MOTIVATION, RESILIENCE, AND RURAL STUDENTS WITH LEARNING DISABILITIES

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ABSTRACT

Alfred Michael Caprino, III: Motivation, Resilience, and Rural Students with Learning Disabilities
(Under the direction of Judith Meece)

As the largest category of students receiving special education services in the United States, students with learning disabilities often encounter challenges in their attempts to succeed in school (Fuchs, Fuchs, Mathes, & Lipsey, 2000; Mason & Hedin, 2011; Mastropieri, Scruggs, & Graetz, 2003; National Association of Special Education Teachers, 2015; Wagner et al., 2003). Students with learning disabilities report lower postsecondary educational aspirations (Irvin et al., 2011a) and do not achieve academically at the same level as their nondisabled peers (National Center for Learning Disabilities, 2014a). In addition, students with learning disabilities frequently experience low levels of motivation to learn in school (Adelman & Taylor, 1983, 1990; Irvin et al., 2011a; Lichtinger & Kaplan, 2015; Melekoglu, 2011; Sideridis, 2003; Zisimopoulos & Galanski, 2009). These challenges can be compounded when students with learning disabilities reside in rural communities. For example, rural schools lack the resources to recruit psychologists, school counselors, and special education teachers to meet the needs of students with disabilities (Hardré, 2012; Irvin, Meece, Byun, Farmer, & Hutchins, 2011b).

I designed this research study to address limitations in the research base about students with learning disabilities in rural areas and the nature of the relation between motivation and educational outcomes for these students. I viewed motivational beliefs through a resilience theory lens to investigate whether having positive motivational beliefs serves as a protective factor for rural high school students with learning disabilities enabling them to achieve

academically and aspire educationally to levels similar to their nondisabled peers. Data used for this research were sourced from the Rural High School Aspirations study (National Research Center on Rural Education Support, 2011). A cluster analysis procedure was used to create three motivational belief profiles and two-way ANOVA procedures were used to test hypotheses regarding positive motivation beliefs serving as a protective factor. I did not find that positive motivational beliefs provided the hypothesized boost for rural students with learning disabilities in terms of their academic achievement or postsecondary educational aspirations. The findings of this study contribute to the limited research base focused on the motivational beliefs and resilience of rural high school students with learning disabilities.

This dissertation is dedicated to my wife, Katie. Thank you for taking this journey with me. It would not have been possible without your support and encouragement. We do everything together with doctoral education being no exception. I could not be more grateful to get to share all of life with you as my traveling partner.

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Studying resilience has helped to strengthen me and I have drawn on several resilience-related quotes for inspiration during the dissertation process. I offer these quotes to all students struggling to succeed in school and in life. My wish for you is that you discover your unique strengths and know that there is hope in the future:

In the depths of winter, I discovered in me an invincible summer. *~Albert Camus*

In order to succeed, people need a sense of self-efficacy, to struggle together with resilience to meet the inevitable obstacles and inequities of life. *~Albert Bandura*

Although the world is full of suffering, it is also full of the overcoming of it. *~Helen Keller*

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CHAPTER ONE
INTRODUCTION

Educational professionals are tasked with preparing each of America's K-12 students for college and career readiness (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). The sheer number of students with learning disabilities (LD) necessitate that educational researchers investigate the unique needs of these students in America's classrooms. In the 2010 census, 4.6 million Americans reported having LD (National Center for Learning Disabilities [NCLD], 2014a). Students with LD make up approximately 5% of the total population of students in America's public schools, or 2.4 million students (NCLD, 2014b). As the largest category of students receiving special education services in the United States, students with LD often encounter challenges in their attempts to succeed in school (Fuchs, Fuchs, Mathes, & Lipsey, 2000; Mason & Hedin, 2011; Mastropieri, Scruggs, & Graetz, 2003; National Association of Special Education Teachers, 2015; Wagner et al., 2003).

Numerous studies and reports document statistically significant achievement disparities between students with LD and nondisabled students (Judge & Watson, 2011; Mason & Hedin, 2011; NCLD, 2014a; Shin & Bryant, 2015; Wagner et al., 2003). Although teachers and parents may identify that a student needs extra support in reading, math, or writing in the lower elementary school grades, many students are not identified having a LD until age 9 because of the psychometric features of standardized tests (Vaughn, Linan-Thompson, & Hickman, 2003). Even so, the reading, math, and writing differences continue to widen as reading, math, or writing tasks students are expected to be able to do become more complex (Impecoven-Lind &

Foegan, 2010; Mason & Hedin, 2011; Sideridis, 2011; Watson, Gable, Gear, & Hughes, 2012). By the high school years, some students with LD earn lower grades and grade point averages and fail courses at a higher rate than their nondisabled peers (NCLD, 2014b).

In addition, students with LD frequently experience low levels of motivation to learn in school (Adelman & Taylor, 1983, 1990; Irvin et al., 2011a; Lichtinger & Kaplan, 2015; Melekoglu, 2011; Sideridis, 2003; Zisimopoulos & Galanski, 2009). Although research is limited, studies document links between motivation of students with LD and academic achievement (DiPerna, 2004; Gottfried, 1985). By adolescence, students with LD also report lower aspirations for postsecondary education, when compared to students without disabilities (Rojewski, 1996, 1999). Taken as a whole, low academic performance, low academic motivation, and low educational aspirations can significantly limit the educational and occupational attainment of these youth later in life (Bandura, Barbaranelli, Capara, & Pastorelli, 2001; Beal & Crockett, 2010; Irvin et al., 2011a; NCLD, 2014a; Rojewski, 1996, 1999).

The challenges students with LD endure are compounded when these students reside in rural communities. Due to geographical isolation and scarcity of resources, schools and families in rural locations struggle to meet the needs of students with LD. For example, rural schools lack the resources to recruit psychologists, school counselors, and special education teachers to meet the needs of students with disabilities (Hardré, 2012; Irvin, Meece, Byun, Farmer, & Hutchins, 2011b). However, to date, educational and motivational researchers have focused more on urban and suburban schools than on rural schools (Gandara, Guiterrez, & O'Hara, 2001; Hardré, 2008; Hardré, Crowson, Debacker, & White, 2010), thus contributing to the lack of research on the motivation of students with LD who attend rural schools.

I designed this research study to address limitations in the research base about students with LD in rural areas and the nature of the relation between motivation and educational outcomes for these students. The connection between educational aspirations and adult-life outcomes (Bandura, et al., 2001; Beal & Crockett, 2010) is further justification for the current study in which I investigate how motivational beliefs potentially moderate the relation between LD status and the educational aspirations and achievement of rural high school students.

In this first chapter, I outline the rationale for the study. I discuss challenges students with LD face in succeeding academically and their education aspirations and achievement motivation. Next, I explain rural schools' unique qualities and focus specifically on contexts in which students with LD in rural schools find themselves. After presenting resilience theory as the theoretical framework for the study, I conclude with a problem statement, the study's purpose, and potential study contributions.

Students with LD

Students with LD often encounter challenges in school that differ from those experienced by their peers who do not have LD. Specifically, students with LD achieve lower grades and display more frequent rates of course failure than students without LD (NCLD, 2014a). Nearly half of all students with LD perform more than three grade levels below their enrolled grade level in reading and math (NCLD, 2014b). Nineteen percent of students with LD dropped out of high school in 2011; which was approximately double the rate of the general student population (NCLD, 2014a). Additionally, approximately two-thirds of the students with LD graduate from high school with a regular diploma versus nearly three-fourths of students in the general population (NCLD, 2014b). Clearly, this group of students often struggles in school, holds lower educational and occupational aspirations (Rojewski, 1996, 1999) and has lower levels of

motivation (Adelman & Taylor, 1983, 1990; Lichtinger & Kaplan, 2015; Melekoglu, 2011; Sideridis, 2003; Zisimopoulos & Galanski, 2009) than their nondisabled peers. I provide a more detailed discussion of motivation levels for students with LD in the literature review.

Rural Context

Students with LD who live in rural communities face a myriad of challenges and obstacles to their academic success not only because they have LD but also because they encounter challenges that are particular to being educated in rural schools. Hardré (2012) described rural communities as places of low population density that are far from large metropolitan areas and where the local industry is strongly related to the geographic context (e.g., agriculture). Hardré found that due to these factors of rural communities, the schools in these areas often are small in size and have limited resources. Additionally, many families are in low socioeconomic categories because family incomes in these areas typically are well below state and national averages (U.S. Bureau of Labor Statistics, 2013; U.S. Council of Economic Advisers, 2015). Meece and colleagues (e.g., Byun, Meece, Irvin, & Hutchins, 2012; Irvin, Byun, Meece, & Farmer, 2012; Irvin et al., 2011b) highlighted several challenges that students attending rural schools face: family poverty, limited school financial resources, shortage of qualified teachers, reduced opportunities to take advanced courses and participate in school activities, geographic isolation, and low parental educational expectations. Irvin et al. (2011b) found that school characteristics (e.g., low student-teacher ratio) and schooling experiences (e.g., academic self-concept, school valuing, school belonging) can either encourage or hinder the development of rural students living in poverty.

Gandara et al. (2001) suggested that researchers have conducted less research in rural schools than in urban or suburban schools. Whereas more than 30% of U.S. schools are

considered to be in rural communities, only 6% of research taking place in schools has involved rural schools (Hardré, 2008). Students with LD who live in rural communities have received even less attention in the research.

Theoretical Framework

Resilience is the ability to bounce back from adversity (Luthar, Cicchetti, & Becker, 2000). Clearly, students with LD attending rural schools face adversity in their journey toward academic success (Hardré, 2012; NCLD, 2014a; Rojewski, 1996, 1999). Consequently, resilience theory is a useful framework in which to situate this study. Werner and Smith (1982, 1992, 2001) were the first researchers to view students with LD from a resilience perspective. In their seminal, longitudinal work on resilience theory, Werner and Smith followed 72 individuals, 22 of whom had LD, to assess their cognitive and psychological development during the first 40 years of their lives. The individuals with LD faced multiple challenges during childhood but were able to overcome them to lead healthy and successful lives in adulthood (Werner & Smith, 2001). Werner (1993) pointed to multiple protective factors to explain the turnaround in the lives of these individuals. Morrison and Cosden (1997) further conceptualized the presence of a LD as a risk factor that does not by itself predict adaptive or nonadaptive outcomes. Instead, other risk and protective factors interact with the LD to influence either positive or negative outcomes. Morrison and Cosden also suggested that risk factors and protective factors could be internal or external to the individual. I focus on motivational beliefs, an internal protective factor, in this study.

Recognizing the benefits of work such as Werner and Smith's (1982, 1992, 2001) longitudinal study, Wong (2003) encouraged researchers to continue to apply the resilience framework to students with LD and encouraged further work in continuing to search for

additional potential risk and protective factors. I investigate motivational beliefs as a potential protective factor for students with LD.

Statement of the Problem

Students with LD face significant challenges in their journey to academic success. A vastly understudied population, students with LD who live in rural communities face an additional set of challenges due to the unique contexts in rural communities. In this research study, I respond to the call for additional research on the understudied group of students with LD who live in rural communities (Irvin et al., 2011a). In my review of the literature, I found no other published studies that feature the combination of the understudied population of rural students with LD, the resilience framework, and the investigation of motivational beliefs as a protective factor. Consequently, I offer a unique approach to examining an understudied group of students in this study.

Purpose of the Study

The purpose of this study was twofold: (1) to help elucidate the relation between LD status, motivation beliefs, and educational aspirations of rural students with LD, and (2) to help elucidate the relation between LD status, motivation beliefs, and academic achievement of rural students with LD. The research helped to answer two important questions: Does motivation serve as a protective factor or as a buffer for rural students with LD, and does motivation relate to their academic achievement and postsecondary educational aspirations? Building on the few studies that have framed motivational beliefs as a protective factor for students, I hoped to illuminate the potentially beneficial and powerful role that motivational beliefs can play for rural students with LD. In this study, I used a person-centered approach (Laursen & Hoff, 2006) that allows for a

more nuanced interpretation of findings with regard to unique configurations of motivational beliefs and their relation to educational outcomes.

Summary

Rural students with LD face many challenges to their educational success. Additionally, they typically report lower postsecondary educational aspirations (Irvin et al., 2011a) and do not achieve academically at the same level as their nondisabled peers (NCLD, 2014a). Resilience theory is a valuable framework that can help researchers analyze the environmental and personal characteristics at play during youth development. I used the resilience framework to investigate the relation between LD status, motivational beliefs, and academic achievement as well as the relation between LD status, motivational beliefs, and aspirations of rural youth with LD. In the study, I considered the presence of a LD to be a risk factor, and I hypothesized that motivational beliefs would be a protective factor in relation to academic achievement and postsecondary educational aspirations for students with LD.

CHAPTER TWO
LITERATURE REVIEW

In this dissertation study, I examined the motivation beliefs of rural high school students with LD and their relation to important educational outcomes such as educational aspirations and academic achievement. More specifically, I used resilience theory to hypothesize that the motivation beliefs of this particular group of students may serve as a protective factor or buffer, which enhances the educational outcomes for these students. To situate this study in the literature and build a case for its necessity, I reviewed scholarship relevant to the subject matter. First, I consider the continuum of educational aspirations and academic achievement outcomes for high school students with LD. Second, I offer resilience as a useful framework through which to investigate questions regarding the motivational beliefs and educational outcomes of rural high school students with LD. Third, I discuss sources of risk and resilience for this population of students. Finally, I outline the purpose of the study and present specific research questions.

Learning Disabilities, Educational Aspirations, and Academic Achievement

Some 2.4 million public school students in America are currently identified under the Individuals with Disabilities Act (IDEA; 2004) as having LD, making them the largest group of students with disabilities in America's schools today (NCLD, 2014a). In fact, more than 42% of the 5.7 million American public school-age children receiving special education services are identified as having LD (NCLD, 2014a). It is important to examine the educational aspirations and achievement outcomes of such a large group of students. In the following sections, I present

research that indicates students with LD can vary with regard to their levels of educational aspirations and academic achievement in the following sections.

Educational Aspirations of High School Students with Learning Disabilities

Educational aspirations are strongly associated with educational and occupational attainment (Bandura, Barbaranelli, Caprara, & Pastoerelli, 2001; Beal & Crockett, 2010). Educational aspirations, defined as how much education a person desires to attain, are typically measured via self-report by asking the individual how far in school he or she would most like to go (Irvin et al., 2011a). The educational aspirations of U.S. students have gradually increased during the last few decades (Goyette, 2008; U.S. Department of Education, 2005). Despite increases in educational aspirations for all U.S. students, differences between students with LD and their nondisabled peers persist.

In a seminal study on the educational aspirations of students with LD, Rojewski (1996) used data from the National Education Longitudinal Study of 1988 and found that high school students with LD in the general population held lower educational and occupational aspirations than their nondisabled peers. The percentage of students with LD who did not aspire to any postsecondary education was approximately three times that of students without LD who did not aspire to postsecondary education. Additionally, two-thirds of high school seniors without LD aspired to obtain a 4-year baccalaureate degree or graduate degree while approximately half of the students with LD aspired to less than a 4-year baccalaureate degree.

Analyzing a national sample of youth with disabilities from the National Longitudinal Transition Study-2, Wagner, Newman, Cameto, Levine, and Marder (2007) reported similar results. Wagner and colleagues asked students aged 15 to 19 with LD in the general population about their postsecondary education plans. While 25.2% of these students said they definitely

would complete a 4-year college degree, 38% said they probably would complete a 4-year college degree and 36.8% indicated they definitely or probably would not complete a 4-year college degree. Although published nearly a decade later, these findings fall closely in line with Rojewski's (1996) results.

Students with LD who attend high schools in rural school districts also show lower educational aspirations than their nondisabled peers (Irvin et al., 2011a; Weiss, Hutchins, & Meece, 2012). Weiss et al. found that 90.7% of rural nondisabled students planned to continue their education after high school compared to only 78.5% of students with disabilities, the majority of who had LD. Additionally, Irvin and his fellow researchers (2011a) found that rural students with LD were more likely than their nondisabled peers to report that they aspired to obtain a high school diploma or general education development (GED) high school equivalency diploma and attend, but not finish, college. Students with LD were also more likely than nondisabled students to report that they did not know the level of education to which they aspired. In contrast, nondisabled students in the sample were more likely to report that they aspired to graduate from college or earn an advanced degree than students with LD.

Though students with LD, overall, do not typically have as high of educational aspirations as their nondisabled peers (Irvin et al., 2011a; Rojewski, 1996; Wagner et al., 2007; Weiss et al., 2012), some students with LD do hold high levels of educational aspirations. Specifically, in Rojewski's (1996) study, 31.4% of male adolescents with LD and 31.9% of female adolescents with LD aspired to a college degree. Additionally, 5.9% of male adolescents with LD and 10.6% of female adolescents with LD wished to pursue a master's degree, whereas 3.6% of males with LD and 5.7% of females with LD were inclined to pursue a doctor of philosophy (PhD), doctor of medicine (MD), or another equivalent terminal degree. Similarly,

Wagner et al. (2007) found that 25.2% of adolescents with LD who participated in the National Longitudinal Transition Study-2 reported that they would definitely complete a 4-year college degree. In summary, though students with LD tend to have lower educational aspirations than their nondisabled peers, a portion of these students—despite their disability status—are able to maintain high educational aspirations.

Academic Achievement of High School Students with LD

Academic achievement can be measured in multiple ways including grades and standardized test results. Of the two measures, grades or grade point averages are more predictive of postsecondary educational outcomes for U.S. high school students (Fleming, 2002; Hoffman & Lowitzki, 2005). Similar to educational aspirations, the academic achievement of high school students with LD varies with some students performing well academically and others not as well. In a study using national data, Wagner et al. (2003) analyzed results from the National Longitudinal Transition Study-2 to investigate the academic achievement of youth with LD during secondary school. Wagner and her colleagues found a mixed picture of academic performance for these students. High school teachers in the study reported that 26.8% of students with LD received mostly A's and B's while 8.3% of these students received mostly D's and F's. Overall, students with LD were not succeeding at a level similar to their nondisabled peers. The NCLD (2014a) reported that the average grade point average for secondary school students with LD was 2.2 compared to 2.7 for their nondisabled peers.

Wagner et al. (2003) found additional evidence that some high school students with LD struggle academically. Teachers in the study reported what proportion of their students with LD were expected to keep up with the assignments and grading expectations in their general education classes and what percentage of students actually did keep up in their classes. Teachers

reported that they expected 98.9% of their students with LD to keep up in their general education classes, but only 77.5% of their students with LD actually kept up with the assignments and grading expectations of their classes. Students with LD also have a higher course failure rate than their nondisabled peers. The NCLD (2014a), for example, reported that 69% of students with LD failed one or more graded courses in secondary school compared to 47% of their nondisabled peers.

Although not as useful as grades in predicting students' postsecondary educational outcomes (Fleming, 2002; Hoffman & Lowitzki, 2005), data from standardized tests are helpful to demonstrate the achievement disparity that exists between students with LD and their nondisabled peers. Evidence of an achievement difference was present in the most recent available results of the National Assessment of Educational Progress (National Center for Education, Statistics [NCES], 2013). The National Assessment of Educational Progress is an assessment in reading and math that is given to more than 700,000 students in fourth and eighth grades across the US. For the 2013 National Assessment of Educational Progress, 9% of eighth grade students with disabilities earned proficient or advanced scores in reading compared to 40% of nondisabled students, students with LD made up a majority of the students with disabilities. In mathematics, 8% of eighth grade students with disabilities earned proficient or advanced scores compared to 39% of nondisabled students (NCES, 2013). Compared with nondisabled peers, students with LD face significant academic challenges as they approach high school.

Wagner et al. (2003) also found evidence of a variation between the standardized test scores of students with LD and their nondisabled peers. The researchers asked teachers to report grade-level equivalency scores from reading and math assessments. Wagner and colleagues compared the assessments with the students' actual grade level to compute deviation scores,

which were indicative of how far above or below grade level students were performing. The students with LD in the sample were performing an average of 3.4 years below their actual grade level in reading and 3.2 years below their actual grade level in math.

In summary, students with LD do not achieve at a level similar to their nondisabled peers on classroom grades or on standardized tests. However, a small number are succeeding academically, when grades and test scores are examined (NCES, 2013; NCLD, 2014a; Wagner et al., 2003). An important question thus emerges from prior research: Why are some students with LD able to achieve academically and maintain high educational aspirations while other students with LD are not? This heterogeneity within samples of students with LD needs further investigation.

Resilience

Resilience theory offers a lens for examining variations in educational outcomes among students with LD. Resilience has been described as a "dynamic process encompassing positive adaptation within the context of significant adversity" (Luthar et al., 2000, p. 543). Resilience researchers have examined factors that positively or negatively affect developmental outcomes. Factors supporting positive or adaptive developmental outcomes are sometimes referred to as protective factors, while factors that predict negative outcomes are sometimes called risk or vulnerability factors (Luthar et al., 2000). Werner and Smith (1982, 1992, 2001) were the first researchers to view students with LD from a resilience theory perspective. In their seminal, longitudinal study, Werner and Smith followed 72 individuals, 22 of whom had LD, for their first 40 years of life in Kauai, Hawaii. The individuals with LD faced many challenges such as growing up in poverty and having parents with substance abuse or mental health problems, but overcame these challenges by adulthood (Wong, 2003). A majority of the Kauai study

participants with LD were satisfied with their jobs and marriages and maintained healthy levels of self-efficacy and psychological well-being in adulthood despite the challenges that they faced as children (Werner & Smith, 2001). Werner (1993) offered several reasons, or protective factors, to explain the turnaround in the lives of these individuals with LD: positive temperament and social skills, self-efficacy and internal locus of control, supportive home environment and effective parenting skills, the presence of supportive adults, and effective transition planning. Encouraging other researchers to build upon Werner and Smith's research, Wong (2003) called for more research that used resilience theory to study students with LD.

