

LEARNING WHAT I WANT TO BE WHEN I GROW UP:
THE CONTEXTUAL EFFECTS OF SCHOOLS
ON STUDENT LOCUS OF CONTROL AND
THE DEVELOPMENT OF STUDENT
OCCUPATIONAL ASPIRATIONS

By

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This dissertation is dedicated my husband, Darwin
who shares my passion for creating something from nothing
and whose love, support, wisdom, perspective and brilliance
made it possible for me to transform these once blank pages into a doctorate.
Thanks for making the journey worth every step—and for walking alongside me.

The Tuesday Before Spring
by Adrienne L. Corn

Cool light of new snow under clouded morning skies is one of my favorite shades of light. I crawl out from under my own pile of blanketed white to open the wooden slats of the bedroom window blinds and welcome the chilly quiet into the room, melding with the landscape as I slip back into the warmth between brown sheets and green cased pillows under a puffed down comforter.

I lay on one side, facing the dawn as it eases into the sky with a neutral palate of muted grays, the sun nestled on the other side of its own layer of blankets, seeming none too eager to leave the cover of clouds, even though it is the end of March and the Tuesday before Easter. This morning, we hibernate for just a little bit longer, letting the last of winter linger.

I have become accustomed to the quiet and the stillness of this cold season, lengthening beyond its traditional stay on the southern calendar, my own deadlines long past like the vacation plans and the gardening projects all waiting on the other side of graduation; suspended time familiar to me like the only friend who could understand this Siberian journey, alone with my work, my sole endeavor, less now one of passion than survival in an inhospitable landscape.

But I have persisted, like the tedious act of making fire from manure and bits of precious hay, twigs turning ever more quickly between hands rubbed raw from friction in hope of a spark, at first, and then a roaring fire, offering light and warmth to this frozen soul, and once fostered into a full blown blaze, ending my decade-long winter of work, beckoning spring.

Still, I linger over the remnants of this time before they, too, are gone, carefully double checking that the words and charts and graphs I once cursed as I labored over their creation are within the acceptable margins, the citations, last name and year, in APA style; futzing over the cover sheet my committee will sign, my name alongside four, more experienced travelers of this terrain, no longer alone; verifying that my graduation hood has been ordered, and the title of my dissertation to be read aloud amidst a backdrop of pomp and circumstance and amassed family and friends is printed clearly and correctly on the paperwork to be submitted, with the faith that when I defend, three days from now, it will be a Good Friday, indeed.

Isaiah 46:4

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CHAPTER I

INTRODUCTION

Need for Study

The development of student occupational aspirations is particularly relevant to educators and policy makers interested in enhancing the educational and eventual occupational outcomes of students. Recent research has revealed that desired educational and subsequent occupational outcomes for students are increasingly disappointing, with less than 45% of the US population ages 25-34 having acquired a college degree (J. M. Lee & Rawls, 2010, p. 28), even as the number of high school students planning to attain a college degree has increased steadily, with current college aspiration rates at over 80% (Goyette, 2008). The rise in misalignment between educational and occupational aspirations and attainment (Csikszentmihalyi & Schneider, 2000; Rosenbaum, 1998, 2001; Schneider & Stevenson, 1999) has highlighted the need for schools to address this disparity. While educational research has placed a great deal of emphasis on understanding how schools impact educational aspirations and attainment, given the increasing misalignment and its subsequent effect on both the individual and society, as well as the significant relationships between occupational aspirations and both educational and occupational attainment (Blau & Duncan, 1967; Csikszentmihalyi & Schneider, 2000; Gottfredson, 1981; Goyette, 2008; Inoue, 1999; Plucker, 1998; Robertshaw & Wolfle, 1980; Rosenbaum, Miller, & Roy, 1996; Schneider & Stevenson, 1999; Sewell, Haller, & Portes, 1969; Wong, 1997a), a renewed focus on understanding how schools impact the formation of student occupational

aspirations is warranted (Cebi, 2007; Kenny, Blustein, Chaves, Grossman, & Gallagher, 2003; Kerckhoff, 2000b; Plucker, 1998).

Indeed, the development of occupational aspirations is a critical step for students, as their aspirations guide their educational and occupational choices toward occupational attainment. How and when student occupational aspirations are formed has long received cross disciplinary attention ranging from sociological perspectives on occupational aspirations being significant in status attainment and the social reproduction cycle (Blau & Duncan, 1967; Bourdieu & Passeron, 1977; Haller & Portes, 1973; Sewell et al., 1969); psychological research analyzing individual and family level characteristics in relation to aspirations (Hansen & McIntire, 1989; Kerckhoff & Huff, 1974; McClelland, 1990); and revealing adolescence as the most influential period for aspirational development and occupational commitment (Holland, 1985; Marcia, 1987; Trice & McClellan, 1993); social psychology addressing the effects of personal attributes such as self-efficacy and motivation on aspirational development (Bandura, 1986; Gottfredson, 1981; Lent, Brown, & Hackett, 1996; Lent, Brown, & Larkin, 1986); and educational research analyzing aspects of schools in relation to aspirations, including school type (Gamoran, 1996; Rumberger & Palardy, 2004), locale (Cook et al., 1996; Gamoran, 1996), curriculum (Kerckhoff, 2000a), student supports (Kenny et al., 2003), and the effects of education policy (Orfield, 1997; Stern, 2009), vocational education (Kerckhoff, 2000a; Rosenbaum, 2001) and school counselors (Paisley & Hayes, 2003; Lee, Daniels, Puig, Newgent and Nam, 2008).

As noted by Helwig (2004), “career education and its consequent career development happen everywhere, all the time” (p. 56). As students spend a significant portion of their lives in schools during developmental stages which are in part associated with occupational exploration, identification, and aspiration, refining their ideas about “who to be . . . and what occupational

direction to pursue” (Marcia, 1987, p.166), it becomes important to examine more closely the role of school context in the development of student occupational aspirations. Although the existing literature documents the direct effects of specific school characteristics on the formation of student occupational aspirations, an examination of how the developmental context of schools (Kenny et al., 2003) may indirectly affect student’s formational process over time (Helwig, 2004; Rindfuss, Cooksey, & Sutterlin, 1999) may provide greater insight into how educators can address the issue of misalignment.

Purpose of Study

Both educators and policy makers seek positive outcomes for students, but require empirical data upon which to base policy and curriculum decisions. The purpose of this study is to examine the interaction between the environment of schools and the agentic choices of students at a time when they are developing and committing to occupational aspirations which may significantly affect both their educational and occupational outcomes. To do so, the theoretical framework of this study builds on: (a) prior educational research that acknowledges this interaction (Csikszentmihalyi & Schneider, 2000; Kerckhoff, 1972; A. M. Ryan & Patrick, 2001; Seifert, 2004); (b) social psychological research that asserts the importance of student motivation in the development of aspirations, specifically the significant importance of how much control students feels over their lives (Gottfredson, 1981; Hanson, 1994; Mau & Bikos, 2000; Mortimer, 2000; Mortimer, Vuolo, Staff, Wakefield, & Xie, 2008; Mortimer, Zimmer-Gembeck, Holmes, & Shanahan, 2002; Wang, Kick, Fraser, & Burns, 1999); and (c) the educational research which reveals that characteristics of schools impact students, and specifically, student motivation and sense of personal control (Bradley & Gaa, 1977; Eccles &

Midgley, 1989; Eccles & Roeser, 2009; Plucker, 1998; Stipek, 1980), along with the career and vocational development research which posits that career education is a constant (Helwig, 2004). Based on this theoretical framework, this study hypothesizes that one way the context of schools may impact student occupational aspirations is indirectly, by impacting student locus of control. This study contributes to the educational research in two important ways: first, by analyzing whether locus of control is a mechanism by which schools have an effect on student occupational aspirations and second, by examining the effect of schools on locus of control and occupational aspirations over time.

Research Interest

The research interest in this study is whether there is a contextual effect of schools, and specific school characteristics, on student occupational aspiration. As such, the research in this study is focused on the following questions:

Is it possible that characteristics of schools have a significant impact on student occupational aspiration indirectly via a mediating student characteristic—specifically student locus of control?

1. Do school characteristics (i.e., academic press, school climate, counselor supports, SES) directly impact student occupational aspirations?
2. Do the characteristics of schools directly impact student locus of control?
3. Does student locus of control directly impact student occupational aspirations?
4. Given these answers, does student locus of control mediate the relationship between the characteristics of schools and student occupational aspirations?

Contribution

This research provides an important contribution to the literature by examining a previously unstudied relationship between school environment and student occupational aspirations via student locus of control and analyzing whether locus of control is a mediating mechanism by which the context of school impacts the formation of student occupational aspiration over time.

Overview

- Chapter I outlines current problem, purpose of study, and research questions as well as the contribution to the existing literature.
- Chapter II provides an overview of the literature regarding the importance of educational and occupational aspirations, the role of schools in their development, the issue of misalignment, the role of locus of control in occupational aspirations and how schools may influence student locus of control and thus student occupational aspirations and eventual outcomes.
- Chapter III provides a discussion of the theoretical framework, hypotheses based on the literature, and expected results from the analysis.
- Chapter IV discusses the dataset, methodology, measures, and models.
- Chapter V provides an analysis of the results of the study in relation to the hypotheses.
- Chapter VI discusses the results of the study in relation to the theoretical framework, the limitations of the study, and opportunities for future research as well as policy considerations stemming from the study.

CHAPTER II

REVIEW OF THE LITERATURE

Educational and Occupational Aspirations and Their Importance

Educational and occupational aspirations have been defined by researchers as a person's orientation toward particular academic or career goals and the desire to obtain those goals (Gottfredson, 1981; Hansen & McIntire, 1989; Rojewski, 1996). Educational and occupational aspirations foster action and persistence when connected to pathways and programs meant for positive outcomes (Paul, 1997a) and are important at both the individual and societal levels. For the individual, aspirations form foundational pathways toward future attainment of education, skills, and jobs. Aspirations serve as a map for future choices, guiding individual agency toward a desired outcome. For US society, educational attainment and transition into the workforce are what create economic sustainability (Wong, 1997b). Development of higher aspirations as a path toward meeting future workforce demands is a necessity in a postindustrial age that requires highly skilled workers (National Commission on Excellence in Education, 1983; Weiss, 2003). In addition, aspirations impact individual status attainment, which in turn shift the overall social stratification.

Due to their importance, research on occupational and educational aspirations has a long history in sociological and educational literature. One of the earliest studies to examine the importance of occupational and educational aspirations specifically focused on the process of formation (Sewell et al., 1969). Status attainment theory explains the formation of aspirations as the result of social stratification (I. H. Lee & Rojewski, 2009). Sewell et al. (1969) hypothesized that aspirations are formed out of two sets of influences:

1. that of significant others such as parents, friends, and teachers; and
2. that of individual assessment of future potential based on past performance (Haller & Portes, 1973).

Known as the Wisconsin Model of status attainment, Sewell et al. (1969) estimated the effects of these influences on the formation of individual educational and occupational aspirations by employing path analysis with a longitudinal set of data collected from male graduates of Wisconsin high schools in 1957, with a follow-up in 1964. With a total sample of 929 subjects, researchers analyzed the impact of socioeconomic status (SES), cognitive ability, academic performance, and the influence of significant others. Significant others' influence was measured by a summed score of four variables which included whether or not the student was encouraged to go to college by his mother, his father, his teachers and whether or not his friends planned to attend college. The resulting estimation supported the hypothesis that significant others and SES had a direct effect on the formation of aspirations. The Wisconsin model was one of the first to reveal the importance of social psychological influences (i.e., the influence of others on students' thoughts, feelings or behaviors) on the development of aspirations and was formative in setting the stage for understanding what contributes to the overall development of aspirations.

Building on past theory and research, Mau and Bikos (2000) also examined how clusters of variables predicted the formation of educational and occupational aspirations. Using the National Educational Longitudinal Study data from 1988-1994 (NELS:88) third wave, these researchers used regression analysis to analyze the impact of personal/psychological characteristics, school, family, sex, and race on the aspirations of 6,133 students. In keeping with prior research, Mau and Bikos found that personal characteristics such as race and sex are highly predictive of the level of aspiration formed by students, although more so for education

than for occupation. Likewise, school variables such as academic track and type of school were also predictive of the level of aspirations formed by students. In other words, minority, male, or students in a general academic track or in a public school will have predictably lower aspirations than non-minority, female, or students in a higher academic track or attending a private school. Personal variables such as self-efficacy, locus of control, and self-concept were also significantly predictive of the levels of aspirations students formed: those students with higher self-efficacy, internal locus of control and greater self-concept predicted higher aspirations than students with low self-efficacy and self-concept scores and an external locus of control.

The formation of aspirations is a critical step for young people in that aspirations help guide choices toward eventual educational and occupational attainment. Aspirational formation is especially important in the current social milieu. The need for such aspirations and for young people to decide what they want to be when they grow up is a relatively modern phenomenon (Csikszentmihalyi & Schneider 2000), coinciding with the rapid increase in industrialization and technology (Choy, 2002; Goyette, 2008; Goyette & Mullen, 2006). In the span of roughly two and a half generations, predictable occupational roles defined by division of labor, familial ties, or social class have ceased to be the norm (R. B. Lee & DeVore, 1975; Shanahan, 2000). While aspiring to an occupation outside of those culturally prescribed was once irrelevant, such occupational aspirations are increasingly requisite to ensure economic self-sufficiency in the complexity of the 21st century marketplace (Mortimer et al., 2008). Modell (1989) referred to this process of having to choose between options as “the injection of increasing volition into the youthful life course” because of a decoupling of “determinate sequences and intervals” (pp. 332-333) which were previously inevitable. According to Mortimer et al. (2008), “it may seem difficult, if not impossible, for teenagers to prepare themselves for the unforeseeable future labor

market” (p. 2), since they are not sure what they will do, “which role models, if any are valid . . . what expectations are realistic, what skills are useful or what values are relevant to their futures” (Csikszentmihalyi & Schneider, 2000, pp. 4-5). Previously predictable roles and livelihoods have been replaced with a need for young people to form aspirations and to be informed about a multitude of occupational pathways at a very early age (Trusty, Niles, & Carney, 2005) in order to gain the educational foundation necessary to pursue the vastly expanded and more technology driven occupations to which they might aspire. Reinforcing the need for students to be prepared and the disappearance of predictable occupational roles, the U.S. Bureau of Labor Statistics (2012) reported that the average baby boomer changed jobs over 11 times between the ages of 18 and 46. While there is a necessity for students to form aspirations for overall success in the modern age, they must also be aware of the need to continually reinvest in the aspiration and attainment process for a lifetime in which job change is a constant reality (Savickas et al., 2009).

At the societal level, educational and occupational aspirations and attainment are important because they are tied to the underpinning of the American social structure (Blau & Duncan, 1967; Haller & Portes, 1973; Haller & Woefel, 1972). According to Blau and Duncan (1967),

technological progress has created a need for advanced knowledge and skills on the part of a large proportion of the labor force, not merely a small professional elite. Under these conditions society cannot any longer afford the waste of human resources a rigid class structure entails. (p. 431)

Greater mobility across the occupational attainment structures is imperative in that it allows for increased numbers of people to gain and contribute knowledge, skills and abilities necessary in a technological age. The importance of mobility is supported by aspirations which are linked to desires for increased status attainment and social mobility (Blau & Duncan, 1967; Gamoran, 2000; Haller & Portes, 1973; Inoue, 1999; Sewell, Haller, & Ohlendorf, 1970; Sewell et al.,

1969; Sorokin, 1927). Research reveals that aspirational development crosses boundaries of class and race. Students from lower SES and minority populations have high aspirations for their futures even if they don't have the same access to resources to achieve these goals as their non-minority, higher SES counterparts (Merton, 1957; Wang et al., 1999). Similarly, students with disabilities have aspirations for their futures, albeit somewhat lower than their peers without disabilities (Rojewski, 1996). What many disadvantaged students recognize is that higher status occupations net greater social mobility (Blau & Duncan, 1967, p. 56), and this recognition in part fuels their aspirations.

Although educational and occupational aspirations are vital to the individual and society, the fundamental development of aspirations remains largely that of the individual student. Given both the agentic nature of educational and occupational choices and the societal need for students to foster aspirations in preparation for the future, understanding not only what motivates and shapes student aspirations, but their impact on future attainment is crucial. Acknowledged as essential pathways toward the future, whether aspirations actually predict future educational and occupational attainment has been widely discussed. Early estimations from the Wisconsin model (Sewell et al., 1969) reveal that aspirations have substantial influence on future attainment. In later research, Rojewski (1996) argued that aspirations may not be determinants of future attainment but are important since they represent orientation toward particular attainment, and that educational aspirations tend to have direct bearing on eventual occupational attainment and play an active role in determining whether students should pursue or ignore educational opportunities available to them, especially in high school (Inoue, 1999; Rojewski, 1996). Echoing early research in which Strong (1953) predicted a .69 correlation between a student's first choice expressed occupational interest and their attained occupation 19 years later, more

recent analysis of aspirations in the areas of education and occupation has shown that aspirations are among the most useful predictors of eventual educational and occupations choices (Blau & Duncan, 1967; Gottfredson, 1981; Marjoribanks, 1985). Research by Schoon and Parsons (2002) corroborated these early findings, establishing that expressed occupational aspirations are equal to or better than interest inventories in predicting future occupational attainment. Research by Paul (1997a) found that career aspirations were important when turning intent into endeavor, whether that intent is to go on to college or into the working world after high school. Given the extensive research demonstrating the effect of aspirations on future attainment and society's need for students to aspire to and attain higher educational and occupational goals in relation to the technological era, the importance of aspirations is clear.

Linkages Between Occupational and Educational Aspirations

The educational and occupational structures in the United States are “so closely intertwined that it is almost impossible to discuss one without discussing the other” (Inoue, 1999, p. 1; Woefel, 1972). Sociologists have long recognized that in the US, more education often equates to higher status (Gamoran, 2000; Sorokin, 1927), and research confirms a high correlation between one's level of education and income (Wong, 1997a). Indeed, the strong and significant effects of academic achievement on occupation and earnings increase steadily up to age 35 (Jencks et al., 1979; Murnane, Willett, & Levy, 1995; O'Rand, 2000). An economic theory of human capital (Becker, 1964) summarizes these outcomes based on two main tenets:

1. that workers with better educational backgrounds and training fare better in the labor market and

2. nations with larger pools of human capital resources will be more competitive in the global economy, resulting in higher paying jobs.

Therefore, investing in education yields increased opportunity and earnings for individuals and helps ensure national economic stability. As noted earlier, educational and occupational aspirations lay the groundwork for future educational and occupational attainment and their subsequent individual and collective outcomes.

More specifically, academic achievement links educational and occupational aspirations and outcomes (Gamoran, 1996; Helwig, 2004; Inoue, 1999; NCES, 2006; Rindfuss et al., 1999; Rosenbaum, 2001). Research shows that strong academic performance enhances future occupational opportunities and provides youth with strong advantages in occupational attainment and earnings (Parcel & Dufur, 2001) while weak academic performance and academic attainment predicts lower earnings (S. R. Miller & Rosenbaum, 1997). In a longitudinal analysis examining the determinants of earnings immediately after high school, Rosenbaum (2001) found that test scores have a strong and significant influence on students' later earnings rather than immediate earnings, but the effects of achievement remain highly significant over time. Indeed, people's jobs and wages are a primarily a function of their educational credentials and cognitive skills developed through schooling (M. K. Johnson & Mortimer, 2002). In their research on how teens prepare for the world of work, Csikszentmihalyi and Schneider (2000) analyzed data from the second year of the longitudinal Sloan Study of Youth and Social Development on 140 high school graduates one year after graduation. Utilizing both logistic regression models and path analysis to understand the effects of academic and background variables on outcomes by examining the number, type, and level of difficulty of courses taken in the previous year as well as variables such as parental education, gender, race and social class, results reveal that academic

performance is an important predictor of college enrollment, which in turn effects future occupational opportunities. Researchers also discovered that a key predictor in determining whether a student will go to college or directly into the workforce is high school GPA. The types of classes, and specifically the number of math and sciences classes taken in high school, are significant predictors of college enrollment and whether a student will pursue a four-year college or a community college. Indeed, research in various disciplines has demonstrated significant and positive relationships between academic achievement and higher educational and occupational aspirations (Mau, 1995). Doing well academically by taking challenging courses and getting good grades offers all students, especially those from challenged or impoverished environments, greater opportunity to pursue both educational and occupational aspirations.

Occupational aspirations have direct effects on educational aspirations, and are often fueled by the desire for higher status attainment (Csikszentmihalyi & Schneider, 2000; Inoue, 1999). In the US, occupation is a strong determinant of wealth, lifestyle, and individual status within their community (M. K. Johnson & Mortimer, 2002). According to researchers, the public thinks about education primarily in terms of preparation for work, better jobs, and better opportunities in life (Orfield, 1997). Adolescents, regardless of race, have an overall belief that if they receive a good education, they will be able to get a good job (Steinberg, Dornbusch, & Brown, 1992), and that “school was viewed as the vehicle leading to better paying jobs” (Okagaki, 2001, p. 12). Csikszentmihalyi and Schneider (2000) noted that wealth and material concerns, specifically “the means to indulge in expensive leisure and consumption habits” (p. 9), motivates many adolescents toward higher occupational goals. As noted previously, jobs are increasingly knowledge and technology driven, which requires additional education. Thus,

students often aspire to educational goals as stepping stones to their occupational aspirations and, in turn, their aspirations for enhanced status (Goyette, 2008).

Which occupations qualify as having higher status has been the focus of sociologists such as Nakao and Treas (1992, 1994) who developed a widely used occupational prestige scale. Occupational prestige is the general level of social standing enjoyed by those within a specific occupation (Hauser & Warren, 1997) and prestige scales are often utilized by sociologists and other social scientists in an effort to understand motivations, conceptions, and behavior related to work and occupations. Previous large-scale survey research in this area was based on both occupational titles from census data and a large representative sample regarding public opinion on the prestige of these occupational titles was carried out by the National Opinion Research Center dating back to 1947 (Reiss, 1961) and subsequently expounded upon and updated by researchers throughout the following decades (Duncan, 1961; Hauser & Feathermen, 1977; Hauser & Warren, 1997). The most current index was developed by Nakao and Treas (1994), and is widely accepted because it reflects not only updated titles but measured the shifts in public opinion regarding the prestige of those titles rather than apply outdated public opinion to the updated occupational categories. Nakao and Treas found that in comparing previous occupational scales from the 1940s through the 1970s (Duncan, 1961; Hauser & Feathermen, 1977; Reiss, 1961; Stevens & Cho, 1985; Stevens & Hoisington, 1987) to the Nakao-Treas scale which was developed using the occupational categories found in the 1980 US census and subsequently updated using the 1990 census occupational categories, that a significant factor in the difference in prestige scores was recent shifts in public opinion, with 44% of occupational titles experiencing a statistically significant change ($p < 0.05$) in prestige score between 1964 and 1989. In general, prestige of occupational titles rose. However, some occupations which had

once been comfortably situated at the top of the prestige scale in the previous decades such as being a banker or a draftsman were now considered less prestigious, while different occupations such as those in entertainment or technology were becoming more prestigious (Nakao & Treas, 1994).

Yet, higher status occupational aspirations may go unfulfilled due to constrained opportunities (M. K. Johnson & Mortimer, 2002). I. H. Lee and Rojewski (2009) posited that “aspirations are formed at an early age by the opportunities or barriers presented to individuals through external factors such as bias, discrimination, cultural expectations, societal attitudes and stereotypes based on gender, race and social class” (p. 83). This position points to perhaps a less obvious but equally important linkage between educational and occupational aspirations. Inequalities in student background such as SES (Bourdieu, 1973; Kerckhoff, 1976; McClelland, 1990; Sewell et al., 1969), personal ability and even organizational features within and between schools (V. E. Lee, Bryk, & Smith, 1993) such as quality of instruction (Oakes, Gamoran, & Page, 1992), interest and commitment of teachers (V. E. Lee & Bryk, 1989), ability grouping (Gamoran, 2000; Gamoran & Berends, 1987) or access to vocational training (Kerckhoff, 2000a; Schneider & Stevenson, 1999) can contribute to differentials in student educational outcomes and have implications for subsequent occupational prospects and career outcomes (M. K. Johnson & Mortimer, 2002). If inequalities in background are reinscribed in educational structures, high occupational aspirations may seem unrealistic and consequently students within constrained opportunity environments may not pursue such aspirations (Hanson, 1994). Rojewski (2005) noted that students with lower occupational expectations are more likely to make educational compromises, restricting the range of future educational and occupational

options. Lower educational aspirations are linked to low occupational attainment (Inoue, 1999), correlating to lower levels of socioeconomic status (Blau & Duncan, 1967; Rojewski, 2005).

Another reason why students may not form high educational and occupational aspirations is related to individual assessment of performance and subsequent opportunity (Sewell et al., 1969). Social psychological research reveals that earlier achievements enhance self-selection for future opportunities (Alwin, 1994; Mortimer, 2000), thus students who assess their personal achievement and find it lacking may also limit their aspirational goals based on what opportunities they assess will be available to them based on their level of achievement. Often such self-evaluations are reinforced over time as prior achievement regulates the access to future opportunities for achievement (O'Rand, 2000). Students modify their aspirations based on learning experiences and performance outcomes (Lent et al., 1996). In relation to this feedback loop, aspirations of children vary over time (Kerckhoff, 1974), but become more invariant with age (Rindfuss et al., 1999). By the end of 12th grade, most student aspirations are crystallized and more realistic of what they expect to achieve (Helwig, 2004; I. H. Lee & Rojewski, 2009), even if lower than the point of their original conception (Dennehy & Mortimer, 1993; Rindfuss et al., 1999).

Research on student perceptions and decision making is exemplified in a two-part study by Kenny et al. (2003), who led a research team in examining the relationship of students' perceived barriers and support with subsequent levels of school engagement and vocational attitudes. The premise of the two-part study was based on previous research establishing that urban youth face many obstacles in pursuit of education and career goals and due to these obstacles are more likely to disengage from school and post-school planning. These barriers are attributed to the lack of resources available to prepare urban youth for success in work or

college, thus leaving them with limited skills and limited opportunities. Additional research focused on “contextual career supports” has been recommended for the purpose of exploring ways to help individuals overcome perceived barriers. Kenny et al.’s research was designed for that purpose, and focused on documenting the relationship between perceived educational and occupational barriers and support to school engagement and career attitudes in urban youth. Hypotheses for the study included the expectation that perceived barriers would be negatively associated with school engagement and occupational aspirations, and that kinship support would be positively associated with these two aspects. Study 1 included 174 students, and Study 2 included 181 students, both samples from public high schools in a large northeastern city. Data were gathered through questionnaires given to ninth-graders involved in classes specifically designed to link school to work.

Results from the first study confirmed the hypotheses and reported that where there were lower levels of perceived barriers, there were higher levels of school engagement and higher aspirations for future careers. Study 2 set out to understand the relationship of these variables in greater depth and found that perceived barriers existed outside of the context of school. The barriers outside of school context, such as poverty and discrimination, had an influence on engagement within school. Likewise, students who had high career aspirations but believed those aspirations were not attainable because of perceived barriers, might choose to disengage. Schools that magnify, or add to, perceived barriers through actions such as default tracking (i.e., basing academic track placements on previous tracking rather than consideration of other variables such as academic performance) increase the risk of student disengagement, which inhibits or limits the process of exploration and subsequent aspirational formation. Kenny et al. (2003) noted that perception of support and barriers influence development of adaptive attitudes

about the self in relation to school and work, that students in the sample are “shaping their lives to some extent from their interpretation of environmental events” (p. 147).

While Kerckhoff (2000a) acknowledged that “we have yet to do an adequate job of accounting for the kinds of linkages between educational and labor force institutions” (p. 51), Kenny et al.’s (2003) work highlights the inherent linkages between school environments and mindset and subsequent engagement and outcomes of adolescents. Many years prior to actually entering the working world, students are interpreting their potential place in that world from their educational interaction. With factors such as academic achievement, educational environment, and self-assessment contributing to the development of aspirations, adolescents may not always aspire to higher levels of educational or occupational attainment even while they desire great social status or personal wealth because they perceive barriers to attainment. While lowered aspirations due to perceived barriers are not a desired outcome, even such perceptions indicate that the linkages between educational and occupational aspirations persist.

Role of Schools in the Development of Aspirations

Based on the importance of, and clear linkages between, educational and occupational aspirations, understanding the role of schools in the development of those aspirations is critical. To that extent one must consider the public expectations of schools, their function and functioning. What are the public expectations of school in relation to preparing students for the working world? How do educational policy decisions reflect the linkages between educational and occupational aspirations? Does how schools work impact aspirational formation? How does the contextual environment of schools—specifically interaction with teachers, curriculum

offerings and tracks, availability and access to counselors—affect student aspirations? This section will discuss each of these questions with a review of relevant literature.

Expectations of schools in relation to preparing students for the world of work varies, although as Hallinan (2000) pointed out, it is widely accepted that one of schools three main functions is economic: to train future workers for participation in the labor market and thus contribute to the country's economic growth and technological development (p. 153). According to Savickas et al. (2009) school must do more than prepare students for a future with high technological requirements; it must also prepare them for one in which they will experience many changes in their career path. Still, unlike other industrialized countries, the US has a very loose coupling between education and labor (Kerckhoff, 2000a). American students often leave school without specific occupational preparation, job skills, or work credentials and are unprepared for how to enter the labor market after high school (Csikszentmihalyi & Schneider, 2000; Rosenbaum, 2001; Schneider & Stevenson, 1999). In the US system, there are few widely developed and accepted connections between schools and employers (Paul, 1997a), even where vocational education exists (Rosenbaum, 2001). In his work on educational and occupational linkages, Kerckhoff (2000a) noted that without some vocational information and direction, students will experience more turbulence early on in their careers, resulting in a hit-or-miss approach to their occupational attainment process.

Although the US education and occupational structures are loosely coupled, education policy makers acknowledge the linkages between education and occupation, at times with education policy that overtly addresses the issue. This was the case with educational legislation enacted in 1994. The goal of the School to Work Opportunities Act of 1994 (STWOA) was to help students at all levels of K-12 education “obtain the experience, knowledge, and skills

required to explore the world of work, develop employment skills, make decisions and to identify, pursue and attain vocational goals” (McWhirter, Rasheed, & Crothers, 2000, p. 330). This act was an important piece of legislation, as it placed a high economic value on the connection between school and work. It also placed a spotlight on this now federally funded transition process, spurring many researchers to focus on its efficacy.

The Indiana Youth Opportunity Study (IYOS), a longitudinal study that focused on students’ transition from school to work, surveyed 5,200 students in the 8th, 10th, and 12th grades across 52 schools in the state of Indiana, along with their parents and counselors, and then followed the 12th graders for two years after graduation. Begun in 1991-1992 with the initial survey, the study administered a follow-up survey to the 12th graders two years after graduation in 1994-1995. The data from the study were used to compare student’s career expectations while in high school with employment outcomes after high school (Wong, 1997a, 1997b). The strength of this study lies in its sample size ($N = 5200$) and its design in including the three specific groups that most influence adolescent decisions in relation to occupational decision making: parents, schools (specifically, counselors) and the students themselves. With significant data on all three groups, the study was able to analyze the role of school in relation to the adolescent and the reality of the academic decision-making process in relation to the working world. Perhaps an even greater strength of this study was its longitudinal design to track student academic choices with outcomes, providing valuable data on the effects of academic program preparation (or lack thereof) and tracking. This study also briefly touched upon an oft forgotten population of adolescents—dropouts—and discussed potential issues this population faces based on its decision to leave school. Critics of the IYOS study have noted that results needed to be more specific and take into account multiple variables involved in the decision-making process

for the students studied, controlling for student attributes such as poor attendance or behavior which might influence the research results. Critics suggested that if true change is to come from such research, schools need more than average outcome information; they need specific student detail on choice and outcome in order to address focused challenges facing the student populations in their specific schools (Rosenbaum, Miller, & Krei, 1997, p. 90).

The IYOS study also found that in many cases, parents relied on schools to help their children prepare for the years beyond high school because they themselves lacked the expertise to do so. Orfield (1997) noted that the educational and occupational level of parents correlated with a willingness to concede educational decisions to school staff, and counselors were counted on to help guide their children to college or successful careers. Additionally, students in the study “reported a serious need for assistance in obtaining information about jobs and seeking employment. For those whose families have poor information, as many do, the school plays a vital role” (Orfield, 1997, p. 21). The IYOS findings are echoed by other research, which cites the importance of the school’s role in providing information on career options and opportunities (Kelly & Lee, 2001; McWhirter et al., 2000; Mortimer et al., 2002). This is especially true in minority groups and lower socioeconomic communities where information about options among parental groups is lacking (Kenny et al., 2003; Okagaki, 2001).

Results from the IYOS reveal that 70% of students went on to pursue their desired path, whether college or work. For those heading to college, the primary factors in converting intent to endeavor were high school courses taken (college prep track) and positive perception of academic efficacy. For those going into the labor force, the primary factors related to converting intent into endeavor were race (non white) and parents level of education (high school or less). Even for those who were enrolled in a vocational track, their courses in this track did not assist

them in turning intent into action if their goal was anything other than the work world (military or post-secondary vocational education). For those students who went on to college but did not persist past the first year (20%), the factors most influencing their lack of persistence were level of parental education (high school or less), perception of academic efficacy (low grades), and not taking the appropriate high school courses. Eighty-seven percent of those students ended up entering the workforce (Paul, 1997b).

Given the IYOS study and other research on actual school to work practices in play after the 1994 STWOA legislation (Helwig, 2004; Orfield, 1997; Paul, 1997a, 1997b; Rosenbaum, 2001; Wong, 1997b), the question of whether the school to work legislation was an efficacious policy in terms of developing for students clear and successful transitional pathways from school to work has since been answered with a negative. Ultimately, the school to work legislation initiatives to help link school based education with internships and work preparation were slow to be adopted by states, as the need for developing the institutional linkages between schools and the labor market was not clearly understood by educators and counselors--the primary source of information for students choosing courses (Wong, 1997a). Thus, students were left to choose courses and academic tracks based on perceptions that those courses would lead successfully to their desired outcomes, despite the fact that for vocational track students, coursework did not assist them in turning intent into endeavor, nor did college prep track assist those students who did not persist in college and ended up entering the workforce prematurely. The School to Work Opportunities Act of 1994 is one example of how policy may be designed to impact the role of schools and subsequently the goals and choices of students—although the ultimate impact and outcomes may not reflect its original design.

