WHAT’S WRONG WITH “I DON’T KNOW?” AN ANALYSIS OF THE CHARACTERISTICS AND EXPERIENCES OF HIGH SCHOOL STUDENTS WITH CAREER UNCERTAINTY

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By

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ABSTRACT

Results from the nationally representative Educational Longitudinal Study of 2002 (ELS:2002) show that 47% of high school students experience career uncertainty either in 10th or 12th grade. Thus when uncertainty in the career decision-making process is ignored, the needs of almost half of high school students are not being understood or addressed. Career and psychological development theorists explain career uncertainty by describing it as an appropriate stage along the way to career maturity and identity formation, while career counseling and education interventions try to “diagnose” uncertainty, suggesting uncertainty is a problem that may prevent young adults from making economically savvy career decisions. This paper applies logistic regression and OLS regression to data from ELS:2002 to examine the characteristics, experiences, and achievement levels of students reporting career uncertainty. Integrating career development and policy research with a more complete picture of the student population in question will help schools better support students through high school and as they enter the workforce. The results show that uncertain students are more likely to be male, more likely to be Hispanic or Asian, less likely to be Black, more likely to be from a higher socioeconomic status, more likely to have lower education expectations, and less likely to have discussed the future with their parents and/or have paid work experience.
Additionally, student achievement was not significantly related to career uncertainty, suggesting that there is no short-term detrimental impact from career uncertainty.
I would like to express my gratitude to my thesis advisor, my family, GPPI professors and staff, and those who read and helped edit this endeavor. Thank you for all of your help, direction, support, and patience.
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1. Introduction

High school students often lack clear career expectations for the future. Although this is often viewed negatively, as perhaps a waste of time and money while students decide what field of study or career they wish to pursue or a reflection of poor decision-making skills or lack of information, career uncertainty may be part of a desirable process that is developmentally appropriate. Uncertainty may in fact be an important step for students in finding their vocation and developing their career decision-making skills for the future. Additionally, career decisions during high school are not binding, and could potentially be detrimental for students whose choice represents narrowed or closed off options, real or perceived. With this in mind, research should focus not only on interventions to eliminate career uncertainty, but also on supporting students while they grapple with this major life decision. Understanding uncertainty in this broader context is especially important for several reasons, including the large proportion of high school students who are uncertain, the potential negative outcomes linked with uncertainty, and the changing knowledge-based economy.

First, trends from the National Educational Longitudinal Study of 1988 (NELS:88) and the Educational Longitudinal Study of 2002 (ELS:2002) indicate that career uncertainty may be more prevalent than previously indicated, up from 10% in 1990 to 33% in 2002 (of sampled sophomores).\(^1\) Cahalan et al.\(^2\) urge caution in

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interpreting these numbers, as the survey questions measuring occupational expectations in years 1990 and 2002 were different. The 2002/2004 survey question is open ended, with the option to choose “I don’t know,” while the 1990 survey had a list of occupational choices with “I don’t know” as an option at the end (see Figure 1). The two years’ numbers measure slightly different attitudes.

However, the open-ended question in the 2002 questionnaire may be more likely to capture students’ uncertainty, since students would probably report an occupation if they had decided or fully certain. Because 33% of sophomores surveyed found it easier to indicate uncertainty rather than specify an occupation, this better represents students who have not reached a firm decision about the career they plan to pursue than the question in the 1990 questionnaire. So, whether these numbers actually indicate growth in career uncertainty or simply differently measured numbers is unknown. However, a full one-third of high school sophomores appear to experience career uncertainty in some form.

Second, some studies have found evidence that career uncertainty is linked to certain negative psychological factors, such as anxiety, low self-esteem, low self-efficacy and to fewer socially adaptive characteristics, such as leadership potential. Due to the inability to determine causation from any of these studies, it is unclear whether uncertainty is the direct cause of any of these negative outcomes, but the significance of

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2 Cahalan et al., “United States High School Sophomores.”
these relationships indicates that career uncertainty in high school is something that merits attention.

Third, the changing economy offers another reason to examine the characteristics of students with career uncertainty. Trends show an ongoing shift towards multiple career changes in a lifetime. Thus, students choosing, “I don’t know,” in response to a question that asks what they expect their occupation will be at age 30 may be more accurate than those with a specific answer – many individuals may be in or on their way to their second career path (not just their second job position) by that time.

