RELATIONSHIP OF HISPANIC STUDENTS' SCHOOL ABSENTEEISM TO MATHEMATICS ACHIEVEMENT AND INTEREST IN STEM CAREERS

by

Rolando Casado

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

The purpose of this bivariate correlational study was to identify whether there was a relationship between Hispanic students' high school absenteeism and their scores on the Algebra I Florida Standards Assessment (FSA) and to identify whether there was a relationship between Hispanic students' high school absenteeism and their aspiration to pursue STEM careers. The population sample consisted of 431 Hispanic students from two Title I high schools located in a Florida school district. A quantitative design was used for this study and the researcher obtained ex post facto data from the high schools with the largest number of enrolled Hispanic students in the school district in the 2018-2019 school year. The data collected included achievement data from test standard scale scores, attendance records including the number of days absent for the year, and career survey information from 431 Hispanic students enrolled in both high schools. Gender breakdown of 221 males and 210 females provides for 51% males and 49% females of the total sample. Instruments used to obtain data include the Algebra I FSA, FOCUS school gradebook software to track absenteeism, and Naviance webtool 'Do What You Are' (N-DWYA) survey. SPSS 25® generated two bivariate linear regressions for the study. Results indicated that Hispanic students' high school absenteeism was not a statistically significant predictor of Algebra 1 FSA standard scale scores for null hypothesis one. Results indicated that Hispanic students' interest to pursue STEM careers was not a statistically significant predictor of students' high school absenteeism for null hypothesis two. The conclusion along with any limitations and recommendations for future research are reported.

Keywords: absenteeism, compulsory age, expectancy-value theory, gatekeeper, STEM, truancy

Dedication

I dedicate this work to my Lord Jesus Christ and savior for giving me the resilience to continue working and still able to manage my home responsibilities. Through it all, I can say that it was not the strength of my own strength and leading of His Holy Spirit. To some of my brothers and sisters from the church, I am grateful as they have picked up some of my functions during the last three years and have prayed so I could be focused on this important work. I am thankful for my family's tolerance as they have missed me in events, yet understood my labor and commitment to this project. And finally, my amazing loving wife Ana, whose support has been selfless and unconditional. She has made sure our home was a peaceful environment where I could work on my dissertation two or three nights each week. We have made this accomplishment possible through mutual sacrifice, effort, and love. Thank you.

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List of Abbreviations

Adequate Yearly Progress (AYP)

American Institutes of Research (AIR)

Average Daily Attendance (ADA)

Avon Longitudinal Study of Parents and Children (ALSPAC)

Common Core State Standards (CCSS)

Common Core State Standards for Mathematics (CCSSM)

Confirming Factor Analysis (CFA)

Depth of Knowledge (DOK)

Early Warning System (EWS)

Expectancy-Value Theory (EVT)

Florida Department of Education (FLDOE)

Florida Standards Assessment (FSA)

Family Education Rights and Privacy Act (FERPA)

Hispanic Serving Institutions (HSI)

Institutional Review Board (IRB)

Mathematics Florida Standards (MAFS)

Mathematics Teaching Association (MTA)

Mathematics Teaching Outcome Expectancy (MTOE)

Multi-Tiered System of Support (MTSS)

National Assessment of Educational Progress (NAEP)

National Center for Education Statistics (NCES)

National Governor's Association (NGA)

National Institute of Child's Health and Human Development Study of Early Child Care and Youth Development (NICHDS-SECCYD)

Naviance-Do What You Are (N-DWYA)

No Child Left Behind (NCLB)

Panel Study of Income Dynamics-Child Development Supplement (PSID-CDS)

Personal Mathematics Teaching Efficacy (PMTE)

Professional Learning Community (PLC)

Race to the Top (RTTT)

Realistic, Investigative, Artistic, Social, Enterprising, Conventional (RIASEC)

Research, Evaluation, and Accountability (REA)

School Climate Assessment Instrument (SCAI)

Science, Technology, Engineering, and Mathematics (STEM)

Statistical Package for the Social Sciences (SPSS)

Subject Task Value (STV)

CHAPTER ONE: INTRODUCTION

Overview

The opening chapter provides insight into the problem of absenteeism among Hispanic students as well as the impacts of absenteeism on the Hispanic community. This is followed by a description of how poor mathematical cognitive development affects postsecondary career selection. Reasoning for conducting the study is provided and leads into why school leaders must act on this empirically-supported, significant problem.

Background

School absenteeism is a complex problem that is ubiquitous in schools throughout the nation and has negatively impacted students' academic performance (Gottfried, 2010; 2019). In addition to poor academic achievement, absenteeism makes it difficult for students to follow specific career fields (Smerillo, Reynolds, Temple, & Ou, 2018). High school absenteeism is at chronic levels in the United States and in other countries around the world (Cabus & De Witte, 2015; Maynard, McCrea, Pigott, & Kelly, 2013). School leadership considers absenteeism to be a problem when a student is absent for five days during the first semester or 10-15 days for the entire school year based on the most common 180-school-days model (Kearney & Graczyk, 2014; Owings et al., 2017; U.S. Department of Education, 2016). The intricacy of this problem is predominantly rooted in medical and mental health of students or family dysfunction (Espinoza-Herold & González-Carriedo, 2017). Students who are frequently absent due to these dynamics may eventually escalate into chronic absenteeism (Kaiser & Schulze, 2015). The problem of absenteeism is correlated with negative social outcomes such as early pregnancy, substance abuse, criminal behavior, truancy, or school dropout (Kearney & Graczyk, 2014; Romero & Lee, 2017). Additionally, "chronic absence is a proven sign of academic risk, as

students who miss school are less likely to meet key academic milestones" (Rafa, 2017, p. 2). Furthermore, students who miss 15-20% of instructional time are less likely to maintain adequate academic performance and most importantly, academic deficiencies contributing to the widening of the White-Hispanic student achievement gap, especially in mathematics (Gottfried, 2010; 2019; Paschall, Gershoff, & Kuhfeld, 2018). The number of students absent from schools ranged between 5 to 7.5 million students in 2016 (U.S. Department of Education, 2016). The collective data provides overwhelming evidence that absenteeism is a glaring problem in school districts across the country (Espinoza-Herold & González-Carriedo, 2017; Rafa, 2017).

This study focuses on Hispanic students because this ethnic group tops the list of students who have the highest absenteeism rates and the highest number of high school dropouts, which stands at 20 percentage points over White students (Espinoza-Herold & González-Carriedo, 2017; Maynard, Vaughn, Nelson, Salas-Wright, Heyne, & Kremer, 2017; Skedgell & Kearney, 2016). Students in this demographic group are performing at particularly low rates on mathematics state assessments (Paschall, Gershoff, & Kuhfeld, 2018). School absenteeism is a significant contributor to students' low mathematics academic performance (Gottfried, 2010; Gottfried & Ehrlich, 2018; Paschall, Gershoff, & Kuhfeld, 2018).

Low mathematics performance became a priority to Americans at the time when the document *A Nation at Risk* (National Commission on Excellence in Education, 1983) was released and gave a wide-lens view of the country's Department of Education. The report placed emphasis on increasing mathematics and science skills to ensure the U.S. could regain global superiority in the areas of science and engineering (National Commission on Excellence in Education, 1983). *A Nation at Risk* positioned education reform at the center of major political agendas that continued over the years leading to legislations like Goals 2000, No Child Left

Behind (NCLB), and Race to the Top (RTTT) (Dee & Jacob, 2011; Paris, 1994; Tichnor-Wagner & Socol, 2016).

Under Presidents George H.W. Bush and Bill Clinton, Goals 2000 aimed at making the U.S. the top nation in mathematics and science achievement among all industrialized countries (Paris, 1994). NCLB was President G.W. Bush's educational initiative for the 21st century that required greater supervision for all students and ethnic subgroups (DuFour, 2017). This legislation established what would be considered the adequate yearly progress (AYP) and it mandated a report card system for schools that monitored students and student subgroups (e.g., race, gender, and students with disabilities) to identify whether AYP had been reached for each student and student subgroup (Peterson & Ackerman, 2015). The RTTT legislation came under President Barack Obama with the vision of implementing the Common Core State Standards (CCSS) nationally (Tichnor-Wagner & Socol, 2016). The CCSS standards dedicated for mathematics instruction were designed to improve mathematics achievement levels (Khaliqi, 2016).

Over the past 30 years, legislators have been deliberate about raising the quality of mathematics and science instruction and achievement levels for students. Increasing mathematics rigor has become a greater barrier for Hispanic students to overcome as this community is challenged with chronic absenteeism and low achievement test scores (Romero & Lee, 2017; Saw & Chang, 2018). School attendance is a national problem that continues to grow among all ethnic groups in the country (Gottfried & Ehrlich, 2018). Students who are absent will not receive direct instruction, intervention, or remediation from a certified teacher, nor will they be able to participate in student-to student interactions which are invaluable for processing information. The literature suggests that students who are frequently absent will not learn at the

same rate as students who attend school regularly (Green, Liem, Martin, Colmar, Marsh, & McInerney, 2012; London, Sanchez, & Castrechini, 2016; Rogers, Duncan, Wolford, Ternovski, Subramanyam, & Reitano, 2017; Romero & Lee, 2017).

The scope of the present study is to determine whether a correlation exists between Hispanic students' high school absenteeism and their mathematics achievement and Hispanic students' interest in STEM careers and school absenteeism. Students in this ethnic group are significantly underrepresented in STEM career fields as a result of students' low expectancy of success in mathematics (Saw & Chang, 2018). The Hispanic population is experiencing the most rapid population growth compared to other demographic groups in the U.S. (Espinoza-Herold & González-Carriedo, 2017; Koppelman, 2017). Consequently, Hispanic students represent a large portion of the group of citizens who will replace the aging labor force in the STEM field (Mau, 2018; National Science Board, 2016).

This study samples Hispanic students enrolled in Florida schools where they exceeded 38% of the total enrolled population at the state level for the 2017-2018 school year (Florida Department of Education Enrollment, 2019). The study aims at finding whether absenteeism can predict Hispanic students' mathematics performance outcome and their interest to enter the STEM career field. Currently in Florida, 54% of migrants into the state are of Hispanic heritage including Cuba, Puerto Rico, and other Hispanic countries in Central and South America (Wang & Rayer, 2016). Additionally, Hispanic student enrollment in the state has grown 3% in the last five years compared to a 2.8% decrease in White students over the same period of time (Florida Department of Education Enrollment, 2019).

The literature points at Hispanic students as the ethnic group most affected by chronic absenteeism and high school dropout in the country (Espinoza-Herold & González-Carriedo,

2017; Musu-Gillette et al., 2017; Rogers et al., 2017; Romero & Lee, 2017). Research suggests that the effects of high absenteeism have led to a downward spiral of Hispanic students' mathematics achievement scores as measured by state annual assessments (National Science Board, 2016). Hispanic students who engage in chronic absenteeism and miss considerable amounts of instruction as a result of absenteeism are likely to receive lower achievement scores in mathematics when compared to other subject areas (Smerillo et al., 2018).

Students aspiring to enter career fields in STEM play a vital role in continuing the drive for the U.S. to grow as an innovative nation (Khatri, Henderson, Cole, Froyd, Friedrichsen, & Stanford, 2017). The Hispanic population is identified as an untapped group of Americans that could contribute to innovation but are underrepresented in STEM careers and in STEM educational settings (Callahan et al., 2017; Edwin, Prescod, & Bryan, 2019). Hispanic underrepresentation is amplified by the growth in STEM career opportunities (Johnson & Kritsonis, 2006; Smerillo et al., 2018). The low percentage of Hispanics that choose to pursue a career in the field of STEM reduces their chances to compete for jobs with high wages in a continually thriving industry in which mathematics skills are the basis for most jobs (Rincon, 2017; Lauen & Gaddis, 2016). STEM jobs are suited to provide a better quality of life to the Hispanic community as the industry maintains an unemployment rate of 3.8% compared to the national unemployment rate of 8.1% (National Science Foundation, 2016). In order for Hispanics to be part of this industry, the White-Hispanic achievement gap in mathematics scores from primary to secondary schools needs to be addressed by school districts.

Empirical evidence demonstrates how school attendance is a strong precursor to students' mathematics levels of achievement gap (Gottfried, 2019). Absenteeism has been found to be a contributor to the White-Hispanic mathematics achievement gap (Owings et al., 2017). In

addition, an examination of the extent to which low mathematics performance affects Hispanic students' career interest in the field of STEM is completed here. This study is framed on the theoretical framework of Eccles' (2009) Expectancy Value Theory (EVT) and Holland's (1959) Theory of Vocational Choice to address the following research questions: Is there a predictive relationship between Hispanic students' high school absenteeism and mathematics achievement? Also, is there a predictive relationship between Hispanic students' interest to pursue careers in the STEM field and high school absenteeism?

EVT is directly related to how individuals select a career. Its "basic premise is that individuals choose to engage in tasks and activities that have high value to them and at which they expect to succeed" (Lauermann, Tsai, & Eccles, 2017, p. 1540). In addition, EVT supports the idea of students having an interest in mathematics and inherently longing for a career field related to mathematics and sciences (Eccles, 2009). Wigfield and Eccles (2000) assert that to experience success in mathematics, the student must embrace a level of expectancy to succeed and a level of enjoyment on the applicable subject task. The EVT rests upon the low sense of self-confidence students have in themselves to succeed. The low expectancy is especially marked in the area of mathematics (Lauermann et al., 2017; Romero & Lee, 2017). The second aspect to the EVT is the subject task value that students place upon the completion of a task (Lanza, Osgood, Eccles, & Wigfield, 2002).

The Theory of Vocational Choice provides an additional framework for this study. Holland's theory (1959) includes six personality types that codify how individuals are likely to select a career. Holland (1959) believes that most people can be identified as one of the following personality types: realistic, investigative, artistic, social, enterprising, and conventional (Campbell & Holland, 1972). The codes are referred to as RIASEC and generally relate to

individuals based on the career interest profiler (Bakker & Macnab, 2004). Holland determined that occupational classification depends on individuals' interactions with others and the work environment (1959). Once categorized, a code is given in the form of one to three letters such as RIA (Realistic-Investigative-Artistic) which represents the personality traits that associate an individual with a career type (Hogan & Blake, 1999). This framework is relevant to the present study as the researcher endeavors to examine Hispanic students' career interests in the field of STEM.

The purpose of the present correlational study is to research the relationship between Hispanic students' absenteeism as the predictive variable and students' mathematics achievement measured by the Florida Standards Assessments as the criterion variable (Florida Department of Education, 2017). The second relationship researched is between Hispanic students' aspiration to pursue STEM careers, the predictive variable, and absenteeism as the criterion variable.