Coursework, and specifically tracking, is another area in which schools play a role in the development of students' aspirations. Tracking starts early and is significantly persistent (Alexander & Entwisle, 2000). Students are placed into ability groups as early as first grade, launching them into "achievement trajectories that persist" (M. K. Johnson & Mortimer, 2002) because of the effects that placement in an ability group or track at one grade level has on the placement at subsequent grade levels (Alexander & Entwisle, 2000; Entwisle & Alexander, 1993). Early tracking is often decided by educators alone, often based on ability or assessed readiness.

The IYOS study (Orfield, 1997) showed significant statistical correlations between the educational and socioeconomic level of parents and those students who chose vocational training programs. Children of parents with less education or lower status jobs were more likely to choose vocational programs. Race, sex, and academic ability were not significant factors in who chose these tracks. IYOS indicates that there was also a consistent pattern of less information and less feeling of confidence and empowerment about program decisions among students and parents in less educated and affluent families (Orfield, 1997). Clearly, this study indicates that vocational tracking can be a significant barrier to future opportunity. Often students and parents have little idea as to how much of a barrier because there is little connection made between the academic program and future aspirations and even less information available to these students and parents on the how various academic programs might affect future opportunities.

The IYOS also noted that the effect of tracking on students is long term. In the IYOS student surveys, most students communicated positive educational and career aspirations, but did not have the appropriate information to link those aspirations with the necessary steps for achievement, ultimately affecting post-secondary outcomes. The study found the misalignment

between aspirations and preparation crossed class, race, and gender lines (Paul, 1997a, p. 94). Longitudinal research confirms that academic choices made as early as middle school have a strong bearing on educational and career development (Rosenbaum, 1998; Trusty et al., 2005) and that track placement is a mediator between student background and academic achievement (Kerckhoff, 1995; V. E. Lee & Bryk, 1988). Berends (1992) noted that students in honors classes were more likely to maintain high expectations than students in other classes, even among students with similar test scores and initial expectations. Indeed, a significant body of research confirms that college preparatory tracking is related to higher educational expectations for attainment (Gamoran & Berends, 1987). Still, research by Hallinan (1996) argued that tracking is not as stringent as once thought, but that movement between tracks still reflects and perpetuates student inequalities in race and gender. Hallinan posited that although tracking changes may be based on academic achievement, after controlling for achievement, the variables gender, SES, and age impact student risk for “tracking down.” Since academic achievement is predictive of future occupational opportunity and earnings (Csikszentmihalyi & Schneider, 2000; S. R. Miller & Rosenbaum, 1997; Parcel & Dufur, 2001; Rosenbaum, 2001) as well as a point for individual evaluation which may limit aspirational development (Alwin, 1994; Lent et al., 1996; O’Rand, 2000), tracking is one way schools play a role in educational and occupations development of students.

As noted in the previous section, student perception of contextual supports or barriers can affect their levels of engagement (Daniels & Araposthesis, 2005; Klem & Connell, 2004), which in turn affects level of achievement (Montalvo, Mansfield, & Miller, 2007; Wehlage, Rutter, Smith, Lesko, & Fernandez, 1989) and sets the groundwork for student aspirations and future attainment. The 2007-2008 High School Survey of Student Engagement asked a national sample

of 6,424 students why they were in school. Fifty-eight percent of those asked responded that they are required by law to attend, with fewer than 40% responding that they are in school because they are interested in learning (Yazzie-Mintz, 2009). While overall levels of engagement are less than ideal given desired student outcomes, such levels are significantly affected by feeling connected to adults in the school community and whether students felt teachers and counselors believed in them (Daniels & Araposthesis, 2005). Research by Plucker (1998) specifically ties supportive school environments to increased student aspirations.

Research by Patrick, Kaplan and Ryan (2007) on the classroom environment and student motivation and engagement found strong evidence that emotional support such as encouragement from teachers improved student engagement, focus on skill mastery and feelings of efficacy (Eccles & Wigfield, 1985; A. M. Ryan & Patrick, 2001). While teacher supports are defined slightly differently by researchers (Goodenow, 1993; Skinner & Belmont, 1993), it typically encompasses features such as caring, understanding, and dependability and refers to the extent students believe teachers value and foster personal relationships with them. Such beliefs contribute dimensionality to the classroom and student perceptions of the support within that context (A. M. Ryan & Patrick, 2001; Schoon, 2001). The specific impact of teachers on student occupational interest is important and increases over time. Helwig (2004) noted that by the time students reach 12th grade, teachers were reported as having the most impact on occupations interests, even with students reporting mixed or negative views about the school's overall career help or support. Franklin (1995) revealed that student interaction with teachers had a strong relationship with academic pursuits and perceptions of cognitive development, which are then used in student self-determination of educational and occupational aspirations. Flowers, Milner, and Moore (2003) found that African American students who felt that their teacher had high

expectations of them had higher educational aspirations but that teachers and counselors need to communicate high aspirations from the beginning of students' educational careers.

In addition, teacher quality and pedagogical methods also impacts engagement and achievement. The academic tasks assigned by teachers to students and the way in which teachers organize classroom participation structures for students contribute to the social environment and thus student learning motivations (A. M. Ryan & Patrick, 2001). Work by educational researchers suggests that instructional content and methods vary systematically, typically favoring those in the higher level classes and working against those in lower level classes, which are typically at the bottom of the status hierarchy (Barr & Dreeben, 1983; Gamoran & Berends, 1987; Gamoran & Mare, 1989; Hoffer, 1992; Kerckhoff, 1986, 1993; Murphy & Hallinger, 1989). Thus, the classroom organization within a school as determined by teachers can impact motivations and aspirational development.

The role of guidance counselors in student trajectories has less prominence in educational research literature, but has received a great deal of research attention from vocational and career development and the field of counseling itself. A 2004 review of career development literature (Hughes & Karp) examined the history and effectiveness of career guidance and counseling, specifically addressing the work performed by school counselors. Noting that counseling gained prominence in public schools at the turn of the century as a way of assisting students in aligning an understanding of self with knowledge, skills and the opportunities available to utilize them, the authors recognize that this was also the beginning of a trend toward "differentiation" tracking in public education based on a counselors determination of future opportunities and outcomes for particular students. Toward the 1970s, a less individualized and more broad based, structured program known as the Comprehensive Guidance Program model was developed, refined and by

the 1980s widely adopted for use in local school districts nationwide. In the last two decades, guidance has received little emphasis in educational reforms, even with the School to Work Opportunities Act of 1994. No Child Left Behind legislation has encouraged academic guidance over vocational or career counseling to coincide with more standards-based outcomes (Carey & Dimmitt, 2008), with only 8% of schools focused on any form of direct career and vocational guidance with students (Hughes & Karp, 2004). According to Hughes and Karp, research in the area of career development confirms that the most often cited activity among counselors is helping students with course scheduling and college admissions, even though career development skills training is predictive of adolescents' goal orientation, directedness, and confidence in their abilities to pursue chosen career paths (Janosz, LeBlanc, Boulerice, & Tremblay, 1997; Turner, 2007). Students seeking vocational guidance are often left to fend for themselves, utilizing what self-help career planning tools may be available within the counseling center.

Counselors were not considered helpful to the large number of students who required their assistance in helping them find relevant academic paths. According to the IYOS (Paul, 1997a; Wong, 1997a), counselors had large counseling loads and little knowledge about work placement or vocational education. The typical course of action was to talk with students about college, even though there was high recognition for the need to help students that might not go to college plan and prepare for work roles after high school. This need was not seen to be as important as college preparation and less than 7% of their time was spent counseling students about alternatives to college. Yet, even the importance of a college preparatory program was not wholly understood by students having to choose which program to embark upon. Often

decisions about academic tracks were made by default by students with very little information about the importance and long term effects of their decision.

The IYOS study stated that

educational and opportunity capital available in high school and required for post high school endeavor and lifelong social and economic opportunity, is mediated by academic program. But the decision process, and the way the decision is treated over the high school years, gives little indication of its immediate and long-term importance. (Paul, 1997b, p. 44)

In terms of academic program choice, the study surveyed eighth-grade school counselors who were asked how they made recommendations for which, if any, high school prep classes (and thus high school program) a student should pursue. From performance criteria such as grades, achievement test scores, IQ tests, or parental and student requests, overwhelmingly counselors made their recommendations based on teacher recommendations, regardless of other factors. Data show that students relied on the influences of guidance counselors in choosing classes in preparation for high school and based on that influence, students rarely revisited their curriculum decision throughout their high school years. This was especially true if there were few opportunities to visit with high school counselors. The study stated that for “90% of the students in our sample, there had been no discussion of broad educational and career goals, or of the more specific issue of program selection for high school, since as far back as the seventh grade” (Paul, 1997b, p. 45).

Research on counseling outcomes reveals significant and positive relationships between student achievement and occupational development and fully implemented guidance programs (Borders & Drury, 1992; Fouad, 1995; Gerler, 1985; Lapan, 2004; Lapan, Aoyagi, & Kayson, 2007; Lapan, Gysbers, Hughey, & Arni, 1993; Lapan, Gysbers, & Sun, 1997; Whiston & Sexton, 1998). This research has early beginnings with Caravello (1958), whose longitudinal research

revealed that one year after graduation, students who had received counseling assistance were more likely to have developed aspirational goals and continue toward those goals after high school. Rothney (1958) found that school counseling had longitudinal effects five years after leaving high school, with students having higher levels of achievement, expressing and attaining aspirations, and persisting in their attained aspirations longer than students who did not receive counseling assistance. Almost 50 years later, McWhirter et al. (2000) echoed these findings in their more recent research using a intervention model which showed significant increases in career decision making as well as increases in their expectations for a satisfying career, but their research showed gains in these areas were not sustainable past the end of the course intervention, casting doubt on the sustainability of the significant effects of counseling outcomes over time. While interaction with school counselors may have positive (if not sustainable) student effects, studies show that a low percentage of students actually seek out counselors to discuss either academic or vocational planning (Mau, 1995) and many students have little or no access to counselors at all (CEEB, 1986). Even where there are counselors available, high student-to-counselor ratios or alternate counselor responsibilities may limit availability of counseling services to individual students (Boyer, 1983; V. E. Lee & Ekstrom, 1987). Such gaps in counselor availability has promoted the use of computer assisted career guidance tools that often require little or no oversight by a guidance counselor, but research on the breadth of their effects and the sustainability of those effects over time is lacking. School counseling is yet another area where schools impact student trajectories, either through their interaction with students, or their lack of it.

In view of research on tracking, student perceptions of contextual supports, actual contextual effects such as teacher practices and actions of and access to counselors, it becomes

clear that schools have an impact on students' self-assessments, motivations, achievement, and development of aspirations. Indeed, as much research in these areas has confirmed, schools are socializing agencies (Alexander & McDill, 1976; Heyns, 1974) that legitimize hierarchies in which people are allocated (i.e., tracks) (Gamoran & Berends, 1987; Gamoran & Mare, 1989; Kerckhoff, 1976; Meyer, 1977). Kerckhoff (1993) detailed the cumulative effects of school organization on both academic achievement and occupational attainment and shows the significant and long-term consequences of those effects—demonstrating through research that formal social structures such as those in schools systematically effect student characteristics and alter outcomes. As noted by Schoon (2001), “the school environment can be either a powerful shaper or deterrent to the development of children’s aspirations” (p. 125).

The Problem of Misalignment

The issue of how schools impact student aspirations is critically pertinent given the relatively sudden onset of a current concern with such aspirations: the issue of misalignment between student aspiration and attainment. According Schneider and Stevenson’s seminal research (1999), teenagers in the 1990s were the most occupationally and educationally ambitious generation in US history, with 70% of students expecting to receive a college degree as compared with 30% in 1955. Ongoing research reveals that recent generations of teens are equally ambitious, if not more so (Reynolds, Stewart, Macdonald, & Sischo, 2006; Yazzie-Mintz, 2009), with educational expectations steadily rising and 84.5% of students in 2002 expecting to receive a college degree (Goyette, 2008). Still, even with high ambitions, students lack the fundamental knowledge of what is required to attain their ambitious aspirations. Not knowing how much and what types of educational attainment are necessary to support their

occupational aspirations is problematic, as it leaves students unable to develop realistic plans for their future. According to research on high school dropout and completion rates, only 73.4% of high school students graduate with a high school diploma (NCES, 2009), even though 91% of students expect to receive one (Yazzie-Mintz, 2009). Researchers have termed the inconsistency in adolescents' knowledge of the world of work and the educational pathways to fulfill their occupational aspirations as an issue of misalignment (Csikszentmihalyi & Schneider, 2000; Orfield, 1997; Rosenbaum, 2001; Schneider & Stevenson, 1999), noting that nearly 60% of students have misaligned ambitions (Schneider & Stevenson, 1999). According to Paul (1997a), misalignment between aspirations and preparation crosses social class, gender, race, and ethnicity. Early theoretical work in vocational development (Ginzberg, Ginsberg, Axelrad, & Herma, 1951) called the process of vocational development irreversible, since experience itself and one's subjective response to it shape vocational choices and build a foundation for future vocational experiences. If the development process is misaligned, it can have negative repercussions on aspirational development and attainment that can last a lifetime. Due to the importance of student educational and occupational aspirations, the alarming rise in aspirational misalignment, and the school's role in it, becomes of equal import.

Level of student engagement can be an important indicator of misalignment. It is widely accepted that the knowledge acquired through high school is related to later options for higher education, and yet many students are disengaged from the academic work required of them during their high school years (Csikszentmihalyi & Schneider, 2000; Rosenbaum, 2001). Initially hypothesized by Stinchcombe in 1965, work bound students do not see school as relevant to their future. This belief was also expressed by work and college bound students alike in 1993 (Rosenbaum, 2001). Recent research on student engagement confirms that while more

students acknowledge that their efforts in high school matter in order for them to go on to college, 46% of students are disengaged at school, believing that among other things, their work is “pointless.” Two thirds of all respondents felt that school did not contribute to their growth in areas such as thinking critically, understanding challenging material, or solving real world problems (Yazzie-Mintz, 2009). Cognitive dissonance between effort and relevance to future outcomes creates the backdrop for aspirational misalignment. If students do not make the fundamental connection between their engagement in high school to subsequent high school outcomes, consequential connections between their aspirations and the work required to attain them may also be at risk.

Reasons for such large numbers of students with misaligned aspirations are numerous. One factor in misalignment is structural. Educational policy which advances a “college for all” norm (Rosenbaum, 2001, p. 56) may have good intentions such as increasing academic achievement and closing the opportunity gap between students from differing SES backgrounds, but according to many researchers the structure of high schools fails to meet the needs of college and non-college bound students alike. First, a college for all norm ignores the needs of those students who are a good match for stable jobs that do not require a college degree or post-secondary skill sets (Reynolds et al., 2006; Rosenbaum, 2001). Counselors are not apt to discourage any students from pursuing college and thus are less likely to suggest alternatives to college (M. K. Johnson & Mortimer, 2002; Rosenbaum, Miller, & Krie, 1996) and the lack of non-college guidance leaves students with few pathways for finding relevant information regarding occupations and planning appropriately.

A similar problem holds true for students who desire to pursue a college degree. While over 80% of students say they will pursue a college education (Goyette, 2008), only about half

will complete a college degree (Resnick & Wirt, 1996; Rosenbaum, 2001). Once again, the students who do not complete a college degree may have had little educational preparation or occupational guidance in high school to assist them when they are unsuccessful in their college pursuits, even though their “subsequent failure is highly predictable in high school” (Rosenbaum, 1998; 2001, p. 58). Rosenbaum (1975, 1976, 1986) posited that high schools encourage high educational aspirations but do not properly discuss barriers, what is necessary to overcome barriers, or what type of planning and effort is necessary to successfully attain those educational aspirations. For college bound students who go on to receive postsecondary degrees, the college bound focus in high school may provide academic training, but a lack of information about occupations in relation to their educational pursuits may still fail to assist students in aligning their aspirations for future attainment. Schneider and Stevenson (1999) posited that these students make less effective use of postsecondary resources than they would if they had a greater sense of direction.

In addition to the college for all norm, unofficial policies within schools such as “social promotion” contribute to the problem of student aspirational misalignment. While research has long confirmed that grades are predictive of future success in college, students may not associate grades and academic achievement with future opportunity because schools do not make this clear to them. If students are promoted to the next grade level regardless of actual achievement, they begin to confuse academic effort with time spent in the classroom. Given their experience, such students are unlikely to expect college norms to be any different than those in high school, but are likely to fail since this expectation is not reality. Social promotion in high school has resulted in many students unknowingly being unprepared for college, with future aspirations similarly misaligned.

The lack of structural support for school to job linkages has left students with little knowledge of how to transition from school life to work life. The 1988 report by the Grant Commission concluded that too many young people across the US flounder and fail in their efforts to successfully make their way into adulthood. Glover and Marshall (1993) summarized the US approach to structural school-to-work linkages by declaring that

America has the worst approach to school-to-work transition of any industrialized nation. Put simply, we have no systematic processes to assist high school graduates to move smoothly from school into employment. . . . Most high school graduates not going to college are left sink or swim--without advice or career counseling and without any job-placement assistance. (p. 130)

Even with the School to Work Opportunities Act (1994), structural linkages between schools and organizations encouraged by the policy failed to catch on, with most school districts nationwide unsuccessful at seeking out and implementing such programs within their schools (Orfield, 1997; Paul, 1997a). Although research acknowledges the need for structural linkages, since the unsuccessful attempts with STWOA such an approach has not been widely pursued (Csikszentmihalyi & Schneider, 2000; Rosenbaum, 2001; Stern, 2009). For all students, a high school environment that fails to associate the importance and requirements of education with relevance to future occupational success creates an environment ripe for aspirational misalignment. In such an environment, students end up developing aspirations and aspirational plans in isolation, unconnected to valid educational requisites or occupational knowledge (Goyette, 2008). Glover and Marshall (1993) posited that these structural issues ultimately fail the students the education policies were meant to assist. Interestingly, these structural issues also signal that the aspirations of high schools themselves are as misaligned as a majority of its students.

Given the lack of exposure to, and education about, linkages between school and work and structural support for aspirational alignment, adolescents are left largely on their own to make connections between school and work (Mortimer et al., 2002). Adolescents face greater workplace complexity, with more occupational options and little knowledge about how to choose between them or prepare for them (Modell, 1989). Without structural supports and knowledge about what effort is required to meet their aspirational goals, M. K. Johnson and Mortimer (2002) noted that students lack interest in thinking about their adult occupational choices. Gottfredson (2005) suggested that the structure and protective nature of high school itself allows students to delay making choices regarding their future and as such, students are less motivated to obtain the information necessary to make informed career choices at a time when access to resources, planning, and education are readily available. Students may also be unmotivated to explore future occupational information because, as Csikszentmihalyi and Schneider (2000) posited, adolescents often associate work with obligatory and undesirable activities. As such, many adolescents view work only as palatable if it results in increased monetary reward, power or fame. Lack of information and disconnection between academic effort and occupational attainment leave these students with naïve and misaligned aspirations. The delay in serious occupational consideration may be a prolongation of childhood with serious consequences in that such students are left to grapple with reality after educational opportunities have already narrowed and they are beyond the scope of secondary school guidance (M. K. Johnson & Mortimer, 2002). Lack of exposure to the vast occupational landscape leaves many students unable to plan appropriately and often, despite their level of academic achievement, they pursue college “in the hope that their vocational goals will become clearer along the way” (Csikszentmihalyi & Schneider, 2000, p. 215). Without the knowledge of whether or not college

may be needed for their ultimate aspirations (Rosenbaum, 2001), or even how to be successful (Goyette, 2008) once enrolled, students take their unresolved problems of misalignment with them from high school to college.

Misaligned aspirations establish a false foundation for future success of students. In an educational environment in which students are asked to make choices but not given sufficient information (Rosenbaum et al., 1997) and are promoted to subsequent grade levels and encouraged to go on to college despite their academic achievement (Rosenbaum, 2001), underachieving students may have an artificial sense that they are prepared for college and develop aspirations and plans accordingly. Yet, research on the number of students with college ambitions who actually receive a college degree confirms that often these students are not prepared for postsecondary education. According to Rosenbaum (2001), open admission policies at community colleges perpetuate inflated educational aspirations of low-achieving, underprepared students with low barriers to entry and remedial course offerings. While students who attend two-year community college programs often view them as a second chance to learn what they missed in high school, research shows that only 18.7% of those planning to get a two-year degree actually attain one in the ten years after leaving high school. Many students who enter two year programs end up “downsizing” their occupational aspirations (Schneider & Stevenson, 1999, p. 208). For those underprepared students who go on to four-year college programs, only 44.5% succeed in getting that degree. Four-year colleges have also begun offering remedial courses for students who are underprepared for regular college curriculum. According to the National Center for Educational Statistics (1999), 40% of college students have taken remedial courses. The effect of remediation is costly for students in multiple ways. First, students pay college tuition for remedial courses as they would regular college courses but

receive no college credit for remedial work, which can be financially costly (Rosenbaum, 2001). Second, research by Deil-Amen and Rosenbaum (2002) revealed that the more remedial courses a student takes, the higher the probability that the student will drop out. This is emotionally costly, affecting a student's self-esteem (Rosenbaum, 2001), as few students pursuing college expect to fail. It also leaves the student without a degree, limiting future earnings (S. R. Miller & Rosenbaum, 1997; Rosenbaum, Miller, & Roy, 1996) and potentially limiting occupational opportunities as well. Finally, for students who postpone occupational planning until college, dropping out of college leaves them with little information, few skills, and no developmental time to assess, plan, and align their aspirations. Data on misalignment confirms that students who are unsuccessful in attaining their educational aspirations end up lowering their occupational aspirations (Rosenbaum, 2001; Schneider & Stevenson, 1999).

The negative effects of misaligned aspirations are far reaching. Despite incentives, for students who do not view their current high school experiences as relevant to their futures or careers, they often become disengaged from school and post-school planning (Kenny et al., 2003). Rather than focusing on consequences, research on student engagement found that students tend to focus on their experiences within school (Yazzie-Mintz, 2009). In addition to those who feel school is irrelevant to their futures, students at risk for disengagement include students who feel a lack of importance, a lack of community, or a sense that someone at school cares, and those who feel a lack of control over the system or their ability to change it. Additionally, the research suggests connections between engagement and achievement and that there is an engagement gap that mirrors the achievement gap in that the characteristics of students with low levels of engagement are the same students with lower levels of achievement (Yazzie-Mintz, 2009). Understanding school as relevant and being engaged with the work of

school is important for alignment. Without it, students are not only likely to have misaligned aspirations but may drop out of school, which is the ultimate form of disengagement.

Ramifications for students who drop out include lower lifetime earnings and lower SES due to limited occupational opportunities. Misalignment has another effect, which is the ratcheting down of aspirational levels upon leaving high school. I. H. Lee and Rojewski (2009) showed that career aspirations experience negative growth after high school graduation and a move to less prestigious occupational goals.

The individual effects of misalignment have a larger, societal impact. While individual disengagement may result in lower academic achievement, aspirations, attainment, and individual earnings, it may also signal societal disengagement. On a large scale, disengagement threatens societal goals and the ability to meet societal needs (AEE, 2009). The landmark report on *A Nation at Risk* (National Commission on Excellence in Education, 1983) delineated the societal need for the US to be academically prepared in order to be globally competitive. This need has been reiterated in follow-up research (Weiss, 2003) and has been an important premise underlying more recent educational policy mandates such as *No Child Left Behind* (*No Child Left Behind Act of 2001, 2002*). Domestically, disengagement may result in higher unemployment, incarceration rates, and reduced financial contribution (Sum, Khatiwada, McLaughlin, & Palma, 2009), all with negative societal effects. As Rosenbaum (2001) noted, the ability for a society to persist in its goals for another generation requires the efforts of engaged youth, and disengagement from school may lead to disengagement from society, threatening persistence. Massive misalignment may have similar effects. While misaligned aspirations may result in disappointed educational and occupational attainment, it may also result in more social stratification and less fluidity in the status attainment process. Educational

attainment is a primary determinant of occupational attainment, which influences the consequential social status via economic attainment of individuals (Haller & Portes, 1973). As noted previously by Blau and Duncan (1967), a less rigid social structure is necessary so that a greater number of people gain the knowledge and skills once reserved for the elite as increased technological needs will require greater numbers of trained and educated support people. Society may be left without an adequately prepared workforce with the knowledge and skills necessary for production. In this way, misalignment, disappointed educational aspirations, and lack of occupational knowledge and linkages threaten societal progress. Misalignment has serious ramifications for the educational system as well. While education policies reflect various societal needs such as a desire for global competitiveness, the preparation of students for the future, considerable misalignment decreases rather than increases viable educational and occupational opportunities for students, calling into question the efficacy of the educational system as a whole. Indeed, Paul (1997 a) summarized the problem of misaligned aspirations, noting that “aspirations spur endeavor and persistence when they are connected to the programs, paths and steps that can lead to positive outcomes. They are meaningless, even harmful, when they are not connected to those programs, paths, and steps” (p. 133).

Importance of Locus of Control

Even where programs, paths, and steps exist, individual agency is a critical factor in achieving outcomes (Seifert, 2004), as structural and agentic processes work in tandem (Mortimer, Staff, & Lee, 2005). According to the research by Csikszentmihalyi and Schneider (2000), two factors that shape the transition from youth to adult careers are social forces and personal effort, and that “individual agency is no less real and important to career formation than

external circumstances” (p. 57). Foundational work in the area of vocational psychology by Super (1953) noted that self-evaluations play an important role in influencing the development of aspirations. Schoon’s research (2001) found that career development is mediated by both individual and contextual factors, and in his early research, Kerckhoff (1972) found that social psychological dimensions such as self-concept and sense of control over one’s environment mediate relationships between outcomes and other individual variables such as SES. Examination of status attainment and educational and occupational attainment by Wang et al., (1999) using multivariate regression on 1,927 respondents in the NLS 72-79 found that after accounting for background variables, locus of control (i.e., sense of control over one’s life choices) has significant effects on the attainment for both education (.135) and occupation (.097) and the effects were greater than those of self-esteem. This finding has been called into question by Cebi (2007) who examined the effect of locus of control on educational outcomes and occupational expectations of 1,737 high school students in the National Longitudinal Survey of Youth and found that when controlling for background variables, locus of control does predict educational attainment and the likelihood of attending college. However, once the level of cognitive ability is introduced, locus of control ceases to be significant. Cebi’s work noted that locus of control is rewarded later in the form of higher wages. Still, given the importance of agency to occupational formation and attainment, understanding students’ perceptions of seminal constructs such as locus of control and how much control they feel over their life choices or their environment is also important.

Additional research suggests that awareness of barriers related to factors such as SES, gender, and academic attainment have direct and negative effects in limiting aspirations of youth (Gottfredson, 1981; Kenny et al., 2003). Indeed, perceived barriers may have as much influence

on career attitudes and behaviors as actual barriers (Flowers et al., 2003; Swanson & Woitke, 1997) and in work by Kenny et. al., (2003) perceived barriers emerged as a negative predictor of educational and vocational attitudes. Mortimer et al. (2005) found similar results confirming that “agency-related psychological precursors have significant effects on achievement-related behaviors” which are associated with attainment even after accounting for SES (p. 144). As Mortimer et al. noted, “persons subjectively orient themselves to the opportunities and constraints that they encounter in particular times and places, and the strategic actions they devise to reach their goals in particular structural contexts” (p. 133). This is echoed in work by Smith-Maddox (1999) who offered that aspirations and outcomes are influenced by the social and cultural resources embedded in students’ environments, such as social class or curriculum track. Rosenbaum (2001) suggested that student efforts are based not solely on internal motivation (which may be influenced by environment) but by their *perception* of the future relevance (outcome) of what they are doing, perceptions which previously cited research shows may be influenced by social psychological factors.

The importance of the interactions between contextual environment, personal perceptions, and subsequent action aligns with social learning theory (Rotter, 1954), which specifically examines human behavior as influenced by environment, cognition, and behavior (Bandura, 1977). Rotter (1954) believed that “major or basic modes of behaving are learned in social situations and are inextricably fused with needs requiring for their satisfaction the mediation of other persons” (p. 84), thus describing his theory as social learning. Social learning theory has two main concepts which impact behavior: reinforcement value and expectancy. Briefly, reinforcement value is “the degree of preference for any reinforcement to occur if the possibilities of their occurring were equal,” while expectancy is “the probability held by the

individual that a particular reinforcement will occur as a function of a specific behavior on his part in a specific situation or situations” (Rotter, 1954, p. 107). In other words, people have preferences for outcomes that impact their behaviors, which are learned from prior experience or expectation of a situation.

Extending his original theory, Rotter (1966) proposed a construct which he called locus of control of reinforcement in which he theorized that people may or may not believe they can control the reinforcements which will in turn impact their behavior. Subsequent reinforcements over time strengthen or weaken behavioral responses. Rotter identified two loci of control of reinforcement: internal and external. Having an internal locus of control (internals) refers to attributing a reinforcement (outcome) to one’s own behavior; feeling that one has control over the outcome and behaving accordingly. Possessing an external locus of control (externals) refers to attributing an outcome to something outside of one’s control, such as luck, fate, other people, the powers that be, unpredictability, or turbulence. Externals feel that outcomes have little to do with one’s behaviors and thus those behaviors are less likely to be influenced (strengthened or weakened) by outcomes. One variable that influences the size of expectancy is the number of previous experiences with a particular situation; the more experiences, the larger the expectancy value. The fewer experiences, the less the experience will affect expectancies and thus a smaller expectancy value. However, with fewer experiences, whatever expectancies there are will most likely reflect the last similar experience (Phares, 1976). Locus of control is accepted as a relatively enduring dispositional characteristic which becomes modified through experience (Findley & Cooper, 1983). As noted by Mirowsky and Ross (2003) and Schieman and Plickert (2008), perceived control represents a cognitive link between objective, social conditions, and inner experience.

Commonly referred to as a motivational variable (deCharms, 1968) and one of the dimensions of motivational attributions (Graham, 1991; Seifert, 2004; Weiner, 1984), research on locus of control spans multiple disciplines, has shown Rotter's (1966) locus of control construct to be robust, and reveals some interesting findings on its importance to educational and occupational aspirations and attainment. Indeed, students pursue both academic and *social* goals in the classroom (A. M. Ryan & Patrick, 2001) and, according to Ames (1992), the perception of control appears to be a significant factor affecting student engagement in learning as well as the quality of learning. In fact, J. S. Coleman et al. (1966) found that locus of control was not only an important predictor of academic performance but the most important determinant of educational achievement than any other factor in a student's background (M. Coleman & DeLeire, 2003). Stipek (1980) examined locus of control and achievement with 89 middle and lower SES students in first grade using both panel correlation and path analysis and found that internal locus of control impacts student achievement. Ross and Broh (2000) analyzed a sample of 8,802 students from the base year, first and second follow ups of the National Educational Longitudinal Study (NELS:88) and using a confirmatory factor analysis found that academic achievement in the 8th grade is associated with an internal locus of control in 10th grade which in turn is associated with higher academic achievement in the 12th grade. Additionally, Ross and Broh confirmed that self-esteem has a smaller impact on academic achievement and does not improve grades or test scores. Using the same dataset with a different sample of 18,311 students spanning the base year through the second follow up, Rojewski and Yang (1997) analyzed the influence of specific factors on occupational aspirations using structure equation modeling and found academic achievement and self-evaluation (specifically locus of control and self-esteem) had "consistent, positive, and statistically significant influences on occupational aspirations,"

(p 403) even though the effect size was moderate. Interestingly, their study found that these effects decreased over time from 8th to 12th grade. Still, Murasko (2007) found that locus of control may have latent and cumulative effects on educational and occupational aspirations and outcomes.

Externals

Based on Rotter's model and scale for measuring locus of control, much of the research on the construct focuses on the impact of the control orientation. Individuals with an external locus of control orientation (externals) often believe that fate, luck or other people control the reinforcements that influence their behavior and outcomes. Externals do not often feel responsible for their lives and are less likely to trust their own abilities or persist through difficult situations. External locus of control is often associated negatively with outcomes. People with a more external locus of control are often found to be less motivated, lower achieving and having lower aspirations and attainment than those with an internal locus of control. Externals are likely to attribute failure to uncontrollable factors, and are unlikely to experience pride, satisfaction, confidence, or self-esteem (Seifert, 2004). Rumberger (Rumberger & Palardy, 2004) found that students with a high internal locus of control orientation were less likely to drop out of school while research in the *Journal of College Admission* found that students with an external control orientation were more at risk for dropping out of college (Gifford, Mianzo, & Briceno-Perriott, 2006). Indeed, one's locus of control orientation has an effect on aspirations and outcomes. Thus, even when choice making is constrained by actual or perceived barriers, people continue to make choices, but may feel that they are not completely in control of making those choices (Mortimer et al., 2002). Research on students with learning disabilities often cites external locus of control caused by repeated failure and inability to act as a self-advocate as problems for such

students (Rojewski, 1996). Research by Glasgow, Dornbusch, Troyer, Steinberg, and Ritter (1997) found that students with non-authoritative parents were more likely to have an external locus of control

Internals

Individuals with an internal locus of control orientation (internals) are more likely to attribute their behavior and outcomes to internal, controllable factors. An internal locus of control orientation has been found to be effective in motivating persistence and achievement. Relationships between locus of control and achievement found in the literature suggest that students with a higher sense of work and a greater sense of control over their outcomes are more productive at school and have better outcomes (Murasko, 2007), and according to attributional research by Weiner (1984) students who attribute success and failure to internal, controllable causes are more likely to feel pride, satisfaction, and confidence and are more likely to “choose to work on more difficult tasks, persist longer in the face of failure and display higher levels of cognitive engagement and produce work that is of higher quality” (Seifert, 2004, p. 140). Weiner (1984) also created a distinction within the internal locus of control orientation in that students may attribute failure to internal but uncontrollable factors (inability) and in that case are more likely to feel shame and humiliation and will show little effort or cognitive engagement (Seifert, 2004). Seifert (1997) described individuals in pursuit of mastery goals to be typically self-regulating and self-determining individuals that attribute their success or failure to internal, controllable factors. The disposition of such individuals fosters cognitive development. Csikszentmihalyi and Schneider (2000) noted that in addition to aspirations and information, students must develop positive personal traits and attitudes such as an internal locus of control to help ensure a smooth transition between school and the adult working world—although they also

point out that feeling one can control all events through hard work and determination despite real external barriers can have, among other things, detrimental health effects (p. 220). Research by Hanson (1994) found that low levels of internal locus of control had significant and negative effects on aspirational development, while Mau and Bikos (2000) found that an internal locus of control was a positive and significant predictor for both educational and occupational aspirations. Early research on student locus of control commonly found that students from middle or higher SES family backgrounds have, on average, a more internal locus of control orientation than students from lower SES families (Bartel, 1971; Battle & Rotter, 1963; Shaw & Uhl, 1971; Stipek, 1980).