Resilience theory guided the current study. While students with LD face many challenges in their pursuit for academic success (Morrison & Cosden, 1997), some students with LD succeed in school and aspire to continue their education. Positive forms of motivation (e.g., high self-efficacy, school valuing, and school belonging) in educational settings may as protective factors to promote academic achievement and educational attainment (Skinner, Pitzser, & Steele, 2013; Yeager & Dweck, 2012). Strong links between high levels of motivation and academic achievement are well established (Broussard & Garrison, 2004; Fortier, Vallerand, & Guay, 1995; Gottfried, 1990; Lepper, Corpus, & Iyengar, 2005; Pintrich & de Groot, 1990). To date, limited research has examined the educational resilience of students with LD.

Guided by a resilience framework, I examined motivational beliefs as a potential source of resilience for students with LD. In the next sections, I describe sources of risk and resilience for students with LD. Offering a unique research contribution, this study focused on adolescents attending rural high schools. The period of adolescence poses many challenges for young people, regardless of disability status. Rural schools also have unique features that positively and negatively shape educational outcomes.

Sources of Risk for Students with LD

Adolescence typically is described as a transitional stage between childhood and adulthood and spans the ages of 10 to 20 (Wigfield, Byrnes, & Eccles, 2006). Adolescence is a time of considerable development for young people as they experience changes across physical, cognitive, social and emotional domains. In the following sections, I describe the changes taking place in the multiple domains of development during this stage, how students with LD might experience them differently from typically-developing adolescents, and the challenges associated with those differing experiences.

Biological and Physical Development

Adolescents experience a biological stage of physical growth called puberty in which they gain physical stature and develop secondary sex characteristics (Wigfield et al., 2006). Adolescents' brains also grow and develop during this period. Reorganization of synaptic connections occurs, which results in more efficient processing of information, and neurotransmitters in the emotional centers of the brain change, resulting in increased emotional activity (Wigfield et al., 2006). These growth processes occur for both typically-developing adolescents and for individuals with LD though the brains of adolescents with LD may differ in particular ways. Research suggests that LD are related to subtle neurological damage during the fetal period or during childhood (Horowitz, 2014). It is likely that this subtle neurological damage persists through the period of brain growth during adolescence for individuals who continue to experience learning difficulties. Though all adolescent brains likely increase in capacity and function, the brains of adolescents with LD continue to differ in their areas of impairment. The physical development of the brain during adolescence has implications for cognitive development in both typically developing adolescents as well as adolescents with LD.

Cognitive Development

Adolescents improve in their ability to think abstractly, consider hypothetical situations, use advanced information processing strategies, think simultaneously of multiple aspects of a problem, and reflect on themselves and complex issues (Larson, Lampkins-Uthando, & Armstrong, 2014; Wigfield et al., 2006). One particular area of the brain that experiences great change during the adolescent period is the prefrontal cortex, which gives the teenage brain greater capacity for executive functioning and decision making (Kuhn, 2009). The increase in skills related to executive functioning such as monitoring, organizing, planning, strategizing, and inhibition (Kuhn, 2009) aids adolescents in improving their learning and problem-solving capacity and in forming more nuanced self-concepts, thinking about the future, and developing perceptions and understanding of others (Wigfield et al., 2006). Students with LD often experience challenges with skills related to executive function such as planning, organizing, and evaluating their schoolwork as well as difficulties with maintaining focus (Dunn & Curran, 2012). These executive-function skill deficits can make schoolwork in reading, writing, and mathematics more challenging for students with LD.

Another area of cognitive development in which adolescents experience growth is in their capacity to process information. A key element involved in how individuals process information is their capacity for working memory (Baddeley, 2001; Wigfield et al., 2006). Swanson (1999) found that spatial and verbal working-memory capacity increased in their sample between the ages of 6 and 35. Zald and Iacono (1998) also found an increase in spatial working memory capacity during adolescence between ages 14 and 20. The additional working memory capacity that adolescents gain can aid them in solving complex problems and weighing multiple pieces of information when making decisions (Wigfield et al., 2006). In contrast to their nondisabled

peers, students with LD often have deficits in working memory, which can play a role in their performance on various academic tasks at school (Alloway & Gathercole, 2006; Maehler & Schuchardt, 2009; Masoura, 2006; Pickering, 2006; Swanson, 1994, 2003; Swanson & Siegel, 2001).

A third cognitive capacity that influences academic performance is the speed with which individuals can process information (Kail, 1991; Kail & Ferrer, 2007). Students with LD, however, often have deficits in processing speed (Calhoun & Dickerson Mayes, 2005). Calhoun and Dickerson Mayes found that the students with LD in their sample received lower scores on the Processing Speed Index compared to the group mean IQ score for students with LD on the Wechsler Intelligence Scale-Third Edition (WISC-III; Wechsler, 1991). Seventy percent of the students with LD scored lower than expected on the Processing Speed Index based on their Full Scale IQ scores.

Adolescents also experience gains in their knowledge base during this period (Craik & Bialystok, 2006; Li et al., 2004; Wigfield et al., 2006). Adolescents increase their level of base knowledge in three ways: declarative knowledge, or knowing facts; procedural knowledge, or knowing the steps of how to complete a task; and conceptual knowledge, which includes what adolescents know about when and why to employ their declarative and procedural knowledge (Wigfield et al., 2006). In addition, the increasing knowledge base of adolescents likely improves their performance on tasks closely linked to areas in which they have increased their domain-specific knowledge (Wigfield et al., 2006). Unfortunately, students with LD may not benefit as much as their peers from their increasing knowledge bases because their learning difficulties can limit or decrease the potential amount of knowledge that they can collect within different domains of learning (Ceci & Baker, 1989).

Emotional and Social Development

It is important to consider the emotional and social development of adolescents, including those with LD. During the adolescent period, individuals desire more autonomy and increase the amount of time that they spend with peers in relation to the time they spend with family (Trentacosta & Izard, 2007). This push for autonomy coincides with the important adolescent task of forming an identity (Erikson, 1968). Academically, adolescents can develop a positive or negative identity as a student based on their experiences in school (Roeser & Lau, 2002). Roeser and Lau suggested those with a positive identity as a student have had a history of positive academic and social experiences in the classroom, feel positive emotions toward academics, maintain high levels of academic self-efficacy, hold positive conceptions of themselves as students, and are committed to learning. Alternatively, those with a negative student identity have a history of academic difficulties, dysfunction in social relationships with peers, and negative emotions related to academics. They also experience low levels of confidence in their academic abilities, become frustrated with themselves as students, and hold low aspirations for future educational attainment (Roeser & Lau, 2002). Certainly students with LD are at risk for developing negative identities as students due to the difficulties they often experience with school achievement.

Sources of Resilience for Students with LD

Following the discussion of risk factors facing students with LD, I now present my argument for examining motivation beliefs as a potential source of resilience for students with LD. Focusing specifically on motivation beliefs, Yeager and Dweck (2012) identified students' beliefs about the nature of intelligence as important sources of educational resilience. These researchers reported that when students believe that intelligence can be developed, they

academically outperform peers who believe that intelligence is fixed or cannot be changed. Similarly, Skinner, Pitzer, and Steele (2013) offered a model of motivational resilience that may be helpful in understanding how positive motivational beliefs can possibly serve as a protective factor for students with LD (see Figure 2.1). Skinner and colleagues proposed that motivational resilience is associated with engagement and reengagement with challenging academic tasks while motivational vulnerability is related to disaffection and giving up on challenging academic work. Students are motivationally resilient if they use adaptive academic coping strategies and motivationally vulnerable if they use maladaptive academic coping strategies.

The current study drew on this body of research to focus on motivational beliefs as possible protective factors. A great deal of research has associated motivational beliefs with positive educational outcomes for students (Anderman, 2002; Finn & Frone, 2004; Goodenow, 1993a, 1993b; Guay, Marsh, & Boivin, 2003; McMahon, Parnes, Keys, & Viola, 2008; Roeser, Midgely, & Urban, 1996; Watson, Battisch, Schaps, & Delucchi, 1996). In this study, I examined the degree to which the motivational beliefs of students with LD serve as a source of resilience, helping them to have higher educational aspirations and academic achievement. I describe the examined motivational beliefs in the next section.

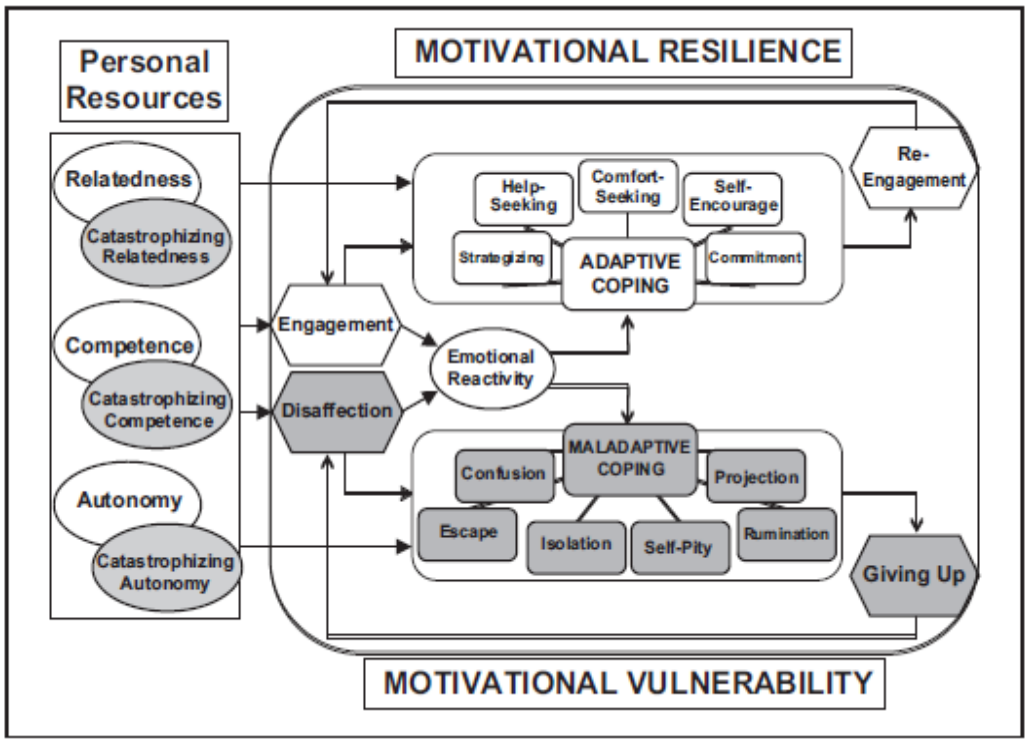

Figure 2.1. Motivational resilience model. Adapted from "Coping as Part of Motivational Resilience in School: A Multidimensional Measure of Families, Allocations, and Profiles of Academic Coping," by E. Skinner, J. Pitzer, and J. Steele, 2013, *Educational and Psychological Measurement, 73*, p. 812. Copyright 2013 by Sage.

Motivational Beliefs and Resilience

In this section, I discuss how three motivational beliefs (i.e., academic self-concept, school valuing, and school belonging) can benefit all students, including students with LD in their pursuit of educational success. I also discuss the differences in the motivational beliefs between students with and without LD. I argue that because motivational beliefs have been associated with positive educational outcomes for students (Anderman, 2002; Finn & Frone, 2004; Goodenow, 1993a, 1993b; Guay, Marsh, & Boivin, 2003; McMahon, Parnes, Keys, & Viola, 2008; Roeser, Midgely, & Urban, 1996; Watson, Battisch, Schaps, & Delucchi, 1996),

motivational beliefs can serve as a protective factor and propel rural high school students with LD toward greater academic achievement and higher educational aspirations.

Academic self-concept. Academic self-concept has been defined as "a person's self-evaluation regarding a specific academic domain or ability" (Trautwein, Ludtke, Marsh, Koller, & Baumert, 2006, p. 789). Academic self-concept is related to multiple indicators of motivation including interest and persistence (Skaalvik & Valas, 2010), and it has a reciprocal relation with academic achievement meaning that prior self-concept affects subsequent achievement and vice versa (Guay et al., 2003). Stone and May (2002) compared the academic self-concepts of a group of high school students with LD to a control group of nondisabled students and found that the students with LD reported statistically significantly lower academic self-concepts than did their nondisabled peers.

Academic self-efficacy. Academic self-efficacy, another form of academic self-perception, has been defined as how one perceives one's skills and abilities to successfully complete academic tasks (Bandura, 1986). Self-concept and self-efficacy share similarities, such as a definitional core of perceived competence, while also displaying important differences such as how self-concept tends to predict affective outcomes and self-efficacy tends to predict cognitive outcomes (Bong & Skaalvik, 2003). Due to the overlapping definitions of academic self-concept and academic self-efficacy, it would be likely that students with LD might also display lower academic self-efficacy and lower self-concepts when compared to their nondisabled peers.

Lackaye and Margalit (2006) investigated the academic self-efficacy of a group of adolescent students with LD and a comparison group of nondisabled students comprised of four levels of achievement. Lackaye and Margalit found that the group of students with LD reported

lower levels of academic self-efficacy when compared to the two groups of high-achieving nondisabled students and a group of low-average achieving nondisabled students. Students with LD showed no differences in academic self-efficacy when compared to low-achieving nondisabled students. The authors of the study hypothesized that students with LD may display low academic self-efficacy due to the absence of sources which can foster positive self-efficacy as described by Bandura (1997): successful past performance, identification with efficacious models, support from others, and emotional arousal during task performance. Lackaye and Margalit (2006) also found that academic self-efficacy along with academic achievement, negative mood, and hope predicted how much effort students with LD would put forth in their schoolwork.

In another study of academic self-efficacy of students with LD, Klassen and Lynch (2007) used a qualitative approach and conducted focus group interviews with 28 high school students and individual interviews with seven LD specialist teachers. Through content analysis of focus group interview data, the authors found that the students perceived themselves as having low levels of academic self-efficacy. Almost all of the students in the study reported that they had less confidence in doing their schoolwork compared to their nondisabled peers. One student reported, "They [students with LD] are less confident—it's because they have to work way harder just to keep up" (Klassen & Lynch, 2007, p. 499). Similar to the students with LD in Lackaye and Margalit's (2006) study who reported suffering from low levels of academic self-efficacy due to the absence of sources of positive self-efficacy, students in Klassen and Lynch's (2007) study discussed multiple sources of low self-efficacy during focus groups including their lack of mastery experiences, negative teacher verbal comments, vicarious experience, and anxiety and nervousness during task performance.

Perceived cognitive competence. Academic self-concept and academic self-efficacy share a conceptual core of perceived competence (Bong & Skaalvik, 2003). Self-determination theory researchers, Grolnick and Ryan (1990) studied the perceived competence of elementary students with LD. Deci and Ryan (2002) developed the self-determination theory, a seminal theory of motivation, in which goal-directed behavior is thought to be directed by an individual's need to satisfy three key psychological needs: competence, the need to master something; autonomy, the need to have agency; and relatedness, the need to feel connected to others. In their study, Grolnick and Ryan (1990) found that students with LD reported lower levels of perceived cognitive competence than nondisabled students in a matched-IQ control group. The students with LD in the study did not display a difference in perceived cognitive competence when compared to a group of low achieving students. These results mirror the findings of the Lackaye and Margalit (2006) study in which students with LD showed lower levels of academic self-efficacy than high achieving and low-average achieving students, but showed no differences from low achieving students. In general, students with LD report lower levels of academic self-concept, academic self-efficacy, and perceived cognitive competence in comparison to high achieving and low-average achieving peers who are not disabled. Students with LD showed no differences, however, when compared to low achieving nondisabled peers.

School belonging. School belonging is the degree to which students perceive that they are included as members of the school or classroom community and includes how students feel about being accepted, respected, and supported within the school social environment (Goodenow, 1993b). School belonging can be an important element in student motivation, engagement, and achievement. For instance, in her study of 353 young adolescents, Goodenow (1993a) found that classroom belonging was related to expectancies and values and that

belonging, along with expectancies and values, influenced classroom effort and achievement. In a separate study, Goodenow (1993b) found school belonging to be highly associated with self-reported school motivation and was correlated, to a lesser degree, with student grades. In their study of young adolescents, Roeser et al. (1996) also found a relation between school belonging and final-semester academic grades. Additionally, Anderman (2002) used data from the National Longitudinal Study of Adolescent Health to find that student perceptions of belonging were related to higher student grade-point averages.

In a study related to school belonging, motivation, and achievement, Solomon, Watson, Battisch, Schaps, and Delucchi (1996) implemented an intervention program—the Child Development Program—for improving the sense of community in elementary schools. The researchers found that the program improved the students' sense of community in their schools, but an effect was not found between the improved sense of community and achievement, in terms of standardized achievement test scores or on a performance-based measure of reading comprehension. There was, however, a positive relationship between an increased sense of community and measures of achievement motivation and intrinsic motivation. The studies by Anderman (2002), Goodenow (1993a, 1993b), Roeser et al. (1996), and Watson et al. (1996) provide evidence that students' sense of school belonging can play an important role in both their motivation and achievement.

A sense of belonging in school also can be important for students with disabilities. McMahon et al. (2008) investigated the role that school belonging plays for students with disabilities in terms of psychological and educational outcomes. In their study, McMahon and colleagues examined school belonging in urban at-risk adolescents with disabilities who had transferred recently to a new school due to the closure of their previous school. Nineteen percent

of the participants in the study were classified as having mild disabilities including LD and emotional disabilities. The researchers found that school belonging was related both to academic self-efficacy and school satisfaction and suggested that a link between academic self-efficacy and academic performance could be inferred from their results. McMahon and colleagues also suggested that school belonging is an important part of academic engagement for students with disabilities because they are more likely to be engaged academically in school when they believe they are included in the school community. Clearly, a sense of school belonging is just as important for students with disabilities as it is for their nondisabled peers in terms of educational outcomes. In summary, a sense of school belonging or inclusion in the school community can be an important facet of both disabled as well as nondisabled students' schooling experiences and can contribute to critical educational outcomes.

School valuing. School valuing has been defined as the importance students place on the schooling experience and whether students see school as a valuable pathway to opportunities in life (Irvin et al., 2011a). Similarly, Voelkl (1997) characterized school valuing as how students view school as being a vehicle to facilitate personal advancement and useful in reaching important life objectives. Finn and Frone (2004) found that school identification, which included items related to school valuing, or whether students found school to be worthwhile and critical to their future, predicted academic achievement and classroom engagement for adolescents. Pintrich and DeGroot (1990) found school valuing to be related to student engagement and academic performance for secondary school students and Mickelson (1990) found valuing of school to be positively related to high school seniors' grade point average. The students in the Mickelson study viewed academic achievement in school as a viable pathway toward success. Adolescents with LD tend to report lower school valuing than their nondisabled peers, which can

lead to negative educational outcomes such as low academic achievement, low school engagement, and school dropout (Reschly & Christenson, 2006). In summary, school valuing is another important facet of the schooling experience for both learning disabled as well as nondisabled adolescent students and can be associated with important educational outcomes.

Research summary. Clearly, motivational beliefs play an important role in the pursuit of educational success for all students, including students with LD. Despite several researchers' findings shared in this review that students with LD have been largely characterized to possess low levels of motivation, some more recent scholarship has suggested otherwise. Irvin et al. (2011a) found that the motivational beliefs (i.e., academic self-concept, school belonging, school valuing) of rural high school students with LD exist across a continuum. In their study, Irvin and his fellow researchers used a cluster analysis procedure to find six clusters of motivational belief profiles in their sample. While there were students characterized as low on all motivational beliefs (e.g., school valuing, academic self-concept, belonging), some clusters that included students with LD, reported positive motivation beliefs as well as high educational aspirations (see Irvin et al., 2011a). Positive motivational beliefs, it seems, served these students well. Perhaps these adaptive motivational beliefs enhanced the schooling experience for the students and in turn helped them to form aspirations for higher education. Building on Irvin et al.'s (2011a) study, I examine whether positive motivational beliefs help make rural high school students with LD more resilient in terms of their educational aspirations and academic achievement.

Rural Context: Sources of Both Risks and Resilience

Because the community in which students reside can be another potential risk factor for students, it is important to discuss the rural context. Students who live in rural communities and

attend rural high schools are likely to have achieved lower rates of educational achievement when compared to their peers in nonrural settings (Brown & Swanson, 2003; Hardré & Sullivan, 2008; Roscigno & Crowley, 2001). Additionally, rural students have a tendency to report comparatively lower educational aspirations than their peers that attend nonrural schools (Gandara, et al., 2001). First, I focus on the challenges and benefits students in rural contexts face.

Students attending schools in rural areas face a multiplicity of challenges in achieving and succeeding in school. One common challenge facing rural students is that their schools often have financial constraints and therefore cannot offer the same degree of support, resources, and extra-curricular activities as can nonrural schools (Hardré & Hennessey, 2010). The financial constraints and subsequent low salaries of rural districts also impact their ability to retain teachers. In addition, rural districts often serve largely minority student populations from high poverty areas with low parent education levels, characteristics that can be associated with low achievement and low school success (Hardré & Hennessey, 2010).