Problem Statement

Studies have repeatedly emphasized how much Hispanics are underrepresented in career fields associated with STEM (Borman, Margolin, Garland, Rapaport, Park, & LiCalsi, 2017; Hinojosa et al., 2016; Mau & Li, 2017; National Science Foundation, 2019; Safavian & Conley, 2016; Saw & Chang, 2018; U.S. Department of Education, 2016). This lack of representation in STEM careers may be an effect of Hispanic students' low mathematics performance exacerbated by habitual school absenteeism that is highest among Hispanics when compared to other races and ethnicities (Maynard, Vaughn, Nelson, Salas-Wright, Heyne, & Kremer, 2017; Skedgell & Kearney, 2016). The problem of absenteeism is well documented in the literature and is considered an extreme situation that affects many stakeholders in school communities in the U.S. and other modern industrialized countries (Cabus & De Witte, 2015; Rafa, 2017; U.S.

Department of Education, 2016). Students who are habitually absent require more remediation to achieve mastery of the learning goals associated with each respective subject area (Gottfried, 2019).

However, the existing research does not provide clear connections to whether and to what extent Hispanic students' absenteeism significantly dampers their potential to excel in mathematics and to aspire to enter STEM careers. Saw and Chang (2018) call for the need to continue the research of the implications of Hispanic students' underrepresentation in the field of STEM. Within the current research literature, there is not any one factor that is strongly correlated to Hispanic students' low interest in entering STEM career fields (Saw & Chang, 2018).

The present study will add to the literature related to the effects of Hispanic students' absenteeism on mathematics achievement and on STEM career interest in this subgroup. Hispanic underrepresentation in STEM careers was a problem recognized by Congress in the Goals 2000 Educate America Act that allocated billions of dollars to institutions that became Hispanic serving institutions (HSI) addressing STEM initiatives (Crisp, Nora, & Taggart, 2009; Goals, 2000). Hispanic population numbers in the U.S. stands at 17% of the total population (Koppelman, 2017) and the White-Hispanic gap in the STEM industry has not declined since the enactment of Goals 2000 (Carpi, Ronan, Falconer, & Lent, 2017). This is indicative of the need of a national goal of increased equity in participation in STEM careers for Hispanics, to develop the ability of Hispanics to compete globally, and for economic stability for this sector of the population. Existing literature on STEM, especially among Hispanics in urban populations, speaks to these needs (Mau & Cheng, 2018). The problem is that there is not sufficient literature

connecting Hispanic students' absenteeism to mathematics achievement or to the consequential effects of Hispanic students having a low interest in STEM careers.

Purpose Statement

The purpose of this bivariate correlational study is to determine whether there is a relationship between Hispanic students' absenteeism as the predictive variable and students' mathematics achievement as the criterion variable as measured by the Algebra 1 Florida Standards Assessments given in high school (Florida Department of Education, 2017). Student absenteeism is generally defined as missing instruction on any of the required 180 instructional days, regardless of whether the absence was excused or unexcused per local school board guidelines (Kearney & Graczyk, 2014; Owings et al., 2017; U.S. Department of Education, 2016). Additionally, Hispanic students' aspirations to enter a STEM career field will serve as a predictive variable to Hispanic students' absenteeism as a second criterion variable. Aspiration to enter a STEM career field is generally defined as the willingness to enter a post-secondary program of study with a focus in a STEM field such as biotechnology, cybertechnology, robotics, and automation manufacturing as measured by students who complete the Naviance program Do What You Are (N-DWYA) career survey (Randall, Issacson, & Ciro, 2017).

The study aims at expanding the literature on the issue of absenteeism in the Hispanic community and the effect of reducing the chances of entering into the competitive field of STEM. Additionally, this study shows stakeholders the data regarding the important role Hispanic students play as viable members of the community in Florida and across the U.S. The Hispanic demographic is the largest ethnic minority group in the country. It is extremely important to explore the factor of absenteeism and the relationship to this demographic's

mathematics achievement and their interest to enter the STEM career field (Lauermann et al., 2017; Porter & Snipp, 2018).

Significance of the Study

The problem of absenteeism is considered a condition that affects community stakeholders within a school's locale across the U.S. and other modern industrialized countries (Cabus & De Witte, 2015). It is critically important that students attend school regularly based on the positive correlation between attendance and academic achievement (Sahin, Arseven, & Kilic, 2016). Research also supports that students who are absent 15 days or more are academically impacted to a greater degree than students missing less than 15 days in a school year (U.S. Department of Education, 2016). The literature suggests that Hispanic students have the highest rate of absenteeism nationally and are the demographic group most likely to dropout (Koppelman, 2017; Maynard et al., 2017).

The significance of this study asserts whether Hispanic students' absenteeism can be correlated to low mathematics achievement or low interest in entering STEM career fields (Paschall et al., 2018; Saw & Chang, 2018). As current STEM workers retire and as Hispanics continue growing as a larger demographic group, Hispanics have the potential to succeed in replacing this growing employment sector and secure jobs in this industry (Callahan et al., 2017). Empirical support contends that habitual absenteeism is denying Hispanic students the opportunity to compete for high wage jobs in STEM career clusters (Mau, 2016). As a result of this study, new information is now added to the existing body of knowledge pertinent to school districts with high numbers of enrolled Hispanic students. In turn, school districts have additional research to allow better allocation of resources that bring awareness and career attainment and success to the Hispanic community.

Research Questions

RQ1: Is there a predictive relationship between Hispanic students' high school absenteeism and mathematics achievement?

RQ2: Is there a predictive relationship between Hispanic students' interest to pursue careers in the STEM field and high school absenteeism?

Definitions

1. *Ability belief* - Ability belief is one aspect of the expectancy value theory and refers to what students are able to do, what they presently know, and how their abilities compare to other students (Wigfield & Eccles, 2000).
2. *Absenteeism or Chronic Absenteeism* - Both terms are used to categorize students who miss 15 days of school or more over the course of the school year that is based on a standard 180-school-days academic year or when 25% of days are missed during a two-week period (Kearney & Graczyk, 2014; Owings, Kaplan, Myran, & Doyle, 2017; U.S. Department of Education, 2016).
3. *Average Daily Attendance* - This is a figure that school districts across the U.S. use to determine the percentage of students who are present in school. This calculation, however, does not account or pinpoint students who are engaging in absenteeism (Rafa, 2017).
4. *Compulsory Age* - Students must be over the compulsory age to legally stop attending school; however, this number varies from state to state, where the requirement generally is for students to receive no less than 9 years and up to 13 years of formal schooling (Owings et al., 2017).

5. *Expectancy of success* - This is the other feature of the expectancy value theory regarding the belief students have in themselves to accomplish future tasks and is measured by focusing on only one task such as a new mathematics skill (Wigfield & Eccles, 2000).
6. *Expectancy Value Theory (EVT)* - A behavior theory that is related to Bandura's self-efficacy construct that establishes how 'well' an individual's self-beliefs can predict the level of success a student has to accomplish a subject task (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Wigfield & Eccles, 2000).
7. *Gatekeeper* - This term relates to the effect and fear Algebra courses generate in high school students where this course is a necessary requirement for graduation and for acceptance to and for postsecondary programs (Laughbaum, 2017).
8. *Hispanic or Latino* - These two terms are used interchangeably when referring to people whose ethnic heritage originates in a Spanish-speaking country such as Mexico, Puerto Rico, or Cuba (Blase, 2001). This ethnic minority group is the largest in the U.S. and, according to the Census Bureau, this demographic group is further categorized by race whether White, Hispanic, or non-White Hispanic (Porter & Snipp, 2018).
9. *Multi-Tiered System of Support (MTSS)* - MTSS is a framework that operates in a multi-tiered ladder designed to render support to students once identified and placed in any of the three tiers of support (Lancaster & Hougen, 2017).
10. *Science, Technology, Engineering, and Mathematics (STEM)* - STEM education involves the clustering of careers that encompass science, technology, engineering, and mathematics disciplines to create 21st century innovations to solve problems (Kubat, 2018).

11. *Truancy* - A student who engages in truancy is refusing to attend school after experiencing chronic absenteeism due to emotional trauma that occurred while attending school or some other behaviors affecting teenagers (Chen, Culhane, Metraux, Park, & Venable, 2016). The legal definition must be looked at in a more humane form because it deals with very young people whose lives are in danger of becoming disaster-prone for adulthood. Related literature notes the reasoning and consequences of engaging in school absenteeism, habitual or chronic, and how it may lead to truancy when the student does not want to be at school any longer (Gottfried & Kirksey, 2017).

CHAPTER TWO: LITERATURE REVIEW

Overview

The research literature in this chapter situates this study within the ongoing question of what correlation absenteeism might have with mathematics achievement and on career choice in the STEM industry. The review of the literature first establishes the theoretical and conceptual frameworks along with published research articles that support the need to complete this quantitative study, focusing on the two underlying factors being addressed in this study. The expectancy-value theory (EVT) and Holland's Theory of Vocational Choice are the rooted frameworks for the present study. The researcher is focused on two underlying factors addressed in the literature review. The researcher first tackles the relationship between high school absenteeism experienced by Hispanic students and any effects absenteeism has on mathematics performance in annual assessments (Callahan et al., 2017; Eccles, Vida, & Barber, 2004; Lauermann et al., 2017). The second factor the researcher examines is the impact of Hispanic students' interest to enter STEM occupations and high school absenteeism (Eccles & Wigfield, 2002; Paschall et al., 2018).

Theoretical Framework

The theoretical framework (EVT) based on Eccles et al.'s (1983) research is applicable to students showing a given amount of motivation based on their expectancy to succeed and their beliefs in their abilities to accomplish academic goals (Eccles & Wigfield, 2002). Additionally, Holland's (1959) Theory of Vocational Choice is a second theoretical framework used to make important connections of student-to-career interest. The basis for Holland's theory is the six career typologies that link a career field to an individual's interest normally referred to as RIASEC types (Bakker & Macnab, 2004). Holland's career assessment measures interest toward

an area of work based on the following personality types: realistic, investigative, artistic, social, enterprising, and conventional (Sheldon, Holliday, Titova, & Benson, 2019).

Expectancy-Value Theory

Eccles' model is a modern version of Atkinson's (1957) early work of the expectancy-value theory (EVT) (Lauermann et al., 2017; Schunk, 2016). Atkinson demonstrates that an individual's willingness to perform a task was dependent upon the person's expectancy of accomplishing the task and on the value the person placed upon the obtained result (Schunk, 2016). Atkinson considers expectancy to be "a cognitive anticipation usually aroused by cues in a situation that performance of some act will be followed by a particular consequence" (p. 360). The strength of the probability to attain a goal is represented by the level of expectancy for success before accomplishing the act (Atkinson, 1957). The principle of motivation is represented on a multiplicative formula where motivation = *f* (motive x expectancy x incentive) (Atkinson, 1957). The three variables in the formula are related to Eccles et al. (1983) three-part EVT where individuals' expectancy of success, ability beliefs, and subject task value (STV) were clearly implied from Atkinson's (1957) work.

Expectancy for success. Expectancy for success is the first aspect of Eccles et al. (1983) modern EVT model. The expectancy for success component measures a learner's own beliefs about succeeding or accomplishing a future academic task when the opportunity arises (Wigfield & Eccles, 2000). Bandura (1996) states that the efficacy expectation construct is distinctly based on the outcome expectations rather than a prediction of performance and choice (Bandura, Barbaranelli, Caprara, & Pastorelli). Outcome expectations are subjective estimates of how likely it is that a specific behavior will be followed by particular consequences (Lippke, 2017). Wigfield and Eccles (2000) sustain that expectancy for success is similar to Bandura's efficacy

expectation without attributing the outcome expectancy construct. Therefore, the expectancy for success aspect of EVT determines a student's self-belief to complete an upcoming task successfully in contrast to the ability belief that is a proven indication of a student's current capacity to perform the task (Eccles et al., 1983).

Ability belief. A second aspect of the EVT is an individual's ability belief to perform a task at the present time (Muenks, Wigfield, & Eccles, 2017; Wigfield & Eccles, 2000). Ability belief is rooted in the students' perceptions of their capabilities to accomplish tasks or their abilities to judge how they compare to other students facing similar problems (Wigfield & Eccles, 2000). Ability belief is a critical aspect of the expectancy-value theory (Wigfield & Eccles, 2000). Researchers have different views on how to measure ability belief. One is by the level of specificity measurement of a behavior (Covington, 1992; Deci & Ryan, 1985; Nichols, 1978; Winer, 1985). As part of the EVT, ability belief is directly related to an individual's current abilities to perform a task successfully (Wigfield & Eccles, 2000). Expectancy for success and ability beliefs address an individual's level of confidence and motivation to complete a task whether at the present or in a future time frame. The subjective task value (STV) refers to the weight of the importance individuals place upon a task (Wigfield & Eccles, 2000).

Subjective task value. The third part of the expectancy-value theory is the subjective task value (STV). STV is outlined as a salient part of Eccles et al.'s (1983) framework of task value that is frequently applied in the areas of mathematics, reading, music, and sports (Wigfield & Eccles, 2000). STV refers to the value an individual places upon achievement-related opportunities in areas such as college coursework selection and career occupations (Eccles, 2009). STV is divided into the following four areas: intrinsic value, attainment value, utility

value, and cost as each one affords a level of worth to each task (Eccles, 2009; Eccles & Wigfield, 2002).

Intrinsic value. The intrinsic or interest value refers to the enjoyment that individuals undergo while accomplishing a task or engaging in a behavior (Eccles, 2009). The level of importance students attach to a task over time will build students' competence at performing the task (Eccles, 2009). Essentially, the "skill at this activity will become part of the individual's 'Me' self" (Eccles, 2009, p. 83). The interest or intrinsic motivation in the "Me" self plays an important factor in keeping students engaged in activities (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). Individuals with high-interest value in a task enjoy performing, increase competence, and remain engaged longer in the activity (Eccles, 2009; Jacobs et al., 2002). An individual performing a task based on interest value creates fulfillment and enjoyment that stimulates the attainment value as the individual has developed the ability to perform the task successfully (Eccles, 2009).

Attainment value. Attainment value is an area of the STV that explains the reasoning people engage in a task or behavior. Individuals determine the level of attainment value when the tasks are consistent with their personal image and overall identity (Eccles, 2009; Gottlieb, 2018). Eccles (2009) sustains that a student's identity or image may change over time as the individual grows and matures. Students' collective identities are transformed over the years and new values will influence their educational and career choices (Eccles, 2009). Students choose a career field of study as the goals for that career are aligned with their identities (Gottlieb, 2018). Specifically, the requirements of a task can influence if individuals perceive the task as either an opportunity or a burden related to their personal identities (Eccles, 2009; Gottlieb, 2018). Attainment value is the product of an individual's image that is linked to a task and affects the

individual when deciding on a course of study or selecting career opportunities (Eccles, 2009; Gottlieb, 2018). Individuals selecting mathematics consider the utility and cost values as these aspects of STV play a role in achieving the individual's goals.