Research confirms that motivations and attitudes are important despite all plans: doing well in high school and college lead to increased opportunities in the adult world of work (Inoue, 1999). Work on the motivational variable locus of control confirms that specific attitudes about one's control over one's work may significantly affect the quality of that work, aspirations, and future attainment. With clear connections between locus of control and aspirations, it becomes important to understand how the context of school may impact student locus of control.

Schools Impact on Student Locus of Control

Schoon (2001) observed that the transition from school to work is shaped by contextual forces which in turn are acted upon by the individual (p. 124). According to Csikszentmihalyi and Schneider (2000), schools are the main arenas in which children prepare themselves to take on the responsibilities of the adult world and are the main institution for socialization before adulthood. In their work on schools, academic motivation and stage-environment fit, Eccles and Roeser (2009) noted that “understanding the impact of schools on adolescent development

requires a conceptual framework for thinking simultaneously about schools as contexts in which development takes place and about the changing developmental needs of students as they move through the schools system” (p. 404). Eccles and Roeser analyzed the context of schools as systems with multiple levels and noted that the multi-level process are dynamic, highly interdependent, and may be complementary or contradictory and may influence students either directly or indirectly. Earlier work argued that while students are developing as they transition, the whole nature of schools is also changing and that these changes can affect the motivation and behavior of adolescents (Eccles & Midgley, 1989). These changes may impact motivational variables such as locus of control either positively or negatively.

One area identified by Eccles and Roeser (2009) where schools impact student motivation is the process of academic sorting and tracking. Researchers on stratification in the US, note that the grouping of students between and within schools has significant effects on later levels of academic success (Alexander & Entwisle, 2000; Gamoran, 2000) which in turn affects occupational outcomes (Cook et al., 1996). Kerckhoff (1995, 2000a) pointed out that the sorting process itself impacts academic achievement and even if offering the same generic educational credentials, the sorting mechanisms alter the distributions of probabilities of obtaining them. He argued that changes in educational status ambitions reflected students’ responses to status classifications and resources allocations experienced within school, stating that the sorting decisions made by teachers and counselors provide students with information about themselves and their probable future and “create socially significant classifications on the basis of which others will respond to them differentially” (Kerckhoff, 1976, pp. 374-375). Similar work by Rosenbaum (1976) noted that the information transmitted each school day from kindergarten on up causes student to negotiate their identities, which drive the decision process, including

aspirational development (Paul, 1997b). Those responses help motivate students in higher ability groups and alienate students in lower ability groups (Gamoran, 2000). In other words, students placed in consistently higher or lower ability groups in areas such as reading or math may begin to view this placement as a form of reinforcement of their performance, subsequently affecting their motivation. Students may also begin to identify their ability status with their understanding of themselves (identity).

As noted previously, research shows that sorting and ability grouping affect students in part because of changes in teaching and instruction methods related to those ability groups (Gamoran, 1993; Gamoran & Berends, 1987; Slavin, 1990). While students may not recognize the meaning of sorting within schools at early ages, teachers and counselors may have differing expectations of students based on sorting and thus make recommendations and decisions about future placement that may have long-term consequences (Gamoran, 2000; Paul, 1997a). For students who perceive the sorting process and differences in outcomes and opportunities related to the types of schools and classrooms, school itself may be recognized as a form of environmental barrier to aspirational attainment. Kerckhoff (1993) found that there was a level of consistency in how students were sorted throughout their educational careers and into the labor force which could not be attributed only to differences in skill level but to the long-term allocation itself. Such long-term allocation to a specific group and indirect effects of socialization work in concert and have cumulative effects on how students feel about themselves and how committed they are to school and successful academic work which in turn affects students' life chances. More specifically, students' recognition of barriers may change their outcome expectancy, especially if such barriers have been reinforced over time. By the end of high school, their level of motivation (Eccles & Midgley, 1989) and aspirations may have

decreased significantly (Helwig, 2004). In sum, the perception that schools control a student's future may impact their locus of control.

While schools may present structural barriers to some student aspirations via ability grouping and recommendations, they may also assist students in learning to navigate around other structural barriers they may find when they enter the labor market. While students may feel little control over structural barriers, schools are important in that they may help students increase their internal locus of control through guidance counseling assistance in identifying sources of job training, helping students with applications materials, job searching strategies, and encouraging the accumulation of meaningful skills and credentials, including high school and postsecondary education (M. K. Johnson & Mortimer, 2002, p. 69). Early research by Bradley and Gaa (1977) revealed that schools can increase student internal locus of control through goal setting projects. Subsequent research on the positive effects of counseling on a specific group of students who were in seventh and eighth grade and whose parents had divorced found that group counseling with specific activities such as role playing and peer discussions increased those students' internal locus of control (Omizo & Omizo, 1988; Whiston & Sexton, 1998). Research by Plucker (1998) examined the relationship between school climate conditions and student aspirations by analyzing a sample for 1,170 students from the Secondary School Aspirations Survey and found that specific school climate variables such as academic press, mentoring, and community are associated with higher levels of self-confidence (including locus of control items) and aspirations. Stipek (1980) proposed that schools may foster the development of internal locus of control through task-oriented work that allows students to observe the success or failure of their efforts and through directly teaching student's responsibility for their work and behavior. Similar to work toward educational goals through locus of control, research by vocational

psychologists proposes that occupational development also requires the development of an internal locus of control as early as elementary school (L. S. Johnson, 2000; Schultheiss, 2005; Super, 1953, 1980), since occupational prestige levels are established early in life and are resistant to later intervention (Gottfredson, 1981). Work by Turner (2007) in which she used structure equation modeling to analyze a sample of 147 inner city eighth graders identified specific factors which schools can actively foster that promote persistence in educational and vocational development, including: academic preparation, career development skills training, parental assistance, and skills to overcome social and environmental barriers. Similar research by R. Ryan and Deci (2000) and Seifert and O'Keefe (2001) suggested that fostering competence and control is critical since they influence behavior, and propose that the interaction between teachers and students is a key factor in such development. Specifically, teachers perceived as nurturing and supporting help students develop confidence and self-determination which translate into the types of behaviors associated with internal motivation.

School impact on student locus of control is important in that locus of control is linked to the outcomes such as engagement, quality of learning and academic achievement. In terms of achievement, ongoing research establishes that achievement and perceptions of control are related (Bartel, 1971; J. S. Coleman et al., 1966; Graham, 1991; Mau & Bikos, 2000; Murasko, 2007; Stipek, 1980) and reinforce each other (Bradley & Gaa, 1977; Ross & Broh, 2000; Stipek, 1980). J. S. Coleman et al.'s (1966) landmark educational research reported that students' sense of control was a better predictor of achievement than any of the other school and family variables measured. Indeed, schools that foster environments geared toward both achievement and support of social psychological attributes such as locus of control (which has specifically been linked to enhancing achievement) will enhance the locus of control and aspirations of its students (Neild,

2009). Both school organization and climate (Rumberger, 1995) are important for fostering achievement and internal locus of control.

Importance of Study

There is general agreement that positive student outcomes are the desired goal of education. Yet, with disturbing proportions of students with misaligned aspirations and subsequently negative outcomes, understanding specifically how schools can shift this negative trend is paramount. As noted in the research literature, an important variable in the development of student aspirations is locus of control. Although research on the role of schools in aspirational development has a long history, and how schools may impact student locus of control has also received attention, the examination of whether and how schools specifically impact student aspirations via their impact on student locus of control would contribute an important piece to the research. According to Kerckhoff (2000 b), “There has been little attention to differences in culture, social structure or the institutional linkages between school and work that could lead certain psychological dimensions to be more important for achievement in one context than another” (p. 26). Kerckhoff holds that such studies could yield “understanding of the interactions of structures and attitudes in predicting attainment outcomes” (p.26). Indeed, there is a need to understand the extent to which personal control impacts aspiration development and more specifically, the impact of the school environment on a students’ sense of control and how that locus of control then impacts occupational aspirations—since such aspirations have been shown to have significant effects on future actions regarding attainment. As noted by Cebi (2007), locus of control is potentially important in analyzing the investment schools make in children (p. 931), and may hold answers to how schools reverse the trend in misalignment.

CHAPTER III

RESEARCH MODEL

Theoretical Framework and Conceptual Model

Rotter's work on social learning theory (1954) and his subsequent theory on locus of control of reinforcement (1966) generated a large body of robust research around this social psychological construct. As previously noted, Rotter's social learning theory posited that there exists an interaction between people and their environments that motivates behavior. Since the main focus of this study is whether environmental characteristics of schools impact the development of student occupational aspirations over time, social learning theory serves as the primary frame for this study's model in which student interaction with schools environments may affect their motivation and subsequent occupational aspirations.

While the main dependent variable in this study is occupational aspirations, a key interest is whether student locus of control is a potential mediator through which school contextual characteristics might influence student occupational aspirations. Since a thorough review of the literature reveals that both academic track and academic achievement have been shown to influence the formation of student occupational aspirations and may also relate to student locus of control, consideration of these variables is also important. In addition, the development of student occupational aspirations happens over time, and as such, consideration of the process of development over time in relation to the individual student is equally important.

By definition, a discussion of process assumes a sequence of events, with both a beginning and an end. However, in a dynamic process related to aspects of human development

(i.e., locus of control), the start and stop points of a process, or specific influences at specific points in time, may be difficult to identify. Additionally, processes may be happening simultaneously (i.e., taking classes while making decisions about one's aspirations) and over time, the effects of such processes may be cumulative, as noted by Rotter's social learning theory (1966). Given these complexities, what follows is a theoretical discussion of the dynamics of the development of the core dependent variable (student occupational aspirations over time), while considering the influences of key variables noted in the literature review, including student academic track, academic achievement, and locus of control in relation to specific school contextual variables (counseling support, school climate, academic press, school SES). While a more detailed description of the specific variables to be included in the study is described in Chapter IV, the following is an overview of the main elements in relation to the dynamic framework posited by Rotter's social learning theory.

Occupational Aspirations

Although students are exposed to occupational discussions early on in their academic careers (i.e., career days in elementary school), the links between occupations and self are often forged later, during middle school and junior high years (Helwig, 2004; I. H. Lee & Rojewski, 2009). During this time, students begin connecting occupations with personal endeavor. With schools being a primary source of information for students, the availability of school resources and support available may affect whether and how student make connections between occupations and achievement. Indeed, if resources are scarce, unavailable or unknown to students, such connections may be incomplete or misaligned and the potential ramifications may not be well understood by the students. If, for example, teachers do not discuss occupations in

relation to schoolwork, encourage students to speak with counselors about occupations and explicit educational requirements or schools do not have counseling resources available to students, linkages between academic effort and occupational outcomes may remain fuzzy to students, and their occupational aspirations may be misaligned. Of course, one would expect that more focused interaction between students, teachers and counselors around occupations and academic requirements would result in students developing more aligned occupational aspirations. Still, even with such expectations, additional considerations in the development of student occupational aspirations are changes in student context (i.e., changing to a different school in a different neighborhood or city or town) as well as the cumulative effects of variables such as curriculum track or academic achievement from previous years.

Locus of Control

An initial point of consideration is that of the student's own sense of personal control. Research on locus of control outlines an external and internal locus of control, with external locus identified as one feeling little or no control over future events and an internal locus identified as one feeling a personal sense of control over the future. In itself, this locus of control (which is itself influenced by SES (Bartel, 1971; Battle & Rotter, 1963; Shaw & Uhl, 1971; Stipek, 1980).) might inform occupational aspirations without any other variables. For example, a student with a highly internal sense of control might aspire to be a doctor, while a student with a highly external sense of control might aspire to occupations with lower level of prestige since they do not feel that they have any control over the final outcome and do not want to be disappointed if they were to aspire to something higher and that aspiration did not come to fruition. Still, it seems more plausible that the sense of control a child develops is, as noted by

Rotter (1966), gained through repeated experiences, such as those found in the place the child spends a great deal of time: school.

Academic Tracking, Effort, and Achievement

The primary activity of school is for students to gain critical knowledge in the classroom, and schools provide students with constant assessment as to how well they are doing at this activity. Such assessment provides the child with experiences upon which to develop a locus of control. Cumulatively, these assessments form the foundation for future educational opportunity. If a child is doing poorly in school, their educational opportunities may be more limited than those for the student who is doing well. According to the research, students very early on gain a sense of where they stand in the hierarchy of assessment, often through early curriculum tracking via assignment to a specific reading group or math class. Research posits that early curriculum tracking often determines subsequent curriculum tracks (Alexander & Entwisle, 2000; M. K. Johnson & Mortimer, 2002), and while there is a sense that students can choose which curricular track they desire once reaching high school, students and parents often depend upon middle school counselors to make the best recommendations for the child entering high school, and once those recommendations are made, few students switch tracks in the course of their high school careers (Paul, 1997a). While research asserts that the curricular track rarely changes in the course of high school, even if there were a change in the track, it is theorized that the original track would continue to impact student locus of control. And while parents are depending on middle school counselors for curriculum recommendations, those counselors often depend on previous assessments of students to make those recommendations. Thus, it is theorized that assessments of academic achievement and subsequent curriculum tracking at individual points in

time and cumulatively over time may in turn foster development of either an internal or more external student locus of control.

Additionally, student locus of control may determine the level of effort they put into their academic pursuits. If an external locus, the effort may be low; if internal, the effort may be high. The effort has subsequent ramifications in that it is reflected in the student’s academic achievement. Being graded on academic effort, positively or negatively, may reinforce their sense of control in subsequent pursuits, and in tandem may impact the way students think about their future occupational capabilities and thus, the occupations to which they aspire.

Diagram of Theoretical Model

Given the theory, at an early stage in which students are beginning to consider self in relation to occupation, an initial model might look like Figure 1, in which curriculum track may be influencing student locus of control, which in turn may be influencing both academic effort and occupational aspirations. The amount of academic effort, in turn, may affect student

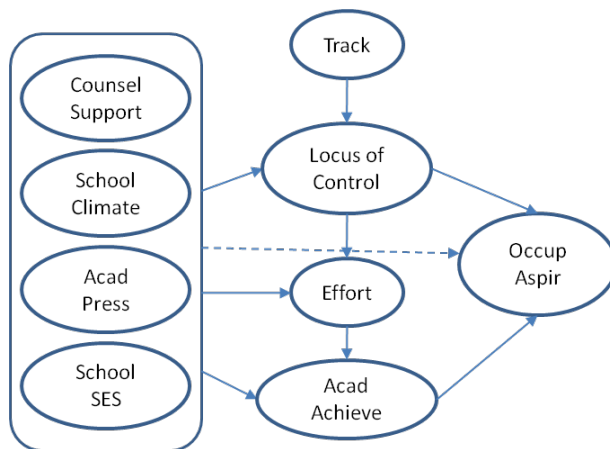


Figure 1. Theoretical Model During Early Stage of Identification Between Self and Occupation (i.e., Middle School).

academic achievement, which may then impact occupational aspiration, since according to Lent (1996) students modify their aspirations based on learning experiences and performance outcomes. The variables on the left side are school contextual variables, which are only discussed briefly here, but are significant to the whole of the theoretical model itself. These variables may influence both student locus of control and may have an impact on student effort and academic achievement.

Then, considering student progression through their academic career, one must also consider how the variables in the model vary over time. For example, research by Ross and Broh (2000) confirmed that academic achievement in 8th grade impacts locus of control in 10th grade which impacts subsequent academic achievement in 12th grade. Additional research in the area confirms the general understanding that previous locus of control impacts future performance. One might theorize this as a type of dynamic feedback loop, with locus of control acting on academic achievement via student effort. The extension of this theory is the impact of academic achievement on occupational aspirations. Thus, the development of aspirations may be impacted by locus of control both independently and via the effect of locus of control on effort and subsequently, academic achievement. This process continues as a student progresses through consecutive grades, assimilating information about their performance, and interpreting their ability to control outcomes related to their efforts, with cumulative effects (Murasko, 2007).

An extension of the theoretical model in Figure 1 would show the continued and cumulative impact of variables working as a type of feedback loop in which students are in various and constant stages of assessing experiences and developing a locus of control, exerting academic effort, having their performance assessed, assimilating their school experiences (i.e., school climate, academic press) and performance assessments into their locus of control, and

making sense of how their performance and locus of control might relate to their future occupations. While the process of academic effort and assessment of academic achievement happens sequentially, the model as a whole is happening all the time, and at different times for each student. In the following extended theoretical diagram, the school contextual variables to the left have a continued effect, even though they are only represented once. There are three time points noted as a way to illustrate the dynamics of the variables over time.

One key difference in the diagram of the theoretical dynamic model noted in Figure 2 is that it takes into account how student occupational aspirations may also impact student academic effort and thus impact academic achievement. While students in earlier stages of their academic careers may have less concrete aspirations (Kerckhoff, 1974; Rindfuss, et al, 1999) and as such may not work hard academically with those aspirations in mind, students in later stages of their academic careers may be more likely to consider their aspirations when exerting effort in their

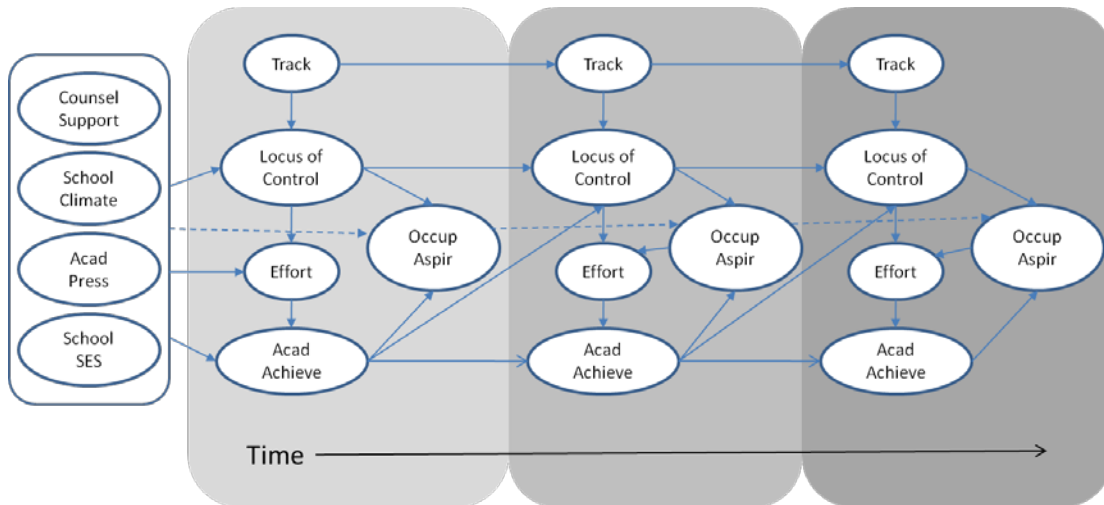


Figure 2. Dynamic Theoretical Model Illustrating the Effects of Tracking and Academic Achievement on Locus of Control and Occupational Aspirations Over Time.

academic pursuits. Another difference is that academic achievement continues to vary and have varying effects on locus of control and occupational aspirations, where the curriculum track becomes more invariant over time.

Diagram of Final Empirical Model and Implications

Since curriculum track becomes more invariant over time (Paul, 1997b), and since student achievement provides information regarding the outcomes of student effort (Carbonaro, 2005) and has stronger ties in the literature to locus of control and aspirations than the student effort variable, a more parsimonious model will not include student effort but will include curriculum track as a control variable at the student level rather than as a predictive variable. Thus the final empirical model will focus more succinctly on the impact of school contextual variables on occupational aspirations via locus of control. In addition, the study will include an analysis of the relationship between locus of control and academic achievement, first with an exploration of whether locus of control might partially mediate the relationship between school characteristics and academic achievement, and second with an exploration of whether locus of control might, in addition to its hypothesized direct effects on occupational aspirations, may also have indirect effects on occupational aspirations via academic achievement since this additional analysis may provide an alternative understanding of the role of locus of control.

Figure 3 provides an overview of the relationships hypothesized and examined in this study. As noted in the model, the relationship between school context and growth in student occupational aspirations is proposed to be fully mediated by growth in student locus of control and growth in student academic achievement. As such, school context is regarded as having a direct effect on growth in student locus of control and growth in student academic achievement,

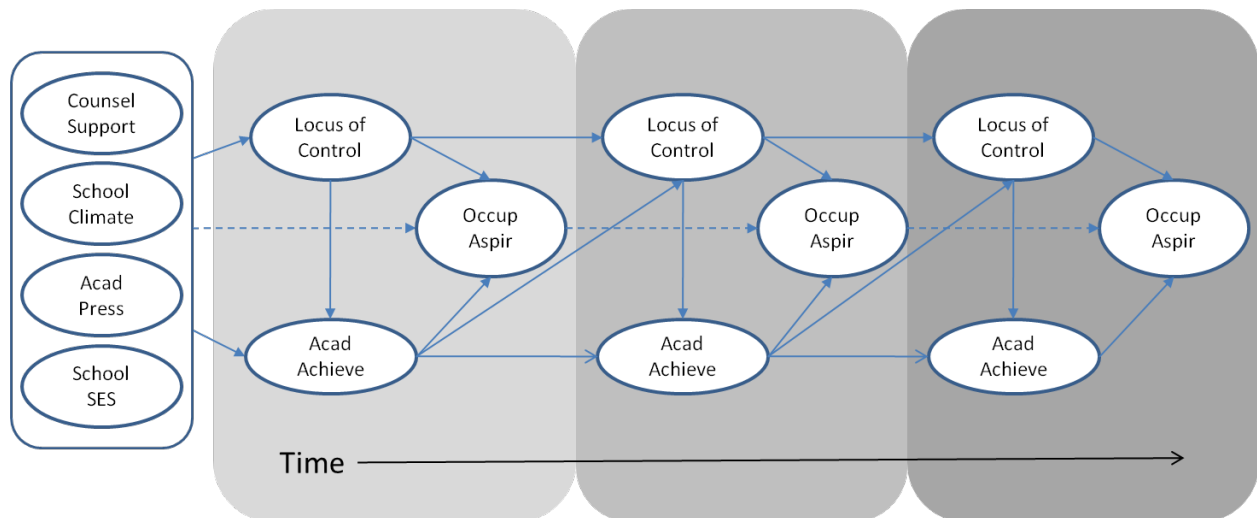


Figure 3. Dynamic Model of Full Mediation Between School Context Variables and Occupational Aspirations via Locus of Control and Academic Achievement.

which in turn directly influence growth in student occupational aspirations. Thus, with full mediation (as depicted by the dotted line), when the effects of locus of control and academic achievement are accounted for, any direct link between school context and occupational aspirations is expected to become nonsignificant (Baron & Kenny, 1986).

This study also examines the relationship between locus of control and academic achievement in which it is proposed that locus of control will have a direct effect on academic achievement and an additional indirect effect on occupational aspirations via academic achievement. Given this, there would also be an additional path for school context to indirectly influence occupational aspirations via its relationship with locus of control.

If the analysis reveals that locus of control has a direct effect on academic achievement, and academic achievement has a direct effect on occupational aspirations, the total effect (indirect and direct effects together) of locus of control on occupational aspirations is strengthened.

Finally, there is the potential for locus of control to mediate school context and academic achievement. Given the strength of the literature outlining the relationship between school context and academic achievement, it is not expected that there would be complete mediation, but locus of control might partially mediate that relationship, which means that with the inclusion of locus of control, the direct effects of school context on academic achievement would be smaller. This relationship is hypothesized and will be modeled and analyzed.

Research Question and Hypotheses

Research Question

Do student locus of control, student occupational aspirations, and student academic achievement change over time? (Findley & Cooper, 1983; Gottfredson, 1981)

Hypotheses

The following hypotheses are proposed. The variables noted in these hypotheses will be defined and discussed in detail in Chapter IV.

Hypothesis 1: School context and occupational aspirations. Positive school contextual characteristics (positive climate, counseling support, at or above average school SES, and higher academic press) will be associated with gains in occupational aspirations over time (Alwin & Otto, 1977; Caravello, 1958; Glover & Marshall, 1993; Helwig, 2004; Hughes & Karp, 2004; Kelly & Lee, 2001; Kerckhoff, 2000a; McWhirter et al., 2000; Mortimer, 2000; Orfield, 1997; Paul, 1997b; Plucker, 1998; Rosenbaum et al., 1997; Rothney, 1958; Schoon, 2001).

Hypothesis 2: Student locus of control and occupational aspirations.

2a: Positive school contextual characteristics (positive climate, counseling support, at or above average school SES and higher academic press) will be associated with change toward an internal locus of control over time (Bradley & Gaa, 1977; Csikszentmihalyi & Schneider, 2000; Eccles & Midgley, 1989; Eccles & Roeser, 2009; Flowers et al., 2003; M. K. Johnson & Mortimer, 2002; Kenny et al., 2003; Rosenbaum, 1976; Rotter, 1954; R. Ryan & Deci, 2000; Schoon, 2001; Seifert & O'Keefe, 2001; Smith-Maddox, 1999; Stipek, 1980; Swanson & Woitke, 1997).

2b: The more internal a student's locus of control over time, the more likely the student is to have gains in occupational aspirations over time (Cebi, 2007; Csikszentmihalyi & Schneider, 2000; L. S. Johnson, 2000; Mau & Bikos, 2000; Mortimer et al., 2005; Rojewski & Yang, 1997; Schultheiss, 2005; Super, 1953; Wang et al., 1999).

2c: Student locus of control partially mediates the relationship between school contextual characteristics (positive climate, counseling support, at or above average school SES, and higher academic press) and occupational aspirations (Cebi, 2007; Helwig, 2004; Kerckhoff, 1972, 2000a; Paul, 1997b; Schoon, 2001).

Hypothesis 3: Student academic achievement and occupational aspirations.

3a: Positive school contextual characteristics (positive climate, counseling support, at or above average school SES, and higher academic press) will be associated with gains in academic achievement over time (Alexander & Entwisle, 2000; Borders & Drury, 1992; Eccles & Midgley, 1989; Flowers et al., 2003; Franklin, 1995; Gamoran, 2000; Kenny et al., 2003; Kerckhoff, 1993; V. E. Lee & Bryk, 1989; V. E. Lee et al., 1993; Orfield, 1997; Rothney, 1958; A. M. Ryan & Patrick, 2001).

3b: Gains in academic achievement over time will be associated with increases in occupational aspirations over time (Borders & Drury, 1992; Fouad, 1995; Gerler, 1985; Kerckhoff, 1993; Lapan, 2004; Lapan et al., 2007; Lapan et al., 1993; Lapan et al., 1997; Mau, 1995; Orfield, 1997; Rosenbaum, 2001; Schneider & Stevenson, 1999; Whiston & Sexton, 1998).

3c: Student academic achievement partially mediates the relationship between school contextual characteristics (positive climate, counseling support, at or above average school SES and higher academic press) and occupational aspirations (Borders & Drury, 1992; Cook et al., 1996; Lapan, 2004; Lapan et al., 2007; Lapan et al., 1993; Lapan et al., 1997; Paul, 1997b; Whiston & Sexton, 1998).

Hypothesis 4: Locus of control and academic achievement.

4a: The more internal a student's locus of control, the more likely the student is to have gains in academic achievement over time (Bradley & Gaa, 1977; Cebi, 2007; J. S. Coleman et al., 1966; M. Coleman & DeLeire, 2003; Graham, 1991; Hanson, 1994; Mau & Bikos, 2000; Mortimer et al., 2005; Murasko, 2007; Ross & Broh, 2000; Seifert, 2004; Wang et al., 1999).

4b: Student locus of control will mediate the relationship between school contextual characteristics (positive climate, counseling support, at or above average school SES, and higher academic press) and student academic achievement (Bartel, 1971; J. S. Coleman et al., 1966; Kerckhoff, 2000a; Mau & Bikos, 2000; Neild, 2009; Rumberger, 1995; Stipek, 1980).

CHAPTER IV

DATA AND METHODS

Dataset/Sample: NELS:88

In order to test whether the school context variables noted in the theoretical model have an effect on student locus of control and occupational aspirations over time, a longitudinal dataset is required that contains data on both students and the schools they attend. The National Educational Longitudinal Survey (NELS:88) (Berkner, 2000; NCES 1996a, 1996b, 2000) is an appropriate dataset for this study because it is a large and nationally representative study of 8th grade students who go on to attend high school and contains repeated measures of students and schools. NELS:88 is also important because it begins surveying students in 8th grade, which provides a baseline prior to starting high school. Beginning with eighth graders in 1988 (base year), NELS followed up with students every two years from 8th grade through the age of 20 with a final follow up six years later at the age of 26. Since two follow-ups were conducted during the 10th (1990--1st follow up) and 12th grade (1992--2nd follow up) high school years, it is possible to measure change between baseline locus of control, achievement and occupational aspirations in 8th grade and locus of control, achievement, and occupational aspirations in 10th grade and again at 12th grade.

In 1988, the NELS began surveying over 24,000 students in the 8th grade from 1,052 schools (815 public and 237 private), with the intent to “study the educational, vocational, and personal development of students at various stages in their educational careers, and the personal, familial, social, institutional, and cultural factors that may affect that development” (Curtin, Ingels, Wu, & Heuer, 2002, p. 2). The study employed a two-stage stratified sampling method

with schools as the first stage and a random sample of students within those schools as the second stage. The study ensured that it garnered a representative sample of students by oversampling schools with larger populations of minority students, increasing the number of randomly selected students in those schools by an average of two students. Overall, an average of 25 students was selected from each school. For schools with less than 25 students in 8th grade, all eligible students were selected (Ingels et al., 1994). Over 90% of the students completing surveys in the base year also completed follow-up questionnaires in their sophomore and senior years. Since this study examines the effects of school characteristics on students, it may be important to note that while the sample of students is random, the sample of high schools is not, since the schools are chosen based on where the sample of 8th grade respondents ended up attending high school. To ensure against bias due to this lack of random sampling of high schools, the models in the study must be properly specified (Gamoran, 1996), which is discussed in greater detail in the section which outlines the models. For this study, only students who were in the appropriate grade during the base year (8th grade), first (10th grade), and second (12th grade) follow-ups and responded to the survey at each of these times will be included in the analysis. Subsequently, there are fewer students per high school included in the analysis, which also impacts model specification and is discussed in greater detail in the following sections.

Methodology

In order to understand the contextual effects of school characteristics on the occupational aspirations of students over time, hierarchical linear modeling (HLM) (Raudenbush & Bryk, 2002) is utilized, which allows regression analysis at multiple levels and specifically the analysis of students nested in schools. HLM improves the estimates of regression models for individual

students and schools in that it borrows strength from similar estimates existing with other students at other schools. In addition, it allows for the partitioning of the variance and covariance components among the levels, allowing an understanding of any contextual effects that may exist by measuring within and between school effects. This analysis includes a 3-level linear growth model in which level 1 is comprised of individual student growth trajectories for locus of control, achievement, and occupational aspirations based on observations at 8th, 10th, and 12th grades. These growth parameters are the outcome variables for the level 2 model. Level 2 captures the variation in growth parameters among students within schools, which takes into account specified student level characteristics. The student level variables at level 2 are the outcome variables for level 3. Level 3 captures that variation among schools and includes specified school level characteristics. Data were imported from SPSS 19.0 statistics software into HLM 6.08 software (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004) and models were estimated at full maximum likelihood (ML) since the number of schools in the model at level 3 is large and based on the size, ML allows the estimates to converge on the true parameter values with reduced bias (Raudenbush & Bryk, 2002, p. 408) while also allowing to test for both alternative variance-covariance structures and alternative specifications of the fixed coefficients (Raudenbush et al., 2004, p. 71). While the study utilizes nested regression, it also specifies mediation and as such incorporates the analysis of the potential mediation effects of student locus of control. All variables and their proposed treatment, multilevel mediation tests and HLM models are outlined below.

Treatment of Data

Missing Values

All missing values in the dataset were specified as missing and showed as a “.” rather than as a numeric value within SPSS. Since missing data cannot be analyzed within HLM, a determination on how to treat missing data was made. Initially, listwise deletion was used to eliminate cases of students who were not in the appropriate grade when the data for the wave were being conducted. For example, if a student that was part of the dataset in the 8th grade base year did not progress to the 10th grade two years later but remained in a lower grade, that student would still be asked to participate in the 1st follow-up, even though they would not be in the 10th grade. Since this study analyzes the growth of occupational aspirations per year, inclusion of students who were not progressing through the grades at an annual pace would not allow for an accurate generalization of annual growth. Thus, such cases were eliminated. Similarly, if cases were missing school ID or panel weight information, they were also eliminated using listwise deletion since HLM cannot handle missing data and both the school ID and panel weight information are necessary for analysis in HLM at level 2 and level 3. Finally, with over 12,000 cases across three waves, there was bound to be missing data among the core variables of interest. Since HLM does not analyze cases with missing data it was important to understand the magnitude and underlying reasons for missing data within the dataset. After an initial analysis, it was determined that over 80% of the cases were missing data, and listwise deletion of all cases with missing data would reduce the number of cases available to less than 2,000 resulting in a significant loss of power and potential for invalid inferences since the deleted data may not be missing completely at random and thus might bias the results and generalizability (Little &

Rubin, 1987). After considering how to approach the missing data, multiple imputation was chosen.

Multiple Imputation

Multiple imputation generates multiple values for each missing value from the student's other observed values and in relation to observed data from other students using regression. While single imputation would fill in missing values, it would underestimate the variability in the data, causing biased variance estimates and invalid results (Little & Rubin, 1987). There are assumptions regarding the missing data when using multiple imputation, the primary assumption being that the data are missing at random (MAR) and that there isn't any inherent information about the probabilities of missingness within the missing data (Little & Rubin, 1987; Rubin, 1976). SPSS software produced a set of five imputations using the core variables of interest. Then, for use within HLM, multiple MDM files were created to reflect the multiple imputation data. Within HLM, Rubin's (1987) rules for combining data are followed and the results for models reported for the combined dataset.

