

WHAT FACTORS OF MOTIVATION PREDICT ACHIEVEMENT OF COLLEGE  
READINESS? A STUDY OF SELF-DETERMINATION AND COLLEGE READINESS

by

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Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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## ABSTRACT

This predictive, correlational study examines the association between the fulfillment of the three basic psychological needs (relatedness, competence, and autonomy) described by self-determination theory and the academic achievement of college readiness as measured by ACT scores. Self-determination theory posits that fulfillment of the three basic psychological needs is associated with greater academic achievement. Juniors from a public high school complete the Basic Psychological Needs Scale questionnaire and the results will be analyzed using hierarchical multiple regression to determine whether or not relatedness, competence, and/or autonomy may be predictors of college readiness achievement.

*Keywords:* self-determination theory, education, college readiness, basic psychological needs theory, motivation, high school, academic achievement

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## Table of Contents

ABSTRACT.....	3
Acknowledgments.....	4
List of Tables.....	8
List of Figures.....	9
List of Abbreviations .....	10
CHAPTER ONE: INTRODUCTION.....	11
Introduction.....	11
Background.....	13
Problem Statement .....	15
Purpose Statement.....	16
Significance of the Study .....	18
Research Questions.....	18
Null Hypotheses.....	19
Alternative Hypotheses.....	20
Identification of Variables .....	20
Definitions.....	22
Research Summary .....	23
Assumptions and Limitations .....	24
Assumptions.....	24
Limitations .....	25
CHAPTER TWO: REVIEW OF THE LITERATURE.....	27

Introduction.....	27
Theoretical Framework.....	31
Literature Review.....	39
Concerns About High School Achievement.....	39
Current Research on High School Intervention.....	42
Self-Determination Perspective Applied to Education.....	45
The Self-determination Continuum of Relative Autonomy Depicting Types of Motivation with Regulation, Perceived Locus of Causality, and Outcome.....	48
Basic Psychological Needs Theory.....	51
Summary.....	56
CHAPTER THREE: METHODOLOGY.....	58
Introduction.....	58
Design.....	59
Research Questions.....	59
Null Hypotheses.....	60
Alternative Hypotheses.....	60
Participants.....	61
Setting.....	62
Instrumentation.....	64
Criterion Variable.....	64
Predictor Variables.....	66
Demographic Variables.....	67
Procedures.....	67

	7
Data Analysis .....	68
CHAPTER FOUR: FINDINGS.....	72
Purpose.....	72
Research Questions.....	72
Hypotheses .....	73
Demographic Data .....	74
Descriptive Statistics and Correlations .....	74
Assumption Testing .....	77
Results.....	77
Additional Analysis .....	79
CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS.....	80
Discussion.....	80
Null Hypotheses.....	80
Rejection of Null Hypothesis 1a.....	80
Failure to Reject Null Hypothesis 1b.....	81
Rejection of Null Hypothesis 1c.....	83
Failure to Reject Null Hypothesis 1d.....	83
Conclusions.....	84
Implications.....	87
Limitations .....	88
REFERENCES.....	90
APPENDIX A.....	105

**List of Tables**

Table 1: The Five Mini-theories of Self-determination Theory.....	36
Table 2: Data Source Blocks.....	70
Table 3: Explanation of Assumptions Tests Utilized.....	71
Table 4: Demographic Data.....	74
Table 5: Means, Standard Deviations, and Intercorrelations for ACT and Predictor Variables...76	
Table 6: Hierarchical Multiple Regression Model.....	79

**List of Figures**

Figure 1: The Self-Determination Continuum.....48

### **List of Abbreviations**

Basic psychological need theory (BPNT)

Building assessment coordinator (BAC)

Comprehensive school improvement plan (CSIP),

Emotional-Behavioral Disorder (EBD)

Individual Learning Plan (ILP),

Individuals With Disabilities Education Act (IDEA)

Infinite Campus (IC)

Institutional Review Board (IRB)

The National Assessment of Educational Progress (NAEP)

National Center for Education Statistics (NCES)

No Child Left Behind (NCLB)

Positive behavior and intervention support (PBIS)

Response to Intervention (RTI)

Self-determination theory (SDT)

Socio-economic status (SES)

Standard Error of Measurement (SEM)

Western High School (WHS)

## CHAPTER ONE: INTRODUCTION

### Introduction

Academic intervention for college readiness is becoming more prominent in secondary schools. For example, Kentucky Revised Statute 158.6459 (2009) mandates that high schools provide intervention for students who perform below the ACT college readiness benchmarks in English, mathematics, or reading on the state administered ACT. This mandate creates a need for college readiness intervention for a large number of high school students. In 2013, 31% of the 1.799 million high school graduates who took the ACT did not meet any college readiness benchmarks and 74% were not college ready in one or more areas (ACT, 2013b; ACT, 2013c). Researchers estimate that by 2016, all high school teachers will be participating in academic intervention initiatives (Bender, 2012). However, the literature documenting successful intervention, also referred to as Response to Intervention (RTI), in departmentalized secondary schools is deficient in specific methodology and generalizable theory (Samuels, 2009; Vaughn & Fletcher, 2012).

The sparse guidance that is available for intervention teachers has developed from early-reading research, and it is severely limited in its application to high school intervention (Bender, 2012; Fisher & Frey, 2011; Fuchs, Fuchs, & Compton, 2010). For instance, the estimate that 20% of a school's total student population may require intervention is based on research conducted in reading and math in primary grades (Fisher & Frey, 2011; Vaughn & Fletcher, 2012). Bender (2012) suggests that those numbers are higher in high school because learning deficits compound over time. The student population in a typical high school contains students who have shown resistance to intervention efforts in the past. According to Bender (2012), those numbers may be ten to fifteen percent too low meaning 35% of a high school student population

may require intervention. Researchers who have studied RTI with secondary students warn that secondary school RTI must be different in some fundamental ways from elementary school RTI (Vaughn & Fletcher, 2010).

A few secondary school studies yield a limited amount of guidance and emphasize reading intervention for adolescents (Torgesen et al, 2007; Vaughn & Fletcher, 2012). High school teachers lack direct, explicit, evidence-based strategies for how to provide intervention - especially college readiness intervention to high school students in their precious remaining years before transitioning to college or the workforce (Fisher & Frey, 2011; Vaughn & Fletcher, 2012).

Prior to developing much needed interventions for college readiness, researchers need a better understanding of what needs to be targeted. Interventions aimed at college readiness skills in reading and math may be little more than a Band-Aid fix if a student's academic discrepancy is significantly affected by psychological factors like motivation. The possibility that motivation has a measurable impact on college readiness skills is important to consider when planning a college readiness intervention for high school students. A secondary school curriculum that provides academic intervention without regard for motivation and basic psychological need fulfillment may actually be counter-productive. If interventions are delivered in a controlling style, then the interventions may contribute to a need-thwarting environment that undermines autonomy and diminishes intrinsic motivation.

Self-determination theory posits that there is a link between motivational types, or motivational quality, and students' degree of success at school. The degree to which students experience success depends on whether or not the learning context supports or thwarts students' motivational resources (Deci, 2009; Guay, Ratelle, & Chanal, 2008). Unfortunately, researchers

who develop high school interventions lack a comprehensive collection of empirical data on college readiness and motivational resources (Savitz-Romer, 2012).

This study intends to add to the literature by examining the theory of self-determination by comparing three basic psychological needs and their association with college readiness achievement while controlling for gender, socio-economic status (SES), and ethnicity. Chapter one contains the following sections: introduction, background, problem statement, purpose statement, significance of the study, research questions, hypotheses, identification of variables, definitions, research summary, and assumptions and limitations.

### **Background**

Research confirms that there is good reason to be concerned about achievement of high school students in the U.S. (McMurrer & Kober, 2011). The National Assessment of Educational Progress (NAEP) has been monitoring academic performance in the United States for the National Center for Education Statistics (NCES) since 1971. A long-term study of trends completed by NAEP in 2012 reported results for a nationally representative sample of nine, 13-, and 17-year-olds in reading and mathematics. Although there has been a small increase in mathematics and reading scores for nine and 13-year-olds over the last forty years, there was no significant difference for 17-year-olds (NCES, 2013).

In addition to the mathematics and reading NAEP scores over the last forty years, national ACT scores appear resistant to reflect improvement. Only 26% of the nation's graduating class of 2013 who took the ACT was able to meet all four of the College Readiness Benchmarks (ACT, 2013c). The ACT, which is scored on a scale from 1-36 in each content area, has determined the following benchmarks on the ACT subtests: English – 18, Math – 22, Reading – 22, and Science – 23 (ACT, 2013b). Students who meet a benchmark have high

probability of success in the corresponding college courses - a 50% chance of earning a B or better and a 75% chance of earning a C or better. Approximately 28% of the 1.66 million high school graduates who took the 2012 ACT did not meet any College Readiness benchmarks (ACT, 2012). In 2013, the number of ACT test takers rose to 1.799 million high school graduates; however 31% did not meet any benchmarks (ACT, 2013b; ACT, 2013c). According to ACT (2011a), high school achievement is not improving by college readiness standards, and there is also a significant gap between the skill requirements demanded by employers and the emerging labor force (Williamson, 2008). Clearly, these statistics have implications for educators.

Fortunately, high school is not too late to intervene for students who lag behind their peers in meeting college readiness benchmarks. However, adolescents require different strategies and emphases to achieve from the current strategies derived from elementary RTI research (Vaughn et al., 2012). There is little time to be wasted on less effective strategies in the last years of high school (Fuchs et al., 2010). Resources and strategies specifically targeted at improving high school students' college readiness skills are needed. In order to develop appropriate interventions for high school students, researchers need to better understand what predicts achievement and more specifically college readiness.

Presently, researchers understand the significance of self-determination theory in various educational contexts and the relationship that exists between basic psychological need support and student success (Guay et al., 2008). Self-determination theory (SDT) is a meta-theory of motivation that differs from other motivational theories because it addresses more than process alone; it also utilizes the concept of psychological need fulfillment to explain why individuals pursue goals. Formally, SDT is comprised of five mini-theories. Basic psychological need

theory (BPNT), a mini-theory of SDT, proposes that basic psychological need fulfillment is a motivational universal for humans that facilitates quality motivation leading to wellness (Deci, Vallerand, Pelletier, & Ryan, 1991). Environments that thwart basic need fulfillment negatively impact motivation and have a detrimental impact on wellness in that setting.

Many studies have investigated SDT in various educational settings. Recent high school research has applied self-determination theory to utilize extrinsic motivation as an untapped resource on high school students' achievement on high stakes testing (Emmett, 2013). In higher education, self-determination theory has been examined to explain how learning communities affect education outcomes (Beachboard, Beachboard, Li, & Adkison, 2011). SDT has also been applied in secondary education to test motivational models pertaining to high school dropouts (Hardré, 2012; Vallerand, Fortier, & Guay, 1997), school reform (Deci, 2009), and a homework intervention in high school (Akioko & Gilmore, 2013). A gap in the literature exists utilizing SDT as a predictor of college readiness achievement for high school students. According to research from the Harvard Graduate School of Education, commissioned by the National Association of College Admission Counselors, the body of research on college readiness for high school students and motivation is very small (Savitz-Romer, 2012).

### **Problem Statement**

High school achievement, despite intervention efforts in reading and mathematics, has stubbornly resisted improvement over the last forty years (NCES, 2013). There is a significant gap between the skill requirements demanded by employers and the emerging labor force and between college readiness skills and the average incoming college freshman (ACT, 2011a). The problem is that researchers lack empirical evidence to guide the development of interventions to close the gap and specifically target adolescents who need different strategies and emphases to

achieve from the incumbent strategies that were developed from research on elementary students (Guay et al, 2008; Savitz-Romer, 2012; Vaughn et al., 2010; Vaughn & Fletcher, 2012).

Practitioners are in need of more research-based interventions to implement in high school (Fisher & Frey, 2011; Fuchs et al., 2010; Vaughn & Fletcher, 2012).

The theoretical position that supporting need fulfillment in students facilitates motivation ergo achievement has not informed the development of interventions for college readiness in secondary education (Emmett, 2013; Savitz-Romer, 2012). Instead, current secondary school interventions have been primarily informed by early reading research conducted on elementary students (Bender, 2012). This study extends the application of SDT and BPNT to high school students and fills both an empirical gap and theoretical gap in the literature by examining whether or not basic psychological need fulfillment can predict achievement of college readiness in high school juniors as indicated by the ACT test.

### **Purpose Statement**

The purpose of this predictive, correlational study is to examine the application of self-determination theory and basic psychological needs theory by comparing the three basic psychological needs that facilitate motivation and their association with the achievement of college readiness while controlling for gender, socio-economic status (SES), and ethnicity for high school juniors in a Kentucky public school. Ryan and Deci (2002) developed SDT and BPNT. A basic premise of SDT and BPNT is the direct relationship between an individual's degree of need satisfaction and achievement (Deci & Ryan, 2000, 2008a, 2008b; Ryan & Deci, 2009). Since there is strong evidence suggesting that supporting need satisfaction leads to greater academic achievement in secondary students, BNPT should be considered to address the difficult task of developing interventions for high school achievement (Deci et al., 1991; Guay et

al, 2008; Niemiec & Ryan, 2009; Reeve, 2002; Ryan & Deci, 2009; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). If BPNT is applicable to the achievement of college readiness, then the degree to which the needs have been satisfied for high school students may correlate to their achievement of college readiness. Therefore, the predictor variables in this study have been selected to be the measurement of the degree to which the three needs have been met. The criterion variable will be generally defined as the composite ACT score, which is an average of the measures of achievement of the college readiness standards in English, math, reading, and science. Conley (2010) defines college readiness as the ability of a student to enter a postsecondary institution and be successful in credit-bearing courses without any remediation. Consistent with Conley's definition, ACT has empirically derived "benchmarks" based on nationally normed data from the actual performance of students in college that reflects the minimum ACT score required to have a high probability of success (50% earn a B or better and 75% earn a C or better) in select credit-bearing first year college courses (ACT, 2007). The predictor variables will be generally defined as the fulfillment of the following three basic psychological needs: competence, autonomy, and relatedness, as measured by the Basic Psychological Needs Scale (Deci & Ryan, 2000). Gender, SES, and ethnicity will be statistically controlled in this study due to the persistent performance gaps in ACT scores and benchmark attainment for students in these groups (ACT, 2013a; Kentucky Department of Education, 2013). Longitudinal analysis of data on college and career readiness consistently reports that high school students' ACT scores differ based on gender, SES, and ethnicity. In multiple longitudinal studies, the majority of students from low SES and minority groups entered high school not meeting college readiness targets (Dougherty, 2010). Furthermore, the same students had a low

probability of reaching college readiness targets by the end of high school in spite of intervention efforts (ACT, 2013a; Dougherty, 2010; Kentucky Department of Education, 2013).