Utility value and cost value. Utility value refers to the usefulness of a specified task in relation to the achievability of the task (Eccles, 2009). Students consider this portion of the STV as the useful value of accomplishing a task that impacts a current or future goal such as entering a STEM career field (Caspi et al., 2019). Additional consideration is given to the cost value an individual is willing to invest in the form of effort, time, finances, and emotional energy to engage in a task. Students often find that a prerequisite course is worth the time and investment because the cost value for taking the class ensures success in a future course (Caspi et al., 2019). Utility and cost values are important aspects of the subjective task value portion of the EVT (Eccles, 2009). Interest, attainment, utility, and cost values are the four elements of the subjective task value component of the EVT that contribute to predicting whether individuals will make a decision for a post-secondary program or a career field (Eccles, 2009; Eccles et al., 2004; Updegraff, Eccles, Barber, & O'Brien, 1996).

EVT provides a suitable framework to study predictive factors related to students' mathematics performance that potentially drives away their aspiration to enter STEM careers. This framework is especially important in understanding the low performance of many Hispanic students (Mau & Li, 2018; Saw & Chang, 2018). Studies have shown Hispanic students as the ethnic group that maintains the highest school dropout rate among other races (Kearney & Graczyk, 2014; Owings et al., 2017). Hispanics have trailed White students for three decades in mathematics proficiency scores with a 20%-point gap as measured by the National Center for Education Statistics (Musu-Gillette et al., 2017). This group of the American society is not

building the necessary competence to enter careers in the field of STEM (National Science Foundation, 2019). Hispanic students' mathematics skills deficiencies are linked to the EVT and provide a correlate to students in Hispanic communities whose aspirations to pursue STEM careers are stifled as a result of their low expectancy-values toward mathematics (Lauermann et al., 2017; Safavian & Conley, 2016; Saw & Chang, 2018). EVT was developed and applied to the field of mathematics education by Eccles who claimed that success is based on expectancy and subjective task values (Wigfield & Eccles, 2000). Expectancy-value theory underlines the plausible key predictors of why Hispanic students with low achievement scores in mathematics could be lacking the motivation to pursue careers in the field of STEM.

Expectancy value influences students in selecting their vocational pathways which can be predicted based on the students self-assessing their abilities to succeed (Eccles, 2009). Students develop a self-perception of the importance of increasing or decreasing their involvement in various tasks (Eccles, 2009). Therefore, a student's outlook for the future can be directly influenced by what is known as causal attribution (Eccles, 2009). Causal attribution is a believed notion of failures that students bring upon themselves as they perceive their inabilities to achieve given tasks. This causal attribution originates from a student's interactions with family, peers, or teachers (Rudolph & Reisenzein, 2008). Hispanic students' poor performances in mathematics may be the effect of causal attribution as a derivative of expectancy-value or may be a lack of willingness to accomplish a task for which the student finds no value (Safavian & Conley, 2016). High school students face the challenge of making post-secondary plans for careers. They especially have a difficult time deciding on career options when they are struggling in mathematics courses throughout high school (Lauermann, Tsai, & Eccles, 2017). Saw and Chang (2018) assert how Hispanic students' low expectations for success in mathematics

negatively influences their decisions to select STEM careers when completing a career interest survey (Saw & Chang, 2018).

Students who engage in absenteeism have poor academic achievement in mathematics as a consequence of the amount of missed instruction (Paschall et al., 2018). Hispanic students with high absenteeism tend to have low expectations of success in any mathematics-related STEM career (Gottfried, 2019; Lauermann et al., 2017). According to the literature, a large proportion of Hispanic students choose to enter into different career fields not associated with strong mathematics skills (Lauermann et al., 2017). In the contemporary EVT version of Eccles' theory, "choices are assumed to be influenced by both negative and positive task characteristics, and all choices are assumed to have costs associated with them" (Eccles & Wigfield, 2002, p. 118). Therefore, individuals who experienced a level of success or failure have the option to move beyond some of the tasks related to the negative characteristics (Eccles & Wigfield, 2002). Eccles et al.'s EVT (1983) framework influences career choices based on a student's perceived expectancy to succeed. Holland's Theory of Vocational Choice provides students with characteristics and traits that unpack their interest in career clusters.

Theory of Vocational Choice

Holland's (1959) theoretical framework is based on the classification of personality types and environmental organizations. Holland suggests that "the person is the product of the interaction of his particular heredity with a variety of cultural and personal forces including peers, parents and significant adults, his social class, American culture, and the physical environment" (Holland, 1959, p. 35).

Individuals searching to make a career choice consider the occupational environment, personal development, and personal interactions within the vocational environment (Holland,

1959). The occupational environment is the actual categorization used by Holland in the RIASEC model. Holland found that differentiation of the occupational environment makes career selection a simpler process (Holland, 1959). Personal development is also simplified when individuals make job selections realizing the occupation is aligned with their intelligence level (Holland, 1959). This also brings fulfillment and more satisfaction to their personal lifestyle (Holland, 1959). Personal interaction of an individual with the environment involves a function where the personal strengths, interests, and lifestyle are aligned with the career (Neukrug, Sparkman, & Moe, 2017). These areas are factored into an aptitude assessment that generates Holland's code report (Sheldon et al., 2019). Holland grouped various careers and aligned them with a specific personality type framework (Holland, 1959; Hogan & Blake, 1999).

The Theory of Vocational Choice is comprised of six personality types that make up the acronym RIASEC: realistic, investigative, artistic, social, enterprising, and conventional (Bakker & Macnab, 2004; Campbell & Holland, 1972; Neukrug, Sparkman, & Moe, 2017). Drawing from his clinical experience working as a vocational counselor, Holland developed the personality types (Campbell & Holland, 1972). The RIASEC scale measures interest while labeling the individual by the six personality types. Holland's RIASEC scale is represented in the shape of a hexagon. An individual is assigned a code consisting of one to three letters of the scale corresponding to the type of personality and the work environment best suited to their interests (Bakker & Macnab, 2004). Holland's (1959) description of each of the six personality types within RIASEC is explained as a code that identifies a plausible occupation of interest for students completing the career interest profiler based on their answer choices.

Realistic. Realistic students seek employment that involves hands-on and physical activities such as work that requires building things. Additionally, individuals with realistic

characteristics are considered doers. This personality type is increasingly practical as well as self-reliant; therefore, people classified as realistic will avoid careers where social interactions are necessary. Individuals with this personality type "avoid situations which require verbal and interpersonal skill, because they lack such skills and are often threatened by close relationships with others" (Holland, 1957, p. 36). People with a realistic personality type consider themselves aggressive and deficient of sensitivity (Holland, 1957). Careers that realistic students may be most suited for include construction, mechanical equipment operators, and farming (Bakker & Macnab, 2004).

Investigative. Students who fall under this personality type are referred to as thinkers as they look to answer why things happen and how things work. They solve problems in an analytical fashion making sense of data and coming up with a conclusive theory or principle. They prefer to work alone to avoid missing information while sorting their thoughts. The investigative personality type is characterized as an individual who does not enjoy leading, selling, or persuading others (Bakker & Macnab, 2004). Career interests for students in this group involve mathematics, science, research, computing, and comprehending the world (Bakker & Macnab, 2004). The investigative or thinker personality type is associated with students who show interest in the STEM career field (Sheldon et al., 2019).

Artistic. Students identified with the artistic type are individuals who express their feelings through the arts (Bakker & Macnab, 2004). People in this personality type "prefer dealing with environmental problems through self-expression in artistic media" (Holland, 1957, p. 37). They have a gift for creation and imagination while creating a product. Students in the artistic category include musicians, painters, and graphic artists (Bakker & Macnab, 2004). As an artist, individuals in this personality type are more interested in the cultural aesthetic than the

sciences (Bakker & Macnab, 2004). Although musicians engage in repetitive tasks while rehearsing, people in this category do not enjoy repeating the same tasks over time without variety and certainly do not appreciate working with numbers (Bakker & Macnab, 2004; Hogan & Bake, 1999).

Social. The social trait aligns with people who are known as helpers and who are found in careers that support people such as nursing, counseling, and teaching. Individuals in this group "are concerned about human welfare and are excited by work that allows them to overcome interpersonal problems and mediate disputes" (Bakker & Macnab, 2004, p. 8). People with social personalities are drawn to socialization in a safe environment (Bakker & Macnab, 2004). This personality type is characterized by the dislike of working with data, machinery, or things as people in this category are driven by interpersonal relationships (Bai & Liao, 2018).

Enterprising. The enterprising attribute defines people in the trade industry from real estate broker to car salesman. Unlike individuals with strong social-type characteristics, people in the enterprising personality category use their strong verbal network skills to influence deals (Sheldon et al., 2019). Students categorized with the enterprising personality type share persuasive qualities similar to politicians and business owners (Bakker & Macnab, 2004; Holland, 1959). People identified with the enterprising personality type show interest in data analysis and performing calculations to help them make decisions and relate to people working in STEM careers (Bakker & Macnab, 2004). People in this personality type have a preference to work directly with people over working with data interpretation and calculations (Bakker & Macnab, 2004).

Conventional. The conventional personality type describes individuals who can also be characterized as organizers as they follow workplace policies and regulations (Bakker &

Macnab, 2004). People identified as conventional are highly methodical and efficient when working on a project (Bakker & Macnab, 2014). Their career choices include business administration, executive secretaries, accountants, and database managers (Bakker & Macnab, 2004). This group of individuals also enjoys working with data and numbers to generate reports that keep the organization working smoothly (Campbell & Holland, 1972). People in this personality type have problems working in an unorganized environment (Bakker & Macnab, 2004).

EVT and the Theory of Vocational Choice establish a strong framework to develop predictability between absenteeism, mathematical achievement, and interest in careers in the STEM field. The related literature provides support and guidance for the present study. The related literature explores the reasoning and consequences of engaging in school absenteeism, habitual or chronic, and how absenteeism may lead to truancy (Gottfried & Kirksey, 2017; Smerillo et al., 2018). The National Science Board (2016) express concerns about how the Hispanic population of young adults may miss opportunities to work in STEM careers. The literature review explains and narrows the focus for examining the predictability of Hispanic students' absenteeism to their test scores in mathematics and their interest to pursue careers in the field of STEM (Lancaster & Hougen, 2017; Saw & Chang, 2018; Vaughn et al., 2013).

Related Literature

In an age of technological advances, the United States needs to maintain a strong workforce in the field of international business to remain at the leading edge in global economies (Andersson, Dasi, Mudambi, & Pedersen, 2018). Businesses in the fields of science, technology, engineering, and mathematics play a vital role in continued innovation and world market competitiveness (Khatri et al., 2017). Labor projections in the fields of STEM will exceed

current market needs and will be outpaced as more job opportunities in the economy become available (Jackson & Rudin, 2019). The U.S. has a growing responsibility to maintain a well-trained STEM workforce to support the nation's global prosperity as the country's demographic makeup changes (Falco, 2017; Jackson & Rudin, 2019).

Hispanic communities are exponentially growing across the United States; however, this ethnic group is underrepresented in the STEM industry (Callahan et al., 2017; National Science Foundation, 2019). Over the last 20 years, data from the National Center for Science and Engineering Statistics show that Hispanic students have increased the number of graduates in STEM programs. The White-Hispanic gap in STEM jobs is very large at 60% even with the number of Hispanic students entering and graduating in STEM programs (National Science Foundation, 2019). Hispanics continue to grow as a strong ethnic contributor in the areas of business, politics, and education in the United States (Koopmans, 2017). However, studies have shown there is a challenge in getting the Hispanic population to become a stronger part of the 21st century STEM workforce which might be influenced by their lack of interest in STEM post-secondary programs (Lauermann et al., 2017; Ozkan, 2017; Safavian & Conley, 2016). The literature has yet to determine whether there is a correlation between absenteeism and mathematics skills among Hispanic students as a contributing factor to Hispanics' underrepresentation in the field of STEM.

Previously, Hispanic students' low mathematics achievement was the subject of a study that aimed to define Hispanic students' perceptions toward mathematics. Safavian and Conley (2016) conducted a study with the purpose to replicate Eccles et al. (1983) expectancy-value belief construct and student achievement levels in mathematics. The variables analyzed included expectancy for success, subjective task values (interest, utility, attainment, and cost), and

achievement in mathematics (Safavian & Conley, 2016). The research sample came from a National Science Foundation program that researched mathematics and science motivation where $N = 926$ seventh graders represented by Hispanics (76%), Vietnamese (13%), and White (6%) students (Safavian & Conley, 2016). A four-factor correlation model was used for data analysis. The researchers found that "Hispanic youth had lower scores in the sixth and seventh grades when compared to their non-Hispanic peers. They also reported significantly lower expectancy beliefs, interest, and attainment values" (Safavian & Conley, 2016, p. 6). The data showed a correlation for expectancy for success, STV, and achievement with moderate to strong correlate among expectancy for success with interest, utility, and attainment that ranged from $r = .44$ -.67, with $p < .001$ (Safavian & Conley, 2016). Other statistical analyses employed in the study included: *t*-test, hierarchical multiple regressions, ordinary least squares regressions, modeled regression, and logistic regressions (Safavian & Conley; Warner, 2013). Although Safavian and Conley (2016) addressed the association of EVT, STV, and achievement in mathematics, they suggested studying additional factors to compare a Hispanic sample size closer in number to a White sample size.

Deficiencies in mathematics skills are a problem for many students, but are more prevalent in the Hispanic community (Romero & Lee, 2017). Findings of the *A Nation at Risk* report demonstrate how mathematics scores dropped 40 points in the Scholastic Aptitude Test (SAT) between 1963 and 1980 (Laughbaum, 2017). The focus of education reform has been to improve mathematics and science skills in order to provide adequate preparation for students entering the STEM career fields (Romero & Lee, 2017). Ironically, as mathematics education increased in rigor and accountability measures were placed upon the country's Departments of Education, Hispanic students' positive expectancy values toward mathematics dropped (Romero

& Lee, 2017). An in-depth analysis of academic achievement levels show how high school mathematics coursework has turned into a gatekeeper for Hispanic students if they are to graduate (Laughbaum, 2017). Studies show Hispanic students as having the highest dropout rate as compared to other demographics (Musu-Gillette et al., 2017; Rogers et al., 2017; Romero & Lee, 2017). Graduation could greatly depend on students' willingness to attend school regularly and to embrace the learning process afforded by the schools (Gottfried, 2018).