Importantly, however, it is not likely that students’ uncertainty expressed in high school reflects this concern. It probably reflects the student’s uncertainty for his or her career path, indicating that the student has yet to fully develop their career maturity. Career maturity refers to “the individual’s readiness to make informed, age-appropriate career decisions and cope with career development tasks.” Career maturity and the ability to match personal strengths with available professional options is an important, yet not innate, skill which should be fostered and encouraged.

For these reasons, more information is necessary to help inform career education policies and best practices in career counseling. A large proportion of students experience uncertainty, and students should develop the skills necessary to eventually resolve their career uncertainty and learn the skills necessary in order to repeat the process if and when

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they need to change career paths later. It is also critical to determine any short-term negative repercussions of uncertainty to perhaps destigmatize uncertainty as problematic for students. In response, this paper will examine the characteristics and achievement scores of high school students who report career uncertainty, contributing to what is known about career uncertainty in high school students.

2. Literature Review

2.1 Background

The nature and quality of career counseling in high school is highly varied across schools. Programs in high school designed to support students in their career decision-making process range from activities where student initiative and motivation play a pivotal role in the student’s access to and use of resources, such as voluntary meetings with a school counselor (to gain information about applying to, choosing, and financing postsecondary education, arranging job shadowing or work placements, or specialized counseling), career fairs, and workshops, to more structured guidance such as career academies, career and technical education programs, and apprenticeships. Career counseling in high schools often involves Computer Information Delivery Systems (CIDS), which are developed by states and provide information like occupational and labor market information, trends analyses, and individual assessment tools. However, resources in many schools are quite constrained; not only is career counseling just one of

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the many responsibilities the typical school counselor has, but also the national
counselor-student ratio is about 1:476,⁸ and up to 1:1,000 or more in low-income and rural settings.⁹

Even with this unevenness in career counseling, close to two-thirds of high school graduates continue to college,¹⁰ so the majority of students are no longer faced with monumental vocational decisions at the time of high school graduation. Students who enter college can postpone their career decision-making, armed with the knowledge that they may change their major and explore many options. Yet, among those who actually enroll in college, few actually make it to graduation.¹¹ This means that students may be faced with career decisions earlier than expected. In addition, by entering but not completing a degree or certification program, students exhibit uncertainty about their future only a few years out of high school.

2.2 Frameworks for Career Decision-making

The purpose of this paper is to describe those high school students for whom the career decision-making process is still in process. However, much of the research around this topic examines how students reach vocational decisions and career maturity, and frame indecision as a problem or a failure of the decision-making process. Career choice

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models can be categorized into two categories: developmental and social learning. In addition, many researchers attempt to verify theories that correctly identify the vocational development process in order to build upon previous literature, address problems in career decision-making, and prevent stratification in career aspirations\(^{12}\) (and ultimately opportunities and income) across race, gender, and socio-economic status.

### 2.2.1 Developmental Models

Career development theories apply development theory to career decision-making, which usually means that the choice process is conceptualized through stages that individuals experience, work through, and then transcent to the next stage of development. Development theorists generally hold that uncertainty is an entirely appropriate state. For example, Erickson,\(^ {13}\) a developmental psychologist, believed that the career choice process and vocational exploration is a central part of identity development, which is the principal challenge adolescents must master in their ongoing development. When career choice is framed as a developmental process, or a process that every student must undertake, concern about career uncertainty can begin to look irrelevant. Within this developmental framework, uncertainty simply indicates that the career development process is not yet complete, and that the individual has not matured enough as a person or has not been exposed to a number of life experiences that might bring them closer to, or even be necessary for, career certainty.

\(^{12}\)“Aspirations” refers to one’s hopes or desires for the future. “Expectations” tries to measure what the individual views as probable or realistic for the future.

Ginzberg, Ginsberg, Axelrad, and Herma\textsuperscript{14} were among the first to apply cognitive development theory to the career choice process. In their theory, career choices start in the pre-teen years and end in young adulthood in three stages – fantasy, tentative, and realistic. In this model, individuals are free to consider any occupational choice, and when individuals identify their “preferred activities” (and in later stages their interests, capacities, and things they value), they relate them to possible occupational choices. After this is completed, individuals transition by recognizing the consequences and responsibilities of their career choice, fully moving out of the “fantasy” and “tentative” stages into the “realistic” stage. Although somewhat simplistic, Ginzberg, et al.’s theory set the foundation for future career development theorists.