Students with LD who reside in rural communities face an even greater level of challenge. Students with LD typically experience higher rates of dropping out of school and lower levels of postsecondary success than their nondisabled peers (deBettencourt, Zigmond, & Thornton, 1989; Dunn & Schumaker, 1997; Karpinski, Neubert, & Graham, 1992; Schalock, Holl, Elliott, & Ross, 1992). Weiss et al. (2012) investigated the educational aspirations of 11th and 12th graders with LD who attended rural schools. The researchers reported that 13.2% of the students with disabilities in their sample were unsure about their postsecondary education plans. In addition, 25.5% of the students with LD were unable to name the academic program in which they were enrolled (e.g., general, college preparatory). Clearly, this lack of knowledge

regarding academic program enrollment could hinder the pursuit of educational goals and plans for these students.

A number of researchers have voiced concerns regarding rural schools' difficulties in recruiting and retaining highly qualified teachers and how this impacts negatively the quality of education that rural students receive (e.g., Barton, 2003; Berry, Petrin, Gravelle, & Farmer, 2011; Brownell, Bishop, & Sindelar, 2005; Hodge & Krumm, 2009; Kossar, Mitchem, & Ludlow, 2005; Ludlow, 1998; Purcell, East, & Rude, 2005; Weiss et al., 2012). For rural students with LD, this problem is compounded because there is a shortage of high-quality special education teachers across the United States (Billingsley, 2004; Billingsley & McLeskey, 2004; McLeskey, Tyler, & Flippin, 2004; Thornton, Peltier, & Medina, 2007).

While rural schools face certain challenges due to their unique profiles, they also possess some beneficial educational characteristics. Hardré and Hennessey (2010) found that the close-knit small classes of rural schools could be leveraged to provide close role modeling and individual attention for students. Similarly, Irvin et al. (2011b) discussed several aspects of rural schools that promote positive development: small school and class sizes that facilitate supportive student-teacher relationships, wider grade-spans within schools that decrease school transitions, and close community-school ties that permit community engagement in schools. The positive aspects of rural schools may assist in the development of positive motivational beliefs that serve as protective factors for students with LD.

Unfortunately, there is limited research focused on adolescents with LD in rural contexts. Irvin et al. (2011a) conducted one of the few existing studies of this understudied population by investigating the educational aspirations of adolescents with LD in rural schools. Irvin and colleagues found that rural students with LD typically have lower levels of motivational beliefs

and educational aspirations than their nondisabled peers, though some portion of rural students with disabilities maintain high levels of motivational beliefs and educational aspirations. While the study by Irvin and colleagues contributed to the limited literature focused on rural students with LD, the authors did not address the possibility of motivational beliefs serving as a protective factor for these students. I address this research limitation in my dissertation study.

Variable-Centered Versus Person-Centered Approaches

The study by Irvin et al. (2011a) adopted what is called a person-centered approach to examining motivation profiles across students with and without disabilities. This approach is a departure from most studies of students with LD, which tend to adopt a variable-approach. In variable-centered studies, students with LD are characterized as having lower mean scores on a particular motivational belief construct when compared to their nondisabled peers. For example, as described earlier, students with LD, when compared to nondisabled students, tend to have lower academic self-concept, academic self-efficacy, perceived cognitive competence, and school valuing (Grolnick & Ryan, 1990; Lackaye & Margalit, 2006; Reschly & Christenson, 2006; Stone & May, 2002). However, in the broader field of achievement motivation, researchers have begun to more frequently use a person-centered approach (e.g., Irvin et al., 2011a; Roeser & Peck, 2003). The use of such an approach can be useful for investigating groups of individuals who share a combination of characteristics (Laursen & Hoff, 2006). The person-centered approach can be used in the context of motivational beliefs research to examine how motivational constructs configure within groups of individuals. Using such an approach can provide a more nuanced view and understanding of the heterogeneity present in the motivational beliefs of students and allow for a more robust interpretation of results. After sharing the work

of other researchers who have used a person-centered approach, I articulate my purpose for this approach and indicate how I built upon these researchers' work in the current study.

Roeser and Peck (2003) used a person-centered approach in their study of early adolescents and academic achievement. They reported that unique configurations of social-demographic, social-contextual, psychological, and behavioral variables contributed to young adolescents' educational choices and achievement. A group of students with non-college educated parents who reported positive motivational and cognitive aptitudes enroll in college at similar rates as a group of White, male adolescents whose parents were wealthy and educated parents. The use of a variable-centered approach by Roeser and Peck in this study would not have provided this specific result or the general richness of information about the particular patterns of variables that were associated with educational outcomes for these students.

Irvin et al. (2011a) also used a person-centered approach to investigate particular constellations of students' motivational beliefs. Irvin et al. (2011a) found that rural high school students with LD are more likely to hold negative motivational beliefs and lower educational aspirations than their nondisabled rural peers, though some rural students with LD have positive motivational beliefs and high educational aspirations. The person-centered approach allowed Irvin and colleagues to investigate which groupings of motivational beliefs predicted educational outcomes. Irvin et al. (2011a) found six clusters of motivational beliefs using school valuing, school belonging, and academic self-concept as clustering variables. These clusters included the following configurations of motivational beliefs: *low on all, low school valuing, low academic self-concept and school belonging, high school belonging, high school valuing,* and *high on all*. Students with LD who reported high levels of academic self-concept, school valuing, and school belonging more often planned to obtain an advanced degree than would be expected by chance.

Students who reported other configurations of motivational belief variables did not hold the same educational aspirations. For instance, fewer students with LD who reported low levels of academic self-concept, and school valuing, and school belonging planned to obtain an advanced degree than would be expected by chance. Irvin and colleagues' use of the person-centered approach allowed for a nuanced level of interpretation that would not have been possible with a variable-centered approach.

There were limitations to Irvin et al.'s (2011a) study. Irvin and colleagues used contingency-table analysis to investigate whether motivational beliefs were associated with educational aspiration and did not examine interaction effects. Therefore, the analysis did not test whether motivational beliefs moderate the risks associated with LD status to promote positive educational outcomes. Another limitation of Irvin et al.'s study is that they did not use matched samples for students with LD and nondisabled students. The number of nondisabled students in Irvin and colleagues' study was much greater than the number of students with LD. In this dissertation study, I built on Irvin et al.'s study by using matched samples and testing moderation effects.

Purpose of the Study

In this study, I examined the relation between LD status, motivation beliefs, and educational aspirations as well as the relation between LD status, motivation beliefs, and academic achievement for rural high school students with LD. Additionally, I sought to determine whether positive motivation beliefs serve as a protective factor or as a buffer for rural students with LD in regard to their academic achievement and postsecondary educational aspirations. Few studies to date have examined the heterogeneity of motivational beliefs of high school students who are receiving learning-disability services in rural schools. Irvin et al.

(2011a) used a person-centered approach to find six configurations of motivational beliefs, which were used in a follow-up analysis to find that rural high school students with LD were more likely to hold negative motivational beliefs and lower educational aspirations than their nondisabled rural peers; some rural students with LD, however, did have positive motivational beliefs and high educational aspirations. Irvin and colleagues' use of the person-centered approach to analyze the specific profiles of motivational beliefs of rural students with LD was useful, but as mentioned, the study had several limitations.

I used a person-centered approach in this study, as did Irvin et al. (2011a), but I extended prior research in three important ways. First, I used a matching procedure to ensure that students with LD and nondisabled students shared specific characteristics, including school attended, gender, ethnicity, and grade level. Irvin et al. (2011a) did not use a matching procedure and had a much larger number of nondisabled students than students with LD in their sample. In the current study, the number of nondisabled students and students with LD was equal. Second, Irvin et al. (2011a) used contingency table analysis and did not test interaction effects. In the current study, I tested interaction effects to examine whether motivation beliefs moderated the relation between LD status and educational outcomes. Third, unlike Irvin and colleagues, I used resilience theory to frame motivation beliefs as a potential protective factor for rural high school students with LD. There are few studies that have used resilience theory to frame motivation beliefs as protective factors (Skinner et al., 2013; Yeager & Dweck, 2012). This study is unique because motivation beliefs have not been examined as protective factors specifically for the understudied population of rural high school students with LD. The following section presents the specific research questions that were pursued in this study.

Research Questions

1.) Can distinct profiles of motivational beliefs be identified in the sample using cluster analysis?

2.) Do these distinct profiles of motivational beliefs moderate the relation between LD and educational aspirations?

3.) Do these distinct profiles of motivational beliefs moderate the relation between LD and educational achievement?

CHAPTER THREE
METHOD

In this chapter, I present a description of the Rural High School Aspirations (RHSA) study. Next, I provide information regarding participants, procedures, and measures used in the study, as well as plans for analysis. The chapter ends with hypotheses for each of the research questions.

Rural High School Aspirations Study

This study drew on data collected as part of the RHSA study. The RHSA study was funded by the U.S. Department of Education (Institute of Education Sciences), and it was designed to gain insight into: 1) the educational, vocational, and residential plans and aspirations for the future of rural high school students; 2) the activities which rural high school students engage in to prepare and plan for postsecondary education, work, and adult life; and 3) how school experiences, geographic location, peer relations, and characteristics of the community influence rural high schools students' aspirations and preparatory activities. Members of the RHSA study research team used surveys and interviews to collect information from rural high school students, their parents, teachers, and school administrators. The researchers collected information from 73 rural high schools across 34 states during 2007 and 2008 (National Research Center on Rural Education Support, 2011). Researchers randomly selected 73 U.S. small towns or rural high schools, identified by NCES urban-centric locale codes.[1] In sum,

[1] The U.S. Census Bureau created urban-centric locale codes for the NCES to categorize schools with regard to their location and proximity to urban areas. Eighty nine percent of the schools participating in the current study were located in rural urban-centric locale codes (41, 42, and 43) while 11 % were located in small town urban-centric locale codes (31, 32, and 33) (Irvin et al., 2011b).

researchers surveyed 8,754 students and surveyed and interviewed 792 parents, 667 teachers, and 69 administrators from 73 different rural schools in the United States (National Research Center on Rural Education Support, 2011).

Consent Procedures

The research team carried out student recruitment and consenting procedures according to participating districts' policies and administrative guidelines. Some districts (28%) selected a waiver procedure in which parents received a form describing the study and signed and returned the form to decline participation. Other districts (36%), requested active consent procedures; students only participated if their parents signed a consent form. The remaining districts (34%) elected a combination of both waiver and active consent procedures. After few consent forms were returned, the researchers consulted with school principals and enacted a waiver procedure. Additionally, all participating students completed an assent form as part of their participation in the survey.

Student Participants with LD

The RHSA study team acquired complete academic self-concept, school valuing, and school belonging data on a total of 8,104 students. This sample included 463 students with LD; teachers identified via survey which students received special education services. Legal identification procedures and definitions for LD varied across the 34 states and specific school districts. Appendix A provides a list of identification criteria for determination of LD in participating states and the number of participants with LD from each state. Local education agencies identified students with LD using a Response to Intervention (RtI) model as well as an ability and achievement discrepancy model, as this study was conducted after the (2004) reauthorization of the Individuals with Disabilities Education Act. States varied in the criteria

used to identify students with LD. For 13 of the 34 states, criteria information was not publicly available through searches of state and school district websites.

Data Collection Procedures

Data collection for the RHSA study occurred during the 2007-2008 school year. Students and teachers completed surveys during the school day at the respective schools. The student survey consisted of 49 items and included the following student constructs: parent respect and identification, perceived family income and economic hardship, family responsibility, academic self-concept, school valuing, school belonging, place-based education, postsecondary preparation activities, rural identity, and perceptions of local job opportunities (Byun, Carver Walton, Meece, Irvin, & Hutchins, 2011). A team of trained researchers from the University of North Carolina at Chapel Hill administered the student survey in a group setting such as the school cafeteria (Irvin et al., 2011b). Students were seated in such a manner as to protect the confidentiality of their responses. One of the researchers led the administration by verbally giving instructions to the survey while other members of the team monitored students' progress and assisted students if necessary.

First period teachers of the participating students, regardless of subject area, were also asked to complete surveys to obtain additional information for each of their individual students, including disability status, classroom behavior, and academic achievement. The teacher survey included 22 items. School administrators or a guidance counselor helped identify teachers who could make informed responses regarding a student's achievement when the initial teachers did not feel that they could adequately complete the survey for a student. Data were collected 3 months into the school year at each of the school sites so that teachers and students would be able to make informed responses regarding the survey items (Irvin et al., 2011b).

Current Study

LD Sample and Matching Procedures

Due to missing student data on the variables of interest, the sample used in the analyses consisted of 303 participants with LD. I constructed a matched sample of 303 nondisabled participants through an individual matching procedure based on the school that students attended and then by gender, ethnicity, and grade level. The created nondisabled subsample had similar proportions concerning gender, ethnicity, and grade level to the LD subsample. The rationale and specific steps for the matching procedure are described in the analysis plan.

Measures

To examine motivation beliefs and educational aspirations of students with and without LD, I used several separate measures from the RHSA study. I describe these measures below along with measures to collect information regarding LD status and academic achievement.

LD status. The teacher survey included items to gather information on students' LD status. Teachers marked all that applied in response to a question focused on whether the student for which they were completing the survey was receiving any special services. Response choices listed in which students were receiving special services included: autism, deaf-blindness, deafness, dropout prevention, emotional disturbance, hearing impairment, mental retardation, multiple disabilities, orthopedic impairment, other health impairment, specific LD, speech or language impairment, traumatic brain injury, and visual impairment.

Clustering variables. I used academic self-concept, school valuing, and school belonging as the clustering variables to identify students with different profiles of motivational beliefs. A fourth variable, *problem behaviors*, was added to validate the cluster solution. The rationale for this procedure is included in the cluster analytic plan.

Academic self-concept. I used a scale created by Jodl, Michael, Malanchuk, Eccles, and Sameroff (2001) to assess students' academic self-concept. The scale included five items. In the five items, students were asked to rate themselves in comparison to their classmates in how good they were in multiple school subjects including, math, science, English/language arts, social studies, and other classes. These ratings were made on a seven-point scale (1 = *not good at all* to 7 = *very good*). Ratings were averaged across items to create a composite score. A higher score indicated higher academic self-concept. Byun et al. (2011) conducted an exploratory factor analysis (EFA) of the scale and discovered that the five items on the scale formed a single factor that accounted for 50% of the variance with item loadings ranging from .52 to .79. Byun and colleagues also reported a Cronbach alpha coefficient of internal consistency of .73 for the total sample.

School valuing. I used a scale, adapted from previous measures created by Voelkl (1996), Lapan, Gysbers, and Petroski (2001), and Jodl et al. (2001), to assess school valuing. The scale consisted of five items. In the five items, students were asked to rate how they valued school and viewed it as a way toward subsequent opportunities later in life on six-point Likert-type scale (1 = strongly disagree to 6 = strongly agree). A higher score indicated higher school value and composite scores were determined through calculating the mean score across items. Byun et al. (2011) conducted an EFA of the scale and discovered that the five items formed a factor that accounted for 39% of the variance with item loadings ranging from .54 and .82. Byun and colleagues also reported a Cronbach alpha coefficient of internal consistency of .85 for the total sample.

School belonging. I used a scale adapted from previous measures by Hagborg (1994, 1998) and Goodenow (1993a, b) to assess school belonging. The scale consisted of 11-items. In

the 11 items, students were asked to rate their feelings of personal belonging, respect, and support in school on a five-point Likert scale (1 = completely false to 5 = completely true). A higher score indicated high school belonging and composite scores were calculated from mean scores across the items. Byun et al. (2011) conducted an EFA of the scale and found that the 11 items on the scale formed a single factor that accounted for 52% of the variance with item loadings between .54 and .79. Byun and colleagues also reported a Cronbach alpha coefficient of internal consistency of .90 for the total sample.

Problem behaviors. The problem behaviors validation variable consisted of two items from the teacher survey, which included questions about the frequency that students start fights and get in trouble at school. Teachers completed a 7-point Likert-type scale on the items of interest as well as on other student characteristics. The first item ranged from 1 = *never gets in trouble at school* to 7 = *always gets in trouble at school*. The second item ranged from 1 = *never gets in a fight* to 7 = a*lways gets in a fight*. I examined these items for skewness and kurtosis and found the values to be within an acceptable range (Kline, 2005). To create a problem variable, I averaged the two items. I also examined correlations between the two items. The results indicated a statistically significant correlation, $r(594) = .65$, $p < .05$. Cronbach's alpha for the problem behavior scale was .79.

Dependent variables. Students' self-reports of educational aspirations and teacher's reports of students' grades served as the dependent variables for the proposed analyses.

Postsecondary educational aspirations. I used one item adapted from the National Educational Longitudinal Study of 1988 (NELS:88) and ELS:2002 to assess students' educational aspirations. Researchers asked students to indicate how far they intended to proceed in school (1 = "less than high school" to 7 = "MD, PhD, or other advanced degree", or "don't

know"). I coded the response choice "don't know" as zero because students answered the question, but they did not have a clear educational plan. The educational aspirations item was treated as a continuous variable in analyses (0 = "don't know" to 7 = "MD, PhD, or other advanced degree"). Other published researchers (e.g., Byun et al., 2012; Irvin et al., 2011a; Irvin et al., 2011b; Meece et al., 2013) have used this approach when analyzing RHSA data.

Academic achievement. Teacher report informed academic achievement. Teachers responded to the question: Which "best describes this student's grades in school this year?" by selecting from a range (1 = *below D's* to 8 = *mostly A's*). I used teacher-reported grades as a continuous variable, which is an approach that has been used in a previously published study based on RHSA data (Irvin et al., 2011b).

Analyses

Preparation of Data for Analyses

First, I included only students who had both completed the student survey and had a teacher survey completed on their behalf in the current study in the analyses. Of the $N = 8{,}104$ students included in the RHSA study data set, 7,401 students had data from both student and teacher surveys. Second, I removed student whose teachers identified them as having disabilities other than LD, as I focused on students with LD and their nondisabled peers in this study. This step included students with emotional behavioral disorders ($n = 53$) and students with physical disabilities or other types of disabilities ($n = 440$). A total of $N = 6{,}908$ students remained in the sample after data cleaning including ($n = 6{,}469$) nondisabled students and ($n = 303$) students with LD. I used a matching procedure to balance the subsamples of students with LD and nondisabled students.

Matching. I matched nondisabled students to the LD sample first by the school that they attended and then by gender, ethnicity, and grade level. I selected the students' school as the

first matching variable because procedures for the identification for students with LD varied across state and school systems as described earlier. Therefore, matching occurred first school-by-school and then within each school. Within each school, I matched on gender, ethnicity, and grade level. Matching was based on gender and ethnicity because of the disproportionality evident in these variables within the larger population of students with LD (Coutinho & Oswald, 2004; Marder, Levine, & Wagner, 2003). Grade level was included to account for differences in students' ages and years of schooling.

Descriptive Analyses

To prepare for the cluster analysis, I calculated descriptive statistics, including means, standard deviations, skewness, and kurtosis for all dependent variables. Additionally, I examined the data for outliers and correlations between clustering variables, which can both distort cluster analysis results. I used SPSS (Version 22) for all statistical analyses in this study.

Cluster Analysis

Cluster analysis is a set of multivariate procedures used to group objects based on characteristics that are commonly held (Hair & Black, 2000). I used cluster analysis to develop profiles of motivational beliefs for the students in the sample based on academic self-concepts, school belonging, and school valuing variables. I followed Hair and Black's (2000) six-stage model-building approach for cluster analysis as depicted in Figure 3.1.

Stage 1	A.) Research Problem -Selection of analysis objectives -Selection of clustering variables
Stage 2	A.) Research Design Issues -Can outliers be detected? B.) Selection of a Similarity Measure -Distance measure or correlation measure?
Stage 3	A.) Examination of Assumptions -Is the sample of representative of the population? -Is multicollinearity substantial enough to affect results?
Stage 4	A.) Selection of a Clustering Algorithm -Hierarchical, nonhierarchical, or combination of the two methods? B.) How Many Clusters Are Formed? -Examine increases in agglomeration coefficient C.) Cluster Analysis Respecification -Were any observations deleted as outliers? -Members of small clusters?
Stage 5	A.) Interpretation of the Clusters -Examine cluster centroids -Name clusters based on clustering variables
Stage 6	A.) Validating and Profiling the Clusters -Validation with selected outcome variables -Profiling with additional descriptive variables

Figure 3.1. Summary of Hair and Black's (2000) six-stage model-building approach for cluster analysis.

There are several important decisions that a researcher must make when conducting a cluster analysis using Hair and Black's (2000) six-stage model building approach. The first decision is the selection of clustering variables. As previously mentioned, I used academic self-concept, school valuing, and school belonging to form profiles of motivational beliefs. The next consideration in the cluster analysis process is to screen for outliers in the data. This is an important step because Hair and Black have suggested that the presence of outliers in the data can distort the clustering process.

The next important decision in Hair and Black's (2000) model-building approach is to select a measure of similarity. A distance measure was selected for the cluster analysis based on the degree of intercorrelation of the clustering variables. Hair and Black suggested using the

squared Euclidean distance when there is a low degree of intercorrelation between clustering variables and the Mahalanobis distance when there is a high degree of intercorrelation between clustering variables. Correlations between variables of .90 and higher are potentially problematic for analyses (Tabachnick & Fidell, 2012), which guided my decision on a measure of similarity. The Euclidean distance represents the similarity of two observations to one another across the variables of interest. Hair and Black (2000) recommended using the Euclidean squared distance as opposed to the simple Euclidean distance as a measure of similarity because computations are quickened and it is the preferred measure when using Ward's (1963) method of clustering.