Mathematics as a Gatekeeper

Mathematics courses are referred to as gatekeeper courses because of the high number of students repeating high school algebra curriculum in the college setting (Douglas & Attewell, 2017; Laughbaum, 2017). The term gatekeeper can be taken literally as prestigious universities use mathematics standardized scores to control admittance into the university (Douglas & Attewell, 2017). In addition to the use of standardized scores, university admissions officers will examine high school transcripts searching for the highest-level mathematics course taken (Douglas & Attewell, 2017). Historically, mathematics coursework is the subject area wherein most students struggle in the K – 12 educational system (Laughbaum, 2017). According to the American College Test (ACT), in the United States 59% of high school graduates in 2016 did not meet mathematics college readiness (ACT, 2016; Laughbaum, 2017). Furthermore, the lack of mathematics college readiness justified increasing the number of remediation courses in colleges by 22% (Laughbaum, 2017).

Data from a longitudinal educational study provided Douglas and Attewell (2017) a sample size of 15,000 participants who were followed for 10 years. The outcome from the study supports the need for gatekeeper courses that help determine program admittance in post-secondary institutions (Douglas & Attewell, 2017). Moreover, the study finds that Hispanic

students "with higher standardized math performance are not as likely as their white counterparts to attend a four-year college" (Douglas & Attewell, 2017, p. 660). Douglas and Attewell's study assert that Hispanic students with high standardized scores are likely to attend a two-year college (2017). Even when students enter a mathematics-based program, only 50% to 55% of those students intending to complete a STEM program earn a STEM degree (Clarkson, Ntow, Chidthachack, & Crotty, 2017). Some student populations, such as Hispanic students, who are historically underrepresented in STEM are still being hindered from participating in STEM career opportunities due to challenges in the gatekeeper course method of student prerequisites for admission (Douglas & Attewell, 2017). Another issue compounding the problem for Hispanic students and further keeping them from pursuing STEM-related careers is the difficulty of Common Core State Standards for Mathematics (CCSSM) (Dossey et al., 2016).

Common Core State Standards of Mathematics. The level of complexity in mathematics instruction increased with the adoption of Common Core State Standards for Mathematics in 2009 (Dossey et al., 2016). The CCSSM places an emphasis on college and career readiness necessary for American students to be able to compete in the global economy (Dossey et al., 2016). Mathematics coursework is associated with STEM careers and students need to dominate algebraic skills in order to pursue careers in the STEM fields (Laughbaum, 2017). The increase of rigor in mathematics standards imposes a barrier for Hispanic students to overcome while trying to meet all high school graduation requirements (Laughbaum, 2017). Most school districts mandate students complete three or four credits in mathematics as a requirement for receipt of a high school diploma. The courses required for credit include Algebra 1 and 2, Geometry, and an additional equally demanding course as established by the

Department of Education (Education Commission of the States, 2019; Rodriguez, 2018; Zinth, 2012).

Algebra as a requirement for high school graduation has increasingly become an unattainable goal for many Hispanic students (Paschall et al., 2018). Students of low socioeconomic status and minorities are the students most affected by the algebra requirement as they do not have home structures, discipline, or role models who can facilitate strategies to overcome their lack of mathematical skills (Paschall et al., 2018). Mathematics skills are the top reason schools hold back students from graduating from high school (Glennie et al., 2016). Additionally, students struggle to get passing grades in mathematics and to obtain proficiency scores in standardized exams such as the Algebra 1 Florida Standards Assessment (FSA) (Florida Department of Education, 2019; Glennie et al., 2016; Hacker, 2012). Kotok (2017) and Woods et al. (2018) suggest that Hispanic students entering the 9th grade will not have mastery of mathematics skills to substantiate placement in higher-level mathematics courses throughout high school. With such a mathematics skills deficit, Hispanic students' chances of taking higher-level mathematics courses and being prepared for more rigorous coursework in a post-secondary institution are lessened (Kotok, 2017; Paschall et al., 2018; Woods et al., 2018).

A large population of Hispanic students have not exhibited high interest or attainment value toward mathematics (Saw & Chang, 2018). The initial goal of a cross-lagged panel design was to determine "whether and to what extent mathematics achievement and motivational factors for Hispanics differ from other racial/ethnic groups" (Saw & Chang, 2018, p. 245). The researchers analyzed the interrelationship of the following variables: mathematics achievement, expectancy for success, and subjective task value measured in the 9th and 11th grades. The analyses included a three-parameter logistic model with valid Cronbach's alpha scores ranging

from 0.88 to 0.90 that compared standardized test achievement levels. Additionally, a confirmatory factor analysis (CFA) with valid Cronbach's alpha scores ranging from 0.71 to .073 was utilized to measure mathematics interest, mathematics utility, and mathematics identity. The data sample was obtained from a 2009 high school longitudinal study from the National Center for Education (Saw & Chang, 2018). Saw and Chang (2018) determined that Hispanic students had a lower level of expectation to be successful in mathematics courses when compared to White students. This study also reported that Hispanics' self-efficacy for mathematics was the lowest among other ethnic groups (Saw & Chang, 2018). The job market has grown in complexity especially in the STEM career field that requires a strong conceptual understanding of mathematics skills to find advancement (Saw & Chang, 2018; Wood & Neal, 2007). Strong mathematics skills are critical for Hispanic students aspiring to enter careers in STEM.

The coursework in mathematics empowers Hispanic students who aspire to be successful in a STEM program. These students must be able to complete pre-calculus or calculus courses at the regular or advanced placement level so that they can be on a pathway for careers in the STEM field (Hinojosa, Rapaport, Jaciw, LiCalsi, & Zacamy, 2016). Park et al. (2018) report that students well prepared with high-level mathematics courses in high school predicted a passing rate of 47% in college Intermediate Algebra (Park et al., 2018). Research suggests that Hispanic students need to take advantage of high-level mathematics courses offered at the high school to overcome their low expectancy for success in mathematics and to better prepare for post-secondary education (Hinojosa et al., 2016; Safavian & Conley, 2016). Unfortunately, Hispanic students tend to steer away from these courses due to their poor mathematics skill levels that create a mindset of low expectations to succeed (Lauermann et al., 2017). Research outcomes empirically link the level of expectancy-value belief toward mathematics directly to career plans

students select in their early high school years (Chang & Saw, 2018; Douglas & Attewell, 2017; Safavian & Conley, 2016).

The National Science Foundation (2016) statistics report a 3.8% unemployment rate in the STEM industry compared to 4.3% for non-STEM jobs and the national unemployment rate of 8.1%. However, only a collective 27% of all minority groups are represented in the STEM's labor market in the U.S. (National Science Foundation, 2016). Mathematics skills proficiency must increase within the Hispanic community to see greater representation in the STEM industry (Rincon, 2017). After 15 years since the NCLB authorization, school systems have not been able to close the White-Hispanic student achievement gap in mathematics across the nation (Kotok, 2017; Musu-Gillette et al., 2017; National Science Foundation, 2019). Addressing the problem of mathematics deficiency is critical in order to enable Hispanic students to be better suited for success and more competitive in the STEM job market in the national or global economies (Lauermann et al., 2017). Secondary schools and post-secondary institutions acknowledgment of the barrier that mathematics imposes upon Hispanic students is a key step in defining and correcting the factors contributing to their low performance in mathematics.

Factors Affecting Hispanic Student Mathematics Achievement

In the United States, factors associated with academic achievement inequalities include racial/ethnic demographic, gender, and socioeconomic status (Bécares & Priest, 2015). These factors remain unfamiliar territory for researchers who endeavor to pinpoint predictive characteristics that affect Hispanic students' mathematics achievement (Bécares & Priest, 2015). However, two factors associated to poor mathematics performance include students' self-confidence towards mathematics and students' absenteeism. Without even considering that mathematics skills can be considered a barrier or gatekeeper course for many students,

Laughbaum (2017) suggests that Hispanic students are greatly affected and struggle with reaching the milestone of high school graduation.

Other factors also influence Hispanic students' mathematics achievement. Teachers in primary and secondary education have a responsibility to build content knowledge and to ensure that learning is happening at high levels measured by formative and summative assessments (Buffum, Mattos, & Malone, 2018). The annual state exam is the method states use to gather information pertaining to the level of achievement attained by individual students and how teachers have impacted the growth in knowledge for the year (Buffum et al., 2018).

As mathematics teachers prepare to influence student learning, they must consider how to equip students with the skills and concepts they will need to function in a multifaceted world economy. Furthermore, educational institutions must be able to deliver information and provide appropriate adaptations to link learning strategies to purposeful skills students will find in a workforce that continually changes (Tan, 2015). Analysis of current data has shown the number of Hispanic students who are interested in following STEM careers versus the number of them who are not interested in following STEM careers is based on their mathematics skills (Saw & Chang, 2018). School principals must establish a culture of high academic success to ensure that the entire school community embraces and fosters excellence while experiencing academic success. This culture must include the way teachers collaborate and build their capacity to meet the needs of a community that is underrepresented in the field of STEM as a result of low mathematics skills (Callahan et al., 2017). Students' responses to the high expectation culture yielded great academic achievement even when some students experienced failures which shows both teacher ability to meet the mathematics needs of Hispanic students and student self-

confidence can contribute to Hispanic students' success, or lack thereof (Espinoza-Herold & González-Carriedo, 2017).

Student self-confidence. Researchers indicate that Hispanic students were reluctant to engage in mathematical courses due to their low expectancy of success (Eccles, 2009; Saw & Chang, 2018). Cleary and Kitsantas (2017) refer to self-confidence, self-efficacy, and expectancy-value to succeed interchangeably when addressing how these factors support students' mathematical outcomes. Students with a high self-concept to succeed is a predicting factor to improved outcomes in mathematics. Clarkson, Love, and Ntow (2017) suggest that a positive correlation exists between students' self-confidence and mathematics achievement based on the individual's self-perception to accomplish the tasks. The purpose of the Clarkson et al., (2017) study was to "find a relationship between students' levels of proficiency and how they describe themselves in terms of confidence doing mathematics" (p. 441). The study used multiple regression analyses with sample data from a Trends in Mathematics and Science Study (TIMSS) consisting of 7,377 eighth graders from 239 schools throughout the United States (Clarkson et al., 2017). The study revealed that the level of confidence as a predictor of mathematics achievement, $F(1, 75) = 121.16$, $p < .001$ was statistically significant (Clarkson et al., 2017). The results for patterns of students' confidence as a predictor of mathematics achievement, $F(1,75) = l41.08$, $p < .001$ was also significant. Students' confidence is an intrinsic factor that can determine their expectations of success or how they will achieve proficiency when attempting to solve mathematical problems (Eccles, 2009; Foster, 2016; Lauermann et al., 2017; Saw & Chang, 2018). Furthermore, empirical evidence directly supports that students with a strong self-efficacy showed that to be a significant predictor of mathematics outcome (Cleary & Kitsantas, 2017; Wang & Eccles, 2013). Mathematics ability and competence are two predicting

aspects of students' academic success in mathematics, yet student self-confidence and self-concept must also be considered when researching and defining correlated relationships for mathematics success.

Student self-concept. Students' self-concept of ability towards mathematics is associated to mathematics achievement (Denner, Valdes, Dickson, & Laursen, 2019). Self-concept refers to students' self-assessments of their abilities to complete a task. Therefore, "if a student feels competent in an academic domain, this sense of ability might enhance his or her self-concept" (Susperreguy, Davis-Kean, Duckworth, & Chen, 2018, p.2197). Students who receive positive feedback from teachers or peers are likely to succeed in mathematics classes as academic praise builds up their self-concept toward mathematics (Susperreguy et al., 2018). Susperreguy et al. (2018) also assert that an individual who gets positive feedback will be encouraged to seek out more challenging tasks and increasingly demanding problems. Susperreguy et al. (2018) used three data sets from Avon Longitudinal Study of Parents and Children (ALSPAC), the National Institute of Child Health and Human Development-Study of Early Child Care and Youth Development (NICHD-SECCYD), and the Panel Study of Income Dynamics-Child Development Supplement (PSID-CDS). The purpose of the study was to determine whether a relationship exists between self-concept and academic achievement from students with different achievement levels using each data set (Susperreguy et al., 2018). The variables of the study measured the level of self-concept of ability and the level of academic achievement in mathematics. The sample size was 13,901 students between 9 and 17 years of age with data obtained in elementary, middle, and high school. The instrument used in the mathematics study included an adaptation from a mathematics Scale Self-Description Questionnaire validated with a Cronbach's alpha of .80 for the ALSPAC data set. Data analyses

were conducted using linear and quantile regression to determine the relationship between self-concept and academic achievement over time (Susperreguy et al., 2018).

The analyses conducted in the Susperreguy et al. (2018) study reveals positive relationships between the students' self-concepts of ability in mathematics and their mathematics achievement levels. The linear regression analyses show a moderate positive prediction for the elementary age students and a high positive prediction for high school age students with an effect size ranging between .22 for the PSID-CDS and .48 for the ALSPAC data sets (Susperreguy et al., 2018). The quantile regression data reveals a strong relationship between self-concept of ability in mathematics and mathematics achievements (Susperreguy et al., 2018). The linear and quantile regressions analyses provide robust outcomes to support the relationship between self-concept of ability in mathematics and mathematics achievements (Susperreguy et al., 2018). Susperreguy et al.'s findings on the factor of students' self-concept of ability in mathematics positively predict mathematics performance (2018). In addition to Susperreguy and colleagues' work, Denner et al. (2019) add that Hispanic students' low self-concept is a contributor to their low performance in mathematics. Hispanics' self-concept of ability in mathematics must be further explored to determine whether an association exists with their low performance in mathematics. Another potential factor that influences mathematics achievement within the Hispanic community is school absenteeism.

Student absenteeism. Student high school absenteeism is a negative behavior that tremendously affects Hispanic students (Smerillo et al., 2018). Studies show an association of school absenteeism with poor academic achievement specifically in mathematics (Gottfried, 2014; 2017; 2019; Gottfried & Kirksey, 2017). However, gaps exist in the body of research related to the predictability of absenteeism of Hispanic students and their low academic

achievement in standardized testing (London et al., 2016; Romero & Lee, 2017). Research studies suggest that absenteeism is a national problem and affects many industrialized countries around the globe (Cabus & De Witte, 2015; Maynard et al., 2017; Rafa, 2017). Empirically supported research indicates that school attendance is a predictor of students' reading and mathematics levels of achievement (Gottfried, 2019). However, not much of the existing research examines how Hispanic students' absenteeism affects their performance in mathematics or influences their interest in STEM careers (Gottfried, 2010; 2014; 2019; Safavian & Conley, 2016; Saw & Cheng, 2018). Gottfried (2010; 2014; 2019) suggests that consistent school attendance can be an indicator of the level of academic performance that students attain throughout the school year and reduce the potential of facing grade-level retention. Absenteeism is a known contributor to the White-Hispanic mathematics achievement gap, especially in urban schools located in low income or high poverty communities (Gottfried, 2010; 2019; Owings et al., 2017). The effects of the lack of attendance are associated with low academic achievement in reading and mathematics attributed to Hispanic students (Green et al., 2012; Rogers et al., 2017; Romero & Lee, 2017). Koopmans (2017) asserts that reading skills may be a remediable skill upon the students' return to school. However, students who do not learn mathematics concepts and skills properly show frustration as a result of the learning gaps (Smerillo et al., 2018).