Weighting

Weighting of the dataset was performed in HLM using the weighted variable produced by NELS for the purpose of analyzing NELS data. In this analysis, the variable (F4PNLWT) was chosen because it applied to sample members who completed questionnaires in all five waves of the NELS:88 survey. In NELS, weighting was calculated for the following reasons:

The general purpose of weighting survey data is to compensate for unequal probabilities of selection and to adjust for the effects of nonresponse. Weights are often calculated in two main steps. In the first step, unadjusted weights are calculated as the inverse of the probabilities of selection, taking into account all stages of the sample selection process.

In the second step, these initial weights are adjusted to compensate for nonresponse; such nonresponse adjustments are typically carried out separately within multiple weighting cells. This is the process that was applied to weighting NELS:88 data in all rounds. (Ingels, et al., 1994, p. 43)

Variables

General Treatment

When necessary, variables taken from NELS were transformed into new variables in SPSS. For example, both the father's and the mother's occupations were translated into an occupational prestige score and then these scores were averaged to create the parental occupation variable used in this analysis. In addition, proxy variables were used when the dataset did not include a specific measure of interest. For example, in the case of the variable measuring school level SES, the dataset variable measuring the percentage of students receiving free and reduced priced school lunches was used as a proxy. Variables may also have been recoded in order for the data to be meaningful in the analysis. For example, with student level variables such as sex and minority, the variables were recoded into dummy variables (0,1). Both dependent and independent variables are outlined below, noting any specific treatment as well as their relationship to prior research.

Dependent Variables

The theory guiding this study is that schools, by their very nature of being institutions in which students spend much of their developmental time, have an effect on the development of occupational aspirations, but that this effect is indirect and mediated by the effect on a students' locus of control which in turn effects students' occupational aspirations. In addition, school context may impact student locus of control which in turn may impact student achievement

which may also impact the development of student occupational aspirations. Based on the theory, prior literature, and hypotheses previously noted, three separate dependent variables are examined in this study: student locus of control, student academic achievement, and student occupational aspirations.

Locus of control. A composite variable of 13 separate items was created within NELS:88 under the label of locus of control. However, extensive review of this composite using factor analysis has shown that the items which have been grouped together into one variable actually load onto two distinctly different constructs: self-concept and locus of control. Furthermore, the reliability of the composite variable was tested and found that the reliability was increased when the items were separated into two different constructs (self-concept and locus of control) based on their loadings. In addition, the predictive power of the composite was analyzed based on its correlation with math, science and reading scores also reported in the NELS:88 database, which revealed that when the items were separated into two different constructs, their predictive power was higher (Freidlin & Salvucci, 1995). Based on this information, a new scaled composite variable has been created for the purposes of this analysis, which includes only the 5 out of the 13 items which were significant and loaded onto the locus of control factor noted by Friedlin and Salvucci and are meant to measure student perception of how chance versus one's own actions affects the way that life unfolds, and not student self-concept. Table 1 outlines the items included in the locus of control variable used in this analysis.

In relation to the literature on locus of control, this composite variable provides a measure of a student's external locus of control, or the extent to which the student believes that external forces beyond their influence have control over their lives. Responses were measured

Table 1

Composite Variable Items for Student Locus of Control

Item Variable Label (BY = Base Year, F1 = 1st follow up, F2 = 2 nd follow up)	Item Description	Connections to Research Literature
BYS44C, F1S62C, F2S66C	Good luck is more important than hard work	Rotter, 1966; Seifert, 2004
BYS44F, F1S62F, F2S66F	Every time I get ahead something stops me	Rotter, 1966; Phares, 1976; Mortimer, et al., 2002
BYS44G, F1S62G, F2S66G	Plans hardly ever work out	Rotter, 1966; Seifert, 2004
BYS44B, F1S62B, F2S66B	I don't have enough control over my life	Rotter, 1966; Ames, 1992; Mortimer, et al., 2002; Mirowsky & Ross, 2003; Seifert, 2004; Schieman and Plickert, 2008
BYS44M, F1S62M, F2S66M	Chance and luck are very important in my life	Rotter, 1966; Seifert, 2004

using a Likert scale from 1 to 4, with 1 being “strongly agree” and 4 being “strong disagree.”

With this in mind, lower scores on this measure indicate an *external* locus of control in which a student believes they have little control over the events in life. Higher scores indicate an *internal* locus of control and the student belief that events in their life are within their control to influence. This repeated measure was utilized to analyze the change in locus of control from 8th grade (base year) to subsequent observations in 10th (1st follow up) and 12th grades (2nd follow up).

Student occupational aspirations. The student occupational aspirations variable consists of a single item within the NELS:88 which asked students at each wave in the longitudinal study what kind of work the student expected to do at the age of 30. Students were given occupational categories from which to choose. These categories were coded numerically

from 1-14, but the codes held no inherent value in connection to the occupational categories. In order to test the hypotheses in this study, the NELS:88 measure of student occupational aspiration has been transformed into a new variable that reflects a level of occupational prestige associated with the occupational category by using the Nakao-Treas occupational prestige scale (1994). As noted in the review of the literature, the Nakao-Treas index is one of the most widely used occupational prestige scales because it is one of the most current major national surveys of occupational prestige and is based on contemporary prestige ratings of the occupational titles that appeared in the 1980 census which was then updated to reflect the 1990 census information (Hauser & Warren, 1997; Nakao & Treas, 1992, 1994). This index was also chosen because the scale reflects the timeframe of the NELS:88 dataset utilized in this analysis. To be clear, occupational prestige scores serve as proxy for occupational aspirations in this study. For all subsequent analysis and discussion of occupational aspirations in this study, the basis of that occupational aspiration is no longer a category of occupation, but a corresponding score on the occupational prestige scale developed by Nakao and Treas.

The use of occupational prestige was chosen as a way to quantify occupational aspirations based on the literature on status attainment, which addresses both the individual and societal components of attainment. At the individual level, researchers note that students often aspire to occupations which will enhance their status (Csikszentmihalyi & Schneider, 2000; Goyette, 2008; Inoue, 1999), as occupation in the US is a strong determinant of wealth, lifestyle, and individual status within a community (M. K. Johnson & Mortimer, 2002). At the societal level, technology requires advanced knowledge on the part of the majority of the population rather than an elite few. As such, greater mobility across occupational attainment structures is imperative in order for larger numbers of the population to contribute their knowledge and skills

in the technological age (Blau & Duncan, 1967). To sustain the social structure, society needs individuals to aspire to greater occupational status and subsequent social mobility (Blau & Duncan, 1967; Haller & Portes, 1973; Inoue, 1999; National Commission on Excellence in Education, 1983; Sewell et al., 1970; Weiss, 2003).

The occupational prestige scale by Nakao and Treas (1992, 1994) was an interval scale developed by using the occupational categories found in the 1980 US census and subsequently updated using the 1990 census occupational categories. Specifically, the Nakao-Treas prestige scale is based on a nationally representative sample of adults ($N = 1,166$) who were used to evaluate the prestige of 740 occupational titles by sorting small cards onto a 9-rung ladder of social standing with “1” being the lowest social standing and “9” being the highest. Subsamples were employed to cover all of the occupational categories, with each respondent randomly assigned to one of 12 subsamples, where they rated 110 titles. The work by Nakao and Treas follows previous work on prestige. Specifically, the Nakao-Treas process for calculating prestige scores for occupational titles replicated that used for developing prestige scales by the National Opinion Research Center (Hodge, Seigel, & Rossi, 1964) in the 1960s. With the ratings in hand, the authors followed a previously devised formula to convert the ratings over the nine rungs of the social standing ladder into “12.5 point intervals so that the prestige scores would have a logical range from 0 (lowest) to 100 (highest)” (Nakao & Treas, 1994, p. 8). Based on scored occupational titles, scores were then assigned to occupational categories.

Examples of highly rated occupational titles include physicians (86 on the 100 point scale), physicists (73), and college professors (74). Lower rated occupational titles include unskilled factory workers (23), delivery drivers (24), and restaurant servers (28). Examples of mid-level prestige titles include auto mechanics (40), lobbyist (46), kindergarten teachers (55),

and chiropractors (57). The mean prestige score is 47.5, roughly the prestige of occupational titles such as postal worker, insurance adjuster, or accountant. While the Nakao-Treas is a scaled score from 0-100, student choices within the NELS were limited and do not reflect the entirety of the Nakao-Treas scale (see Table 2).

Table 2

Variable for Occupational Aspirations in 8th Grade

NELS Category Choices & Description (For BY 8th grade)	NELS Category	Nakao & Treas Prestige Score
Craftsperson	1	39
Farmer/Farm Manager	2	44
Housewife	3	51
Laborer/Farm Worker	4	28
Military/Police/Security	5	56
Business/Managerial/Professional	6	57
Business Owner	7	52
Technical Person	8	59
Sales/Clerical	9	38
Science/Engineering	10	76
Service Worker	11	35
Other	12	50
Not Working	13	0
Don't Know	14	NA

In fact, the categorical choices available to students differ from BY in 8th grade to the 1st follow up in 10th grade, with fewer categories from which to choose, and a lower occupational prestige ceiling, given the choices. In the 1st follow up, students were given a slightly broader range of categories from which to choose, increasing their occupational prestige possibilities, with the highest category available being that of a professional such as a doctor, with a prestige

score of 86 as opposed to the highest score on the BY which is a 76 for a scientist or engineer (see Table 3).

Table 3

Variable Changes for Occupational Aspirations in 10th and 12th Grades

NELS Category Choices & Description (for 1 st follow up 10 th grade and 2 nd follow up 12 th grade)	NELS Category	Nakao & Treas Prestige Score
Office Worker	1	42
Tradesperson	2	36
Farmer	3	40
Full Time Homemaker	4	51
Laborer	5	28
Manager	6	57
Military	7	56
Machine Operator	8	34
Professional 1 (architect, engineer)	9	71
Professional 2 (doctor)	10	86
Proprietor/Owner	11	52
Protective Services	12	55
Sales	13	38
School Teacher	14	65
Service	15	35
Technical	16	59
Never Worked	17	0

While this may not be a perfect measure in terms of broad occupational choices, the transformation of the variable from categorical to occupational prestige allows for increased knowledge not only of an occupational category to which students aspire, but an understanding of the level of prestige and social standing associated with those aspirations. Since this measure was repeated in each wave of the NELS:88, student responses from the 8th grade base year

through the 10th and 12th grades will be utilized to analyze the change in occupational aspirations over time. However, due to the shift in categorical choices in the NELS as noted above, using two different scales may mean that any change in aspirations found within the study may be somewhat inflated in that students have a wider range of choices in the subsequent follow ups to the base year. To eliminate inflated change in aspirations over time due to differences in scales, this variable has been created by reducing the 10th and 12th grade categories into their 8th grade equivalents and measured accordingly. Table 4 shows the category changes, the largest being the reduction from Professional 2 (doctor) in the 10th and 12th grade scales, which has a prestige score of 86, to the 8th grade equivalent category of Science/ Engineering which has a prestige score of 76, a difference of 10 points on the prestige scale. Overall, there are five categories which experience small increases in prestige, for a total increase of 14 prestige points and three that experience decreases for a total decrease of 22 prestige points, leaving a net loss of 8 points. An additional limitation is that the categories tend to have prestige scores that cluster around the mean (50), and thus may not be as representative of the overall aspirational prestige of students as they might otherwise have been with the inclusion of additional categories in the NELS questionnaire. Table 5 provides an overview of the occupational aspirations variable created.

Academic achievement. Research shows that strong academic achievement enhances future occupational opportunities (Inoue, 1999) and provides youth with strong advantages in occupational attainment and earnings (Parcel & Dufur, 2001; Rosenbaum, 2001) while weak academic achievement and academic attainment predicts lower earnings (S. R. Miller & Rosenbaum, 1997). Still, students are often unaware of these relationships, and may not factor their academic performance (specifically if weak) into their occupational aspirations

Table 4

Prestige Score Differences in BY and F1/F2 Scale for Student Occupational Aspirations

NELS Category Description For F1 and F2	NELS Category	Nakao & Treas Prestige Score (F1/F2)	NELS Category Description For BY 8th grade equivalent	Nakao & Treas Prestige Score (BY)	Score Difference from F1/F2 to BY
Office Worker	1	42	Clerical	38	-4
Tradesperson	2	36	Craftsperson	39	+3
Farmer	3	40	Farmer/Farm Manager	44	+4
Full Time Homemaker	4	51	Housewife	51	0
Laborer	5	28	Laborer/Farm Worker	28	0
Manager	6	57	Business/Managerial/Professional	57	0
Military	7	56	Military/Police/Security	56	0
Machine Operator	8	34	Service Worker	35	+1
Professional 1 (architect, engineer)	9	71	Science/Engineering	76	+5
Professional 2 (doctor)	10	86	Science/Engineering	76	-10
Proprietor/Owner	11	52	Business Owner	52	0
Protective Services	12	55	Military/Police/Security	56	+1
Sales	13	38	Sales/Clerical	38	0
School Teacher	14	65	Business/Managerial/Professional	57	-8
Service	15	35	Service Worker	35	0
Technical	16	59	Technical Person	59	0
Never Worked	17	0	Not Working	0	0
					(-8) Total

Table 5

Variable for Student Occupational Aspirations

Variable Label (noted from Base Year, 1st follow up, 2nd follow up)	New Variable Label (for use in this analysis)	Description	Type of Variable	Treatment
BYS52, F1S53B, F2S64B	OCC30	Occupation student aspire to have at age 30	Categorical	Transformed reported occupational categories into occupational prestige scores

(Rosenbaum, 2001), thus having misaligned aspirations that may require higher levels of education of which they may be unaware and for which they may be unprepared, especially if they have weak academic performance. Given the relationship between achievement and aspirations noted above and in the previous review of the literature, it is hypothesized that schools might impact student occupational aspirations through the impact of school contextual characteristics on student achievement via their impact on student locus of control.

For this analysis, math scores taken from the NELS:88 serve as the proxy for student academic achievement. As part of the NELS:88 survey, students were given a battery of multiple choice tests in various areas, including mathematics. In the base year, all students received the same test. Then, multiple forms of the test were developed for follow-up testing in subsequent waves based on track and coursework exposure to account for any floor or ceiling effects (more correct answers to questions that were too easy for advanced math students or more guessed answers to difficult test questions by less advanced math students). The appropriate follow-up tests were given at 10th grade and again in 12th grade based on students' academic

track and exposure to previous mathematics coursework. Scores were then scaled using item response theory (IRT) scoring in order to compare scores from tests with varying degrees of difficulty. According to the NELS:88,

Item Response Theory (IRT) was employed to calculate scores that could be compared regardless of which test form a student took. A core of items shared among the different test forms made it possible to establish a common scale. IRT uses the pattern of right, wrong, and omitted responses to the items actually administered in a test form, and the difficulty, discriminating ability, and “guess-ability” of each item, to place each student on a continuous ability scale. It is then possible to estimate the score the student would have achieved for any arbitrary subset of test items calibrated on this scale. (Ingels et al., 1994, p. H-32)

In order to analyze growth in student academic achievement, the theta score variables (Rock, 2012) from 8th, 10th, and 12th grade have been utilized in this study, which is noted in Table 6.

Table 6

Variable for Student Academic Achievement

Variable Label (noted from Base Year, 1 st follow up, 2 nd follow up)	New Variable Label (for use in this analysis)	Description	Type of Variable	Treatment
BY2XMTH, F12XMTH, F22XMTH	ACHIEVE	Student math scores (proxy for academic achievement)	Scaled	None

Independent Variables

Student (Level 2) variables were specifically chosen based on the cited literature which outlines their significance in relation to student occupational aspirations and locus of control.

They have been included in the model either as predictor variables, as is the case with academic

track in relation to locus of control, or in order to control for their effects, as is the case with the student characteristic variables such as socioeconomic status (SES), race, gender, and parental occupation.

Curriculum track. The literature on the effects of academic tracking on students is rich, and as noted in the review of the literature, types of tracking can be persistent (Alexander & Entwisle, 2000; Entwisle & Alexander, 1993; M. K. Johnson & Mortimer, 2002; Paul, 1997a, 1997b), may be barriers to future opportunity (Hallinan, 1996, 2000; Orfield, 1997) and may provide students with a perception of self that may also play a motivational role in their aspirational development (Alwin, 1994; Lent et al., 1996; O'Rand, 2000).

For inclusion in this study, two types of variables were considered: the student reported variable of their curriculum track (available at the 1st and 2nd follow ups) and the school reported variable of the student's curriculum track (available at the 2nd follow up). From these two, the school reported variable was eliminated from consideration for two reasons: first, while the school reported track may be a more accurate assessment of the student's academic track, using the school reported variable is not a reflection of the student's knowledge of their curricular track, which is the reason for including academic track in the analysis. Using the school reported track will not provide an adequate understanding of whether the student is aware of the track they are in and then whether their track influences their locus of control or academic achievement. Second, the school reported variable was missing more information than the student reported variable. Instead, the student reported track from the second follow up was included (F2S12A), which asked students to describe their high school program, which provides some insight as to whether the student was aware of their curricular track and subsequently how that track might influence their locus of control and academic achievement.

The academic track variable was originally coded as five categories where 1 and 2 represented academically oriented programs and 3 through 5 included vocationally related programs. Since this analysis was interested in whether vocational coursework, as indicated by a vocational track, might influence student locus of control, the variable was recoded as a dummy variable as follows: 0 = academically oriented track; 1 = vocationally related track.

SES. Socioeconomic status (SES) often plays a role in what many students consider realistic aspirations. In addition to the previous discussion of status attainment noted in the review of the literature, Bourdieu's concept of social reproduction (Bourdieu & Passeron, 1977) laid the groundwork for further research underscoring the effect of SES on educational opportunities, occupational knowledge, role models, material and network resources, and perceived barriers to occupational opportunities (Macleod, 1987; Orfield, 1997), all of which influence occupational aspirations (Hansen & McIntire, 1989; Schoon, 2001; Schulenberg, Vondracek, & Crouter, 1984). Student level SES also influences the quality of academic pursuits and perceptions of ability (Franklin, 1995; Inoue, 1999) which in turn may affect the occupations to which a student aspires (Parcel & Dufur, 2001). In addition, research on locus of control has found that student SES often indicates a locus of control orientation, with higher SES indicating a more internal locus of control (Bartel, 1971; Battle & Rotter, 1963; Stipek, 1980).

Since this study is focused on the impact of school contextual characteristics on student occupational aspirations via student locus of control, it does not include SES as a predictor variable. However, given its importance to occupational aspirations, it has been included as a control variable. To control for student SES in this study, the variable reporting SES from the 2nd follow up of the NELS:88 will be utilized (F2SES1), since this variable was derived from the

base year parental data, but is the most accurate, as it corrects for a NELS transposition error found in earlier waves (CIC, 1994). This is a standardized score.

Race. Similar to SES, research on race and occupational aspirations discusses the concept of reproduction of race in occupational choices and highlights that occupational aspirations appear to be related to perceptions of opportunities (Flowers et al., 2003) and the reality of racism in the marketplace (Cook et al., 1996). Minority students may be more likely to perceive barriers to occupational choices based on their race resulting in prematurely foreclosing career options (Fouad, 2007), which impacts occupational aspirations.

Race is included in this analysis as a control variable. For the purposes of this analysis, the variable for race found in the NELS:88 database (BYS31A) from the base year (8th grade) was recoded as a dummy variable as follows: 0 = White, 1 = minority.

Gender. Studies differ on whether gender matters to the development of occupational aspirations of students in high school, with some studies showing that both genders aspire to professional occupations by the age of 30 (Rasinski, Ingels, Rock, Pollack, & Wu, 1993) while others show that females aspire to professional occupations in a greater percentage than men (Schneider & Stevenson, 1999), men aspire to higher status occupations (Inoue, 1999), or that male and female high school students aspire to different, more gender specific occupations (Armstrong & Crombie, 2000; L. Miller & Bud, 1999; Schneider & Stevenson, 1999; Schoon, 2001). Inclusion of this variable allows controlling for it.

In this analysis, the control variable for student gender was taken from the NELS:88 database (BYS12) from the base year (8th grade) and was coded as a dummy variable, with 0 = male and 1 = female.

Parents occupation. Adult models are an essential ingredient in developing occupational aspirations (Csikszentmihalyi & Schneider, 2000). Research on the effect of parental occupations on the occupational aspirations of students has a long history (Blau & Duncan, 1967; Haller & Portes, 1973; Haller & Woefel, 1972; Sewell et al., 1970) with more recent research positing that parental occupations have a strong influence on occupational and educational aspirations and attainment (Kalmijn, 1994; Lampard, 1995; Updegraff, 1996). Orfield's work (1997) showed significant statistical correlations between parents with less education and lower status jobs and students who chose vocational programs in high school rather than higher academic programs. Such student choices are an indication of occupational aspirations.

For the purposes of this analysis, both the occupational status of student's mothers and fathers taken at the base year (8th grade) were recoded to the Nakao and Treas occupational prestige scale (1994) and the mean of the combined occupational status of the student's parents utilized (see Table 7). While the Nakao and Treas Prestige scale ranges from 0-100, the categories offered in the NELS do not reflect the entirety of the prestige scale.

School (Level 3) variables were chosen for the same reasons as student level variables: based on the literature citing the effect of these level 3 variables on locus of control and on occupational aspirations.

School SES. The potential contextual effects of school SES on student locus of control and occupational aspirations is couched in the research discussed in the literature review. Hanson (1994) noted that student inequalities such as lower SES reinscribed in educational structures (schools with lower SES) may inhibit development of higher occupational aspirations.

Table 7

Variable for Parental Occupation

Variable Label (noted from Base Year)	New Variable Label (for use in this analysis)	NELS Category Description	NELS Category	Nakao & Treas Prestige Score
BYS4OCC, BYS7OCC	PAROCCUP	Clerical	1	32
		Craftsperson	2	39
		Farmer/Farm Manager	3	44
		Homemaker	4	51
		Laborer	5	28
		Manager/Administrator	6	57
		Military	7	56
		Machine Operator	8	34
		Professional 1 (architect, engineer)	9	71
		Professional 2 (doctor)	10	86
		Proprietor/Owner	11	52
		Protective Services	12	55
		Sales	13	38
		School Teacher	14	65
		Service	15	35
		Technical	16	59
		Never Worked	17	0

Similarly, schools with higher SES also have higher levels of student achievement, which is in turn linked to higher student occupational aspirations and locus of control. Research points to the importance of the school's role in providing information on career options and opportunities to students (Kelly & Lee, 2001; McWhirter et al., 2000; Mortimer et al., 2002; Orfield, 1997), but school SES may impact the school's ability to provide career and guidance resources to students. School SES may also impact the school's ability to hire quality teachers, which might also impact student locus of control (Plucker, 1998) and occupational aspirations. If not all

schools have the same resources to assist students (Flowers et al., 2003; Gamoran, 1996), then the level of available resources and the potential subsequent effect on student locus of control and occupational aspirations may be related to school SES.

Given this, the level of school SES was included. A proxy variable for the SES of the high school was created by determining the percentage of students receiving free or reduced priced lunch (FRPL) as found in NELS:88 in the 1st follow up (F1C30A). Tenth grade was chosen since it is the midpoint through a four-year high school program and would be most representative of the school SES for the bulk of time over which any changes in the dependent variables would occur. While schools report the percentages of students receiving FRPL, NELS recoded these percentages into categories, which, for the purposes of this study were transformed into a dummy variable. The treatment for this variable is noted in Table 8.

School climate. As noted by Rumberger (1995), school organization and climate are important for fostering achievement and internal locus of control, which, as hypothesized in this study, may in turn affect student occupational aspirations. Further review of the literature acknowledges that school climate may be reflected by a variety of factors. Given that, variables related to teachers and the organization of their classrooms are of specific interest and will be used to define school climate in this analysis, as teachers are the most consistent interface with students on a daily basis. Specifically, previous research shows that the interest and commitment of teachers to the students in their classrooms and schools (V. E. Lee & Bryk, 1989), students receiving encouragement from teachers within their schools (Patrick et al., 2007; A. M. Ryan & Patrick, 2001) and even the organization of classrooms or how lessons are taught (Franklin, 1995; A. M. Ryan & Patrick, 2001), are important factors that can affect student perceptions of contextual supports which in turn affects student self-perceptions such as locus of control

Table 8

Variable for School Level SES

Variable Label (noted from 1 st follow up)	New Variable Label (for use in this analysis)	Description	Type of Variable	Treatment
F1C30A	SCHOOLSES	Measures the SES of the school through a proxy variable – the percentage of the student population receiving Free and Reduced Priced Lunches (FRPL)	Dummy	The percentage of students receiving FRPL was recoded by NELS into a categorical variable: 0 = 0% 1 = 1-10% 2 = 11-50% 3 = 51-100% Which was transformed into a dummy variable for use in this analysis: 0 = 50% or less receive FRPL 1 = 51% or more receive FRPL

(Daniels & Araposthasis, 2005; Plucker, 1998) and thus, as hypothesized, occupational aspirations. Inclusion of a school climate variable is one way to measure whether schools have an effect on student locus of control and, indirectly, occupational aspirations.

For inclusion in this analysis, a composite variable within NELS:88 was considered. This composite is made up of 13 separate items within the NELS:88 to help define the climate of a school as answered by a school counselor or someone serving the role of a counselor within a school. However, a detailed review of this composite (Freidlin & Salvucci, 1995) has shown that the items which have been grouped together under the NELS:88 label of “school climate” did not all load onto the construct of school climate. Those items that did load onto the school climate variable, once tested, had high internal consistency (Cronbach’s alpha of .868), but as a

composite reduced the predictive power to such a degree as to make the composite “useless” (Freidlin & Salvucci, 1995, p. 41). Table 9 lists each of the items noted in the NELS:88 school climate composite and their subsequent loadings onto the school climate construct.

Due to the reduced power of these items as a composite, Freidlin and Salvucci (1995) recommend using these items individually within an analysis. While Freidlin and Salvucci tested this composite using only the base year (8th grade) variables, the school climate composite created within NELS:88 remains relatively unchanged for the 1st follow up (10th grade), with differences in the composite being the omission of four items (BYSC47J through BYSC47M) that were measured during the base year but were not measured in the 1st follow up, as recorded in the table. Since all other items were the same, no significant changes in factor loadings onto the construct of school climate were anticipated. Therefore, in keeping with their findings and the literature on school climate, this analysis combined the following individual items from the 10th grade 1st follow up, (also noted in Table 9), into one composite variable to measure school climate: teacher morale and classroom structure. Teacher attentiveness was not included since it was not measured again in the 1st follow up. Tenth grade was chosen since it is the midpoint through a four-year high school program and would be most representative of the school climate for the bulk of time over which any changes in the dependent variables would occur. Since both of these items are based on a 5 point Likert scale, they were kept as scaled scores for this analysis.

Academic press. Whether teachers press students to achieve is the topic of much research. As noted more specifically in the review of the literature for this analysis, the quality of instruction and the interest and commitment of teachers is important not only for encouraging student achievement, but for encouraging internal locus of control (Plucker, 1998; Stipek, 1980).

Table 9

School Climate Composite Variable Items

Item Variable Label (noted from Base Year and 1st follow up)	Item Description	Factor Loading (from Base Year-Friedlin & Salvucci 1995)	Included in current analysis?/ Type of Scale	Connections to Research Literature
BYSC47A, F1C93M	There is conflict between teachers and administrators	.329	No	
BYSC47B, F1C93A	Discipline is emphasized at the school	.601	No	
BYSC47C, F1C93B	Students place high priority on learning	.448	No	Eccles & Wigfield, 1985; Plucker, 1998; Yazzie-Mintz, 2009
BYSC47D, F1C93C	Classroom activities are highly structured	.640	Yes – School Climate (5 pt Likert scale)	Barr & Dreeben, 1983; Bradley & Gaa, 1977; Gamoran & Berends, 1987; Gamoran & Mare, 1989; Kerckhoff, 1986; A. M. Ryan & Patrick, 2001; Stipek, 1980
BYSC47E, F1C93D	Teachers press students to achieve	.811	Yes – Academic Press (4 point Likert scale)	Eccles & Wigfield, 1985; Flowers, et al., 2003; Plucker, 1998; Seifert & O'Keefe, 2001
BYSC47F, F1C93E	Students are expected to do homework	.767	Yes – Academic Press (4 point Likert scale)	Flowers, et al., 2003; Plucker, 1998 (Table continues)

BYSC47G, F1C93F	Teacher morale is high	.621	Yes – School Climate (5 point Likert scale)	Daniels & Araposthasis, 2005; Eccles & Wigfield, 1985; Klem & Connell, 2004; Plucker, 1998
BYSC47H, F1C93K	Teachers have a negative attitude toward students	.282	No	
BYSC47I, F1C93L	Teachers have difficulty motivating students	.156	No	
BYSC47J,	The school day is structured	.640	No	
BYSC47K	Rule deviation is not tolerated	.560	No	
BYSC47L	Environment is flexible	.257	No	
BYSC47M	Teacher responds to individual needs	.598	No (would be included but does not have corresponding variable in the 1 st follow up – F1)	Flowers, et al., 2003; Franklin, 1995; Patrick, et al., 2007; R. Ryan & Deci, 2000; Seifert & O'Keefe, 2001
BYSC47N, F1C93H	School emphasizes sports	.165	No	
BYSC47O, F1C93I	Students compete for grades	.244	No	

If achievement and perceptions of control are related (Bartel, 1971; J. S. Coleman et al., 1966; Graham, 1991; Mau & Bikos, 2000; Murasko, 2007; Neild, 2009; Stipek, 1980) and reinforce each other (Bradley & Gaa, 1977; Ross & Broh, 2000; Stipek, 1980), then understanding how schools encourage achievement (i.e., through teachers) is important to understanding how they may indirectly influence student occupational aspirations via their influence on student locus of control.

For the purposes of this study, school level variables within NELS:88 associated with academic press were considered. Initially included as part of a composite variable measuring school climate, these items were included based on the recommendations of Freidlin and Salvucci (1995) specified in the previous variable on school climate. The three specific items measuring academic press noted in Table 9 include: teachers pressing students to achieve, students expected to do homework and students placing a high priority on learning. While all three items address academic press, only two items (teacher pressing students to achieve and students expected to do homework) focus on what schools do to encourage achievement while the other item (students placing a high priority on learning) addresses how students may respond to that encouragement. Thus, only the two school-oriented items from the 1st follow up (10th grade) were combined into a composite variable and included as measures of academic press in this analysis. Tenth grade was chosen since it is the midpoint through a four-year high school program and would be most representative of the academic press for the bulk of time over which any changes in the dependent variables would occur. Since both of the items are based on a 4 point Likert scale (forced response), the composite was kept as a scaled score for this analysis.

Counseling support. With a burgeoning number of students with misaligned aspirations, the role of counselors is emerging as an important one (Csikszentmihalyi &

Schneider, 2000; Rosenbaum, 2001; Schneider & Stevenson, 1999). Although counselors have been reticent in counseling students toward non-college pursuits (Rosenbaum, Miller & Krie, 1996; Rosenbaum et al., 1997), and students have not often seen counseling as particularly helpful, research confirms that access to fully implemented guidance programs have positive relationships with achievement and occupational development (Borders & Drury, 1992; Cicourel & Kitsuse, 1963; Gerler, 1985; Kerckhoff, 2000a; Whiston & Sexton, 1998). As such, including a measure of whether schools have counseling support available to students is important to understanding how such access may indirectly influence student occupational aspirations via their influence on student locus of control.

For inclusion in this study, variables within NELS:88 1st follow up (10th grade) indicating counseling support were considered. While NELS:88 provides a measure (F1C41J) of the number of guidance counseling faculty within a school, which would indicate whether the school provided access to formal counseling support to students, the variable is categorical and respondents were not given the option of answering “none” if their school did not have any guidance counselors. Instead, the category available was “0-5,” thus negating the ability to distinguish between those schools with counselors (1 or more) and those without counselors (0). There are no other variables within the 1st follow up that clearly indicate whether the school provided student access to counseling support. Since students attended the same high school in the 2nd follow up (12th grade), variables within the 2nd follow up (12th grade) indicating school provision of a formal counseling program for students were considered. Unlike the 1st follow up, the 2nd follow up includes a specific item (F2C35K) that asks whether the school has a formal guidance counseling program as well as an item (F2C36K1) that asks the number of full-time guidance counselors employed by the school and thus indicating the availability of formal

counseling support available for students. The second item differs from its 1st follow up counterpart in that it offers a category choice of “none” for schools without full time counselors. While this variable offers insight into whether a counseling program has full time dedicated staff, it does not eliminate the possibility of a formal counseling department available to students employing multiple part time counselors rather than full time counselors. Thus, the best way to measure counseling support is via the 2nd follow up (12th grade) variable (F2C35K) which asks whether the school has a formal guidance counseling department. Since the variable was already coded categorically with 1 = “yes” and 2 = “no” to indicate whether there was a formal guidance counseling department at a student’s high school, for the purposes of clear analysis the categories were just recoded as 0 = “yes” and 1 = “no” (see Table 10).

Table 10

Variable for School Level Counseling Department

Variable Label (noted from 2 nd follow up)	New Variable Label (for use in this analysis)	Description	Type of Variable	Treatment
F2C35K	NOCOUNSEL	Indicates whether there is a formal guidance counseling department at a student’s high school	Dummy	Recoded categories in the original variable to the following for more clear analysis: 0 = Yes 1 = No

Year. In order to analyze growth over time in the three dependent variables student occupational aspirations, student locus of control, and student academic achievement, a “Year”

variable was created that would allow for the analysis of these variables in each of the three waves for each student (see Table 11). This variable was coded for each wave, with “0” = initial wave measure, which was taken in 8th grade, “2” = 2nd wave measure which was taken two years later in 10th grade, and “4” = 3rd wave measure which was taken four years after the initial wave in 12th grade. The data were then restructured so that each student had a measure for each year. Table 12 provides a sample representation of the restructured data in which there are three data entries for each student ID, since the student has three measures for each of the dependent variables. Coding the year variable in this manner allows for interpretation of the results in relation to annual growth. All the variables within the study are noted in Table 13

Table 11

Variable for Analyzing Growth Over Time

Variable Label	New Variable Label (for use in this analysis)	Description	Type of Variable	Treatment
-----	YEAR	Indicates in which wave the student measure was taken	Categorical	Restructured student data to show three lines per student in order to capture the multi-wave data for the dependent variables.