If correlations between the clustering variables exceeded .90, then I planned to use the Mahalanobis distance as a measure of similarity because highly intercorrelated variables can overweight one set of variables and distort cluster analysis results. Hair and Black (2000) suggested using the Mahalanobis distance as a measure of similarity when clustering variables are highly intercorrelated because it sums the pooled within-group variance-covariance thereby adjusting for highly intercorrelated variables. If correlations between the clustering variables did not exceed .90 then I planned to use the squared Euclidean distance.

Another important decision is the choice of an appropriate clustering algorithm (Hair & Black, 2000). I employed Ward's (1963) method, an agglomerative hierarchical clustering procedure. In an agglomerative hierarchical clustering procedure, each object starts out as its own cluster and then objects are combined with other objects or clusters at each step (Hair & Black, 2000). At the conclusion of this procedure all objects are grouped into a single cluster. Ward's (1963) method utilizes an ANOVA approach to assess the distance between clusters.

During each stage of the clustering procedure, minimization of the within-cluster sum of squares is used as a criterion for the merging of clusters.

Next, a researcher must choose the appropriate number of clusters present in the data. As no standard, objective procedure exists, Hair and Black (2000) recommended that researchers use one or more of the informal guidelines or research-developed criteria to choose the number of clusters. One such guideline is to examine the agglomeration coefficient at each clustering step and, then, determine the step where the largest within-cluster average distance occurs. Once this largest gap has been located, the number of clusters in the prior step is chosen based on the rationale that the following step in the clustering procedure caused a large reduction in similarity.

In addition to this guideline, I used practical considerations, including cell size, theoretical interpretability, and utility to aid in determining the appropriate number of clusters. An example of an agglomerative cluster solution table similar to the one that I used in my cluster number decision-making process is presented in Figure 3.2. In this example, a three-cluster solution is optimal because there is a large increase in the Overall Similarity Measure in step five while in steps two through four there were much smaller increases. This indicates that in step five, when the number of clusters was reduced to two, the clusters that were merged to form the new cluster were not as similar as the new clusters formed from previous mergers. As such, the three-cluster solution is the most parsimonious solution. The Overall Similarity Measure represents the agglomeration coefficient in this example.

	AGGLOMERATIVE PROCESS		CLUSTER SOLUTION		
Step	Minimum Distance Unclustered Observations[a]	Observation Pair	Cluster Membership	Number of Clusters	Overall Similarity Measure (Average Within-Cluster Distance)
	Initial Solution		(A)(B)(C)(D)(E)(F)(G)	7	0
1	1.414	E-F	(A)(B)(C)(D)(E-F)(G)	6	1.414
2	2.000	E-G	(A)(B)(C)(D)(E-F-G)	5	2.192
3	2.000	C-D	(A)(B)(C-D)(E-F-G)	4	2.144
4	2.000	B-C	(A)(B-C-D)(E-F-G)	3	2.234
5	2.236	B-E	(A)(B-C-D-E-F-G)	2	2.896
6	3.162	A-B	(A-B-C-D-E-F-G)	1	3.420

Figure 3.2. Agglomerative Cluster Solution Table. Adapted from Hair, J. F., Jr., & Black, W. C. (2000). Cluster analysis. In L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding more multivariate statistics* (pp. 147-205). Washington, DC: American Psychological Association.

In the final stages of Hair and Black's (2000) approach, the newly formed clusters are interpreted based on their characteristics. Hair and Black recommended investigating each cluster's centroid to help with appropriate interpretation and cluster labeling. Comparing each cluster's centroid to the other clusters' centroids gives a picture of where each cluster stands in relation to the other clusters on each variable. For instance, a hypothetical Cluster 1 might have higher scores on academic self-concept, school valuing, and school belonging when compared to Cluster 2. In this simplified example, Cluster 1 might be labeled high motivational beliefs and Cluster 2 labeled low motivational beliefs. I also looked at other descriptive statistics, including gender, ethnicity, LD status, and grade level, for each cluster.

Additionally, I validated the cluster solution to ensure its practical significance. Hair and Black (2000) suggested that one way researchers can attempt to validate the results of a cluster analysis is to establish some form of predictive or criterion validity. Hair and Black also suggested that a variable not used in the formation of the clusters, but known to vary across the

clusters, be used to test for predictive or criterion validity. I assessed the validity of my cluster solution by testing for differences across motivational belief clusters on a validation variable related to student problem behaviors in the school. This variable was constructed from two items of the teacher survey as previously described (see p. 39). Predictive and criterion validity can be established using this variable as problem behaviors are known to be negatively correlated with positive achievement motivational beliefs (Kaplan & Maehr, 1999).

Irvin et al. (2011a) followed similar steps in a previous cluster analysis using the full sample of the RHSA study to identify unique student patterns of motivational beliefs based students' self-reports of academic self-concept, school valuing, and school belonging. Irvin and colleagues' cluster analysis resulted in a six-profile solution. The clusters that Irvin and colleagues (2011a) derived were:

1. Low on all: well below average academic self-concept, future school value, present school value, and school belonging.
2. Low school value: above average academic self-concept, below average future school value, well below average present school value, average school belonging.
3. Low academic self-concept and belonging: below average academic self-concept, average future school value, above average present school value, and well below average school belonging.
4. High belonging: well below average scores on academic self-concept, average future and present school value, above average school belonging.
5. High school value: average scores on academic self-concept, well above average future and present school value, and average school belonging.

6. High on all: well above average scores on academic self-concept, future and present school value, and school belonging.

The present study's cluster analysis diverged from Irvin et al. (2011a) in several important ways. First, I matched the disabled sample with a nondisabled sample to equate the two samples on size, school location, gender, ethnicity, and grade level. Irvin and colleagues used the total RHSA sample, comparing 428 students with LD with a much larger group of nondisabled students (n = 6171). Using a matched sample in the current study's cluster analysis is likely to lead to a different cluster solution when compared to Irvin and colleagues' cluster results. Second, I examined the clustering variables for multicollinearity. This step was not included in the Irvin et al. (2011a) study. As described above, multicollinearity can distort cluster solutions. I selected a distance measure based on the multicollinearity of the clustering variables. Irvin et al. (2011a) used squared Euclidean distances as a measure of similarity in their study. Last, I used a measure of problem behavior to validate the cluster solution. The Irvin et al. (2011a) study did not include a validation procedure.

Analysis of Variance

Once I determined a cluster solution based on patterns of students' self-reported motivational beliefs including academic self-concept, school valuing, and school belonging, I used two-way ANOVA procedures to analyze the relations between my independent variables, LD status and motivational beliefs, and my dependent variables, academic achievement and educational aspirations. I used ANOVA procedures to build on Irvin et al.'s (2011a) analysis, which consisted of contingency table analysis using the chi-square statistic. The use of two-way ANOVAs allowed me to compare the means of multiple groups in addition to the identification of any interaction effects between variables. These analytic procedures are in contrast to

contingency table analysis used in the Irvin et al. study, which simply allowed for the comparison of observed frequencies to expected frequencies between two variables.

I conducted two separate two-way ANOVA analyses, one with academic achievement as the outcome variable and another with postsecondary aspirations as the outcome variable. First, I examined assumptions for ANOVA analyses to ensure that they were met, including independence of observations, normal distribution and homogeneity of variance, and lack of statistical outliers for dependent variables. Next, I investigated interaction effects between independent variables reflected in the dependent variables within both ANOVA procedures. If interaction effects were found, this meant that the effect of LD status on academic achievement or educational aspirations depended on motivational belief cluster. Subsequently, I used *t*-test procedures as simple main effects to examine mean differences between the two groups (LD vs. non-LD) by cluster groups. If no interaction effects were found in the ANOVA analyses, then no *t*-tests were completed to investigate simple main effects. Due to the likelihood of multiple comparisons, the alpha level across all tests will exceed alpha for any one test necessitating an adjustment to the alpha levels for each test (Tabachnik & Fidell, 2012). I used the Bonferroni correction as a way to adjust for multiple comparisons and control the Type 1 error rate. For example, if there were three *t*-tests, there would be an approximately 15% chance of committing a Type 1 error across four tests [3(.05)]. Using the Bonferroni correction, alpha for each test is adjusted by dividing alpha for each test by the number of comparisons. Under the scenario of 3 *t*-tests, alpha for each test becomes .0166 [.05/3].

Simple main effects *t*-test results would help to answer the research question of whether positive motivational beliefs of rural students with LD help to promote positive academic and educational outcomes. Consider a hypothetical scenario in which Cluster 1 represents high

levels of motivational beliefs and Cluster 2 represents low levels of motivational beliefs as depicted in Figure 3.3. In this scenario, I would use *t*-tests to test for statistically significant academic achievement mean differences between the disability status groups within each motivational belief cluster. If I find no statistically significant academic achievement mean difference for Cluster 1 (high motivational beliefs) but did find one for Cluster 2 (low motivational beliefs), I could conclude that positive motivational beliefs did indeed serve as a promotive or buffer factor to offset the academic risks (low achievement and low educational aspirations) associated with LD. I could make this conclusion because students with LD performed similarly to their nondisabled peers with regard to academic achievement when they were in the high motivational belief cluster while their performance dropped dramatically and was statistically significantly lower than their nondisabled peers when they were in the low motivational belief cluster.

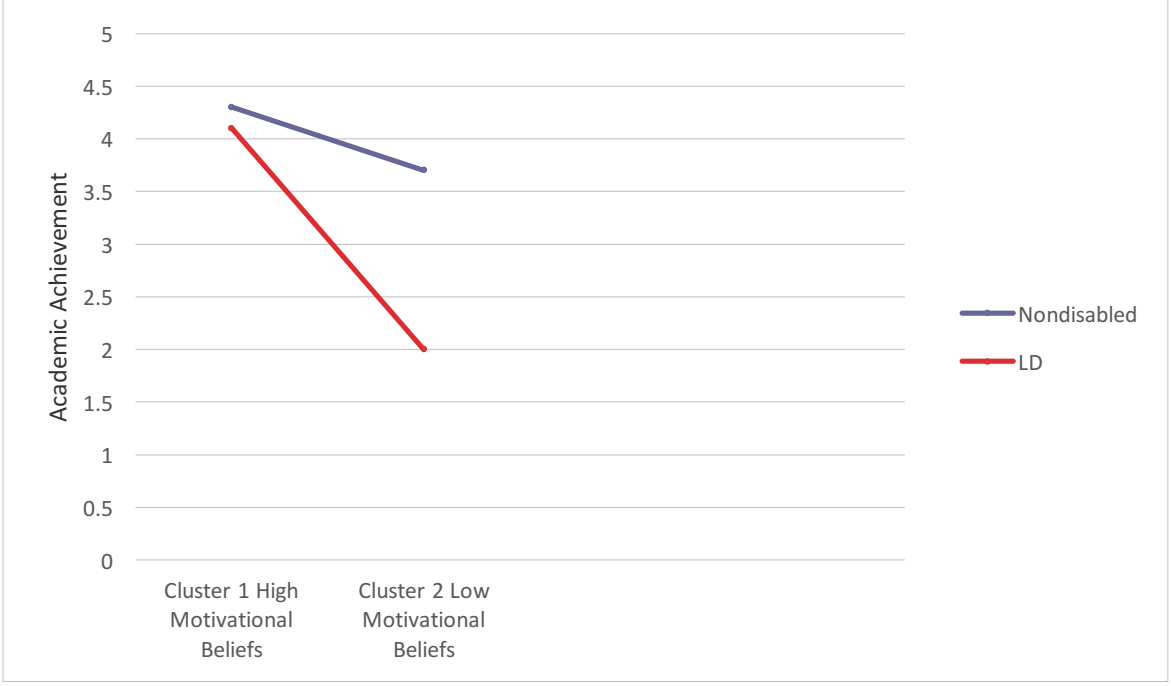

Figure 3.3. Interaction Effect Hypothetical Scenario

Research Hypotheses

Hypothesis 1. I hypothesized that distinct profiles of motivational beliefs would be identified within the sample using cluster analysis.

Hypothesis 2.1. I hypothesized that motivational belief profiles would moderate the relation between LD status and educational aspirations.

Hypothesis 2.2. I hypothesized that positive motivational beliefs would help to diminish risks associated with having a LD for students in regard to their educational aspirations.

Hypothesis 3.1. I hypothesized that motivational belief profiles would moderate the relation between LD status and academic achievement.

Hypothesis 3.2. I hypothesized that positive motivational beliefs would help to diminish risks associated with having a LD for students in regard to their academic achievement.

CHAPTER FOUR
RESULTS

In this study, I examined the role of motivational beliefs regarding the relation between LD status and educational outcomes, including academic achievement and educational aspirations. In this chapter, I present the results. First, I detail data-preparation results, including the development of a matched subsample for nondisabled students based on criteria from an existing sample of students with LD, creation of a validation variable for the cluster analysis, and the presentation of descriptive statistics for dependent and clustering variables. Second, I present results of the cluster analysis. Third, I share analysis of variance results. Finally, I provide a summary of results.

Data Preparation

Creation of matched subsample. I created a matched subsample (n = 303) of nondisabled students based on characteristics from a subsample of (n = 303) students with LD. I used the following characteristics to create the matched subsample: school attended, gender, ethnicity, and grade level. In Table 4.1, I present a breakdown of the characteristics of the LD subsample, including the number of students represented by ethnicity and by gender in each grade level. I used the information in Table 4.1 as a guide to draw a random subsample (n = 303) of nondisabled students from a subsample (n = 6,469) of nondisabled students. I double-checked the newly created subsample of nondisabled students (n = 303) to ensure that it matched the proportions of the characteristics of the subsample of students with LD (n = 303) (see Table 4.2). I used the combined two matched subsamples (n = 606) as the sample for all analyses.

Table 4.1

Gender, Ethnicity, and Grade Level of Students with LD Subsample

	9th grade		10th grade		11th grade		12th grade		Totals
Ethnicity	Females	Males	Females	Males	Females	Males	Females	Males	
Black	1(3)	6(10)	2(5)	2(4)	4(15)	1(3)	2(6)	0(0)	18
Hispanic	1(3)	7(11)	2(5)	7(15)	1(4)	4(13)	3(9)	4(14)	29
Other and multiracial	12(30)	11(18)	8(22)	10(22)	2(8)	2(7)	5(15)	2(7)	52
White	25(64)	38(61)	25(68)	27(59)	19(73)	24(77)	23(70)	23(79)	204
Totals	39	62	37	46	26	31	33	29	303

Note. Numbers in parentheses represent percentages across ethnicity categories.

Table 4.2

Gender, Ethnicity, and Grade Level of Nondisabled Students Subsample

	9th grade		10th grade		11th grade		12th grade		Totals
Ethnicity	Females	Males	Females	Males	Females	Males	Females	Males	
Black	1(3)	6(10)	2(5)	2(4)	4(15)	1(3)	2(6)	0(0)	18
Hispanic	1(3)	7(11)	2(5)	7(15)	1(4)	4(13)	3(9)	4(14)	29
Other and multiracial	12(30)	11(18)	8(22)	10(22)	2(8)	2(7)	5(15)	2(7)	52
White	25(64)	38(61)	25(68)	27(59)	19(73)	24(77)	23(70)	23(79)	204
Totals	39	62	37	46	26	31	33	29	303

Note. Numbers in parentheses represent percentages across ethnicity categories.

Descriptive Analyses

I calculated descriptive statistics, including means, range, standard deviations, skewness, and kurtosis for the dependent variables, educational aspirations and academic achievement. I also calculated descriptive statistics for all clustering variables, which included academic self-concept, school valuing, and school belonging, and for the validation variable, problem behaviors.

Dependent variables. In Table 4.3, I report descriptive statistics on dependent variables for the full sample and for the students with LD and nondisabled subsamples in Tables 4.4 and 4.5, respectively. Skewness and kurtosis absolute values were within acceptable ranges for both dependent variables in the full sample as well as for both the students with LD and nondisabled subsamples; skewness absolute values were less than 2, and kurtosis values were less than 7 (Kline, 2005). I also conducted an analysis of outliers, and identified no statistically significant outliers for either educational aspirations or academic achievement.

Table 4.3
Descriptive Statistics for Full Sample

	n	Mean (*SE*)	Standard deviation	Skewness (*SE*)	Kurtosis (*SE*)	Range	95% Confidence	
							Lower bound	Upper bound
Educational aspirations[a]	597	5.10 (.07)	1.71	-.08 (.10)	-.61 (.20)	7	4.96	5.24
Academic achievement[b]	592	5.20 (.08)	1.83	.16 (.10)	-.76 (.20)	7	5.05	5.35

[a] Students rated their aspirations on a scale of 0 (Don't Know) to 7 (M.D., to Ph.D. or Other Advanced Degree. [b] Teachers rated students' level of school achievement from 1 (Below D's to 8 (Mostly A's)

Table 4.4
Descriptive Statistics for Students with LD Subsample

	n	Mean (*SE*)	Standard deviation	Skewness (*SE*)	Kurtosis (*SE*)	Range	95% Confidence	
							Lower bound	Upper bound
Educational aspirations	297	4.97 (.11)	1.92	.08 (.14)	-.92 (.28)	7	4.74	5.18
Academic achievement	297	4.53 (.09)	1.61	.04 (.14)	-.50 (.28)	7	4.37	4.74

Table 4.5
Descriptive Statistics for Nondisabled Subsample

	n	Mean (*SE*)	Standard Deviation	Skewness (*SE*)	Kurtosis (*SE*)	Range	95% Confidence	
							Lower bound	Upper bound
Educational aspirations	300	5.23 (.09)	1.47	-.25 (.14)	-.16 (.28)	6	5.07	5.41
Academic achievement	295	5.84 (.11)	1.81	-.54 (.14)	-.52 (.28)	7	5.62	6.04

Clustering variables and validation variable. I report descriptive statistics for the clustering variables and validation variable in Table 4.6. Skewness and kurtosis values were within an acceptable range (Kline, 2005). I used boxplots to analyze univariate outliers for the clustering variables and validation variable. I found several outlier cases for each of the clustering variables; however, these cases did not overlap across the three clustering variables. As such, I evaluated all cases in the sample acceptable for use in the analysis.

Table 4.6
Descriptive Statistics for Clustering Variables[a]

	N	Mean	Standard deviation	Skewness (*SE*)	Kurtosis (*SE*)	Range	95% Confidence	
							Lower bound	Upper bound
Academic self-concept	606	4.66	1.18	-.42 (.10)	.21 (.20)	6	4.56	4.75
School valuing	606	4.22	1.15	-.40 (.10)	-.20 (.20)	4	4.12	4.30
School belonging	606	3.37	.87	-.26 (.10)	-.35 (.20)	3	3.30	3.44
Problem behavior	594	2.43	1.53	.94 (.10)	-.05 (.20)	6	2.30	2.55

[a] Variables in this table represent mean scale scores. Higher ratings indicate stronger motivation beliefs or higher frequency of problem behaviors.

Clustering variables correlation. I conducted a correlational analysis to determine the relations among the clustering variables. Table 4.7 presents the correlation matrix for the clustering variables. Although there was overlap between the clustering variables, all of the

correlations between clustering variables were well below .90. Thus, results indicated no strong evidence for multicollinearity among the clustering variables (Tabachnick & Fidell, 2012).

Table 4.7
Clustering Variables Correlations

	Academic concept	School valuing	School belonging
Academic concept	1		
School valuing	.36	1	
School belonging	.40	.48	1

Cluster Analysis

I hypothesized that distinct profiles of motivational beliefs would be identified in the sample. I conducted a cluster analysis following Hair and Black's (2000) six-stage model-building approach to test this hypothesis. A summary of the results is provided below. First, I provide results related to the cluster solution and proposed an appropriate cluster solution. Second, I share descriptive statistics for the proposed cluster solution. Finally, I report results of the cluster validation procedures.

Cluster solution results. Following Hair and Black's (2000) model-building approach, I first selected the variables to be included in the cluster analysis. I included academic self-concept, school valuing, and school belonging in the cluster analysis based on research by Irvin and colleagues (2011a) who documented variations in motivation profiles using these variables. Next, I completed a univariate boxplot outlier analysis, which revealed several outliers for each clustering variable. Because these cases were not the same across the three clustering variables, I deemed these cases acceptable to use in the cluster analysis. After completing the outlier analysis, I chose the squared Euclidean distance as a measure of similarity because there was no evidence of extreme multicollinearity amongst the clustering variables.

Next, I chose Ward's (1963) method as an agglomerative hierarchical clustering algorithm and calculated an agglomeration schedule, which I present in Table 4.8. The

agglomeration coefficient indicates the distance between the two clusters or cases joined during a stage. The larger the agglomeration coefficient, the more heterogeneous the clusters or cases being combined during the current stage. The appropriate number of clusters in a cluster analysis can be determined in part by examining the agglomeration schedule and the change between the coefficients during each stage. A large change or gap in the coefficients indicates that the clusters are becoming too dissimilar to combine and yields information regarding the appropriate number of clusters (Yim & Ramdeen, 2015).

Table 4.8
Agglomeration Schedule

Step	No. of clusters	Agglomeration coefficient
596	10	544.10
597	9	578.29
598	8	627.54
599	7	678.33
600	6	736.74
601	5	823.76
602	4	945.74
603	3	1,099.35
604	2	1,357.91
605	1	2,100.22

Information from the agglomeration schedule is presented in Table 4.8. A three-cluster solution appeared optimal because there was a large increase in the agglomeration coefficient in step 604 compared to the smaller increases in prior steps. This indicated that in step 604 when the number of clusters was reduced to two, the clusters that were merged to form the new cluster were not as similar as the new clusters formed from previous mergers. As such, the three-cluster solution was the most parsimonious solution. The agglomeration scree plot presented in Figure 4.1 also supported the three-cluster solution. The results indicated a distinct elbow in the coefficient and change plots at the three-cluster mark. The plots smooth out when there are greater than three clusters which indicated that the distance between the clusters or cases is lower

and that they can be combined. Again, when the agglomeration coefficients are highest, this indicated that the clusters are more heterogeneous and likely should not be combined. Based on the results from the agglomeration schedule and scree plot, I concluded a three-cluster solution was most appropriate.