Another early career development theorist, Super, expanded on this use of stages and saw the career development process as a way for the individual to best express his or her self-concept.\textsuperscript{15} In this framework, students who are career uncertain are simply in the exploratory stage, or the first stage of Super’s career development process. Super’s expected age ranges for the stages of career development place high school students firmly in the exploratory stage. As the individual matures, his or her self-concept becomes more stable, causing the individual’s self-concept, as demonstrated by their career choice, to change and progress as the individual matures.


After Super came Gottfredson, who applied four stages of cognitive development to the career development process. In the last stage of development, beginning at age 14, individuals are oriented to their “internal, unique self”, again similar to Erikson, Ginzberg et al., and Super, in the explicit emphasis on identity formation. For Gottfredson, the individual’s career choices are shaped by the influence of gender identity (stage two), perceptions of appropriate social aspirations (stage three), and their own values and interests (stage four).

For another career development theorist, career choice is even more explicitly tied to personality development. In Holland’s typology, six categories of work environments exist within American society, and these six work environments correspond with his six proposed personality orientations. Holland also used the cognitive development framework of personality development, only he placed less emphasis on a student’s development through stages, and more on how the student’s personality directly affects his or her career choice. Uncertainty in Holland’s context can be explained by inconsistent self-evaluation or the student still working through their personality or identity development.

So, Ginzberg, et al., Gottfredson, and Super all used stages to describe a student’s career development, and related the student’s career development to his or her self-concept development, while Holland utilized personality and career types to do the same.

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17 Osipow and Fitzgerald, Theories of Career Development.
18 Ibid.
Development theory frames the career decision-making process as one of a maturation process that all individuals experience. When career choice is viewed in that context, uncertainty is not a problem; it is implicitly an indication that the individual is still working through their personal development and identity formation. The “problem,” if addressed, is addressed as a self-discovery problem rather than a career choice problem.

In support of developmental theory, one longitudinal study found that younger adolescents might not be ready to give up occupational fantasies (high social value occupations and much higher than average salaries, e.g. professional athlete) until they are older.\(^\text{20}\) This suggests that interventions in high school which target awareness of strengths and weaknesses, parental and teacher input, and work experiences, are more conducive to career development, rather than intervening in middle school or earlier, when the student is not developmentally prepared to give up their occupational fantasies. Another study found, using multiple analysis of variance,\(^\text{21}\) that students in their sample of Austrian secondary students who were 15, 16, and 17 years old scored higher on a measure of career maturity (the Career Decision Scale, see section 2.3) than 12, 13, and 14 year olds.\(^\text{22}\) While this supports the idea that career maturity is developed over a person’s life span (or at least during adolescence), this analysis only tells us the raw differences between the two groups. Factors that could easily affect career maturity and be associated with older students (such as more career interventions, more conversations


\(^{21}\) MANOVA tests differences on several outcomes between groups that are classified by certain characteristics.

with parents, teachers, or others about career options) were not included in the model. The possible effects of these external factors are included in a more recently developed theoretical framework, social learning theory.

### 2.2.2 Social Learning Theory

In addition to the developmental framework, researchers have looked at psychologist Albert Bandura’s social learning theory as a framework for career development. Social learning theory recognizes the role of cognitive development and integrates both developmental and sociological factors. In this framework, career choices are explained and influenced by both personal and environmental factors, but with an emphasis on identifying factors outside of the individual that shape an individual’s decision-making and feelings of self-efficacy. Considered factors include (but are not limited to) gender and race, socioeconomic status, social climate, an individual’s experiences, the policies and laws that structure society, and learned heuristics for how the world works.

Some empirical research which supports social learning theory finds that in general a student’s demographic background is a less powerful factor in determining a student’s aspirations, motivation, and career than his or her environment and personal influences. Another study, however, used longitudinal data and found a considerable link between uncertainty and demographic factors only until 8th grade. This result also

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implies that interventions may be helpful to students who have not reached high school (and may have higher risk of uncertainty) in working towards career maturity,\textsuperscript{25} although this slightly contradicts the findings of an earlier-cited study that found interventions to be less helpful when they occur before high school,\textsuperscript{26} highlighting the lack of clarity and agreement across career uncertainty research.