Table 12

Sample of Restructured Data Showing Data for Each Wave in the Analysis

ID	SCH ID	YEAR	ACHIEVE	OCC30	LOC
7898401	81	0	60	4	38.76
7898401	81	2	42	3	48.12
7898401	81	4	42	3	47.14
7898402	81	0	52	3	34.60
7898402	81	2	36	3	37.64
7898402	81	4	64	2	31.53
7898406	81	0	50	3	47.50
7898406	81	2	38	3	58.94
7898406	81	4	40	3	63.61
7898407	81	0	51	3	43.13
7898407	81	2	71	3	49.54
7898407	81	4	86	3	57.71

Table 13

Complete Variable Table

Variables	Description (where R is the individual student)
Dependent Variable	(BY = Base Year, F1 = 1 st Follow up, F2 = 2 nd Follow up)
OCC30	Occupation R aspires to have at the age of 30 (based on the occupational prestige scale by Nakao & Treas, 1994)
LOC	R's locus of control. Scaled score reporting how much control R feels s/he has over life and the future.
ACHIEVE	R's academic achievement over time (proxy measure: math score).
Independent Variables	
<i>Level 1 Variable</i>	
YEAR	Repeated measures for R taken at 8 th , 10 th and 12 th grades. Coded as 0,2,4 respectively, so outcomes reflect yearly growth.
<i>Level 2 Variables</i>	
SES	Socioeconomic status of R (SES from BY)
FEMALE	Gender of R (0 = male; 1 = female) from BY
MINORITY	Race of R (0 = white; 1 = minority) from BY
PAROCCUP	Occupational status of R's parents from BY (based on the occupational prestige scale by Nakao & Treas, 1994)
VOCTRACK	R's HS academic track in F1 (0 = academic; 1 = vocational)
<i>Level 3 Variables</i>	
LOSCHSES	SES of HS determined by % of students receiving free or reduced priced lunch (FRPL). Dummy variable (0 = 50% or less FRPL; 1 = 51% or more FRPL)
ACADPRESS	Teachers at R's high school encourage high academic achievement, Scaled score taken from F1.
NOCOUNSEL	There is no formal guidance counseling department at R's high school taken from F2 (0 = formal guidance counseling dept, 1 = no formal guidance counseling dept)
POSCLIMATE	Climate at R's high school is positive. Scaled score taken from F1.

Descriptive Statistics

A standard visual screening and subsequent analysis of the descriptive statistics show that the variables most generally conform to normality, with means, standard deviations and values within an acceptable range (see Table 14). While multiple imputation was used to replace missing values, performing due diligence regarding the acceptable range of values ensured that the process did not create any outer range values. The one exception to this is the variable

Table 14

Descriptive Statistics

Variable	N	M	SD	Min	Max
Level 1					
OCC30	28302	60.20	13.38	0.00	76.00
LOC	28302	3.03	0.50	1.00	4.00
ACHIEVE	28302	51.30	10.08	24.87	80.67
Level 2					
FEMALE	9434	0.53	0.50	0.00	1.00
MINORITY	9434	0.31	0.46	0.00	1.00
SES	9434	0.068	0.78	-2.43	2.75
PAROCCUP	9434	46.38	11.40	0.00	86.00
VOCTRACK	9434	0.15	0.36	0.00	1.00
Level 3					
LOSCHSES	1315	0.10	0.30	0.00	1.00
CLIMATE	1315	3.88	0.60	2.00	5.00
ACADPRES	1315	3.18	0.65	1.00	4.00
NOCOUNSE	1315	0.12	0.32	0.00	1.00

measuring the occupational aspirations of students at 30 (OCC30). When the data were first explored in a visual graph using SPSS, most all variables looked normal, with a normal distribution. However, OCC30 was somewhat negatively skewed and leptokurtic. While it is

generally accepted that certain violations of normality can impact the estimation of variable effects (p-values) and standard errors and increase Type II errors, HLM is generally robust to violations of normality, especially with larger samples sizes (Kulikowich & Edwards, 2007; Maas & Hox, 2004), which is the case in this study.

HLM Models

Based on the sampling method discussed in Chapter III and in keeping with the need for proper specification (Gamoran, 1996), the variables tested in the following models have been grand mean centered. In theory, group mean centering the variables would allow for an analysis of the effects of school context between students within a school. However, the given the small number of students in the study that come from the same school, such an analysis would not be meaningful in that any inferences would have been drawn from an unbalanced sample. Grand mean centering the variables allows for an analysis of students across all schools and provides a significantly larger and more balanced sample from which to draw meaning (Raudenbush & Bryk, 2002).

The following growth models will be estimated in order to answer the first research question noted in the previous section. The first model will provide an initial understanding of change in student locus of control from 8th through 12th grades (model 1). The second model will provide an initial analysis of change in occupational aspirations from 8th grade through 12th grade as a baseline understanding of student aspirations (model 2) and the third model (model 3) will provide an initial analysis of student academic achievement from 8th grade through 12th grade. The fourth model (model 4) will provide an understanding of whether changes from 8th grade through 12th grade in student locus of control and student academic achievement influence

change in student occupational aspirations. All of the models will enrich the subsequent mediation models analyzing whether school characteristics impact student occupational aspirations via student locus of control and academic achievement from 8th grade through 12th grade.

Model 1: Growth Model for Student Locus of Control

In this model, student locus of control (LOC_{tij}) is estimated, and specifically the how student locus of control changes over the course of four years, from 8th grade through 12th grade. Level 1 specifies repeated measures of locus of control for students. In this model, there are no predictors at level 2 or level 3 in order to analyze the variance in student locus of control within and between schools.

Level-1

$$(LOC)_{tij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{tij} + e_{tij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + r_{1ij}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{10j} = \gamma_{100} + u_{10j}$$

Y_{tij} = predicted locus of control of student i in school j at time t

π_{0ij} = predicted average locus of control of student i in school j while in the eighth grade

π_{1ij} = predicted per year change in the locus of control of student i in school j over the course of four years in high school

Model 2: Growth Model for Student Occupational Aspirations

In this model, student occupational aspirations ($OCC30_{tij}$) is estimated, and specifically the how student occupational aspirations change over the course of four years, from 8th grade

through 12th grade. For measuring change over time, the term Year is used. Level 1 specifies repeated measures of occupational aspirations for students. In this model, there are no predictor variables in order to analyze the variance of student occupational aspirations within and between schools.

Level-1

$$(\text{OCC30})_{ij} = \pi_{0ij} + \pi_{1ij}(\text{YEAR})_{ij} + e_{ij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + r_{1ij}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{10j} = \gamma_{100} + u_{10j}$$

Y_{ij} = predicted occupational aspirations of student i in school j at time t

π_{0ij} = predicted average occupational aspirations of student i in school j while in the eighth grade

π_{1ij} = predicted per year change in the occupational aspirations of student i in school j over the course of four years in high school

Model 3: Growth Model for Student Academic Achievement

In this model, student academic achievement (ACHIEVE_{ij}) is estimated, and specifically how student academic achievement changes over the course of four years, from 8th grade through 12th grade. For measuring change over time, the term Year is used, allowing the estimation of initial academic achievement and growth in academic achievement. Once again, there are no predictor variables in order to understand the initial variance in academic achievement within and between schools.

Level-1

$$(\text{ACHIEVE})_{ij} = \pi_{0ij} + \pi_{1ij}(\text{YEAR})_{ij} + e_{ij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + r_{1ij}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{10j} = \gamma_{100} + u_{10j}$$

Y_{tij} = predicted academic achievement of student i in school j at time t

π_{0ij} = predicted average academic achievement of student i in school j while in the eighth grade

π_{1ij} = predicted per year change in the academic achievement of student i in school j over the course of four years in high school

Model 4: Full Growth Model for Student Occupational Aspirations

In this model, student occupational aspirations ($OCC30_{tij}$) is estimated, and specifically the how change in student locus of control (LOC_{tij}) and student academic achievement ($ACHIEVE_{tij}$) impact change student occupational aspirations change over the course of four years, from 8th grade through 12th grade. For measuring change over time, the term Year is used. Level 1 specifies repeated measures of occupational aspirations for students as predicted by change in locus of control and academic achievement. In this model, there are no student or school level characteristics in order to understand the unconditional relationship between growth in student occupational aspirations, locus of control and academic achievement.

Level-1

$$(OCC30)_{tij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{tij} + \pi_{2ij}(ACHIEVE)_{tij} + \pi_{3ij}(LOC)_{tij} + e_{tij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + r_{1ij}$$

$$\pi_{2ij} = \beta_{20j}$$

$$\pi_{3ij} = \beta_{30j}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{10j} = \gamma_{100} + u_{10j}$$

$$\beta_{20j} = \gamma_{200}$$

$$\beta_{30j} = \gamma_{300}$$

- Y_{ti} = occupational aspirations of student i in school j at time t
 γ_{000} = average occupation aspirations of student i in school j while in the eighth grade
 γ_{100} = per year change in the occupational aspirations of student i in school j over the course of four years in high school
 γ_{200} = change in occupational aspirations of student i in school j over the course of four years in high school associated with a one unit change in academic achievement
 γ_{300} = change in occupational aspirations of student i in school j over the course of four years in high school associated with a one unit change in locus of control

Mediation Testing

While the theoretical model posits that the characteristics of the school environment are expected to affect student occupational aspirations via student locus of control (as noted in Figure 4), measuring the extent to which locus of control actually mediates this relationship is key. Baron and Kenny (1986) noted that “mediators explain how external physical events take on internal psychological significance” (p. 1176) and are the most cited for tests of mediation for traditional mediation models in which running three regression models provide evidence for mediation, if it exists (Iacobucci, 2008). Zhang’s diagram (Zhang, Zyphur, & Preacher, 2009) of Baron and Kenny’s (1986) work on mediation depicts traditional mediation models and tests to determine whether mediation is significant.

Baron and Kenny (1986, p. 1176) proposed several conditions that needed to be met for a variable to function as a mediator: (Path c) in which the independent variables influence the outcome variable when the mediator is absent; (Path a) in which variations in the levels of the independent variables significantly account for variations in the mediating variable; (Path b) variations in the mediator significantly account for variations the outcome variable; and (Path c') which tests the influence of the independent variables on the outcome variable but includes the mediator. According to Baron and Kenny, when paths a and b are controlled, a previously

significant relationship between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when Path c is zero.

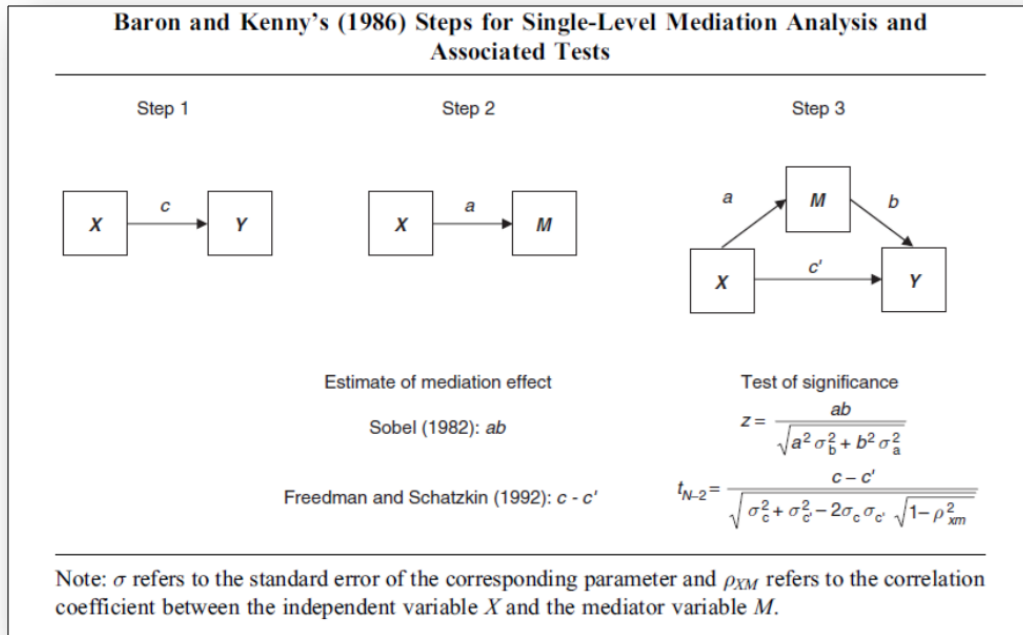


Figure 4. Baron & Kenny (1986) Mediation Models.

While this study employs a three level nested regression model (MacKinnon, 2008; Pituch, Murphy, & Tate, 2010; Zhang et al., 2009) the same process applies, but instead of running the classic mediation tests for a single level regression, multilevel mediation tests will be conducted and analyzed for indirect effects.

Below are general specifications for applying mediation testing to multilevel design to this study (MacKinnon, 2008) (Figure 5).

1.
 - Level 1: $Y_{ij} = \pi_{0ij} + e_{ij}$
 - Level 2: $\pi_{0ij} = \beta_{00j} + r_{0ij}$
 - Level 3: $\beta_{00j} = \gamma_{000} + cX_{0ij} + u_{00j}$

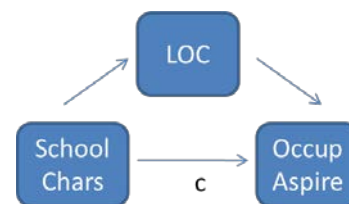


Figure 5. Path c

This test analyzes whether there is a significant direct relationship (c) between the school characteristics (X) and student occupational aspirations (Y)

(Figure 6).

2.
 Level 1: $M_{tij} = \pi_{0ij} + e_{tij}$
 Level 2: $\pi_{0ij} = \beta_{00j} + r_{0ij}$
 Level 3: $\beta_{00j} = \gamma_{000} + aX_{0ij} + u_{00j}$

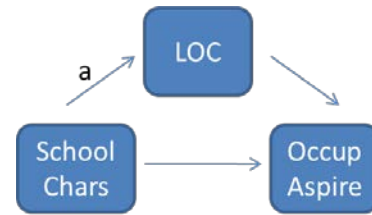


Figure 6. Path a

This test will analyze whether there is a significant relationship (a) between the school characteristics in the model (X) and student locus of control (M) (Figure 7).

3.
 Level 1: $Y_{tij} = \pi_{0ij} + bM_{ij} + e_{tij}$
 Level 2: $\pi_{0ij} = \beta_{00j} + r_{0ij}$
 Level 3: $\beta_{00j} = \gamma_{000} + c'X_{0ij} + u_{00j}$

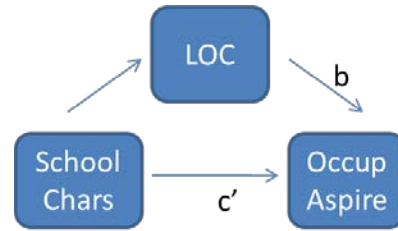


Figure 7. Paths b and c'

This last mediation test will analyze whether locus of control (M) has a significant relationship (b) with student occupational aspirations (Y) and whether the direct relationship (c') of the school characteristic (X) becomes significantly smaller in size relative to (c) in equation 1.

Mediation Models Sets

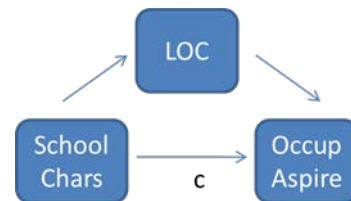
School Effects on Occupational Aspirations via Student Locus of Control (Model Set 1)

The following models have been specified to test the indirect effects of school characteristics on student occupational aspirations via student locus of control. While the models are based on the multilevel tests of mediation noted in the previous section, the following models

include both the school level characteristics and student level characteristics of interest. Student characteristics (Sex, SES, Minority Status, Parental Occupation, Curriculum Track) are utilized primarily as control variables.

As noted in the previous section on mediation testing, Baron and Kenny (1986, p. 1176) proposed several conditions that needed to be met for a variable to function as a mediator. Based on their work and updated for use in hierarchical linear models (Zhang et al., 2009, p. 697), the following paths will be tested: (Path *c*) whether the school characteristics at Level 3 influence the occupational aspirations outcome at Level 1 when the mediator (locus of control) is absent; (Path *a*) whether variations in the levels of the school characteristics at Level 3 significantly account for variations in the locus of control, the mediating variable, at Level 1; (Path *b*) whether variations in the locus of control mediator at Level 1 significantly accounts for variations in the occupational aspirations outcome at Level 1; and (Path *c'*) whether the influence of the school characteristics at Level 3 on the occupational aspiration outcomes at Level 1 is reduced with the inclusion of the locus of control mediator at Level 1.

Mediation path c: School effects model for student occupational aspirations. In this model, the effect of school characteristics on student occupational aspirations is examined and student occupational aspirations ($OCC30_{ij}$) is estimated.



This model takes into account student level characteristics at Level 2 in order to control for their effects at the starting point (8th grade) and on the change in student occupational aspirations through 12th grade. School level characteristics from Level 3 are included in order to understand the extent to which these characteristics predict change in student occupational aspirations from 8th through 12th grades. Level 1 specifies repeated measures of occupational aspirations for

students over 8th, 10th, and 12th grades. Level 2 specifies student level characteristics. Level 3 specifies school level characteristics.

Level-1

$$(OCC30)_{ij} = \pi_{0ij} + \pi_{1ij}(\text{YEAR})_{ij} + e_{ij}$$

Level-2

$$\begin{aligned} \pi_{0ij} &= \beta_{00j} + \beta_{01j}(\text{FEMALE}) + \beta_{02j}(\text{MINORITY}) + \beta_{03j}(\text{SES}) + \beta_{04j}(\text{PAROCCUP}) + r_{0ij} \\ \pi_{1ij} &= \beta_{10j} + \beta_{11j}(\text{FEMALE}) + \beta_{12j}(\text{MINORITY}) + \beta_{13j}(\text{SES}) + \beta_{14j}(\text{PAROCCUP}) + \\ &\quad \beta_{15j}(\text{VOCTRACK}) + r_{1ij} \end{aligned}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(\text{LOSCHSES}) + \gamma_{102}(\text{CLIMATE}) + \gamma_{103}(\text{ACADPRESS}) + \\ \gamma_{104}(\text{NOCOUNSEL}) + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

Y_{ij} = average occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average occupation aspirations of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

γ_{010} = effect of being female on the average occupational aspirations of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige

γ_{020} = effect of being a racial minority on the average occupational aspirations of an eighth-grade male student of average SES with parents of average occupational prestige

γ_{030} = effect of a one unit increase in student SES on the average occupational aspirations of an eighth-grade male, non-minority student with parents of average occupational prestige

γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average occupational aspirations of an eighth-grade male, non-minority student of average SES

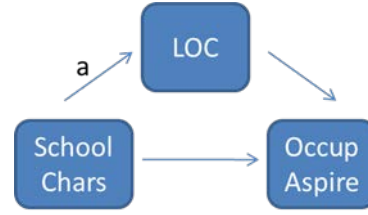
γ_{100} = average per year change in the occupational aspirations over the course of four years in high school of a male, non-minority student of average SES in an

- academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department
- γ_{101} = effect of below average school SES on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department
- γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department
- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and average academic press
- γ_{110} = effect of the student being female on the average per year change in the occupational aspirations of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the occupational aspirations of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the occupational aspirations of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in occupational aspirations of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the occupational aspirations of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above

average SES, average climate, average academic press and a formal counseling department

Mediation path a: School effects model for student

locus of control. In this model, the influence of school level characteristics on the change in student locus of control is examined and student locus of control (LOC_{ij}) is estimated.



This model takes into account student level characteristics in order to control for their effects at the starting point (8th grade) and on the change in locus of control.

Level-1

$$(LOC)_{ij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{ij} + e_{ij}$$

Level-2

$$\begin{aligned} \pi_{0ij} &= \beta_{00j} + \beta_{01j}(FEMALE) + \beta_{02j}(MINORITY) + \beta_{03j}(SES) + \beta_{04j}(PAROCCUP) + r_{0ij} \\ \pi_{1ij} &= \beta_{10j} + \beta_{11j}(FEMALE) + \beta_{12j}(MINORITY) + \beta_{13j}(SES) + \beta_{14j}(PAROCCUP) + \\ &\quad \beta_{15j}(VOCTRACK) + r_{1ij} \end{aligned}$$

Level-3

$$\begin{aligned} \beta_{00j} &= \gamma_{000} + u_{00j} \\ \beta_{01j} &= \gamma_{010} \\ \beta_{02j} &= \gamma_{020} \\ \beta_{03j} &= \gamma_{030} \\ \beta_{04j} &= \gamma_{040} \\ \beta_{10j} &= \gamma_{100} + \gamma_{101}(LOSCHSES) + \gamma_{102}(CLIMATE) + \gamma_{103}(ACADPRESS) + \\ &\quad \gamma_{104}(NOCOUNSEL) + u_{10j} \\ \beta_{11j} &= \gamma_{110} \\ \beta_{12j} &= \gamma_{120} \\ \beta_{13j} &= \gamma_{130} \\ \beta_{14j} &= \gamma_{140} \\ \beta_{15j} &= \gamma_{150} \end{aligned}$$

Y_{ij} = average locus of control of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average locus of control of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

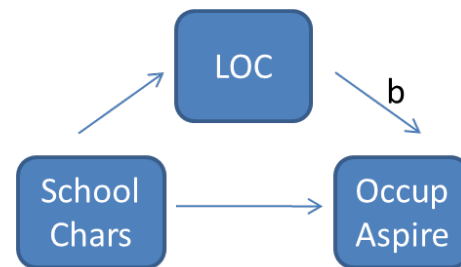
γ_{010} = effect of being female on the average locus of control of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige

- γ_{020} = effect of being a racial minority on the average locus of control of an eighth-grade male student of average SES with parents of average occupational prestige
- γ_{030} = effect of a one unit increase in student SES on the average locus of control of an eighth-grade male, non-minority student with parents of average occupational prestige
- γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average locus of control of an eighth-grade male, non-minority student of average SES
- γ_{100} = average per year change in the locus of control over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department
- γ_{101} = effect of below average school SES on the average per year change in the locus of control of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department
- γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the locus of control of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department
- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the locus of control of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the locus of control of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and average academic press
- γ_{110} = effect of the student being female on the average per year change in the locus of control of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the locus of control of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the locus of control of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above

- average SES, average climate, average academic press and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in the locus of control of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the locus of control of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department

Mediation path b: Student locus of control effects on student occupational aspirations.

In this model, the effects of change in student locus of control on change in student occupational aspirations is examined (Path b) and student occupational aspirations ($OCC30_{tij}$) is estimated. This model also takes into account several student level



characteristics at Level 2 to control for their effects on the starting point in 8th grade and on the change in student occupational aspirations and locus of control over time.

Level-1

$$(OCC30)_{tij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{tij} + \pi_{2ij}(LOC)_{tij} + e_{tij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(FEMALE) + \beta_{02j}(MINORITY) + \beta_{03j}(SES) + \beta_{04j}(PAROCCUP) + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(FEMALE) + \beta_{12j}(MINORITY) + \beta_{13j}(SES) + \beta_{14j}(PAROCCUP) + \beta_{15j}(VOCTRACK) + r_{1ij}$$

$$\pi_{2ij} = \beta_{20j}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

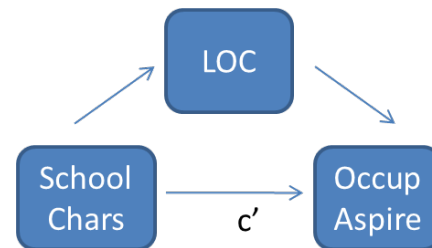
$$\beta_{20j} = \gamma_{200} + u_{20j}$$

- Y_{ij} = average occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.
- γ_{000} = average occupation aspirations of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige
- γ_{010} = effect of being female on the average occupational aspirations of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige
- γ_{020} = effect of being a racial minority on the average occupational aspirations of an eighth-grade male student of average SES with parents of average occupational prestige
- γ_{030} = effect of a one unit increase in student SES on the average occupational aspirations of an eighth-grade male, non-minority student with parents of average occupational prestige
- γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average occupational aspirations of an eighth-grade male, non-minority student of average SES
- γ_{100} = average per year change in the occupational aspirations over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department
- γ_{110} = effect of the student being female on the average per year change in the occupational aspirations of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the occupational aspirations of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the occupational aspirations of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department

- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in occupational aspirations of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the occupational aspirations of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{200} = average per year change in the occupational aspirations of a male, non-minority student of average SES, in an academic track and with parents of average occupational prestige over the course of four years in high school associated with one unit change in student locus of control

Mediation path c': School effects model for

student occupational aspirations with mediator. In this model, the effects of school characteristics on student occupational aspirations via their effects on student locus of control are examined and student occupational



aspirations ($OCC30_{ij}$) are estimated. This model (Path c') differs from the previous model (Path c) in that this model includes the mediator at Level 1. It differs from the previous model (Path b) in that this model includes the school level characteristics at Level 3. With the inclusion of both the mediator and school level characteristics, this model examines the relationship of school level characteristics and the effect of change in locus of control on change in occupational aspirations. As with all the other models, this model takes into account the student level characteristics at Level 2 in order to control for their effects. Level 1 specifies repeated measures of locus of control over 8th, 10th, and 12th grades. Level 2 specifies student level characteristics. Level 3 specifies school level characteristics.

Level-1

$$(OCC30)_{ij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{ij} + \pi_{2ij}(LOC)_{ij} + e_{ij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(\text{FEMALE}) + \beta_{02j}(\text{MINORITY}) + \beta_{03j}(\text{SES}) + \beta_{04j}(\text{PAROCCUP}) + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(\text{FEMALE}) + \beta_{12j}(\text{MINORITY}) + \beta_{13j}(\text{SES}) + \beta_{14j}(\text{PAROCCUP}) + \beta_{15j}(\text{VOCTRACK}) + r_{1ij}$$

$$\pi_{2ij} = \beta_{20j}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(\text{LOSCHSES}) + \gamma_{102}(\text{CLIMATE}) + \gamma_{103}(\text{ACADPRESS}) + \gamma_{104}(\text{NOCOUNSEL}) + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

$$\beta_{20j} = \gamma_{200} + u_{20j}$$

Y_{ij} = average occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average occupation aspirations of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

γ_{010} = effect of being female on the average occupational aspirations of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige

γ_{020} = effect of being a racial minority on the average occupational aspirations of an eighth-grade male student of average SES with parents of average occupational prestige

γ_{030} = effect of a one unit increase in student SES on the average occupational aspirations of an eighth-grade male, non-minority student with parents of average occupational prestige

γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average occupational aspirations of an eighth-grade male, non-minority student of average SES

γ_{100} = average per year change in the occupational aspirations over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department

γ_{101} = effect of below average school SES on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an

- γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department
- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and average academic press
- γ_{110} = effect of the student being female on the average per year change in the occupational aspirations of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the occupational aspirations of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the occupational aspirations of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in occupational aspirations of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the occupational aspirations of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{200} = per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track and parents of average occupational prestige attending a high school at or above the average SES, average climate, average

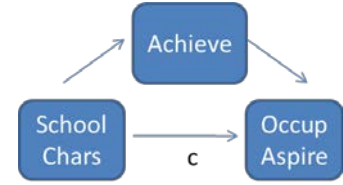
academic press and a formal counseling department over the course of four years in high school associated with a one unit change in locus of control

School Effects on Student Occupational Aspirations via Academic Achievement (Model Set 2)

Given that academic achievement may be another avenue through which schools influence student occupational aspirations, the following models have been specified to test the indirect effects of school characteristics on student occupational aspirations via student academic achievement. While the models are based on the multilevel tests of mediation, as in the previous model set, the following models include both the school level characteristics and student level characteristics of interest. Student characteristics (Sex, SES, Minority Status, Parental Occupation, Curriculum Track) are utilized as control variables.

Also consistent with the previous model set, in this model set the following paths will be tested: (Path *c*) whether the school characteristics at Level 3 influence the occupational aspirations outcome at Level 1 when the mediator (achievement) is absent; (Path *a*) whether variations in the levels of the school characteristics at Level 3 significantly account for variations in achievement, the mediating variable, at Level 1; (Path *b*) whether variations in the achievement mediator at Level 1 significantly accounts for variations in the occupational aspirations outcome at Level 1; and (Path *c'*) whether the influence of the school characteristics at Level 3 on the occupational aspiration outcomes at Level 1 is reduced with the inclusion of the achievement mediator at Level 1.

Mediation path c: School effects model for student occupational aspirations. This model was tested in the previous model set. It is reiterated here in order to provide a complete understanding of the mediation paths in this model set with a different mediator. As noted in the previous model set, the effect of school characteristics on student occupational aspirations is examined and student occupational aspirations ($OCC30_{tij}$) is estimated. This model takes into account student level characteristics at Level 2 in order to control for their effects at the starting point (8th grade) and on the change in student occupational aspirations. School level characteristics from Level 3 are included in order to understand the extent to which the school contextual characteristics predict change in student occupational aspirations from 8th through 12th grades. Level 1 specifies repeated measures of occupational aspirations for students over 8th, 10th, and 12th grades. Level 2 specifies student level characteristics. Level 3 specifies school level characteristics.



Level-1

$$(OCC30)_{tij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{tij} + e_{ij}$$

Level-2

$$\begin{aligned} \pi_{0ij} &= \beta_{00j} + \beta_{01j}(FEMALE) + \beta_{02j}(MINORITY) + \beta_{03j}(SES) + \beta_{04j}(PAROCCUP) + r_{0ij} \\ \pi_{1ij} &= \beta_{10j} + \beta_{11j}(FEMALE) + \beta_{12j}(MINORITY) + \beta_{13j}(SES) + \beta_{14j}(PAROCCUP) + \\ &\quad \beta_{15j}(VOCTRACK) + r_{1ij} \end{aligned}$$

Level-3

$$\begin{aligned} \beta_{00j} &= \gamma_{000} + u_{00j} \\ \beta_{01j} &= \gamma_{010} \\ \beta_{02j} &= \gamma_{020} \\ \beta_{03j} &= \gamma_{030} \\ \beta_{04j} &= \gamma_{040} \\ \beta_{10j} &= \gamma_{100} + \gamma_{101}(LOSCHSES) + \gamma_{102}(CLIMATE) + \gamma_{103}(ACADPRESS) + \\ &\quad \gamma_{104}(NOCOUNSEL) + u_{10j} \\ \beta_{11j} &= \gamma_{110} \\ \beta_{12j} &= \gamma_{120} \\ \beta_{13j} &= \gamma_{130} \end{aligned}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

Y_{ij} = average occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average occupation aspirations of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

γ_{010} = effect of being female on the average occupational aspirations of an eighth grade non-minority student who is of average SES with parents of average occupational prestige

γ_{020} = effect of being a racial minority on the average occupational aspirations of an eighth-grade male student of average SES with parents of average occupational prestige

γ_{030} = effect of a one unit increase in student SES on the average occupational aspirations of an eighth-grade male, non-minority student with parents of average occupational prestige

γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average occupational aspirations of an eighth-grade male, non-minority student of average SES

γ_{100} = average per year change in the occupational aspirations over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department

γ_{101} = effect of below average school SES on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department

γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department

γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department

γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and average academic press

- γ_{110} = effect of the student being female on the average per year change in the occupational aspirations of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the occupational aspirations of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the occupational aspirations of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the occupational aspirations of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department

Mediation path a: School effects model for student academic

achievement. In this model, the influence of school level characteristics on the change in student academic achievement is examined and student achievement ($ACHIEVE_{ij}$) is estimated. This model takes into account student level characteristics in order to control for their effects at the starting point in 8th grade and on their change over time.



Level-1

$$(ACHIEVE)_{ij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{ij} + e_{ij}$$

Level-2

$$\begin{aligned} \pi_{0ij} &= \beta_{00j} + \beta_{01j}(FEMALE) + \beta_{02j}(MINORITY) + \beta_{03j}(SES) + \beta_{04j}(PAROCCUP) + r_{0ij} \\ \pi_{1ij} &= \beta_{10j} + \beta_{11j}(FEMALE) + \beta_{12j}(MINORITY) + \beta_{13j}(SES) + \beta_{14j}(PAROCCUP) + \beta_{15j}(VOCTRACK) + r_{1ij} \end{aligned}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(\mathbf{LOSCHSES}) + \gamma_{102}(\mathbf{CLIMATE}) + \gamma_{103}(\mathbf{ACADPRESS}) + \gamma_{104}(\mathbf{NOCOUNSEL}) + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

Y_{tij} = average achievement of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average achievement of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

γ_{010} = effect of being female on the average achievement of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige

γ_{020} = effect of being a racial minority on the average achievement of an eighth-grade male student of average SES with parents of average occupational prestige

γ_{030} = effect of a one unit increase in student SES on the average achievement of an eighth-grade male, non-minority student with parents of average occupational prestige

γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average achievement of an eighth-grade male, non-minority student of average SES

γ_{100} = average per year change in the achievement over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department

γ_{101} = effect of below average school SES on the average per year change in the achievement of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department

γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the achievement of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department

- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the achievement of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the achievement of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and average academic press
- γ_{110} = effect of the student being female on the average per year change in the achievement of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the achievement of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the achievement of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in the achievement of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the achievement of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department

Mediation path b: Student academic achievement effects

on student occupational aspirations. In this model, the effects of change in student academic achievement on change in student occupational aspirations are examined (Path b) and student



occupational aspirations ($OCC30_{ij}$) are estimated. This model also takes into account several

student level characteristics at Level 2 to control for their effects on the Level 1 variables starting at 8th grade and on the change over time.