### **Significance of the Study**

This information is of interest because the achievement of college readiness has become the end-point for high school accountability (National Governors Association Center for Best Practices, 2010). Unfortunately, scarce research exists in the area of motivation and college readiness for high school students (Savitz-Romer, 2012). This study will contribute to the literature by providing information about the association between factors facilitating motivation and student achievement of college readiness benchmarks.

A practical application of this study will be to provide researchers and practitioners with insight into motivational factors that predict academic achievement. In turn, insight into motivation and academic achievement may be useful for developing appropriate intervention strategies (Guay et al., 2008). The data can heighten teacher awareness of student needs that are critical for internalization of academic motivation (Niemi & Ryan, 2009). Teacher training has already been a practical application of SDT in the literature (Guay et al., 2008). This study could add to the continued development of teacher practices that are positively associated with improved student motivation.

### **Research Questions**

The following are the primary research questions for this study:

**RQ1:** Is there a statistically significant association between autonomy, competence, and relatedness scores and the ACT scores of high school juniors when controlling for gender, SES, and ethnicity?

**RQ1a:** Do high school juniors' demographic variables significantly contribute to the predictive model for college readiness?

**RQ1b:** Do high school juniors' autonomy scores significantly contribute to the predictive model for college readiness?

**RQ1c:** Do high school juniors' competence scores significantly contribute to the predictive model for college readiness?

**RQ1d:** Do high school juniors' relatedness scores significantly contribute to the predictive model for college readiness?

**RQ2:** Which is the best predictor of college readiness (measured by ACT scores): autonomy, competence, or relatedness, (measured by the Basic Psychological Needs Scale) when controlling for gender, socioeconomic status (SES), and ethnicity?

### **Null Hypotheses**

The following are the null hypotheses:

**H<sub>01a</sub>:** There will be no statistically significant association between autonomy, relatedness, and competence scores and the ACT scores of high school juniors while controlling for gender, SES, and ethnicity.

**H<sub>01b</sub>:** There will be no statistically significant association between autonomy scores and the ACT scores of high school juniors.

**H<sub>01c</sub>:** There will be no statistically significant association between competence scores and the ACT scores of high school juniors.

**H<sub>01d</sub>:** There will be no statistically significant association between the relatedness scores and the ACT scores of high school juniors.

### **Alternative Hypotheses**

Alternatively, the following are the research hypotheses:

**H<sub>1a</sub>:** There will be a statistically significant association between autonomy, competence, and relatedness scores and the ACT scores of high school juniors while controlling for gender, SES, and ethnicity.

**H<sub>1b</sub>:** There will be a statistically significant association between autonomy scores and the ACT scores of high school juniors.

**H<sub>1c</sub>:** There will be a statistically significant association between competence scores and ACT scores of high school juniors.

**H<sub>1d</sub>:** There will be a statistically significant association between relatedness scores and ACT scores of high school juniors.

### **Identification of Variables**

The predictor variables in this study will be the three essential psychological needs in human life according to self-determination theory: autonomy, competence, and relatedness (Deci et al., 1991). Autonomy refers to the need to feel that one's actions are self-determined (deCharms, 1968; Deci & Ryan, 1985). Competence refers to the need to feel capable of performing tasks, and relatedness refers to the need to connect and be cared about by other people (Ryan & Deci, 2002).

The Basic Psychological Needs Scale (BPNS) will be used to measure the three basic psychological needs nurturing motivation (Deci & Ryan, 2000; Deci et al., 2001; Ilardi, Leone, Kasser, & Ryan, 1993). The target high school has a positive behavior and intervention support (PBIS) team that gives the BPNS to students to evaluate school culture. The PBIS team looks at the data as part of their positive behavioral support initiative. The team is expected to continue

this practice in future years since an ongoing component of their positive behavior intervention system is to monitor culture and analyze student data. The BPNS uses 21 items to measure the three needs by asking individuals to use a Likert scale from one (not true at all) to seven (very true) to indicate their agreement with the statements (Deci & Ryan, n.d.). The scale can be used to produce individual subscores for autonomy, competence, and relatedness, as well as a total score for the degree to which the basic psychological needs are met. The BPNS has a reported Cronbach's alpha of .89 (Deci et al., 2001). The subscores for autonomy, competence, and relatedness have internal consistency coefficients of .83, .77, and .79, respectively (Bacanli & Cankaya-Cihangir, 2003; Kuzucu & Simsek, 2013).

The criterion variable in this study will be the composite ACT score of the participants. The ACT is a standardized test that scores the four domains of English, reading, math, and science each on a scale of 1-36. Averaging the four subscores results in a composite score ranging from 1-36 (ACT, 2007). The ACT is a valid instrument for measuring college readiness, knowledge, and problem solving skills. The ACT reports its test reliability in terms of Standard Error of Measurement (SEM), which is SEM +/- 1 (ACT, 2007).

The demographic variables in this study, SES, gender, and ethnicity, will be controlled. Demographic data will not have to be collected because they are included on the ACT score report provided to schools. ACT receives the demographic information from two sources, the school's building assessment coordinator (BAC) and the student. Students report their demographic information on their ACT test form, which includes gender and ethnicity. Ethnicity categories include the following: Black/African American, American Indian/Alaska Native, White, Hispanic/Latino, Asian, Native Hawaiian/Other Pacific Islander, and two or more races (ACT, 2013a). SES, gender, and ethnicity are reported to ACT by the BAC along with

verification of gender and ethnicity reported by the student. The BAC verifies the demographic information utilizing the school's student information system – Infinite Campus (IC). SES is determined by eligibility for free or reduced lunch and is dependent upon students filling out the application for eligibility (Kentucky Department of Education, 2013). The ACT and Kentucky school report card both report differential performance on the ACT by gender, family income, and ethnicity (ACT, 2007; Kentucky Department of Education, 2013).

### **Definitions**

1. *Autonomy*: Autonomy refers to “being self-initiating and self-regulating of one’s own actions” (Deci et al., 1991, p. 327). It is important to recognize that autonomy does not refer to independence or separateness from others, but rather an inner endorsement of one’s behavior.

2. *Benchmarks*: The use of the term benchmarks will be defined by the ACT’s definition of college and career readiness benchmarks. These are the “minimum scores needed on the ACT subject area tests to indicate a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in corresponding credit-bearing first-year college courses” (ACT, 2013c, p. v).

2. *BPNT*: BPNT is an acronym for basic psychological needs theory, which is a mini-theory of Ryan and Deci’s self-determination theory (Deci & Ryan, 2008b).

3. *College readiness*: College readiness is different from college eligibility (Lombardi, Conley, Seburn, & Downs, 2013). The definition used in this research is the definition used by ACT, “the level of preparation a student needs to be ready to enroll and succeed—without remediation—in a credit-bearing course at a two-year or four-year institution, trade school, or technical school. College readiness also means workplace readiness” (ACT, 2004, p. v).

4. *Competence*: Competence refers to “the understanding of how to attain various external and internal outcomes and being efficacious in performing the requisite actions” (Deci et al., 1991, p. 327).

5. *Intervention*: An intervention is educational instruction, practice, strategy, or curriculum designed to accelerate learning for all students (Bender, 2012).

6. *Needs*: “In SDT, needs specify innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being” (Deci & Ryan, 2000, p. 229).

7. *Relatedness*: Relatedness is “the development of secure and satisfying connections with others in one’s social milieu” (Deci et al., 1991, p. 327).

8. *RTI*: In the field of education, RTI is an acronym for response to intervention, which can refer to many different types of models. Most models involve some variation of systematic, increasingly intensive, targeted educational interventions designed to address the specific learning challenges of individual students (Bender, 2012).

9. *SDT*: SDT is an acronym for self-determination theory; it is a motivational theory that is concerned with supporting basic universal psychological needs for wellness and optimal health and functioning (Deci & Ryan, 1980).

### **Research Summary**

The research design is a quantitative, predictive correlational design. A correlational design will be used because this study seeks to explore the relationships between variables that facilitate motivation, performance, and ultimately influence outcome in terms of academic achievement (Deci et al., 1991). According to Campbell and Stanley (1963), correlational design provides a preliminary survey of hypotheses prior to experimental design. Therefore, correlational design is appropriate for this study as the body of research on college readiness for

high school students and psychological processes like motivation is very small (Savitz-Romer, 2012). The predictive nature of the study addresses the need expressed in the literature for empirical data to inform the development of intervention strategies for high school students. Also, the naturally occurring groups of participants fit the non-experimental research design (Warner, 2013). Hierarchical, multiple-regression will be used to analyze the interrelationship of the three-predictor variables because it can estimate the magnitude and statistical significance of the relationships between variables (Gall, Gall, & Borg, 2007).

### **Assumptions and Limitations**

#### **Assumptions**

**Reliability of measurement.** The proper specification of the multiple-regression model is essential and it depends on the reliability of the strength of the relationship with the independent variables added to the regression equation. “The more independent variables added to the equation with low levels of reliability the greater the likelihood that the variance accounted for is not apportioned correctly” (Osborne & Waters, 2002, Reliability and regression section, para. 1). Assumptions include the following: students reliably reported their answers on the BPNS; gender, ethnicity, and socio-economic status were correctly reported by the student and correctly verified by the building assessment coordinator; students eligible for free or reduced lunch have filled out the application for free or reduced lunch, and it has been correctly approved and coded; the correct socioeconomic status was recorded in infinite campus; students choosing not to give their best effort were not motivated to do so; and the survey was administered with fidelity by school employees. At the test site, juniors who do not meet college readiness benchmarks must take a transition course their senior year for English/reading and math that requires them to take up to two ACT Compass tests in an attempt to meet college readiness

benchmarks before graduation. The consequence provides a degree of incentive for students to give a best effort, even if they are not college bound.

### **Limitations**

Self-report data, which was used in this study, can threaten internal validity through self-report bias, non-ignorable non-response, and instrumentation (Tabachnick & Fidell, 2013; Warner, 2013). Students may have distorted their degree of needs satisfaction according to what they perceive would be a favorable response. A control for this bias was provided, as the survey was taken online anonymously, which may have alleviated feelings of pressure to please the survey administrator. Students were assured of the confidential nature of the survey, but also understood that all computers were monitored on school grounds. Web-based survey administration eliminated the option to skip a question, thereby providing control for non-ignorable non-response. Additionally, the web-based survey provided an interface that allowed the students to see an explanation for each question that helped minimize misunderstanding the question. There is no way to know if students answered questions thoughtfully, but the school made an attempt to collect reliable data. To prevent instrument decay, multiple overseers monitored the computer lab to see that students appeared attentive and on task. The computer lab runs computer-monitoring software that displays all students' screens simultaneously on one monitor. The administrators could not read students' responses, but they could see enough of the screen to ensure that students did not appear to be rapidly selecting random answers. The results do not account for students who chose not to participate or who dropped out of school before the ACT was administered. Due to inclement weather, some students were not able to take the survey before the ACT test date. The findings are limited to students who agreed and were able to take both the survey and the ACT at the research site and cannot be generalized to students

who did not participate or to students from other schools. The survey data is archival, and the researcher did not have control over the survey administration conditions.

## CHAPTER TWO: REVIEW OF THE LITERATURE

### Introduction

Academic intervention is gaining momentum in secondary schools. Researchers project that every high school teacher will be performing academic intervention by 2016 (Bender, 2012; Fuchs, Fuchs, & Stecker, 2010). Some states have already written intervention into legislation for their secondary schools. Kentucky Revised Statute 158.6459 (2009) mandates that high schools provide intervention for students who perform below college readiness benchmarks in English, mathematics, or reading on the state administration of the ACT to juniors. Despite state mandated intervention efforts, over 50% of Kentucky graduates were not college ready in 2013 (Kentucky Department of Education, 2013). The less than favorable response to secondary school intervention efforts is raising questions about high school intervention methods and models (Fuchs, Fuchs, & Compton, 2010; Vaughn & Fletcher, 2010).

Intervention or response to intervention (RTI) is a framework for accelerating learning for all students that traces its roots to early-reading research in primary education (Bender, 2012; Fisher & Frey, 2011; Fuchs, Fuchs, & Compton, 2010). The process, which generally consists of universal screening, review of student data, school-wide application of evidence-based practices, intensive, data-driven individualized instruction, and progress monitoring is well supported with research at the elementary level, but lacks empirical evidence at the high school level (Brozo, 2010; Fisher & Frey, 2013; Fuchs, Fuchs, & Compton, 2010; Tyre, Feuerborn, Beisse, & McCready, 2012). It is because of this deficiency in secondary school research that RTI implementation in high schools is cautioned yet recommended in the literature.

Harbingers in the RTI field who have attempted secondary school interventions have exchanged interesting dialogue in a series of journal articles about “rethinking response to

intervention with secondary school students” (Fuchs, Fuchs, & Compton, 2010, p. 22; Vaughn & Fletcher, 2010, p. 296). Veteran RTI researchers express concerns about the validity of applying the elementary-based model in secondary schools and note that RTI in secondary schools may need an alternative framework (Brozo, 2010; Fuchs, Fuchs, & Compton, 2010; Fuchs & Deshler, 2007; King, Lemons, & Hill, 2012). Concurrently, the limited amount of empirical evidence that exists also suggests that RTI may be a plausible method for improving the achievement of secondary students (Fagella-Luby & Wardwell, 2011; Fisher & Frey, 2013; Vaughn et al., 2010; Vaughn & Fletcher, 2012). Fagella-Luby and Wardell (2011) put their perspective on the state of secondary school intervention in the following terms, “...while much has been learned, considerably more technical information is necessary to ensure RTI as a viable model for improving student outcomes” (p. 48).

