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Intelligence Mindsets, Psychological Needs Satisfaction, and Academic Achievement Among Dominican Secondary School Students

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Abstract

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MA, Walden University 2017

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Dissertation Submitted in Partial Fulfillment

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Doctor of Philosophy

Educational Psychology

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Abstract

There is an ongoing need for educational psychologists, researchers, policymakers, educators, and parents to continue to identify and understand the academic and nonacademic factors that influence academic achievement. Recent studies have documented the steady decline in the academic performances of students from Grades 7 to 9. The purpose of this study was to examine the statistical relationship between basic psychological needs satisfaction in relationship with caregivers, mindsets of intelligence, and academic achievement among secondary school students in the Commonwealth of Dominica. This study was grounded in the self-determination theory and mindsets of intelligence theory. A non-experimental correlational design using survey methodology was used for this study. Participants were 143 3rd year secondary school students ages 11 through 15. The participants' academic achievement, mindsets of intelligence and their basic psychological needs satisfaction in relationship with their caregivers, were measured. The data were analyzed using standard multiple regression. The results of the study found a significant inverse relationship between the relatedness component of psychological needs satisfaction and academic achievement. Additionally, higher mindset of intelligence scores significantly predicted higher scores in math, English, and science in the participants first and second years of secondary school. The positive social change implications of this study may equip policymakers, teachers, and parents with the relevant information needed to design and implement programs aimed at improving the academic achievement of secondary school students.

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Dedication

I dedicate this dissertation to the love of my life, my precocious 7-year old daughter Khala Eden, Africa. Your curiosity excites me, your analytical mind intrigues me, and your capacity to love humbles me.

Thank you for allowing me to do this work. For cleaning up while I take a nap, thank you. For bringing me something to eat while I work, thank you. Your little fingers massaging my stiff shoulders after hours of researching and writing, thank you. I will forever cherish these moments.

For the sacrifices that you made, the nights I was unavailable for cuddles and bedtime stories, the days that you missed school while I collected data, the times that I could not play with you because I was working on this project, my impatience with you because I was sleep-deprived. For all you have given up, I want to say thank you. Without your cooperation, I would not have been able to do this; This is our accomplishment.

Always remember that this dissertation is the baseline from which you spring forth, and the tangible proof of what is possible for you. It is with great anticipation that I await your unveiling.

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To my Lord and Savior, Jesus Christ, my gratitude knows no bounds. This work is a testament to your unwavering faithfulness, grace, and mercy towards me. May everything that springs from this bring glory to your name.

To my Chair Dr. Anthony Perry, you have been consistently amazing throughout this process. Your feedback, guidance, and understanding were paramount to the successful completion of this work, and for that I am eternally grateful to you. To my other committee members, Dr. Elisha Galaif and Dr. Stephen Rice thank you for your contribution to this work. A big thank you to the Ministry of Education and the Ministry of Health in the Commonwealth of Dominica for allowing me to conduct this study using their resources. The Government of Dominica, I am grateful for your assistance in this process.

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Chapter 1: Introduction to the Study

Education is the bedrock of all social structures, and its influence permeates every generation, culture, and societal strata (Smith et al., 2016). The importance of education to human development, societal functionality, and positive social change cannot be overly emphasized. To this end, it is imperative that every effort is made to identify and understand the factors that hinder, enhance, mitigate, and influence education and its related processes, such as academic achievement.

Academic achievement is the measuring device used in modern society to indicate educational success (Alcott, 2017). Therefore, investigating the academic and nonacademic constructs that influence academic achievement provides a direct pathway to a more thorough understanding of education. Researchers have identified several academic factors that influence academic achievement, including teaching practices (Ngware, Oketch, & Mutisya, 2014), class size (Nye, Hedges, & Konstantopoulos, 2000), and academic engagement (Lei, Cui, & Zhou, 2018). Alternatively, nonacademic factors that have been found to influence academic achievement include mindsets of intelligence (Dweck, 2006), psychological needs satisfaction (Deci & Ryan, 2000), and intrinsic motivation (Taylor et al., 2014).

In this study, I focused two of the nonacademic factors that influenced academic achievement; mindsets of intelligence and basic psychological needs satisfaction in a relationship with caregivers. In this study, I investigated the relationship between these two nonacademic constructs and academic achievement among secondary school students in the Commonwealth of Dominica. I chose nonacademic factors as the focus of

this study because previous research has shown that nonacademic factors influence academic achievement (Tian, Chen, & Heubener, 2013; Yu, Li, & Zhang, 2015). This study was the first to explore the combined effects of these constructs on academic performance. The information garnered from this study added to the general knowledge base of the different factors that influenced academic achievement. Policymakers and teachers were equipped with the relevant information needed to develop and implement programs to enhance the academic achievement of secondary school students. Additionally, the results of this study provided parents with the information needed to create an environment at home that is conducive to optimal academic achievement.

In this chapter, I will present the background for the study and the problem statement, which provides a thorough discussion on the research problem and establishes that problem as current, relevant, and significant to the field of educational psychology. I will discuss the purpose of the study and the research questions and hypotheses. I will also present the theoretical framework that grounds this study, along with its major assumptions. Finally, I will present a discussion of the nature of the study, the definition of the relevant terms used in the study, and the assumptions, scope, limitations, and significance of the study.

Background

Researchers have conducted many studies to understand how academic achievement is individually influenced by basic psychological needs satisfaction and mindsets of intelligence. These studies provide the background for the current study. Romero, Master, Paunesku, Dweck, and Gross (2014) examined how students' implicit

theories about the malleability of traits predicted their ability to cope with academic and emotional challenges. The researchers found that students' theories about the malleability of attributes (i.e., whether intelligence and emotions can be changed) predicted multiple markers of academic and emotional functioning. The authors explained that the students who believed in the malleability of intelligence were more likely to enroll in advanced-level courses than those who did not. Claro, Paunesku, and Dweck (2016) studied students' mindsets on intelligence and how these mindsets influenced the socioeconomic achievement gap. The results of the study indicated that across all socioeconomic levels, the students who had a growth mindset of intelligence performed better academically than the students with a fixed mindset of intelligence.

Additionally, Bahník and Vranka (2017) focused on the strength of the association between implicit theories of intelligence and achievement. Bahník and Vranka (2017) conducted this study in the Czech Republic with a sample of 5,653 college students. The authors used the General Academic Prerequisite (GAP) test as a measure of academic performance. The researchers found that the students' mindsets of intelligence did not influence their performance on the GAP test.

Chao, Visaria, Mukhopadhyay, and Dehejia (2017) found similar results when they investigated whether mindsets of intelligence also influenced the academic achievement of students from a developing country. The results from this study revealed that on its own, the growth mindset did not increase or predict positive academic achievement. This study indicated that the growth mindset influenced positive academic performance only when there was an incentive system that promoted a feeling of

autonomy with the students. Dixson, Roberson, and Worrell (2017) also examined the effects that grit, growth mindset, ethnic identity, and other group orientation had on the academic performance of high achieving African American students between the ages of14–18. The results from this study contradicted that of other studies that identified a positive relationship specifically between the growth mindset of intelligence and academic achievements. The authors found that there was no relationship between the growth mindset and academic achievement.

Yang, Zhang, and Sheldon (2017) explored the relationship between basic psychological needs satisfaction, self-determined motivation, and acculturation. The authors found that there was a positive correlation between self-determined motivation and the three basic psychological needs among Asian college students studying in the United States. Additionally, the students who were highly self-determined were also more likely to find satisfaction with their basic psychological needs in their new environment. This meant that these students were less likely to experience culture shock, which positively impacted their grades.

Similarly, Malu and Reddy (2016) investigated whether intrinsic, extrinsic, or motivation mediates the relationship between basic psychological needs satisfaction and academic performance. The authors concluded that neither amotivation, intrinsic motivation, nor extrinsic motivation mediated the relationship between basic psychological needs satisfaction and academic achievement. Additionally, Tian, Tian, and Huebner (2015) studied the role of basic psychological needs satisfaction in the relationship between school-related support and school-related subjective well-being in

adolescence. The results of the study indicated that both teacher support and classmates' support were significantly related to school-related subjective well-being. The authors also reported that basic psychological needs satisfaction at school partially mediated the relationship between teacher support and school-related subjective well-being.

Previous research focused on needs satisfaction in relationship with teachers in a classroom setting and how that influenced academic achievement. However, how needs satisfaction in a relationship with caregivers in the home setting influenced academic achievement has not yet been explored. Additionally, the literature does not address how basic psychological needs satisfaction and mindsets of intelligence combine to influence academic performance.

In this current study, I addressed the above-mentioned gaps in the literature. The importance of this study is its ability to provide a deeper understanding of how these two nonacademic constructs combine to influence academic achievement. The results from this study may be used to equip policymakers, teachers, and parents/guardians with the relevant information on how to create an environment at home, which is conducive to children’s academic success.

Problem Statement

The National Assessment of Educational Progress (2015) reported that only 33% of eighth graders performed at or above the proficiency level in mathematics and 34% in reading, which marked a 2% decline from 2013. Additionally, Wijsman, Warrens, Saab, van Driel, and Westenberg (2015) found that there was a linear decline in the academic performance of both boys and girls from Grade 7 to Grade 9. Students are the foundation

of every educational institution, and the academic performance of these students are critical indicators of the quality of future social and economic societal development (Khan & Mushtaq, 2012). Therefore, there is an ongoing need for educational psychologists, researchers, policymakers, educators, and parents to identify and understand the academic and nonacademic factors that influence academic achievement. Lee-St. John, Shields, and Walsh (2016) stated that nonacademic factors account for two-thirds of the observed variation in academic achievement, two of which are basic psychological needs satisfaction and mindsets of intelligence.

Chao, Visaria, Mukhopadhyay, and Dehejia (2017) indicated that a growth mindset influenced positive academic performance only when there was an incentive system that promoted a feeling of autonomy with the students. However, there is a gap in the literature regarding how satisfaction of the three psychological needs (i.e., autonomy, competence, and relatedness), and mindsets of intelligence combine to influence academic achievement. Furthermore, the influence of basic psychological needs satisfaction on academic performance has only been explored in the school setting, in the relationship between teachers and students.

In this study, I focused on how academic achievement was influenced when basic psychological needs are satisfied by caregivers in the home setting. As already established in the literature, mindsets of intelligence were associated with academic achievement (e.g., Paunesku et al., 2015; Stipek & Gralinski, 1996), and the satisfaction of basic psychological needs was also associated with academic achievement (e.g., Malu & Reddy, 2016). To that end, how these two constructs combine to ultimately influence

academic achievement, requires further exploration. This study added to the existing knowledge base of the different nonacademic factors that combined to influence the academic achievement of students.

Purpose of the Study

This was a nonexperimental quantitative study using survey methodology. The purpose of this study was to examine the relationship between perceived psychological needs satisfaction in a relationship with caregivers, mindsets of intelligence, and academic achievement of Dominican secondary school students, ages 11 through 15.

Research Questions and Hypotheses

Research Question 1 (RQ1): To what extent does the autonomy component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$1) Autonomy is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a1) Autonomy is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 2 (RQ2): To what extent does the competence component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in

mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$2) Competence is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a2): Competence is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 3 (RQ3): To what extent does the relatedness component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$3) Relatedness is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a3) Relatedness is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 4 (RQ4): To what extent does psychological needs satisfaction (total score), as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$4) Psychological needs satisfaction is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a4) Psychological needs satisfaction is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 5 (RQ5): To what extent do mindsets of intelligence, as measured by the Implicit Theory of Intelligence Scale, relate to academic achievement as measured by the term grade in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis (H_05) Mindsets of intelligence is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a5) Mindsets of intelligence is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Theoretical Framework for the Study

I used the self-determination theory (SDT; Deci & Ryan, 1985) and mindsets of intelligence theory (Dweck, 2015) to ground this study. Deci and Ryan (2000) posited that the satisfaction of psychological needs is a significant motivating factor to propel one to self-actualization and goal attainment. SDT focuses on extrinsic and intrinsic motivation and states that human beings are motivated by the need to grow, and to attain this growth, a sense of competence, relatedness, and autonomy is needed (Deci & Ryan, 1985). In the context of education, psychologists agree that when psychological needs are not met, disruptive behaviors, low academic performance, and low academic motivation prevails (Diseth & Martinsen, 2003; Loyd, 2005).

Mindsets of intelligence theory were developed by Dweck (2015), who explained that an individual's mindset or their belief in their abilities and intelligence is one of the main determining factors of their achievement. Dweck (2015) grouped mindsets into two categories: growth mindsets and fixed mindsets. The fixed mindset of intelligence states that intelligence is a trait that cannot be changed, and one is either intelligent or not. On the other hand, the growth mindset of intelligence posits that intelligence is not fixed but can be developed with enough dedication and effort.

The mindsets of intelligence theory and the SDT present frameworks for understanding how academic achievement is individually influenced by these nonacademic constructs. In addition, the research questions have the potential to add to the current body of knowledge in providing information on how these two constructs combine to influence academic achievement. I will discuss these frameworks in further detail in Chapter 2.

Nature of the Study

This study was quantitative. The quantitative method of inquiry is employed when questions relating to the relationship between and among variables need to be answered. The independent variables for this study included mindsets of intelligence (growth mindset, fixed mindset), and basic psychological needs satisfaction (autonomy, competence, relatedness). The dependent variable was academic achievement. The instrument chosen to measure basic psychological needs satisfaction was the Basic Needs Satisfaction in Relationships Scale (La Guardia, Ryan, Couchman, & Deci, 2000). Mindsets of intelligence was measured using the 3-item Implicit Theory of Intelligence

Scale (Dweck, Chiu, & Hong, 1995). The mathematics, English, and science grades of the participants were used to determine academic achievement. I collected data using a self-administered survey from Dominican students ages 11–15 who were in their third year of secondary school. I used standard multiple regression to analyze the collected data.

