	38.1	46.8	15.64	9.03
pp.alg17	3	41.9	52.9	19.84	11.45
alg15	3	742.3	746.4	7.14	4.12
alg17	3	741.2	746.6	10.14	5.86

Table 35: Descriptives of Paired Sample t-tests between GEO1 2015 and 2017 Eligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.geo15	3	4.76	4.43	4.26	2.46
pp.geo17	3	24.20	24.00	7.30	4.22
geo15	3	713.88	716.62	5.77	3.33
geo17	3	729.47	728.40	8.15	4.71

Table 36: Descriptives of Paired Sample t-tests between GEO 1 2015 and 2017 Ineligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.geo15	3	49.5	45.9	15.89	9.18
pp.geo17	3	81.6	90.0	16.85	9.73
geo15	3	749.2	746.3	7.58	4.38
geo17	3	765.3	768.8	6.50	3.75

Table 37: Descriptives of Paired Sample t-tests between ELA 2015 and 2017 Eligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.ela15	3	19.1	21.3	9.12	5.27
pp.ela17	3	15.6	14.3	4.26	2.46
ela15	3	714.7	714.4	10.56	6.10
ela17	3	716.8	715.8	4.63	2.67

Table 38: Descriptives of Paired Sample t-tests between ELA 2015 and 2017 Ineligible School Scores

Descriptives

	N	Mean	Median	SD	SE
pp.ela15	3	65.5	72.0	17.48	10.09
pp.ela17	3	69.5	70.3	10.22	5.90
ela15	3	760.9	764.9	14.82	8.56
ela17	3	762.4	765.2	9.67	5.58

Appendix B

List of Figures

Figure 1: Completed Secondary Data Analysis Worksheet

IRB
Secondary Data Analysis Worksheet
Rev. March 2015

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HUMAN SUBJECTS RESEARCH

- If your study is limited to analysis of deidentified existing data, documents, records, or specimens, it may not be necessary to complete and submit a full IRB application.
- To make that determination, please complete this form and submit it via IRBNet.
- Do **not** complete or submit an IRB application along with this form. You will be notified if a complete IRB application will be required via IRBNet.
- If you have questions about filling out this form, please email researchintegrity@etal.uri.edu.

Protocol Title: Food Insecurity and its Association with Testing

Principal Investigator: Diane Kern
Student Name: Daniel Riley
College: College of Education and Professio
Department: School of Education
PI Email Address: dkern@uri.edu
Student Email Address: driley1994@gmail.com
PI Telephone No.: 401-874-9490
Student Telephone No.: 860-608-1529

REQUIRED:

☒ The data for this research is to be used for a thesis or dissertation.
I have included:

- ☒ A copy of the SIGNED **MA/PhD Proposal Signature Sheet**
- ☒ MA/PhD approved Proposal, **proposal,** and **CITI certification** has been uploaded
- ☒ CITI certification (Basic Course I - Social Behavioral) for student and PI

☒ This study uses secondary data from living individuals; i.e. records, documents, or specimens already collected.
The data is owned by: Rhode Island Department of Education
☐ I have attached letter of authorization from the owner of the data set.

☒ The data was de-identified at the source and the researcher will never have access to any identifiers.

☐ The data was originally collected with appropriate informed consent process, IRB approval, and/or HIPAA authorization.
HU#:

☒ The data set is closed (data collection is **not** ongoing for the data set you will use).

Page 1 of 2

IRB

Secondary Data Analysis Worksheet

Rev. March 2015

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CHECK ALL THAT APPLY

☐ You will have access to identifying information but will not record or disclose subject private or identifying information in any way and will maintain the confidentiality of subjects.

☐ Specimens or data includes genetic information about subjects (e.g. DNA). Give details below.

PI Name:	Diane Kern	PI Signature:	Diane Kern Digitally signed by Diane Kern Date: 2017.12.26 09:28:59 -05'00'
Student Name:	Daniel Riley	Student Signature:	Daniel Riley Digitally signed by Daniel Riley Date: 2017.12.26 09:34:12 -05'00'
Dept. Chair Name:	David Byrd	Dept. Chair Signature:	David Byrd Digitally signed by David Byrd Date: 2017.12.26 09:34:42 -05'00'

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