Hispanic students are discouraged from their lack of learning gains shown in classroom academic achievement data and on annual mathematics assessments (Green et al., 2012). These students have high levels of academic frustration to the point that they are not motivated to attend school (Rafa, 2017). Consequently, Hispanic communities must deal with low social-economic problems continually exacerbated by obtaining low-paying jobs or experiencing

unemployment for not obtaining a high school diploma in four years or before 21 years of age (Smerillo et al., 2018). The continual decline in academic achievement and the rise in absenteeism of Hispanic students is creating a critical setback in their community as students in this constant struggle end up as truants (Mallet, 2016; United States Department of Education, 2016).

In response to absenteeism in Florida schools, the daily task of taking attendance in classrooms has become one of the most important teacher responsibilities before instruction takes place (Koopmans, 2017; Watson & Hemmer, 2015). Accurate average daily attendance (ADA) reporting is a strong indicator that connects student attendance to academic achievement (Gottfried, 2019; Rafa, 2017). The national education legislation, Every Student Succeeds Acts (ESSA), was signed by President Obama in 2015 as the reauthorization of the Elementary and Secondary Education Act (Every Student Succeeds Act, 2017). ESSA mandated the implementation of strategies to address absenteeism as part of the yearly accountability system to be included in a school's improvement plan (Rafa, 2017). The early warning system (EWS) functions as "a system based on student data to identify students who exhibit behavior or academic performance that puts them at risk of dropping out of school" (Rafa, 2017, p. 4). The data collected through the EWS are analyzed, monitored, and used by school-based Multi-Tiered Systems of Support (MTSS) teams to allocate resources that tackle absenteeism and academic deficiencies (Lancaster & Hougen, 2017; Rafa, 2017).

School absenteeism is associated with poor academic performance and may predict high school dropouts (Gottfried, 2019). Students involved in absenteeism are more likely to become high school dropouts and engage in risky behaviors such as delinquency, substance abuse, and early pregnancy (Kearney & Graczyk, 2014; London et al., 2016).

Hispanics in STEM Careers

Hispanic students are not aspiring to enter STEM-related career fields even with the opportunities afforded by an industry of wages above national average and workforce shortages (Fayer, Lacey, & Watson, 2017; Mau & Li, 2017). The United States Bureau of Labor Statistics report that the national average income in STEM jobs was over $80,000 and the employment demands are projected to increase 13% by 2022 (Fayer et al., 2017; Segovia, 2019). A close comparison to these numbers has industry experts concerned as they believe the number of jobs projected will not be filled due to a shortage in labor force (Mau, 2018). Therefore, STEM jobs are instrumental for economic development of the Hispanic community and providing access to high-wage careers (Hinojosa et al., 2016). An increase in the number of Hispanic students pursuing math and science programs in post-secondary institutions directly impact the United States university ranking in terms of STEM producing degrees among countries that compete for this global market (Dossey et al., 2016). Universities in the U.S. are generating 12% of degrees compared to China's 23% of all engineering careers among industrialized nations (National Science Board, 2016).

The National Science Board (2016) reviewed existing studies with the goal of determining which indicators are associated with Hispanics underrepresentation in STEM careers. The body of research expresses ideas to understand why Hispanics have fallen behind in career fields where strong mathematics skills are necessary (Lauermann et al., 2017; Porter & Snipp, 2018). C These factors are considered to be contributing influences to Hispanics' lack of aspiration to enter the STEM field.

A plethora of studies that connect students' absenteeism to low performance in mathematics exists; consequently, the evidence supports that absenteeism detracts one from

developing strong mathematics skills (Mallet, 2016; Musu-Gillette et al., 2017; Rafa, 2017; United States Department of Education, 2016). A secondary association was shown in prior studies: Hispanic students' low expectancy-value to succeed in acquiring strong mathematical skills steers them away from entering STEM careers. As students are absent from classrooms in America, reading comprehension and mathematics achievement levels continue to fall across the nation's schools making it difficult to close the achievement gap that continues to challenge the education system (Kearney & Graczyk, 2014). Mathematics is the subject area most affected by absenteeism and missing instructional time is unrecoverable (Coelho, Fischer, McKnight, Matteson, & Schwartz, 2015).

Mathematics courses build confidence and provide pathways for students to enter STEM careers; however, "the underrepresentation of Hispanic people in the STEM workforce may be explained in part by differences in the STEM knowledge, skills, and motivation that are instilled into Hispanic students in grades K–12" (Hinojosa et al., 2016, p. 1). The United States Department of Education and the Department of Labor Statistics connect Hispanic students' low expectancy-value to their low level of mathematics performance. Furthermore, Hispanic students' low expectancy-value may be associated with their underrepresentation in the STEM career field (Eccles, 2009; National Science Board, 2016; Saw & Chang, 2018). The competitive edge for the 21st century lies in the nation's capacity to lead the global economy in the areas of science and technology innovation and to invest in the education sector that can generate a workforce capable of filling STEM career jobs (Andersson et al., 2018).

Mathematics subject areas will continue to be an access point into STEM career fields for secondary and postsecondary students so that they may fill jobs as qualified college graduates across all demographics (Ozkan, 2017). A study conducted by the United States Department of

Education provides robust evidence that students with successful completion of mathematics courses in high school will have greater aspirations to pursue STEM careers (Borman et al., 2017). In the case of Hispanic youths who aspire to pursue a career in the field of mathematics or science, low performance in those subject areas is a discouraging factor preventing them to turning those aspirations into real, attainable goals (Riegle-Crumb, Moore, & Ramos-Wada, 2010). Nonetheless, academic performance in mathematics and science as access points into the field of STEM are strong predictors of students' aspiration for STEM careers (Borman et al., 2017; Saw & Chang, 2018).

In search for answers to Hispanic students' low mathematics achievement levels, Safavian and Conley (2016) point toward the disparity that exists among different races in expectancy values (E-V) as related to mathematics in primary and secondary schools. E-V are "expectancies and values that are assumed to be influenced by task-specific beliefs such as ability beliefs, the perceived difficulty of different tasks, and individuals' goals, self-schema, and affective memories" (Wigfield & Eccles, 2000, p. 69). Hispanic high school students are shown to have a lower E-V toward mathematics when compared to White students, thus, correlating to the low achievement levels in mathematics which contributes to the math achievement gap (Saw & Chang, 2018). In addition to E-V, the subject task value plays an important role in whether Hispanic students perceived value of mathematics as worthy of their willingness to complete a task (Safavian & Conley, 2016).

Students pursuing STEM careers score higher on standardized testing than non-STEM pursing students. Mau & Li (2018) find that students who are interested in STEM careers have significantly higher annual assessments scores and better academic achievement in advanced mathematics and science courses than students who are not interested in the STEM career field.

In the study, the following factors are found to be supporting and positive predictors of which students aspire to enter a STEM career: mathematics self-efficacy, mathematics interests, school engagement, gender familial background, and educational aspirations (Mau & Li, 2018). Students who complete a college degree in a STEM career field score higher in standardized annual assessments as they are influenced to persist working toward accomplishing the degree (Mau & Li, 2018). Among the STEM degree completers, the data reveal that Hispanics only represent 6% of STEM workers in the industry (Segovia, 2019).

Hispanic students' representation in the field of STEM careers is critically low and the literature provides evidence of the prevalence of this 21st-century problem (Kubat, 2018; United State Department of Education, 2016). These studies explore themes that point at possible relationships regarding the lack of Hispanic students' representation in STEM careers and their poor mathematics skills. Studies also indicate that poor attendance leads to low motivation to succeed in math and science courses throughout the K-12 education system. Increasing school attendance improves the chances of Hispanic students participating in rigorous mathematical coursework. As more Hispanic students succeed in advanced mathematics courses, more Hispanic students are on a pathway to STEM post-secondary programs and careers (Hinojosa et al., 2016). The existing research gaps and limitations do not address how Hispanic students' high school absenteeism can potentially predict mathematics achievement or interest in STEM careers and this possible correlation will need to be considered with subsequent research. The present study proposes to answer the following research questions: Is there a predictive relationship between Hispanic students' absenteeism and mathematics achievement? Is there a predictive relationship between Hispanic students' absenteeism and their interest in STEM careers?

Summary

The body of literature within this review conveys ample evidence to support the claim that Hispanic students' absenteeism is extremely high. A large portion of Hispanic students affected by absenteeism find difficulty to excel in mathematics courses that build their skills to enter careers in the field of STEM. Evidence in the literature suggests a negative impact of absenteeism on academic performance in mathematics. Hispanic students are identified as a demographic group frequently engaged in chronic absenteeism. Their academic achievement suffers to the point that many decide to drop out of school. Hispanic students that remain in school are underrepresented in STEM career clusters. They are more reluctant to enter STEM programs in their post-secondary pathways due to a low expectancy to succeed in mathematics foundational coursework.

In Eccles et al.'s (1983) synthesis of expectancy-value theory, the authors postulate the importance of an individuals' expectation to succeed and their ability belief to accomplish a task specifically in mathematics. This motivational framework is applicable to this study as Hispanic students are not building strong mathematical skills to enable them to build an ability belief that gives them the confidence to pursue careers that are fundamentally based on mathematics. Deficits in math competencies are recognized in Hispanic students' who engaged in habitual school absenteeism. This problem has caught the attention of leaders at state-level Departments of Education as well as school district superintendents. The lack of school attendance coupled with low expectation to succeed is resulting in Hispanic students having low aspirations toward STEM careers.

This salient problem also draws from Holland's vocational choice theory that uses a coding method to pinpoint students career aspirations predicated on an individual's personality

type. Students typically entering the STEM career field have traits associated with investigative or thinker interests. Hispanic students who are chronically absent from mathematics courses have a more difficult time acquiring these problem-solving competencies necessary to be successful in the STEM industry.

The related literature provides a wide-lens view of how mathematics skills are foundational in American education and a main precursor to technology and innovation. *A Nation at Risk* (1983) delivered a blow to the United States education system chiefly in the area of mathematics. In the views that *A Nation at Risk* presents, legislators have made it their mission to ensure that mathematics education is addressed through legislative initiatives including Goals 2000, NCLB, and RTTT. With Race to the Top comes the Common Core State Standards, increasing the rigor of English language arts and mathematics courses across the education system in the country. The goals of the legislation differs from one political administration to the next; however, the common objective is to improve critical thinking skills and to close the achievement gap of American students ensuring they are college and career ready and have the ability to compete in the global market.

STEM jobs are expected to grow 12.5% by the year 2022; however, experts believe that those jobs will not be filled because of a lack in workforce trained for these positions. As a rapidly growing ethnic group, Hispanic students can become the replacement to an aging population in the STEM field. A significant amount of research demonstrates the need for the importance of Hispanic communities to access STEM careers jobs as this industry affords opportunities to high-wage careers. Studies also suggest that a lack of expectancy-value to succeed and motivation created by chronic absenteeism can affect how Hispanic students learn mathematics. The research exposes the ideas of absenteeism interfering with direct instruction

which has a highly desired effect in mathematics. The gap in the literature implies further studies should work to identify key barriers that are preventing Hispanic students from entering STEM fields. Other implications of correlation could exist within these barriers and should be further researched for direct connections.

CHAPTER THREE: METHODS

Overview

The purpose of this correlational study is twofold. First, the study uses the Expectancy Value Theory model (Eccles & Wigfield, 2002) to determine whether a relationship exists between Hispanic students' absenteeism and mathematics achievement and, if a relationship does exist, to what strength. The second determination this study tries to prove using Holland's Theory of Vocational Choice (1959) is whether a relationship exists between Hispanic students' aspiration to enter the STEM career field and students' absenteeism, if a relationship does exist, to what strength. This chapter presents the research design, the research questions, the hypotheses, the participant selection criteria, the setting for data collection, the instruments, the procedures, and the statistical analyses.

Design

In the present quantitative study, the researcher utilizes a correlational design as the most appropriate approach to determine the correlation and strength of the relationship between two variables (Joyner, Rouse, & Glatthorn, 2013; Warner, 2013). This design is chosen because it appropriately aligned when seeking for a predictive relationship between the predictor variable and criterion variables (Gall, Gall, & Borg, 2007). Statistical significance resulting from this correlational design does not imply a causal relationship among the variables (Gall et al., 2007). A correlational design aligns with research studies and the present study is modeled after previous research that examined similar factors among a different population (Gottfried, 2019; Laurment et al., 2017; Saw & Cheng, 2018).

In this correlational study, the researcher employs two bivariate linear regression analyses seeking to find a predictive relationship, first, between Hispanic students' absenteeism and

mathematics achievement level. Based on extant definitions of student absenteeism, the operational definition for the predictor variable is percent of the year missed per 180 school days (Kearney & Graczyk, 2014; 2018; Owings et al., 2017; United States Department of Education, 2016). Students' mathematic scores, operationally defined as the achievement level obtained on the Algebra 1 Florida Standards Assessment (Florida Department of Education, 2017; Giambo, 2017), serves as one criterion variable. The researcher conducted a second bivariate linear regression analysis seeking to determine whether a predictive relationship exists between aspirations to enter a STEM career and school absenteeism. Aspiration, the predictor variable, is operationally defined as an educational direction determined by a career employment survey (Bakker & Macnab, 2004; Mau & Li, 2018; Morgan, 2006).

In a bivariate linear regression analysis, one can assume "that the relation of the X and Y variables is linear" (Warner, 2013, p. 344). In similar studies, bivariate regressions were used to examine factors that influenced students' aspirations to enter careers in the STEM field (Borman et al., 2017; Cleary & Kitsantas, 2017; Mau & Li, 2018; Saw & Chang, 2018). This study uses archival data—information held in the school district's and schools' electronic database archives (Gall et al., 2007).

Research Questions

The following research questions are considered in the present study:

RQ1: Is there a predictive relationship between Hispanic students' high school absenteeism and mathematics achievement?

RQ2: Is there a predictive relationship between Hispanic students' interest to pursue careers in the STEM field and high school absenteeism?

Hypotheses

The corresponding null hypotheses that addressed the research questions are:

$H_0$1: There is no significant predictive relationship between Hispanic students' high school absenteeism and mathematics achievement.