Definitions

Academic achievement: academic achievement refers to students' final grades in mathematics, English, and science from their first and second years of secondary school.

Autonomy: Ones' sense of freedom or free will in their choices, which reflects their innate desires (Deci & Ryan, 2000; Deci & Ryan, 2002).

Basic psychological needs: Refers to the needs of autonomy, competence, and relatedness, which is required for psychological growth and well-being (Deci & Ryan, 1985).

Competence: The feeling that one can successfully master their environment (Deci, 1975; White, 1959).

Fixed mindset of intelligence: The belief that intelligence is a fixed trait that cannot be changed. This belief states that either one is intelligent or not, and there is nothing that can be done to change their level of intelligence (Dweck, 2006).

Growth mindset of intelligence: The belief that intelligence is not a fixed trait and by using the appropriate strategies, obtaining the appropriate resources, developing the right skill, and exerting enough effort, one's level of intelligence can be increased over time (Dweck, 2006).

Mindsets of intelligence: This refers to ones' belief about whether intelligence can be developed over time or whether it is a fixed trait that cannot be altered. (Dweck, 2006).

Relatedness: The need to form and maintain bonds, interpersonal relationships, social connectedness, and to belong to a community (Baumeister & Leary, 1995).

Assumptions

The most salient assumption of this study was that the grades of the students were valid indicators of their academic ability at the time the tests in the various subjects were administered. Additionally, I assumed that the mindset of intelligence of the participants and their perceived psychological needs satisfaction have remained stable over time. I The grades I used in this study spanned 2 school years. However, the surveys were completed in the participants third year of secondary school. Given the malleability and dynamic nature of mindsets, as discussed in Chapter 2, there was a possibility that the student's mindsets changed over time, and their grades were not an accurate reflection of their mindsets of intelligence at the time of taking the surveys. I also assumed that the surveys were valid measures of the mindsets of intelligence and psychological needs satisfaction of the participants. Additionally, I assumed that the survey questions were appropriate for the age group, reading level, and grade level of the participants so that they were able to understand and answer the questions accurately, as further discussed in Chapter 3.

Scope and Delimitations

In this study, I focused on how mindsets of intelligence and satisfaction of psychological needs in relationship with caregivers influenced the academic achievement

of secondary school students ages 11 through 15. I chose this age group based on Dweck's (2015) implicit theory of intelligence, which stated that the influence of mindset of intelligence is most salient in early adolescence. Therefore, younger or older age groups were not appropriate for this study. Many studies focused on how students' grades are influenced when their psychological needs have been satisfied in the classroom setting in their relationship with their teachers. However, the caregiver-student relationship is very critical and may also influence a student's academic performance. To date, there has not been a study that investigated how satisfaction of psychological needs in the caregiver-student relationship influences academic achievement. While studies have focused on the influence of mindsets of intelligence on academic performance, the literature does not address how mindsets of intelligence combined with the satisfaction of psychological needs in the caregiver-student relationship, to influence academic achievement, thus necessitating the current study.

Several researchers explained that the effect of mindsets of intelligence is most prominent when students faced challenges, which is inherent to the first two years of secondary school (Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 2006; Romero, Master, Paunesku, Dweck, & Gross, 2014). This assertion provided the basis for the sample choice and its inclusive and exclusive criteria.

Limitations

I used the students' term and exam grades from their first 2 years of high school as indicators of their academic achievement. However, I administered the surveys that determined their mindset of intelligence and the satisfaction of their psychological needs

while they were in their third year of high school. This gap in time was one of the most important limitations of this study. Many factors can influence academic achievement and may contribute to the observed variance. Some of these factors include the student's school attendance (Morrissey, Hutchison, & Winsler, 2014), socioeconomic status (Martens et al., 2014), and level of intelligence (Soares, Lemos, Primi, & Almeida, 2015). However, I did not assess these factors and many other possible factors which added to the limitations of this study.

Another limitation of this study was the weaknesses inherent in correlational designs. Creswell (2014) explained that researchers used correlational designs when they are investigating the relationship between naturally occurring variables. Therefore, a researcher cannot determine cause and effect using correlational designs. Consequently, correlation designs are very low in internal validity (Creswell, 2014). The results from this study could only determine whether there was a relationship between mindsets of intelligence, basic psychological needs satisfaction (autonomy, competence, relatedness, and the total score of needs satisfaction) and academic achievement. In this study, I was unable to determine whether the participants' mindsets of intelligence or the satisfaction of their basic psychological needs predicted their academic achievement.

The correlational design was the most appropriate for this study as opposed to experimental design. Experimental designs require that the researcher manipulate the variables. However, in this study, it would have been unethical to manipulate the participant's mindsets of intelligence and the satisfaction of their basic psychological needs. Additionally, using a correlational design allowed me to document the relationship

between the variables as they occur in the real world, thus increasing the generalizability of the study.

The sampling strategy I used was also one of the weaknesses of this study. I selected the purposive homogeneous sampling strategy for this study. Unlike random sampling, purposive sampling may not yield a sample that is representative of the population. Consequently, I am unable to generalize the result of this study to the population.

Self-report surveys rely on the honesty of the respondents and their understanding and accurate interpretation of the questions on the questionnaires. Therefore, biases are inherent to self-report surveys, such as the respondents choosing answers that are socially desirable instead of accurate. To that end, the developers of the Implicit Theory of Intelligence Scale (Dweck et al., 1995) and the Basic Needs Satisfaction in Relationship scale (La Guardia et al., 2000) explained that the questions on the scales were designed in a way to reduce self-report bias. To further reduce self-report bias, I chose surveys because of their appropriateness to the reading and comprehension levels of the participants of the study. Also, the participants who volunteered to participate in this study were different from those who did not, thus limiting generalizability.

Significance

This study was the first to explore how mindsets of intelligence and basic psychological needs satisfaction in a relationship with caregivers influence academic achievement. The results from this research added to the general knowledge base and understanding of variables that influence academic achievement. Consequently,

policymakers were equipped with the relevant knowledge to tailor educational policies and develop programs geared towards educating parents on how to create an atmosphere in the home which is conducive to psychological needs satisfaction and the appropriate mindset of intelligence. The results of this study also provided information about the influence of the guardian-student relationship on psychological needs satisfaction and intelligence mindsets, which could be a catalyst for the exploration of the teacher-student relationships and how that relationship can be enhanced to encourage academic achievement. Therefore, students' psychological needs may be supported in the home and the classroom setting. This, in turn, may improve the academic achievement of students and ultimately lead to positive social change. As explained by Khan and Mushtaq (2012), the academic success of students is an indication of the quality of future leaders and social and economic development.

Summary

Education is a critical aspect of society, and academic achievement is the determining factor for educational success. Researchers have identified many academic and nonacademic factors that influence academic achievement. Researchers have established that many studies have investigated the individual influence of mindsets of intelligence and psychological needs satisfaction on academic achievement. However, there is no information in the literature on how these two nonacademic constructs combine to influence academic achievement.

Furthermore, researchers have not investigated how the satisfaction of psychological needs in the student-caregiver relationship influences academic

achievement. In chapter 1, I presented an overview of the study and identified the gap in the literature, which necessitates the current study. I also highlighted the potential of the results from this study to inform parents, policymakers, and teachers in practices that will enhance academic performance. Additionally, in chapter 1 I discussed the assumptions, scope, delimitations, and limitations of the proposed study and presented the research questions that I will answer using this study. In Chapter 2, I will present a thorough literature review of the variables and theoretical frameworks that are related to this study.

Chapter 2: Literature Review

Introduction

The decline in academic achievement in junior high school students has been well documented (e. g Anderson, Jacobs, Schramm, & Splittgerber, 2000; Blackwell, Trzesniewski, & Dweck, 2007; McGill, Hughes, Alicea, & Way, 2012; Wijsman, Warrens, Saab, van Driel, & Westenberg, 2015). Wijsman et al. (2015) found that there was a linear decline in the academic performance of both boys and girls from Grade 7 to Grade 9. Additionally, the National Assessment of Educational Progress (2015) reported that only 33% of eighth graders performed at or above the proficiency level in mathematics and 34% in reading, which marked a 2% decline from 2013. Among junior high students, researchers also noted a decline in intrinsic academic motivation, which led to a decrease in academic achievement (Gnambs & Hanfstingl, 2015; Gottfried, 1985; Lepper, Corpus & Iyengar, 2005; Lloyd & Barenblatt, 1984). This decline in academic achievement in lower secondary education is not limited to the West but has also been observed in Switzerland, the Czech Republic, the Netherlands, and East Germany (Peetsma, Hascher, van der Veen, & Roede, 2005). The purpose of this study was to examine the relationship between perceived psychological needs satisfaction in the relationship with caregivers, mindsets of intelligence, and academic achievement among Dominican secondary school students, ages 11–15.

In this chapter, I will begin with an explanation of the search strategy used to conduct the literature review, followed by an explanation of the theoretical framework used for this study. The theoretical framework will include a historical overview of the

self-determination theory, which will include its fundamental tenet of basic psychological needs satisfaction. Additionally, I will give a historical overview of the mindsets of intelligence theory and its subcomponents of the growth mindset of intelligence and the fixed mindset of intelligence. Finally, I will synthesize literature that explores the relationship between academic achievement and psychological needs satisfaction, and between academic achievement and mindsets of intelligence.

Literature Search Strategy

I Primarily used The Walden University Library to search for articles related to my study. During this literature review, I searched the following databases: PsycINFO, Education Source, Academic Search Complete, ERIC, PsycEXTRA, and PsycARTICLES. I conducted a complete review of the literature however the focus was on the last five to seven years (2012–2018). I limited my databases search to only peer-reviewed articles and journals and government websites. I searched using the initial key terms of *academic achievement, academic performance basic psychological needs satisfaction, BPNS,* and *mindset of intelligence*. I combined these key terms in the following ways using Boolean connectors to refine the search. *Academic achievement OR academic performance AND middle school OR Junior High School. Academic achievement OR academic performance AND Psychological needs satisfaction OR SDT OR self-determination theory*.

I also explored the SDT official website, which was created and maintained by the theorists who developed SDT. This website contains the listings of all articles with studies that applied the SDT. After reading these articles and noting that psychological

needs satisfaction was not directly linked to academic achievement but was linked to other constructs that influenced academic achievement, I modified the key terms that I used in the previously mentioned databases. The new key terms included; *basic psychological needs satisfaction AND intrinsic motivation*; *basic psychological needs satisfaction AND students' wellbeing AND adolescence;* and *psychological needs satisfaction AND academic engagement*. I then combined the different keywords with academic achievement. Additionally, I used the reference list of relevant articles as a means of obtaining more articles that were relevant to my study.

Theoretical Foundation

Self-Determination Theory

I used the SDT developed by Deci and Ryan (1985) to ground this study. At its core, SDT is fundamentally a motivational theory that evolved from the cognitive evaluation theory (CET; Deci, 1975), an intrinsic motivational theory that explores the impact of social contexts on intrinsic motivation. In a personal communication, Ryan explained that the CET was further developed and expanded by a collaborative effort, into the organismic integration theory (OIT) and the causality orientation theory (COT). The author went on to explain that these three mini theories initially made up the foundation of the SDT theory. However, since 1985, these theories have expanded in scope and depth to include the basic psychological needs theory (BPNT), goal contents theory (GCT), and relationship motivation theory (RMT) (R. Ryan, personal communication, April 4th, 2018). Consequently, the SDT theory is composed of six mini theories that focus on extrinsic and intrinsic motivation and stated that human beings are

motivated by the need to grow, and to attain this growth, a sense of competence, relatedness, and autonomy is needed (Deci & Ryan, 1985).

Deci and Ryan (1985) identified autonomy, competence, and relatedness as basic psychological needs that must be met for one to experience an ongoing sense of well-being. Autonomy refers to a person's sense of freedom or free will in their choices, which reflects their innate desires (Deci & Ryan, 2000; Deci & Ryan, 2002). Deci (1975) and White (1959) both defined competence as the resulting affect of effectively interacting with one's environment. Baumeister and Leary (1995) explained relatedness as the need to form and maintain bonds, interpersonal relationships, social connectedness, and to belong to a community. SDT posits that the need for autonomy, competence, and relatedness are integral to optimal human psychological development and functioning (Deci & Ryan, 2000), and for an individual to experience wellbeing in any aspect of their life, these basic psychological needs must be satisfied.

SDT was used by Gnambs and Hanfstingl (2015) to explain the effects of the satisfaction of basic psychological needs on intrinsic academic motivation (which predicts academic performance) over time. The authors found that when the school did not satisfy students' basic psychological needs, there was a corresponding decline in intrinsic academic motivation during adolescence. Guay, Ratelle, Larose, Vallerand, and Vitaro (2013) used the SDT to compare the French grades of students who have one or several autonomy-supportive relationships (father-student, mother-student, and teacher-student). The study revealed that students whose need for autonomy was met by all three relationships demonstrated a higher level of academic achievement than those whose

need for autonomy was only supported by one or two of these relationships (Guay, Ratelle, Larose, Vallerand, & Vitaro, 2013). Additionally, Zhen et al. (2017) conducted a longitudinal study with Chinese students between the ages of 10–18. In this study, the author examined different factors (competence, autonomy, relatedness, academic self-efficacy, and positive/negative academic emotions) that influence the level to which students engage in learning activities, which is a predictor of academic performance. The results of the study indicated that through self-efficacy and positive/negative emotions, the satisfaction of relatedness and competence positively predicted learning engagement. However, autonomy satisfaction was not significantly related to learning engagement.