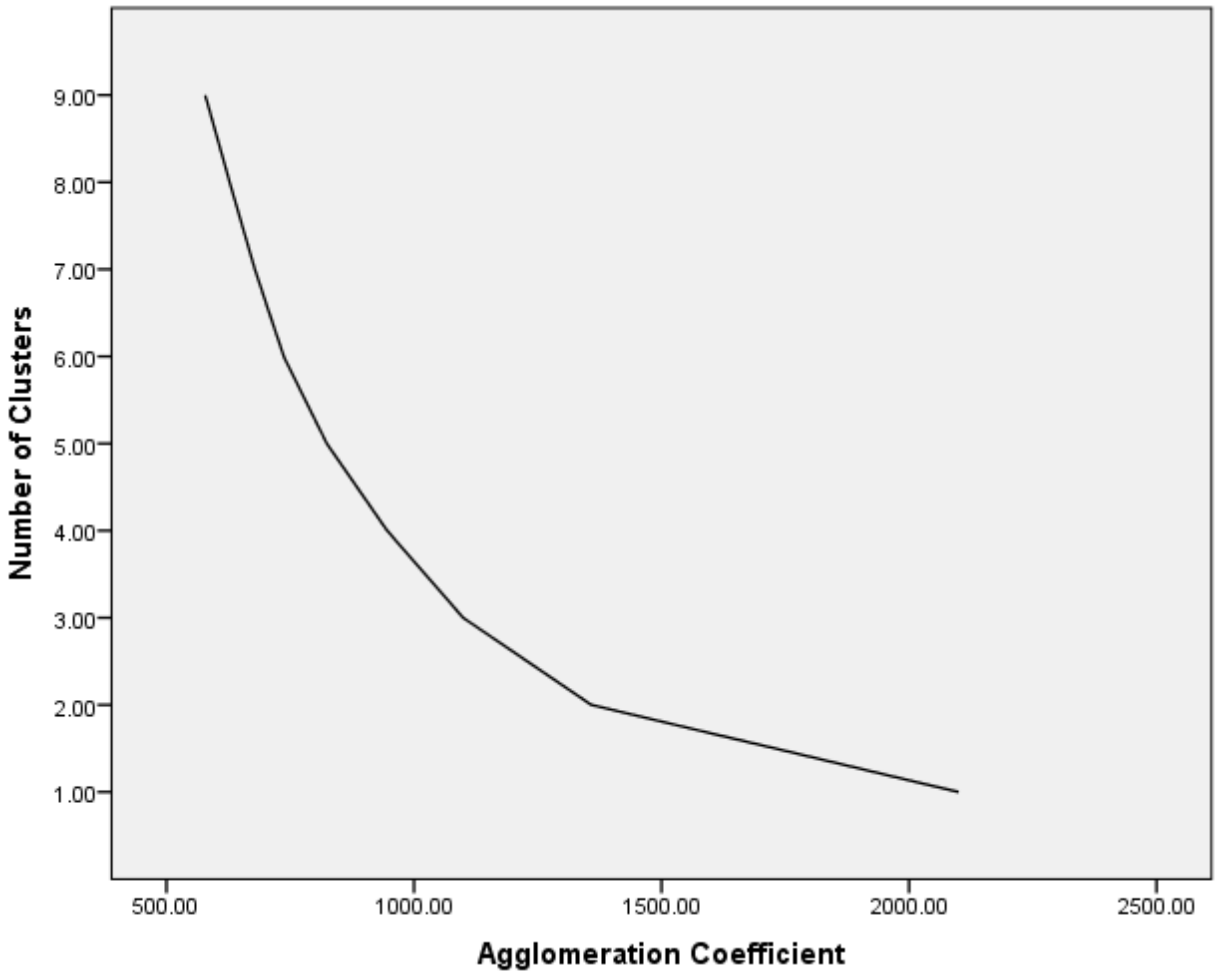

Figure 4.1. Agglomeration coefficient scree plot.

Cluster descriptive statistics. The clusters varied in sample sizes and number of students with LD. In Table 4.9, I included means for each of the clustering variables within each cluster, and in Figure 4.2, I plotted these means across clusters. Cluster 1 included (n = 303) students, Cluster 2 included (n = 202) students, and Cluster 3 included (n = 101) students. Additionally, I examined expected counts for each cluster in the areas of LD status and display

these counts in Table 4.10. There was a statistically significant overall chi-square result for the disability status expected counts presented in Table 4.10, χ^2 (2, N = 606) = 16.90, $p < .05$.

Table 4.9
Clustering Variable Means by Cluster

	Cluster 1	Cluster 2	Cluster 3
n	303	202	101
Mean (*SD*)			
Academic self-concept	5.26 (.85)	3.48 (.85)	5.24 (.74)
School valuing	5.00 (.70)	3.69 (.97)	2.93 (.76)
School belonging	3.88 (.70)	2.72 (.69)	3.14 (.66)

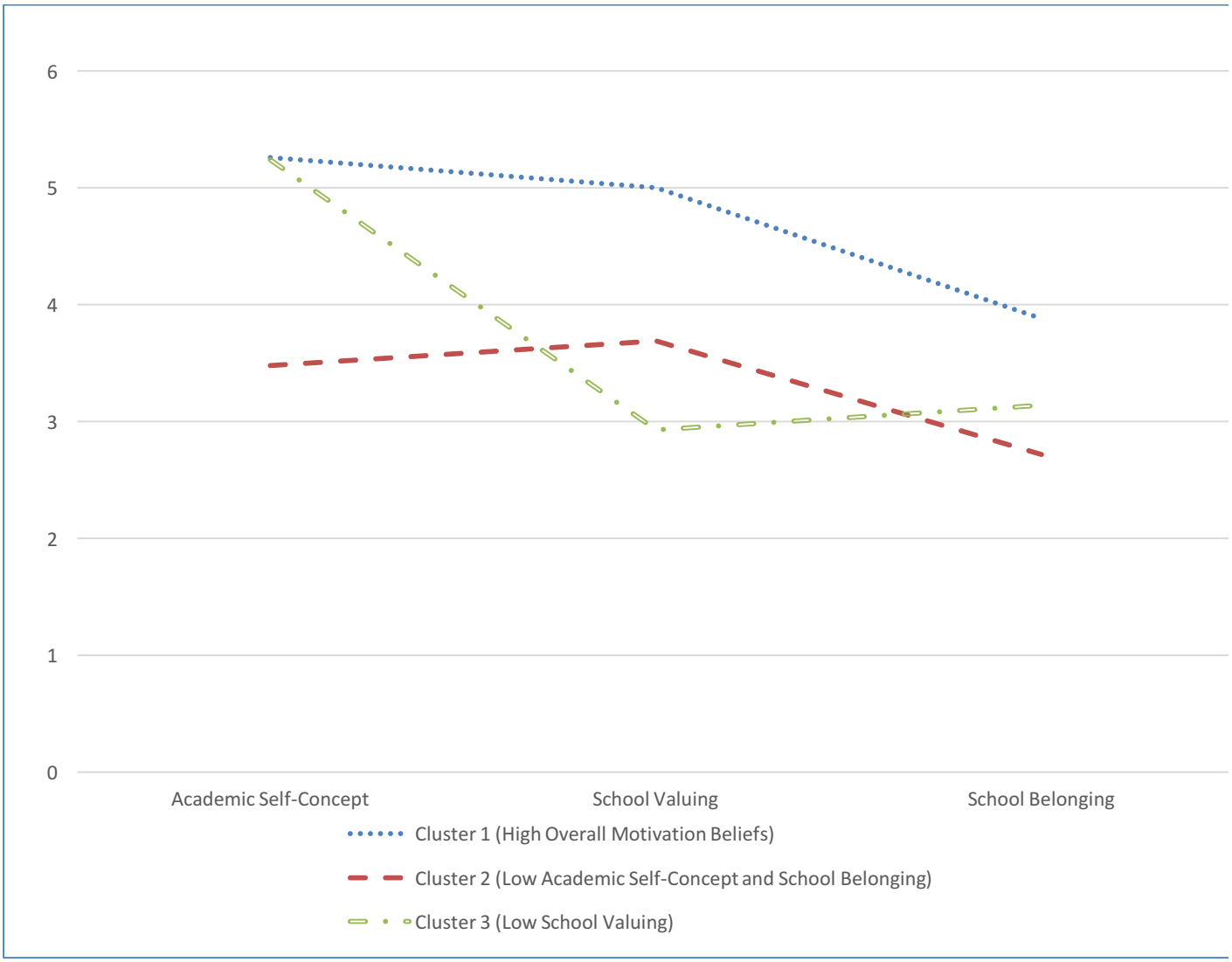

Figure 4.2 Motivational belief means by cluster plot.

Table 4.10

Expected Counts in Clusters for Disability Status

Cluster		No disability	LD	Total
1	Observed	164	139	303
	Expected	151.5	151.5	303
2	Observed	78	124	202
	Expected	101	101	202
3	Observed	61	40	101
	Expected	50.5	50.5	101
Total	Observed	303	303	606
	Expected	303	303	606

Cluster solution validation. The final step of Hair and Black's (2000) approach to cluster analysis involves validating and profiling the identified clusters. To this end, I used a one-way ANOVA procedure by clustering the outcome variables of academic self-concept, school valuing, and school belonging to examine whether the clusters in the proposed three-cluster solution are distinct. I used an ANOVA procedure with the validation variable *problem behaviors* to further validate the proposed cluster solution with an additional but related descriptive variable.

Clustering variables analysis of variance. To begin the validation of the cluster solution, I conducted an ANOVA procedure to examine the differences between cluster means on academic self-concept, school valuing, and school belonging (see Table 4.9). Prior to conducting the analysis of variance, I completed Levene's test for homogeneity of variances on the academic self-concept, school valuing, and school belonging variables. I found a statistically significant Levene's test result for school valuing, $F(2, 603) = 7.036$, $p = .001$. However, I used the F_{max} test to inspect further the level of heteroscedasticity and found it to be acceptable for ANOVA analysis. Tabachnick and Fidell (2012) offered specific parameters for what is an acceptable level of heteroscedasticity within ANOVA procedures. Tabachnick and Fidell suggested an F_{max} ratio, which is the ratio of the largest cell variance to the smallest, of no more

than 10 when sample sizes are relatively equal, within a ratio of 4 or less for the largest to smallest cell size. The cell sizes for the clustering variables one-way ANOVA fit within the suggested 4-to-1 ratio (Tabachnick & Fidell, 2012). Additionally, I converted the various cells' standard deviations to variances and used them to calculate an F_{max} ratio of 2.16. This F_{max} ratio is well under Tabachnick and Fidell's guideline of being under 10. Together, the cell size ratio and the calculated F_{max} suggested that heteroscedasticity does not unduly bias results of the clustering variables one-way ANOVA.

Descriptive statistics for the one-way ANOVA are provided in Table 4.11. There were cluster differences for academic self-concept $F(2, 603) = 304.59$, $p < .001$, $\eta_p^2 = .503$; school valuing, $F(2, 603) = 311.53$, $p < .001$, $\eta_p^2 = .508$; and school belonging $F(2, 603) = 179.01$, $p < .001$, $\eta_p^2 = .373$ as depicted in Table 4.12. Partial eta squared values above .14 are considered to be large effect sizes (Cohen, 1988).

Table 4.11

Clustering Variables - One-Way ANOVA Descriptive Statistics

		n	Mean	Standard deviation(*SE*)	Range	95% Confidence	
						Lower bound	Upper bound
Academic self-concept	Cluster 1	303	5.26	.85 (.05)	4.80	5.16	5.36
	Cluster 2	202	3.48	.85 (.06)	3.80	3.36	3.60
	Cluster 3	101	5.24	.74 (.07)	3.20	5.09	5.38
	Total	606	4.66	1.18 (.05)	6.00	4.57	4.76
School valuing	Cluster 1	303	5.00	.70 (.04)	2.50	4.92	5.08
	Cluster 2	202	3.69	.97 (.07)	5.00	3.56	3.83
	Cluster 3	101	2.93	.76 (.08)	3.00	2.78	3.08
	Total	606	4.22	1.15 (.05)	5.00	4.13	4.31
School belonging	Cluster 1	303	3.88	.70 (.04)	3.65	3.80	3.96
	Cluster 2	202	2.72	.69 (.05)	3.27	2.62	2.81
	Cluster 3	101	3.14	.66 (.07)	3.82	3.00	3.27
	Total	606	3.37	.87 (.04)	4.00	3.30	3.44

Note. Cluster 1 = high overall motivational beliefs); Cluster = low academic self-concept and school belonging; and Cluster 3 = low school valuing.

Table 4.12
ANOVA – Clustering Variables

		Sum of squares	*df*	Mean square	*F*	*p*	Partial eta squared
Academic self-concept	Between groups	424.21	2	212.10	304.59	<.001	.503
	Within groups	419.91	603	.70			
	Total	844.12	605				
School valuing	Between groups	407.29	2	203.65	311.53	<.001	.508
	Within groups	394.17	603	.65			
	Total	801.47	605				
School belonging	Between groups	169.37	2	84.69	179.01	<.001	.373
	Within groups	285.26	603	.47			
	Total	454.63	605				

Results from Tukey's HSD tests, at the .05 level of significance, indicated that students in Cluster 1 had a statistically significantly higher academic self-concept than students in Cluster 2. Cohen's *d* for this difference was 2.09, a Cohen's *d* value over .80 is considered a large effect size (Cohen, 1988).[2] Students in Cluster 1 did not differ statistically significantly from students in cluster 3. Students in Cluster 3 had a statistically significantly higher academic self-concept than students in Cluster 2. Cohen's *d* for this difference was 2.21 suggesting a large effect size (Cohen, 1988). Students in Cluster 1 had statistically significantly higher school valuing than students in Clusters 2 and 3, with respective Cohen's *d* values of 1.55 and 2.83 suggesting large effect sizes. Students in Cluster 2 had statistically significantly higher school valuing than students in Cluster 3, with a Cohen's *d* value of .87, suggesting a large effect size. Students in

[2] I also calculated Glass's delta as an additional effect size for all Tukey's HSD tests in the study because it is robust to heterogeneity of variance (Glass, McGraw, & Smith, 1981; Vacha-Haase & Thompson, 2004). The Glass's delta values that I calculated for the Tukey's HSD tests in this study were all very similar to the Cohen's *d* values and led to similar descriptions of effect sizes (small, moderate, and large). See Appendix B for a comparison of Cohen's *d* and Glass's delta values for all Tukey's HSD tests in the study.

Cluster 1 had statistically significantly higher school belonging than students in Clusters 2 and Cluster 3, with respective Cohen's *d* values of 1.67 and 1.09, suggesting large effect sizes. Students in Cluster 3 had statistically significantly higher school belonging than students in Cluster 2. The Cohen's *d* value for this difference was 0.62, suggesting a moderate effect size (Cohen, 1988). The overall differences in the motivation beliefs between clusters, except academic self-concept in Clusters 1 and 3, indicated that (a) the three clusters reflected distinct motivation profiles (see Figure 4.2) and (b) the three-cluster solution was appropriate.

Naming of clusters. Given the results of the ANOVA and the results of Tukey's post hoc analyses indicating the distinctiveness of each cluster, I named the clusters according to their relative standing by clustering variable means. I give brief textual descriptors of the clusters in Figure 4.3.

Cluster 1	High overall motivational beliefs
Cluster 2	Low academic self-concept and school belonging
Cluster 3	Low school valuing

Figure 4.3. Cluster descriptions.

Validation variable analysis of variance. Finally, I validated the proposed cluster solution using a variable known to vary across the clusters (Hair & Black, 2000). I used problem behaviors as a validation variable because Kaplan and Maehr (1999) suggested that problem behaviors are negatively correlated with positive achievement motivational beliefs. As such, the cluster solution would have been validated if a statistically significant difference was present between clusters on the problem behavior scale, with Cluster 1 (high overall motivational beliefs) participants reporting lower scores on the problem behavior scale than Cluster 2 (low academic self-concept and school belonging) students and Cluster 3 (low school valuing) students.

I conducted an ANOVA procedure to examine if differences existed between clusters on the problem behavior scale. Prior to conducting the analysis of variance, I performed Levene's test for homogeneity of variances. Levene's test for homogeneity of variances was statistically significant for this ANOVA, $F(2, 591) = 6.472$, $p < .05$. However, I used the F_{max} test to inspect further the level of heteroscedasticity and found it to be acceptable for ANOVA analysis. The cell sizes for the validation variable one-way ANOVA fit within the suggested 4-1 ratio (Tabachnik & Fidell, 2012). I calculated an F_{max} ratio of 1.44 using the largest and smallest cells' variances. This F_{max} ratio is well under Tabachnick and Fidell's (2012) guideline of being under 10 and suggests that heteroscedasticity does not unduly bias results of the validation variable one-way ANOVA.

In Table 4.13, I present descriptive statistics for the ANOVA. Results indicated a statistically significant difference between clusters on the problem behavior scale, $F(2, 593) = 10.37$, $p < .05$, $\eta_p^2 = .034$ (see Table 4.14). A partial eta squared value below .04 is considered to be a small effect size (Cohen, 1988). Results from Tukey's HSD tests, at the .05 level of statistical significance, indicated that students in Cluster 1 had statistically significantly lower scores on the problem behavior scale than students in Cluster 2. The Cohen's *d* value for this difference was -.40, suggesting a small effect size (Cohen, 1988).[3] Students in Cluster 1 also had statistically significantly lower scores on the problem behavior scale than students in Cluster 3. The Cohen's *d* value for this difference was -.33, suggesting a small effect size (Cohen, 1988). Problem behavior scale scores for students in Cluster 2 and Cluster 3 did not differ in a statistically significant way. In short, students in Cluster 1 (high overall motivational beliefs)

[3] I also calculated Glass's delta as an additional effect size for all Tukey's HSD tests in the study. See Appendix B for a comparison of Cohen's *d* and Glass's delta values for all Tukey's HSD tests in the study.

had lower teacher-reported problem behavior scores than students in Clusters 2 (low academic self-concept and school belonging) and Cluster 3 (low school valuing). These results indicated that the clusters function as would be expected with regard to problem behaviors and offered further evidence of the appropriateness and validity of the three-cluster solution.

Table 4.13
Problem Behavior Scale by Cluster - One-Way ANOVA Descriptive Statistics

	n	Mean	Standard deviation(*SE*)	Range	95% Confidence	
					Lower bound	Upper bound
Cluster 1	299	2.15	1.37 (.08)	5.5	2.00	2.31
Cluster 2	196	2.75	1.64 (.12)	6	2.52	2.98
Cluster 3	99	2.63	1.62 (.16)	6	2.31	2.95
Total	594	2.43	1.50 (.06)	6	2.31	2.55

Note. Cluster 1 = high overall motivational beliefs); Cluster = low academic self-concept and school belonging; and Cluster 3 = low school valuing.

Table 4.14
ANOVA – Problem Behavior Scale by Cluster

	Sum of squares	*df*	Mean square	*F*	*p*	Partial eta squared
Between groups	46.89	2	23.44	10.37	<.001	.034
Within groups	1335.47	591	2.260			
Total	1382.35	593				

In summary, the results of the cluster analysis supported the first hypothesis of the study. The analyses revealed distinct profiles of motivational beliefs present within the sample.

Analysis of Variance

I conducted two separate two-way ANOVA to investigate the relations between LD status, motivational belief profiles, and educational outcomes. One two-way analysis of variance procedure included the dependent variable of educational aspirations; the second analysis of variance included the dependent variable of academic achievement.

Educational aspirations analysis of variance. I conducted a two-way analysis of variance to test for between-group differences amongst LD status and motivational profile groups on educational aspirations. I hypothesized (2.1) that the relation between LD status and level of education aspirations would depend on student cluster membership (motivation profile). Prior to conducting the two-way ANOVA, I performed Levene's test for homogeneity of variances because ensuring equality of variances is an important assumption of ANOVA procedures. Levene's test for homogeneity of variances was statistically significant for this two-way ANOVA, F (5, 591) = 10.361, $p < .05$. I used the F_{max} test to inspect further the level of heteroscedasticity, however, and found it to be acceptable for ANOVA analysis. The cell sizes for the educational aspirations two-way ANOVA fit within the 4:1 ratio Tabachnik and Fidell (2012) suggested. I calculated an F_{max} ratio of 2.76 using the largest and smallest cells' variances. This F_{max} ratio is well under Tabachnick and Fidell's guideline of being under 10 and suggests that heteroscedasticity does not unduly bias results of the two-way educational aspirations ANOVA. I present descriptive statistics for the educational aspirations two-way ANOVA in Table 4.15 and ANOVA results in Table 4.16.