$H_0$2: There is no significant predictive relationship between Hispanic students' interest to pursue careers in the STEM field and high school absenteeism.

Participants and Setting

The participants for this study are drawn from a convenience sample of high school students who attended two schools located in a school district in Florida. The school district consists of approximately 64,000 students enrolled at the time of the study, with a demographic breakdown of 59% Hispanics, 26% Whites, 11% Blacks, 2% Asians, and 2% Native Americans (Data U.S.A., 2018). The school district enrollment by gender is 49% male and 51% female students. The correlational study uses a population sample consisting of 431 Hispanic students from two Title I high schools in the school district's most southern location. The researcher uses a matched sample as both high schools are located in similar communities with similar Hispanic student density and socioeconomic and cultural milieu (Eccles &Wigfield, 2002). Throughout the population of all other high schools in the observed Central Florida school district, none have representative demographics that could be matched into the sample.

High school A has an enrollment of 2,030 students with a demographic breakdown of 64% Hispanic, 9% White, 23% Black, 2% Asian, and 2% Native American. High school B has an enrollment of 1,740 students with a demographic breakdown of 64% Hispanic, 13% White, 19% Black, 1% Asian, and 3% Native American. For this study, the researcher uses sample data from these two high schools, A and B, with the highest number of enrolled Hispanic students in

the school district. Ex post facto data are collected for the 2018-2019 school year to analyze the following factors: annual mathematics achievement standard scale scores, attendance records with the number of days absent for the year, and the career survey DWYA information from 431 Hispanic students enrolled in the selected high schools. The gender breakdown of 221 males and 210 females provides for 49% females and 51% males of the total sample. The inclusion of 431 students in the sample population (*N*) exceeds the required minimum of 66 students for a medium effect size and a statistical power of .7 at the .05 alpha level (Gall et al., 2007).

Instrumentation

The present study uses archival data generated from the following instruments: Algebra 1 Florida Standards Assessment, the state-mandated assessment used for end-of-course mastery determination; FOCUS school software that records, tracks, and manages attendance; and Naviance – Do What You Are survey that is used to determine students' career interests.

Algebra 1 Florida Standards Assessment

The Florida Standards Assessment (FSA) is used as Florida's standardized summative exam administered yearly in third through tenth grades (Florida Department of Education FSA, 2017). The FSA serves as students' demonstration of proficiency and as a high school graduation requirement in the Algebra 1 subject area (Giambo, 2017). The FSA is a summative assessment that measures the level of mastery students attained throughout the school year. This type of assessment is used to determine mathematics achievement in an effort to ascertain whether a student is ready to enter college or a career at an entry level (Giambo, 2017). Additionally, this information provides state legislators accountability data to evaluate the effectiveness of school districts, schools, and teachers (FLDOE Secondary, 2017). The FSA, developed by the American Institutes of Research (AIR) in collaboration with the Florida

Department of Education, uses mixed item types such as multiple choice, short response, and extended response. The test is designed to measure 21 mathematics Florida standards that include algebra and modeling, functions, statistics, and the number system (Florida Department of Education FSA, 2017). The test items are aligned in complexity to Webb's (1977) depth of knowledge (DOK) from level 1 to 4 with a distribution of 20% of the test items at DOK 1, a low-level range of difficulty; 60% of the test items at DOK 2, medium-range level of difficulty; and 20% of test items are DOK 3, the highest level of difficulty assessed; however, students are not measured at DOK 4 (Florida Department of Education FSA, 2017). The Algebra 1 FSA scores are divided in levels 1 through 5 with the proficiency attainment beginning at level 3 and advanced proficiency at levels 4 and 5. In the 2018-2019 school year, the test's scale score range for the corresponding levels were level 1 = 425-486, level 2 = 487-496, level 3 = 497-515, level 4 = 518-531, and level 5 = 532-575, as determined on 51 test items completed during two 90-minute sessions over two days (Florida Department of Education FSA, 2017).

The Florida Department of Education (2017) uses three reliability tests to obtain measures of internal consistency and test reliability of the Algebra 1 FSA. The tests FLDOE implemented are Cronbach's alpha, stratified alpha, and Feldt-Raju coefficient. The 2016-2017 Algebra 1 FSA reliability coefficient for Cronbach's alpha was $\alpha = .85$, for the stratified alpha was $\alpha = .85$, and for the Feldt-Raju coefficient was $\alpha = .85$ (Florida Department of Education FSA, 2017). The Algebra 1 FSA test is found to be internally consistent and reliable as indicated by an overall Cronbach's alpha of .84 (Warner, 2013). Due to the subtests embedded in the Algebra 1 FSA, a stratified alpha of .84 provides a better reliability estimate of the test items (Osburn, 2000). Cronbach's alpha can underestimate parallel form and split-half reliability; therefore, the Feldt-Raju coefficient of .85 is within the acceptable range of .70 and .95.

Consequently, based on the combined Feldt-Raju coefficient of .85 and Cronbach's alpha of .84, it is determined that the Algebra 1 FSA is reliable (Feldt & Qualls, 1996; Gall et al., 2007).

The Algebra 1 FSA test validity denotes the measurements that are used to ensure that the test items are properly aligned with the standards the item is intended to assess (Warner, 2013). Test developers validate each test item to ensure that field-tested items are not giving cues or clues to answers of other field-test items. The test developers include a mixed range of items composed of multiple reporting categories and standards that reflect a range of difficulty and cognitive levels. Throughout test development, abrupt transitions between subject strands are eliminated or minimized, and selected items within strands are placed and organized in the appropriate variety and number (Florida Department of Education FSA, 2017; Giambo, 2017).

FOCUS School Software

FOCUS is an electronic gradebook developed as a data clearinghouse system that collects students' attendance tracking information, students' academic performance, students' historical and demographic data, scheduling tools, discipline records, and counseling documentation (FOCUS, n.d.). Attendance data from FOCUS is used in this study as a predicting variable. The face validity of the FOCUS program relies on the number of school districts in which the program is actively in operation. Currently, FOCUS school software has data from 1.5 million students in their records (FOCUS, n.d.).

Teachers use FOCUS electronic gradebook to input daily attendance. The attendance clerk evaluates reports on a weekly basis and generates a parent letter for students missing five days of school with no excuse. Parents get a second letter when their students miss 10 school days without excuse. These letters inform parents and document that the child has not been attending school. Some of the characteristics and structures provided by the FOCUS system include the

abilities to tr ack and report hourly attendance, automatically drop students from adult education courses after seven days of non-attendance, automate and customize letters to parents/guardians, and alert and send emails based on attendance. Each of the actions listed above is shown in the teacher grade book portion of the FOCUS system (FOCUS, n.d.). Attendance is used empirically to validate the importance of going to school regularly as one way to avoid poor academic achievement (Baird and Ozler, 2010; Gottfried, 2010; 2014; Sahin, Arseven, & Kilic, 2016).

Naviance – Do What You Are Survey

The Naviance – "Do What You Are" (N-DWYA) survey is used to determine students' career interests upon entering the 11th grade (Randall et al., 2017). The N-DWYA survey requires students to complete the personality assessment to help students understand more about themselves. In the second component, students answer questions about the career cluster the N-DWYA survey generates based on their personality type (Randall et al., 2017). Students complete a Likert-type questionnaire about each career field they would like to work in using a scale of 1 to 3 where 1= not at all interested, 2 = somewhat interested, and 3 = very interested. The N-DWYA is an abbreviated format of the Myers-Briggs Type Indicator (MBTI) based on Jung's psychological types (Stein & Swan, 2019). The school college and career specialist facilitates the process of completing this 36-item survey. The MBTI types are Extrovert-Introvert (EI), Sensing-Intuition (SN), Judging-Perception (JP), and Thinking-Feeling (TF). According to Nordvik, career clusters with the strongest association to STEM careers included the EI and TF (1996). Association to other career clusters are shown in Table 1.

Table 1.

MBTI types correlation to career cluster

MBTI-Types	Career Cluster	Correlation
TF, EI	STEM	-.36
EI	Manufacturing	-.36
SN, TF	Human Services	-.38
JP EI SN	Business	-.58

The measures of internal validity for the four personality types all present acceptable levels of Pearson's *r* ranging from .61 to .75. The different types have reliability score as follows: EI = .75, SN = .75, JP = .75, and TF = .61 (Randall et al., 2017). Randall et al. issued the caution that the validity construct was originally completed with college-age students and thoughtful consideration should be given when utilizing a different age group (2017). These results sustain that N-DWYA measures are valid and, therefore, it is implemented in this correlational design to study if a relationship is determined to exist between Hispanic students' absenteeism and interest to select a STEM career and also to determine the strength of this relationship.

Procedures

The office of the superintendent of schools was approached via letter to solicit permission to conduct the study and to gain access to the archived data. The researcher secured the permission of the Institutional Review Board (IRB) to conduct the study utilizing ex post facto data archived on the school district's databases (see Appendix A). Upon obtaining IRB permission, the Research, Evaluation, and Accountability (REA) department was contacted for final school district-level permissions. Upon receiving written permission (see Appendix B) and REA approval, the researcher collaborated with REA staff to obtain the data package. Data collection entailed accessing archived school files and reports from the Schools District's

database. The data was immediately saved to an external hard drive and remained locked in a cabinet until the researcher began to process and analyze the information. The data package did not have student names as they were anonymized to maintain confidentiality in accordance with the Family Educational Rights and Privacy Act (FERPA). Each student's data file received a corresponding case number generated in Microsoft Excel to preserve anonymity.

The researcher created an Excel spreadsheet with all the data files to simplify the information and to increase efficiency during the data analysis process. IBM Statistical Package for the Social Science (SPSS) was used to examine the relationship of Hispanic students' high school absenteeism with mathematics achievement. SPSS also examined the relationship of Hispanic students' high school absenteeism and their interests to pursue careers in the STEM field. The researcher entered the data into the SPSS program for statistical analyses that generated tables, plots, and graphs for the study.

Data Analysis

Bivariate linear regressions were used to analyze FOCUS software absenteeism data, Algebra 1 FSA standard scale score achievement data, and N-DWYA result data to determine whether a predictive relationship exists among the predictor and criterion variables (Florida Department of Education FSA, 2017; Giambo, 2017; Mau & Li, 2018; Morgan, 2006; Randall et al., 2017). The researcher used two bivariate linear regression analyses as the statistical techniques to address each of the null hypothesis (Gall et al., 2007). In order to accomplish these goals, two separate bivariate linear regressions were used. Bivariate linear regression is appropriate to use because the predictor variable of school absenteeism was operationalized as the number of days Hispanic students were absent from school through the 2018-2019 school year. The criterion variable was operationalized as the Algebra 1 standard scale score of

mathematics achievement for the first regression. For the second regression, interest in STEM careers was represented by the number of careers selected from the STEM cluster, manufacturing cluster, human services cluster, and business cluster, in the STEM field selected. The N-DWYA survey was operationalized as the predictor variable (Warner, 2013). The effect size was determined in addition to Pearson *r* (Warner, 2013). Pearson's *r* was used to determine whether a correlation exists and, if so, the strength of the relationship between variables (Warner, 2013). Pearson's *r* is preferred when conducting educational research "because most educational measures yield continuous scores and because *r* has a small standard of error" (Gall et al., 2007, p. 347).

Data was screened for outliers, inconsistencies, and missing values that can skew the results. To ensure the data were free of outliers, the researcher used a scatter plot to detect and eliminate any extreme outliers. Missing values include relevant data that are left out during the data collection process (Warner, 2013). The test for missing values was completed using SPSS 25® missing values add-on procedure (Warner, 2013). The data screening included testing for the assumption of bivariate outliers using a scatter plot. The assumption of bivariate normal distribution was also examined with a scatter plot. A scatterplot was also used to check for the assumption of linearity looking at all data points to see how closely they fall along the line of best fit (Warner, 2013).

The SPSS data output for the present correlation study was analyzed for significance at the alpha level of $p < .05$ statistical power. In order to meet the desired statistical power, the number of cases (*N*) need to be at least 105 (Warner, 2013). However, for the present study $N = 431$. Pearson's *r* analysis indicated tenable levels of linearity between variable X, Hispanic students' absenteeism, and variable Y, the Algebra 1 FSA level of achievement. Furthermore, a

second Pearson's *r* analysis indicated a tenable level of linearity between variable X, Hispanic students' absenteeism, and variable Y, Hispanic students' aspirations to enter the STEM career field. Warner (2013) sustains that the degree of linearity between variables should not be considered evidence of causation in a non-experimental research study. Two bivariate regressions were conducted to analyze the strength of the independent variable in predicting the dependent variables. The researcher analyzed the following SPSS 25® correlation output: Pearson's *r*, *N*, *p*-values, and R^2.

Descriptive statistics were generated for the sample utilizing SPSS 25® as described in the data instruments (see table 1 and 2). The statistical output included sample size, the mean scores and standard deviation of FSA achievement standard scale scores, and the likelihood scale of selecting a career according to the N-DWYA survey results.

CHAPTER FOUR: FINDINGS

Overview

The purpose for this, nonexperimental, quantitative, ex post facto, correlational study is to determine whether there is a relationship between Hispanic students' high school absenteeism as the predictive variable and mathematics achievement as the criterion variable. Additionally, this study seeks to determine if a relationship exists between Hispanic students' high school absenteeism as a predictive variable and their aspiration to enter STEM career fields as the second criterion variable. In this chapter, the research questions and null hypotheses are reviewed. Also, the descriptive statistics and bivariate assumptions are reported. Their analyses determine whether to reject or fail to reject the null hypotheses.

Research Question(s)

The following research questions are examined in this study:

RQ1: Is there a predictive relationship between Hispanic students' high school absenteeism and mathematics achievement?

RQ2: Is there a predictive relationship between Hispanic students' interest to pursue careers in the STEM field and high school absenteeism?

Null Hypothesis(es)

The null hypotheses for this study are the following:

H_0 1: There is no significant predictive relationship between Hispanic students' high school absenteeism and mathematics achievement.

H_0 2: There is no significant predictive relationship between Hispanic students' interest to pursue careers in the STEM field and high school absenteeism.

Descriptive Statistics

A total of 431 Hispanic student records were sampled from two Title I high schools with the largest number of Hispanic ethnicity enrollment in the chosen school district. The gender breakdown for the participants was evenly split in the study with 221 (51%) males and 210 (49%) females. The researcher prepared categorical data by converting the data into 0 and 1 where males received a code of 0 and females a code of 1 before exporting the file to SPSS for analysis. The number of students interested in pursuing a STEM career was 178 (41%) and the number of students not interested in STEM careers was 253 (59%). The descriptive frequency for 11th grade students by gender and their frequency of interest in STEM careers are listed in Table 2.

Table 2.