In the context of education, psychologists agree that unmet psychological needs can result in disruptive behaviors, low academic performance, and low academic motivation (Diseth & Martinsen, 2003; Loyd, 2005). Therefore, to determine the conditions which enhance academic achievement or academic well-being, SDT is a necessary framework and appropriate foundation.

SDT relates to the present study in that it presents a framework for understanding the nonacademic factor of basic psychological needs and how they affect academic performance when combined with mindsets of intelligence. Malu and Reddy (2016) stated that psychological needs satisfaction affects other constructs, which then influences academic performance; My research questions build on that premise. This means that the present study has the potential to establish a link between the satisfaction of psychological needs, mindsets of intelligence, and academic achievement.

Mindsets of Intelligence

This study was also grounded in the mindsets of intelligence theory developed by Dweck (2006). Dweck (2006) explained that the mindset of intelligence theory emerged from a study that was designed to understand how students cope with failure. However, instead of observing how children coped with failure, Dweck noticed that some students thrived when faced with failure and regarded it as a challenge and an opportunity to learn, while others avoided challenges. These observations caused Dweck to probe deeper into the belief system of these children, and a pattern emerged. The author discovered that what an individual believed about their intelligence and the learning process greatly influenced their level of success (Dweck, 2006). This theory explained that individuals' mindsets or beliefs in their abilities and intelligence was one of the main determining factors of their achievement.

The two major concepts of the mindsets of intelligence theory are *growth* or *incremental mindset of intelligence* and *fixed* or *entity mindset of intelligence.* The fixed mindset of intelligence states that intelligence is a stable trait, and everyone is endowed with a certain level of intelligence that cannot be altered (Dweck, 2006). On the other hand, the growth mindset of intelligence posits that intelligence is malleable and can be developed and increased (Dweck, 2015). The author explained that the fixed mindset of intelligence induces an urge to avoid challenges and validate that intelligence, whereas a growth mindset of intelligence encourages the desire to learn (Dweck, 2000)

In a recent study, Claro, Paunesku, and Dweck (2016) investigated the influence of poverty on mindsets of intelligence and found that there was a significant link between

students' mindsets of intelligence and their socioeconomic status. Romero, Master, Paunesku, Dweck, and Gross (2014) looked at the role that mindsets of intelligence played in equipping middle school students to deal with the social, academic, and developmental challenges inherent to that transitional period. The authors found that the student's mindsets of intelligence predicted their academic performance and the likelihood of taking on advanced courses. Alternatively, Bahník and Vranka (2017) found that, when a group of college students applied the mindset of intelligence theory, the student's mindsets of intelligence were not significantly related to their academic achievement. These findings supported one of the basic tenets of the mindset theories, which emphasized that mindsets of intelligence only influence academic performance in the face of adversity, as is characterized by the transitions from primary school to secondary school (Dweck, 2015).

This theory was an appropriate choice for the current study as it provided another framework geared towards understanding other factors that influence academic achievement. This theory also focused on junior high school students and their academic achievement as they transition from primary school, which was also the focus of the current study.

Academic Achievement and Psychological Needs Satisfaction

After a thorough review of the literature, the study by Guay, Ratelle, Larose, Vallerand, and Vitaro (2013) was the only study that directly linked psychological needs satisfaction to academic achievement, as previously discussed. Instead, previous research has focused on how satisfaction of basic psychological needs creates the conditions that

are conducive to academic performance by influencing constructs that are directly linked to academic achievement (Malu & Reddy, 2016). Some of these identified constructs include intrinsic motivation (Gnambs & Hansfsting, 2016), learning engagement (Saeki & Quirk, 2015), and students' school-related subjective well-being (Tian & Chen & Heubner, 2013).

Intrinsic Motivation

Deci and Ryan (2000) explained that when the basic psychological needs are satisfied, individuals are motivated to excel in every aspect of their lives, and intrinsic motivation is enhanced. The authors identified intrinsic motivation as one of the catalysts to educational achievement and defined it as the act of engaging in behavior for no other purpose, but the inherent enjoyment contained in that behavior or activity (Deci & Ryan, 2000). Gottfried et al. (2001) found that there is a steady decline in intrinsic motivation among students ages 9 –16 years old. These findings were also supported by Gnambs and Hansfsting (2016), who found a similar trend in students between the ages of 11–16 with the most significant decline among students ages 13–14. Gnambs and Hansfsting (2016) explained that the satisfaction of the basic psychological needs did not result in a higher level of intrinsic motivation. Instead, it only stopped a decline in motivation. Additionally, Taylor et al. (2014) found that there is a linear relationship between intrinsic motivation and academic achievement in high school students. Alternatively, Malu and Reddy (2016)'s study was one of the only studies that found that there was no relationship between these two constructs.

Academic Engagement

Student academic engagement refers to the active involvement of students in the learning process (Lei, Cui, & Zhou, 2018). The influence of psychological needs satisfaction on students' academic engagement has been well documented. In a sample of Canadian students with an average age of 11.8 years, Wilson et al. (2012) explained that the satisfaction of all three psychological needs positively and significantly predicted students' engagement. Yu, Li, and Zhang (2015) fully supported these findings, while Zhen et al. (2017) found that with a sample of Chinese students between the ages of 10–18, only the relatedness and competence need positively predicted students' engagement. The authors also noted that the satisfaction of the autonomy need had no effect on the academic engagement of the students and attributed his findings to the collectivistic culture of the students.

Additionally, researchers have empirically established a positive relationship between students' academic engagement and their resulting academic performance. In a meta-analysis conducted by Lei, Cui, and Zhou (2018), the authors investigated the relationship between academic engagement and academic achievement. This meta-analysis revealed that an increase in students' academic engagement increased academic performance.

Well-being

Students' evaluation of their emotional experiences at school is a measure of their school-related subjective well-being, as explained by Taylor et al. (2014). The authors explained that school-related subjective well-being takes into consideration how satisfied

students feel with their school experiences and the emotions that they associate with school (Taylor et al., 2014). Studies conducted with junior high school students established a strong relationship between psychological needs satisfaction and school-related well-being. For example, Tian, Chen, and Heubener (2013) found that as the level of psychological needs satisfaction increased, so did school-related subjective well-being. These results were also replicated with a Chinese population of junior high students (Li & Feng, 2018). Additionally, Tian, Chen, and Heubener (2013) found a positive link between school-related subjective well-being and academic achievement in early adolescence.

Academic Achievement and Mindsets of Intelligence

Mindsets of intelligence was another of the nonacademic constructs that have been linked to academic performance. Researches have extensively studied the decline in academic performance of students in their transition to secondary school (Barber & Olsen, 2004; Blackwell, Trzesniewski & Dweck, 2007; McGill, Hughes, Alicea & Way, 2012; Wampler, Munsh & Adams, 2002; Wijsman et al., 2015). Researchers attributed this decline to the developmental, academic, and social challenges which are associated with this transitional period (Dweck, 2015; Romero, Master, Paunesku, Dweck, & Gross, 2014; Wampler, Munsh & Adams, 2002). However, research has shown that this decline in grades was not evident with every child (Wampler, Munsh & Adams, 2002). Some students, despite the inherent challenges associated with this transitional period, seemed to excel academically. Dweck (2015) postulated that students' mindset of intelligence determined whether they excel or decline academically.

Researchers observed that students with both fixed and growth mindsets of intelligence demonstrated equal academic excellence in elementary school. However, those with a growth mindset of intelligence continued to thrive academically under the inherent pressure associated with middle school (Dweck, 2015; Stipek & Gralinski, 1996). Alternatively, the students with a fixed mindset of intelligence, when faced with the challenges of middle school, showed a decline in their academic performance (Dweck, 2006). Claro, Paunesku, and Dweck (2016) investigated whether the influence of students' mindsets of intelligence on academic achievement was the same across different socioeconomic levels. The authors found that the effects of the mindsets of intelligence on academic achievement was the same at every socioeconomic level, gender, and culture. For example, in their sample, the authors observed that in every SES, there were students with both the growth mindset and the fixed mindset. However, those with a growth mindset always outperformed those with a fixed mindset. Additionally, it was noted that the base abilities of students with both growth and fixed mindsets are in some cases, similar and their mindsets of intelligence only influence their academic performance when they are faced with challenges (Bahnik & Vranka, 2017; Blackwell, Trzesniewski, & Dweck, 2007).

Elementary School Students and Mindsets of Intelligence

Researchers have shown that younger students were more likely to have a growth mindset of intelligence than older students (Black, 2008; Leondari, & Gialamas, 2002; Tarbetsky, Collie, &Martin, 2016). Dweck (2006) explained that the idea of a growth

mindset could be observed in toddlers as they learn to walk, talk, and achieve other milestones. Dweck (2006) described that when toddlers fell from attempting to walk, they quickly got back up and kept trying. Dweck (2016) likened this innate tendency to learn and explore even in the face of adversity as the foundation of the growth mindset. However, the author postulated that as these toddlers developed and became more aware of their environment and others' evaluation of them, either this growth mindset persisted or changed into a fixed mindset where challenges were avoided instead of embraced (Dweck, 2006). Chen (2012) explained that during early adolescence, children's' belief about ability merged with other belief systems and began to form meaning systems. Consequently, mindsets of intelligence beliefs do not begin to influence academic performance until around ages 10–12.

Dweck (2006) stated that the effects of mindsets of intelligence on students' academic performance could only be observed in times of great adversity, which is inherent to the early adolescent years and the transition to high school. Dweck (2006) explained that students with a fixed mindset of intelligence are engrossed in proving their intelligence instead of learning. The author stated that when faced with challenges, such as the transition to high school, students with a growth mindset of intelligence relished the opportunity to learn from these challenges. They viewed challenges and mistakes as opportunities for growth, learning, and development. Alternatively, students with a fixed mindset of intelligence, when faced with challenges, avoided those challenges because of their fear of failure, and of making mistakes, which to them, is a reflection of their

abilities and who they are. Therefore, in the face of adversity, these students usually refrained from trying.

Black (2008) investigated the influence of mindsets of intelligence on academic performance with a sample of third and fifth graders from a dual language classroom, whose native language was not English. The results of the study showed that the students with a growth mindset were less likely to experience a decline in their academic achievement, and were more likely to continue to excel academically as they progressed through school than the students with a fixed mindset. Black (2008) went on to explain that because of the challenges that are associated with being in a dual language classroom, the student's mindset of intelligence had a positive influence on their academic achievement. The author posited that although these were elementary school students, the additional challenges they faced and not their grade level or age was what determined the influence that their mindsets had on their academic achievement.

The influence of mindsets of intelligence on literacy achievement in elementary school students was explored and revealed contradicting results. Anderson (2017) found that mindsets of intelligence were a significant predictor of literacy scores and reading achievement in elementary school students from Grades 4 to Grade 6. These results were also supported by Law (2009), who investigated a sample of fifth-grade Chinese students and Pepi, Alesi, and Geraci (2004) also observed a great improvement in reading comprehension with third-grade students who held a growth mindset. Additionally, Saia (2016) explained that there was a significant increase in the literacy skills of first-grade students when they were taught a growth mindset,. Guich (2007) also observed in a

sample of first graders, that those with a fixed mindset of intelligence had lower reading scores than those with a growth mindset of intelligence.

Alternatively, in a sample of third, fourth, and fifth-graders, Wilson (2016) found no relationship between the student's mindsets of intelligence and their reading scores. The same results were observed by Clevenger (2013) with a sample of students from Grades 4 to Grade 8. Additionally, Boyars (2016) found no relationship between a growth mindset of intelligence and literacy achievement with a sample of elementary students from the third, fourth, and fifth grades. As evident in the studies above, the observed relationship between mindsets of intelligence and academic performance in elementary school students was inconsistent at best.

Middle School Students and Mindsets of Intelligence

As previously outlined, the influence of mindsets of intelligence on the academic performance of middle school students consistently supported by researchers who used samples from an industrialized population. Da Fonseca et al. (2009) found that French middle school students between the ages of 11–16 who had a fixed mindset of intelligence did not perform as well in mathematics as did the students with a growth mindset. These results were replicated by Curry, Elliot, Da Fonseca, and Moller (2006) with 12–14 years old French students and Curry, Da Fonseca, Zahn, and Elliot (2008) with French students ages 13–15. Additionally, Tarbetsky, Collie, and Martin (2016) found that growth mindset positively predicted academic performance in a sample of Australian students from

Grades 7 to Grade 9, with an average age of 13.7 years. American middle school students from Grades 6 to Grade 8 who had a growth mindset of intelligence performed better on English and Mathematics standardized tests, as opposed to those with a fixed mindset (Volpe, 2016). These findings were also supported by Diseth, Meland, and Breidablik (2014), who found a positive correlation between the growth mindset and academic achievement in a sample of eighth-grade students.

High School Students and Mindsets of Intelligence

The findings of mindsets of intelligence influence on academic performance were inconsistent as it related to high school students. After investigating a sample of gifted and talented students between the ages of 16–17, Cadwallader (2009) found that the students with a fixed mindset of intelligence outperformed the students with a growth mindset of intelligence. The above finding was in stark contrast to the findings of other studies. De Castella and Byrne (2015) conducted a study using a sample of high school students ages 15–19. The authors confirmed Dweck's (2015) hypothesis, which stated that students with a fixed mindset have lower academic achievement than the students with a growth mindset. Alternatively, Dixson, Roberson, and Worrell (2017) found that in a sample of high achieving African American high school students ages 14–18, the growth mindset of intelligence was not significantly related to academic achievement. This result was also supported when Williams and Dortch (2011) studied a sample of African American students from Grades 9–12 and found that there was not a significant relationship between the student's mindset of intelligence and their academic

achievement. Contrary to these findings, Jones, Wilkins, Long, and Wang (2011) found that students with a growth mindset had better math scores than the students with a fixed mindset in a sample of ninth graders. Mouratidis, Michou, and Vassiou (2017) also had the same results with a sample of students from Grades 10–12, with an average age of 16 years.