Table 4.15
Two-way ANOVA – Educational Aspirations Descriptive Statistics

		Cluster 1	Cluster 2	Cluster 3	LD status group means
No disability	n_{ij}	161	78	61	
	Mean	5.47	4.88	5.03	5.23
	SD	1.18	1.82	1.57	1.47
LD	n_{ij}	138	120	39	
	Mean	5.33	4.62	4.74	4.97
	SD	1.43	1.96	1.82	1.71
Cluster Means		5.40	4.73	4.92	5.10

Table 4.16
Two-Way ANOVA for Educational Aspirations

Source	Type III sum of squares	*df*	Mean square	*F*	*p*	Partial eta squared
Disability status	6.06	1	6.06	2.12	.146	.004
Three clusters	53.46	2	26.73	9.37	<.001	.031
Disability status*three clusters	.70	2	.35	.12	.885	.000
Error	1686.19	591	2.85			
Total	17272.00	597				

Note. R^2 = .037 (Adjusted R^2 = .029)

Contrary to hypothesis 2.1, the interaction between disability status and motivational belief cluster for educational aspirations was not statistically significant, $F(2, 597) = .12$, $p = .89$, $\eta_p^2 = .000$. I did not complete *t*-tests for simple main effects because there was not a statistically significant interaction effect. Examining main effects, disability-status group differences (NLD vs. LD) in self-reported educational aspirations, was not statistically significant, $F(1, 597) = 2.12$, $p = .15$, $\eta_p^2 = .004$. A partial eta squared value of .004 is considered to be a small effect size (Cohen, 1988). By contrast, the main effect for educational aspirations by motivation cluster was statistically significant, $F(2, 597), = 9.37$, $p < .001$, $\eta_p^2 = .031$. A partial eta squared value of .031 is considered to be a small effect size (Cohen, 1988).

Results of Tukey's HSD tests, at the .05 significance level, indicated that students in Cluster 1, those with high overall motivational beliefs, had statistically significantly higher educational aspirations than students in Cluster 2, who had a low academic self-concept and school belonging, and students in Cluster 3, who had low school valuing. The Cohen's *d* values for these two differences were respectively, 0.39 and -.10, suggesting small effect sizes (Cohen,

1988).[4] Educational aspirations for students in Cluster 2 and Cluster 3 did not statistically significantly differ ($p < .0167$).

Academic achievement analysis of variance. I conducted a separate two-way analysis of variance to determine the relation between disability status, motivational beliefs by cluster, and academic achievement. I hypothesized (3.1) that the relation between LD status and level of academic achievement would depend on students' cluster membership (motivation profile). As before, due to the two-way ANOVA design, it is important to examine equality of variance across groups (e.g., disability status by motivation profile cluster). The Levene's test for homogeneity of variance for this two-way ANOVA was statistically nonsignificant, F (5, 586) = 2.200, p = .053. I present descriptive statistics for the academic achievement two-way ANOVA in Table 4.17 and ANOVA results in Table 4.18.

Table 4.17
Two-way ANOVA- Academic Achievement Descriptive Statistics

		Cluster 1	Cluster 2	Cluster 3	LD status group means
No disability	*n*	160	74	61	
	Mean	6.31	4.97	5.64	5.84
	SD	1.57	1.81	1.98	1.81
LD	*n*	136	121	40	
	Mean	4.71	4.27	4.68	4.53
	SD	1.53	1.63	1.76	1.61
Cluster means		5.58	4.54	5.26	5.18

[4] I also calculated Glass's delta as an additional effect size for all Tukey's HSD tests in the study. See Appendix B for a comparison of Cohen's *d* and Glass's delta values for all Tukey's HSD tests in the study.

Table 4.18
Two-Way ANOVA for Academic Achievement

Source	Type III sum of squares	*df*	Mean square	*F*	*p*	Partial eta squared
Disability status	50.27	1	50.27	21.55	<.001	.036
Three clusters	138.02	2	69.01	29.57	<.001	.092
Disability status*three clusters	30.11	2	15.05	6.45	.002	.022
Error	1365.08	585	2.33			
Total	21300.00	591				

Note. R^2 = .160 (Adjusted R^2 = .153)

Consistent with hypothesis 3.1, the interaction between disability status and motivational belief cluster for academic achievement was statistically significant, $F(2, 592) = 6.45$, $p = .002$, $\eta_p^2 = .022$. A partial eta squared value of .022 is considered to be a small effect size (Cohen, 1988). I analyzed simple main effects to investigate hypothesis 3.2 and to help determine whether positive motivational beliefs serve as a protective factor for rural students with LD regarding their academic achievement. I used three separate *t*-tests, one for each motivational belief cluster, to compare the means in academic achievement between students with LD and nondisabled students. Using the Bonferroni correction, alpha for each test is adjusted by dividing alpha for each test by the number of comparisons. As there are three *t*-tests, alpha for each test becomes .0167 [.05/3].

For hypothesis 3.2 to be supported, no statistically significant difference must be found in academic achievement between students with LD and nondisabled students in Cluster 1 (high motivation beliefs) in addition to finding statistically significant differences within Cluster 2 (low academic self-concept and school belonging) and within Cluster 3 (low school valuing) between nondisabled and students with LD with nondisabled students outperforming students with LD academically in Clusters 2 and 3 (see p. 53). If a pattern of nondifference and

differences between the disability groups within the clusters is found, then it could be reasonably concluded that the higher profiles of motivational beliefs in Cluster 1 help to provide a source of resilience for students with LD. In this scenario, students with LD earn grades similar to their nondisabled peers when their motivational belief levels are high but earn lower grades than their nondisabled peers when they have low academic self-concept and school belonging, as in Cluster 2, or low school valuing, as in Cluster 3.

Cluster 1. Within Cluster 1, results indicated a statistically significant difference in academic achievement between students with LD and nondisabled students (NLD > LD), $t(294) = 8.85$, $SEM = .18$, $p < .001$. Cohen's d was 1.03 suggesting a large effect size (Cohen, 1988). This finding did not support hypothesis 3.2.

Table 4.19
Descriptive Statistics for Academic Achievement by Disability Status in Cluster 1

Disability status	*n*	Mean	Standard deviation	Standard error mean
No disability	160	6.31	1.57	.12
LD	136	4.71	1.53	.13

Cluster 2. Within Cluster 2, results indicated a statistically significant difference in academic achievement between students with LD and nondisabled students (NLD > LD), $t(193) = 2.79$, $SEM = .25$, $p = .006$. Cohen's d was .41, suggesting a medium effect size (Cohen, 1988).

Table 4.20
Descriptive Statistics for Academic Achievement by Disability Status in Cluster 2

Disability status	*n*	Mean	Standard deviation	Standard error mean
No disability	74	4.97	1.81	.21
LD	121	4.27	1.63	.15

Cluster 3. Within Cluster 3, results indicated a statistically significant difference in academic achievement between students with LD and nondisabled students (NLD > LD), $t(99) = 2.50$, $SEM = .39$, $p = .014$. Cohen's d was .51, suggesting a medium effect size (Cohen, 1988).

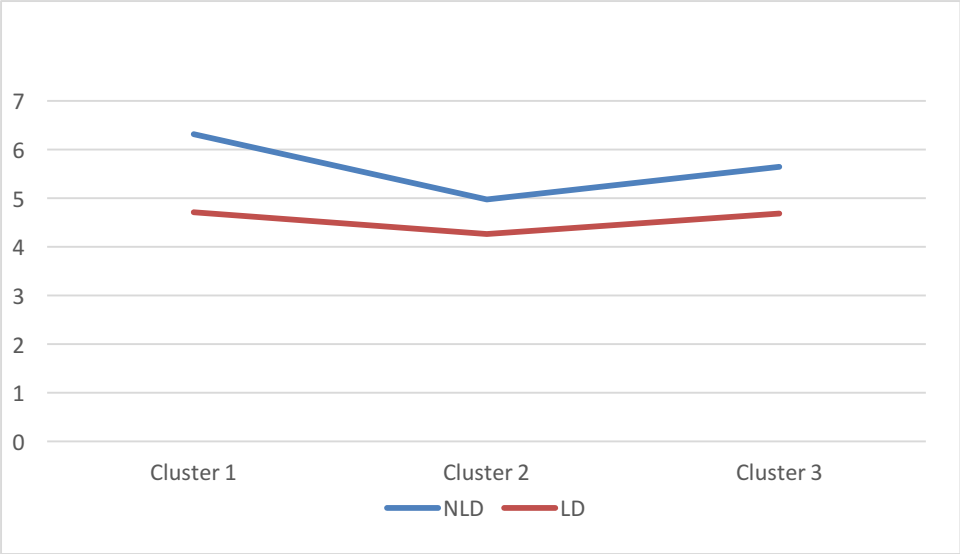

Figure 4.4. Academic achievement differences by LD status within clusters.

Table 4.21
Descriptive Statistics for Academic Achievement by Disability Status in Cluster 3

Disability status	*N*	Mean	Standard deviation	Standard error mean
No disability	61	5.64	1.98	.25
LD	40	4.68	1.76	.28

Overall, the findings of the simple main effects *t*-tests did not support hypothesis 3.2. I found a statistically significant difference in the academic performance between disability groups in Cluster 1 (high motivational beliefs), with nondisabled students outperforming their peers with LD. I hypothesized that when students with LD had high motivational belief profiles they would be able to perform similarly to their nondisabled peers. The results did not support this hypothesis.

Summary

In summary, I conducted a series of data analyses guided by three major hypotheses. A summary of the hypotheses and results are presented in Table 4.22.

Table 4.22
Hypotheses and Results

Hypothesis	Description	Results
1	Distinct motivation profiles will be identified in the sample.	Supported
2.1	Motivational belief profiles will moderate the relation between LD and educational aspirations.	Not supported
2.2	Positive motivational beliefs will help to diminish risks associated with having a LD for students in regard to their educational aspirations.	Not supported
3.1	Motivational belief profiles will moderate the relation between LD and academic achievement.	Supported
3.2	Positive motivational beliefs will help to diminish risks associated with having a LD for students in regard to their academic achievement.	Not supported

Using cluster analysis procedures, I found three distinct motivational belief profiles in the sample: high overall motivational beliefs, low academic self-concept and school belonging, and low school valuing. In an ANOVA with educational aspirations as the dependent variable, I found that the relation between LD status and educational aspirations was not moderated by motivational belief profile. That is, there was no statistically significant interaction effect between cluster membership and disability status. Therefore, I was also unable to find support for the hypothesis based on resilience theory that positive motivational beliefs would help to diminish risks associated with having a LD for students in regard to their educational aspirations and enable them to have aspirations at a level similar to their nondisabled peers. Educational aspirations were statistically significantly higher for students with high overall motivational

beliefs than they were for students with low academic self-concept and school belonging or low school valuing. Also, students with LD had similar levels of educational aspirations to their nondisabled peers. In an ANOVA analysis with academic achievement as the dependent variable, I found that motivational belief profiles moderated the relation between LD status and academic achievement. I did not, however, find support for the hypothesis based on resilience theory that maintaining positive motivational beliefs would help to diminish risks associated with having a LD for students in regard to their academic achievement and enable them to achieve at a level similar to their nondisabled peers.

CHAPTER FIVE
DISCUSSION

Using a resilience theory lens (Luthar et al., 2000; Masten, 2001; Wright, Masten, & Narayan, 2013), the overall purpose of this study was to investigate the role of motivational beliefs on the academic achievement and educational aspirations of rural students with LD. A central question of the study was whether positive motivational beliefs might serve as a protective factor or buffer for rural students with LD which could buoy their academic performance and educational aspirations. In this chapter, I briefly review the guiding framework of resilience theory. Next, I give a summary of major findings and how these findings did or did not support the hypotheses as well as alternative explanations. Finally, I provide implications for the field of educational psychology, limitations of the study, future directions, and a brief conclusion.

Resilience Theory Lens

In resilience theory, protective factors and risk factors interact in complex ways resulting in either positive or negative developmental outcomes (Wright et al., 2013). In the present study, students with LD had a particular set of risk factors and protective factors due to their rural setting. Morrison and Cosden (1997) considered the presence of a LD to be a risk factor for students. Attending schools in a rural context presents an additional risk factor for rural students with LD, as rural school districts oftentimes lack adequate financial resources making it difficult for them to recruit and retain highly qualified teachers to serve students with disabilities (Hardré & Hennessey, 2010; Irvin et al., 2011b). There is a large body of research linking high levels of

motivation and positive educational outcomes (e.g., Broussard & Garrison, 2004; Fortier, et al., 1995; Gottfried, 1990, Lepper et al., 2005; Pintrich & de Groot, 1990). As such, in this study I hypothesized that positive motivational beliefs would serve as a protective factor for rural high schools students with LD in terms of their educational aspirations and academic achievement.

In the motivational resilience model, Skinner et al. (2013) characterized students as either motivationally resilient or motivationally vulnerable. Motivationally resilient students use their personal resources to adaptively cope and are more likely to reengage with challenging tasks, while motivationally vulnerable students tend to give up and not reengage with tasks (Skinner et al., 2013). I use this model to interpret my findings in a later section in this chapter.

Drawing on theories of educational resilience, I tested the degree to which motivational beliefs served as protective factors for students with LD attending rural schools in terms of their academic achievement and educational aspirations. To test these hypotheses, I first conducted a cluster analysis to separate rural students into distinct groups with different patterns of motivational beliefs. Next, I used ANOVA procedures to determine if the relation between LD status and academic achievement and educational aspirations depended on motivational belief profile. If an interaction was present, I conducted follow-up *t*-tests to examine whether rural students with LD who had high motivational beliefs academically outperformed and had higher educational aspirations than their peers with LD who had both low academic self-concept and school belonging and those who had low school valuing. To support resilience theory and give evidence that motivational beliefs served as a protective factor, I expected that rural students with LD who had high motivational beliefs would show higher levels of academic achievement and educational aspirations than their peers with LD who had other motivational belief profiles.

Summary of Major Findings

I tested three hypotheses in the study. First, following the research of Irvin and colleagues (2011a), I used cluster analysis to identify distinct patterns of rural youth's motivational beliefs (academic self-concept, sense of belonging, school valuing). The results indicated three distinct motivational belief profiles in the sample of rural high school students. Next, I used two-way ANOVA procedures to determine if the relation between LD status and academic achievement and educational aspirations depended on motivational belief profile. I conducted follow-up *t*-tests if an interaction was present to examine whether rural students with LD who had high motivational beliefs academically outperformed and had higher educational aspirations than their peers with LD who had other motivational belief profiles. In the academic achievement two-way ANOVA, the relation between LD status and academic achievement depended on motivational belief profile. Rural students with LD who had high motivational beliefs, however, did not academically outperform their peers with LD who had other motivational belief profiles. As such, I could not conclude that high motivational belief profiles served as a protective factor for rural students with LD in terms of their academic achievement. In the educational aspirations two-way ANOVA, the relation between LD status and educational aspirations did not depend on motivational belief profile. Due to the statistically nonsignificant interaction effect, a follow-up *t*-test was not performed. I could not conclude that high motivational belief profiles served as a protective factor for rural students with LD in terms of their educational aspirations.

Taken together, study results indicated that distinct motivational profiles could be identified in a sample of high school students with and without LD. However, results provided limited support for hypotheses proposing motivational beliefs as a source of educational

resilience for rural adolescents with LD. These results are discussed in more detail in the following section.

Motivational Belief Profiles

Following other researchers in the field who have begun to more frequently use person-centered approaches in their studies (e.g., Irvin et al., 2011a; Roeser & Peck, 2003), I used cluster analysis as part of the analytical plan of the study. Roeser and Peck (2003) argued that person-centered approaches are advantageous because they allow researchers to focus on theoretically interesting subgroups that might not otherwise be apparent when variable-centered approaches are utilized. Applying a person-centered technique of cluster analysis, I identified three distinct clusters of rural high school students who shared different configurations of motivational beliefs in my analysis: positive motivational beliefs, low academic self-concept and school belonging, and low school valuing. The largest discrepancy between expected and observed frequencies was found for the cluster of rural students with low academic self-concept and school belonging (Cluster 2). There were 23 more students with LD and 23 fewer students than would be expected. Given that rural adolescents with LD were overrepresented in this cluster, the finding indicates this group of students is challenged by academic confidence as well as a sense of belonging and connection.

Also using cluster analysis, Irvin et al. (2011a) found six motivational belief clusters that were characterized in the following manner*:* low on all, low school valuing, low academic self-concept and belonging, high belonging, high school valuing, and high on all. Irvin and colleagues found more students with LD and fewer nondisabled students than were expected by chance in both the *low on all* and *low school value* clusters. This finding is consistent with the results of the current study in which more students with LD and fewer nondisabled students were

in Cluster 2 (low academic self-concept and school belonging) than expected if there was no relation between LD status and cluster membership. The results of Irvin et al. and the current study suggest that when rural high school students with LD are sorted by motivational beliefs in a cluster analysis they tend to be overrepresented in clusters characterized by low academic self-concept and school belonging. These findings are important to consider in light of previous research highlighting the importance of academic self-concept and school belonging to the schooling experience of students with LD (Lackaye & Margalit, 2006; McMahon et al., 2008; Stone & May, 2002).

Motivation Profiles and Academic Achievement

Based on the academic achievement two-way ANOVA and follow-up *t*-tests results, I did not find that positive motivational beliefs served as a protective factor for rural students with LD. Contrary to expectations of no statistically significant difference, comparisons for teacher-reported grades within Cluster 1 indicated that highly motivated nondisabled students outperformed their highly motivated peers with LD. There are several explanations for this unexpected finding. As described below, positive motivational beliefs may not have helped rural students with LD overcome their risk factors and perform similarly to their nondisabled peers due to the cognitive challenges of students with LD, low teacher expectations, and the risks associated with rural schooling.

Cognitive challenges. The cognitive challenges faced by students with LD may have been too great to be overcome by simply having the protective factor of positive motivational beliefs. The students with LD in the study likely faced differing levels of severity in terms of cognitive challenges. I did not, however, have access to information regarding the severity of cognitive challenges faced by students in the data set. Teachers identified if a student was

receiving special support services for LD; information regarding the severity or type of LD was not requested. As a result, there was limited information regarding the severity or type of students' LD.

In general, students with LD face a myriad of cognitive challenges (Johnson, Humphrey, Mellard, Woods, & Swanson, 2010). Students with LD experience poor executive function skills such as planning, organizing, and evaluating their schoolwork as well as difficulties maintaining focus (Dunn & Curran, 2012) and deficits in processing speed (Calhoun & Dickerson Mayes, 2005). Students with LD also may not benefit as much as their nondisabled peers from their increasing knowledge bases because their learning difficulties can limit or decrease the potential amount of knowledge that they can collect within different domains of learning (Ceci & Baker, 1989). Cognitive challenges including poor executive function skills, processing speed, and limited knowledge bases are disadvantages that students with LD encounter and are one possible reason that they did not benefit from having positive motivational beliefs and achieve at a level similar to their nondisabled peers.

Teacher expectations. I collected surveys from students' first period or homeroom teachers, who were not typically the students' special education teachers. The general education teachers' perceptions of students with LD may have influenced the schooling experiences of these students. Cook, Tankersley, and Cook (2000) found attitudinal response results from general educational teachers that were negative toward the students with disabilities in their classrooms. Specifically, general education teachers disproportionately responded to prompts regarding concern and rejection with the names of students with disabilities in their classrooms. Students with disabilities were also statistically significantly underrepresented in the responses of their teachers to prompts concerning attachment. In another study, Klehm (2014) found that

teachers' attitudes towards students with disabilities predicted their use of evidence-based practice. Clearly, teachers' attitudes toward their students with disabilities can have important ramifications on the quality of the students' instructional experiences.

Rural context. Students with LD who have positive motivational beliefs may not have been able to achieve similarly to their nondisabled peers due to the risks associated with attending schools in a rural context. Researchers (e.g., Billingsley, 2004; Billingsley & McLeskey, 2004; Thornton, Peltier, & Medina, 2007; McLeskey, Tyler, & Flippin, 2004) have suggested that school districts have a difficult time recruiting highly qualified special education teachers. These recruitment challenges are further intensified in rural districts. Rural schools oftentimes face difficulties recruiting and retaining highly qualified teachers, including special education teachers, which limits their ability to adhere to federal law regarding provision of highly qualified teachers (Barton, 2003; Berry et al., 2011; Brownell et al., 2005; Hardré & Hennessey, 2010; Hodge & Krumm, 2009; Kossar et al., 2005; Ludlow, 1998; Purcell et al., 2005). Students with LD in the current study may not have received quality instruction due to recruitment and retention difficulties. This possible lack of high-quality special education instruction, in combination with the cognitive challenges that students with LD face, may have contributed to students with LD not being able to benefit from having positive motivational beliefs and achieve at a level similar to their nondisabled peers. The nondisabled students in this study who had positive motivational beliefs may not have been impacted as greatly by the potential lack of high quality instruction, as they received a boost from their positive motivational beliefs and outperformed their nondisabled peers with other configurations of motivational beliefs.

Motivational Profiles and Educational Aspirations

Similar to findings above, I did not find an interaction effect in the two-way ANOVA for educational aspirations. The relation between LD status and educational aspirations did not depend on motivational belief profile. As such, I was not able to conclude that positive motivational beliefs served as a protective factor for rural students with LD, enabling this group of students to hold educational aspirations similar to their nondisabled peers. Although I did not find an interaction effect in the two-way ANOVA for educational aspirations, there was a main effect for motivational belief profile and educational aspirations. Regardless of LD status, students with high overall motivational beliefs had statistically significantly higher educational aspirations than their peers with low academic self-concept and school belonging as well as low school valuing. This finding is consistent with Irvin and colleagues (2011a), who found that rural high school students with high motivational beliefs, regardless of disability status, more often plan to pursue postsecondary education and aspire to complete college or an advanced degree than their peers with low motivational beliefs. Additionally, in a separate study focused on the relationship of school context to rural youth's educational achievement and aspirations, Irvin et al. (2011b) found that academic self-concept and school valuing predicted educational aspirations for a sample of rural high school students that included both students with LD and nondisabled students. It is not surprising that students who are confident in their academic abilities, find meaning in and a connection to school—and likely enjoy school—may wish to extend their educations farther than those with contrasting motivational beliefs.