The concept of career uncertainty is not directly addressed by social learning theorists. However, a paper titled \textit{The wisdom of indecision},\textsuperscript{27} suggested that open-mindedness might be the source of some people’s indecision,\textsuperscript{28} which can be viewed as a greater virtue than decisiveness, placing indecision in a positive, rather than negative, context. Social learning theory acknowledges the impact of other factors besides identity development in an individual’s career development process. Building on this understanding, researchers and theorists have also examined possible sources of career uncertainty, both developmental and environmental in nature.

\textbf{2.3 Sources and Types of Uncertainty}

The purpose of identifying different kinds of indecision is usually to create differentiated interventions based on different needs. If consistent types appear, then interventions can be developed and tailored to each type. This approach to uncertainty fundamentally treats uncertainty as a problem to be measured and then resolved, as opposed to an appropriate stage in a student’s development.

\textsuperscript{28} Career uncertainty is the broader, concept connoting a lack of knowledge or being unsure, while career indecision is a more specific version of uncertainty, indicating a lack of decision.
Measuring uncertainty. Many efforts have been made to list sources of career uncertainty and indecision and the different kinds of uncertainty that students experience. In measuring career indecision, studies use one or more of the different scales that have been developed.\(^\text{29}\) Early scales developed in the late 1970s and early 1980s that are still often used include the Career Decision Scale (CDS) and My Vocational Situation (MVS). CDS has two subscales, the Indecision and Certainty scales. The Indecision scale uses 16 factors and is most often used as an index of the student’s indecision. It also aims to be as complete a list as possible of the reasons individuals use to explain their career indecision.\(^\text{30}\) The Certainty scale measures the degree of certainty the student feels about his or her decision and consists of two questions that address this.\(^\text{31}\) The MVS, based on Holland’s theory of career development, is founded on the assumption that there are six personality types and these types correspond to six career fields. In this theory, career decision-making difficulties arise for individuals who fall into multiple personality categories or who have some issue in evaluating their personality type.\(^\text{32}\)

More recently, the Career Factors Inventory\(^\text{33}\) and the Career Decision Profile\(^\text{34}\) treat indecision in a more multidimensional way, allowing for a more precise assessment.

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\(^{31}\) Osipow, “Assessing career indecision.”


\(^{34}\) Lawrence K. Jones, “Measuring a three-dimensional construct of career indecision among college students: A revision of the *Vocational Decision Scale-the Career Decision Profile,*” *Journal of Counseling Psychology* 36 (1989).
of the causes of indecision. Additionally, the Career Decision Difficulties Questionnaire (CDDQ) is a 44-item questionnaire that is grounded in a theoretical taxonomy of career decision-making difficulties, such as lack of information about the self, occupations, ways of obtain information about the career decision making process. The CDDQ divides these difficulties into two time periods, pre- and during decision-making, which allows for greater differentiation of information to facilitate career counseling.

Sources and types of uncertainty. A review by Gordon of indecision types found 15 separate studies that surveyed high school or college students and found specific subtypes of indecision. The different subtypes found in these studies were not identical, but many had considerable overlap in their categorization of indecision. For example, many identified types along a continuum of decision-status (i.e. very decided, tentatively decided, etc.). Other subtypes are related to the individual’s state of mind, such as anxious/worried, independent/confident, or whether or not the individual is well informed about educational and career options. Related, one study found three sources of career indecision among a sample of Dutch students (using their own indecision scale), 1) a lack of information, 2) valuation problems (such as value unclarity or conflict), and 3) uncertainty about the outcomes, to be a good fit. These findings resonate with the types

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35 Osipow, “Assessing career indecision.”
37 Osipow, “Assessing career indecision.”
39 Only students who were likely to continue their education post-high school were allowed to participate, which limits the external validity of the study, as well as its application to this paper, which aims to understand all high school students, not just students who are likely to continue their education.
identified by the studies above, and other studies have been conducted since the review, with similar results.\textsuperscript{40}

While the literature agrees that indecision presents differently across individuals and that these differences can be categorized,\textsuperscript{41} it is not clear what those exact categories are, and it is even less clear the extent to which those categories can be generalized across different populations. Problematically, most of the studies cited used samples of college students, and many of the high school student samples are relatively small and not representative of the national population.