The Malleability of Mindsets

Dweck (2006) explained that mindsets are learned behavior, and students can be taught a new mindset. The author stated that when students with fixed mindsets were taught a growth mindset, their academic performance improved (Dweck, 2000; Dweck 2006; Dweck 2015). Bettinger, Ludvigsen, Rege, Solli, and Yeager (2018) conducted a study in which high school students were engaged in a growth mindset intervention. During this intervention, the students were taught the principles of the growth mindset—essentially, that they could develop their intelligence if they exerted enough effort into learning, and intelligence was not a fixed trait. The authors found that there was a significant increase in the student's grades after the growth mindset intervention. The researchers also noted that the students who entered the intervention with a fixed mindset of intelligence were the main beneficiaries of the intervention as their grades improved post-intervention. Alternatively, the students who already had a growth mindset before engaging in the intervention did not show a significant increase in their academic performance (Bettinger et al., 2018). These results were replicated in several other studies; (Blackwell, Trzesniewski, & Dweck, 2007; Paunesku et al., 2015; Good,

Aronson, & Inzlicht, 2003; Yeager, Johnson, Spitzer, Trzesniewski, Powers, & Dweck, 2014; Yeager, Romero, Paunesku, Hulleman, Schneider, & Hinojosa et al., 2016).

Hong et al. (1999) was the only study that showed that when students' mindsets were manipulated, it changed their academic-related behaviors, which influenced their academic achievement. In this study, the students were randomly assigned manipulated mindsets of intelligence articles to read. The fixed mindset article presented evidence that intelligence was a fixed trait, while the growth mindset article presented evidence that intelligence was malleable. The researchers then gave the students' practice problems to complete. These problems were chosen specifically because of their difficult nature. After the students completed the problems, the experimenters gave half of the student's positive feedback, and the other half received negative feedback. The experimenters also presented a tutorial that could help increase the scores of the students. The researchers found that in the group of students who received negative feedback, only 13% of students who read the fixed mindset article were interested in taking the tutorial in comparison to 73% of the students who read the growth mindset article. The researchers also found that in the group of students who received positive feedback, 67% of the students who read the fixed mindset article wanted to do the tutorial along with 73% of those who read the growth article. When the students received positive feedback, those with fixed mindsets were just as likely to do the tutorial as those with a growth mindset. The authors explained that positive feedback was an indication to the fixed mindset students of their ability to do well and it reinforced to them that they had already done well. However, when faced with negative feedback the students with a fixed mindset were not interested

in the tutorial that could improve their grades because the feedback was an indication to them that they were unable to do well because they had already failed (Hong et al.,1999).

While the malleability of the mindsets of intelligence was supported (Dommett, Devonshire, Sewter, & Greenfield, 2013; Donohoe, Topping, & Hannah, 2012), its effect on academic performance was not consistent. In a growth mindset intervention study conducted by Brougham (2016) with ninth-grade students, the results indicated that after the students completed the intervention they adopted a growth mindset. However, there was no corresponding increase in their GPA's from one semester to the next. Guathreaux (2015) also observed that there was no change in mindsets or academic performance after a growth intervention with seventh-grade students. This lack of improvement in academic achievement after a growth mindset intervention was replicated in many other studies (Saunders, 2013; Wilkins, 2014; Wilson, 2016).

Donohoe, Topping, and Hannah (2012) explained that while growth mindset interventions changed the mindsets of students ages 13–14, these changes were short-lived, and the students eventually revert to their pre-intervention mindset. The authors found that one-year post-intervention, there was no change in the academic performance of these students. Similarly, Dommett et al. (2013) demonstrated that seven months after a growth mindset intervention with students aged 11–12, there was an increase in the students who endorsed a growth mindset, but there was no corresponding increase in academic performance. However, 19 months post-intervention, the researchers observed an increase in academic performance. Rienzo et al. (2015) also found that there was no corresponding improvement in fifth-grade students' grades after a growth mindset

intervention. These findings were also supported in a meta-analysis conducted by Sisk et al. (2018), who confirmed that mindsets interventions did not significantly improve academic achievement for adolescents. This was the case for students facing challenges, and for typical students. However, growth mindset interventions positively impacted the academic performance of academically high-risked students and those who were economically disadvantaged.

Researchers also observed the ineffectiveness of mindsets of intelligence interventions in students from developing countries. Chao, Visaria, Mukhopadhyay, and Dehejia (2017), using third graders from schools in India, found that the growth mindset did not increase or predict positive academic achievement. This study indicated that the growth mindset influenced positive academic performance only when there was an incentive system that promoted feelings of autonomy with students. The findings of this study were corroborated by Zhoa (2014), who found that Chinese students between the ages of 12–16 whose mothers were autonomy supportive of their academics had growth mindsets and better academic performance.

Summary

The review of the literature indicated that basic psychological needs satisfaction influenced intrinsic academic motivation, academic engagement, and students' well-being, which in turn influenced academic achievement. Additionally, the relevant studies only looked at the satisfaction of basic psychological needs provided by teachers to students in a classroom setting, and how the satisfaction of those needs influenced other constructs and, ultimately, academic achievement. This left a significant gap in the

literature and little insight on how the satisfaction of students' basic psychological needs satisfaction by their caregivers in the home setting, influenced academic achievement.

There was evidence that supported the malleability of mindsets of intelligence, the influence of mindsets of intelligence on academic achievement, and the impact of growth mindset interventions on academic achievement. However, the review of the literature suggested that there may be other factors that inhibit or encourage the effectiveness of the growth mindset and its influence on academic performance. Additionally, the appropriate timeframe for an increase in academic performance after a growth mindset intervention, and the factors that influence this timeframe were not determined. There were many inconsistencies in the influence of mindsets of intelligence on academic performance in developing countries.

The present study investigated the relationship between students' academic achievement and psychological needs satisfaction in a relationship with caregivers. This study also investigated how mindsets of intelligence combined with the satisfaction of basic psychological needs in relationship with caregivers, to influence academic achievement. In chapter 3, I will explain the research design and rationale, along with the methodology used for the current study. Additionally, I will identify and discuss the threats to validity.

Chapter 3: Research Method

Introduction

The purpose of this study was to examine the relationship between perceived psychological needs satisfaction with caregivers, mindsets of intelligence, and academic achievement of Dominican secondary school students, ages 11–15. In this chapter, I will describe the research design and rationale, the methodology of the research, the threats to validity and the ethical concerns of the proposed study

Research Design and Rationale

This was a quantitative study where I measured mindsets of intelligence and basic psychological needs satisfaction (autonomy, competence, relatedness, and the total need satisfaction score). There were five independent variables/predictors of academic achievement. For this study, I used a quantitative nonexperimental cross-sectional survey design. Creswell (2014) explained that non-experimental designs are appropriate for use when the proposed study is not an intervention study, variables will not be manipulated, and variables will be studied as they exist. Cross-sectional surveys are one type of data collection method which provides a rapid turnaround of data and requires data to be collected at one point in time, usually to make comparisons (Creswell, 2014). For the reasons above, a non-experimental cross-sectional survey design was the most appropriate for the study as it aligned with the purpose of the study. This design was also the most appropriate to adequately answer the research questions in this study and advance knowledge in the field. In similar studies where the relationship between psychological needs satisfaction and academic achievement was explored, the researchers

also used a survey method along with some form of longitudinal designs (Gnambs, & Hanfstingl, 2015; Tian, Chen, & Huebner, 2013; Yu, Li, & Zhang, 2015; Zhen et al., 2017). Researchers also used longitudinal surveys in studies that investigated the relationship between mindsets of intelligence and academic achievement (Blackwell, Trzesniewski, & Dweck, 2007).

Methodology

Target Population

The target population for this study was male and female secondary school students in the Commonwealth of Dominica, an English-speaking island in the Caribbean. According to an email from the Ministry of Education in the Commonwealth of Dominica, there are currently 15 secondary schools in Dominica, with a total of 4,641 students, 2,345 girls, and 2,326 boys ages 10 through 18. Of these 15 schools, six are government-assisted, two are private, and seven are government public schools.

The Dominican educational system is divided into three major sections: Mandatory Primary and Secondary school and optional Tertiary education. Primary school consists of seven grades from Grade K (Kindergarten) to Grade 6. The secondary school consists of five grades from forms 1–5, with students from ages 10–18. After graduation from secondary school, the students then move on to tertiary education.

Sampling and Sampling Procedures

I used non-probability purposive sampling to recruit participants for the study. Creswell (2014) explained that it is most appropriate to use this type of sampling strategy when the researcher needs to focus on specific characteristics of a population, that is

essential in answering the research questions. Specifically, I used homogeneous purposive sampling in this study. Researchers used this sampling strategy when they are interested in studying participants who share similar characteristics that are specific to the research questions and the purpose of the study. The sampling frame for this study was Dominican students in their third year of secondary school ages 11–15. Only the students who fit the criteria returned signed informed consent forms from their legal guardians, and who signs assent forms participated in the study.

I conducted a power analysis using G*Power software to determine the minimum sample size required for this study. An α (error probability or significance level) of .05, a power level of .95, and an effect size (f^2) of .15 (a medium effect size), with five predictor variables included in the power analysis. The suggested minimum sample size was 138 participants. I determined the effect size for this study using a meta-analysis conducted by Sisk et al. (2018), where the authors investigated the magnitude of the relationship between the mindsets of intelligence and academic achievement. The authors found an average effect size of $\overline{r}$ =.12 between adolescents' mindsets and GPA, which is a small effect size. However, the authors also explained that effect size was not consistent across studies, and there was a high degree of heterogeneity, which was not explained by moderators. Alternatively, Guay et al. (2013) found a medium effect size, η^2= .06 when they investigated the relationship between autonomy satisfaction by parents and teachers and academic performance. Based on the literature, I concluded that a medium effect size was appropriate for this study.

Procedures for Recruitment, Participation, and Data Collection

I received written permission from the Ministry of Education in the Commonwealth of Dominica to conduct this study. To maintain the anonymity of the participating schools, I did not include the permission letters in this document. However, I included the permission letters in the Walden Internal Review Board (IRB) application. After receiving approval from the IRB (05-15-19-0528732), over 2 weeks (from May 20th, 2019 to May 31st, 2019), I visited all seven government public secondary schools in the Commonwealth of Dominica and one government-assisted secondary school. At these schools, I distributed approximately 500 parental informed consent and legal guardian demographic forms to students in their third year of secondary school. One hundred and seventy students returned signed parental consent forms. The other students reported that they either forgot to ask their parents to sign the consent forms, forgot to return the signed consent forms, or their parents refused to sign the consent forms. One hundred and seventy students returned signed consent forms. Among the students who returned signed consent forms, 10 decided to not participate in the study, and 160 completed the surveys. Among the students who completed the survey, 15 did not meet the inclusion criteria, and I eliminated two due to missing data. The final participants in the study were 143 students.

The day before I started recruiting, I met with the principal of three of the government public high schools located in the Northern, Northeastern, and Eastern part of Dominica. At that meeting, I discussed my study with the principals, and each principal designated someone who would be responsible for providing me with the

students' grades. At that meeting, I finalized the time of the participants' recruitment and data collection procedure, and a classroom for both of these events was designated. After visiting the first three secondary schools, I did not receive the minimum required participants. Therefore, data collection continued at five more secondary schools located in the Northern, Southern, and Western part of Dominica, until I reached the minimum required number of participants.

At three of the schools, the secretary was assigned to give grades, at three other schools, a staff member was assigned, for one school I received the grades from the Ministry of Education in Dominica, and at the final school, the principal was the only person with access to these grades and therefore was the designated person. The participant recruitment and data collection times were different for each school. I met with the students either before classes started for the day, during the break period, between class periods, or at the end of the school day.

The data collection process for each school took place within a 2-day time frame. On the first day, the students were given parental consent forms to take home to their parents. The next day, I returned to the schools and collected the signed consent forms from the students who returned them. I explained the study to the students and allowed them to ask questions. I then asked the students who agreed to participate in the study to sign assent forms, complete a demographic questionnaire, the Basic Psychological Needs Satisfaction in Relationship questionnaire, and the Implicit Theory of Intelligence questionnaire. I assigned each student a unique ID number and noted that number on their questionnaires. I passed around a blank sheet of paper and asked the participants to print

their names and their assigned ID number on that paper. I then gave this list to the designated person at each school who was responsible for providing the grades. I was then given a list that included the student's ID numbers and their final grades for English, math, and science from their first and second years of secondary school. The student's names were not included on that list.

Instrumentation and Operationalization of Constructs

Academic Achievement

Academic achievement was measured using archival data of 3rd-year students' final grades in mathematics, English, and science from their first and second years of secondary school. There was a total of two grades for each subject, one for each school year. For example, there was a final grade for mathematics for the students' first year at secondary school, and another final grade in mathematics for the students' second year in secondary school.

In the Commonwealth of Dominica, the academic year in both primary and secondary schools consist of three terms; September to December, January to the middle of April, and the middle of April to July. At the end of the first term, the student obtains two grades per subject: a term grade (representative of the work the student completed during the term) and an end of term final exam grade. At the end of the second term, the student only receives a term grade, and at the end of the third term, the student also receives a term grade and an exam grade. However, the final exam in the third term is a cumulative exam that is inclusive of all three terms. Although the final exams are not standardized, every high school across the island uses the same curriculum, which

corresponds to his or her grade level and subject. At the end of the school year, the students receive a final grade for each subject, which is an average of the five grades received throughout the school year (two from the first term, one from the second term and two from the third term).The teachers record the students grades into the Education Management Information System (EMIS), which is maintained by the Ministry of Education and Human Resource Development in the Commonwealth of Dominica. Each student is assigned a unique EMIS number and them along with their parents, and the principal has access to the EMIS database.