As researchers continue to ask questions about how to apply intervention in secondary schools, high school teachers execute the intervention mandate targeted at college readiness for high school students with insufficient guidance. This pressure to move forward in college readiness interventions without a robust research base is problematic since a fundamental component of RTI is the use of evidence-based practices (Bender, 2012). It is no wonder that high school achievement has resisted improvement efforts over the last forty years (National Center for Education Statistics, 2013).

The sizeable gap between postsecondary demands and a typical high school graduate’s skills further complicate the intervention problem. There is a significant gap between the skill requirements demanded by employers and the emerging labor force. The gap is prominent particularly in the readability level of military, citizenship, and workplace texts (ACT, 2011a; Williamson, 2008). The readability gap between the average high school texts and college level

materials is so large that students who are reading on grade-level in high school may find their reading skills deficient when they begin college. Some estimates of the readability gap predict that three months after graduation, high school graduates may transition from being able to successfully access 75% of their texts to only accessing as little as 5% of college texts (Williamson, 2008). High school is not too late to intervene for reading difficulties, but researchers report that adolescents require different strategies and emphases to achieve than younger students do (Fuchs, Fuchs, & Compton, 2010; Fuchs & Deshler, 2007; Vaughn et al., 2010; Vaughn & Fletcher, 2012). Well-developed, comprehensive reading interventions have been provided to secondary students by distinguished RTI researchers only to find the results disappointing and even non-evident when measured by standardized tests (Fuchs, Fuchs, & Compton, 2010; Vaughn et al., 2010; Vaughn et al., 2012). Researchers have commented that difficulties with conducting research in high schools such as the compliance issues that are typical of secondary students cause many to avoid high school research altogether (Fuchs, Fuchs, & Compton, 2010). Educators need more evidence-based strategies to develop interventions that target college readiness and motivate older students in their waning years of secondary school. The application of self-determination theory to college readiness interventions may be a viable way to contribute to that need.

Chapter one introduced self-determination theory (SDT) as a macrotheory of human motivation and also introduced one of its mini-theories called the basic psychological needs theory (BPNT). Evidence from SDT and BPNT research supports the strong influence motivation has on achievement (Cordova & Lepper, 1996; Deci et al., 1991; Liu & Lu, 2011). However, adolescent motivation generally degrades significantly throughout secondary school along with a decline in academic achievement (Center on Education Policy, 2012; McMurrer &

Kobel, 2011; Ryan & Deci, 2000a). Furthermore, BPNT proposes that fulfillment of the three basic psychological needs for autonomy, competence, and relatedness facilitates motivation and consequently improves academic achievement (Deci et al., 1991). This proposition connects SDT to RTI because SDT claims to positively impact academic achievement by increasing motivation; evidence for this proposition would also make a contribution to the need for evidence to inform development of intervention strategies for older students. Secondary school students may be experiencing a decline in motivation due to the controlling nature of secondary school. SDT has been applied in diverse contexts, including education, and across multiple domains and cultures (Deci & Ryan, 2002; Guay et al., 2008), but it has not been tested in relation to the achievement of college readiness in high school students. This study seeks to examine SDT and uncover whether or not there is a relationship between the fulfillment of basic psychological needs and the achievement of college readiness. In particular, the ability to predict college readiness from basic psychological need fulfillment has practical significance for high school teachers who may be blindly delivering college readiness interventions without a robust evidence base to support their intervention strategies. Understanding this relationship could improve professional practice and inform the development of interventions to target high school students in a way that has not been approached. Therefore, this research proposes to make a practical and theoretical contribution to the small body of literature about college readiness for high school students and psychological processes like motivation (Savitz-Romer, 2012).

The following literature review begins with the theoretical framework for SDT followed by concerns about high school students' achievement of the new college readiness standards. The theoretical framework section will not review all the historical and current theories on motivation, but rather draw attention to the theories that influenced SDT and those that SDT

proposes to expand upon. An overview of SDT applied to education and the multiple domains and cultural contexts transcended by SDT will also be discussed in order to point out the broad applications of the theory in the literature. Next, the literature on secondary school intervention and the need for more research will be reviewed. Motivation, academic achievement, and the role of SDT in education will be analyzed to establish with greater detail the rationale, practical significance, and empirical gap that this study addresses. The summary will reiterate the usefulness of collecting more high school intervention research and testing the basic psychological needs theory's ability to predict high school students' achievement of college readiness.

### **Theoretical Framework**

Historical motivational theories about learning have influenced SDT. It is clear from multiple publications by the authors of SDT (Deci & Ryan, 1980; Deci et al., 1991; Ryan & Deci 2000b) that deCharms' work (1968) on perceived locus of causality informed their development of cognitive evaluation theory about contextual effects on intrinsic motivation (see Table 1). Additionally, Deci and Ryan (1985) identified types of extrinsic motivation (see Figure 1) based around the concept of internalization as originally described by Schafer (1968). However, the SDT perspective on motivation differs from the motivational theories of Bandura (1977), Dweck (1986), and Eccles (2002), who all focus on the processes that direct behavior toward desired goals. SDT not only also explains the processes that direct behavior, but also adds an explanation for *why* certain goals are desired by postulating that basic psychological needs are motivational universals in all individuals (Deci et al., 1991). This basic premise embraces the assumption that individuals naturally orient themselves toward psychological growth and a unified sense of self (Ryan & Deci, 2002).

While some psychological theories view the ideal of a true self as a post-romantic view (Gergen, 1993) due to evidence of divided functioning and inner conflict (Broughton, 1987; Greenwald, 1982), SDT claims to provide a framework that integrates the discrepant viewpoints of divided self and unified self. This “organismic dialectic” (Ryan & Deci, 2002, p.5) reconciles multiple, apparently contradicting, perspectives of human behavior and integrates them into a meta-theory of human motivation, development, and health that has been applied extensively to multiple domains including education (Deci & Ryan, 2008b). The *why* of motivation is a salient point in SDT that is addressed via focus on processes that energize behavior.

*The Handbook of Social Psychology* describes motivation as the term used to describe “*why* (emphasis mine) a person in a given situation selects one response over another or makes a given response with great energization or frequency” (Bargh, Gollwitzer, Oettingen, 2010, para. 3). The definition gives the appearance of consensus in the field, yet theories of motivation vary in focus and explanation. For example, Bandura (1977) attributes motivation and lower academic performance to a variety of processes that direct behavior, such as self-efficacy, while other theories of motivation focus on the strength of one or more psychological needs such as Hull’s (1935) drive theory or Maslow’s (1943) hierarchy of needs. However, the self-determination perspective on motivation is unique because it deals with not only the processes that direct behavior, but also the processes that energize or fuel behavior. This “energization of behavior issue” (Deci et al., 1991, p. 327) postulates that the fulfillment of basic psychological needs facilitates motivation. Each of the needs, autonomy, competence, and relatedness, is conceptualized as a nutriment that must be fulfilled in order for an individual to thrive. A central distinction is made between autonomous motivation (advantageous) and controlled motivation.

The two types of motivation lead to very different outcomes even though they both “energize and direct behavior” (Deci & Ryan, 2008b, p. 182).

In educational research, substantial evidence supports that student motivation influences academic achievement (Bandura, 2001; Cordova & Lepper, 1996; Deci & Ryan, 1985; Deci & Ryan, 2008a; Deci et al., 1991; Emmett, 2013; Liu & Lu, 2011), yet adolescent motivation degrades significantly throughout secondary school along with a decline in academic growth (Center on Education Policy, 2012; McMurrer & Kobel, 2011; Ryan & Deci, 2008b). Exclusive to SDT, the notion of energization of motivation places greater value on the quality of motivation (autonomous versus controlling) over the quantity of motivation. Motivation is differentiated in SDT by distinguishing between types of motivation, whereas other motivational theories focus on quantity of motivation and treat it as a unitary concept (Deci & Ryan, 2008b). Quality instead of quantity of motivation is proposed to be a better predictor of important outcomes such as conceptual learning, creative problem solving, and effective performance; “type of motivation is generally more important than the amount in predicting life’s important outcomes” (Deci & Ryan, 2008b, p. 14). This insight into quality of motivation is relevant to research on motivation in secondary schools. A recent study of high school and college students found that in both population samples, students with good quality of motivation (high autonomous, low controlled) had better learning outcomes than did students with low quality (low autonomous, high controlled) but higher quantity of motivation (Vansteenkiste et al., 2009).

Self-determination theory proposes that basic need support promotes quality motivation that leads to desired educational outcomes, whereas need thwarting environments diminish desired educational outcomes (Deci & Ryan, 1985; Deci et al, 1991; Deci & Ryan, 2000). The needs are not conceptualized as a hierarchy per se, but as a set of universal human needs that

must be satisfied for well being. Individuals may encounter varying experiences that fall anywhere along the continuum of motivation. Therefore, the social context of the individual plays a key role in motivation because it may either support or thwart satisfaction of the basic psychological needs. The focus of self-determination theory and basic psychological needs theory is on the degree of need satisfaction versus degree of need thwarting, not the strength of needs or quantity of motivation (Deci et al., 1991; Deci & Ryan, 2008b; Vansteenkiste et al., 2009). In SDT, this central concept of needs fulfillment provides a predictive value (Deci & Ryan, 2008b). Since fulfillment of autonomy, competence, and relatedness is proposed to be absolutely vital for optimal health, environments that undermine autonomy, competence, and relatedness are detrimental to well being. Educational environments are included in this premise (Ryan & Deci, 2002; Guay et al., 2008).

The importance of SDT in education has already been established in the literature. A literature review by Guay et al. (2008) reported that the lens of SDT has guided over 200 empirical studies in education that have investigated the understanding of contextual factors underlying motivation and facilitating learning. SDT and BPNT have also been extensively applied to multiple domains of life where the impact of controlling versus autonomy-supportive environments has been researched. Extant literature provides support for the importance of autonomy, competence, and relatedness in areas such as sports (Gillet, Berjot, & Gobance, 2009; Vallerand, 1983), the workplace (Baard, Deci, & Ryan, 2004; Ilardi et al., 1993), mental health (Ryan & Deci, 2000a), and general well-being (Brien et al., 2012; Patrick, Knee, Canevello, & Lonsbary, 2007), as well as education (Niemic & Ryan, 2009; Vansteenkiste & Lens, 2006; Vansteenkiste et al., 2009). As a result of the significance of SDT in multiple life domains, Ryan and Deci (2008b) describe SDT as a “macrotheory of human motivation, development, and

health” p. 182. Of the five mini-theories that have emerged from SDT (See Table 1), BPNT informed the selection of the predictor variables and the empirical gap in this study due to the argument that all three needs are essential for optimal functioning, and that thwarting any of the needs will result in pronounced functional costs to desired educational outcomes.

Table 1

*The Five Mini-theories of Self-determination Theory with their Specific Phenomena*

Mini-theory	Specific Phenomena
Cognitive Evaluation Theory	Addresses effects of social contexts on intrinsic motivation
Organismic Integration Theory	Addresses various forms of extrinsic motivation within a continuum of internalization and social contexts that enhance or forestall internalization
Causality Orientations Theory	Addresses the three types of causality orientations: autonomy, controlled, or amotivated
Basic Psychological Needs Theory	Addresses the social contexts that promote optimal functioning and the functional cost associated with thwarting autonomy, competence, or relatedness
Goal Contents Theory	Addresses distinctions between intrinsic and extrinsic goals and their impact on motivation and wellness

Another important and fundamental premise of BPNT is that there is a direct relationship between the degree of need satisfaction and achievement. This relationship provides a predictive utility to the theory (Deci & Ryan, 2000; Deci & Ryan, 2008a; Deci & Ryan, 2008b). Since there is strong evidence suggesting that supporting need satisfaction leads to greater academic achievement in older students and diverse cultures, BNPT should be considered when tackling the difficult task of developing interventions to increase high school students' achievement of ambitious college readiness standards (Deci et al., 1991; Guay et al, 2008; Niemiec & Ryan, 2009; Reeve, 2002; Vansteenkiste et al., 2009). If BPNT is applicable to the achievement of college readiness, then the degree to which the needs have been satisfied or thwarted for high

school students may correlate to their achievement of college readiness. Therefore, the predictor variables in this study have been selected to be the measurement of the degree to which the three needs have been met.

The tendency of humans to seek fulfillment of their basic psychological needs is a resource that some researchers claim can be cultivated and harnessed by educational practitioners to foster learning and enhance educational outcomes (Deci et al., 1991; Niemiec & Ryan, 2009; Reeves, 2001). Supporting the needs leads to better engagement and learning, whereas frustrating the attainment of needs leads to disengagement and poor academic outcomes. The concept of autonomy is a central idea, which hypothesizes that students will experience positive academic outcomes if they are regulated by autonomous motivations (Deci & Ryan, 2008a; Guay et al., 2008). Studies of persistence (Vallerand et al., 1997) and achievement (Fortier, Vallerand, & Guay, 1995; Grolnick, Ryan, & Deci, 1991; Ratelle, Guay, Vallerand, Larose, & Senecal, 2007; Deci, 2009) that show positive association with the fulfillment of autonomy are particularly relevant to high schools as these are areas of persistent poor performance (Nord et al., 2011). Unfortunately, Ratelle et al. (2007) point out that the autonomous motivational profile is more likely to develop in college than in high school due to the increased external locus of control typical of high schools. This controlling culture is problematic because a direct corollary of SDT is that people will pursue goals that allow or support need satisfaction, therefore the hindrance of need satisfaction can be amotivating (Deci & Ryan, 2000; Ryan & Weinstein, 2009). If high schools naturally limit autonomy support via controlling culture, then addressing such a counterproductive social context may prove to be a very effective intervention. Researchers report, "School and classroom strategies, including the use of grades, evaluations, rewards and external pressures, are thus of particular interest within SDT as they impact our

human potentials to learn and develop” (Ryan & Weinstein, 2009, p. 225). Because it is the satisfaction of all three basic psychological needs that is associated with greater academic achievement, in the context where one need is hampered, the fulfillment of the other needs may need to pick up the slack (Niemi & Ryan, 2009). Understanding the dynamics between the satisfaction of each of the three basic needs is one example of how BPNT can be harnessed as a resource to aid educators in the quest to accelerate learning for all students.