Level-1

$$(OCC30)_{ij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{ij} + \pi_{2ij}(ACHIEVE)_{ij} + e_{ij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(SEX) + \beta_{02j}(MINORITY) + \beta_{03j}(SES) + \beta_{04j}(PAROCCUP) + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(SEX) + \beta_{12j}(MINORITY) + \beta_{13j}(SES) + \beta_{14j}(PAROCCUP) + \beta_{15j}(VOCTRACK) + r_{1ij}$$

$$\pi_{2ij} = \beta_{20j}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

$$\beta_{20j} = \gamma_{200} + u_{20j}$$

Y_{ij} = average occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average occupation aspirations of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

γ_{010} = effect of being female on the average occupational aspirations of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige

γ_{020} = effect of being a racial minority on the average occupational aspirations of an eighth-grade male student of average SES with parents of average occupational prestige

γ_{030} = effect of a one unit increase in student SES on the average occupational aspirations of an eighth-grade male, non-minority student with parents of average occupational prestige

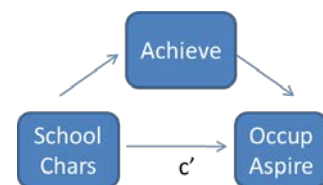
γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average occupational aspirations of an eighth-grade male, non-minority student of average SES

γ_{100} = average per year change in the occupational aspirations over the course of four years in high school of a male, non-minority student of average SES in an

- academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department
- γ_{110} = effect of the student being female on the average per year change in the occupational aspirations of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the occupational aspirations of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the occupational aspirations of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in occupational aspirations of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the occupational aspirations of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{200} = average per year change in the occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school which is at or above the average school SES, with an average climate, average academic press, and a formal counseling department associated with one unit change in student academic achievement

Mediation path c': School effects model for student

occupational aspirations with mediator. In this model, the effects of school characteristics on student occupational aspirations via their effects on student academic achievement are examined and student



occupational aspirations ($OCC30_{ij}$) are estimated. This model (Path c') differs from the previous model (Path c) in that this model includes the mediator at Level 1. It differs from the previous

model (Path b) in that this model includes the school level characteristics at Level 3. With the inclusion of both the mediator and school level characteristics, this model examines the relationship of school level characteristics on change in academic achievement and the effect of change in academic achievement on change in occupational aspirations. As with all the other models, this model takes into account the student level characteristics at Level 2 in order to control for their effects. Level 1 specifies repeated measures of locus of control over 8th, 10th, and 12th grades. Level 2 specifies student level characteristics. Level 3 specifies school level characteristics.

Level-1

$$(OCC30)_{tij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{tij} + \pi_{2ij}(ACHIEVE)_{tij} + e_{tij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(FEMALE) + \beta_{02j}(MINORITY) + \beta_{03j}(SES) + \beta_{04j}(PAROCCUP) + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(FEMALE) + \beta_{12j}(MINORITY) + \beta_{13j}(SES) + \beta_{14j}(PAROCCUP) + \beta_{15j}(VOCTRACK) + r_{1ij}$$

$$\pi_{2ij} = \beta_{20j}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(LOSCHSES) + \gamma_{102}(CLIMATE) + \gamma_{103}(ACADPRESS) + \gamma_{104}(NOCOUNSEL) + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

$$\beta_{20j} = \gamma_{200} + u_{20j}$$

Y_{tij} = average occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average occupation aspirations of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

- γ_{010} = effect of being female on the average occupational aspirations of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige
- γ_{020} = effect of being a racial minority on the average occupational aspirations of an eighth-grade male student of average SES with parents of average occupational prestige
- γ_{030} = effect of a one unit increase in student SES on the average occupational aspirations of an eighth-grade male, non-minority student with parents of average occupational prestige
- γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average occupational aspirations of an eighth-grade male, non-minority student of average SES
- γ_{100} = average per year change in the occupational aspirations over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department
- γ_{101} = effect of below average school SES on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department
- γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department
- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and average academic press
- γ_{110} = effect of the student being female on the average per year change in the occupational aspirations of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the occupational aspirations of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department

- γ_{130} = effect of a one unit increase in student SES on the average per year change in the occupational aspirations of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in occupational aspirations of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the occupational aspirations of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{200} = average per year change in the occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school which is at or above the average school SES, with an average climate, average academic press, and a formal counseling department associated with one unit change in student academic achievement

School Effects on Student Achievement via Student Locus of Control (Model Set 3)

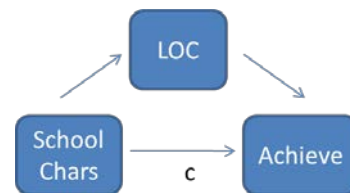
The primary mediator of interest in this study is student locus of control. However, given the ties between academic achievement and occupations noted in the theoretical framework, it was important to analyze the potential role achievement might have in mediating the impact of schools on student occupational aspirations in the previous model set. Both previous model sets then set the stage to analyze Hypothesis 3: whether academic achievement may also be indirectly influenced by school contextual characteristics via student locus of control. The following models have been specified to test the indirect effects of school characteristics on student academic achievement via student locus of control. While the models are based on the multilevel tests of mediation noted in the previous section, the following models include both the school level characteristics and student level characteristics of interest. Student characteristics

(Sex, SES, Minority Status, Parental Occupation, Student Curriculum Track) are utilized as control variables.

As noted in the previous section on mediation testing, Baron and Kenny (1986, p. 1176) proposed several conditions that needed to be met for a variable to function as a mediator. Based on their proposal and updated for use in hierarchical linear models (Zhang et al., 2009, p. 697), the following paths will be tested: (Path *c*) whether the school characteristics at Level 3 influence academic achievement outcome at Level 1 when the mediator (locus of control) is absent; (Path *a*) whether variations in the levels of the school characteristics at Level 3 significantly account for variations in the locus of control, the mediating variable, at Level 1; (Path *b*) whether variations in the locus of control mediator at Level 1 significantly accounts for variations in the academic achievement outcome at Level 1; and (Path *c'*) whether the influence of the school characteristics at Level 3 on the academic achievement outcomes at Level 1 is reduced with the inclusion of the locus of control mediator at Level 1.

Mediation path c: School effects model for student

academic achievement. This model is the same as that of Path a in the previous model set. Still, it is included here for the purposes of providing a complete mediation model. As such, the



effect of school characteristics on student academic achievement is examined and student academic achievement ($ACHIEVE_{ij}$) is estimated. This model takes into account student level characteristics at Level 2 in order to control for their effects at the starting point (8th grade) and on the change in student occupational aspirations. School level characteristics from Level 3 are included in order to understand the direct relationship between them without the mediator. Level 1 specifies repeated measures of occupational aspirations for students over 8th, 10th, and 12th

grades. Level 2 specifies student level characteristics. Level 3 specifies school level characteristics.

Level-1

$$(ACHIEVE)_{ij} = \pi_{0ij} + \pi_{1ij}(\text{YEAR})_{ij} + e_{ij}$$

Level-2

$$\begin{aligned} \pi_{0ij} &= \beta_{00j} + \beta_{01j}(\text{FEMALE}) + \beta_{02j}(\text{MINORITY}) + \beta_{03j}(\text{SES}) + \beta_{04j}(\text{PAROCCUP}) + r_{0ij} \\ \pi_{1ij} &= \beta_{10j} + \beta_{11j}(\text{FEMALE}) + \beta_{12j}(\text{MINORITY}) + \beta_{13j}(\text{SES}) + \beta_{14j}(\text{PAROCCUP}) + \\ &\quad \beta_{15j}(\text{VOCTRACK}) + r_{1ij} \end{aligned}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(\text{LOSCSSES}) + \gamma_{102}(\text{CLIMATE}) + \gamma_{103}(\text{ACADPRESS}) + \gamma_{104}(\text{NOCOUNSEL}) + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

Y_{ij} = average achievement of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average achievement of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

γ_{010} = effect of being female on the average achievement of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige

γ_{020} = effect of being a racial minority on the average achievement of an eighth-grade male student of average SES with parents of average occupational prestige

γ_{030} = effect of a one unit increase in student SES on the average achievement of an eighth-grade male, non-minority student with parents of average occupational prestige

γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average achievement of an eighth-grade male, non-minority student of average SES

γ_{100} = average per year change in the achievement over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average

- SES, an average climate, average academic press and a formal counseling department
- γ_{101} = effect of below average school SES on the average per year change in the achievement of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department
- γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the achievement of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department
- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the achievement of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the achievement of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and average academic press
- γ_{110} = effect of the student being female on the average per year change in the achievement of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the achievement of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the achievement of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in the achievement of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the achievement of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department

Mediation path a: School effects model for student

locus of control. This model is the same as Path a in the first

mediation model set. Still, it is noted here in the interest of

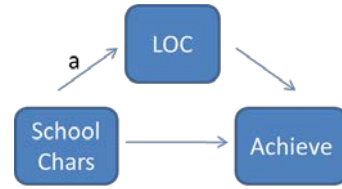
providing a complete mediation model by showing all of the paths being examined. As noted

previously, in this model, the influence of school level characteristics on the change in student

locus of control is examined and student locus of control (LOC_{ij}) is estimated. This model takes

into account student level characteristics in order to control for their effects at the starting point

(8th grade) and on the change in locus of control over time.



Level-1

$$(LOC)_{ij} = \pi_{0ij} + \pi_{1ij}(\text{YEAR})_{ij} + e_{ij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(\text{FEMALE}) + \beta_{02j}(\text{MINORITY}) + \beta_{03j}(\text{SES}) + \beta_{04j}(\text{PAROCCUP}) + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(\text{FEMALE}) + \beta_{12j}(\text{MINORITY}) + \beta_{13j}(\text{SES}) + \beta_{14j}(\text{PAROCCUP}) + \beta_{15j}(\text{VOCTRACK}) + r_{1ij}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(\text{LOSCHSES}) + \gamma_{102}(\text{CLIMATE}) + \gamma_{103}(\text{ACADPRESS}) + \gamma_{104}(\text{NOCOUNSEL}) + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

Y_{ij} = average locus of control of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

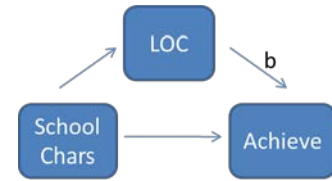
γ_{000} = average locus of control of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

- γ_{010} = effect of being female on the average locus of control of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige
- γ_{020} = effect of being a racial minority on the average locus of control of an eighth-grade male student of average SES with parents of average occupational prestige
- γ_{030} = effect of a one unit increase in student SES on the average locus of control of an eighth-grade male, non-minority student with parents of average occupational prestige
- γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average locus of control of an eighth-grade male, non-minority student of average SES
- γ_{100} = average per year change in the locus of control over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department
- γ_{101} = effect of below average school SES on the average per year change in the locus of control of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department
- γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the locus of control of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department
- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the locus of control of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the locus of control of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and average academic press
- γ_{110} = effect of the student being female on the average per year change in the locus of control of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the locus of control of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department

- γ_{130} = effect of a one unit increase in student SES on the average per year change in the locus of control of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in the locus of control of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the locus of control of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department

Mediation path b: Student locus of control effects on student academic

achievement. In this model, the effects of change in student locus of control on change in student academic achievement is examined (Path b) and student academic achievement ($ACHIEVE_{tij}$) is



estimated. This model also takes into account several student level characteristics at Level 2 to control for their effects on the starting point in 8th grade and on the change in student academic achievement and locus of control over time.

Level-1

$$(ACHIEVE)_{tij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{tij} + \pi_{2ij}(LOC)_{tij} + e_{tij}$$

Level-2

$$\begin{aligned} \pi_{0ij} &= \beta_{00j} + \beta_{01j}(FEMALE) + \beta_{02j}(MINORITY) + \beta_{03j}(SES) + \beta_{04j}(PAROCCUP) + r_{0ij} \\ \pi_{1ij} &= \beta_{10j} + \beta_{11j}(FEMALE) + \beta_{12j}(MINORITY) + \beta_{13j}(SES) + \beta_{14j}(PAROCCUP) + \\ &\quad \beta_{15j}(VOCTRACK) + r_{1ij} \\ \pi_{2ij} &= \beta_{20j} \end{aligned}$$

Level-3

$$\begin{aligned} \beta_{00j} &= \gamma_{000} + u_{00j} \\ \beta_{01j} &= \gamma_{010} \\ \beta_{02j} &= \gamma_{020} \\ \beta_{03j} &= \gamma_{030} \\ \beta_{04j} &= \gamma_{040} \end{aligned}$$

$$\beta_{10j} = \gamma_{100} + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

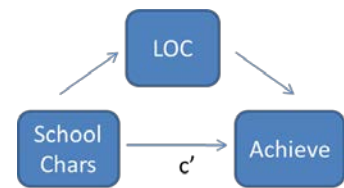
$$\beta_{20j} = \gamma_{200} + u_{20j}$$

- Y_{ij} = average achievement of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.
- γ_{000} = average achievement of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige
- γ_{010} = effect of being female on the average achievement of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige
- γ_{020} = effect of being a racial minority on the average achievement of an eighth-grade male student of average SES with parents of average occupational prestige
- γ_{030} = effect of a one unit increase in student SES on the average achievement of an eighth-grade male, non-minority student with parents of average occupational prestige
- γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average achievement of an eighth-grade male, non-minority student of average SES
- γ_{100} = average per year change in the achievement over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press, and a formal counseling department
- γ_{110} = effect of the student being female on the average per year change in the achievement of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the achievement of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the achievement of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department

- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in the achievement of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the achievement of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{200} = average per year change in achievement of a male, non-minority student of average SES in an academic track and parents of average occupational prestige attending a high school at or above the average SES, average climate, average academic press, and a formal counseling department associated with a one unit change in locus of control

Mediation path c': School effects model for student

academic achievement with mediator. In this model, the effects of school characteristics on student academic achievement via their effects on student locus of control are examined and student



academic achievement ($ACHIEVE_{tij}$) is estimated. This model (Path c') differs from the previous model (Path c) in that this model includes the mediator at Level 1. It differs from the previous model (Path b) in that this model includes the school level characteristics at Level 3. With the inclusion of both the mediator and school level characteristics, this model examines the relationship of school level characteristics on change in locus of control and the effect of change in locus of control on change in academic achievement. As with all the other models, this model takes into account the student level characteristics at Level 2 in order to control for their effects. Level 1 specifies repeated measures of locus of control over 8th, 10th, and 12th grades. Level 2 specifies student level characteristics. Level 3 specifies school level characteristics.

Level-1

$$(ACHIEVE)_{tij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{tij} + \pi_{2ij}(LOC)_{tij} + e_{tij}$$

Level-2

$$\pi_{0ij} = \beta_{00j} + \beta_{01j}(\mathbf{FEMALE}) + \beta_{02j}(\mathbf{MINORITY}) + \beta_{03j}(\mathbf{SES}) + \beta_{04j}(\mathbf{PAROCCUP}) + r_{0ij}$$

$$\pi_{1ij} = \beta_{10j} + \beta_{11j}(\mathbf{FEMALE}) + \beta_{12j}(\mathbf{MINORITY}) + \beta_{13j}(\mathbf{SES}) + \beta_{14j}(\mathbf{PAROCCUP}) + \beta_{15j}(\mathbf{VOCTRACK}) + r_{1ij}$$

$$\pi_{2ij} = \beta_{20j}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(\mathbf{LOSCHSES}) + \gamma_{102}(\mathbf{CLIMATE}) + \gamma_{103}(\mathbf{ACADPRESS}) + \gamma_{104}(\mathbf{NOCOUNSEL}) + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

$$\beta_{20j} = \gamma_{200} + u_{20j}$$

Y_{tij} = average achievement of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average achievement of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

γ_{010} = effect of being female on the average achievement of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige

γ_{020} = effect of being a racial minority on the average achievement of an eighth-grade male student of average SES with parents of average occupational prestige

γ_{030} = effect of a one unit increase in student SES on the average achievement of an eighth-grade male, non-minority student with parents of average occupational prestige

γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average achievement of an eighth-grade male, non-minority student of average SES

γ_{100} = average per year change in the achievement over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press, and a formal counseling department

γ_{101} = effect of below average school SES on the average per year change in the achievement of a male, non-minority student of average SES in an academic track

- with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department
- γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the achievement of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department
- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the achievement of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the achievement of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, and average academic press
- γ_{110} = effect of the student being female on the average per year change in the achievement of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the achievement of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the achievement of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in the achievement of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the achievement of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{200} = average per year change in the achievement of a male, non-minority student of average SES in an academic track and parents of average occupational prestige attending a high school at or above the average SES, average climate, average

academic press and a formal counseling department associated with a one unit change in locus of control

Full Mediation Model: School Effects on Occupational Aspirations via Locus of Control and Achievement (Model Set 4)

The following model is a culmination of the previous model sets in that it includes both student locus of control and student academic achievement as a way to test for the indirect effects of school characteristics on student occupational aspirations. The following model includes both the school level characteristics and student level characteristics of interest. Student characteristics (Sex, SES, Minority Status, Parental Occupation, Curriculum Track) are utilized as control variables.

In this model, the effects of school characteristics on student occupational aspirations via their effects on student locus of control and academic achievement are examined and student occupational aspirations ($OCC30_{ij}$) are estimated. This model



examines the interaction of the school level characteristics on change in locus of control and the change in academic achievement and how the change in these variables impacts the effects on student occupational aspirations over time. Level 1 specifies repeated measures of locus of control and academic achievement over 8th, 10th, and 12th grades. Level 2 specifies student level characteristics. Level 3 specifies school level characteristics.

Level-1

$$(OCC30)_{ij} = \pi_{0ij} + \pi_{1ij}(YEAR)_{ij} + \pi_{2ij}(ACHIEVE)_{ij} + \pi_{3ij}(LOC)_{ij} + e_{ij}$$

Level-2

$$\begin{aligned} \pi_{0ij} &= \beta_{00j} + \beta_{01j}(FEMALE) + \beta_{02j}(MINORITY) + \beta_{03j}(SES) + \beta_{04j}(PAROCCUP) + r_{0ij} \\ \pi_{1ij} &= \beta_{10j} + \beta_{11j}(FEMALE) + \beta_{12j}(MINORITY) + \beta_{13j}(SES) + \beta_{14j}(PAROCCUP) + \\ &\quad \beta_{15j}(VOCTRACK) + r_{1ij} \end{aligned}$$

$$\pi_{2ij} = \beta_{20j}$$

$$\pi_{3ij} = \beta_{30j}$$

Level-3

$$\beta_{00j} = \gamma_{000} + u_{00j}$$

$$\beta_{01j} = \gamma_{010}$$

$$\beta_{02j} = \gamma_{020}$$

$$\beta_{03j} = \gamma_{030}$$

$$\beta_{04j} = \gamma_{040}$$

$$\beta_{10j} = \gamma_{100} + \gamma_{101}(\mathbf{LOSCHSES}) + \gamma_{102}(\mathbf{CLIMATE}) + \gamma_{103}(\mathbf{ACADPRESS}) + \gamma_{104}(\mathbf{NOCOUNSEL}) + u_{10j}$$

$$\beta_{11j} = \gamma_{110}$$

$$\beta_{12j} = \gamma_{120}$$

$$\beta_{13j} = \gamma_{130}$$

$$\beta_{14j} = \gamma_{140}$$

$$\beta_{15j} = \gamma_{150}$$

$$\beta_{20j} = \gamma_{200} + u_{20j}$$

$$\beta_{30j} = \gamma_{300} + u_{30j}$$

Y_{tij} = average occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school with at or above average SES, with an average climate, average academic press, and a formal counseling department.

γ_{000} = average occupation aspirations of an eighth-grade male, non-minority, average SES student with parents of average occupational prestige

γ_{010} = effect of being female on the average occupational aspirations of an eighth-grade non-minority student who is of average SES with parents of average occupational prestige

γ_{020} = effect of being a racial minority on the average occupational aspirations of an eighth-grade male student of average SES with parents of average occupational prestige

γ_{030} = effect of a one unit increase in student SES on the average occupational aspirations of an eighth-grade male, non-minority student with parents of average occupational prestige

γ_{040} = effect of a one unit increase in occupational prestige of the student's parents on the average occupational aspirations of an eighth-grade male, non-minority student of average SES

γ_{100} = average per year change in the occupational aspirations over the course of four years in high school of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with at or above average SES, an average climate, average academic press and a formal counseling department

γ_{101} = effect of below average school SES on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige in a school with average climate, average academic press and a formal counseling department

- γ_{102} = effect of a one unit increase in the positive climate of the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES, in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average academic press, and a formal counseling department
- γ_{103} = effect of a one unit increase in the level of academic press at the school on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, and a formal counseling department
- γ_{104} = effect of not having access to a formal department of counseling on the average per year change in the occupational aspirations of a male, non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, and average academic press
- γ_{110} = effect of the student being female on the average per year change in the occupational aspirations of a non-minority student of average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{120} = effect of the student being a racial minority on the average per year change in the occupational aspirations of a male student with average SES in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{130} = effect of a one unit increase in student SES on the average per year change in the occupational aspirations of a male, non-minority student in an academic track with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{140} = effect of a one unit increase in occupational prestige of the student's parents on the average per year change in occupational aspirations of a male, non-minority student of average SES in an academic track attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{150} = effect of a student being in a vocational track on the average per year change in the occupational aspirations of a male, non-minority student of average SES with parents of average occupational prestige attending a high school with at or above average SES, average climate, average academic press, and a formal counseling department
- γ_{200} = average per year change in the occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school which is at or above the average school SES, with an average climate, average academic press, and a formal counseling department associated with one unit change in locus of control

γ_{300} = average per year change in the occupational aspirations of a male, non-minority, average SES student in an academic track with parents of average occupational prestige in a school which is at or above the average school SES, with an average climate, average academic press, and a formal counseling department associated with one unit change in student academic achievement

Significance and Effect Sizes of Mediation

Testing whether student locus of control mediates the relationship between school characteristics and student occupational aspirations requires additional tests once the models above are estimated. According to Baron and Kenny (1986), when paths a and b are controlled, a previously significant relationship between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when Path c is zero.

The quantification of mediation effects can be performed in different ways, two of which include the product-of-coefficients method (the product of paths a and paths $b = ab$) or the *difference-in-coefficients* method (path $c - c'$). Both methods are considered valid and roughly equivalent in single-level models, however, within multiple levels these methods can produce different values which may be interpreted differently (Krull & MacKinnon, 1999; MacKinnon, 2008), but this is if multiple mediators are present (Zhang et al., 2009, p. 699). In the case of this analysis, both methods will be utilized to understand whether mediation is present.

If mediation has been established, then it is necessary to understand whether the level of mediation is significant. To understand the significance levels of the mediation, MacKinnon (2008) noted that the mediated effect must be significantly different from zero and suggests that one way to test for this is to estimate a confidence interval and assess whether zero is included in the confidence interval. If zero is outside of the confidence interval, then the mediated effect is

statistically significant, or if the value of the ratio exceeds 1.96, then the mediated effect is significantly different from zero at $p < .05$ (MacKinnon, 2008, p. 53).

MacKinnon (2008) also pointed out that significance tests do not provide information on the size and meaningfulness of a mediation effect. In order to understand the size and meaningfulness, MacKinnon suggests that while ideal effect size measures for mediation are yet to be resolved, analyzing the partial correlation of the mediated paths is one way currently in use. To analyze the partial correlation for Path c' ($r_{YX.M}$ which is the correlation between X and Y partialled for M) and Path b ($r_{YM.X}$ which is the correlation between Y and M, partialled for X), the following formulas are suggested (MacKinnon, 2008, p. 86):

$$r_{YX.M} = \frac{r_{XY} - r_{MY} r_{XM}}{\sqrt{(1-r_{MY}^2)(1-r_{XM}^2)}} \quad (\text{Path c'})$$

$$r_{YM.X} = \frac{r_{MY} - r_{XY} r_{XM}}{\sqrt{(1-r_{XY}^2)(1-r_{XM}^2)}} \quad (\text{Path b})$$

Taken together, the tests of significance, effect size, and meaningfulness will allow a more precise understanding of the meaningfulness of the mediation effects between schools, locus of control, and occupational aspirations.

CHAPTER V

ANALYSIS

An analysis of the results from each of the models reveals the relationship between school contextual characteristics, the growth of student occupational aspirations, student locus of control, and academic achievement. Following is a discussion of these results and their relationship to the hypotheses and framework of the study.

Dependent Variables and Growth Over Time

Initial ANOVA models were run for the three dependent variables (student occupational aspirations, student locus of control, and student academic achievement) to test the first hypothesis and determine whether there was growth in these variables over time (see Table 15).

Table 15

Descriptive Statistics for ANOVA's

		Occupational Aspirations				Locus of Control				Academic Achievement			
		<i>M</i>	<i>SD</i>	Max	Min	<i>M</i>	<i>SD</i>	Max	Min	<i>M</i>	<i>SD</i>	Max	Min
Time of Repeated Measure	8th	54	9	76	0	3	.51	4	1	47	8	67	25
	10th	63	14	76	0	3	.49	4	1	52	9	73	25
	12th	63	14	76	0	3	.52	4	1	55	10	81	26

Results reveal that for student occupational aspirations, there is significant and positive growth in occupational aspirations over time ($\pi_{1ij} = 2.37, p < .001$) and that while there is

variation in the average growth in occupational aspirations across schools ($u_{10} = .21$, $\chi^2 = 1830.76$ with a standard deviation of .46 and $p < .001$), with plausible mean growth values for 95% of schools between 1.47 and 3.27, the magnitude of that variation in mean growth in occupational aspirations across schools is small, at less than one-fifth of one standard deviation. Additionally, the annual growth rate of student occupational aspirations across schools is highly and positively correlated ($T_{\beta} = .959$) with initial student occupational aspirations in 8th grade. While student aspirations tend to show significant and positive growth across schools, Figure 8 provides a visual representation of a small, random sample of individual students and their occupational aspirations at 8th, 10th, and 12th grades, revealing that individual student occupational aspirations change over time, with some students having decreases in aspirations.

Since occupational aspirations are a primary focus of this study, it is helpful to interpret these results in relationship to the Nakao-Treas (1994) occupational prestige scale. As noted in the descriptive statistics, the grand mean occupational aspiration of students in 8th grade is 54. This score is roughly equivalent to the occupational prestige of jobs such as kindergarten teacher, TV or radio announcer, construction supervisor, or general administrator. The grand mean occupational aspirations of students in 10th and 12th grade increase to a prestige score of 63, roughly the equivalent to occupations such as educational administrator, automotive plant manager, economist, nuclear engineer, author, banker or meteorologist. While the mean reflects the average aspirations across schools for 8th, 10th, and 12th grades, the results of the unconditional model indicate that individual student aspirational scores increase each year by 2.37. An example of how this growth might be interpreted is illustrated by considering the

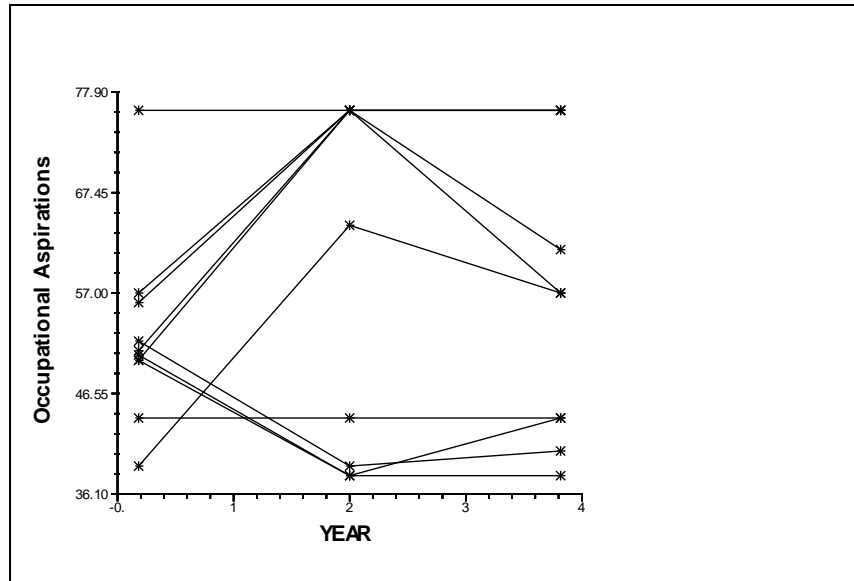


Figure 8. Sample of Change in Occupational Aspirations from 8th to 12th Grades.
Year: 0 = 8th grade, 2 = 10th grade, 4 = 12th grade

occupational prestige of the student with an average score (54) in 8th grade. If that student's score grew by the average of 2.37 prestige points each of the following years through 12th grade, then in the 10th grade their score would be 58.74 (54+2.37+2.37), roughly equivalent to the prestige of occupations such as an advertising executive, public relations manager, mechanical engineer, journalist, fire inspector, detective, or secret service agent. In 12th grade, their score would be 63.48 (58.74+2.37+2.37), roughly equivalent to the grand mean occupational prestige score of 63 (corresponding occupations for this score are noted above). Obviously, given the variation in initial scores across schools in 8th grade and their variation in growth, not all students will have initial occupational aspirations in 8th grade beginning at the mean of 54, nor will all students aspirational scores grow by the grand mean average of 2.37 each year—although the average score growth across 95% of schools will be between 1.47 and 3.27.

Results for student locus of control reveal that the average growth across schools in locus of control is both negative and nonsignificant ($\pi_{1ij} = -.004, p > .05$). Still, an analysis of the chi-

squared statistics show that there *is* variation in the growth in locus of control across schools ($u_{10} = .001$, $\chi^2 = 2334.63$ with a standard deviation of .03 and $p < .001$), with 20% of the variation in change being between schools and the magnitude of that variation being small (less than one fourth of one standard deviation) and 95% of schools having variations in changes in locus of control between -.067 and .059, allowing for a decrease, or change from an internal locus of control and toward a more external locus of control over time. While average growth in locus of control across schools is nonsignificant, Figure 9 is a small sample of individual students that provides a visual representation of individual student change in locus of control from 8th to 10th to 12th grades.

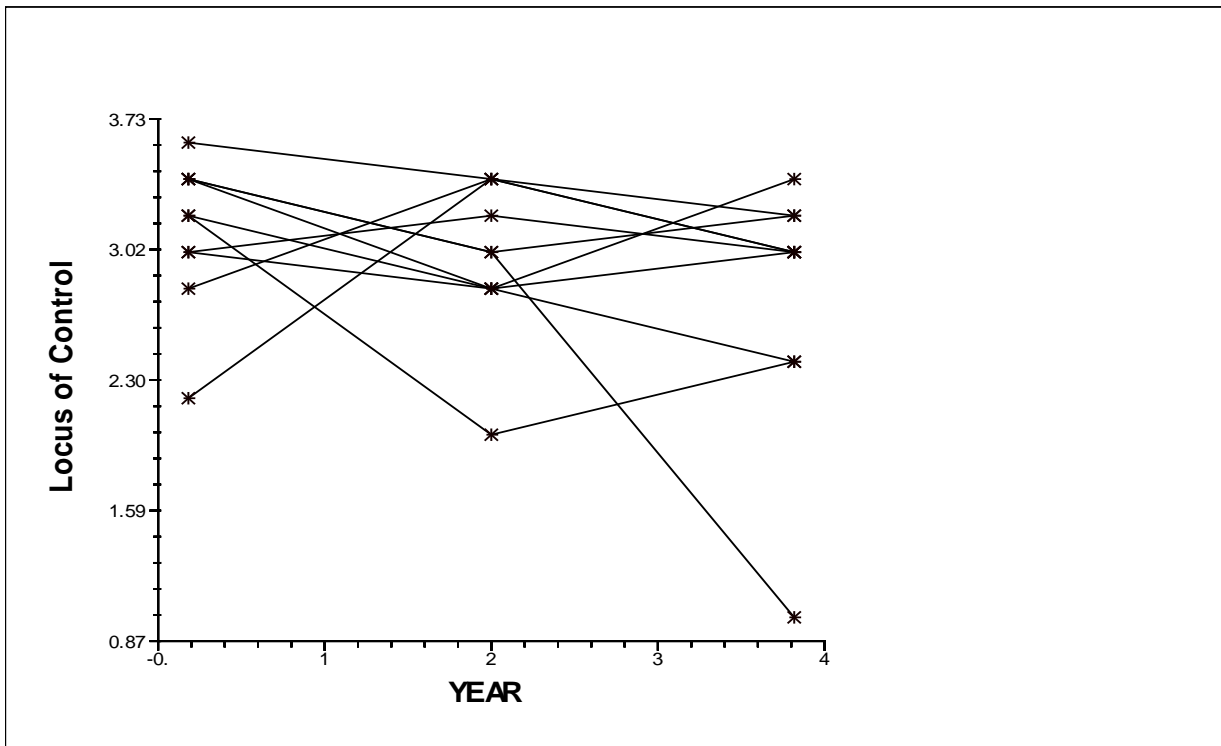


Figure 9. Sample of Change in Locus of Control From 8th to 12th Grades.
 Year: 0 = 8th grade, 2 = 10th grade, 4 = 12th grade

Finally, results for student academic achievement reveal that the grand mean growth for academic achievement is positive and significant ($\pi_{1ij} = 2.21, p > .001$). An analysis of the variation in achievement shows that there *is* variation in the average growth ($u_{10} = .181, \chi^2 = 3136.28$ with a standard deviation of .43 and $p < .001$), with the magnitude of variation in growth being small (less than one-fourth of one standard deviation), and plausible values for variation in change for 95% of schools between 1.38 and 3.04. Correlations confirm a positive relationship ($T_\beta = .094$) between mean academic achievement in 8th grade and growth in mean achievement. While the results provide information on the growth in academic achievement across schools, Figure 10 provides a visual representation of individual student

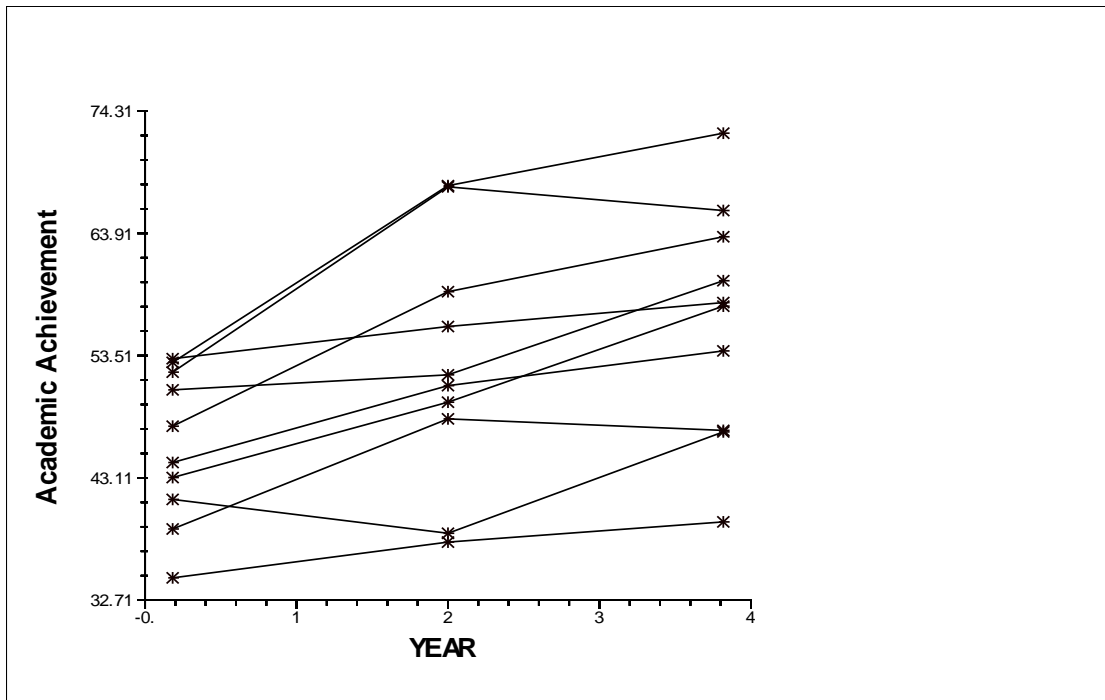


Figure 10. Sample of Change in Academic Achievement From 8th to 12th Grades.
Year: 0 = 8th grade, 2 = 10th grade, 4 = 12th grade

achievement across 8th, 10th, and 12th grades taken from a small, random sample of individual students.