Motivational Resilience Model

In their motivational resilience model, Skinner et al. (2013) provided a way to think about what may be happening for the students in the current study in terms of their motivational

beliefs, academic achievement, and educational aspirations. Skinner and colleagues considered students who use their personal resources to adaptively cope to be motivationally resilient and are likely to reengage with challenging tasks, while students who maladaptively cope are considered to be motivationally vulnerable and tend to give up and not reengage with tasks. Students who are motivationally resilient engage in adaptive coping activities, such as seeking help, strategizing, seeking comfort, and self-encouraging. Students who are motivationally vulnerable engage in maladaptive coping activities, such as self-pity, rumination, projection, isolation, and escape. These respective coping activities lead students to either re-engaging with or giving up on academic tasks.

It is possible that the nondisabled students in the current study who had positive motivational beliefs and achieved statistically significantly better than their nondisabled peers with other configurations of motivational beliefs may have benefited from being motivationally resilient. These nondisabled students with positive motivational beliefs may have been more willing to reengage with challenging tasks and subsequently experienced more success due to their persistence. The students with LD who had high motivational beliefs may also have been motivationally resilient and more willing to reengage with challenging tasks. Due to cognitive challenges or inadequate instruction, however, these students may not have experienced as much academic success as their nondisabled peers with positive motivational beliefs, potentially leading to frustration and eventual loss of their positive motivational beliefs. As such, it is important to ensure that students with LD receive appropriate instruction and other supports for their academic success, so as not to squander their motivational resilience.

The motivational resilience model may also be used to explain why students in the current study with positive motivational beliefs had higher educational aspirations. It is possible

that students with positive motivational beliefs are more likely to be motivationally resilient and, therefore, more likely to reengage with challenging tasks prompting higher levels of academic success. As academic success has been associated with educational aspirations (Bui, 2007; Sanders, Field, & Diego, 2001), students in the current study with positive motivational beliefs may be succeeding academically due to their persistence and thus have higher levels of educational aspirations than their peers with other configurations of motivational beliefs.

Educational Aspirations, Disability Status, and Postsecondary Transitions

In the current study, I found that educational aspirations did not differ by LD status, which is in contrast to Irvin et al.'s (2011a) findings. Irvin and colleagues found that students with LD had lower educational aspirations than their nondisabled peers. The contrast in findings may be attributed to the difference in the number of nondisabled participants included in Irvin et al.'s study (n = 6,171) compared to the current study (n = 303). In the current study, I used a matching process to select (n = 303) nondisabled rural high school students from a larger group of (n = 7,098) nondisabled students to balance the number of students with LD and nondisabled students. I selected nondisabled students by matching these students to the group of (n = 303) students with LD in the sample based on: school attended, gender, ethnicity, and grade level. The current study included (n = 303) students with LD and (n = 303) nondisabled students while Irvin et al.'s study included (n = 463) students with LD and (n = 6,171) nondisabled students. The difference in the proportion of nondisabled students to students with LD in the two studies and the lack of a matching procedure in Irvin et al.'s study may account for the difference in findings.

Given that students with LD have levels of educational aspirations that are similar to their nondisabled peers, it is important to discuss the implications of this finding. Students with LD

who aspire to matriculate to postsecondary institutions can encounter multiple challenges (Janiga & Costenbader, 2002; Skinner & Lindstrom, 2003; Weiss, Hutchins, & Meece, 2012). For example, Weiss and colleagues (2012) reported that rural high school students with disabilities were less likely than their nondisabled peers to participate in postsecondary transition programs, such as college and career counseling. Another study indicated that students with LD can experience difficulty in gaining admission to postsecondary institutions due to stringent standardized testing requirements (Janiga & Costenbader, 2002). Additionally, students with LD may not be proactive in self-advocating for accommodations because they often wish to distance themselves from special education. Hadley (2006) suggested it is important for students with LD to self-advocate and communicate with their professors to ensure that they receive appropriate accommodations in their postsecondary classes. An additional challenge for students with LD is that college settings often feature less teacher-student contact and require more independent study and effective time management skills to succeed than secondary school settings. Similarly, Skinner and Lindstrom (2003) offered several factors that influence success for college students with LD: student knowledge of their disability and compensatory strategies, student self-advocacy skills, the presence of academic and emotional support at the particular postsecondary institution, the severity of the disability, and the student's motivation and level of perseverance. High school personnel, through the provision of adequate transition planning services, can mitigate the challenges students with LD face as they matriculate to postsecondary institutions (Janiga & Costenbader, 2002).

Implications and Limitations for Educational Psychology

Contributions to Educational Psychology

This study is one of only a few studies (e.g., Skinner et al., 2013; Yeager & Dweck, 2012) to use resilience research to frame motivational beliefs as a protective factor. Additionally, the participants in this study were a national sample of rural high school students with LD. Research on adolescents with LD is limited, but even more limited for high school students with LD who live in rural communities (see also Irvin et al., 2011a). Current motivation research continues to promote educational programs focused on developing particular constructs related to students' achievement motivation such as grit and mindsets to help students who are at-risk for poor school achievement (Dweck, 2006; Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014; Tough, 2012; Yeager & Dweck, 2012). Results of the current study do not support focusing on these motivation-related constructs in place of academic skills for students with LD. Nurturing positive motivation in students with LD is not unimportant, but, as the results of this study indicate, cannot make up for a lack of academic skills.

My findings that educational aspirations differ by motivational cluster, but not by disability status, are important contributions to the educational psychology literature that is specific to rural populations. Overall, my study adds to the currently small base of research conducted on rural youth with LD and can be used as a starting point for further research on motivational beliefs viewed through a resilience theory lens.

Study Limitations

Though I used a large sample and sound quantitative methods, the study was not without limitations. One limitation was that educational aspirations data were collected via a student survey; which could make the data vulnerable to self-report biases such as the social desirability

bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Crowne and Marlowe (1964) described the social desirability bias as the "need for social approval and acceptance and the belief that it can be attained by means of culturally acceptable and appropriate behaviors" (p. 109). The students in the current study completed the student survey in the presence of their teachers and the researchers. Although students were told that their responses would not be shared, it is still possible that these students may have wished to please their teachers or the researchers by marking high educational aspirations on the student survey. The potential for the social desirability bias regarding educational aspirations may be even greater for these rural students as teachers are a primary source of information for them regarding their future plans (Griffin et al., 2011).

Another limitation of the study is that I did not have access to detailed information regarding the specific LD for the students in the study. In the RHSA study, teachers identified which students had LD and educational records were not accessed due to practical and logistical limitations regarding data collection. The data collection team spent only one morning in each of the 73 schools included in the RHSA study. The team had to travel to each school, all located in different towns across 34 states, precluding review of educational records. It would have been interesting to view my results in light of information regarding the severity of LD for the students in the study. Perhaps students with less severe forms of LD might have benefited from having positive motivational beliefs, but not students with more severe LD.

Similarly, access to information regarding the instructional placement of students would have been helpful. If a student were placed in an inclusion classroom compared to a self-contained classroom for different subjects there could be important implications for the student's motivational beliefs. For instance, Wiener and Tardif (2004), found that students in inclusive

settings had higher self-perceptions of mathematics competence than their peers who received support in a resource room. Knowing more information about the special education placements of the students with LD in the current study could have been informative.

Another limitation is that self-reported educational aspirations reflect how far an individual wishes to pursue education at the time of survey and do not reflect actual educational attainment (Weiss et al., 2012). I did not examine college enrollment, so it is not clear if rural youth with LD who aspired to attend college actually enrolled in college. Further research is needed to investigate the relation between educational aspirations and college enrollment patterns of rural youth with LD.

Future Directions

Limitations from the current investigation provide avenues for future research in the field. Future investigations could include more detailed information regarding the specific LD of students as well as aligning the subjects of the teachers who complete surveys for the students with the students' specific LD. It would be interesting to see if students with more mild forms of LD are able to benefit from having positive motivational beliefs and achieve at levels similar to their nondisabled peers. Perhaps positive motivational beliefs may serve as a protective factor for students with mild forms of LD, but not for students with more severe forms of LD, for whom the achievement gap has become too wide.

Future studies might also include more information about the quality of instruction in rural schools and how this could possibly play a role in the motivational beliefs of students with LD. Along the same lines, future studies might include information about the motivational climate of rural classrooms, the quality of teacher-student relationships, and whether there is sharing of aspirational information between teachers and students. Future studies might include

information regarding whether students with LD receive support in an inclusionary environment or in a resource room, as this could be pertinent data with regard to motivational beliefs. In general, more work is needed to better understand how students with LD who attend rural schools can be optimally motivated, resilient, and supported to achieve positive educational outcomes.

Conclusions

In this study, I viewed motivational beliefs through a resilience theory lens to investigate whether having positive motivational beliefs served as a protective factor for rural students with LD, enabling them to achieve academically and aspire educationally to levels similar to their nondisabled peers. I used a person-centered approach to data analysis to find three different motivational belief profiles in the sample. I did not, however, find that positive motivational beliefs provided the hypothesized boost for rural students with LD in terms of their academic achievement. Despite having positive motivational beliefs, students with LD may not have been able to perform academically at a level similar to their nondisabled peers due to their cognitive challenges along with a potential lack of adequate special education instruction.

Finally, educational aspirations did not differ based on LD status, but did differ by motivational belief profile. Students with positive motivational beliefs reported higher educational aspirations than their peers with other configurations of motivational beliefs. The findings of the current study make an important contribution to the field and add to the limited research base on rural students with LD. The findings of this study also provide many avenues for further research involving rural students with LD and the understudied topic of their motivational beliefs.

APPENDIX A: CRITERIA FOR LD AND NUMBER AND PERCENTAGE OF PARTICIPANTS WITH LD

Number of State(s)	Criteria for LD	Additional Information	*n* (%)
13	1 and (2 or 3)	Not stated if RtI or discrepancy required or prohibited	150(35.0)
2	1 and (2 or 3)	May not use discrepancy	14(3.3)
1	1 and (2 or 3)	Not required to use discrepancy but may	3(0.7)
1	1 and (2 or 3)	Discrepancy discouraged; cannot be used solely	10(2.3)
1	1 and (2 or 3)	2 must be met using RtI	32(7.5)
1	1 and (2 or 3)	Explicitly indicate severe discrepancy not prohibited	20(4.7)
1	1 and (2 or 3)	3 using severe discrepancy	38(8.9)
1	1 and (2 or 3)	2 must be met using RtI with CBM, 3 may be variance in cognitive functions or between cognitive functioning and achievement	27(6.3)
1	1 and (2 or 3)	2 must be met using RtI, 3 must be met using discrepancy	2(0.5)
1	1 and (2 or 3)	2 can be met using RtI or discrepancy	4(0.9)
1	1, 2, and 3	2 met if rate of progress is slow	7(1.6)
1	1 and 2		12(2.8)
1	1 and 2	2 meet using RtI or severe discrepancy	18(4.2)
1	1	1 can be met using RtI or severe discrepancy; if use RtI then 2 must also be met; if use discrepancy then 3	22(5.1)

		must also be met	
1	1	By meeting either 2 or 3 via severe discrepancy between intellectual ability an achievement or relative to age/grade	18(4.2)
1	1 or severe discrepancy in achievement and ability		20(4.7)
1	2	Determined either by response to scientific research-based intervention or severe discrepancy between intellectual ability and achievement ($\geq$ *2 SD*)	9(2.1)
1	May use 2	May not use IQ test or severe discrepancy	10(2.3)
1	ABC (1 and disorder in basic psychological processes and discrepancy between intellectual ability and achievement) or ABD (1, disorder in basic psychological processes, and 2)		1(0.2)
1	Inability to meet instructional demands, severe discrepancy, and information processing deficit		11(2.6)

Note: 1 = does not achieve adequately for the child's age or meet State-approved grade-level standards in one or more of the following areas: oral expression, listening comprehension, written expression, basic reading skills, reading fluency skills, reading comprehension, mathematics calculation, mathematics problem solving. 2 = does not make sufficient progress to meet age or State-approved grade-level standards when using a process based on the child's response to scientific, research-based intervention. 3 = child exhibits a pattern of strengths and weaknesses in performance, achievement, or both, relative to age, State-approved grade-level standards, or intellectual development. Criteria for one state not

included in table as there were not participating students with LD from that state. RtI = response to intervention. Adapted from "Perceptions of School and Aspirations of Rural Students with LD and Their Nondisabled Peers," by M. Irvin et al., 2011, *Learning Disabilities Research*, 26, p. 13.

APPENDIX B: EFFECT SIZE COMPARISON

ANOVA	Tukey's HSD difference comparison	Cohen's *d* (effect size)	Glass's delta (effect size)
Clustering variables one-way	Academic self-concept – Cluster 1 > Cluster 2	-2.09 (large)	-2.09 (large)
	Academic self-concept – Cluster 3 > Cluster 2	-2.21 (large)	-2.20 (large)
	School valuing – Cluster 1 > Cluster 2	-1.55 (large)	-1.35 (large)
	School valuing – Cluster 1 > Cluster 3	-2.83 (large)	-2.72 (large)
	School valuing – Cluster 2 > Cluster 3	-.87 (large)	-1.0 (large)
	School belonging – Cluster 1 > Cluster 2	-1.67 (large)	-1.68 (large)
	School belonging – Cluster 1 > 3	-1.09 (large)	-1.12 (large)
	School belonging – Cluster 3 > Cluster 2	-.62 (moderate)	-.61 (moderate)
Validation variable one-way	Cluster 1 < Cluster 2	.40 (small)	.37 (small)
	Cluster 1 < Cluster 3	.33 (small)	.32 (small)
Educational aspirations two-way	Cluster 1 > Cluster 2	-.39 (small)	-.34 (small)
	Cluster 1 > Cluster 3	-.29 (small)	-.26 (small)

REFERENCES

Adelman, H. S., & Taylor, L. (1983). Enhancing motivation for overcoming learning and behavior problems. *Journal of Learning Disabilities, 16*, 384-392.

Adelman, H. S., & Taylor, L. (1990). Intrinsic motivation and school misbehavior: Some intervention implications. *Journal of Learning Disabilities, 23*, 541-550.

Alloway, T. P., & Gathercole, S. E. (Eds.) (2006). *Working memory and neurodevelopmental disorders*. New York, NY: Psychology Press.

Anderman, E. M. (2002). School effects on psychological outcomes during adolescence. *Journal of Educational Psychology, 94(4)*, 793-809.

Baddeley, A. D. (2001). Is working memory still working? *American Psychologist, 56*, 851-864.

Baird, G. L., Scott, W. D., Dearing, E., & Hamill, S. K. (2009). Cognitive self-regulation in youth with and without learning disabilities: Academic self-efficacy, theories of intelligence, learning vs. performance goal preferences, and effort attributions. *Journal of Social and Clinical Psychology, 28*(7), 881-902.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall, Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Bandura, A., Barbaranelli, C., Capara, G. V., & Pastorelli, C. (2001). Self-efficacy beliefs as shapers of children's aspirations and career trajectories. *Child Development, 72*(1), 187-206.

Barton, R. (2003). *Challenges and opportunities of NCLB for small, rural, and isolated schools.* Portland, OR: Northwest Regional Educational Laboratory (ERIC Document No. 482267)

Beal, S. J., & Crockett, L. (2010). Adolescents' occupational and educational aspirations and expectations: Links to high school activities and adult educational attainment. *Developmental Psychology, 46*, 258-265.

Benard, B. (1991). *Fostering resiliency in kids: Protective factors in the family, school, and community*. Portland, OR: Northwest Regional Educational Laboratory.

Benard, B. (1993). Fostering resiliency in kids. *Educational Leadership, 51*(3), 44-48.

Benard, B. (1995). *Fostering resilience in children.* Urbana, IL: ERIC Clearinghouse on Elementary and Early Childhood Education. (ERIC Document No. ED386327).

Berry, A. B., Petrin, R. A., Gravelle, M. L., & Farmer, T. W. (2011). Issues in special education teacher recruitment, retention, and professional development: Considerations in supporting rural teachers. *Rural Special Education Quarterly, 30*(4), 3-11.

Billingsley, B. S. (2004). Special education teacher retention and attrition a critical analysis of the research literature. *The Journal of Special Education*, *38*(1), 39-55.

Billingsley, B. S., & McLeskey, J. (2004). Critical issues in special education teacher supply and demand: Overview. *Journal of Special Education*, *38*(1), 2-4.

Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational Psychology Review, 15*(1), 1-40.

Botsas, G., & Padeliadu, S. (2003). Goal orientation and reading comprehension strategy use among students with and without reading difficulties. *International Journal of Educational Research, 39(4-5)*, 477-495.

Broussard, S. C., & Garrison, M. E. B. (2004). The relationship between classroom motivation and academic achievement in elementary-school-aged children. *Family and Consumer Sciences Research Journal, 33*, 106-120.

Brownell, M., Bishop, A., & Sindelar, P. (2005). NCLB and the demand for highly qualified teachers: Challenges and solutions for rural schools. *Rural Special Education Quarterly, 24*(1), 9-15.

Brown, D. L. & Swanson, L. E. (2003). *Challenges for rural America in the twenty-first century*. University Park, PA: The Pennsylvania State University Press.

Bui, K. (2007). Educational expectations and academic achievement among middle and high school students. *Education, 127(3)*, 328-331.

Byun, S-Y, Carver Walton, M., Meece, J. L., Irvin, M. J., & Hutchins, B. C. (2011). *Technical report on the development of the rural high school aspirations study: Student constructs.* (Unpublished manuscript). University of North Carolina at Chapel Hill, Chapel Hill, NC.

Byun, S-Y, Meece, J. L., Irvin, M. J., & Hutchins, B. C. (2012). The role of social capital in educational aspirations of rural youth. *Rural Sociology, 77*(3), 355-379.

Calhoun, S. L., & Dickerson Mayes, S. (2005). Processing speed in children with clinical disorders. *Psychology in the Schools, 42*(4), 333-343.

Ceci, S. J., & Baker, J. G. (1989). On learning…more or less: A knowledge x process x context view of learning disabilities. *Journal of Learning Disabilities, 22*(2), 90-99.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. New York, NY: Routledge Academic.

Cook, B. G., Tankersley, M., & Cook, L. (2000). Teachers attitudes toward their included students with disabilities. *Exceptional Children, 67*, 115-135.

Coutinho, M. J., & Oswald, D. P. (2006). *Disproportionate representation of culturally and linguistically diverse students in special education: Measuring the problem*. (Practitioner Brief). Tempe, AZ: National Center for Culturally Responsive Educational Systems.

Craik, F., & Bialystok, E. (2006). Cognition through the lifespan: Mechanisms of change. *Trends in Cognitive Sciences, 10*(3), 131-138.

Crowne, D., & Marlow, D. (1964). *The approval motive: Studies in evaluative dependence.* New York, NY: Wiley.

deBettencourt, L. U., Zigmond, N., & Thornton, H. (1989). Follow-up of post-secondary-age rural learning disabled graduates and dropouts. *Exceptional Children, 56*, 40-49.

Deci, E., & Ryan, R. (Eds.) (2002). *Handbook of self-determination research*. Rochester, NY: University of Rochester Press.

DiPerna, J. C. (2004). Structural and concurrent validity evidence for the academic competence evaluation scales – college edition. *Journal of College Counseling, 7*, 64-72.

Dunn, C., & Schumaker, L. (1997). A follow-up of former special education students from a rural and urban county school system. *Career Development of the Exceptional Individual, 20*, 43-54.

Dunn, C. & Curran, C. M. (2012). Transition education for adolescents with learning disabilities. In M. L. Wehmeyer & K. W. Webb (Eds.), *Handbook of adolescent transition education for youth with disabilities* (pp. 381-398). New York, NY: Routledge.

Dweck, C. S. (2006). *Mindset: The new psychology of success. How we can fulfill our potential.* New York, NY: Ballantine Books.

Ebbers, S.M., & Denton, C.A. (2008). A root awakening: Vocabulary instruction for older students with reading difficulties. *Learning Disabilities Research and Practice, 23*(2), 90-102.

Elliot, A. J., Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology, 72(1)*, 218-232.

Elliot, A. J., Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70(3)*, 461-475.

Erikson, E. H. (1968). *Identity: Youth and crisis*. New York, NY: W. W. Norton.

Eskreis-Winker, L., Shulman, E. P., Beal, S. A., & Duckworth, A. L. (2014). The grit effect: Predicting retention in the military, the workplace, school, and marriage. *Frontiers in Psychology, 36*(5), 1-12.

Finn, K. V., & Frone, M. R. (2004). Academic performance and cheating: Moderating role of school identification and self-efficacy. *The Journal of Educational Research, 97*, 115-122.

Fleming, J. (2002). Who will succeed in college? When the SAT predicts Black students' performance. *The Review of Higher Education, 25*, 281-296.

Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic motivation and school performance: Toward a structural model. *Contemporary Educational Psychology, 20*, 257-274.

Fuchs, D., Fuchs, L.S., Mathes, P.G., Lipsey, M.W. (2000). Reading differences between underachievers with and without learning disabilities. In R. Gersten, E. Schiller, & S. Vaughn (Eds.) *Contemporary special education research* (pp. 81–104). Mahwah, NJ: Erlbaum.

Gandara, P., Gutierrez, D., & O'Hara, S. (2001). Planning for the future in rural and urban high schools. *Journal of Education for Students Placed At-Risk, 6*(1), 73-93.

Glass, G. V., McGraw, B., & Smith, M. L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: Sage.