The extant literature has not addressed the interplay between the degree to which the three basic needs are satisfied in high school and its relationship to the achievement of college readiness. Recent research has attempted to theorize about extrinsic motivation as an untapped resource for high school achievement on high stakes testing in California, but the research did not consider instruments that measure college readiness (Emmett, 2013). The instruments in Emmett’s (2013) study were state assessments designed to measure the state’s content standards, not college readiness skills. In higher education, self-determination theory has been researched as an explanation of how learning communities affect education outcomes. However, these studies were on students already in college; the readiness level of students entering college was not considered in the study (Beachboard et al., 2011). SDT has been used in educational research to investigate motivational models, school reform, high school persistence to graduation, and intervention for homework motivation, none of which addressed college readiness (Hardre & Reeve, 2003; Deci, 2009; Vallerand et al., 1997; Akioka & Gilmore, 2013).

The application of SDT to educational research has primarily addressed contextual factors that optimize the learning environment, and in doing so has set a precedent for the predictive value of BPNT (Ryan & Deci, 2002; Guay et al., 2008). SDT researchers recommend more intervention studies and, in particular, intervention studies at different education levels and

diverse backgrounds (Guay et al., 2008; Su & Reeve, 2011). The results of this study may make both an empirical and theoretical contribution to the extant literature by doing just that, applying SDT to a relatively diverse, adolescent population to test whether or not it can predict academic achievement in the context of college readiness. The practical significance of this study is that it may contribute to a clearer picture of the factors contributing to student achievement and in turn, inform the design of interventions aimed at psychological factors that facilitate motivation via fulfillment of the basic psychological needs for autonomy, competence, and relatedness.

## **Literature Review**

### **Concerns About High School Achievement**

Academic achievement continues to lag in the United States, especially among high achieving students and secondary school students (McMurrer & Kober, 2011). The National Assessment of Educational Progress reports no improvement in academic achievement in reading and mathematics over the last forty years for 17-year-olds, even when other age groups have shown some improvement (NCES, 2013). The U.S. also lags behind other countries in reading and mathematics achievement even when comparing only our highest performing sub-populations to other countries (Hall Mark, 2013; Hanushek, Lastra-Anadon, Carlos, Peterson, & Woessman, 2011). In addition to mediocre international achievement, inadequate preparation for college has led analysts to refer to the U.S. educational system as in crisis (ACT, 2004; Hanushek et al., 2011; Swanson, 2009). ACT (2004, 2012) persistently reports that America's high school students graduate underprepared to enter college or the workforce and that no progress is being made toward the goal of college readiness.

**College readiness is the new standard.** The ACT test (2007), a standardized test scored on a scale from 1-36 in each content area, has determined the following college readiness

benchmarks on the ACT subtests: English – 18, Math – 22, Reading – 22, and Science – 23, to mean that students who meet a benchmark have high probability of success in the corresponding college courses. In other words, they have a 50% chance of earning a B or better and a 75% chance of earning a C or better in the corresponding areas. Specifically, ACT defines college readiness as, “the acquisition of the knowledge and skills a student needs to enroll and succeed in credit-bearing first-year courses at a postsecondary institution (such as a 2- or 4-year college, trade school, or technical school) without the need for remediation” (ACT, 2013a, p. v). This generally accepted definition is reiterated in the literature on college readiness that is not affiliated with the ACT test (Conley, 2008; Conley, 2010 Savitz-Romer, 2012). Research has provided empirical evidence that the level of reading and mathematics skills needed to successfully enter workforce training programs directly out of high school or to enter credit-bearing college courses without remediation are the same (ACT, 2006; ACT 2008).

Accordingly, college readiness and career readiness can be thought of interchangeably since the skills and knowledge for workplace readiness are the same as those required for college readiness (ACT, 2008). This is the new standard that high school educators must help all students meet (Lombardi et al., 2013). In 2010, President Obama called for new steps to prepare students for college and career readiness and reauthorized the Elementary and Secondary Education Act (2011) to support college and career readiness standards, which all states must now adopt. College readiness intervention is now making its way into legislation as states like Kentucky are mandating that schools provide intervention for students who fail to meet college readiness benchmarks (Kentucky Revised Statute 158.6459, 2009).

**State of college readiness.** Despite implementation of intervention legislation for high school students who are not on track to graduate college ready, nationwide only 26% of the

students in the graduating class of 2013 who took the ACT were able to meet all four of the College Readiness Benchmarks (ACT, 2013c). Approximately 28% of the 1.66 million high school graduates who took the 2012 ACT did not meet any College Readiness benchmarks (ACT, 2012). In 2013, the percent of high school graduates who did not meet any benchmarks rose to 31% (ACT, 2013c). High school achievement is not improving based on ACT data, and there is also a significant gap between the skill requirements demanded by employers and the emerging labor force (ACT, 2011a). Analysts criticize that the U.S. is not ready to meet the demands of a globalized economy and 21<sup>st</sup> century jobs; it must improve college readiness in order to develop a highly skilled labor force to compete in the global economy (ACT, 2004).

**Demographics and college readiness.** Since 1995, the National Center for Education Statistics (2012) has reported ACT scores by demographics such as gender and ethnicity. The composite and subject area ACT scores for Asian American/Pacific Islander and White students have been consistently higher than the corresponding scores from Black, Hispanic, and American Indian/Alaska Native students. The National Center for Educational Achievement reports that the majority of African American and Hispanic students who graduate from high school do not graduate college ready (Dougherty, 2010). Males have maintained a higher average composite ACT score than females have, although gender differences fluctuate by subject score. Male averages are higher in math and science, while female averages are higher in English and reading. Wealthy students have made greater gains in ACT scores over the last forty years than low-income (Bastedo & Jaquette, 2011). Poverty may be one of the most significant demographic factors impacting ACT scores. Statewide in Kentucky, only 35.6 % of students who received free or reduced lunch graduated college ready compared to 64 % of students who paid for lunch (Kentucky Department of Education, 2013). A research report from Washington

State University reported a .97 correlation between parental income and students' ACT scores, which can account for 80% of the variance in ACT scores (Orlich, 2013). This statistic illuminates the fact that although a larger and more diverse population of students took the ACT this year, the scores reflect a decline instead of an improvement (ACT, 2013a). Researchers and legislators continue to call on educators to provide interventions to deal with the problem (ACT, 2013a; Obama, 2010; Schaefer & Rivera, 2012).

### **Current Research on High School Intervention**

**Defining intervention.** Defining RTI can be challenging due to the variations that exist in the model from state to state and school to school (Berkeley, Bender, Peaster, & Saunders, 2009; Fuchs, Fuchs, & Compton, 2010). Schools may be implementing RTI very differently and they may variably prioritize different types of learning challenges. Nevertheless, common to most of the different models is the view that RTI is not a program, but rather a set of “systematic, increasingly intensive educational interventions” targeted at individual students' specific learning difficulties (Bender, 2012, p. 7). Typically RTI is a 3-tiered model that includes core instruction for all students at tier one, short-term targeted supplemental instructional support for small groups at tier two, and intensive one-on-one supplemental instruction for students in tier three (Brozo, 2010). It should be noted that researchers and RTI advocates are not in agreement on the role of special education in RTI and the exact structure of the continuum of placements and services (Fuchs, Fuchs, & Stecker, 2010). Theoretically, the purpose of RTI was originally to prevent academic failure and assist in the diagnosis of learning disabilities (Baker, Fien, & Baker, 2010; Torgesen et al., 2007). As such, schools may utilize RTI as part of the pre-referral process for determining special education eligibility, as a service delivery model for students with learning difficulties, or as a general education initiative to accelerate learning for all

students. The latter includes diverse interventions for homework, grades, retention, and academic skills and places an emphasis on closing the achievement gap (Bender, 2011; Fagella-Luby & Wardell, 2011).

**Disagreements about the nature of RTI.** The literature discussing RTI appears to share a common language that treats concepts such as preventive intent, early identification, early intervention, tiered instruction, and research-based practice uniformly (Baker et al., 2010; Brozo, 2009; Fuchs & Deshler, 2010; Torgesen et al., 2007). However, deeper exploration reveals that stakeholders have not reached consensus about the nature and purpose of RTI. Fuchs, Fuchs, and Stecker (2010) contrast two different camps of thought, which they call the “Individuals With Disabilities Education Act (IDEA) group and a No Child Left Behind (NCLB) group” (p. 301). The groups differ in purpose and approach to intervention/instruction. The NCLB perspective views RTI as standards-driven general education reform aimed at bridging the gap between federal policy and local practice. States that require intervention for high school students who fail to meet ACT benchmarks are closest to this perspective because attainment of standards measured by high-stakes assessments are driving the content mastery-based interventions through a school-wide approach aimed at closing the achievement gap (Fisher & Frey, 2011; National High School Center, 2010). Bender (2012) confirms this perspective; “RTI assists schools in meeting educational standards-based goals” (p. 18). The IDEA perspective envisions the purpose of RTI as early intervention and improvement of valid measures of disability identification. In the IDEA conceptualization, the nature of intervention is replicable, time-sensitive, systematic, and includes cognitive processes in evaluation of reading or math difficulties (Fuchs, Fuchs, & Compton, 2010; Fuchs, Fuchs, & Stecker, 2010; Vaughn &

Fletcher, 2012). The lack of consensus about the nature and purpose of RTI further complicates interpretation of the thin research base for practitioners.

**High school research.** The significant lack of research evidence specifically on high school RTI has caused researchers to warn secondary school administrators and teachers to pause and take careful consideration before applying elementary approaches to high school intervention (Brozo, 2009; Vaughn & Fletcher, 2010; Fuchs, Fuchs, & Compton, 2010; King et al., 2012). Fuchs, Fuchs, & Stecker (2010) warn stakeholders to think about what they want to accomplish in the name of RTI. Secondary RTI studies have only produced modest academic gains even when implemented with great fidelity from researchers who were given the extensive support of a large research facility that included adequate staff, funds, and expertise to carry out nearly perfect interventions (Fisher & Frey, 2011; Fuchs, Fuchs, & Compton, 2010; Vaughn et al., 2010). Furthermore, the limited research has focused on interventions that are typically geared toward a specific reading skills intervention (Fagella-Luby & Wardell, 2011; Vaughn et al., 2010), not the typical systemic school-wide framework that high schools report using (National High School Center, 2010). The lack of research-based RTI practices has resulted in the execution of RTI methods utilizing only modest empirical validation (Berkeley et al., 2009). There is certainly a paradox since RTI implementation is supposed to be supported by research-based practices, but the absence of secondary research and documented successes leaves practitioners to exercise their own judgment of best practice (Brozo, 2009; Vaughn & Fletcher, 2010; King et al., 2012).

**Lack of interventions informed by psychology.** In addition to the empirical deficit in high school academic intervention, there is also a lack of application of psychological theory to inform the development of interventions and strategies, especially pertaining to the level of

academic achievement necessary for college readiness. One reason the approach to college readiness intervention is so limited is due to the narrow focus on best practices in instruction without a theoretical foundation in psychology (Radcliffe & Bos, 2013; Savitz-Romer, 2012). A real-life test of existing psychological theories in the intervention framework for adolescents is much needed to address the theoretical gap in the literature.

### **Self-Determination Perspective Applied to Education**

**Motivation types, quality, and academic achievement.** Ryan and Deci (2002) have accumulated decades of research in education that support the following two conclusions: “autonomously-motivated students thrive in educational settings, and students benefit when teachers support their autonomy” (p. 183). The two conclusions emphasize the type and quality of motivation and link quality of motivation to the quality of the student-teacher relationship. A significant distinction between SDT and other motivational theories is that SDT differentiates types and quality of motivation versus the treatment of motivation as a singular construct by other theories that are concerned only with amount of motivation (Ryan & Deci, 2000a). The total amount of a student’s motivation is not as important as the quality of a student’s motivation when it comes to predicting desired outcomes such as effective performance, creative problem solving, and deep conceptual learning (Deci & Ryan, 2008b). The different types of motivation can be conceptualized along a continuum from amotivation, controlled or extrinsic motivation, to autonomous, intrinsic motivation, which is the state of doing something out of interest and inherent satisfaction (Ryan & Deci, 2002). Differing types of motivation lead to very different outcomes based on how controlled or autonomous they are. Deci and Ryan (2002) conclude that, “students achieve highly, learn conceptually, and stay in school in part because their teachers support their autonomy rather than control their behavior” (p. 183). Autonomous

behavior stems from self and is perceived by the student as volitional and self-endorsed, which enhances intrinsic motivation (Deci & Ryan, 1985). Since educational tasks may comprise activities that are not always inherently satisfying to students, extrinsic motivation also plays an important role in education (Reeve, 2002).