Basic Needs Satisfaction in Relationship Scale

Psychological needs satisfaction in the relationship with caregivers was measured using the Basic Needs Satisfaction in Relationships Scale BNSR-S (La Guardia, Ryan, Couchman, & Deci, 2000). The BNSR-S is a 9-item scale rated on a 7-point Likert scale ranging from not at all *true* to *very true*. This scale is based on the SDT and assesses the degree to which an individual feel that their needs for autonomy, competence, and relatedness are satisfied with target individuals. This scale provides three scores corresponding to each of the subscales (autonomy, competence, relatedness) with higher scores being an indication of satisfied needs. Deci and Ryan (2000) explained that autonomy is the need to have some level of control over one's life, relatedness refers to the need to belong, and competence is the need to feel that one has mastered their environment. The scale includes three items for autonomy, three items for competence, and three items for relatedness. Sample items include:

1. When I am with my caregiver, I am free to be who I am (autonomy subscale)

2. When I am with my caregiver, I feel like a competent person (competence subscale)
3. When I am with my caregiver, I feel loved and cared about (relatedness subscale)

This instrument was appropriate for use in my study as I explored the extent to which the students felt like their basic psychological needs were satisfied in relationship with their caregivers.

La Guardia, Ryan, Couchman, and Deci (2000) tested this scale with a sample of college students and assessed their basic needs satisfaction in their relationships with their mothers, fathers, romantic partners, best friends, roommates, and other significant adults in their lives. Internal consistency values for each relationship studied were α .91, .94, .88, .85, and .90 respectively

Concurrent validity of BNSR-S was demonstrated by La Guardia, et al. (2000), who found that needs satisfaction was highly correlated with attachment, with correlation values that ranged from $r = .46$ to $r = .65$ (*ps* <.001). Additionally, the authors found that across a variety of relationships (mother, father, romantic partner, best friend, roommate, adult figure) needs satisfaction was positively and significantly correlated with attachment, with correlation values that ranged from $r = .59$ to $r = .79$ (*ps* <.001). (LaGuardia, et al., 2000).

Researchers found that when psychological needs are satisfied, intrinsic motivation is enhanced (Deci & Ryan, 2000; Gnambs & Hansfsting, 2016), and academic achievement increases (Taylor et al., 2014). Researchers reported a similar relationship

between needs satisfaction, academic engagement and academic achievement (Wilson et al., 2012; Yu et al., 2015; Zhen et al., 2017; Lei et al., 2018), and needs satisfaction, well-being and academic achievement (Tian et al., 2013; Li & Feng, 2018). The above studies are an indication of the importance of needs satisfaction construct in predicting academic achievement. The BNSR-S is valid and reliable, is in the public domain, and the developers permitted me to use the scale in the present study.

Implicit Theory of Intelligence Scale

Mindsets of intelligence was measured using the 3-item Implicit Theory of Intelligence Scale (Dweck, Chiu & Hong, 1995). The developers of this scale did not respond to the request for permission to use the scale in this study. However, the scale is in the public domain. The Implicit Theory of Intelligence Scale has been used with both adult and children population and measures ones' belief about intelligence. This measure is rated on a 6-point Likert scale ranging from strongly agree to strongly disagree. The three items on the implicit theory of intelligence scale were;

1. You have a certain amount of intelligence, and you cannot really do much to change it.
2. Your intelligence is something about you that you cannot change very much.
3. You can learn new things, but you cannot really change your basic intelligence.

Dweck et al. (1995) explained that this scale provides one score, with scores less than 3.0 indicating a fixed mindset of intelligence which means that intelligence is a stable trait that cannot be altered, and scores higher than 4.0 indicating a growth mindset

of intelligence which means that intelligence is malleable and can be developed and increased. Scores between 3.0 and 4.0 indicate a mixed mindset of intelligence. Dweck et al. (1995) went on to explain that the implicit theory of intelligence scale has high internal reliability with alphas ranging from .94 to .98 from 6 different reliability studies with sample sizes ranging from 32 to 184. The test-retest reliability, which was done over a 2-week interval, was r = 0.80 (Dweck, Chiu & Hong, 1995).

To indicate predictive validity of the Implicit Theory of Intelligence Scale, researchers found that there was a significant difference between students who held a fixed mindset of intelligence and those who held a growth mindset of intelligence (Henderson & Dweck; 1990; Hong, Chiu, Dweck, Lin & Wan, 1999). The researchers reported that students who had a fixed mindset of intelligence usually attributed their academic failures or negative feedback to their intellectual ability, whereas those with a growth mindset of intelligence attributed theirs to lack of effort (Henderson & Dweck; 1990; Hong et al.,1999). Additionally, Hong et al. found that students with a growth mindset of intelligence who performed poorly on an English exam were significantly more likely to take a remedial course to improve their grades than the students with a fixed mindset of intelligence, who also performed poorly on that exam. Therefore, I concluded that the implicit theory of intelligence scale was reliable and valid.

Data Analysis Plan

The purpose of this quantitative study was to examine the relationship between perceived psychological needs satisfaction with caregivers, mindsets of intelligence, and academic achievement of Dominican secondary school students, ages 11–15. I used the

Statistical Package for the Social Sciences (SPSS) software student version 16.0 to conduct the statistical analysis.

I performed the following screening of the data before the data was analyzed using multiple linear regression. I tested the data for linearity (Warner, 2013), which meant that there was a linear relationship collectively between the independent (mindsets of intelligence, and basic psychological needs satisfaction) and the dependent (academic achievement) variables. In addition, each independent variable should be linearly related to the dependent variable. This was done using a scatterplot procedure in SPSS. All the relationships were linear, therefore, I used the scatterplot previously mentioned to test for homoscedasticity.

There was homoscedasticity, so I checked the data for multicollinearity. Multicollinearity occurs when independent variables are highly correlated with each other; this could result in difficulties in determining which of these independent variables contribute to the variance explained (Warner, 2013). To determine multicollinearity, I examined the correlation coefficients to ensure that the correlations for the independent variables were not greater than 0.7. Additionally, I examined the tolerance values for values that were greater than 0.1, which was an indication of no collinearity in the data set (Warner, 2013). The data showed no multicollinearity; I then tested the data for unusual points such as outliers, high leverage points, and highly influential points, as explained by Warner (2013). I did this test using casewise diagnostics. I then tested the data for the assumption of normality, as is required for multiple regression statistical tests (Warner, 2013). I did this using a normal Q-Q plot and the skewness and kurtosis values.

The following research questions and hypotheses were developed to assist in achieving the goal of the study.

Research Question 1 (RQ1): To what extent does the autonomy component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$1) Autonomy is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a1) Autonomy is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 2 (RQ2): To what extent does the competence component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$2) Competence is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a2): Competence is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 3 (RQ3): To what extent does the relatedness component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in

Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$3) Relatedness is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a3) Relatedness is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 4 (RQ4): To what extent does psychological needs satisfaction (total score), as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$4) Psychological needs satisfaction is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a4) Psychological needs satisfaction is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 5 (RQ5): To what extent do mindsets of intelligence as measured by the Implicit Theory of Intelligence Scale, relate to academic achievement as measured by the term grade in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$5) Mindsets of intelligence is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a5) Mindsets of intelligence is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Standard multiple regression was the most appropriate statistical test for this stud, as it allowed me to predict a continuous dependent variable based on multiple independent variables. Multiple regression also allowed me to determine the contribution of each independent variable on the total variance explained. Additionally, standard multiple regression required me to give the independent variables equal priority when I enter them in the regression model.

Threats to Validity

On September 18th, 2017, the Dominican High School students experienced a destructive category-five hurricane, which left 90% of buildings destroyed or damaged (Knight 2017). Students were not completely back at school until January 2018. Additionally, students were left without homes, electricity, internet, and other educational resources such as textbooks and school supplies. As a result of Hurricane Maria, to date, there are still students who are without electricity, internet services, functional homes, and other resources, which are essential for optimal educational productivity. This trauma may have negatively influenced the grades of the students because of the inaccessibility of the resources needed to perform well at schools such as electricity for studying and doing homework, and the internet for researching. Therefore, the extent to which that experience influenced their grades was uncertain, and the observed trend in grades may

not be a direct result of their mindsets of intelligence or the satisfaction of their basic psychological needs.

I measured students' mindsets of intelligence and their basic psychological needs satisfaction in their third year of secondary school. However, the grades which I used for the study were from their previous 2 years of secondary school. As noted in the literature, mindsets of intelligence can be a very dynamic construct. Therefore, there was a possibility that the student's mindsets of intelligence did not remain constant over the past 2 school years and at the time of testing may be different from the previous 2 years.

The most salient threats to the validity of this study were its design and the type of sampling strategy that I chose. Purposive sampling is a non-probability sampling strategy that limits the researcher's ability to generalize the results of a study, thus affecting its external validity. Additionally, the correlational design of this study did not allow me to manipulate the variables, which decreases the internal validity of the study. Manipulating the variables in this study would have been unethical. Therefore, the correlational design was the most appropriate design for this study as it allowed me to measure the variables as they occurred in the real world.

Ethical Procedures

Before I started collecting data, I obtained permission from Walden's IRB. To initiate that process, I completed and submitted an IRB application. I Included in that application, written permission from the Ministry of Education in the Commonwealth of Dominica to use the students of the secondary schools as participants of the study. I also

gave an in-depth report of all ethical concerns related to the recruitment, materials, and processes of study and the ways I would address these concerns.

There was also a possible threat to the statistical conclusion validity, which may occur because of inaccurate inferences made by me. These inaccurate inferences may be a consequence of the violation of one or more assumptions of the standard multiple regression statistical test, or from inadequate statistical power, as explained by Creswell (2014).

I chose surveys that were appropriate for the grade and age levels of the participants of the study. However, the students were encouraged to ask questions if they did not understand any of the questions. The students' identity was concealed to protect their privacy. To achieve this, I did the following. I did not use the students' names in the study. Instead, I assigned unique identification numbers to each student. A pre-identified person used these identification numbers to match the students' academic achievement scores to the survey data. I will keep the collected data 3–5 years in a locked drawer at my home office, to which only I have access.

I ensured that the students who participated in the study submitted signed consent forms from their legal guardians and assent forms. When seeking parental consent, I ensured that the following was done in agreement with the Belmont report. I gave adequate information about the study. This information included an explanation of the purpose of the study and its anticipated benefits. I also gave the parents and students an opportunity to ask questions. I also informed them that they did not have to participate in the study, and if they decided to participate, then they may withdraw from the study at

any time with no negative consequences. Additionally, I informed both parents and students that if there were any adverse effects from the study, the student/s would be taken to the on-campus school counselor for assistance.

Summary

In this chapter, I discussed the research design, methodology, and method of inquiry of the study. I used a quantitative nonexperimental cross-sectional survey design as the method of inquiry for this study. I recruited a sample of high school students ages 11– 15 using a purposive sampling strategy. I measured academic achievement using archival data of third-year students' final grades in mathematics, English, and science from their first and second years of secondary school. Additionally, I measured mindset of intelligence using the 3-item Implicit Theory of Intelligence Scale, and I used the 9-item BNSR-S to measure the participant's basic psychological needs satisfaction in relationship with their caregivers. In Chapter 4, I will explain the data collection timeframe, data collection methods, and procedures of the study. I will also give a detailed presentation of the results of the study.

Chapter 4: Results

Introduction

The purpose of this study was to examine the statistical association between perceived psychological needs satisfaction in relationship with caregivers, mindsets of intelligence, and academic achievement of Dominican secondary school students, ages 11–15. In this chapter, I will describe the research questions, data collection procedures for the study, and the descriptive and demographic characteristics of the sample. I will also present the statistical assumptions and results of the multiple regression analyses. The research questions and hypotheses that guided this study were:

Research Question 1 (RQ1): To what extent does the autonomy component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$1) Autonomy is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a1) Autonomy is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 2 (RQ2): To what extent does the competence component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in

mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$2) Competence is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a2): Competence is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 3 (RQ3): To what extent does the relatedness component of psychological needs satisfaction, as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$3) Relatedness is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a3) Relatedness is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 4 (RQ4): To what extent does psychological needs satisfaction (total score), as measured by the Basic Needs Satisfaction in Relationships Scale, relate to academic achievement, as measured by the term grades in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$4) Psychological needs satisfaction is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a4) Psychological needs satisfaction is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Research Question 5 (RQ5): To what extent do mindsets of intelligence, as measured by the Implicit Theory of Intelligence Scale, relate to academic achievement as measured by the term grade in mathematics, English, and science, among Dominican secondary school students ages 11–15?

Null Hypothesis ($H_0$5) Mindsets of intelligence is not a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Alternative Hypothesis (H_a5) Mindsets of intelligence is a significant predictor of academic achievement among Dominican secondary school students ages 11–15.

Data Collection

After receiving approval from Walden IRB, over 2 weeks, from May 20th, 2019 to May 31st, 2019, I visited all seven government public secondary schools in the Commonwealth of Dominica and one government-assisted secondary school. At these schools, I distributed approximately 500 parental informed consent and legal guardian demographic forms to students in their third year of secondary school. One hundred and seventy students returned signed parental consent forms. The other students reported that they either forgot to ask their parents to sign the consent forms, forgot to return the signed consent forms, or their parents refused to sign the consent forms. Among the students who returned signed consent forms, 10 decided to not participate in the study,

and 160 completed the surveys. Among the students who completed the survey, 15 did not meet the inclusion criteria, and I eliminated two due to missing data. The final participants in the study were 143 students, indicating a 29% response rate.