The results for all ANOVA models are summarized in Table 16. The subsequent hypotheses themselves are built upon the theory that there would be change in the dependent variable. Indeed, even as there is slight variation in average change in locus of control across schools, the lack of significant change in locus of control over time is unexpected.

Table 16

Results for Individual ANOVA Models

Results for Individual ANOVA Models	Coefficient for Growth (γ_{10})	Magnitude of Variation	Variance (U_{10})	Chi-Squared (χ^2)	SD	Df	Correlations to initial status (T_{β})
Occupational Aspirations	2.37*	(1.47, 3.27)	.21*	1830.76	.46	1314	.959
Locus of Control	-.004 [†]	(-.067, .059)	.001*	2334.63	.03	1314	-.723
Academic Achievement	2.21*	(1.38, 3.04)	.18*	3136.28	.43	1314	.094

* significant at $p < .001$; [†] nonsignificant.

The ANOVA for occupational aspirations, locus of control, and academic achievement suggest that student occupational aspirations and academic achievement grow while locus of control remains significantly unchanged over time. However, these models do not show results in relation to each other as they were run independent of any predictor variables (i.e., the occupational aspirations model did not include locus of control or academic achievement as

predictors) and they do not control for the effects of student level variables such as race, gender, SES, parental occupation, or curriculum track and as such, any conclusions drawn prior to running more complete models would be premature.

Unlike the ANOVA models discussed above, the unconditional growth model (Model 4) examines growth in occupational aspirations in relation to growth in student locus of control and student academic achievement and provides a baseline understanding of the relationship between the three variables. Without any student or school level variables, the results of this model reveal that the average occupational aspirations of 8th grade students across all schools is 57.11 ($p < .001$) and the average growth in occupational aspirations across schools is 1.57 prestige points per year and is significant at $p < .001$. A one unit increase in student locus of control (toward a more internalized locus) across schools is associated with the average growth in occupational aspirations by 1.35 prestige points per year, significant at $p < .001$, and a one unit increase in student academic achievement across schools is positively and significantly ($p < .001$) associated with the average growth in student occupational aspirations across schools by .36 prestige points per year (see Table 17).

Results of this model suggest that change in both academic achievement and locus of control positively and significantly influence the growth in student occupational aspirations. It is helpful to understand the size of the effects of growth in locus of control and academic achievement on growth in occupational aspirations. To determine effect size, the following equation has been used: (coefficient for growth x standard deviation/standard deviation of occupational aspirations) with the understanding that closer to 1, the larger the effect size. The effect size of growth in locus of control on growth in occupational aspirations is .05 and the

Table 17

Results for Model 4: Full Growth Model

Results for Model 4: Full Growth Model	Average Growth in OCC30 (γ)	Effect Size
Occupational Aspirations (OCC30)	1.57*	--
Associated with a 1 unit increase in Locus of Control (LOC)	1.35*	.05
Associated with a 1 unit increase in Academic Achievement (ACHIEVE)	.36*	.27

*significant at $p < .001$.

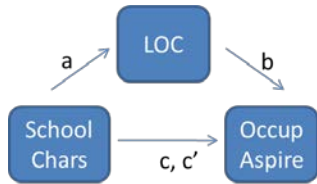
effect size of growth in achievement on growth in occupational aspirations is .27. While initial conclusions regarding student occupational aspirations, locus of control and achievement cannot be drawn from an analysis of the ANOVA models, the unconditional model provides greater detail into the relationship among the three variables, suggesting that growth in achievement and locus of control are significantly and positively associated with growth in occupational aspirations.

Mediation Models

The first hypothesis in this study proposes that positive school characteristics (positive climate, counseling support, at or above average school SES, and more academic press) will be associated with gains in occupational aspirations over time. This hypothesis will be tested as

part of the mediation model sets outlined below. Table 18 outlines the results of all the mediation models.

School Effects on Occupational Aspirations via Student Locus of Control (Model Set 1)



Hypothesis 2 proposes that student locus of control will mediate the relationship between school contextual variables and growth in student occupational aspirations. Paths in this model set have been

specified to test this hypothesis. Analysis of the paths in this model set provides information on the indirect effects of school characteristics including school climate, counseling support, school SES, and academic press on student occupational aspirations via student locus of control and whether hypothesis 2 can be supported. Each path was modeled independently in order to ascertain the mediation effects.

Path c. As noted previously, this path tests whether there is a significant direct relationship between the school contextual characteristics and the growth in student occupational aspirations. The school characteristics analyzed in this study did not have a significant effect on growth in student occupational aspirations. In fact, all of the four variables included were nonsignificant, even though there was significant and positive growth ($\gamma = 2.39, p < .001$) in student occupational aspirations over time. While all the school characteristics had nonsignificant effects, the coefficients for school SES ($\gamma_{101} = -.113, p = .609$) and school climate ($\gamma_{102} = -.126, p = .281$) were negative, while academic press ($\gamma_{103} = .175, p = .110$) and counseling support ($\gamma_{104} = .092, p = .627$) has small, positive effects.

Table 18

Results of all Mediation Model Sets

	Growth in Outcome Variable (γ_{100})	Effect of Mediating Variable (γ_{200})	Between School Variance in Growth (U_{10})	χ^2	SD	df
Model Set 1 SCH→LOC→OCC						
Path C SCH→OCC	2.39*		.09*	1752.33	.30	1310
Path A SCH→LOC	-.003 [†]		.001*	2283.99	.02	1310
Path B LOC→OCC	2.39*	2.05*	.11*	1880.09	.33	1302
Path C' SCH→LOC→OCC	2.39*	2.05*	.11*	1878.56	.32	1300
Model Set 2 SCH→ACH→OCC						
Path C SCH→OCC	2.39*		.09*	1752.33	.30	1310
Path A SCH→ACH	2.21*		.14*	2857.56	.37	1310
Path B ACH→OCC	1.64*	.34*	.22*	2133.22	.47	1314
Path C' SCH→ACH→OCC	1.65*	.34*	.22*	2131.01	.47	1310
Model Set 3 SCH→LOC→ACH						
Path C SCH→ACH	2.21*		.14*	2857.56	.37	1310
Path A SCH→LOC	-.003 [†]		.00*	2283.99	.02	1310
Path B LOC→ACH	2.21*	.67*	.14*	2775.97	.38	1304
Path C' SCH→LOC→ACH	2.21*	.67*	.14*	2742.03	.37	1300
Full Model SCH→LOC→ACH→OCC	1.69*	1.16* LOC .33* ACH	.24 [†]	1108.35	.49	1185

Note. SCH = school characteristics, OCC = student occupational aspirations, LOC = student locus of control, ACH = student academic achievement.

*significant at $p < .001$, **significant at $p < .05$, [†]nonsignificant

Path a. This study hypothesized that school contextual variables might have an effect on occupational aspirations via a mediator, specifically student locus of control. Path a specifically tests hypothesis 2a, and an analysis of the test on Path a provides an understanding of a potential mediating effect and whether there is a significant relationship between the school contextual characteristics in the model and growth in student locus of control (toward an internal locus of control).

Results show that school contextual characteristics were nonsignificant in the change in student locus of control, which in itself produced a nonsignificant result ($\gamma = -.003, p = .330$). Since results of Path a reveal that school context characteristics do not influence student locus of control over time, hypothesis 2a is not supported.

Path b. Complete mediation analysis requires an examination of the final two paths, b and c'. Path b tests hypothesis 2b and examines whether student locus of control influences student occupational aspirations. Results of Path b indicate that growth in student locus of control over time has a positive and significant effect on growth in student occupational aspirations ($\gamma = 2.05, p < .001$), which supports hypothesis 2b.

Path c. When full or partial mediation exists, the direct effects of school contextual characteristics found in the original Path c should be smaller (partial mediation) or fully reduced to zero (full mediation) in Path c'. The direct relationship between school contextual variables and student occupational aspirations was tested in Path c, which showed the direct effect of the school contextual variables on growth in student occupational aspirations to be nonsignificant. Similarly, Path c' reveals that school contextual effects on student occupational aspirations remains nonsignificant, even with the inclusion of student locus of control. Table 19 summarizes the results of model set 1.

Table 19

School Contextual Effects for Model Set 1

Model Set 1 SCH→LOC→OCC	Path C SCH→OCC	Path A SCH→LOC	Path B LOC→OCC	Path C' SCH→LOC→OCC
Growth in Dependent Variable	2.39*	-.003 [†]	2.40*	2.40*
Effect of LOC on Growth in OCC			2.05*	2.05*
School SES	-.113 [†]	-.008 [†]		-.084 [†]
Counseling Support	.092 [†]	.005 [†]		.070 [†]
Positive Climate	-.126 [†]	-.003 [†]		-.127 [†]
Academic Press	.175 [†]	.002 [†]		.177 [†]

Note. SCH = school characteristics, OCC = student occupational aspirations, LOC = student locus of control.

*significant at $p < .001$; [†]nonsignificant.

Mediation analysis. With results from all of the paths in this model set, the steps outlined by Baron and Kenny (1986) were utilized to analyze whether there is a mediation effect. The first step is to establish that the independent variables have an effect on the dependent variable, which requires an analysis of Path c. MacKinnon (2008) noted that the purpose of this initial step is to ensure there is an effect to mediate. In the case of this model set, none of the school contextual variables were shown to have a significant effect on student occupational aspirations. Since that was not the case, and Path c was nonsignificant, it might seem that any further mediation analysis would be unnecessary. Still, MacKinnon pointed out that the necessity of establishing an initial effect between the independent and dependent variables prior to any additional steps is controversial since “it is possible that the relation between the independent variable and the dependent variable may be nonsignificant, yet there can still be substantial mediation” (p. 68), and a relationship that is not seen initially in an analysis of Path c may exist,

but through a mediating variable. MacKinnon goes on to suggest that the most important paths for much of mediation in the social sciences are paths a and b, and analysis of the relationships in these two paths are often the only steps required to establish mediation. Given the results of Path c, this is the expectation for model set 1 and analysis of potential mediation for this model set moves to the next step.

The second step in mediation analysis is to ensure that the independent variables are related to the mediating variable, which is Path a. In the case of model set 1, this requires analyzing the relationship between school contextual variables and student locus of control. This relationship also proved to be nonsignificant.

In the third step, the mediator must affect the dependent variable while controlling for the independent variable (Path b). In model set 1, Path b is the relationship between student locus of control and student occupational aspirations while controlling for the school contextual variables. For model set 1, Path b shows a positive, significant relationship.

The final step in the mediation analysis is to assess whether there is a mediation effect, either full or partial, which means that either the direct relationship between the school contextual variables are now nonsignificant where they were previously significant (full mediation) or that Path c' is now less than Path c, but not necessarily reduced to zero (partial mediation). Recalling MacKinnon's (2008) comment that paths a and b are often the most important in determining whether mediation may exist, it is important to note that while Path b in this model set is significant, Path a is not. MacKinnon cautions that

generally, the test of \hat{b} (Path B) is not sufficient to demonstrate a mediation effect because a researcher will typically require the relation between the independent variable and the mediator, the \hat{a} (Path A) regression coefficient, to be statistically significant.
(p. 69)

Therefore, there is no mediated relationship and analysis of model set 1 concludes with the assessment that school contextual characteristics do not influence the development of student occupational aspirations either directly or indirectly through student locus of control, since there is not a significant relationship between the school contextual variables and growth in student locus of control. Hypotheses 2a and 2c are not supported. However, growth in student locus of control (toward a more internal locus) is associated with growth in student occupational aspirations, and therefore hypothesis 2b is supported.

Results in relation to hypotheses. In this model set, hypothesis 2a was tested in which it was expected that positive school contextual characteristics would be associated with a change toward an increased locus of control.

Results of Path a revealed that school climate, school SES, school counseling support, and academic press do not influence student locus of control.

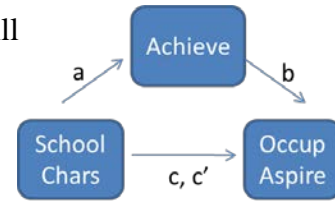
Path b tested hypothesis 2b in which it was expected that the more internal a student's locus of control over time, the more likely the student would be to have gains in occupational aspirations over time. The results of testing this pathway revealed that growth toward a more internal locus of control does have a positive influence on occupational aspirations. If a student's locus of control increases (moving toward a greater internal locus) by one unit, then the occupational aspirations of that student also tend to increase by 2.05 prestige points.

Path c' tested whether student locus of control mediated the relationship between school contextual characteristics and occupational aspirations. The results reveal that since school SES, climate, academic press, and counseling support do not influence student locus of control, then locus of control cannot mediate the relationship between school SES, climate, academic press, and counseling support and student occupational aspirations.

In this study, hypothesis 2a is unsupported, hypotheses 2b is supported and 2c is unsupported.

School Effects on Student Occupational Aspirations via Student Academic Achievement (Model Set 2)

Hypothesis 3 proposes that student academic achievement will mediate the relationship between school context variables and student occupational aspirations. Paths in model set 2 have been



specified to test this hypothesis and analysis of the paths in this model set provides information on the indirect effects of school characteristics including school climate, counseling support, school SES, and academic press on student occupational aspirations via student academic achievement, since academic achievement may be another avenue through which schools influence student occupational aspirations. Each path was modeled independently in order to ascertain the mediation effects.

Path c . As in Model Set 1, this path tests whether there is a significant direct relationship between the school contextual characteristics and the growth in student occupational aspirations. As with model set 1, the school characteristics analyzed did not have a significant effect on growth in student occupational aspirations.

Path a. As previously discussed, this study hypothesizes that school contextual variables might have an effect on student occupational aspirations via a mediator. While student locus of control was an initial focal point for potential mediation, literature on the intersections between school contextual characteristics, academic achievement and occupational aspirations brought achievement to the fore as another potential mediator through which school context might influence student occupational aspirations. Path a specifically tests hypothesis 3a and an analysis

of the test on Path a provides information on a potential mediating effect and whether there is a significant relationship between the school contextual characteristics in the model and growth in student academic achievement.

The coefficient for growth in student academic achievement is positive and significant ($\gamma = 2.21, p < .001$). In addition, all school contextual characteristics are shown to be nonsignificant in the growth of student academic achievement except for academic press, which has a small, positive and significant impact on growth ($\gamma_{103} = .184, p < .05$). Since results of Path a reveal that academic press is one of the school contextual characteristics that significantly influence student academic achievement over time, hypothesis 3a is partially supported.

Path b. Path b tests hypothesis 3b and examines whether student academic achievement influences student occupational aspirations. Results of Path b indicate that growth in student academic achievement over time has a positive and significant effect ($\gamma = 1.64, p < .001$) on growth in student occupational aspirations, increasing growth in aspirations by 1.64 prestige points, which supports hypothesis 3b.

Path c'. As described in model set 1, when full or partial mediation exists, the direct effects of school contextual characteristics found in the original Path c should be smaller (partial mediation) or fully reduced to zero (full mediation) in Path c'. In this model, as in model set 1, the relationship between the school contextual characteristics and student occupational aspirations is nonsignificant. Table 20 summarizes the results of model set 2.

Mediation analysis. Following the steps outlined in the previous model set, potential mediation in model set 2 will be analyzed. While the first step in Baron and Kenny's mediation analysis (1986) is to establish that the independent variables have an effect on the dependent variable (Path c) to ensure there is an effect to mediate, the results of Path c in this model set are

Table 20

School Contextual Effects for Model Set 2

Model Set 2 SCH→ACH→OCC	Path C SCH→OCC	Path A SCH→ACH	Path B ACH→OCC	Path C' SCH→ACH→OCC
Growth in Dependent Variable	2.39*	2.21*	1.64*	1.65*
Effect of ACH on Growth in OCC			.34*	.34*
School SES	-.113 [†]	.024 [†]		.041 [†]
Counseling Support	.092 [†]	-.074 [†]		.076 [†]
Positive Climate	-.126 [†]	-.082 [†]		-.082 [†]
Academic Press	.175 [†]	.184*		.085 [†]

Note. SCH = school characteristics, OCC = student occupational aspirations, ACH = student academic achievement.

*significant at $p < .001$, [†]nonsignificant

the same as Path c in the previous model set in that none of the school contextual variables are shown to have a significant effect on student occupational aspirations. Since prior work in mediation establishes that the product of coefficients method (the products of paths a and paths b = ab) is also a valid method for analyzing mediation (Cohen & Cohen, 1983; MacKinnon, 2008; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002), model set 2 will be analyzed for mediation effects, despite the nonsignificant relationship revealed by the analysis using the differences in coefficients method (paths c-c').

The second step in mediation analysis is to ensure that the independent variables are related to the mediating variable, which is Path a. In the case of model set 2, this requires analyzing the relationship between school contextual variables and student academic achievement. With the exception of the academic press, these relationships also proved to be

nonsignificant. Since academic press has a significant and positive effect ($\gamma = .184, p < .05$) on academic achievement, Path a is a significant pathway.

In the third step, the mediator must affect the dependent variable while controlling for the independent variable (Path b). In model set 2, Path b is the relationship between student academic achievement and student occupational aspirations while controlling for the school contextual variables. For model set 2, Path b shows a significant and positive relationship ($\gamma = .34, p < .001$).

The final step in the mediation analysis is to assess whether there is a mediation effect, either full or partial, which means that in an examination of paths c and c' that either the direct relationship between the school contextual variables are now nonsignificant where they were previously significant (full mediation) or that Path c' is now less than Path c, but not necessarily reduced to zero (partial mediation). In an analysis of mediation via paths a and b it is important to note that Path a has one contextual variable with a positive and significant effect on the mediator and Path b has a significant and positive effect on the dependent variable. Unlike model set 1, the analysis of model set 2 concludes with the assessment that, using the product of coefficients method (paths ab), there is a mediated relationship: the school contextual characteristic of academic press does influence the development of student occupational aspirations indirectly through student academic achievement. The mediated effect of ab is $(.184)(.34) = .063$. This is a significant effect ($p < .001$), which was validated through the calculation of Sobel's z test and the subsequent analysis of the confidence interval around the mediated effect (Iacobucci, 2008; MacKinnon, 2008). Given the significant mediated effect of academic press on academic achievement and the effect of academic achievement on student occupational aspirations, hypothesis 3 is supported.

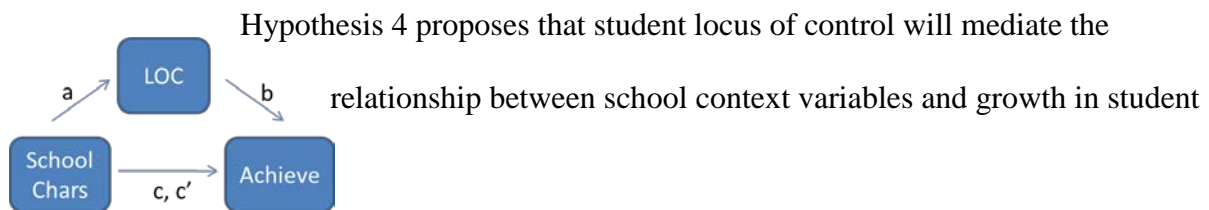
Results in relation to hypotheses. In model set 2, hypothesis 3a was tested in which it was expected that positive school contextual characteristics would be associated with gains in academic achievement over time. Results of Path a revealed that school climate, school SES, and school counseling support do not influence student achievement, but a one unit increase in the encouragement of students by teachers to achieve academically (academic press) increased academic achievement of students by .184 unit, providing partial support for hypothesis 3a.

Path b tested hypothesis 3b in which it was expected that gains in academic achievement would be associated with gains in occupational aspirations over time. The results of testing this pathway revealed that when a student has a one unit increase in academic achievement, they are also likely to have an increase in their aspirations of .34 prestige points, providing support for hypothesis 3b.

Path c' tested whether student academic achievement mediated the relationship between school contextual characteristics and occupational aspirations, which was the foundation for hypothesis 3c. Given the mediation results in which a one unit increase in academic press increases a student's occupational aspirations by .063 prestige points, hypothesis 3c is partially supported. .

For this study, hypothesis 3a is partially supported, 3b is supported, and 3c is partially supported.

School Effects on Student Achievement via Student Locus of Control (Model Set 3)



achievement. The paths in this model set have been specified to test this hypothesis and analysis of the paths in this model set provides information on the indirect effects of school characteristics including school climate, counseling support, school SES, and academic press on student academic achievement via student locus of control, as a way to understand whether student locus of control might mediate school contextual influence on student academic achievement since there is subsequent interest in whether achievement might influence student occupational aspirations (see model set 2). Each path was modeled independently in order to ascertain the mediation effects, with the following results.

Path c. As noted previously in Path a of model set 2, this path analyzes the relationship between school contextual variables and growth in student academic achievement. In this path, the coefficient for growth in student academic achievement is positive and significant ($\gamma = 2.21$, $p < .001$). Academic press is the only school contextual characteristic that has a significant effect, with a small, positive and significant impact on growth in academic achievement ($\gamma_{103} = .184$, $p < .05$).

Path a. Path a in this model set is the same as Path a in model set 1 and reveals whether there is a significant relationship between the school contextual characteristics in the model and student locus of control. Results show that school contextual characteristics were nonsignificant in the change in student locus of control, which in itself produced a nonsignificant result ($\gamma = -.003$, $p = .311$, n.s.).

Path b. Path b tests hypothesis 4a and analyzes whether locus of control influences student academic achievement. Results of Path b indicate that growth in locus of control toward a more internal locus is positively and significantly associated with gains in student academic achievement ($\gamma = .667$, $p < .001$), which supports hypotheses 4a.

Path c'. With mediation analysis using the differences in coefficients method (path $c-c'$), the direct effects of school contextual characteristics found in the original Path c should be smaller (partial mediation) or fully reduced to zero (full mediation) in Path c'. In the case of model set 3, academic press is the only characteristic that has a significant effect on achievement and this effect does not decrease from Path c to Path c', but rather increases slightly from $\gamma = .184, p < .05$ to $\gamma = .190, p < .05$. Table 21 summarizes the results of model set 3.

Table 21

School Contextual Effects for Model Set 3

Model Set 3 SCH→LOC→ACH	Path C SCH→ACH	Path A SCH→LOC	Path B LOC→ACH	Path C' SCH→LOC→ACH
Growth in Dependent Variable	2.21*	-.003 [†]	2.21*	2.21*
Effect of LOC on Growth in ACH			.67*	.67*
School SES	.024 [†]	-.008 [†]		.018 [†]
Counseling Support	-.074 [†]	.005 [†]		-.077 [†]
Positive Climate	-.082 [†]	-.003 [†]		-.082 [†]
Academic Press	.184*	.002 [†]		.190*

Note. SCH = school characteristics, LOC = student locus of control, ACH = student academic achievement.

*significant at $p < .001$, [†]nonsignificant

Mediation analysis. Following the steps outlined in the previous model sets, potential mediation in model set 3 will be analyzed. The first step in Baron and Kenny's mediation analysis (1986) is to establish that the independent variables have an effect on the dependent variable (Path c) to ensure there is an effect to mediate. The results of Path c in this model set reveal that one school contextual variable, academic press, is shown to have a significant effect

on the dependent variable, student academic achievement. As such, mediation analysis of model set 3 continues.

The second step in mediation analysis is to ensure that the independent variables are related to the mediating variable, which is Path a. In the case of model set 3, this requires analyzing the relationship between school contextual variables and student locus of control. This relationship proved to be nonsignificant.

In the third step, the mediator must affect the dependent variable while controlling for the independent variable (Path b). In model set 3, Path b is the relationship between student locus of control and student academic achievement while controlling for the school contextual variables. For model set 3, Path b shows a positive, significant, relationship.

The final step in the mediation analysis is to assess whether there is a mediation effect. An analysis of the differences in Path c and Path c' shows that there is not a reduction in the effects with the inclusion of the mediating variable, and thus the difference in coefficients analysis does not support a mediating effect. While paths a and b are often the most important in determining whether mediation may exist, it is important to note that although Path b in this model set is significant, Path a is not. Therefore, the product of coefficients analysis also reveals a lack of a mediating effect. Thus, the analysis of model set 3 concludes with the assessment that there is no mediation effect. School contextual characteristics do not influence the development of student academic achievement indirectly through student locus of control, since there is not a significant relationship between the school contextual variables and student locus of control. Hypothesis 4b is not supported.

Results in relation to hypotheses. In model set 3, hypotheses 4a and 4b were tested. In hypothesis 4a it was expected that the more internal a student's locus of control, the more likely

a student would be to have gains in academic achievement over time. Results of Path b revealed that if a student had a one unit increase toward a more internal locus of control, the student would also see an increase in academic achievement of .67 units, supporting hypothesis 4a.

Hypothesis 4b expected that student locus of control would mediate the relationship between school SES, climate, academic press and counseling support and student academic achievement. Since none of these characteristics influence a student’s sense of control, there was no mediated pathway and therefore hypothesis 4b was not supported.

For this study, hypothesis 4a is supported and hypotheses 4b is unsupported

Full Mediation Model: School Effects on Occupational Aspirations via Locus of Control and Achievement (Model Set 4)



The full mediation model was specified to test whether, with the inclusion of both mediators (student locus of control and student academic achievement), school

contextual characteristics would significantly influence growth in student occupational aspirations, as noted in hypothesis 1.

In this model, growth in student locus of control positively and significantly ($\gamma_{20} = 1.16, p < .001$) influences the growth of student occupational aspirations ($\gamma_{10} = 1.69, p < .001$), as does growth in student academic achievement ($\gamma_{30} = .325, p < .001$).

Mediation analysis. An analysis of the school contextual characteristics reveals them to be nonsignificant across the board, as noted in the Table 22 below. While aligned with the reported results found in previous model sets, this result is disappointing in the context of the study which theorizes a mediated pathway through which schools might influence student occupational aspirations. Taken together with the mediation analysis of the three previous model

Table 22

School Contextual Effects on Dependent Variables From Full Model

Full Model SCH→LOC→ACH→ OCC	Occupational Aspirations	Academic Achievement	Locus of Control
Growth	1.69*	.33*	1.16*
School SES	.050 [†]		
Counseling Support	.065 [†]		
Positive Climate	-.087 [†]		
Academic Press	.091 [†]		

Note. SCH = school characteristics, LOC = student locus of control, ACH = student academic achievement, OCC = student occupational aspirations.

*significant at $p < .001$, [†]nonsignificant

Student Level Characteristics

Student SES, race, gender, academic track, and parental occupational status are characteristics included in order to analyze their role in relation to the dependent variables. As noted in the discussion of the theoretical model in Chapter III, the student curriculum track variable is of some interest in that it was initially thought to have potential influence on student occupational aspirations, locus of control, and academic achievement. Analysis of the results of the student level characteristics reveal that curriculum track is the student level variable with the largest, significant effect in relation to the outcome variables of occupational aspirations, locus of control, and achievement. Student gender is the second largest, significant effect. SES is significant only in relation to achievement while parental occupation is significant only in relation to locus of control and achievement, and race is nonsignificant.

Previous literature has discussed the potential role of curriculum tracking on perceptions of self and subsequent development of aspirations development. The results of the current study are in keeping with the literature, revealing that students who reported being in a vocational track showed a negative influence on growth of internal locus of control ($\gamma = -.019, p < .001$). The results of the model sets in this study also suggest that being in a vocational track has significant, negative influence on growth of occupational aspirations ($\gamma_{150} = -1.88, p < .001$) and academic achievement ($\gamma_{150} = -.507, p < .001$).

Gender also has an influence on locus of control, occupational aspiration, and achievement. A brief look at the study results on the effects of student gender shows that girls have higher occupational aspirations ($\gamma_{110} = .837, p < .001$), a more internal locus of control ($\gamma_{110} = .038, p < .001$) but also tend to have also tend to have slightly lower levels of academic achievement ($\gamma_{110} = -.257, p < .001$).

Parental occupational prestige does not have a significant influence on occupational aspirations, although it has a very small but negative influence on student locus of control ($\gamma_{140} = -.001, p < .001$) and student academic achievement ($\gamma_{140} = -.004, p < .05$). Current results reveal that SES is not significantly related to locus of control or occupational aspirations, but does have an effect on academic achievement ($\gamma_{130} = .197, p < .001$), which is in line with previous research. Table 23 summarizes the effects of student characteristics.

Summary of Findings

The initial hypothesis in the study is that positive school contextual characteristics will be associated with gains in occupational aspirations over time. An overview of the hypotheses and

Table 23

Effects of Student Level Characteristics

	Sex (γ_{110})	Race (γ_{120})	SES (γ_{130})	Parent Occupation (γ_{140})	Curriculum Track (γ_{150})
Model Set 1 SCH→LOC→OCC					
Path C: SCH→OCC	.837*	.209 [†]	.217 [†]	.006 [†]	-1.88*
Path A: SCH→LOC	.038*	.010 [†]	.003 [†]	-.001*	-.019*
Path B: LOC→OCC	.771*	.198 [†]	.249**	.007 [†]	-1.84*
Path C': SCH→LOC→OCC	.773*	.206 [†]	.231 [†]	.006 [†]	-1.84*
Model Set 2 SCH→ACH→OCC					
Path C: SCH→OCC	.837*	.209 [†]	.217 [†]	.006 [†]	-1.88*
Path A: SCH→ACH	-.257*	.036 [†]	.197*	-.004**	-.507*
Path B: ACH→OCC	.926*	.147 [†]	.184 [†]	.005 [†]	-1.52*
Path C': SCH→ACH→OCC	.928*	.140 [†]	.180 [†]	.005 [†]	-1.52*
Model Set 3 SCH→LOC→ACH					
Path C: SCH→ACH	-.257*	.036 [†]	.197*	-.004**	-.507*
Path A: SCH→LOC	.038*	.010 [†]	.003 [†]	-.001*	-.019*
Path B: LOC→ACH	-.287*	.034 [†]	.202*	.005 [†]	-.510*
Path C': SCH→LOC→ACH	-.282*	.031 [†]	.190*	.005 [†]	-.508*
Full Model: SCH→LOC→ACH→ OCC	.896*	.150 [†]	.201 [†]	.004 [†]	-1.51*

Note. SCH = school characteristics, LOC = student locus of control, OCC = student occupational aspirations, ACH = student academic achievement.

*significant at $p < .001$, **significant at $p < .05$, [†]nonsignificant

the subsequent results found in Table 24 suggest that given the measures utilized, only one of the contextual characteristics of schools specified in this study is associated with growth in student occupational aspirations—but not through student locus of control, as initially envisioned. Rather than school contextual characteristics influencing change toward an internal locus of control over time which would, in turn, influence change in student occupational aspirations, the study reveals that there is not an association between school contextual characteristics and change in student locus of control. This result eliminates locus of control as a mediator through which school characteristics could influence change in student occupational aspirations and leaves hypotheses 2a and 2c unsupported.

Alternatively, academic press is one of the school characteristics in the study that is associated with change in student occupational aspirations via student academic achievement, which mediates the relationship as proposed in hypothesis 3c. So, while this study did not find locus of control to be a mediating variable, a relationship between school context and occupational aspirations was found to be mediated, alternatively, through academic achievement which provides support for hypothesis 1. Other hypotheses supported by the study were the relationships between the mediators and the dependent variables, unrelated to school contextual characteristics (specifically, 2b, 3b, and 4a). Still, the data in this study did not find associations between three of the four school contextual variables specified (school climate, school SES, and counseling support) and the development of student occupational aspirations over time, even as the models above show growth in occupational aspirations over time despite that lack of association.

Table 24

Summary of Hypotheses

	Hypothesis	Path	Supported or Unsupported
1	Positive school contextual characteristics will be associated with gains in occupational aspirations over time	SCH→OCC	Partially Supported
2a	Positive school contextual characteristics will be associated with change toward an internal locus of control over time	SCH→LOC	Unsupported
2b	The more internal a student's locus of control over time, the more likely the student is to have gains in occupational aspirations over time	LOC→OCC	Supported
2c	Student locus of control partially mediates the relationship between school contextual characteristics and occupational aspirations	SCH→LOC→ OCC	Unsupported
3a	Positive school contextual characteristics will be associated with gains in academic achievement over time	SCH→ACH	Partially Supported
3b	Gains in academic achievement over time will be associated with increases in occupational aspirations over time	ACH→OCC	Supported
3c	Student academic achievement partially mediates the relationship between school contextual characteristics and occupational aspirations	SCH→ACH→ OCC	Partially Supported
4a	The more internal a student's locus of control, the more likely the student is to have gains in academic achievement over time	LOC→ACH	Supported
4b	Student locus of control will mediate the relationship between school contextual characteristics and student academic achievement	SCH→LOC→ ACH	Unsupported

Note. SCH = school contextual characteristics, OCC = student occupational aspirations, LOC = student locus of control, ACH = student academic achievement.