2.4 Consequences of Certainty and Uncertainty

The literature presents mixed results regarding the possible consequences of uncertainty. A relationship between some psychological factors, e.g. anxiety, and career uncertainty has been found in the literature, but other psychological factors seem unrelated. It is important to note that it is difficult to determine causation and the direction of the relationship. For example, if a model finds a correlation between career uncertainty and anxiety, anxiety may lead to career uncertainty, or career uncertainty may lead to anxiety, or other unknown factors may be at work. Complicating the picture, students likely vary; for some anxiety may be the source, for others it may be a consequence.

Researchers have tried to find connections between uncertainty and factors like depression, anxiety, self-esteem, and personality factors. Depression does not appear to be correlated with indecision when other psychological factors are taken into account, such as vocational identity, state anxiety, trait anxiety, and locus of control.\(^42\) However, lower self-esteem seems to be correlated with greater indecision.\(^43\) One such study found that students with career indecision exhibited less decision-making self-efficacy and self-esteem than decided students in their sample of 8\(^{th}\) and 10\(^{th}\) grade Australians, using a multiple analysis of variances (MANOVA).\(^44,45\) Higher anxiety is also correlated with greater indecision.\(^46\) Additionally, evidence indicates that undecided students are less likely to have interpersonal personality dimensions related to social power and leadership potential. Indecisive students in this study also demonstrated a greater tendency towards nonconformity or resistance to prescribed rules and norms.\(^47\) These results indicate that personality and interpersonal factors can also be useful in understanding career decision-making.

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\(^{42}\) Saunders et al. “Relation of depression and dysfunctional career thinking to career indecision.”


\(^{44}\) MANOVA tests differences on several outcomes between groups which are classified by certain characteristics.


From this research, depression does not appear to be a possible consequence of uncertainty, but lower self-esteem and higher anxiety could potentially play a role as a cause or consequence. Additionally, students who report indecision are less likely to have personality traits associated with social power and leadership. However, these are all very difficult states of mind to measure and distinguish in a survey. Self-esteem and anxiety issues are often related to depression, but are also simply part of being an adolescent wrestling with important life decisions. The methods used in these studies cannot isolate the causes or outcomes of uncertainty or how these relationships vary among certain subgroups.

2.5 Stratification Issues

Studies examining career choice across racial/ethnic groups and gender focus on gaps between groups in career expectations and aspirations, and do not explore variations between groups in career uncertainty. Differences in both career aspirations and expectations are often assumed between genders and across racial/ethnic groups and socioeconomic status. However, this picture appears to be changing. Evidence indicates career aspirations are relatively similar across racial groups, but still divergent between genders.

Race/ethnicity. Every study in this review found closing or closed gaps in career-related factors between racial/ethnic groups. For example, the National Center for Education Statistics (NCES) reports on ELS:2002 and its predecessor, the National

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48 Again, “aspirations” refers to one’s hopes or desires for the future. “Expectations” tries to measure what the individual views as probable or realistic for the future.
Education Longitudinal Study 1988 (NELS:88),\textsuperscript{49} find closing or non-significant racial/ethnic gaps between students who expected to be employed as “professionals” (such as accountant, engineer, doctor, or school teacher) by age 30 versus other occupations, and declining gaps between those with high and low socioeconomic status in “professional” occupation expectations and other occupations.\textsuperscript{50} Another study tested the differences in aspirations between white, Mexican American, and black students of 866 freshmen at an urban university in the southwest, and found no ethnic gap in aspirations. Farmer’s review of research examining race and gender’s roles in motivation and aspiration found that black and Hispanic students had significantly higher aspirations than white students.\textsuperscript{51}

Additionally, Perry, et al. examined levels of optimism (related to career aspirations) of urban youth, arguing that the gap between aspirations and expectations for minority youth appears to have significantly narrowed, as the results of their analysis (using Friedman’s test, a tool similar to ANOVA) showed no significant difference between the occupational prestige levels of sampled students’ expectations and aspirations.\textsuperscript{52} Some problems are present, most importantly the possibility of selection bias. The sample of students consisted of those who returned a signed consent form to


\textsuperscript{50} Ingels and Dalton, “Trends among high school seniors.”


\textsuperscript{52} Justin C. Perry, Jeff Przybysz, and Muna Al-Sheikh, “Reconsidering the “aspiration-expectation gap” and assumed gender differences among urban youth,” \textit{Journal of Vocational Behavior} 74 (2009).
participate, which might indicate higher motivation or feelings of responsibility, factors that might be positively correlated with more congruent aspirations and expectations.