Descriptive Frequency of Participants (N = 431)

Gender		*N*	*%*
Total Participants		431	100
Gender			
	Males	221	51
	Females	210	49
STEM Interest			
	Yes	178	41
	No	253	59

The participant records include 2018-19 school year total number of school days absent, the 2016-17 standard scale scores for the Algebra 1 Florida Standards Assessment (FSA), and the analysis of the N-DWYA survey results. The range of days Hispanic students were absent from school is 0 to 42 days with a mean of 9.41 ($SD = 8.30$). The Algebra 1 FSA standard scale

scores range from 425 (minimum) to 554 (maximum) yielding a mean of 490.20 (*SD* = 26.02). The five-point Likert-type survey scores were coded with a number 1 for STEM level of interest 'not at all interested,' number 2 for STEM level of interest 'somewhat interested,' and number 3 for STEM level of interest 'very interested'. The mean score is 1.65 (*SD* = .86) for this variable. Most students chose approximately 8 STEM careers based on their survey responses. The mean score is .89 (*SD* = 1.47). Table 3 displays the descriptive statistics for the criterion and predictor variables that were analyzed.

Table 3.

Descriptive Statistics of Variables

Variables	*N*	*Minimum*	*Maximum*	*M*	*SD*
Alg. 1 Std Scale Scores 2018-19	431	425	554	490.20	26.02
Absences 2018-19	431	0	42	9.41	8.30
STEM Careers Selected	431	0	8	.89	1.47
STEM Interest Level	431	1	3	1.65	.86
Valid *N* (listwise)	431				

Assumptions Testing

Assumption of Bivariate Outliers

The data files were screened for inconsistencies and outliers with two bivariate outlier scatterplots. The first bivariate scatterplot displays the predictor variable in days absent from school and Algebra 1 FSA achievement standard scale scores as the criterion variable. The second scatterplot displays the predictor variable was the STEM interest level based on STEM

careers selected and the days absent from school as a criterion variable. Observation of the scatterplot shows no errors; however, two data points were identified as outliers. The two cases identified as outliers were removed as they represented extreme situations (Warner, 2013). Figures 1 and 2 show the bivariate scatterplots.

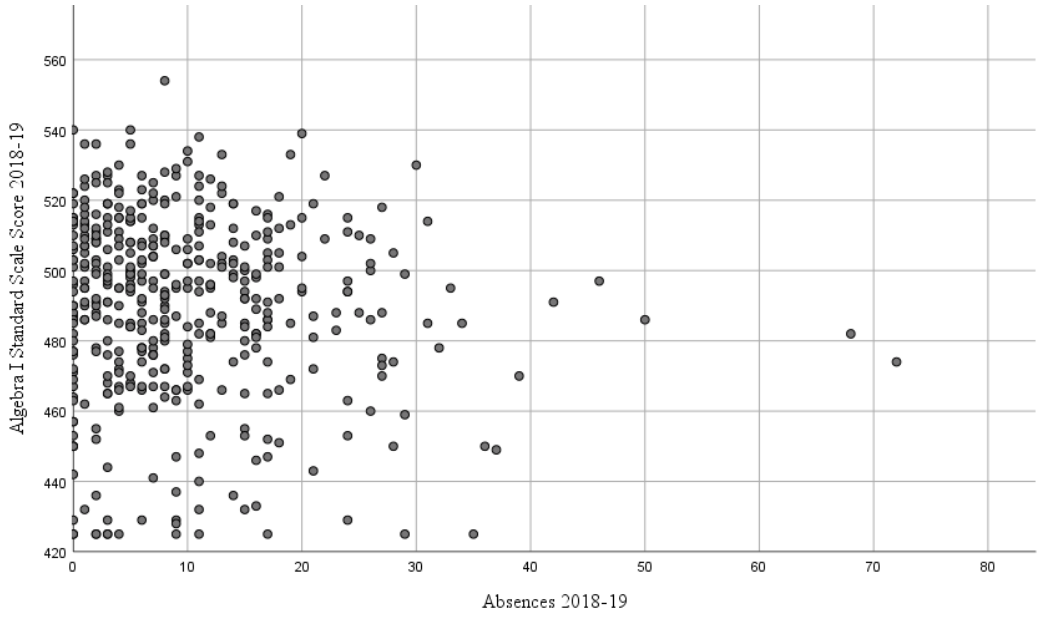

Figure 1. Bivariate Scatterplot of the Criterion Variable, Algebra 1 Standard Scale Scores.

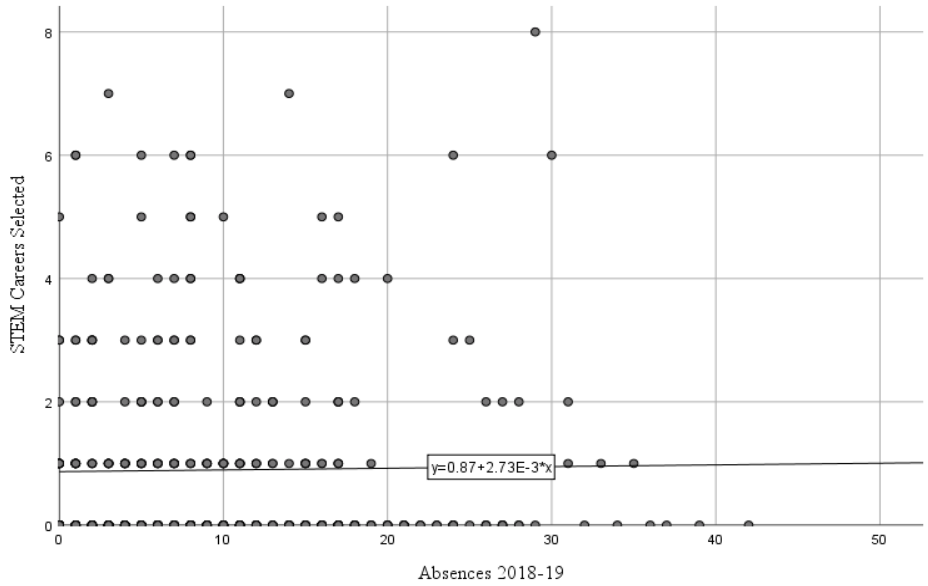

Figure 2. Bivariate Scatterplot of the Criterion Variable, Absences 2018-19.

Assumption of Linearity

Linearity is an assumption requirement for a bivariate regression (Warner, 2013). The scatterplots in Figures 1 and 2 were used to determined linearity. The assumption of linearity is relatively met as shown in Figures 1 and 2.

Assumption of Bivariate Normal Distribution

Scatterplots, Q-Q plots, and histograms were used to examine the assumption of bivariate normal distribution for the predictor variables, days absent from school and STEM careers selected, and the two criterion variables Algebra 1 standard scale scores and days absent from school. After observation of Figure 1 (scatterplot), Figure 2 (scatterplot), Figure 3 (histogram), Figure 4 (Q-Q Plot), Figure 5 (histogram), and Figure 6 (Q-Q Plot) the assumption of normality is tenable even though Figure 5 shows a statistically significant skewness of 2.09 to the right (Cramer & Howitt, 2004; Warner, 2013).

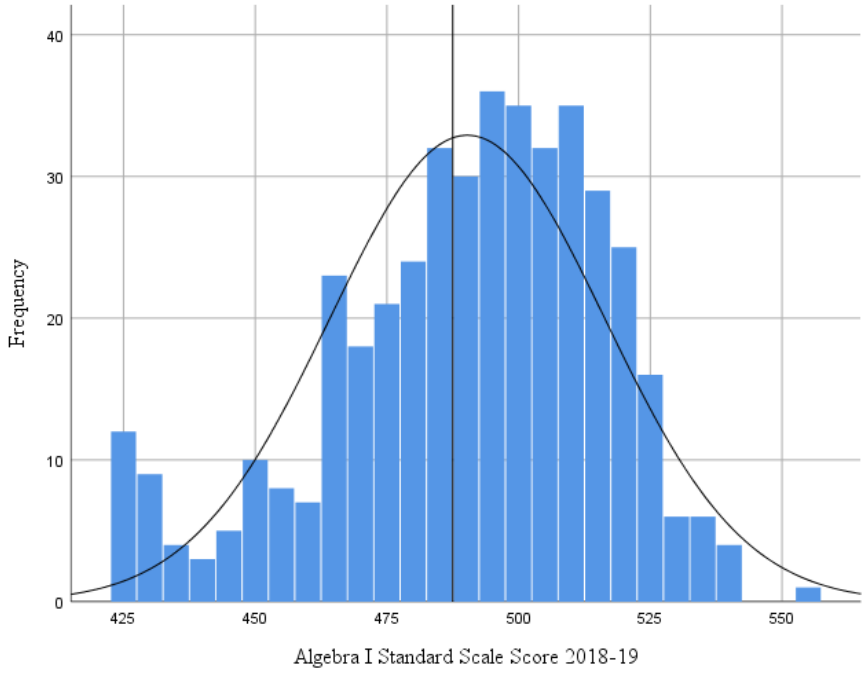

Figure 3. Histogram of Algebra 1 Standard Scale Scores 2018-19.

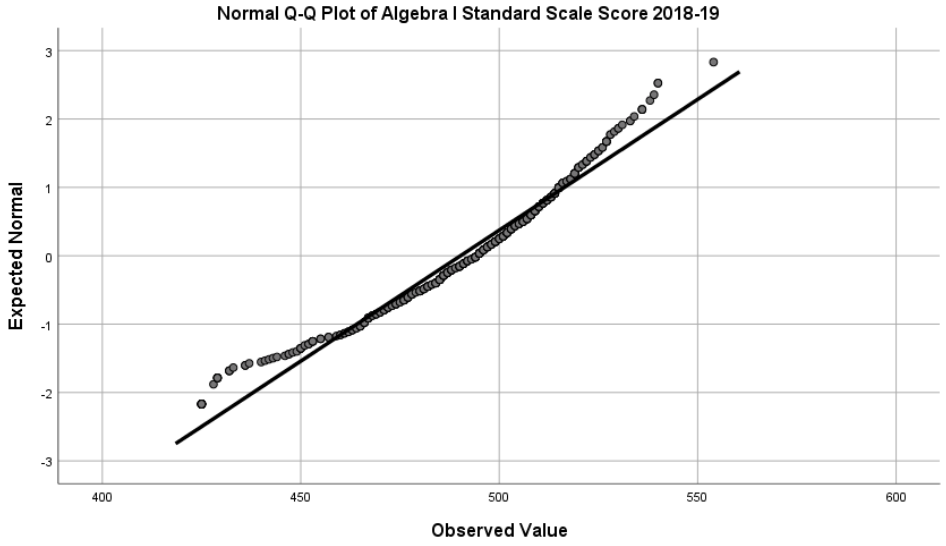

Figure 4. Normal Q-Q Plot of Algebra 1 Standard Scale Scores 2018-19.

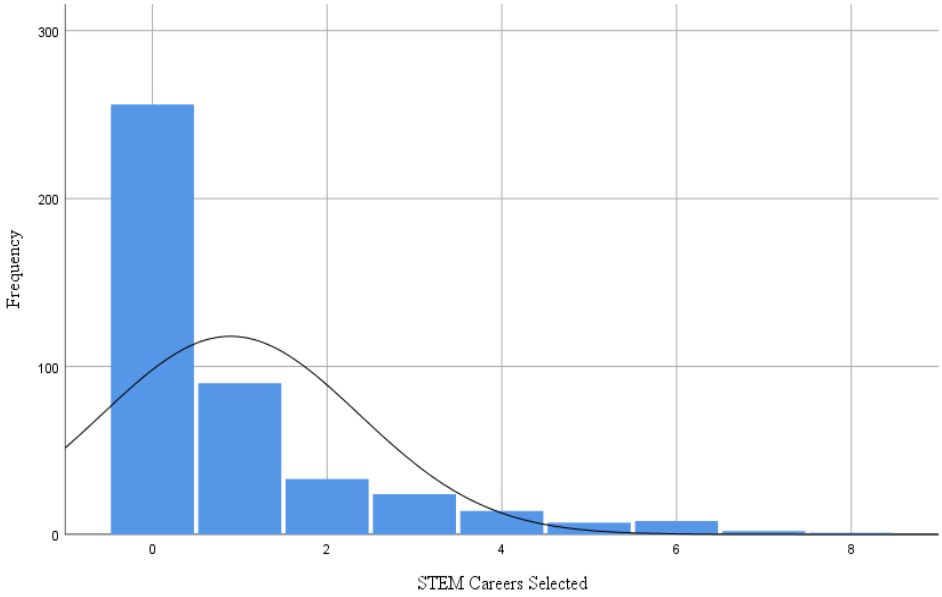

Figure 5. Histogram of STEM Careers Selected.

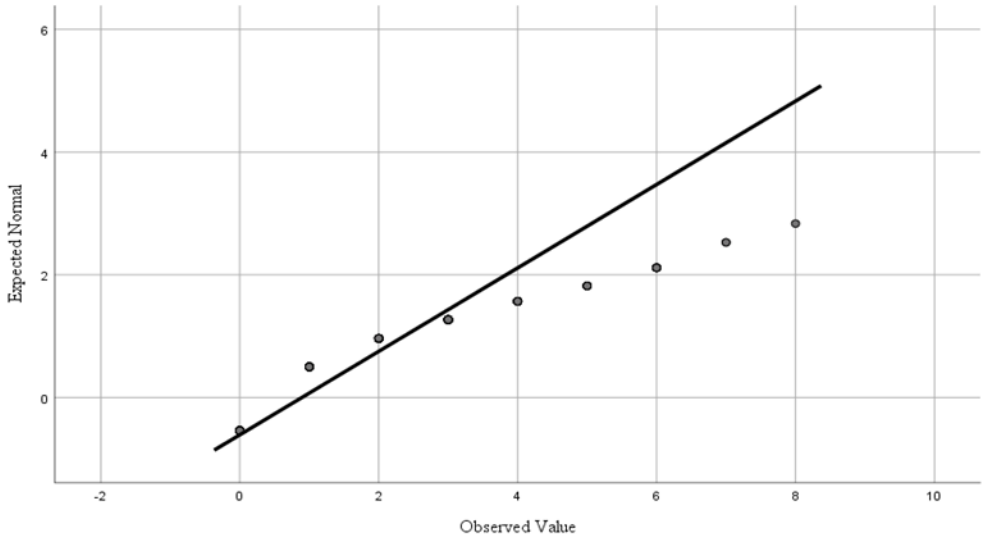

Figure 6. Normal Q-Q Plot of STEM Careers Selected.