The results of this study are interesting in that previous research provides ample background support for testing the relationships in this study and given the research, one would expect to find stronger relationships between the contextual variables and student occupational aspirations. Given that significant relationships do not exist between the bulk of specified contextual environmental variables of schools and the key student variables in this study that influence student outcomes is, in itself, of interest even if unexpected. Discussion of these findings in relationship to the framework for the study, previous and future research and education policy is the focus of the following chapter.

CHAPTER VI

CONTEXTUALIZATION OF RESULTS

The Problem of Misalignment and Social Learning Theory

Part of the title for this study is “learning what I want to be when I grow up” which encompasses the broad purpose underlying the examination of the specific contextual characteristics of schools in relation to students and their sense of personal control over their lives and the development of their aspirations. Children spend the bulk of 13 formative years walking the hallways of school buildings, sitting in classrooms in front of teachers, and studying subjects from a carefully selected curriculum. Children become students and schools are their daily ecosystem. In this ecosystem, children are not only learning about academic subjects, but they are learning about themselves and they are developing their aspirations for the future: they are learning what they want to be when they grow up. The research on student outcomes—what happens after students leave the school system—reveals a disturbing trend: students are growing up and failing to become what they want to be. They are aspiring to college educations and yet failing to graduate with college degrees in record numbers. They are aspiring to specific professions, yet failing to develop successful pathways to those professions. While in school, they may have been graded on core subjects such as mathematics and science, but they were not assessed on how they were assimilating this information for their own futures, how their education was influencing their aspirations and their choices toward those aspirations. Even as previous research shows that increasingly students are making choices that are misaligned with their desired outcomes, this information comes too late for those students being studied. Research reveals retrospectively the information on alignment that students need

contemporaneously, information that they need infused into their daily educational ecosystem. As the percentage of students with misaligned aspirations outnumbers those with aligned aspirations (Rosenbaum, 2001), there is more at risk than individual earnings and economic status. National economic stability, technological and scientific progress, and global positioning are all at risk. Our nation relies on our educational system and the subsequent outcomes of students to ensure our future place in the world. As such, understanding the disparity between those students who aspire to specific outcomes and those students who attain their desired outcomes is important to policymakers, educators, parents, and to the students themselves.

The subtitle of this study is “the contextual effects of schools on student locus of control and the development of student occupational aspirations,” because it is the influence of environment, and specifically the schools where children spend so many formative years that is the context of focus. Rotter’s social learning theory (1954) in which the interaction between people and their environment motivates behavior created the framework for studying the contextual effects of schools on students. Grounded in previous research and theory, the current study identified specific school level variables that, hypothetically, could or should be influencing students and then reanalyzed their potential direct effects on the development of student occupational aspirations while it also introduced mediated mechanisms (student locus of control and student academic achievement) through which the school variables might show an indirect effect on the development of student occupational aspirations. School socioeconomic status, whether a school has a positive climate, whether there is encouragement to achieve academically, and whether there is counseling support within a school were the four variables that made up the school contextual characteristics studied. A brief synopsis of Chapter V might lead one to believe that the current study is, on balance, unimportant in that only one of the four

school contextual variables showed an impact on the development of student occupational aspirations. However, such a simple overview may miss the potential complexity of what these results may indicate.

School socioeconomic status (SES) was hypothesized to impact student development of occupational aspirations for several reasons outlined in the literature: lower scores on school SES may signal a structural reinscription of inequalities that exist for students outside of school (i.e., in their neighborhoods) and may also indicate a deficit in resources such as counseling programs or high quality teachers available within the school. Similarly, higher SES schools may indicate an abundance of resources available to students such as higher quality teachers and counseling supports (Flowers et al., 2003; Gamoran, 1996; Hanson, 1994; Kelly & Lee, 2001; McWhirter et al., 2000; Mortimer et al., 2002; Orfield, 1997; Plucker, 1998), all of which may influence the development of student occupational aspirations via student locus of control or student academic achievement. The finding in this study that school SES has no significant influence on the development of student occupational aspirations whether school SES is high or low might suggest that students may be disconnected from the context in which they are developing occupational aspirations over time. If, as the literature suggests, lower SES schools may have fewer resources such as counseling available to students, those students may be unaware of the lack of resources such as counseling support that they may need to seek out in order to inform their occupational aspirations. In the case of schools with higher SES, it may suggest that even though there may be resources and information available to them, students may be unaware that they may need to avail themselves of those resources and information in order to foster aligned aspirations. In both cases, the context of school SES is not associated with the development of the occupational aspirations of students.

Similarly, the climate in the school is important for fostering achievement and internal locus of control (Rumberger, 1995) and may be reflected in the commitment of teachers to their classrooms (V. E. Lee & Bryk, 1989) and encouragement from teachers (A. M. Ryan & Patrick, 2001). It was hypothesized that a positive school climate, as measured by structured classroom activity and teacher morale, would influence the development of student locus of control and subsequently student occupational aspirations. However, the current study finds in opposition of Rumberger's (1995) work, that school climate has no significant effect on the development of student locus of control or student achievement or thus indirectly on the development of student occupational aspirations. Low morale and unstructured classrooms have no more of an effect on student's sense of control or achievement than high teacher morale and highly structured classrooms. As noted earlier with school SES, the lack of significant effect of the contextual climate of school may suggest that students may be disengaged from the daily context in which they are learning and developing, and such disengagement may lead to disconnections between learning and aspirations and subsequent outcomes.

Since educational and occupational aspirations are so closely intertwined and achievement and perceptions of control are related, academic press was included as a variable that might influence the development of student locus of control, achievement and subsequent occupational aspirations. Measured by whether teachers encourage students to achieve and whether students are expected to do homework, the results of this study show a significant but small indirect effect of academic press on occupational aspirations. While previous literature suggests that encouragement to achieve and to do well academically should matter a great deal to students, this study clearly shows that while it matters, its influence appears to be small. Students may not be placing as much stock in the expectations of their teachers, or the

encouragement to achieve when developing their aspirations as educators and policymakers might hope.

Finally, one might expect that the availability of information and support for one's occupational aspirations would influence students, perhaps giving them a greater sense of control over their decisions toward occupational pathways, or assisting them in aligning their aspirations with their desired outcomes. As such, the availability of formal guidance counseling was measured. Once again, the availability of school resources was not a significant influence on student's locus of control, achievement or subsequent development of occupational aspirations, signaling that students may be making decisions either without or in spite of the input and support of informational resources.

For each of the variables included in the study there is ample research pointing to the importance of these variables in the development of student locus of control, achievement and occupational aspirations. Still, even as previous research may have noted their significance, the current study found no significant influence of three of the four school contextual variables either directly or indirectly on student occupational aspirations, even as student locus of control and student academic achievement both influence the development of student occupational aspirations over time. Only academic press showed a small influence on aspirational development. Taken together, the answers to the research questions posed in this study seem not to support its theoretical framework built on social learning theory: the interaction between students and their school environment is not motivating their behavior. Is it possible that social learning theory is wrong, that students are immune to any effects of the environment in which they spend so much time? How else does one explain the results of this study?

One explanation of these results may come from viewing them from a different perspective by asking the following question: Are these school characteristics *designed* to influence students? With this question in mind, the school characteristics can then be viewed from a program evaluation perspective in which the goals of the contextual characteristics are important to the subsequent outcomes (Rossi, Lipsey, & Freeman, 2004). In the case of counseling support, the results seem to indicate a disconnection between students and the need for information as either a venue to increase their locus of control or develop appropriate pathways for their educational and occupational aspirations. For example, if the goal of counseling departments is to provide students with appropriate information toward the development of aligned pathways, but counseling support has no significant effect on the development of occupational aspirations either directly or indirectly through an association with student locus of control or student academic achievement, then one might call into question whether the goals associated with counseling departments are aligned with the desired student outcomes.

A program evaluation perspective spurs the question of whether schools have goals for contextual characteristics such as climate and counseling in relation to their influence on student outcomes. Based on the literature, it was expected that the school contextual variables in this study would have an influence on student occupational aspirations either directly or indirectly. Social learning theory supports the idea that context influences behavior. Yet, with results revealing a lack of association between the school context variables and the outcome variable of student occupational aspirations, one might question whether the goals schools may have in relation to school context influencing student behavior and outcomes are aligned in achieving those outcomes. If social learning theory is correct and context does motivate behavior, and the

goals of schools for how their context motivates behavior and influences student outcomes such as occupational aspirations do not align with actions and programs that are in place to attain those outcomes, then is it possible that such *institutional misalignment* could be the contextual characteristic that is influencing students. Is it possible that the results of this study are signaling that social learning is taking place, but perhaps what students are learning that is motivating their behavior is the *misalignment* between educational goals and outcomes that schools themselves may be modeling, rather than alignment and connection? If the research on student perceptions of contextual supports or barriers can affect levels of engagement (Daniels & Araposthasis, 2005; Klem & Connell, 2004) which in turn affects level of achievement (Montalvo et al., 2007; Wehlage et al., 1989) and sets the groundwork for student aspirations and future attainment, then student perceptions of misaligned contextual supports may be the reason for the lack of influence of school context on their locus of control, achievement, and development of occupational aspirations. The logic follows that if students perceive that the desired goals of schools for students are disconnected from actions and actual student outcomes, then students may perceive school as irrelevant both to themselves and their futures, fueling misalignment of their own.

Policy Implications and Recommendations

While students may think otherwise, the cited literature on the school contextual variables included in this study is clear: school context has mattered and should continue to matter to student outcomes, especially in light of the results of the current study. At a time when students may see school as irrelevant to their sense of control, achievement, and future aspirations, when students may be disregarding the desire of teachers and schools for positive student outcomes, and not availing themselves of the resources and programs which may be

available to them, it is even more critical that schools work to positively influence students and their subsequent outcomes. With the relevance of schools clearly established in the literature, the issue becomes one of clearly communicating that relevance to students and having that communication reflected in their school environment.

The idea of relating school to the world of work has been hotly debated in academic circles since the formation of the public school system in the US (Dewey, 1900, 1897/1959; Rury, 2002), with educators often arguing for a separation of the two in order to give all children regardless of social standing an opportunity at an unstratified education and subsequent opportunities beyond what a stratified, work-oriented education might provide. While the intentions to provide the best education to all students have been positive, such a separation between school and the world of work has had inadvertent ramifications in that school is being perceived by students as irrelevant to their occupational aspirations and attainment and students are leaving schools with misaligned aspirations which they are failing to attain. According to Rosenbaum (2001), any effective change in perceptions about the relevance of schools must have a dual focus that addresses the internal motivation of students and includes external incentives beyond a “college only” choice. Unfortunately, linkages between academic effort and occupational outcomes remain fuzzy to students. They need to see that their performance in school matters to their outcomes in order to see school as relevant, whether they go to college or go into the workforce. Stern (2009) suggested that relevance of school to students’ lives involves connecting their educational experiences to their future civic responsibilities and earning a living. Schneider and Stevenson (1999) discussed the importance of students connecting their academic efforts with their own desired outcomes via planning and taking into account the steps, motivation, and resources necessary to ensure their plans come to fruition.

Dewey (1900) first gave voice to these ideals at the beginning of the last century during a similar era of change, recognizing the need for education to reflect the changing culture. Dewey felt that schools shouldn't remain couched in a "mediaeval conception of learning" (p. 26), narrowly focused on the memorization of symbols and recitation of facts. Rather, education should be experiential, engaging not only a student's brain but their imagination and abilities, their tendencies "to make, to do, to create and to produce" (Dewey, 1900, p. 26) which would contribute to the betterment of their society. While only a sampling, this literature emphasizes the importance of making education relevant to students by connecting the work they do in schools with their desired outcomes once they leave school. Based on the findings in this study, the broad recommendations found in the literature, and the acknowledgement of the complexity that accompanies educational policy initiatives, the following are considerations for how the contextual characteristics of schools might reflect their relevance to student aspirations and future attainment.

1. **Create and offer multiple pathways to work and college.** As indicated by the results of this study, curriculum track influences student occupational aspirations, locus of control and achievement. Rather than continuing with curriculum tracks that separate and stigmatize career and vocational education, Stern (2009) proposes reimagining curriculum as a combination of career and technical education (CTE) with core academic curriculum as a way to prepare students for both college and economic self-sufficiency. Stern cites longitudinal research that reveals students who had a combined program had more success in postsecondary education and work than students who chose a college or career prep track alone. Ideal implementation of this concept would require integrating the value of career and college into the daily

ecosystem of school so that the educational context would reflect the educational goals. For example, students would be encouraged to discuss their aspirations with school counselors, who would be encouraged to discuss and provide information and resources on a broader range of options for students' educational and occupational pathways, not just the pathway to college. Academic press would include encouraging students to connect their achievement academically with educational and occupational aspirations and attainment after high school. This consideration is not a new one and there are versions of such initiatives running in various school districts across the country. While it is still too early for researchers to know whether such programs are having the desired effect in enhancing student outcomes long term, initial results have been positive (Stern, 2009, p. 227).

- 2. Incorporate relevancy of academic work to occupational work into the curriculum.** As previously noted, occupations are less clearly delineated and less stable than they were in the past, with people having multiple jobs throughout their working lives. In addition, students have only a vague understanding of what different jobs entail, the types of skills and education necessary, and how one would enter a job or profession (Csikszentmihalyi & Schneider, 2000). While students are seeking relevancy in what they are learning, educators should also desire students to successfully be able to apply the knowledge and skills learned across their academic careers throughout their working lives once they leave the realm of academia. To that end, classroom curriculum should include explicit and clear connections for how what is being learned is applicable and necessary beyond the classroom. It should also aim to expand the scope of the students' occupational knowledge (i.e., occupational

sectors, educational pathways, and requisites, necessary soft skills) as they move through their educational careers, fueling connections between their academic work and occupational aspirations and assisting in aligning their aspirations with successful attainment. Incorporation could be as basic as classroom discussion regarding the relevancy of current subject matter to the realm of occupations or might include service learning, mentoring, apprenticeship, or other types of projects in which students have the opportunity to test the relevancy of their learning and solidify transferrable knowledge by putting that knowledge into action and anchoring understanding in experience (Bransford, Brown, & Cocking, 1999; Eyer & Giles, 1999).

Another way to incorporate relevancy between academic and occupational work into the curriculum is to incorporate explicit teaching modules on the alignment and development of student aspirational pathways. Since research shows that students develop aspirations in spite of their context, that there is a majority of students having misaligned aspirations, and that educators are concerned about student misalignment of aspirations and outcomes, one way to alleviate misalignment is for schools to do what they do best: educate students on this critical issue.

Csikszentmihalyi and Schneider (2000) highlighted the need for learning environments to be relevant to student outcomes by including clear information, experiences, connections, and supports to enhance student internal motivation and external actions toward their occupational aspirations. Educating students about aspirational alignment and the ramifications of misalignment, and helping them actively develop aligned pathways may help alleviate misalignment of student

aspirations, but it also signals to students the relevancy of education to their futures. Once again, the integration of relevancy into the daily ecosystem of the school signals to students that schools not only desire positive student outcomes beyond high school but have aligned their educational goals toward that end. By signaling alignment in their context, schools may be subtly influencing student aspirational alignment as well.

3. **Assess student understanding of educational relevancy.** In conjunction with incorporating relevancy into the curriculum, students should be assessed and coached (Bransford, 1993) on their ongoing understanding of academic relevancy throughout their academic careers since “the purpose of learning is to use what is learned” (Eyler & Giles, 1999, p. 66). One way students perceive what is important in the classroom is through the process of testing as a way to measure learning. While assessment does not ensure learning, research suggests that if students are involved in goals of mastery, learning, and challenge and believe that a task is important, they will engage in more metacognitive activity (Pintrich & De Groot, 1990). Assessing the ability to understand the transfer of knowledge and skills from the classroom to the working world would signal to students that schools believe in the relevancy of education beyond the classroom, and that the ability to transfer knowledge to that realm is important. For teachers, assessing student knowledge of relevance between educations and occupations would underscore the importance of teaching that relevance and would help ensure that it would garner an ongoing classroom focus. In addition, such an assessment would provide educators and researchers with a way to gauge the extent to which students have aligned occupational and educational

aspirations. Finally, such assessment would be both an actualization and signal of alignment between what schools profess they want for students and the actions they take to help ensure student outcomes, both of which might influence the alignment of student occupational aspirations.

4. **Develop institutional linkages to the working world.** Csikszentmihalyi & Schneider (2000) noted that in order for students to have successful outcomes, they not only need clear information about the relevancy and connections between school and work, they need to be able to “learn and practice job relevant behavior” (p. 215). Rosenbaum’s work (2001) suggested that clear linkages between schools and organizations allow for students to gain important information that may help them align their aspirations, including work culture, requisite educational knowledge, and expectations of necessary soft skills. The school to work opportunities act (STWOA, 1994) tried to incorporate a similar initiative, but failed due to teachers being unsure of how to go about creating relationships between their classrooms and the organizations. One consideration for developing such linkages would be to prioritize this initiative at the administrative level to determine a plan of action for the school community and initiate the relationships, and then engage counselors and teachers to work together on implementation. Programs could consist of service learning projects, mentorships, work study, apprenticeships or other such programs to provide students with exposure to the working world and expand their understanding of connections between school and the world of work. To be effective, such linkages should be established by schools that are committed to developing programs to enhance the aspirational alignment of students via relevant connections between

school and work. These linkages should signal to students the school level commitment to communicating the relevancy of school to their futures and assisting them in aligning their aspirations toward attainment.

5. **Restructure and reincorporate counseling resources.** Rather than perpetuate a “college for all” approach which does little to address the “forgotten half” (Rosenbaum, 2001), a new counseling initiative would recognize that fully implemented guidance programs have positive relationships with both achievement and occupational development (Borders & Drury, 1992) by restructuring counseling to be an integral part of educating students toward aligned outcomes rather than leaving it as an optional—and disregarded—resource for students. Throughout the academic life of a student, the student would be exposed to and interact with counselors. Counselors would become a necessary part of the classroom and curriculum to help bridge student understanding between academics and occupational outcomes, expanding the student scope of knowledge about the world of work. For example, counselors might work with teachers in exploring how an academic subject matter might relate to occupational competence and achievement. They might assist in teaching sections on pathway planning and development that would be built into a more aligned curriculum. In addition, counselors could be responsible for coordinating linkage programs between schools and organizations to garner community support for positive student outcomes, perhaps assist teachers with developing service learning or other learning opportunities related to the local community and the world of work, and work with students in obtaining exposure to occupational interests in relation to their aspirational pathways. Rather than reducing

the role of counselors to a limited, late-stage resource for students attending college, this initiative would expand the role of counselors to help both students and schools bridge academic and occupational aspirations with aligned outcomes throughout the entire educational lifecycle of students.

While the above policy considerations do not explicitly address all of the school contextual variables in the current study, the connections are inherent in the implementation of such initiatives. By developing a culture of alignment in which students learn not only what they should know and be able to do for their specific grade level but how that knowledge is valuable for the future, schools infuse their climate with signals to students that they are invested in their aspirations (positive climate). Counseling departments would be focused on aspirational alignment and relevancy education (counseling support), while teachers would be encouraging students to know and demonstrate that relevancy (academic press). In developing linkages to organizations, communities would become active participants in the lives and aspirations of students as well, perhaps alleviating stigmas that students in lower socioeconomic areas might otherwise feel regarding their aspirations (school SES). Policy considerations like those noted above not only offer suggestions for bridging the chasm of perceived irrelevancy between school and the world of work, but help schools provide context and education around the critical issue of aspirational alignment and attainment, and educating students on how to leave the classroom better prepared to attain their goals. Policy initiatives such as these assist not only in realigning the aspirations of students with desired outcomes, but assist in realigning the aspirational pathways of schools with their desired outcomes for students. While versions of some of these suggestions are beginning to take place in school districts across the country, there is still much work to be done at the policy level to ensure that students understand the importance of schools

to their future aspirations and make use of the resources and information available to them in their daily context of school.

Limitations of the Study and Opportunities for Future Research

Pintrich (2000) noted that “the social and academic domains need to be more fully integrated in our models of learning” (p. 221), and suggests that a more fully formed understanding of the influence of context on the individual within that context is important for the future of education. It is also important for educational research. While the current study makes an important contribution to understanding how school contextual characteristics might indirectly influence the development of student occupational aspirations via student locus of control and academic achievement, the study has limitations. Both the limitations and the interesting results of the study suggest directions for future research in the area of the contextual influence of schools on student development.

Overall, the NELS:88 provided a robust dataset with which to address the questions posed in this study and, overall, was well suited for the desired analysis. However, there were a few limitations of the NELS:88 dataset in terms of the variables available for use within the study. First, the results of the study show growth in student occupational aspirations over time. However, the study was limited in the range of occupations provided to the students in the sample. The small range was reflected as a tighter grouping of scores on Nakao-Treas (1994) occupational prestige scale, and a more fully realized list of potential occupations might provide future researchers with a broader distribution of scores and a more detailed understanding of growth in aspirations over time. Second, in terms of the school contextual variables, an understanding of the depth of counseling support available to students was desired. However,

due to how the survey question was worded in one of the waves it was not possible to ascertain how many full-time staff were dedicated to supporting the counseling needs of students. As such, counseling support was limited to knowing only whether or not the school had a formal counseling department. Again, greater knowledge of the depth of counseling support might provide a more intimate understanding of the value schools place on having counseling resources available to students. Third, availability of additional variables regarding school context such as whether variables included in the study such as school climate were tied to specific goals for student outcomes, whether and how students were encouraged to utilize counseling resources, and whether and how students were encouraged to explore occupational areas would have allowed a more comprehensive test of the proposed theories within this study.

The results of the study offer some important directions for future researchers. In examining any potential indirect influence of school context on student occupational aspirations via mediators, this study contributes the answer to the other half of the question on whether the context of schools is influencing the development of student occupational aspirations, since the results confirm that that school SES, school climate, and counseling support do not directly or indirectly influence aspirations, and the results suggest that these school context variables have no significant indirect influence on the development of student occupational aspirations via locus of control or academic achievement over time. Based on the premise of social learning theory—that interaction between an individual and their environment motivates behavior—and the results of this study which suggest the lack of association between school context and student development of locus of control, achievement, and occupational aspirations, it becomes an imperative of future research to examine whether these contextual variables *should be* influencing students, in what ways, to what extent, and what other contextual variables could be

influencing student development of occupational aspirations. Additionally, given the importance of aligned aspirations and relevance of education highlighted by the results of this study, a deeper examination of the influence of the alignment of school actions with desired student outcomes on student alignment of aspirations and perceptions of relevance is warranted.

Final Words

The literature is clear regarding the importance of student occupational aspirations. Similarly, research underscores the importance of school in relation to student outcomes. What the current study highlights is the continued misalignment of student aspirations in relationship to school, as school resources, climate, and encouragement have no significant effect on the development of their locus of control, academic achievement, and occupational aspirations. While previous research has shown that key school contextual variables have no direct influence on the development of student occupational aspirations, the current study reveals that key school contextual variables have no *indirect* influence on student occupational aspirations either. In essence, students may be disregarding key elements of school as irrelevant to their futures. But students alone cannot bear the blame for their misaligned aspirations. Schools may be failing to communicate the relevancy of education to the future of what students want to become even as influencing positive student outcomes are core aspirations of public education. Thus, schools may be misaligned in their own aspirational pathways in relation to student outcomes. A school context of misalignment may breed the misaligned aspirations of students—and while the school context should matter in that it is positively influencing aligned aspirations, this study suggests that it might not matter. As an important educator and educational reformer, John Dewey believed passionately that education is a social process, and

the school is simply that form of community life in which all those agencies are concentrated that will be most effective in bringing the child to share in the inherited resources of the race and to use his own powers for social ends. (1897, p.7)

For the sake of the future, educators and policy makers must ensure that the educational context in which students are developing matters to their development, that school is not only perceived as relevant but is so grounded in relevance that students cannot disregard it.

APPENDIX

LITERATURE MATRIX

Section	Key Points	Literature Cited
	Definitions of	Gottfredson, 1981; Hansen & MacIntire, 1989; Rojewski, 1996; Paul, 1997
	Formation of: Status Attainment Theory	Sewell, 1969; Haller & Portes, 1973; Mau & Bikos, 2000; Lee & Rojewski, 2009
Educational & Occupational Aspirations and their Importance	A modern phenomenon	Lee & DeVore, 1975; Shanahan, 2000; Csikszentmihalyi & Schneider, 2000; Choy, 2002; Goyette, 2008; Goyette and Mullen, 2006; Mortimer 2008; Modell, 1989; Trusty, Niles & Carney, 2005; Savickas, 2009
	Tied to the underpinning of American social structure	Sorokin, 1927; Blau & Duncan, 1967; Sewell, 1969; Sewell, Haller & Ohlendorf, 1970; Haller & Portes, 1973; Haller & Woefel, 1972
	Influence on future attainment	Strong, 1953; Sewell, 1969; Rojewski 1996; Inoue, 1999; Blau & Duncan, 1967; Gottfredson, 1981; Marjoribanks, 1985; Schoon & Parsons, 2002; Paul, 1997
	Closely intertwined	Woefel, 1972; Inoue, 1999; Sorokin, 1927
	<ul style="list-style-type: none"> ●more education equates to higher status 	Gamoran, 2000; Wong, 1997
	<ul style="list-style-type: none"> ●education has impact on occupation long term 	Jencks, 1979; O'Rand, 2000; Schoon & Parsons, 2002; Rosenbaum, 2001
	<ul style="list-style-type: none"> ●sociological implications: labor market and global competitiveness 	Becker, 1964

Linkages between Occupational & Educational Aspirations	Academic achievement links aspirations and outcomes	Gamoran, 1996; Helwig, 2004; NCES, 2006; Rindfuss 1999; Rosenbaum 2001; Woefel, 1972
	●enhances future occupational opportunities	Parcel & Dufur, 2001
	●weak performance and academic attainment predicts lower earnings	Miller & Rosenbaum, 1997
	●Jobs, wages function of education	Johnson & Mortimer, 2002; Csikszentmihalyi & Schneider, 2000; Mau, 1995
	Occupational aspirations have direct effects on educational aspirations	
	●fueled by desire for higher status	Csikszentmihalyi & Schneider, 2000; Inoue, 1999
	●occupation strong determinant of wealth	Johnson & Mortimer, 2002
	●public associations between education and preparation for work	Orfield, 1997; Steinberg, 1992; Okagaki, 2001; Csikszentmihalyi & Schneider, 2000; Goyette, 2008
	Constrained opportunities impact both education and occupation	
	●at an early age	Lee & Rojewski, 2009
	due to background inequalities (i.e. SES, ability)	Bourdieu, 1973; Kerckhoff, 1976; McClelland, 1990; Sewell, 1969
Linkages between Occupational & Educational Aspirations (cont'd)	●due to school characteristics	Lee, Bryk & Smith, 1993; Oakes, Gamoran & Page, 1992; Lee & Bryk, 1989; Gamoran, 2000; Gamoran & Berends, 1987; Kerckhoff, 2000; Schneider & Stevenson, 1999; Johnson & Mortimer, 2002
	●low educational aspirations linked to low occupational attainment	Inoue, 1999; Blau & Duncan 1967; Rojewski, 2005
	Individual assessment impacts outcomes	Sewell, 1969
	●early achievement enhances self selection for future opportunity	Alwin & Otto, 1993; Mortimer, 2000
	●self-assessment reinforced, modified over time - regulates access, engagement, opportunities	O'Rand, 2000; Lent, 1996; Kerckhoff, 1974; Rindfuss, 1999; Helwig, 2004; Lee & Rojewski, 2009; Kenny 2003

	Function of schools in relation to society, preparation	Hallinan, 2000; Savickas, 2009; Csikszentmihalyi & Schneider, 2000; Rosenbaum, 2001; Schneider & Stevenson, 1999; Paul, 1997
	Connections between school and work	Paul, 1997; Rosenbaum, 2001; Kerckhoff, 2000; McWhirter, 2000
Role of Schools in the Development of Aspirations	Role of schools in the Development of Aspirations	Wong, 1997; Paul, 1997; Orfield, 1997; Rosenbaum, 1997
	Influence of coursework and curriculum tracking	Kelly & Lee, 2001; McWhirter, 2000; Mortimer, 2002; Kenny, 2003; Okagaki, 2001
	Influence of coursework and curriculum tracking (cont'd)	Alexander & Entwisle, 2000; Johnson & Mortimer, 2000; Entwisle & Alexander 1993; Orfield, 1997; Paul, 1997; Kerckhoff, 1995; Lee & Bryk, 1988; Berends, 1992; Gamoran & Berends, 1987; Hallinan, 1996
	Student perception of school supports/barriers	Daniels & Araposthesis, 2005; Klem & McConnell, 2004; Montalvo, 2007; Wehlage, 1989
	<ul style="list-style-type: none"> ● impact on engagement 	Yazzie-Mintz, 2009
	<ul style="list-style-type: none"> ● classroom environment & motivation 	Patrick, Kaplan & Ryan, 2007; Eccles & Wigfield, 1985; Ryan & Patrick, 2001
Role of Schools in the Development of Aspirations (cont'd)	<ul style="list-style-type: none"> ● teacher support 	Goodenow, 1993; Skinner & Belmont, 1993; Ryan & Patrick, 2001; Schoon, 2001; Helwig 2004; Franklin, 1995; Flowers, Milner & Moore, 2003
	<ul style="list-style-type: none"> ● classroom organization, pedagogical methods 	Ryan & Patrick, 2001; Barr & Dreeben, 1983; Gamoran & Berends, 1987; Gamoran & Mare, 1989; Hoffer, 1992; Kerckhoff, 1986, 1993; Murphy & Hallinger, 1989
	School guidance counselors	Hughes & Karp, 2004
	<ul style="list-style-type: none"> ● history of; change in role over time 	Hughes & Karp, Carey & Dimmitt, 2008
	<ul style="list-style-type: none"> ● importance of career development skills 	Janosz, 1997; Turner, 2007
	<ul style="list-style-type: none"> ● perspective of /impact on students 	Paul, 1997
	<ul style="list-style-type: none"> ● impact on student achievement and occupational development 	Borders & Drury, 1992; Fouad, 1995; Gerler, 1985; Lapan, 2004, 2007, 1993, 1997; Whiston &

		Sexton, 1998
	●impact on student aspirations and achievement	Rothney, 1958; McWhirter, 2000
	●access to	Mau, 1995; CEEB, 1986; Boyer, 1983; Lee & Ekstrom, 1987
	Aspirationally ambitious teens - generational comparison	Schneider & Stevenson, 1999; Reynolds, 2006; Yazzie-Mintz, 2009; Goyette, 2008
The Problem of Misalignment	Definition of misalignment	Csikszentmihalyi & Schneider, 2000; Orfield, 1997; Rosenbaum, 2001; Schneider & Stevenson, 1999; Paul 1997
	Indicators of	Yazzie-Mintz, 2009; Csikszentmihalyi & Schneider, 2000; Rosenbaum, 2001; Stinchcombe, 1965; Kenny, 2003
	Structural contribution to	Rosenbaum, 2001; Reynolds, 2006; Johnson & Mortimer, 2002; Rosenbaum, Miller & Krie, 1996; Orfield, 1997; Paul, 1997; Stern, 2009; STWOA, 1994; Glover & Marshall, 1993; Mortimer, 2002; Modell, 1989; Gottfredson, 2005
The Problem of Misalignment (cont'd)	In relation to college	Goyette, 2008; Resnick & Wirt, 1996; Rosenbaum, 1975, 1976, 1986, 2001; Schneider & Stevenson, 1999
	Establish false foundation for future success	Rosenbaum, 1997, 2001; Schneider & Stevenson, 1999; NCES, 1999; Deil-Amen & Rosenbaum, 2002; Miller & Rosenbaum, 1997; Rosenbaum, 1996
	Societal impact of	Yazzie-Mintz, 2009; Lee & Rojewski, 2009; NCEE, 1983; Weiss, 2003; Sum, 2009; Rosenbaum, 2001; Haller & Portes, 1973; Blau & Duncan, 1967; Paul, 1997
	Agency/self concept important for outcomes	Seifert, 2004; Mortimer, 2005; Csikszentmihalyi & Schneider, 2000; Super, 1953; Schoon, 2001; Kerckhoff, 1972
	Contextual interactions impact self concept	Gottfredson, 1981; Kenny, 2003; Swanson & Woitke, 1997; Mortimer, 2005; Rotter, 1954

	Social learning theory	Rotter, 1954
Importance of Locus of Control	Definition of locus of control	Rotter, 1966; Phares, 1976; Findley & Cooper, 1983; Mirowsky & Ross, 2003; Schieman & Plickert, 2008; deCharms, 1968; Graham, 1991; Seifert, 2004; Weiner, 1984
	Importance to educational and occupational outcomes	Ryan & Patrick, 2001; Ames, 1992; Coleman, 1966; Coleman & DeLeire, 2003; Stipek, 1980; Ross & Broh, 2000; Murasko, 2007
The Importance of Locus of Control (cont'd)	External/Internal	Rotter, 1966; Seifert, 1997, 2004; Rumberger & Palardy, 2004; Gifford, 2006; Rojewski, 1996; Mortimer, 2002; Glasgow, 1997; Murasko, 2007; Weiner, 1984; Csikszentmihalyi & Schneider, 2000; Hanson, 1994; Mau & Bikos, 2000; Bartels, 1971; Battle & Rotter, 1963; Shaw & Uh, 1971; Stipek, 1980
	Schools as socializing context	Csikszentmihalyi & Schneider, 2000; Eccles & Roeser, 2009; Eccles & Midgley, 1989
School Impact on Student Locus of Control	<ul style="list-style-type: none"> ●tracking impact on locus 	Alexander & Entwisle, 2000; Gamoran, 2000; Cook, 1996; Kerckhoff, 1976, 1993, 1995, 2000; Rosenbaum, 1976; Gamoran, 1993; Gamoran & Berends, 1987; Slavin, 1990; Gamoran, 2000; Paul, 1997; Eccles & Midgley, 1989; Helwig, 2004
	<ul style="list-style-type: none"> ●access to info/counseling impact on 	Johnson & Mortimer, 2002; Bradley & Gaa, 1977; Omizo & Omizo, 1988; Whiston & Sexton, 1998
	<ul style="list-style-type: none"> ●other school climate variables impact on (instruction, press, mentoring) 	Plucker 1998; Stipek, 1980; Johnson, 2000; Schultheiss, 2005; Super 1953, 1980; Turner, 2007; Deci & Ryan ,2000; Seifert & O'Keefe, 2001; Neild, 2009; Rumberger, 1995

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