**Gender.** Gender is still a factor in career decision-making, but its relationship seems to be weakening. Farmer’s review of research found that females had higher career motivation scores than male students. A study found that female students’ expectations are sometimes incongruent with their aspirations, and that this incongruence is sensitive to support (or discouragement) from significant people in their lives, as well as to the cost of education for their expected occupation, but is not sensitive to factors like maternal employment and perception of gender discrimination in the labor force. This indicates that factors which indicate limited options for women (like perception of gender discrimination) may not be important factors for females as they consider future careers.

Where higher uncertainty among minority populations might be expected, especially if the source of their uncertainty is from fewer available options due to perceived or actual discrimination, the literature indicates that the expected positive correlation between uncertainty and minority status may be weaker than expected. In the same way, where females might be expected to have higher career uncertainty due to their relative disadvantage in the labor force, the literature seems to indicate that this is not an important factor in forming career expectations. However, it is difficult to assume from existing research what role gender and race will play in career uncertainty, since

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53 Farmer, “A multivariate model for explaining gender differences.”
uncertainty was not directly measured or addressed in any of the studies found in this review.

2.6 Work Experience and its Relationship to Uncertainty

Benefits. An important factor related to career uncertainty is whether or not students had paid work experience during high school. Evidence is mixed regarding the academic outcomes of students who work during high school, but as students gain work experience and access to knowledge and opportunities, they may become better equipped to make career decisions, especially as they develop work-related attitudes and interests. The work environment is also a context in which adolescents can explore their identity and social roles and develop important social and career development skills. One study found that youths in their mid-twenties reported that work during high school assisted them in formulation of their future goals, both in what they hoped to accomplish and what they hoped to avoid. Additionally, employment gives adolescents valuable networking opportunities and allows them to build social capital toward finding a job or a career. Yet another study found higher-quality part-time jobs (measured by skill variety and degree of autonomy) to be linked with lower levels of work-related cynicism and higher levels of career maturity in their sample of 756 Canadian high school students.

accounting for differences across family socioeconomic status and family’s attitudes and values about achievement.\textsuperscript{57}

**Drawbacks.** However, the idea that work experience offers significant benefits to high school students has not reached consensus. For example, one study found that high school students who worked during high school had lower achievement and lower educational and occupational aspirations, holding differences across socioeconomic status, ethnicity, gender, and prior education experiences constant. These results were even stronger for students in higher grades.\textsuperscript{58}

**Work experience and uncertainty.** Research regarding work experience and its relationship with career indecision does not provide conclusive evidence about its advantages and disadvantages. In support of the idea that work experience may help students in their career decisions, one study found that students in their sample of 292 Australian high school students who reported career indecision were less likely to have paid work experience.\textsuperscript{59} However, other studies have not found a significant relationship between work experience and indecision. The aforementioned Canadian study did not find a relationship between work-related attitudes and aspirations and the student’s quantity of work-experience.\textsuperscript{60} A longitudinal study of 483 high school students in rural Pennsylvania and found that career certainty before working part time was not


\textsuperscript{59} Creed et al., “Antecedents and consequences of career decisional states.”

significantly related to the student’s decision to find part-time employment.\textsuperscript{61}

Additionally, using MANOVA to look at the difference in indecision between the time period before and after employment, the researchers found that part-time work did not affect the student’s career decision status.

Research on the relationship between work experience in high school and career uncertainty is not conclusive. Studies have found both positive benefits to, and negative connections with working during high school, and results are somewhat conflicting regarding work experience and career decision-status. Further research is necessary to understand the complex relationship between high school work experience and career uncertainty.

2.7 Literature Summary

The literature on career uncertainty ranges from placing uncertainty in the context of developmental theory, where career choices are self-focused and the result of a progression through stages of identity formation and uncertainty is considered normal, or social learning theory, where career choices are developed and influenced by a number of internal and environmental factors. The literature also explores sources and types of uncertainty in order to diagnose and address the “problem” and catalog career choice difficulties for counseling purposes. The possible effects of uncertainty are mixed, with researchers finding that lower self-esteem and higher anxiety are related to career indecision; however, depression does not seem to be related. Researchers have also examined ways that certain populations such as women and minorities approach and are

\textsuperscript{61} Vladimir B. Skorikov and Fred W. Vondracek, “Longitudinal relationships between part-time work and career development in adolescents,” \textit{The Career Development Quarterly} 43, no. 3 (1997).
affected by career decision-making difficulties, and have found that the assumed gaps in expectations between whites and minorities and men and women do not matter directly to career decision-making. Research concerning work experience during high school and its role in the career development process is also mixed, as work experience may or may not be correlated with less career indecision. Each aspect of the literature touches a different aspect of uncertainty, but each also leaves questions unanswered, especially regarding the role of uncertainty specifically, pointing to a need for further research.