**Behavioral regulation and extrinsic motivation.** Along the self-determination continuum, extrinsic motivation is centered between amotivation and intrinsic motivation (Ryan & Deci, 2002; Deci & Ryan, 2008a). According to Ryan and Deci (2002), each type of motivation differs in type of regulation and type of outcome (see Figure 1). Amotivation is non-regulated and describes people who lack the intention to act. The resultant behavior is not self-determined; people do not act at all, or they act passively. The rest of the continuum refers to types of motivated behavior. Extrinsic motivation comprises the bulk of the spectrum because the following types of progressively more self-determined regulation characterize it: external regulation, introjected regulation, identified regulation, and integrated regulation. External regulation is the least autonomous and includes being motivated to satisfy a demand or contingency. The person acts to avoid punishment or to obtain rewards. Introjected regulation describes the internalization of an external regulation, but it is still controlling because the person is motivated through ego-involvement. For example, a person who is practicing introjected regulation may act to avoid guilt or shame but does not truly take ownership of the external regulation. Identified regulation involves a conscious valuing and “acceptance of a behavior as personally important” (Ryan & Deci, 2002, p.17). Individuals accept and identify with values external to their own. Integrated regulation is the most autonomous form of extrinsic motivation, which is similar to intrinsic regulation in several ways. The main difference is that integrated regulation, although performed volitionally, is not directing behavior based on inherent pleasure

but out of desire to attain personally important outcomes. Deci and Ryan (2008a) point out that people will be effective internalizing and integrating behavioral regulations to the degree that they experience ambient support for their basic psychological needs. Some researchers report both internal regulation and integrated regulation together in the category of autonomous behavior (Guay et al., 2008). Integrated regulation is important to educational contexts where certain tasks may not be inherently pleasurable. According to SDT, schools are a social context that enhance or forestall the internalization of educational values and goals and thereby impact student motivation (Deci, 2009).



Type of Motivation	Type of Regulation	Perceived Locus of Causality	Outcome
Intrinsic Motivation	Internal Regulation	Fully Internal	Self-determined behavior, Actions provide inherent satisfaction
Extrinsic Motivation	Integrated Regulation	Internal	Behaviors are congruent with one's self
	Identified Regulation	Somewhat Internal	Behaviors are congruent with one's values
	Introjected Regulation	Somewhat External	Ego involvement, behaviors satisfy internal rewards or punishment
	External Regulation	External	Behaviors satisfy an external demand or reward
Amotivation	Non-regulated	Impersonal	Non-self determined behavior, no intention to act

**Figure 1. The Self-determination Continuum of Relative Autonomy Depicting Types of Motivation with Regulation, Perceived Locus of Causality, and Outcome**

However, the current NCLB high-stakes testing climate in high schools does not lend itself to motivate students intrinsically, thus many schools have taken up providing extrinsic rewards to motivate students (Emmett, 2013). Researchers warn that extrinsic rewards can undermine motivation, “Although research has shown that extrinsic motivators often undermine intrinsic motivation because they are experienced as controlling, it is also the case that people can feel autonomous while being extrinsically motivated” (Deci & Ryan, 2008a, p. 16). This is a significant point made by self-determination theory that impacts educational practice because it implies that moderation is necessary in the amount of extrinsic motivation that a school provides. A major factor in determining the degree of autonomy support that a student may experience at

school is the teacher's orientation toward controlling versus autonomy supporting motivation style (Reeve, 2009). Since high schools cannot escape the external controls of high stakes testing, it is essential that educators are aware that autonomy support can exist in the presence of external controls. Striking the balance between autonomy support and external control may prove difficult since schools often use extrinsic rewards to motivate students, and extrinsic rewards can undermine motivation when experienced as controlling. It is vital to students' motivational quality and positive educational outcomes for high school teachers to find a balance of extrinsic motivation and autonomy support in educational practice.

**Teacher support for autonomy.** The literature has established the importance of autonomy support for enhanced educational outcomes (Deci & Ryan, 2008b; Jang, Reeve, Ryan, & Kim, 2009; Niemiec et al., 2009; Roth, Assor, Kanat-Maymon & Kaplan, 2007). Conversely, teachers' controlling motivation styles that undermine autonomy have been linked to poor student outcomes (Reeve, 2009). Yet, researchers have observed that teachers commonly enact controlling motivational styles (Niemiec et al., 2009; Reeve, 2009; Roth et al., 2007). Reeve (2009) explained that teachers are pressured from multiple angles to practice controlling motivational styles - high stakes testing is one example. High stakes testing as demonstrated in the United States' No Child Left Behind (NCLB) legislation represents a controlling motivational approach since emphasis is placed on test scores; strategies are implemented to improve outcomes by use of rewards or sanctions (Ryan & Weinstein, 2009). One result of high stakes testing has been to enact a more controlling motivational style in teachers that, in turn, has resulted in students demonstrating a more controlled motivation orientation (Pelletier & Sharp, 2009). SDT provides a solution to this phenomenon since teachers' degree of autonomy support is a contextual factor that can be influenced. Researchers investigated the effect of helping

teachers become more autonomy supportive; studies investigating the effectiveness of interventions aimed at training teachers to support students' autonomy have been limited but promising (Reeve, Jang, Jeon, & Barch, 2004; Reeve 2009; Roth et al., 2007; Sarwar, Zerpa, Hachey, Simon, & van Barneveld, 2012; Su & Reeve, 2011).

Ryan & Deci (2002) proposed that teacher training programs do not teach teachers how to design instruction to promote student autonomy, and interventions would do well to target psychological need deprivation in people (Ryan & Deci, 2000a). Since that time, there have been attempts to train teachers to support students' autonomy (Reeve et al., 2004; Roth et al., 2007; Ryan & Deci, 2000a). A recent meta-analysis of the effectiveness of intervention programs designed to support autonomy concluded that teachers benefitted more from an autonomy-supportive intervention program than other groups of participants. Teacher training was compared to training of parents, clinicians, and managers (Su & Reeve, 2011). However, the low number of included studies limited the conclusions that could be offered. Only 19 studies were included, six of which were unpublished reports that may have been prone to weaker methodologies. This recent meta-analysis provides a timely but limited addition to the literature, which corroborates the recommendation by Guay et al. (2008) for more intervention studies.

**Cross-cultural contexts.** Empirical research findings demonstrate that classroom contexts that support satisfaction of autonomy, competence, and relatedness have been associated with greater engagement and academic achievement across different cultures and different educational settings (Ryan & Deci, 2002; Guay et al., 2008; Jang et al., 2009; Ryan & Deci, 2011). The motivational benefit of teacher support of student autonomy has been documented in diverse research conducted in Belgium, Canada, China, Israel, Korea, and Russia

(Guay et al., 2008; Jang et al., 2009; Roth et al., 2007; Vallerand et al., 1997; Vansteenkiste et al., 2009). South Korean students who had all three basic needs supported experienced greater academic achievement and satisfaction with school despite the generally collectivistic culture of South Korea. These results remained even when controlling for parental and cultural influence (Jang et al., 2009). Students with learning difficulties, (Deci, Hodges, Pierson, & Tomassone, 1992) as well as medical students and law students in demanding academic programs (Sheldon & Krieger, 2007; Williams & Deci, 1996), also benefitted from teacher support of autonomy.

### **Basic Psychological Needs Theory**

**The universality of the concept of needs.** Many of the current theories of motivation are concerned with processes that direct behavior and, in turn, focus on goals or desired outcomes (Bandura, 1977; Dweck, 1986; Eccles, 2002). They postulate that people pursue goals based on the belief that persistence will lead to a desired outcome. SDT also addresses the direction of behavior but additionally deals with the reasons why certain outcomes are desired based on the premise that the basic psychological needs are universal in human beings. Deci et al. (1991) refer to this addition as “the issue of the energization of behavior” (p. 327). SDT attends to the regulatory processes by which goals are pursued via the concept of innate psychological needs. The degree to which people are able to satisfy their basic psychological needs is critical to effectively achieve their goals and desired outcomes (Deci & Ryan, 2000). At the heart of BPNT, the needs concept posits that the psychological needs for autonomy, competence, and relatedness are common to human nature and social contexts can either support or thwart flourishing by their degree of need satisfaction (Ryan & Niemiec, 2009). The universal nature of the needs contributes to its predictive use in the research literature (Deci & Ryan, 2008a).

**The usefulness of the needs concept.** Deci et al., (1991) made several significant claims about the usefulness of BPNT. In addition to the universal nature of the needs that can be generalized to humans regardless of cultural context, the ability of the needs construct to connect and make sense out of apparently superficial phenomena is another useful claim. However, the most significant claim is that BPNT may have a predictive value when understood. “Simply stated, motivation, performance, and development will be maximized within social contexts that provide people the opportunity to satisfy their basic psychological needs for competence, relatedness, and autonomy” (Deci et al., 1991, p. 327). These empirically supported claims to maximize motivation, performance, and development within supportive social contexts have implications for classroom practice and overall educational reform (Niemic & Ryan, 2009). The literature supporting the former statement has described positive learning outcomes in varying capacities: conceptual learning, creative problem solving, and effective performance in school.

**Optimizing learning through supporting needs.** According to basic psychological needs theory, satisfying all three psychological needs and not just autonomy in students sustains intrinsic motivation, promotes internalization, and leads to better educational outcomes (Deci et al., 1991; Niemic & Ryan, 2009; Vansteenkiste et al., 2009). Some high school studies found that facilitating intrinsic motivation by supporting the needs for competence and autonomy was associated with deeper conceptual learning, where controlling educational climates thwarted those processes (Jang et al., 2009; Tsai, Kunter, Ludtke, Trautwein, & Ryan; 2008). Additionally, supporting the need for relatedness becomes important in education when learning tasks are arduous and not inherently enjoyable for students. When students relate and feel connected to teachers, they are more likely to internalize and adopt the values involved in

learning. They also tend to voluntarily engage in less interesting learning tasks as opposed to students who feel rejected by their teachers. It is essential that students internalize extrinsic motivation, as it is associated with enhanced student learning (Niemi & Ryan, 2009). The concept of relationships being a part of motivation is not novel to BNPT. Attachment theorists, who have had an impact on the study of relatedness, also recognize the power teacher-student relationships may have on improving student achievement; they also suggest that improvement of teacher-student relationships could be particularly effective for at-risk, minority children (Bergin & Bergin, 2009; Deci & Ryan, 2000; Ryan & Niemi, 2009). This evidence may prove insightful when considering how to develop interventions to address the achievement gap in ACT scores particularly among state reported gap groups such as minority and low-income students. (ACT, 2013a; Kentucky Department of Education, 2013).

**BNPT research needed in high school.** BNPT research indicates that student motivation is context sensitive. Yet, high schools tend to frustrate the basic psychological needs instead of support them, consequently diminishing motivation (Bong, 2009; Niemi & Ryan, 2009; Reeve, 2002). Researchers who have investigated the stagnant academic performance of adolescents have suggested that the lack of improvement in high schools suggests that all the possible factors contributing to the school improvement process have likely been unrealized or untapped (Bryan et al., 2012; Emmett, 2013). Positive teacher-student interactions translate into achievement, yet this influence on achievement is not generally utilized in intervention efforts for high school students that have been typically narrow, skill-based interventions (Berkeley et al., 2009; Fuchs, Fuchs, & Stecker, 2010). The mechanism is not completely understood, but it is documented that adolescents themselves understand that their relationships with teachers affect their learning (McHugh, Horner, Colditz, & Wallace, 2012). Furthermore, solely

academic interventions implemented with high fidelity that target specific reading skills have not been successful at improving reading as measured by standardized test scores in secondary school students (Vaughn et al., 2010; Vaughn & Fletcher, 2012). The high school interventions in SDT and BNPT literature primarily measure achievement through monitoring grades, retention, homework completion, and student engagement, rather than standardized test scores (Akioka & Gilmore, 2013; Jang et al., 2009; Patall, Cooper, & Wynn, 2010; Vansteenkiste et al., 2009). When standardized test scores are discussed within the context of SDT, studies do not investigate whether or not there exists a correlation between SDT and college readiness achievement on the ACT (Emmett, 2013; Lepper, Corpus, & Iyengar, 2005; Ryan & Weinstein, 2009). The predictive value of SDT and BPNT for estimating degree of college readiness in high school students has not been addressed. The urgent pressure to intervene for high school students' college readiness raises the question, can need fulfillment predict college readiness in high school students and consequently inform the development of innovative interventions for these students before they graduate?

Recently, a qualitative study of high school students' attitudes toward state assessments was conducted in the context of SDT (Emmett, 2013). The research tested a different but related SDT mini-theory called organismic integration theory to study external motivation and attitudes of high school students toward standardized, high-stakes testing. A positive shift in students' attitudes toward state testing was reported for students involved in the study. Although the sample was randomly selected, it was still limited by the small size of 19 students and the lack of students representing the amotivated level of motivation (Emmett, 2013). Students who were randomly selected but declined to participate may have resulted in an omission of other perspectives. Therefore, the sample population probably did not accurately match the true

population parameters. The study did not use a pretest or posttest design and was not designed with the intent to imply causality (Warner, 2013). Robust studies utilizing BNPT to intervene with the intention of improving performance on high stakes tests, like the ACT or other college readiness measures, are wanting in the literature.

**Self-determination theory and college readiness.** College readiness as measured by the ACT, represents a level of academic achievement that is significantly higher than average. This sizeable skill gap is an additional challenge for educators who are already facing a shortage of evidence-based practices designed to target high schools students' college readiness skills. For example, only 26% of the 1.8 million high school seniors who took the ACT in 2013 were able to meet all four college readiness benchmarks (ACT, 2013b). In other words, students attaining this level of achievement are performing above 74% of their peers nationally. While other measures of college readiness exist, the ACT test is the instrument of interest to this study since 22 states are now utilizing it as part of their state accountability to report college readiness to the public (ACT, 2013d; Lombardi et al., 2013; Maruyama, 2012). Despite intervention efforts in many of those states, high school achievement is not showing improvement on standardized tests, and national ACT scores are not improving (ACT, 2013a; McMurrer & Kober, 2011; Vaughn & Fletcher, 2012). Since the act of taking a standardized test is not intrinsically pleasurable or satisfying in its own regard, students are not intrinsically motivated to take a standardized test like the ACT (Ryan & Deci, 2000a). Discovering factors that support the process of internalization may be a great intervention tool for secondary school educators if a significant correlation to college readiness attainment is observed (Emmett, 2013; Niemiec & Ryan, 2009).

Insight into motivational factors that predict academic achievement may be useful information for developing appropriate strategies for intervention (Guay et al., 2008). The data can also assist teachers by heightening their awareness of students' needs that are critical for internalization of academic motivation (Niemi & Ryan, 2009). Teacher training has been an established practical application of SDT (Guay et al., 2008). This study could inform teacher training about practices both positively and negatively associated with student motivation.