Results

Null Hypothesis One

A bivariate linear regression was conducted to evaluate whether there was a predictive relationship between the Hispanic students' high school absenteeism as the predictor variable and Algebra 1 standard scale scores as the criterion variable. The correlation between absenteeism and Algebra 1 standard scale scores is negatively weak as $r = -.081$. This finding shows how students with high number of absences will have lower achievement mathematics scores in their annual exams. Table 4 presents the correlation values. The analysis of variance (ANOVA) for this model yielded $F(1, 429) = 2.89$, $p = .093$ where $R^2 = .004$. The researcher failed to reject null hypothesis one as the regression model is not statistically significant at the alpha = .05 level. Furthermore, R^2 does not show significant variance between the predictor and criterion variables. Table 4 displays ANOVA results.

Table 4.

Correlation between Variables

	Variables	Algebra 1 Standard Scale Score 2018-19	Absences 2018-19
Pearson Correlation	Algebra 1 Standard Scale Scores 2018-19	1.000	-.081
	Absences 2018-19	-.081	1.000
Sig. (1-tailed) Careers Selected	Algebra 1 Standard Scale Scores 2018-19		.047
	Absences 2018-19	.047	
N	Algebra 1 Standard Scale Scores 2018-19	431	431
	Absences 2018-19	431	431

Table 5.

Model 1 ANOVA Totals

Model		Sum of Squares	DF	Mean Square	*F*	Sig.
1	Regression	1922.570	1	1922.570	2.89	.093
	Residual	291510.864	429	679.513		
	Total	293433.434	430			

Null Hypothesis Two

The researcher addressed null hypothesis two by conducting a bivariate linear regression. Through this process, the researcher considered whether there was a predictive relationship between Hispanic students' interest in pursuing STEM careers as determined in their responses of the N-DWYA survey as the predictor variable and their high school absenteeism as the criterion variable. The correlation between STEM interest and absenteeism is weak yet, positive

as $r = .015$. This finding shows how students with greater interest in STEM careers will be least likely to be absent from school. Table 6 presents the correlation values. The analysis of variance (ANOVA) for this model yielded $F(1, 429) = .102$, $p = .750$ where $R^2 = .000$. The researcher failed to reject null hypothesis two as the regression model is not statistically significant at the .05 level. Furthermore, R^2 does not show any significant variance between the predictor and criterion variables. Table 7 displays ANOVA results.

Table 6.

Correlation between Variables

	Variables	Absences 2018-19	STEM Careers Selected
Pearson Correlation	Absences 2018-19	1.000	.015
	STEM Careers Selected	.015	1.000
Sig. (1-tailed) Careers Selected	Absences 2018-19		.375
	STEM Careers Selected	.375	
N	Absences 2018-19	431	431
	STEM Careers Selected	431	431

Table 7.

Model 2 ANOVA Totals

Model		Sum of Squares	DF	Mean Square	*F*	Sig.
2	Regression	7.013	1	7.013	.102	.750[a]
	Residual	29585.298	429	68.963		
	Total	29592.311	430			

Summary

Chapter four presents the statistical results for the current study including the descriptive statistics to address two null hypotheses. The initial goal was to examine Hispanic students' Algebra 1 standard scale scores as measured with the FSA. A secondary goal was to determine Hispanic students' interest in STEM careers through the completion of the N-DWYA survey. Algebra 1 FSA represents the criterion variable and student absenteeism was the predictor variable for the first bivariate regression analysis. Students' absenteeism is the number of days Hispanic students were absent from class. Student's interest for STEM careers was the predictor variable for the second bivariate regression analysis.

Two linear regressions analyses were employed to determine the predictability of the Algebra 1 scores and Hispanic student's school absenteeism. Based on the results from both linear regression analyses, the researcher failed to reject both null hypotheses.

CHAPTER FIVE: CONCLUSIONS

Overview

Chapter Five addresses the results presented in chapter four and aligns those results with the literature in light of the theoretical framework. The implications of the study, the limitations of the study, and recommendation for further research is provided.

Discussion

The purpose for this study is to determine whether there is a predictive relationship of Hispanic students' high school absenteeism to mathematics achievement and their aspirations to enter careers in the STEM field. This study deals with a real-time problem that is affecting a large portion of the Hispanic community across the U.S. (Smerillo et al., 2018). School absenteeism is prevalent among Hispanic students. This ethnic group is also underrepresented in the STEM career industry where soon there will be a need to replace the retiring workforce (Mau, 2018; National Science Board, 2016). The current study contributes to the existing body of knowledge that addresses the correlation effects of chronic absenteeism among Hispanic students. Furthermore, the study presents relevant literature for school districts with high numbers of enrolled Hispanic students to consider the impact chronic absenteeism has on mathematics achievement and these students' interest in selecting STEM careers.

The first research question seeks to find out whether there is a predictive relationship between Hispanic students' high school absenteeism and mathematics achievement. The literature establishes how Hispanic demographics top the list of students with the highest number of school absences (Gottfried, 2010; 2019; Paschall, Gershoff, & Kuhfeld, 2018). Additionally, Hispanic students' mathematics academic performance is consistently at 20 percentage points lower than White students over the last 20 years (Paschall, Gershoff, & Kuhfeld, 2018). School

absenteeism plays an important role in students' low academic performance as appropriate grade-level skills and self-confidence are not developing (Gottfried & Ehrlich, 2018). This study is framed upon the Expectancy Value Theory (EVT) which suggests Hispanic students' poor mathematic skills are connected to their low expectation to succeed (Eccles, 2009). EVT further supports how Hispanic students do not pursue mathematics studies and therefore, do not develop the necessary self-confidence to experience a level of success in the mathematics subject area content (Saw & Chang, 2018). Clarkson et al. (2017) finds that a student's level of confidence towards mathematics is statistically significant in predicting mathematics achievement. Susperreguy et al. also find that self-confidence is a strong predictor of mathematics performance (2018). In contrast, the results from the current study show a negative weak correlation of $r = -.081$ between school absenteeism and Algebra 1 standard scale scores even with a sample size of 431 cases. This outcome concurs with prior finding on the effects of high school absenteeism has on mathematics achievement (Gottfried, 2019). Regardless of attendance, EVT sustains that students who build self-confidence do advance academically as they embrace the learning environment. The intrinsic aspect of self-confidence or expectancy to succeed play an important role as Hispanic students engage in mathematics instruction (Cleary & Kitsantas, 2017; Wang & Eccles, 2013).

The second research question addressed in this study evaluates whether there is a predictive relationship between Hispanic students' interest to pursue careers in the STEM field and their high school absenteeism. The literature review in this study shows Hispanic students are not pursuing STEM careers and are considered an underrepresented group in the STEM field (Fayer et al., 2017; Mau & Li, 2017). Descriptive data presented in Table 2 are consistent with the literature as 41% of the students selected STEM careers. However, the findings from the

linear regression show a weak correlation ($r = .015$) between Hispanic students' selection of career opportunities in the STEM field and their school absenteeism . The ANOVA yields a non-statistically significant ($p = .750$) result. Consequently, students' interest in STEM career is not a predictor of Hispanic students' high school absenteeism. The researcher used the Theory of Vocational Choice as an additional framework to address this research question (Holland, 1959). The theory uses students' personality traits to help them discover areas that influence career selection (Campbell & Holland, 1972). The applicability of this framework lies on the alignment of a student's intellectuality when choosing a career field (Holland, 1959). In addition, students who enjoy interpretation of data are more inclined to select STEM careers (Bakker & Macnab, 2004). Sheldon et al. support the claim that students possessing investigative and thinking personality traits also show interest in pursuing careers or opportunities in the STEM field (2019).

Implications

The purpose of this study is to examine whether a predictive relationship exists between school absenteeism and mathematics achievement. Furthermore, the researcher aims to find whether a predictive relationship exists between students' STEM career interest and school absenteeism. Hispanic students who are absent from school frequently miss valuable classroom instruction. Students missing over 10% of instruction in a regular 180-day model, show a decrease in academic performance (Gottfried, 2019). Students who do not build strong foundational skills in mathematics impede their development of self-confidence or ability belief (Muenks et al., 2017). The implication of students lacking ability belief in mathematics creates a barrier for students to think of pursuing mathematically-oriented careers. The behavior of

absenteeism has created a problem for Hispanic demographics and the STEM industry (Mau, 2018; Segovia, 2019).

The researcher logically laid out the procriblem of how underrepresentation of Hispanics in STEM careers could be associated with school absenteeism among Hispanic students and their low mathematics achievement scores (Borman et al., 2017). The outcome data from the present study does not support such association. However, the study brings to light the important role Hispanic students have to potentially repla ce the retiring STEM workforce (National Science Foundation, 2019). Consequently, school districts need to adequately undertake the problem of school absenteeism and design targeted interventions to reduce absenteeism, close the mathematics achievement gap, and increase interest in STEM careers among Hispanic students. The present study does not show statistically significant results that school absenteeism is a suitable predicting variable for Algebra 1 achievement scores. Also, the study does not show statistically significant results that STEM career interest may be a suitable predicting variable for school absenteeism. Therefore, in view of the non-statistically significant correlations, the researcher failed to reject null hypotheses one and two.

Limitations

The limitations of this bivariate correlational study in terms of internal and external validity includes the school district archived data package used in the analyses. The researcher used archived data from a relatively large sample size. School absenteeism as the predictive variable was collected from a database that gathers absenteeism information from approximately 100 teachers in each of the schools where the students attended. However, there could be a level of inconsistency with such a large number of teachers who input attendance daily throughout the school year. Other inconsistencies exist when attendance is taken by a substitute teacher, when

attendance is assumed, or whenever not taken at all. Algebra 1 standard scale scores achievement are limited by the internal factors influencing the test taker. The school district data package reflects how students who missed 23% of the instructional days were able to score within the proficiency range in mathematics. In contrast, students with zero days absent actually scored below proficiency range in mathematics and even scored in the bottom 25% of the entire grade level, raising questions regarding the students' mindset and testing setting. These inconsistencies can challenge the validity of student effort, motivation, and treatment of such an important assessment.

The last variable employed in the study was the N-DWYA survey questionnaire used to ascertain the level of interest students have in STEM careers. Students have the choice to select up to 8 careers that allow the researcher to determine whether associations exists through the examination of the scatterplots. The career survey proved to have a certain level of inconsistency when correlated to the number of days a student is absent from school. Students with high absenteeism tend to exhibit poor academic achievement (Gottfried, 2019). Collection of anecdotal data can be helpful in explaining why the data analysis in the current study demonstrate how students within the chronic absenteeism range selected 2 or more STEM careers. The survey intent is to help students clarify career options as they define who they are as a person while the survey identifies their strengths and personality types. The outcome may come as a surprise since students with high absenteeism may not see themselves interested in careers that require above average academic achievement. Results from this study show 5% of students with chronic absenteeism selected multiple STEM career choices. A point of interest from the survey results show 22% of students scoring within mathematics proficiency range and not selecting STEM careers in their choices. Although it can be a generalization, students who

demonstrate above average mathematics skills typically have an inclination toward the 'Investigative' personality that is associated to careers in the STEM field (Sheldon et al., 2019). As the survey limits participants' options for responses, utilizing qualitative approaches to determine students' intended career path could yield further insight.

Recommendations for Future Research

The data for this study comes from two high schools with the largest number of Hispanic students enrolled in the chosen school district. The first recommendation is to replicate this study using a sample population from a non-Title I school where a large number of Hispanic students attend. Additional variables recommended include whether the students are English Language Learners (ELL), the students' socio-economic status (SES), the number of students with disabilities (SWD) and the students' family structure or composition. The second recommendation is to use attendance data files from teachers whose accurate attendance record contains less than 3% margin of error determined in the semiannual school district accountability report. A third recommendation is to use the N-DWYA career survey supplemental instrument for students to provide reflective information explaining their selections. The validity of the survey accuracy is dependent on external factors such as the administration instruction, time allotted, assurance of completion, and the administration environment. The survey shows that 41% of students who selected between 1 and 7 careers left the other options blank.

Continued research is recommended with the implementation of other factors that can effectively predict why Hispanic students perform relatively poor in mathematics and have a low interest in pursuing careers in the STEM field. The findings of the current study mirror those in a junior high school study, which did not find a correlation between mathematics self-efficacy and STEM interest (Blotnicky et al. 2018). Questions that need further investigation include:

what factors contribute to Hispanic students' interest in STEM careers? Will STEM career planning in elementary school increase post-secondary STEM career interest? How can post-secondary counseling or the knowledge of the counselor serve as effective predictors in creating an interest in Hispanic students to pursue a STEM career pathway? Despite the need for further examination, the findings from the current study add to the body of literature and support the need for school districts to develop effective interventions addressing the problem of school absenteeism in the Hispanic community and the low interest in STEM careers.

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APPENDICES

Appendix A

IRB Permission

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

May 11, 2020

Rolando Casado

Re: IRB Exemption - IRB-FY19-20-229 Relationship of Hispanic Students' School Absenteeism to Mathematics Achievement and Interest in STEM Careers

Dear Rolando Casado:

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46: 101(b):

Category 4. Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met:

(i) The identifiable private information or identifiable biospecimens are publicly available;

(ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;

(iii) The research involves only information collection and analysis involving the investigator's use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for the purposes of "health care operations" or "research" as those terms are defined at 45 CFR 164.501 or for "public health activities and purposes" as described under 45 CFR 164.512(b); or

(iv) The research is conducted by, or on behalf of, a Federal department or agency using government-generated or government-collected information obtained for nonresearch activities, if the research generates identifiable private information that is or will be maintained on information technology that is subject to and in compliance with section 208(b) of the E-

Government Act of 2002, 44 U.S.C. 3501 note, if all of the identifiable private information collected, used, or generated as part of the activity will be maintained in systems of records subject to the Privacy Act of 1974, 5 U.S.C. 552a, and, if applicable, the information used in the research was collected subject to the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 et seq.

Your stamped consent form can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. This form should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document should be made available without alteration.

Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,

[redacted]
Administrative Chair of Institutional Research
Research Ethics Office

Appendix B

Permission to Conduct Research at the School District

April 27, 2020

Rolando Casado

Dear Mr. Casado:

This letter is to inform you that we have received your request to conduct research in our School District. Based on the description of the research you intend to conduct, I am pleased to inform you that you may proceed with your work as you have outlined. Please be advised that this approval is based on the understanding that a school's participation is completely voluntary and left to the discretion of each building administrator. Please also be advised that the district office will not be able to assist you with any aspect of your research (e.g. sending emails, obtaining data, locating students, providing addresses, etc.).

Finally, be reminded that all information obtained for the purpose of your research must be dealt with in the strictest of confidentiality. At no time is it acceptable to release any student or staff identifiable information. Upon completion of your research, please provide our office with a copy of your results.

I wish you the best of luck in your future endeavors. If I can be further assistance, please do not hesitate to contact me.

Sincerely,

Research, Evaluation & Accountability