Goodenow, C. (1993a). Classroom belonging among early adolescent students: Relationships to motivation and achievement. *Journal of Early Adolescence, 13*, 21-43.

Goodenow, C. (1993b). The psychological sense of school membership among adolescents: Scale development and educational correlates. *Psychology in the Schools, 30*, 79-90.

Gottfried, A. E. (1985). Academic intrinsic motivation in elementary and junior high school students. *Journal of Educational Psychology, 77*(6), 631-645.

Gottfried, A. E. (1990). Academic intrinsic motivation in young elementary school children. *Journal of Educational Psychology, 82*(3), 525-538.

Goyette, K. A. (2008). College for some to college for all: Social background, occupational expectations over time. *Social Science Research, 37*, 461-484.

Griffin, D., Hutchins, B. C., & Meece, J. L. (2011). Where do rural high school students go to find information about their futures? *Journal of Counseling & Development, 89*(2), 172-181.

Grolnick, W. S., & Ryan, R. M. (1990). Self-perceptions, motivation, and adjustment in children with learning disabilities: A multiple group comparison study. *Journal of Learning Disabilities, 23*(3), 177-184.

Guay, F., Marsh, H. W., & Boivin, M. (2003). Academic self-concept and academic achievement: Developmental perspectives on their causal ordering. *Journal of Educational Psychology, 95*(1), 124-136.

Hadley, W. M. (2006). L.D. students' access to higher education: Self-advocacy and support. *Journal of Developmental Education, 30*(2), 10-16.

Hagborg, W. J. (1994). An exploration of school membership among middle- and high-school students. *Journal of Psychoeducational Assessment, 12*, 312-323.

Hagborg, W. J. (1998). An investigation of a brief measure of school membership. *Adolescence, 33*, 461-468.

Hair, J. F., Jr., & Black, W. C. (2000). Cluster analysis. In L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding more multivariate statistics* (pp. 147-205). Washington, DC: American Psychological Association.

Hardré, P. L. (2008). Taking on the motivating challenge: Rural high school teachers' perceptions and practice. *Teacher Education and Practice, 21*(1), 72-88.

Hardré, P. L. (2012). Standing in the gap: Research that informs strategies for motivating and retaining rural high school students. *The Rural Educator, 34*(1), 12-18.

Hardré, P. L., Crowson, H. M., Debacker, T. K., & White, D. (2010). Predicting the academic motivation of rural high school students. *The Journal of Experimental Education, 75*(4), 247-269.

Hardré, P. L., & Hennessey (2010). Two rural worlds: Differences of rural high school students' motivational profiles in Indiana and Colorado. *Journal of Research in Rural Education, 25*(8), 1-32.

Hardré, P. L. & Sullivan, D. W. (2008). Student differences and environment perceptions: How they contribute to student motivation in rural high schools. *Learning and Individual Differences, 18*, 471-485.

Hartup, W. W., & Stevens, N. (1997). Friendships and adaptation in the life course. *Psychological Bulletin, 121*, 335-370.

Hodge, C. L., & Krumm, B. L. (2009). NCLB: A study of its effect on rural schools – School administrators rate service options for students with disabilities. *Rural Special Education Quarterly, 28*(1), 20-27.

Hoffman, J. L. & Lowitzki, K. E. (2005). Predicting college success with high school grades and test scores: Limitations for minority students. *The Review of Higher Education, 28*(4), 455-474.

Horowitz, S. H. (2014). The National Center for Learning Disabilities. *The neurobiology of learning disorders*. Retrieved from http://ncld.org/types-learning-disabilities/what-is-ld/neurobiology-learning-disabilities

Individuals with Disabilities Education Improvement Act of 2004, P.L. 108-446, 20 U.S.C. § 1400 et seq. (2004)

Irvin, M. J., Byun, S-Y, Meece, J. L., Farmer, T. W. (2012). Educational barriers of rural youth: Relation of individual and contextual difference variables. *Journal of Career Assessment, 20*(1), 71-87.

Irvin, M. J., Farmer, T. W., Weiss, M. P., Meece, J. L., Byun, S-Y, McConnell, B. M., & Petrin, R. A. (2011a). Perceptions of school and aspirations of rural students with LD and their nondisabled peers. *Learning Disabilities Research, 26*(1), 2-14.

Irvin, M. J., Meece, J. L., Byun, S-Y, Farmer, T. W., Hutchins, B. C. (2011b). Relationship of school context to rural youth's educational achievement and aspirations. *Journal of Youth and Adolescence, 40*, 1225-1242.

Jodl, K. M., Michael, A., Malanchuk, O., Eccles, J. S., & Sameroff, A. (2001). Parents' roles in shaping early adolescents' occupational aspirations. *Child Development, 72*, 1247-1265.

Johnson, E. S., Humphrey, M., Mellard, D. F., Woods, K., & Swanson, H. L. (2010). Cognitive processing deficits and students with specific learning disabilities: A selective meta-analysis of the literature. *Learning Disability Quarterly, 33*(1), 3-18.

Judge, S., & Watson, S.M.R. (2011). Longitudinal outcomes for mathematics for students with learning disabilities. *The Journal of Educational Research, 104*(3), 147-157.

Kail, R. V. (1991). Developmental change in speed of processing during childhood and adolescence. *Psychological Bulletin, 109*(3), 490-501.

Kail, R. V. & Ferrer, E. (2007). Processing speed in childhood and adolescence: Longitudinal models for examining developmental change. *Child Development, 78*(6), 1760-1770.

Kaplan, A., & Maehr, M. L. (1999). Achievement goals and student well-being. *Contemporary Educational Psychology, 24*, 330-358.

Karpinksi, M. J., Neubert, D. A., Graham, S. (1992). A follow-along study of postsecondary outcomes for graduates and dropouts with mild disabilities in a rural setting. *Journal of Learning Disabilities, 25*, 376-385.

Klassen, R. M., & Lynch, S. L. (2007). Self-efficacy from the perspective of adolescents with LD and their specialist teachers. *Journal of Learning Disabilities, 40*(6), 494-507.

Klehm, M. (2014). The effects of teacher beliefs on teaching practices and achievement of students with disabilities. *Teacher Education and Special Education, 37*(3), 216-240.

Kline, R. B. (2005). *Principals and practice of structural equation modeling* (2nd ed.). New York, NY: Guilford Press.

Kossar, K., Mitchem, K., & Ludlow, B. (2005). No Child Left Behind: A national study of its impact on special education in rural schools. *Rural Special Education Quarterly, 24*(1), 3-8.

Kuhn, D. (2009). Adolescent thinking. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (3rd ed.: Vol. 1, pp. 152-186). Hoboken, NJ: John Wiley & Sons.

Lackaye, T. D., & Margalit, M. (2006). Comparisons of achievement, effort, and self-perceptions among students with learning disabilities and their peers from different achievement groups. *Journal of Learning Disabilities, 39*(5), 432-446.

Lapan, R. T., Gysbers, N. C., & Petroski, G. F. (2001). Helping seventh graders be safe and successful: A statewide study of the impact on comprehensive guidance and counseling programs. *Journal of Counseling & Development, 79*, 320-330.

Larson, R. W., Lampkins-Uthando, S., & Armstrong, J. (2014). Adolescents' development of new skills for prospective cognition: Learning to anticipate, plan, and think strategically. *Journal of Cognitive Education and Psychology, 13*(2), 232-244.

Laursen, B. P., & Hoff, E. (2006). Person-centered and variable-centered approaches to longitudinal data. *Merrill-Palmer Quarterly, 52*(3), 377-389.

Lee, V. E. (2000). Using hierarchical linear modeling to study social contexts: The case of school effects. *Educational Psychologist, 35*, 125-141.

Lepper, M. R., Corpus, J. H., & Iynegar, S. S. (2005). Intrinsic and extrinsic motivational orientations in the classroom: Age differences and academic correlates. *Journal of Educational Psychology, 97*(2), 184-196.

Li, S-C, Lindenberger, U., Hommel, B., Aschersleben, G., Prinz, W, & Baltes, P. B. (2004). Transformations in the couplings among intellectual abilities and constituent cognitive processes across the life span. *Psychological Science, 15*(3), 155-163.

Lichtinger, E., & Kaplan, A. (2015). Employing a case study approach to capture motivation and self-regulation of young students with learning disabilities in authentic educational context. *Metacognition and Learning, 10*(1), 119-149.

Ludlow, B. L. (1998). Preparing special education personnel for rural schools. *Journal of Research in Rural Special Education, 14*(2), 57-75.

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*(3), 543-562.

Maehler, C., & Schuchardt, K. (2009). Working memory functioning in children with learning disabilities: Does intelligence make a difference? *Journal of Intellectual Disability Research, 53*, 3-10.

Marder, C., Levine, P., & Wagner, M. (2003). Demographic characteristics of youth with disabilities. In M. Wagner, C. Marder, P. Levine, R. Cameto, T. W. Cadwallader, & J. Blackorby,…L. Newman, *The individual and household characteristics of youth with disabilities*. Menlo Park, CA: SRI International. Available at: http://www.nlts2.org/reports/components/component1.html.

Mason, L.H., & Hedin, L.R. (2011). Reading science text: Challenges for students with learning disabilities and considerations for teachers. *Learning Disabilities Research and Practice, 26*(4), 214-222.

Masoura, E. V. (2006). Establishing the link between working memory function and LD. *LD: A Contemporary Journal*, *4*(2), 29-41.

Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist, 56*(3), 227-238.

Mastropieri, M. A., Scruggs, T. E., & Graetz, J. E.. (2003). Reading comprehension instruction for secondary students: Challenges for struggling students and teachers. *Learning Disability Quarterly*, *26*(2), 103–116.

McLeskey, J., Tyler, N. C., & Flippin, S. S. (2004). The supply of and demand for special education teachers A review of research regarding the chronic shortage of special education teachers. *The Journal of Special Education*, *38*(1), 5-21.

McMahon, S. D., Parnes, A. L., Keys, C. B., & Viola, J. J. (2008). School belonging among low-income urban youth with disabilities: Testing a theoretical model. *Psychology in the Schools, 45*(5), 387-401.

Meece, J. L., Hutchins, B. C., Byun, S-Y, Farmer, T. W., Irvin, M. J., & Weiss, M. (2013). Preparing for adulthood: A recent examination of the alignment of rural youth's future educational and vocational aspirations. *Journal of Educational and Developmental Psychology, (3)*2, 175-192.

Melekoglu, M. A.. (2011). Impact of Motivation to Read on Reading Gains for Struggling Readers With and Without Learning Disabilities. *Learning Disability Quarterly*, *34*(4), 248–261.

Mickelson, R. A. (1990). The attitude-achievement paradox among black adolescents. *Sociology of Education, 63*(1), 44-61.

Morrison, G. M., & Cosden, M. A. (1997). Risk, resilience, and adjustment of individuals with learning disabilities. *Learning Disability Quarterly, 20*(1), 43-60.

National Association of Special Education Teachers. (2015) Characteristics of children with learning disabilities. *NASET LD Report, (3*), 1-26. Retrieved from http://www.naset.org/2521.0.html

National Center for Education Statistics (2013). *The nation's report card: A first look: 2013 mathematics and reading* (NCES 2014-451). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, Washington, D.C.

National Center for Learning Disabilities. (2014)a. *The state of learning disabilities* (3rd ed.). New York, NY: Author.

National Center for Learning Disabilities. (2014)b. Retrieved from http://ncld.org/types-learning-disabilities/what-is-ld/learning-disability-fast-facts

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards*. Washington, DC: Authors.

National Research Center on Rural Education Support. (2011). *Rural High School Aspirations Study*. Retrieved from http://www.nrcres.org/HSA.htm

Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879-903.

Pickering, S. J. (2006). *Working Memory and Education*. San Diego, CA: Academic Press.

Pintrich, P. R., & DeGroot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33-40.

Purcell, L., East, B., & Rude, H. (2005). Administrative perspectives on the No Child Left Behind Act (NBLC) for students with disabilities in rural settings. *Rural Special Education Quarterly, 24*(1), 27-31.

Reschly, A. L., & Christenson, S. L. (2006). Predication of dropout among students with mild disabilities: A case for the inclusion of student engagement variables. *Remedial and Special Education, 27*(5), 276-292.

Roeser, R. W., & Lau, S. (2002). On academic identity formation in middle school settings during early adolescence. In T. M. Brinthaupt & R. P. Lipka (Eds.), *Understanding early*

adolescent self and identity: Applications and interventions (pp. 91-131). Albany, NY: State University of New York Press.

Roeser, R. W., & Peck, S. C. (2003). Patterns and pathways of educational achievement across adolescence: A holistic-developmental perspective. In W. Damon (Series Ed.), S. C. Peck & R. W. Roeser (Vol. Eds.), *New directions for child and adolescent development: Vol. 101. Person-centered approaches to studying development in context* (Vol. 101; pp. 39-62). San Francisco, CA: Jossey-Bass.

Roeser, R. W., Midgley, C., & Urdan, T. C. (1996). Perceptions of the school psychological environment and early adolescents' psychological and behavioral functioning in school: The mediating role of goals and belonging. *Journal of Educational Psychology, 88*(3), 408-422.

Rojewski, J. W. (1996). Educational and occupational aspirations of high school seniors with learning disabilities. *Exceptional Children, 62*(5), 463-476.

Rojewski, J. W. (1999). Occupational and educational aspirations and attainment of young adults with and without LD 2 years after high school completion. *Journal of Learning Disabilities*, *32*, 533–552.

Roscigno, V. J. & Crowle, M. L. (2001). Rurality, institutional disadvantage, and achievement/attainment. *Rural Sociology, 66*(2), 268-292.

Sanders, C. E., Field, T. M., & Diego, M. A. (2001). Adolescents' academic expectations and achievement. *Adolescence, 36*(144), 795-802.

Schalock, R., Holl, C., Elliott, B., & Ross, I. (1992). A longitudinal follow-up of graduates from a rural special education program. *Learning Disability Quarterly, 15*, 29-38.

Schunk, D. H., Meece, J. L., & Pintrich, P. R. (2014). Motivation in education: Theory, research, and applications (4th ed.). Boston, MA: Pearson.

Sideridis, G. D. (2011). Exploring the presence of Matthew effects in learning disabilities. *Journal of Learning Disabilities, 44*(5), 399-401.

Shin, M., & Bryant, D.P. (2015). A synthesis of mathematical and cognitive performances of students with mathematics learning disabilities. *Journal of Learning Disabilities, 48*(1), 96-112.

Skaalvik, E. M., & Valas, H. (2010). Relations among achievement, self-concept, and motivation in mathematics and language arts: A longitudinal study. *The Journal of Experimental Education, 67*(2), 135-149.

Skinner, M. E., & Lindstrom, B. D. (2003). Bridging the gap between high school and college: Strategies for the successful transition of students with learning disabilities. *Preventing School Failure, 47*(3), 132-137.

Skinner, E., Pitzer, J., & Steele, J. (2013). Coping as part of motivational resilience in school: A multidimensional measure of families, allocations, and profiles of academic coping. *Educational and Psychological Measurement, 73*(5), 803-835.

Solomon, D., Watson, W., Battistich, V., Schaps, E., & Delucchi, K. (1996). Creating classrooms that students experience as communities. *American Journal of Community Psychology, 24*(6), 719-748.

Stone, C. A., & May, A. L. (2002). The accuracy of academic self-evaluations in adolescents with learning disabilities. *Journal of Learning Disabilities, 35*(4), 370-383.

Swanson, H. L. (1994). Short-term memory and working memory: Do both contribute to our understanding of academic achievement in children and adults with learning disabilities? *Journal of Learning Disabilities, 27*(1), 34-50.

Swanson, H. L. (1999). What develops in working memory? A life span perspective. *Developmental Psychology, 35*(4), 986-1000.

Swanson, H. L. (2003). Age-related differences in learning disabled and skilled readers' working memory. *Journal of Experimental Child Psychology, 85*(1), 1-31.

Swanson, H. L., & Siegel, L. (2001). Learning disabilities as a working memory deficit. *Issues in Education, 7*(1), 1-48.

Tabachnick, B. G., and Fidell, L. S. (2012). *Using Multivariate Statistics, 6th ed.* Boston: Pearson.

Thornton, B., Peltier, G., & Medina, R. (2007). Reducing the special education teacher shortage. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *80*(5), 233-238.

Tough, P. (2012). *How children succeed: Grit, curiosity, and the hidden power of character*. New York, NY: First Mariner.

Trautwein, U., Ludtke, O., Marsh, H. W., Koller, O., & Baumert, J. (2006). Tracking, grading, and student motivation: Using group composition status to predict self-concept and interest in ninth-grade mathematics. *Journal of Educational Psychology, 98*(4), 788-806.

Trentacosta, C. J., & Izard, C. E. (2006). Emotional development. In N. J. Salkind (Ed.), *Encyclopedia of Human Development*. (Vol. 1, pp. 457-459). Thousand Oaks, CA: Sage.

U.S. Bureau of Labor Statistics. (2013). *Expenditures of urban and rural households in 2011*. Retrieved from http://www.bls.gov/opub/btn/volume-2/pdf/expenditures-of-urban-and-rural-households-in-2011.pdf

U.S. Council of Economic Advisers. (2015). Strengthening the rural economy – The current state of rural America. Retrieved from https://www.whitehouse.gov/administration/eop/cea/factsheets-reports/strengthening-the-rural-economy/the-current-state-of-rural-america

U.S. Department of Education. (2005). *A profile of the American high school senior in 2004: A first look. Initial results from the first follow-up of the Education Longitudinal Study of Aspirations: A logistic transform model.* Washington, DC: National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Vacha-Haase, T., & Thompson, B. (2004). How to estimate and interpret various effect sizes. *Journal of Counseling Psychology, 51*(4), 473-481.

Vaughn, S., Linan-Thompson, S., & Hickman, P. (2003). Response to instruction as a means of identifying students with reading/learning disabilities. *Exceptional Children, 69*(4), 391-409.

Voelkl, K. E. (1996). Measuring students' identification with school. *Educational and Psychological Measurement, 56*, 760-770.

Voelkl, K. E. (1997). Identification with school. *American Journal of Education, 105*, 294-318.

Wagner, M., Marder, C., Blackorby, J., Cameto, R., Newman, L., Levine, P.,…Sumi, C. (2003). *The achievements of youth with disabilities during secondary school. A report from the National Longitudinal Transition Study-2 (NLTS2).* Menlo Park, CA: SRI International. Available at www.nlts2.org.

Wagner, M., Newman, L., Cameto, R., Levine, P., & Marder, C. (2007). Perceptions and expectations of youth with disabilities: A special topic report of findings from the National Longitudinal Transition Study-2 (NLTS2: NCSER 2007-3006). Menlo Park, CA: SRI International.

Ward, J. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association, 58*, 236-244.

Watson, S.M.R., Gable, R.A., Gear, S.B., Hughes, K.C. (2012). Evidence-based strategies for improving the reading comprehension of secondary students: Implications for students with learning disabilities. *Learning Disabilities Research and Practice, 27*(2), 79-89.

Wechsler, D. (1991). *Wechsler Intelligence Scale for Children* (3rd ed.). New York, NY: Psychological Corporation.

Weiss, M., Hutchins, B. C., & Meece, J. L. (2012). The postsecondary plans of rural youth with and without disabilities. *Career Development and Transition for Exceptional Individuals, 35,*180-189.

Werner, E. E. (1993). Risk and resilience in individuals with learning disabilities: Lessons learned from Kauai longitudinal study. *Learning Disabilities Research & Practice, 8*, 28-34.

Werner, E. E., & Smith, R. S. (1982). *Vulnerable but invincible: A longitudinal study of resilient children and youth*. New York, NY: McGraw-Hill.

Werner, E. E., & Smith, R. S. (1992). *Overcoming the odds: High risk children from birth to adulthood*. Ithaca, NY: Cornell University Press.

Werner, E. E., & Smith, R. S. (2001). *Journeys from childhood to midlife: Risk, resilience and recovery*. Ithaca, NY: Cornell University Press.

Wiener, J., & Tardif, C. Y. (2004). Social and emotional functioning of children with learning disabilities: Does special education placement make a difference? *Learning Disabilities Research & Practice, 19*(1), 20-32.

Wigfield, A., Byrnes, J. P., & Eccles, J. S. (2006). Development during early and middle adolescence. In P. A. Alexander & P. H. Winne (Eds.), *The handbook of educational psychology* (pp. 87-113). Mahwah, NJ: Lawrence Erlbaum Associates.

Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R., & Davis-Kean, P. (2006). Motivation. In N. Eisenberg (Ed.), *Handbook of child psychology* (Vol. 3; 6th ed., pp. 933-1002). New York, NY: Wiley.

Wong, B. Y. L. (2003). General and specific issues for researchers' consideration in applying the risk and resilience framework to the social domain of learning disabilities. *Learning Disabilities Research & Practice, 18*(2), 68-76.

Wright, M. O., Masten, A. S., & Narayan, A. J. (2013). Resilience processes in development: Four waves of research on positive adaptation in the context of adversity. In S. Goldstein & R. B. Brooks (Eds.) *Handbook of resilience in children* (2nd ed.*:* pp. 15-37). New York, NY: Springer.

Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist, 47*(4), 302-314.

Yim, O., & Ramdeen. K. T. (2015). Hierarchical cluster analysis: Comparison of three linkage measures and application to psychological data. *The Quantitative Methods for Psychology, 11*(1), 8-21.

Zald, D. H., & Iacono, W. G. (1998). The development of spatial working memory abilities, *Developmental Neuropsychology, 14*, 563-578.