Teachers can influence the effect that the experience of taking the ACT can have on students' self-motivation. If students experience the ACT test as an event that produces informational feedback, rather than an event that is perceived as pressure toward a specific outcome, it can enhance feelings of competence and autonomy (Ryan & Weinstein, 2009). Conversely, if the test experience is connected with rewards and sanctions, or if it is too challenging, the impact on students' motivation can be negative. The presence of sanctions and the resulting pressure of high stakes testing has been a complaint of SDT proponents because of the undermining effects it has on student motivation (Ryan & Weinstein, 2009).

### **Summary**

In summary, the basic psychological needs theory has been useful for informing successful interventions in education across multiple cultures and domains. However, high school achievement remains stagnant and has been resistant to intervention efforts so far. Part of this resistance may be mitigated by the decline in motivation that generally occurs in students as they get older. Other negative influences may include the culture in high schools and teachers' controlling motivational styles. High stakes testing and its undermining effect on motivation from high-pressure external controls has also been criticized. If students' motivation is a factor in the achievement of college readiness, then SDT and BPNT may effectively inform the

development of innovative interventions for the masses of high school students struggling to achieve such a lofty goal.

Basic psychological need fulfillment may be predictive of college readiness achievement for high school students as measured by the ACT test. If a correlation exists between the degree of need fulfillment in students and their ACT scores, then BPNT may be a useful, underutilized construct to guide the development of effective interventions for high school students and to inform the professional development of teachers. A practical application of this study will be to provide researchers and practitioners with insight into motivational factors that predict academic achievement, which may be useful information for developing appropriate strategies for intervention (Guay et al., 2008). The data can assist teachers by heightening their awareness of students' needs that are critical for internalization of academic motivation (Niemi & Ryan, 2009). Teacher training could also enhance their use of practices associated with improved student motivation (Guay et al., 2008).

This study also seeks to add to the empirical and theoretical literature gap by investigating the relationship between the fulfillment of the basic psychological needs for autonomy, competence, and relatedness and the attainment of college readiness as measured by the ACT. The following three chapters will provide a detailed description of the methodology for this study, a report of the findings, and a discussion of the findings.

## CHAPTER THREE: METHODOLOGY

### Introduction

Research confirms that there is good reason to be concerned about achievement of high school students in the U.S. (McMurrer, 2011). Recent research has attempted to theorize about extrinsic motivation as an untapped resource on high school achievement on high stakes testing (Emmett, 2013). Self-determination theory (SDT) as an explanation of how learning communities affect education outcomes has been researched in higher education (Beachboard et al., 2011). SDT has also been utilized in studies to test motivational models pertaining to high school dropouts (Vallerand et al., 1997). A gap in the literature exists utilizing SDT as a predictor of college readiness achievement for high school students. The achievement of college readiness has become the critical end-point for high school accountability (National Governors Association Center for Best Practices, 2010). Since the body of research on college readiness for high school students and psychological processes like motivation is very small, (Savitz-Romer, 2012) this study contributes to the literature by providing information about the association between factors facilitating motivation and student achievement of college readiness benchmarks.

The purpose of this predictive, correlational study was to examine the theory of self-determination that compares three basic psychological needs that facilitate motivation and their association with achievement of college readiness while controlling for gender, socio-economic status (SES), and ethnicity for high school juniors in a suburban Kentucky public school. Chapter Three will describe and explain the design, research questions, hypotheses, participants, setting, instrumentation, procedures, and data analysis for this study.

## Design

The research design is a quantitative, predictive correlational design. A correlational design was used because this study seeks to explore the relationships between the three basic psychological needs (competence, relatedness, and autonomy) that facilitate motivation, performance, and ultimately influence academic achievement and student achievement on the ACT test (Deci et al., 1991). Campbell and Stanley (1963) state that correlational design provides a preliminary survey of hypotheses prior to experimental design and is appropriate when little research exists in an area of study. Also, the naturally occurring groups of participants fit the non-experimental research design as the researcher has no control over the levels of each of the predictor variables (degree of relatedness, competence, and autonomy) perceived by each participant (Tabachnick & Fidell, 2013). The research design is not intended to infer causality but to explore the degree to which the criterion variable (ACT score) can be predicted from the predictor variables (autonomy, competence, and relatedness) (Warner, 2013).

## Research Questions

The following are the primary research questions for this study:

**RQ1:** Is there a statistically significant association between autonomy, competence, and relatedness scores and the ACT scores of high school juniors when controlling for gender, SES, and ethnicity?

**RQ1a:** Do high school juniors' demographic variables significantly contribute to the predictive model for college readiness?

**RQ1b:** Do high school juniors' autonomy scores significantly contribute to the predictive model for college readiness?

**RQ1c:** Do high school juniors' competence scores significantly contribute to the predictive model for college readiness?

**RQ1d:** Do high school juniors' relatedness scores significantly contribute to the predictive model for college readiness?

**RQ2:** Which is the best predictor of college readiness (measured by ACT scores): autonomy, competence, or relatedness, (measured by the Basic Psychological Needs Scale) when controlling for gender, socioeconomic status (SES), and ethnicity?

### **Null Hypotheses**

The following are the null hypotheses:

**H<sub>01a</sub>:** There will be no statistically significant association between autonomy, relatedness, and competence scores and the ACT scores of high school juniors while controlling for gender, SES, and ethnicity.

**H<sub>01b</sub>:** There will be no statistically significant association between autonomy scores and the ACT scores of high school juniors.

**H<sub>01c</sub>:** There will be no statistically significant association between competence scores and the ACT scores of high school juniors.

**H<sub>01d</sub>:** There will be no statistically significant association between the relatedness scores and the ACT scores of high school juniors.

### **Alternative Hypotheses**

Alternatively, the following are the research hypotheses:

**H<sub>1a</sub>:** There will be a statistically significant association between autonomy, competence, and relatedness scores and the ACT scores of high school juniors while controlling for gender, SES, and ethnicity.

**H<sub>1b</sub>**: There will be a statistically significant association between autonomy scores and the ACT scores of high school juniors.

**H<sub>1c</sub>**: There will be a statistically significant association between competence scores and ACT scores of high school juniors.

**H<sub>1d</sub>**: There will be a statistically significant association between relatedness scores and ACT scores of high school juniors.

### **Participants**

The target population consisted of high school juniors from a single rural, Kentucky, public high school who took the Basic Psychological Needs Survey (BPNS) before the annual state administration of the ACT in March 2014 of their junior year. The state ACT assessment was given to all Kentucky juniors on the same day. All juniors who had already taken the BPNS before they took the March 2014 ACT composed the convenience sample. Convenience sampling is commonly used in educational research because the participants are readily available to the researcher, and that is true in this case (Warner, 2013). The demographics collected with the ACT test were gender, socioeconomic status, and ethnicity.

The total sample size needed to be  $N > 110$  and depended upon the number of students who met two conditions. The sample had to consist of students who first took the BPNS and second were in attendance for the state ACT test. Warner (2013) advises using a sample size of at least 100 to ensure power and strength of relationship between variables. For statistical power in multiple regression, Tabachnick and Fidell's (2007) rule,  $N > 104 + k$ , requires that at least 110 cases be used for the three predictor variables and three control variables ( $k$ ) used. The total number of juniors who met the criteria were  $N = 146$ , which provided an adequate sample size.

Western High School (pseudonym) has an enrollment of 886 students with the following demographics: 85.3% White, 7.9% Black, 3.2% Hispanic, 0.9% Asian, 0.3% American Indian or Alaska Native, and 2.4% Two or More Races. By gender the population is composed of 462 males and 424 females. SES is designated by student lunch status in which 524 (59%) students receive free or reduced lunch.

All Western High School (WHS) students were given the BPNS during their annual spring course registration appointment. School was repeatedly cancelled due to inclement weather, and some classes of juniors did not get to take their surveys before they took their ACT. Only juniors who took the survey first were included in the sample since this is a predictive correlational study.

### **Setting**

The site was a rural, public high school in a large district containing twenty-two schools. The district serves over 14,000 students; 48% of those students receive free or reduced lunch. The student population also includes 20% of Kentucky's refugee students. The district had not met AYP for four years in a row until this year. It has since come out of Corrective Action Status and has received a rating of proficient. The high school containing the target population was in needs improvement status, formerly ranked in the 37<sup>th</sup> percentile for state accountability scores, and is now in the 70<sup>th</sup> percentile ranking proficient. The graduation rate is 77.4%. Approximately 10.6% of graduates are reported as unsuccessful in transition to adult life one year after graduation.

WHS has distinct cultural elements that make it unique. The school's location has been referenced in the community as "on the other side of the river." The number of students living in poverty and students with disabilities is higher than the other high schools in the district. WHS

is the only high school in the county with a dedicated Emotional-Behavioral Disorder (EBD) unit. The residential areas that feed the school include five low-income trailer parks, rental properties, subdivided living communities, and farms. The geographic area surrounding the school is home to many factories and the Area Technology Center (school for career and technology education). Some housing growth has occurred in Western's district, but the majority of the city's wealth is concentrated on the other side of the county. At times, certain parents have demonstrated resentment to college readiness initiatives. Generational poverty, resistance to school efforts to promote graduation, and resentment toward college planning is common. The culture team at WHS makes an effort to value career and technology education, as it is valued in the community.

This was an appropriate site for this study because the school is motivated to improve its culture and help students reach college readiness benchmarks by graduation. A positive behavior team meets monthly to evaluate school-wide data and plan activities to foster a positive culture. College readiness is supported daily with 30 minutes of instruction dedicated to improving students' college readiness skills in reading and mathematics. To assist teachers with delivering college-readiness intervention, the school has purchased multiple curricula in both online and paper workbook format. All students participate in a daily intervention period where the college readiness curriculum is administered. Also, the number of subjects who fit the criterion variable was 146 – an adequate population sample.

The ACT test was the instrument used to measure college readiness. It is given annually at the site to all juniors per state requirement. Students took the ACT in the gym where desks were spaced out over the entire gym floor consistent with ACT test regulations. All ACT test

procedures were followed, and the school schedule supported valid testing measures by turning off the bells and keeping student traffic out of the gym during the test administration.

The Basic Psychological Needs Survey questionnaire was the instrument used to measure autonomy, relatedness, and competence. The school's junior guidance counselor administered the survey to juniors during course registration in the computer lab as part of annual school assessment to evaluate culture. After they registered for next year's classes online, they accessed the survey via a link on the school website. Taking the survey via the Internet was a convenience measure by the school, but it provided a degree of control for non-ignorable, non-response. The survey was transcribed into a Google doc that required each question to be answered by the participant. Skipping questions was not an option, although students could always opt to stop. When students took the questionnaire, the guidance counselor, teacher, and librarian monitored student behavior to ensure proper computer use while registering for classes and answering the survey questions. Students at WHS are exposed to many different surveys throughout their high school years. Each year students answer survey questions during the test administrations of the PLAN and the ACT, the culture team survey (BPNS), the state survey in the student Individual Learning Plan (ILP), the comprehensive school improvement plan (CSIP), various surveys from educational organizations, and often local university students or officials are granted permission to survey students.

### **Instrumentation**

#### **Criterion Variable**

The ACT test is the instrument that was utilized to measure the criterion variable. The composite ACT score of the participants measures the achievement of college readiness on a scale of 1-36. The ACT technical manual reports test score reliability by summarizing the

amount of error or inconsistency in the scores on a test in terms of Standard Error of Measurement (SEM), which is +/- 1 for the composite ACT score (ACT, 2007). In addition to SEM, a scale score reliability of .96 is also reported for the ACT composite score. The rater-agreement reliability ranged from .92 to .94 across multiple forms of the test. The instrument is annually under review by the researchers at ACT, Inc., for fairness and validity (ACT, 2010). In the ACT Technical Manual (2007), both content and construct validity are addressed. Content validity is assessed the following process: referral to multiple external expert panels, revision based on panel recommendations, pretesting with a normed sample, and further revision after the second round of examination by external experts who must be different from the original reviewers (ACT, 2007). ACT describes its construct validity in terms of predictive validity. ACT reports median multiple correlation indices of .42 as “valid predictors of overall first year GPA in college” (ACT, 2007, p.94). Nationally, high schools use the ACT scores for evaluating the effectiveness of instruction, identifying students who need assistance with certain subject areas or academic skills, and planning changes and improvements in the curriculum. (ACT, 2011b) The use of the ACT is ideal because the test has already been scrutinized for acceptable levels of reliability and objectivity (ACT, 2010). The ACT test is designed to measure college readiness in each of the four content areas: English, mathematics, reading, and science. Each sub score is also measured on a scale of 1-36. The four sub scores are averaged into one composite score (ACT, 2007). This study examines the composite ACT score, not the sub scores. The composite ACT score, not the individual sub scores, is the number that is reported for the purpose of college admission and scholarships as a holistic representation of a student’s readiness. The individual sub scores are used to determine readiness in single subjects as opposed to overall readiness as predicted by the composite score.

### Predictor Variables

The Basic Psychological Needs Scale (BPNS) questionnaire, which has been used for measuring the SDT needs construct (Deci & Ryan, 2000), was used to measure the following predictor variables: autonomy, competence, and relatedness. The questionnaire originated from the Psychological Needs at Work Scale used and validated by Deci et al. (2001) and Ilardi et al. (1993). The questionnaire contains 21 items (seven per need) designed to assess the degree to which people feel satisfaction of the three basic needs (Deci & Ryan, n.d.). Scoring of the questionnaire provides a general score as well as individual subscores for autonomy, competence, and relatedness, all ranging from 1 to 7. Students rated truthfulness of the 21 statements on a Likert scale ranging from 1 (not true at all) to 7 (very true). Cronbach's alpha for reliability was reported to be .87 (Baard et al., 2004; Gagne, 2003). There is precedent for using the scale both in educational contexts and with adolescents. Adaptations of the scale for assessing need satisfaction in adolescent physical education classes have been created and used (Ntoumanis, 2005; Vlachopoulos & Michailidou, 2006). Another recent adolescent study used the scale to measure basic psychological needs in leisure activities (Levenson, Danielsen, Birkeland, & Samdal, 2012). The BPNS (see Appendix A) items include the following statements: "I feel like I am free to decide for myself how to live my life," "I really like the people I interact with," and "Often, I do not feel very competent." The reliability for the subscale items have been reported using the following alpha ( $\alpha$ ) scores: autonomy ( $\alpha = .72$ ,  $\alpha = .73$ ), competence ( $\alpha = .73$ ), and relatedness ( $\alpha = .82$ ,  $\alpha = .83$ ) (Niemic et al., 2009). A more recent study reported the internal consistencies for autonomy, competence, and relatedness to be .83, .77, and .79, respectively (Kuzucu & Simsec, 2013). In this sample, Cronbach's alpha for

the overall BPNS was .81. Alpha scores for the subscales in this study were found as follows: autonomy ( $\alpha = .65$ ), competence ( $\alpha = .70$ ), and relatedness ( $\alpha = .82$ ).