The day before I started recruiting, I met with the principal of three of the government public high schools located in the Northern, Northeastern, and Eastern part of Dominica. At that meeting, I discussed my study with the principals, and each principal designated someone who would be responsible for providing me with the students' grades. At that meeting, I finalized the time of participants' recruitment and data collection procedure, and a classroom for both of these events was designated. After visiting the first three secondary schools, I did not receive the minimum required participants. Therefore, data collection continued at five more secondary schools located in the Northern, Southern, and Western part of Dominica, until I reached the minimum required number of participants.

At three of the schools, the secretary was assigned to give grades, at three other schools, a staff member was assigned, for one school I received the grades from the Ministry of Education in Dominica, and at the final school, the principal was the only person with access to these grades and therefore was the designated person. The participant recruitment and data collection times were different for each school. I met with the students either before classes started for the day, during the break period, between class periods, or at the end of the school day.

The data collection process for each school took place within 2 days. On the first day, I gave the students parental consent forms to take home to their parents. The next

day, I returned to the schools and collected the signed consent forms from the students who returned them. I then explained the study to the students and allowed them to ask questions. I asked the students who agreed to participate in the study to sign consent forms, complete a demographic questionnaire, the Basic Psychological Needs Satisfaction in Relationship questionnaire and the Implicit Theory of Intelligence questionnaire. I assigned each student a unique ID number and noted that number on their questionnaires. I passed a blank sheet of paper around the class, and I asked the participants to print their names and their assigned ID number on that paper. I then gave the list to the designated person at each school who was responsible for providing the grades. I was then given a list that included the student's ID numbers and their final grades for English, math, and science from their first and second years of secondary school. The student's names were not included on that list.

Results

Descriptive Statistics

Most of the participants of this study (73.4%) were Black or of African descent, and 90% lived with their parents. Only 19% of the participant's legal guardians had an education beyond secondary school, and 53.8% reported a monthly income between $0.00 and $1,000 eastern Caribbean dollars (XCD). Among the participants of the study, 15.9% had no other siblings in the home, and 73.9% had between one and three other siblings at home. Frequency data for the demographic variables are shown in Table 1. The known population distribution for gender among third-year secondary school students in the Commonwealth of Dominica is 48.75% girls and 51.25% boys. However,

there was a higher proportion of female participants (63.6%) in the current study, as shown in Table 1**.**

The dependent variable for this study was academic achievement defined as students' final grades in math, English, and science, in their first and second years of secondary school. For the first year of secondary school, the students' average final grades in math, English, and science were 72.83, 71.22, and 71.60, respectively. However, for the second year of secondary school, there was a slight decline in the average final grades for math (67.76), English (70.60), and science (70.01). The descriptive statistics for the final grades are shown in Table 2.

The predictor variables for this study were the total score of psychological needs satisfaction, its subscales (autonomy, competence, and relatedness), and mindsets of intelligence. Psychological needs and its subscales were measured on a 7-point Likert scale with a minimum score of 1, indicating unsatisfied needs and a maximum score of 7, indicating a satisfied need. The average score for psychological needs satisfaction (total score), autonomy, competence, and relatedness are 5.26, 4.76, 5.47, and 5.55, respectively. I measured Mindsets of intelligence on a 6-point Likert scale with a score ranging from 1–6. Scores less than 3 indicated a fixed mindset, scores between 3 and 4 a mixed mindset, and scores greater than 4 a growth mindset. The average score for mindset of intelligence was 3.67, with a minimum score of 1.33 and a maximum score of 6. The descriptive statistics for the predictor variables are also shown in Table 2.

Table 1

Frequency Table for Demographic Characteristics of Sample

Variable	n	%
[a]Gender of Participants		
Male	52	36.4
Female	91	63.6
[a]Race of Participants		
Black/African descent	105	73.4
Carib/Kalinago	30	21.0
White/Caucasian	2	1.4
Other	6	4.2
[a]Age of Participants		
14 years	69	48.3
15years	74	51.7
[b]Education of Level of Legal Guardian		
Primary School	51	37.8
Secondary School	57	42.2
Associate Degree	15	11.1
Bachelor's Degree	9	6.7
Post Graduate Degree	3	2.2
[c] Monthly Income of Legal Guardian		
$0.00-$1,000	77	60.6
$1,000- $2,000	25	19.7
$2,000- $3,000	10	7.9
$3,000- $4,000	7	5.5
Above $4,000	8	6.3
[d]Other Siblings in the Home		
0	22	15.9
1	35	25.4
2	31	22.5
3	22	15.9
4	14	10.1
5	6	4.3
6	5	3.6
8	1	0.7
9	2	1.4

[a] N = 143
[b] N = 135
[c] N = 127
[d] N = 138

Table 2

Descriptive Statistics for Final grades, Psychological Needs Satisfaction, and Mindsets

Variable	*n*	*M*	*SD*	Minimum	Maximum
1st year English	143	71.22	9.58	49	92
1st year Science	142	71.60	9.56	48	93
1st year Math	143	72.83	13.88	38	96
2nd year English	143	70.60	9.80	42	97
2nd year Science	142	70.01	11.39	38	94
2nd year Math	143	67.76	13.68	25	95
Autonomy	143	4.76	1.64	1.00	7.00
Competence	143	5.47	1.34	2.00	7.00
Relatedness	143	5.55	1.35	2.00	7.00
Psychological needs satisfaction	143	5.26	1.14	2.33	7.00
Mindsets of intelligence	143	3.67	1.27	1.33	6.00

Evaluation of Statistical Assumptions

The assumptions of homoscedasticity, multicollinearity, outliers, and normality were evaluated before the multiple regression analyses were conducted. To assess homoscedasticity, scatterplots for each of the dependent variable subscales (first year and second-year math, English, and final science grades) were plotted using the standardized residuals against the standardized predicted values. Warner (2013) explained that the assumption of homoscedasticity was met when there is a lack of a clear pattern in the produced scatterplot. Figures 1–6 indicated that the assumption of homoscedasticity was met.

Multicollinearity occurs when there is a high correlation among predictor variables (Warner, 2013). Warner (2013) stated that tolerance values range from 0 to 1.

Warner (2013) went on to explain that a tolerance value of 0 is an indication of perfect multicollinearity, whereas a tolerance value of 1 indicates that there is no correlation among the predictor variables. Therefore, tolerance values less than 0.1, and VIF values greater than 10 is an indication that multicollinearity exists among predictor variables. To assess multicollinearity, I examined the Tolerance/VIF values. The tolerance values were all greater than 0.1, which indicated that there was no multicollinearity among the predictor variables, and the assumption of multicollinearity was met. The results are presented in Table 3.

To assess outliers, I evaluated the standardized residuals. The cutoff criteria I used to identify outliers were any scores greater than ±3 standard deviations. Upon evaluation, there were two outliers identified. I excluded these two cases from the dataset.

The assumption of normality refers to the normal distribution of standardized residuals. To assess the assumption of normality, I calculated the skewness and kurtosis values and evaluated the results of the Shapiro-Wilk test. Warner (2013) explained that a skewness and Kurtosis value within ± 2.58 means that distribution is normal and symmetrical. The Shapiro-Wilk test of normality requires $p > 0.05$ as an indication of normally distributed scores. The results presented in Table 4 showed first- and second-years' English and science grades were normally distributed. However, first and second-years' math scores were not normally distributed.

I used the SPSS reliability procedure to calculate Cronbach's alpha measure for internal consistency and reliability of the participant's responses for each of the scales and subscales. The results were as follows: mindset of intelligence (α=0.699), basic needs

satisfaction in relationship (total score) (α=0.769), autonomy (α=0.661), competence (α=0.566), and relatedness (α=0.623). Warner (2013) stated that Cronbach's alpha measures of 0.7 and higher are considered to be acceptable. Based on the results, I concluded that the mindset of intelligence and the psychological needs satisfaction scales demonstrated satisfactory levels of internal consistency. However, the psychological needs satisfaction subscales (autonomy, competence, relatedness) had lower internal consistency values.

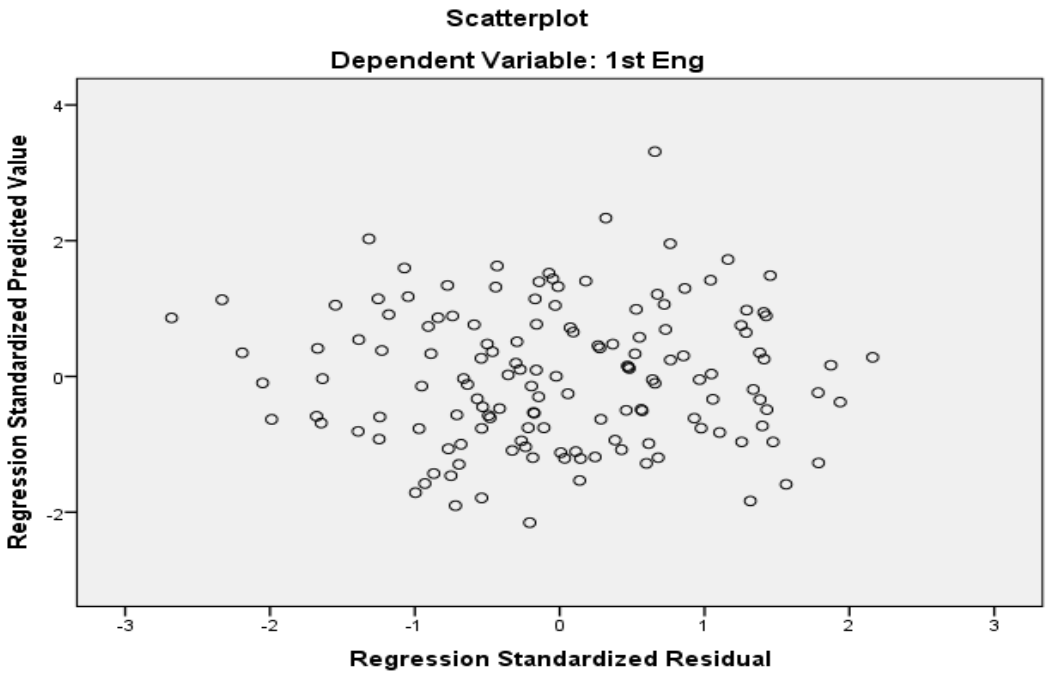

Figure 1. Scatterplot of the standardized residuals for first-year English.

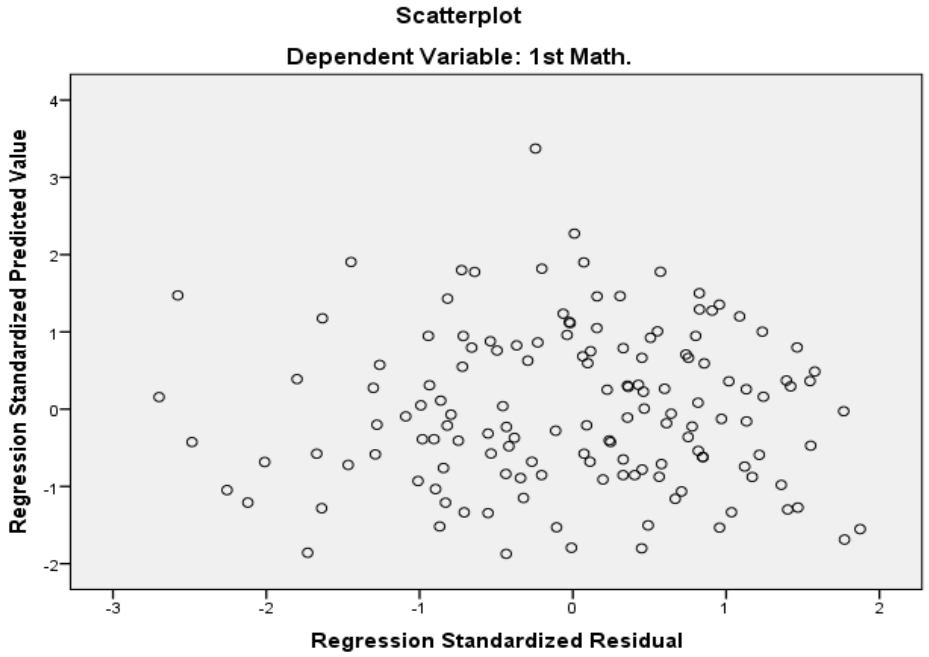

Figure 2. Scatterplot of the standardized residuals for first-year Math.

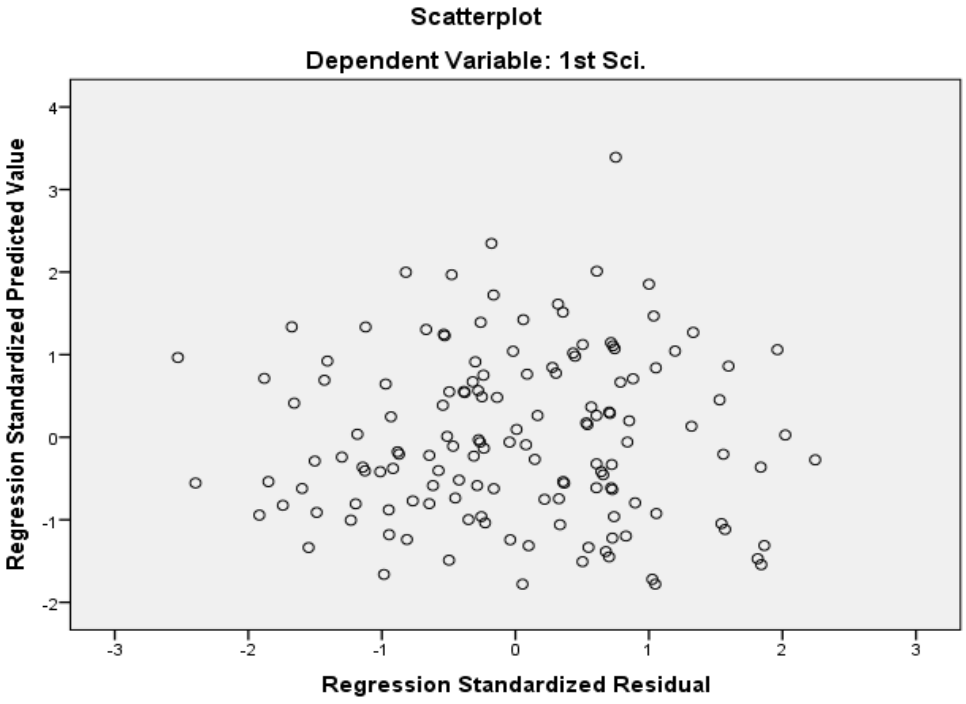

Figure 3. Scatterplot of the standardized residuals for first-year science.