### **Demographic Variables**

The demographic variables in this study, socioeconomic status (SES), gender, and ethnicity, were controlled. Demographic data was included on the ACT score report provided to the school. ACT received the demographic information from two sources, the school's building assessment coordinator (BAC) and the student. Students report their demographic information on their ACT test form. The following dummy variables were used to code ethnicity categories: 1 for Black/African American, 2 for American Indian/Alaska Native, 3 for White, 4 for Hispanic/Latino, 5 for Asian, 6 for Native Hawaiian/Other Pacific Islander, and 7 for two or more races (ACT, 2013a). Gender was coded using the dummy variables 0 for male and 1 for female. The BAC verifies the demographic information utilizing the school's student information system – Infinite Campus. SES is determined by eligibility for free or reduced lunch and is dependent upon students filling out the application for eligibility (Kentucky Department of Education, 2013). SES was coded using dummy variables with 1 for free or reduced lunch and 2 for paid lunch. The relevance of these demographics to this study is due to the following data: the ACT and the Kentucky school report card both report differential performance on the ACT by gender, SES, and ethnicity (ACT, 2007; Kentucky Department of Education, 2013). Additionally, gender differences in motivation and achievement have consistently been reported in SDT research (Ratelle et al., 2007; Vansteenkiste et al., 2009).

### **Procedures**

Permission was obtained from the principal of the target high school for this study to be conducted using archival data. Next, the Institutional Review Board (IRB) granted approval for

the use of archival data. After approval was secured, the principal was contacted to confirm that the proposed research on Western High School (WHS) had been approved. The archival data was requested for data analysis. The principal provided a digital copy of the requested data to the researcher that had been stripped of identifying student data. The school archived the ACT scores and the student survey data in Excel spreadsheets that were easily imported into SPSS. After the survey results were acquired from WHS, they were saved and stored in SPSS on a password-protected computer. The ACT results and demographic information included in the ACT score report were also be transferred to SPSS and password protected upon availability.

The guidance counselor collected the survey data while registering juniors for their 2014-2015 school year courses. Registration took place in March during their regularly scheduled English classes. Groups of students were not larger than 30 per class. The guidance counselor, teacher, and librarian monitored students taking the online survey. Since school policy required the teachers to circulate and monitor student behavior in the computer lab, it is assumed that the students gave a good faith effort on the survey. Students accessed the survey in a Google doc via a link on the school web site. The format required students to answer each question in order to advance to the next question and finish the survey. Student surveys collected the student identification number, which corresponds to the ACT score and demographic data for that student. The student identification number for each student was stripped from the spreadsheets and replaced with a random number so that no identifiable data was contained in the files that the school provided to the researcher.

### **Data Analysis**

The null hypothesis was analyzed using hierarchical multiple regression at a significance level of .05. Multiple regression allows for analysis of three or more variables in combination

with each other and also allows for analysis of the strength of the relationship between variables (Gall, Gall & Borg, 2010). It is possible with multiple regression to keep the Type I error rate at 5% while testing multiple variables (Tabachnick & Fidell, 2013). Hierarchical (sequential) regression was chosen for its predictive usefulness. Hierarchical regression performs a series of regression analyses that control for the other variables in the same or previous steps instead of treating all the variables equally (Warner, 2013).

Control variables were entered into the first block to account for the variation due to gender, ethnicity, and SES (ACT, 2011b). The next three blocks were composed of the subscores for autonomy, competence, then relatedness, respectively (Jang et al., 2009). The importance of each variable according to theoretical considerations determined assigned entry into blocks. Autonomy is the first predictor variable listed in the research followed by competence, then relatedness, which is why that order was chosen (Deci & Ryan, 2000). Table 2 summarizes the blocks and their order of entry into the analysis.

Table 2

*Data Source Blocks*

Data Source Blocks	Variables
Block 1	Demographic Data
	Gender
	Ethnicity
	SES
Block 2	Autonomy
Block 3	Competence
Block 4	Relatedness

Before the analysis, assumptions of linearity, independence of observations, homoscedasticity, normality, multicollinearity, and outliers were tested. Histograms were constructed for each variable to check for normality and absence of extreme outliers in the data distribution.

Scatterplots between every pair of variables tested for violations of homoscedasticity, linearity, and the absence of extreme bivariate outliers (Gall, et al., 2007). Another test for outliers was a confirmed Cook's distance of less than one (Warner, 2013). A 2.00 was the accepted Durbin-Watson statistic for independence of residuals. A correlation matrix was constructed to analyze bivariate relationships between variables and test the assumptions of singularity and multicollinearity. A variance-inflation factor ( $VIF < 10$ ) was used to identify the absence of multicollinearity (Warner 2008). Table 3 lists the tests that were used to screen for violations of assumptions.

Table 3

*Explanation of Assumption Tests Utilized*

Assumption Test	Purpose
Histogram	Test each variable for normality and outliers
Scatter plots	Test every pair of variables for linearity, homoscedasticity, and bivariate outliers
Durbin-Watson	Test for independence of residuals
Cook's distance	Test for outliers
Variance-inflation factor (VIF)	Test for multicollinearity
Correlation matrix	Test for singularity and multicollinearity among variables
Probability-Probability Plot (P-P plot)	Test for normal distribution of residuals

## CHAPTER FOUR: FINDINGS

### Purpose

The purpose of this predictive, correlational study was to examine the degree to which ACT score (criterion variable) could be predicted from autonomy, competence, and relatedness scores (predictor variables) when controlling for gender, SES, and ethnicity in a single, rural, Kentucky high school. A hierarchical multiple regression analysis was conducted to answer the research questions listed below. The data reported in this chapter is followed by a detailed discussion in Chapter Five.

### Research Questions

**RQ1:** Is there a statistically significant association between autonomy, competence, and relatedness scores and the ACT scores of high school juniors when controlling for gender, SES, and ethnicity?

**RQ1a:** Do high school juniors' demographic variables significantly contribute to the predictive model for college readiness?

**RQ1b:** Do high school juniors' autonomy scores significantly contribute to the predictive model for college readiness?

**RQ1c:** Do high school juniors' competence scores significantly contribute to the predictive model for college readiness?

**RQ1d:** Do high school juniors' relatedness scores significantly contribute to the predictive model for college readiness?

**RQ2:** Which is the best predictor of college readiness (measured by ACT scores): autonomy, competence, or relatedness, (measured by the Basic Psychological Needs Scale) when controlling for gender, socioeconomic status (SES), and ethnicity?

## Hypotheses

The following are the null hypotheses:

**H<sub>01a</sub>:** There will be no statistically significant association between autonomy, relatedness, and competence scores and the ACT scores of high school juniors while controlling for gender, SES, and ethnicity.

**H<sub>01b</sub>:** There will be no statistically significant association between autonomy scores and the ACT scores of high school juniors.

**H<sub>01c</sub>:** There will be no statistically significant association between competence scores and the ACT scores of high school juniors.

**H<sub>01d</sub>:** There will be no statistically significant association between the relatedness scores and the ACT scores of high school juniors.

Alternatively, the following are the research hypotheses:

**H<sub>1a</sub>:** There will be a statistically significant association between autonomy, competence, and relatedness scores and the ACT scores of high school juniors while controlling for gender, SES, and ethnicity.

**H<sub>1b</sub>:** There will be a statistically significant association between autonomy scores and the ACT scores of high school juniors.

**H<sub>1c</sub>:** There will be a statistically significant association between competence scores and ACT scores of high school juniors.

**H<sub>1d</sub>:** There will be a statistically significant association between relatedness scores and ACT scores of high school juniors.

### Demographic Data

A total of 146 participants met the criteria for the study. However, two of the 146 participants were missing SES data. In SPSS, cases were excluded pairwise so that the  $N = 144$  for SES only. Table 4 summarizes the demographic data for the three categorical predictor variables. All three categorical variables (gender, SES, and ethnicity) were dummy coded prior to analysis as described in Chapter Three.

Table 4

*Demographic Data*

Variables	<i>N</i> (%)
Gender	146 (100%)
Male	79 (54.1%)
Female	67 (45.9%)
Ethnicity	146 (100%)
Hispanic/Latino	2 (1.4%)
American Indian/Alaska Native	-
Asian	1 (0.7%)
Black/African American	11 (7.5%)
Native Hawaiian/Other Pacific Islander	-
White/Caucasian	129 (88.4%)
Two or more races	3 (2.1%)
SES <sup>a</sup>	144 (98.6%)
Free/Reduced Lunch	80 (54.8%)
Paid Lunch	64 (43.8%)

*Note.* <sup>a</sup> $N = 144$  for SES

### Descriptive Statistics and Correlations

Table 4 reports descriptive statistics and bivariate relationships between the variables. The sample ( $N = 146$ ) consisted of 79 (54.1%) males and 67 (45.9%) females. Only five of the seven possible categories for ethnicity were represented in the sample, which included 2 (1.4%)

Hispanic/Latino, 1 (0.7%) Asian, 11 (7.5%) Black/African American, 129 (88.4%) White/Caucasian, and 3 (2.1%) two or more races. Eighty (54.8%) students were reported as having free/reduced lunch status and 64 (43.8%) students were reported as paid lunch status. The mean scores on the predictor variables were as follows: autonomy ( $M = 4.68$ ,  $SD = 0.93$ ), competence ( $M = 4.97$ ,  $SD = 1.01$ ), and relatedness ( $M = 5.37$ ,  $SD = 1.01$ ). The ACT mean score was 19.6, ( $SD = 4.57$ ).

Pearson's Correlation is reported in Table 5 for all variables. The correlation matrix provided a preliminary scan for singularity and multicollinearity in the data. All intercorrelations between predictor variables were below  $r = .60$  suggesting collinearity (Warner, 2013).

Additionally, the matrix suggested that there were significant positive relationships between ACT scores and competence scores ( $r = .20$ ,  $p = .007$ ). The demographic variables ethnicity ( $r = .20$ ,  $p = .008$ ) and SES ( $r = .26$ ,  $p = .001$ ) were also positively correlated with ACT scores. Gender, autonomy, and relatedness were not significantly correlated with ACT scores in this sample.

Table 5

*Means, Standard Deviations, and Intercorrelations for ACT and Predictor Variables<sup>a</sup> (N = 146)*

Variable	ACT	Gender	Ethnicity	SES	Autonomy	Competence	Relatedness
ACT	1.00						
Predictor variable							
1. Gender	.11	1.00					
2. Ethnicity	.20*	.03	1.00				
3. SES <sup>a</sup>	.26*	.03	.14*	1.00			
4. Autonomy	.04	.20*	.01	.00	1.00		
5. Competence	.20*	.10	-.05	.14	.59*	1.00	
6. Relatedness	.11	.04	-.06	.14	.58*	.60*	1.00
Mean <sup>b</sup>	19.62	-	-	-	4.68	4.97	5.37
<i>SD</i>	4.57	-	-	-	0.93	1.01	1.01

*Note.* <sup>a</sup>*N* = 144 for SES. For all other variables, *N* = 146.

<sup>b</sup>Because gender, ethnicity, and SES were coded as dummy variables; means and standard deviations were not reported.

\* *p* < .01

### Assumption Testing

Preliminary data screening included all the tests listed in Table 3. Histograms of scores on all seven variables and scatterplots of all pairs of variables were examined. The assumptions of normality and linearity were tenable for all univariate and bivariate data. Upon visual inspection of the residuals scatterplot, two cases appeared to be possible small outliers. However, upon further inspection both cases were not extreme. Casewise diagnostics in SPSS revealed that their Cook's distances were acceptable values of .02 and .08, well below the recommended distance of less than 1.00 (Tabachnick & Fidell, 2013). Therefore, the assumption of no extreme outliers was found to be tenable. The assumption of collinearity was tenable from inspection of the correlation matrix, VIF values, and tolerance values. The VIF values for all the variables were significantly below 10, and the tolerance values were above 0.10. A Durbin-Watson value of 2.0 confirmed independence of residuals. Residuals were normally distributed according to P-P plots and casewise diagnostics.

### Results

Table 6 reports the results of the hierarchical regression analysis that indicated that autonomy, competence, and relatedness scores significantly predicted ACT scores when controlling for gender, SES, and ethnicity,  $F(6, 137) = 3.82, p = .001$ , in the overall model. The control (demographic) variables grouped in the first block explained 10% of the variance in ACT scores at a statistical significance of  $F(3, 140) = 5.33, p = .002$ . Within Block 1, only SES ( $\beta = .23, p = .01$ ) and ethnicity ( $\beta = .17, p = .04$ ) were statistically significant variables.

Block 2 was statistically significant in the overall model  $F(4, 139) = 3.98, p = .004$ . However, autonomy was not a significant predictor variable because it did not account for unique variance ( $ES = 0.0\%, \beta = .02, p = .83$ ).

Block 3 added competence to the model and accounted for an additional 4% of variance,  $F(5, 138) = 4.60, p = .001$ . Competence was a statistically significant predictor variable ( $\beta = .25, p = .01$ ).

The fourth block added relatedness as final predictor variable to the model. Overall the model after step four is still significant explaining 14% of variance in ACT scores,  $F(6, 137) = 3.82, p = .001$ . However, relatedness was not a statistically significant predictor variable within the model ( $\beta = .03, p = .81$ ).

Table 6

*Hierarchical Multiple Regression Model*

	R <sup>2</sup>	R <sup>2</sup> Change (Effect Size)	F Ratio for R <sup>2</sup> Change	B	SE	β	t	Sig.
Block 1	.10	.10	5.33*					
Block 2	.10	.00	.049					
Block 3	.14	.04	6.45*					
Block 4	.14	.00	.06					
Gender				.90	.74	.10	1.22	.23
Ethnicity				1.03	.45	.19	2.3	.02
SES				1.75	.75	.19	2.33	.02
Autonomy				-.69	.53	-.14	-1.30	.20
Competence				1.10	.48	.24	2.27	.02
Relatedness				.12	.49	.03	.24	.81

\*  $p < .05$ ;  $\alpha = .05$

**Additional Analysis**

In this sample, Cronbach's alpha for the overall BPNS was .81. Alpha scores for the subscales in this study were reliable with the following values: autonomy ( $\alpha = .65$ ), competence ( $\alpha = .70$ ), and relatedness ( $\alpha = .82$ ).

Chapter Five discusses the results of this study and its contribution to the literature on the relationship between basic psychological needs fulfillment of high school juniors and achievement of college readiness as measured by ACT scores.

## CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

### Discussion

The purpose of this predictive, correlational study is to examine the theory of self-determination that compares three basic psychological needs that facilitate motivation and their association with achievement of college readiness while controlling for gender, socio-economic status (SES), and ethnicity for high school juniors in a rural Kentucky public school. A hierarchical multiple regression analysis was utilized to examine the correlation between the predictor variables (autonomy, competence, and relatedness) and the criterion variable (ACT score).

### Null Hypotheses

The following null hypotheses are discussed in this chapter:

**H<sub>01a</sub>:** There will be no statistically significant association between autonomy, relatedness, and competency scores and the ACT scores of high school juniors while controlling for gender, SES, and ethnicity.

**H<sub>01b</sub>:** There will be no statistically significant association between autonomy scores and the ACT scores of high school juniors.

**H<sub>01c</sub>:** There will be no statistically significant association between competence scores and the ACT scores of high school juniors.

**H<sub>01d</sub>:** There will be no statistically significant association between the relatedness scores and the ACT scores of high school juniors.

### Rejection of Null Hypothesis 1a

**Association between the predictors and criterion variable.** The overall model tested the association between autonomy, relatedness, competency, and ACT scores after controlling

for demographics. Since the results were statistically significant  $F(6, 137) = 3.82, p = .001$ , the null hypothesis was rejected. The demographic variables were found to significantly contribute to the predictive model for college readiness explaining 10% of the variance,  $F(3, 140) = 5.33, p = .002$ . However, only the demographic variables SES ( $\beta = .23, p = .01$ ) and ethnicity ( $\beta = .17, p = .04$ ) were statistically significant. Gender did not have a statistically significant impact on the model.

***Research on gender performance differences.*** In the literature, ACT scores by gender are reported inconsistently, and they fluctuate by subject score. Bastedo & Jaquette (2011) report that males average higher in ACT composite, math, and science, while females average higher in English and reading. In contrast, the Kentucky school report cards for both 2013 and 2014 disclosed that the average composite ACT score was higher for females than males across the state, within the target district, and the target high school. Gender was not an influential variable in this study; that result is a reasonable fit with the ambiguity in the literature.

***SES and ethnicity.*** The statistical significance of SES and ethnicity as predictors of ACT performance that was found in this study is supported by other studies. Multiple longitudinal analyses, including those specific to the state of Kentucky, report performance discrepancies for students from low SES and minority groups (ACT, 2013a; Dougherty, 2010; Kentucky Department of Education, 2013; Orlich, 2013). These data support controlling for SES and ethnicity in the first step of the model. However, the low correlation values reveal that additional variables to SES and ethnicity influence the predictive model for college readiness.

### **Failure to Reject Null Hypothesis 1b**

***Autonomy and ACT scores.*** The association between autonomy scores and ACT scores was not statistically significant resulting in failure to reject the null hypothesis ( $ES = 0.0\%, \beta =$

.02,  $p = .83$ ). Current studies do not specifically investigate whether or not autonomy scores can predict ACT scores in high school juniors (Emmett, 2013; Lepper et al., 2005; Ryan & Weinstein, 2009). This result was not expected, but it is not in direct conflict with extant research since no precedent has been set for autonomy and ACT scores. There are no studies to compare these results against.

It is notable that in this study the Cronbach's Alpha for autonomy ( $\alpha = .65$ ) was lower than for the overall BPNS value of .81. Autonomy had the lowest reliability value of the three constructs measured by the BPNS.

**Autonomy and achievement.** The importance of autonomy support for enhanced educational outcomes has been researched extensively and established in the literature (Deci & Ryan, 2008b; Jang et al., 2009; Niemiec et al., 2009; Roth et al., 2007). A Canadian study on motivation, teacher practices, and province-wide mathematics scores (9<sup>th</sup> grade mathematics assessment) reported a significant, strong correlation between motivation and achievement for high school students (Sarwar, et al., 2012). Sarwar et al. emphasized that autonomy, competence, and relatedness were all significant components of motivation that influenced achievement. Furthermore, they found teacher practices that encouraged competence and autonomy accounted for an additional 39% of the variance in overall student achievement. Notice that Sarwar's (2012) study measured achievement by different standards from this study. In Sarwar's case, province-wide mathematics assessments were congruent to the academic standards that were taught in the Canadian schools. In contrast, the ACT assesses college readiness skills, not the taught content. Therefore, the ACT is not completely congruent to the standards that are being taught in the target school. The curriculum at WHS focuses on teaching the Common Core State Standards. The lack of a statistically significant correlation between

autonomy and ACT scores in this sample suggests that other variables influenced ACT achievement. The assessment of college readiness skills by the ACT (as opposed to content mastery) may be a factor influencing the lack of correlation between autonomy and ACT scores.

Other high school studies that report a correlation between autonomy and achievement utilized grade point average (Vansteenkiste, 2009), course grades, engagement, (Jang et al., 2009), or unit test scores (Patall, et al., 2010) to measure achievement. In each of these cases, the assessments intentionally measure or reflect mastery of content standards being taught directly in the curriculum.

The results from this single study should not be interpreted to suggest that autonomy support does not influence achievement. On the contrary, mounds of empirical evidence support the conclusion that “autonomously motivated students thrive in educational settings and students benefit when teachers support their autonomy” (Ryan & Deci, 2002, p. 183). The literature recommends that teachers receive training to design instruction that promotes student autonomy, and to deliver interventions that target psychological need deprivation (Ryan & Deci, 2000a).

### **Rejection of Null Hypothesis 1c**

**Competence and ACT scores.** The association between competence scores and ACT scores was statistically significant and accounted for an additional 4% of variance,  $F(5, 138) = 4.60, p = .001$  in the model when competence was entered. Competence was a statistically significant predictor variable ( $\beta = .25, p = .01$ ), therefore, the null hypothesis was rejected.

### **Failure to Reject Null Hypothesis 1d**

**Relatedness and ACT scores.** The association between relatedness scores and ACT scores was not statistically significant resulting in failure to reject the null hypothesis ( $ES = 0.0\%, \beta = .03, p = .81$ ). These results do not support the general state of the literature on

relatedness and achievement, and they suggest that other variables influenced the ACT scores in this sample.

### **Conclusions**

Although the overall model was a statistically significant predictor of ACT scores, competence alone accounted for only 4.5% unique variance, and autonomy and relatedness did not contribute to the variance in ACT scores when demographics were controlled. The lack of statistical significance of autonomy and relatedness to the predictive model suggests that other variables influenced ACT scores in the sample.

The unique variance that competence contributed to ACT scores warrants further scrutiny. Although the correlation is positive, it is weak and should be interpreted with caution. In the literature, all three basic psychological needs are consistently correlated with achievement (Deci et al., 1991; Niemiec & Ryan, 2009; Vansteenkiste, 2009). Often these studies focused on achievement in specific academic areas. Based on the results of the Sarwar et al. (2012) study on motivation and mathematics achievement, one approach to further study could be to compare the BPNS scores of juniors to their ACT scores by subject area. Since the correlation between achievement and need fulfillment is context specific (Deci & Ryan, 2000, 2008b), it is possible that students would answer the same questions on the BPNS differently in a more specific context. Additional research could survey students during math class and compare those BPNS results to their ACT math scores instead of the composite score.

The ACT composite score may be a metric that is influenced by a broad range of factors that were not included in this model. Multiple researchers have shared the experience that standardized tests have not been sensitive instruments for measuring the impact of interventions (Fisher & Frey, 2011; Fuchs, Fuchs, & Compton, 2010; Vaughn et al., 2010). In previous

secondary school studies where nearly perfect reading interventions were delivered by researchers, the results were negligible when measured by standardized tests. Yet, the interventions' influence on achievement was detected when measured by other indicators such as grades, engagement, retention, and homework completion. SDT studies conducted in high schools document strong correlation between need fulfillment and achievement when achievement is also measured by grades, engagement, retention, and homework completion (Akioka & Gilmore, 2013; Jang et al., 2009; Patall et al., 2010; Vansteenkiste et al., 2009). Emmett (2013) suggests that student performance on standardized tests is mitigated by the non-consequential nature of the tests. It was assumed that students in this study would give a good effort because Kentucky students face consequences if they fail to meet college readiness benchmarks; students who do not meet ACT benchmarks by their senior year must take intervention classes. One problem with this assumption is that the school administration of the ACT is not the only opportunity students have to take the test. Students can take the ACT during any of the six annual test dates. If they are happy with their scores from another test attempt, students may not be motivated to try their best on the school administration of the ACT. Motivated students who could have scored high on the BPNS may not have given their best effort on the ACT under these circumstances. Another problematic scenario occurs if a motivated student does not meet college readiness benchmarks, it appears that they did not flourish academically. However, a student may have entered high school far below college readiness levels. If their high school experience was psychologically and academically nurturing and they grew academically (but not enough to reach college readiness benchmarks), they could score high on BPNS and low on the ACT. A longitudinal study that collected data at two points in time would better reflect how the school contributed to need support and whether or not a

student made gains on the ACT. A next step in research may be to investigate the relationship between need fulfillment and change in ACT performance over time in the target high school.

Student attitudes toward taking surveys may have limited the fidelity of self-report data on the BPNS. The student population at WHS is frequently exposed to surveys. Since the community tends to undervalue education, it is possible that students did not take the survey seriously. Inaccurate responses by students would not have been detected since the anonymous nature of the survey prevented teacher inspection of student answers. Repeating this study with researcher directed surveys instead of archival data could provide another data source for comparison. The purpose and importance of the survey could be communicated to students beforehand. Intentional explanation of the research may better address bias attributed to a student population that has been saturated by surveys. Using a random sampling of students across the state, repeating the study with experimental data from the same population instead of archival data, or surveying a more diverse population in the same city, would build on this study and provide useful data for future research.

Since this study suggests that other variables influenced ACT scores, it is plausible that the correlation between need fulfillment and college readiness achievement would be more evident if another variable such as teacher practices that target need fulfillment entered the model (Wormington, Corpus, & Anderson, 2012). Additionally, the use of different approaches such as person-centered studies using cluster analysis would provide new data on need fulfillment, motivation, and college readiness in high school students.

## Implications

The implications of this study for practitioners remain consistent with the literature. As Ryan and Deci (2000b) advised, “interventions would do well to target psychological need deprivation in people (p. 74).”

Targeting psychological need deprivation is more nuanced than simply creating opportunities to foster autonomy, competence, and relatedness at school. It is equally vital for educators to discern when the school culture undermines need fulfillment. For example, using external rewards to motivate students to perform well on high stakes testing can be perceived as controlling by students. The enormous pressure to reach benchmarks and the sanctions surrounding failure may actually undermine autonomy, diminish internal motivation, and lead to decreased educational outcomes (Ryan & Weinstein, 2009).

Fortunately, teachers can influence the effect that ACT testing can have on motivation by turning the test into an event that provides informational feedback that students value. By supporting the process of internalization, teachers may deflect some of the negative influence that sanctions and high-pressure tactics place on students (Niemiec & Ryan, 2009; Ryan & Deci, 2000a). Students can also feel autonomous while being extrinsically motivated if schools use such motivation in moderation and lean toward encouraging behaviors that are congruent with students' values (Deci & Ryan, 2008b). On the continuum of extrinsic motivation, perceived locus of causality switches from external to internal when behaviors are sought that are congruent with one's values or one's self. Educators must be trained to cultivate the proper balance of autonomy support with extrinsic motivation in educational practice.

### **Limitations**

One of the limitations of this study is the threat to internal validity from self-report data. Students may have varying perceptions of what constitutes “very true” or “somewhat true” on the Likert scale. Additionally, student attitudes toward surveys could have negatively impacted survey fidelity. Students may have answered carelessly since they have repeatedly participated in educational surveys at WHS. Students could have randomly answered questions without reading them. If students had trouble understanding the survey, their responses may not truly match their perceived degree of need satisfaction.

The use of archival data is another limitation. The school administered the survey during student registration time as an additional task students had to complete. Students may have felt rushed to complete the survey before their class period ended. The survey was not administered in a way that conveyed its importance or as a time dedicated to intentional study of students’ psychological needs. There is no assurance that students answered questions thoughtfully and sincerely.

These findings are limited to students who fit the sample parameters and cannot be generalized to students who did not participate or to students from other schools. WHS has a distinct culture and demographic parameters that are not representative of the general population of high school juniors. Correlational design does not imply causality.

Experimental research needs to be conducted to address the literature gap on high school students’ need fulfillment and college readiness achievement measured by ACT scores. Ultimately, practitioners need data that can inform best practice and positively influence student achievement on high stakes tests such as the ACT. More research on motivation and college

readiness is needed to build an empirical database to inform the development of effective college readiness interventions.

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**APPENDIX A**

The Basic Psychological Needs Scale can be accessed at

<http://www.selfdeterminationtheory.org/basic-psychological-needs-scale/>