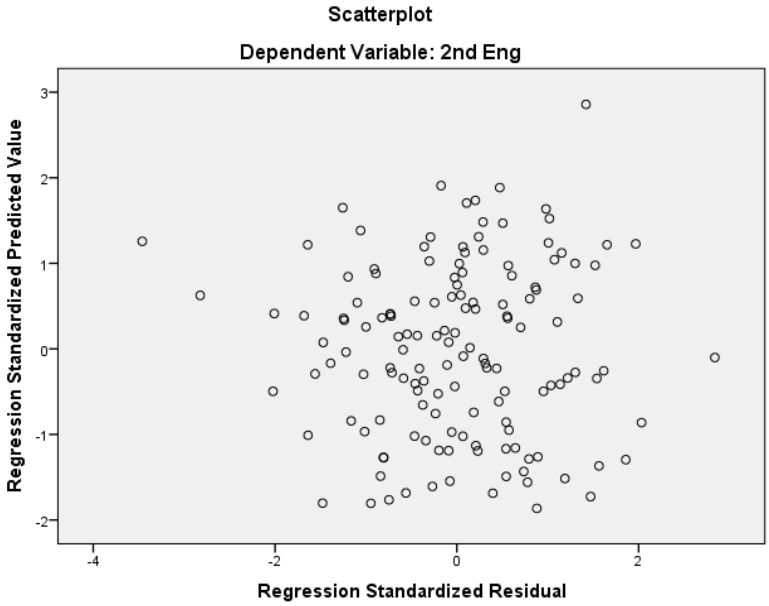

Figure 4. Scatterplot of the standardized residuals for second-year English

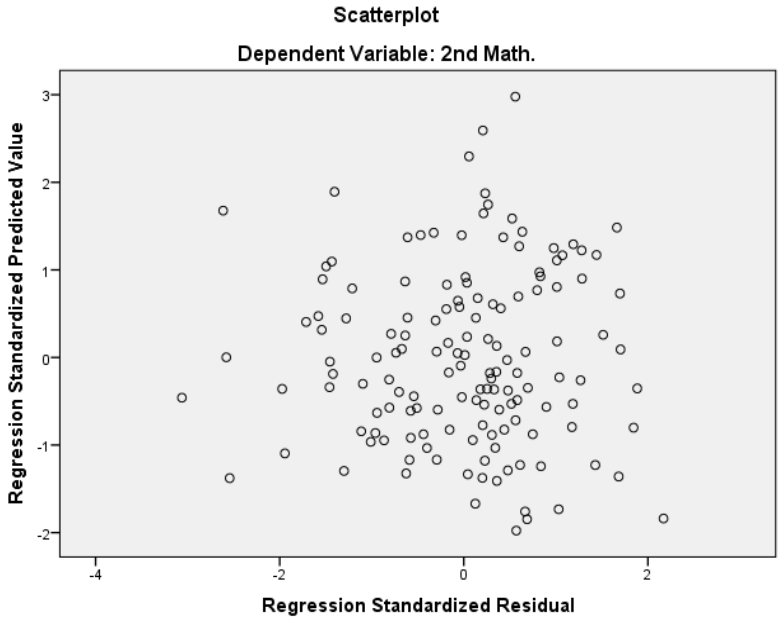

Figure 5. Scatterplot of the standardized residuals for second-year math

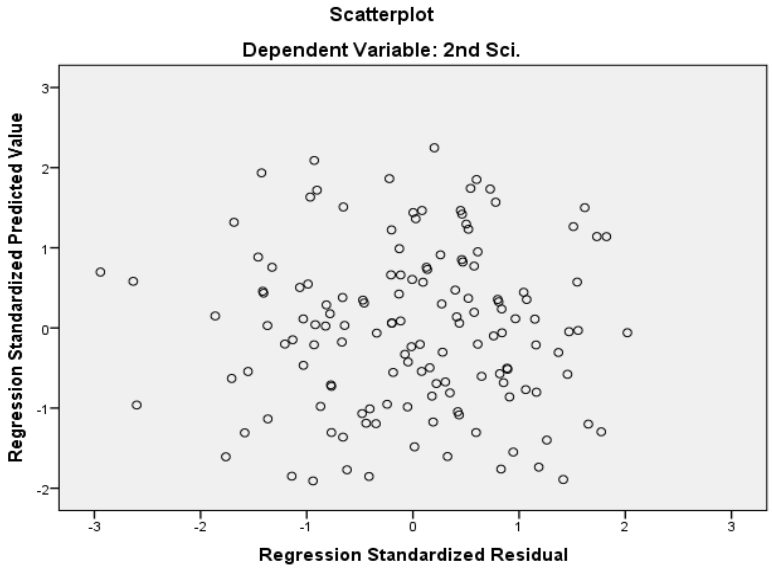

Figure 6. Scatterplot of the standardized residuals for second-year science.

Table 3

Collinearity Statistics of Study Independent Variables

Variable	Tolerance	VIF
Autonomy	.724	1.382
Relatedness	.764	1.309
Competence	.726	1.378
Mindsets of Intelligence	.988	1.012

Table 4

Normality Test (Shapiro-Wilk) Results for the Study Variables

Variables	Statistics	*df*	*p*	Skewness	Kurtosis
Ist year English	.986	141	.172	-.046	-.663
Ist year Science	.991	141	.557	-.127	-.467
Ist year Math	.963	141	.001	-.545	-.250
2nd year English	.995	141	.920	-.047	.083
2nd year Science	.984	141	.092	-.340	-.165
2nd year Math	.980	141	.037	-.471	.239
Autonomy	.932	141	.000	-.689	-.167
Competence	.921	141	.000	-.697	-.306
Relatedness	.903	141	.000	-.660	-.410
Basic Needs Satisfaction	.933	141	.000	-.801	.024
Mindset of Intelligence	.968	141	.002	.101	-.910

Multiple Regression Analyses

To address the research questions, I conducted standard multiple regression using SPSS student version 24. Each multiple regression analysis used autonomy, competence, relatedness, psychological needs satisfaction (total score), and mindset of intelligence as predictor variables. There were six dependent variables; English, science, and math final grades for the first and second years of high school. In each analysis, SPSS excluded psychological needs satisfaction (total score) as a predictor because it was perfectly predicted from one or more of the other predictor variables. That is, the psychological needs satisfaction (total score) was redundant with the other predictors.

Multiple Regression Predicting 1st Year English Grades

I used multiple regression analysis to assess the statistical relationship between autonomy, competence, relatedness, psychological needs satisfaction (total score), mindset of intelligence, and first-year English scores. The result of the multiple regression analysis was statistically significant, F (4, 138) = 3.573, p = .008, adjusted R^2 = 0.068. The model explained 6.8% of the variance in first-year English final grades. The results are shown in Table 5. The only significant predictor of the first-year English Grades was mindset of intelligence, B = 1.403, p = 0.024. On average, for every one-unit increase in mindset of intelligence, there was a 1.40 unit increase in first-year English grades.

Table 5

Results for Multiple Regression Predicting 1st Year English Grades

Variable	*B*	*SE B*	*β*	*t*	*p*
Autonomy	-1.076	.554	-.185	-1.940	.054
Relatedness	-.682	.659	-.096	-1.035	.303
Competence	.235	.680	.033	.346	.730
Mindsets of Intelligence	1.403	.614	.186	2.284	.024

Multiple Regression Predicting 1st Year Science Grades

I used multiple regression analysis to assess the statistical relationship between autonomy, competence, relatedness, psychological needs satisfaction (total score), mindset of intelligence, and first-year science scores. The result of the multiple regression analysis was statistically significant, F (4, 137) = 5.020, p = .001, adjusted R^2 = 0.102. The model explained 10.2% of the variance in first-year science final grades. The results are shown in Table 6. Mindset of intelligence (B = 1.398, p = 0.022) and relatedness (B =-2.186, p = 0.001) were the only significant predictors of first-year science grades. On average, for every one-unit increase in mindset of intelligence, there was a 1.39 unit increase in first-year science grades. Also, for every one-unit increase in relatedness, there was a 2.186 unit decrease in first-year science grades.

Table 6

Results for Multiple Regression Predicting 1st Year Science Grades

Variable	*B*	*SE B*	*β*	*t*	*p*
Autonomy	-.176	.544	-.030	-.324	.747
Relatedness	-2.186	.649	-.307	-3.366	.001
Competence	.500	.667	.070	.749	.455
Mindsets of Intelligence	1.398	.602	.186	2.321	.022

Multiple Regression Predicting 1st Year Math Grades

I used multiple regression analysis to assess the statistical relationship between autonomy, competence, relatedness, psychological needs satisfaction (total score), mindset of intelligence, and first-year math scores. The result of the multiple regression analysis was statistically significant, $F(4, 138) = 4.817$, $p = .001$, adjusted $R^2 = 0.097$. The model explained 9.7% of the variance in first-year final math grades. The results are shown in Table 7. Mindset of intelligence, $B = 2.474$, $p = 0.005$, and relatedness $B = -2.796$, $p = 0.003$ were the only significant predictors of first-year math grades. On average, for every one-unit increase in mindset of intelligence, there was a 2.47 unit increase in first-year math grades. Also, for every one-unit increase in relatedness, there was a 2.796 unit decrease in first-year math grades.

Table 7

Results for Multiple Regression Predicting 1st Year Math Grades

Variable	*B*	*SE B*	*β*	*t*	*p*
Autonomy	-.214	.792	-.025	-.271	.787
Relatedness	-2.796	.941	-.271	-2.971	.003
Competence	.798	.971	.077	.821	.413
Mindset of Intelligence	2.474	.877	.226	2.822	.005

Multiple Regression Predicting 2nd Year English Grades

I used multiple regression analysis to assess the statistical relationship between autonomy, competence, relatedness, psychological needs satisfaction (total score), mindset of intelligence, and second-year English scores. The result of the multiple

regression analysis was statistically significant, F (4, 137) = 3.999, p = .004, adjusted R^2 = 0.078. The model explained 7.8% of the variance in second-year English final grades. The results are shown in Table 8. The only significant predictor of second-year English grades was mindset of intelligence, B = 2.063, p = 0.001. On average, for every one-unit increase in mindset of intelligence, there was a 2.063 unit increase in second-year English grades.

Table 8
Results for Multiple Regression Predicting 2nd Year English Grades

Variable	*B*	*SE B*	*β*	*t*	*p*
Autonomy	-.950	.565	-.159	-1.682	.095
Relatedness	-.221	.672	-.030	-.330	.742
Competence	1.029	.693	.140	1.484	.140
Mindsets of Intelligence	2.063	.626	.267	3.297	.001

Multiple Regression Predicting 2nd Year Science Grades

I used multiple regression analysis to assess the statistical relationship between autonomy, competence, relatedness, psychological needs satisfaction (total score), mindset of intelligence, and second-year science scores. The result of the multiple regression analysis was statistically significant, F (4, 137) = 3.503, p = .009, adjusted R^2 = 0.066. The model explained 6.6% of the variance in second-year science final grades. The results are shown in Table 9. The only significant predictor of second-year science grades was mindset of intelligence, B = 2.368, p = 0.002. On average, for every one-unit increase in mindset of intelligence, there was a 2.368 unit increase in second-year science grades.

Table 9

Results for Multiple Regression Predicting 2nd Year Science Grades

Variable	*B*	*SE B*	*β*	*t*	*p*
Autonomy	-.420	.661	-.061	-.635	.526
Relatedness	-.271	.795	-.032	-.341	.734
Competence	1.558	.821	.182	1.898	.060
Mindsets of Intelligence	2.368	.735	.264	3.221	.002

Multiple Regression Predicting 2nd Year Math Grades

I used multiple regression analysis to assess the statistical relationship between autonomy, competence, relatedness, psychological needs satisfaction (total score), mindset of intelligence, and second-year math scores. The result of the multiple regression analysis was not statistically significant, F (4, 138) = 2.078, p = .087. The results are shown in Table 10. Mindset of intelligence, B = 1.858, p = 0.040, and relatedness B =-1.900, p = 0.050 were the only significant predictors of second-year math grades. On average, for every one-unit increase in mindset of intelligence, there was a 1.858 unit increase in second-year math grades. Also, for every one-unit increase in relatedness, there was a 1.900 unit decrease in second-year math grades.

Table 10

Results for Multiple Regression Predicting 2nd Year Math Grades

Variable	*B*	*SE B*	*β*	*t*	*p*
Autonomy	.341	.809	.041	.422	.674
Relatedness	-1.900	.962	-.187	-1.976	.050
Competence	.585	.993	.057	.589	.557
Mindset of Intelligence	1.858	.893	.172	2.074	.040

Summary

The relatedness component of psychological needs satisfaction significantly predicted the first- and second-year's final grades in math, and the first-year grades in science, among Dominican secondary school students ages 11–15. However, the autonomy and competence components of psychological needs satisfaction did not significantly predict academic achievement among Dominican secondary school students ages 11–15, for both first- and second-year English, math, and science. Mindset of intelligence significantly predicted the first- and second-year final grades in math, English, and Science among Dominican secondary school students ages 11–15

In chapter 5, I will present a thorough interpretation of the findings, and I will discuss the limitations of this study. I will also make recommendations for further research and will explore the implications of the results of this study.

Chapter 5: Discussion

Introduction

The purpose of this quantitative study was to examine the statistical association between perceived psychological needs satisfaction in a relationship with caregivers, mindsets of intelligence, and academic achievement of Dominican secondary school students, ages 11–15. I conducted this research to add to the existing body of literature regarding the nonacademic factors that influence academic achievement. This study was the first to examine the statistical relationship between psychological needs satisfaction in a relationship with caregivers, mindsets of intelligence, and academic achievement.

The results of this study indicated that students' mindset of intelligence was consistently and significantly related to their academic achievement. That is, higher scores in mindset (indicating a growth mindset) were significantly associated with higher scores on final grades in math, English, and science. The results also showed that the relatedness component of psychological needs satisfaction had an inverse relationship with academic achievement among Dominican secondary school students in first- and second-year math and first-year science. However, autonomy, competence, and the total score of psychological needs satisfaction did not statistically significantly predict academic achievement.

Interpretation of Findings

Psychological Needs Satisfaction

In this study, I examined the statistical relationship between psychological needs satisfaction in a relationship with caregivers and the academic achievement of Dominican

secondary school students ages 11–15. I examined the individual components of psychological needs satisfaction (autonomy, competence, and relatedness) along with the total score of psychological needs satisfaction. The results showed that autonomy, competence, and psychological needs satisfaction (total score) did not significantly contribute to the observed variance in math, science, and English grades for the students' first and second years of secondary school. However, the results indicated that the relatedness component of psychological needs satisfaction significantly predicted math and science grades for the students' first year in secondary school. There was an inverse relationship between relatedness and first-year math and science grades. As the students' need for relatedness in their relationship with their caregivers became more satisfied, their grades in math and science for their first year in secondary school decreased.

The results from this study contradict the literature on needs satisfaction and achievement, with intrinsic motivation as a mediating factor. The SDT explains that along with autonomy and competence, relatedness is another component of the psychological needs that is essential to optimal functioning and performance in a particular context (Deci & Ryan, 1985). Baumister and Leary (1995) defined relatedness as the need for belongingness that every human being experiences. Deci and Ryan (2000) posited that when the need for relatedness is satisfied, a higher level of overall functionality is seen. Trenshaw, Revelo, and Herman (2016) explained that in any context, when these three psychological needs are satisfied, intrinsic motivation is fostered.

The authors went on to suggest that in an academic context, when the three psychological needs are met, the result is an increase in intrinsic academic motivation. These findings were supported by Gnambs and Hansfsting (2016), who found a positive linear relationship between psychological needs satisfaction at school and intrinsic motivation. Additionally, Taylor et al. (2014) found that as intrinsic academic motivation increased in high school students, so did the academic achievement. These studies demonstrated that when basic psychological needs are satisfied, there is an increase in intrinsic motivation, which in turn, increased academic achievement.

In this study, I found an inverse relationship between relatedness satisfaction and academic achievement. One plausible explanation for these results could be that when faced with negative situations such as unsatisfied needs, then intrinsic motivation increases. Therefore, in the context of this study and based on the results, I hypothesized that when the need for relatedness is not met, then the students' intrinsic motivation increased, which led to an increase in their academic achievement. However, there is no literature to support this statement, and further research in this area is warranted.

Another possible explanation for this inverse relationship between academic achievement and relatedness is that although the students' relatedness need was not being met in their relationships with their caregivers, this need was being met in other relationships. In this study, I specifically measured relatedness satisfaction in the student-guardian relationship, and how the satisfaction of that need influenced academic achievement. However, researchers have shown that during adolescence, parental influence becomes less important as the student moves towards approval from their peers

and others outside the home (Hay & Ashman, 2003; LaFontana & Cillessen, 2010). On that basis, I postulated that as the satisfaction of relatedness decreased in the parent-student relationship, there may have been an increase in the student-peers and/ or student-teacher relationships. This relatedness satisfaction in those other relationships may have fostered intrinsic motivation and increased academic achievement.

This explanation is supported by Guay, Denault, and Renauld (2017), who found that the satisfaction of relatedness in the student-teacher relationship predicted intrinsic motivation in a sample of high school students. In a meta-analysis conducted by Roorda, Jak, Zee, Oort, and Koomen (2017), the authors found that among high school students, a positive teacher-student relationship predicted academic achievement and that relationship was mediated by students' academic engagement. The authors explained that a positive student-teacher relationship led to increased student engagement and ultimately increased academic achievement.

Mindsets of Intelligence

The results of this study showed that the mindset of intelligence of Dominican secondary school students ages 11–15, significantly predicted their final grades in math, English, and science for both their first and second years in secondary school. The results indicated that as the student's mindset of intelligence scores increased, so did their final grades in math, English, and science for both the first and second years of high school.

The findings from this study align with the theoretical framework on which this study was grounded. Dweck (2006) posited that what an individual believes about their intelligence greatly influences their level of success. The mindsets of intelligence theory

include two main mindsets of intelligence. The fixed mindset of intelligence is the belief that intelligence is a fixed trait that cannot be altered; either one is born intelligent, or they are not, and there is nothing that can be done about it (Dweck, 2000). Alternatively, the growth mindset of intelligence speaks to the malleability of intelligence. The growth mindset of intelligence is the belief that with enough effort and the right resources, intelligence can be increased (Dweck, 2000).

The results of the current study showed that as the students' scores on mindsets of intelligence increased towards a growth mindset, so did their grades in math, English, and science for both their first and second years in secondary school. The findings from this study further corroborate the results from previous studies, which found that students between the ages of 11–16 who have a growth mindset of intelligence performed better in math than those with a fixed mindset of intelligence (Da Fonseca et al.,2009). Curry, Elliot, Da Fonseca, and Moller (2006) conducted a study with French students ages 12–14 and found that the students with a growth mindset of intelligence did better in mathematics than those with a fixed mindset. The result from this study was further confirmed by Tarbetsky, Collie, and Martin (2016), who found that Australian students in Grades 7–9 with a growth mindset of intelligence performed better in math than those with a fixed mindset of intelligence. The findings from these studies supported the basic tenet of the mindsets of intelligence theory where Dweck (2000) explained that ones' belief in their intelligence influences achievement. Based on the findings from these studies, the researchers concluded that mindsets of intelligence should be considered an important factor in increasing academic achievement. Alternatively, Chao, Visaria,

Mukhopadhyay, and Dehejia (2017) found that mindset of intelligence did not influence academic performance in a sample of middle school students in India.

Limitations

There were many limitations to this study. I used the students' final grades in math, science, and English from their first two years of secondary school as indicators of their academic achievement. However, the surveys which determined their mindset of intelligence and the satisfaction of their psychological needs were not administered until the end of their third year of high school, which is approximately 1 to 2 years after the students took their achievement tests. This means that no mindset of intelligence nor psychological needs satisfaction scores were collected before or during the period that the student's achievement tests were administered. This gap in time is one of the most important limitations of this study, as the students' mindsets and needs satisfaction could have changed over the course of the 2 years.

Additionally, there are many confounding factors that can influence academic achievement and may have contributed to the observed variance in students' final grades. Some of these factors may have included the student's school attendance (Morrissey, Hutchison, & Winsler, 2014), socioeconomic status (Martens et al., 2014), and level of intelligence (Soares, Lemos, Primi, & Almeida, 2015). However, these potential confounding factors were not assessed, which adds to the limitations of this study.

Another important limitation of this study was the weaknesses inherent in correlational designs. Creswell (2014) explained that correlational designs are used when researchers are investigating the relationship between naturally occurring variables.

Therefore, cause and effect cannot be determined by correlational designs. Consequently, correlation designs are very low in internal validity (Creswell, 2014). I could only use the results from this study to determine whether there was a relationship between mindsets of intelligence, basic psychological needs satisfaction (autonomy, competence, relatedness, and the total score of needs satisfaction) and academic achievement. The results from this study cannot be used to determine whether the academic achievement of the participants was caused by their mindsets of intelligence or the satisfaction of their basic psychological needs.

Self-report surveys also rely on the honesty of the respondents and their understanding and accurate interpretation of the questions on the questionnaires. Therefore, there are biases that are inherent to self-report surveys, such as the respondents choosing answers that they perceive to be socially desirable, instead of accurate. Additionally, the participants who volunteered to participate in this study were different from those who did not, thus limiting generalizability. The gender distribution of the participants of this study was 63.6% female and 36.4%, male. This was another limitation to the study as it did not reflect the gender distribution of the population, which was 48.75% female and 51.25%, male. Lastly, there was a low response rate of 29%.

Recommendations

The most salient limitation to this study was the time gap between the students' grades and the measurement of their psychological needs satisfaction and their mindset of intelligence. Dweck (2000) explained that the effect of mindsets of intelligence is most visible in the transitional period from primary to secondary school. Dweck (2000) further

noted that during that transitional period, not only are the students faced with social and in some cases, institutional changes, but they are also experiencing major developmental changes. Dweck (2000) suggested that in many cases, the students who performed well academically in primary school, if they do not have a growth mindset of intelligence, usually do not perform as well in secondary school. There are many studies which confirmed the malleability of mindsets of intelligence (Bettinger, Ludvigsen, Rege, Solli, & Yeager, 2018; Dweck, 2000; Dweck 2006; Dweck 2015). Therefore, a future study should follow students longitudinally from their last year of primary school through their first year of secondary school, while periodically measuring their mindsets of intelligence and the satisfaction of their psychological needs. A longitudinal study would provide a more accurate assessment of how mindsets of intelligence and psychological needs satisfaction influence academic achievement.

Further research should also be done to explore the causal relationship between relatedness and academic achievement. A thorough review of the literature revealed that in an academic context, psychological needs satisfaction promoted intrinsic academic motivation (Deci & Ryan, 2000) and in some cases, stopped the decline in intrinsic academic motivation (Gnambs & Hansfsting, 2016) ultimately positively influencing academic achievement. Therefore, further research should be done to determine whether intrinsic motivation is a moderating factor in the relationship between relatedness and academic engagement. In addition, further research should consider psychological needs satisfaction in terms of relationships with parents/guardians, peers, and teachers.

Additionally, it is also possible that when the need for relatedness is not satisfied, it may motivate one to do what is necessary to have that need met. Taormina and Gao (2013) explained that a need is created when there is a lack of something that is essential to ones' well-being. The authors went on to say that it is that deficiency which motivates and organism to have that need satisfied (Taormina & Gao, 2013). This speaks to extrinsic motivation. Therefore, further research should also explore the relationship between relatedness, extrinsic motivation, and academic achievement.

These further studies could provide a pathway through which relatedness could influence academic achievement. Additionally, an exploration of the Dominican culture and how it influences the relationship between psychological needs satisfaction and academic achievement is warranted. Further research should include possible confounding variables such as school attendance, socioeconomic status, and level of intelligence in their analyses. Additionally, a more representative sample of the target population should be obtained.

Implications

There are many social change implications from this study, which may positively impact and inform policymakers, families, individuals, and society. The uniqueness of this population can be seen in the results of this study, where relatedness was inversely related to academic achievement in first- and second-year math and first-year science. This is the first study to show an inverse relationship between these variables. Currently, the literature using this population is sparse at best, and educational policies in the

commonwealth of Dominica are implemented based on research from developed countries whose demographics are unlike that of Dominica.

The Ministry of Education in the Commonwealth of Dominica now has information specific to their demographics to guide them in developing programs to meet the unique needs of Dominican secondary school students. Policymakers must first understand how mindsets of intelligence and psychological needs satisfaction influence the academic achievement of Dominican secondary school students. This will then allow them to develop more effective educational programs, not only at the secondary school level but also at the adult education level.

From the results of this study, I found that students with a growth mindset of intelligence performed better than those with a fixed mindset of intelligence. The information that I obtained from the literature suggested that mindsets are malleable. This information could inform policymakers in developing and implementing intervention programs during the students first year of secondary school. These intervention programs should be geared towards teaching the students a growth mindset of intelligence, which will ultimately increase their academic achievement.

Currently, the policymakers in the Commonwealth of Dominica have developed and implemented several adult education courses. The information garnered from this study could also inform the development of other adult education programs with the aim of educating parents about mindsets of intelligence, and giving them the necessary tools needed to create an environment in the home that is conducive to the development of a growth mindset. However, change must first happen on a policy level. Over time, a

gradual change will occur in families and communities as mindsets shift from fixed to growth. As Dweck (2000) explained, the growth and fixed mindset do not just apply to academic achievement or intelligence. Dweck (2000) suggested that a growth mindset can be applied to other contexts (e.g., social interactions, interpersonal relationships), which may result in more positive outcomes. Consequently, the positive social change implications of this study go beyond the field of education.

Conclusion

Academic achievement is one of the best indicators of future success (Cumpton, Schexnayder, & King, 2012). To that end, it is critical that the variables and factors that influence academic achievement are understood. The results of this study showed that there is a significant inverse relationship between the relatedness component of the basic psychological needs and academic achievement in Dominican secondary school students ages 11–15. The results also showed that higher scores of mindsets of intelligence were significantly associated with higher scores in math, English, and Science in their first and second years of high school.

The results of this study provided a basis for additional research. In addition, the information contained in this study can help to equip parents, policymakers, and other stakeholders with relevant information. That information can assist in the development of programs to adequately address the needs of students, improve their academic achievement, and ultimately effect positive social change.

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