2.8 Research Gaps

One important and large gap in existing research is the lack of an investigation of the relationship between a student’s academic achievement (or any other predictor of future success) and career uncertainty. Because student success is the ultimate priority and desired outcome of education policy, having a clear picture of whether uncertainty is linked to subject academic achievement, and ultimately whether one causes the other, is an important part of evaluating career uncertainty in high school students. Due to limits with the data, this paper cannot determine causality. However, the relationship between academic achievement and uncertainty will be examined.

Looking at the outcomes of students who are uncertain about their career expectations and comparing them with the outcomes of students who have clear career expectations is crucial to understand uncertainty’s role in students’ lives. Comparing outcomes will also help inform policymakers and schools about the extent to which uncertainty points to other critical issues that need to be addressed, or whether it is found across all achievement levels and whether or not it is a good predictor of performance in
school. Achievement alone certainly is not the only measure by which uncertainty should be judged as harmful or acceptable, and many factors can contribute to a student’s success after high school. However, academic achievement is often used as a proxy for student learning and as a signal to colleges and employers about a student’s potential future performance, making it one of the primary outcomes of interest in education policy.

Other gaps in the research relate to the statistical methods most often used. Most literature reviewed in this paper that examine the relationship between uncertainty or indecision and background factors or consequences use an ANOVA or MANOVA to test differences among uncertain and certain students. These methods provide valuable information; however, they fall short of providing a full picture of uncertainty in students, as most do not account for differences across many relevant demographic factors, likely due to constraints in available data, and a lack of career-certainty-related questions in large representative datasets.

The scale of ELS:2002 allows inclusion of many variables related to students’ background and experiences in order to look at the differences in career uncertainty across, for example, student achievement levels, independent of the other factors (such as the student’s socioeconomic status) that might influence uncertainty. The trade-off is that ELS:2002 uses a cruder measure of uncertainty that does not have the precision that scales of indecision provide. ELS:2002 captures broad feelings of career uncertainty, but those students who are unsure, nearly sure, waffling between a couple or a plethora of options, simply do not care or have not considered the future are all potentially included
in this one measure. The model used in this paper uses many more background variables, significantly decreasing the chances of omitted variable bias. Additionally, ELS:2002 participants are a nationally representative sample, which greatly improves the extent to which the results can be generalized to the broader population. However, the results will also tell less about the nature of the students’ uncertainty than studies using more focused data.

3. Policy & Research Questions

3.1 Policy Question

While other studies use samples of uncertain students and try to diagnose students’ uncertainty, this paper shifts direction, examining how uncertainty is related to student outcomes. Even as career development literature indicates that uncertainty is appropriate and a universal state theoretically experienced by college-bound students and high school dropouts alike, all high school students face greater pressure to make career decisions. In response, this paper will take a focused look at high school students who answer, “I don’t know,” when asked to “name the job or occupation you expect or plan to have at age 30,”\(^{62}\) providing insight into the characteristics and work experiences of these students, as well as an analysis of the relationship between student achievement and career uncertainty. This, along with an analysis of the current body of research on career uncertainty, integrates career development and policy research in order to shape career education policy and programs based on robust and full information. Both in the field and

in the policy sphere, it is important to be well informed about an issue and the intended recipients as programs are formed and practices established. This analysis can help inform system supports for uncertain students.

While this paper looks at the characteristics and outcomes of uncertain students, it is important to note that scales of decidedness used in studies and data created with the purpose of examining indecision measure something different from the career uncertainty that ELS:2002 picks up, although the two concepts are certainly related. Career uncertainty is the broader concept connoting a lack of knowledge or being unsure about careers in general or in particular, while career indecision is a more specific version of uncertainty, suggesting a lack of decision between career choices. Scales of indecision tend to diagnose the causes of indecision in order to arrive at a solution. On the other hand, the ELS:2002 survey question (which this study uses) captures broad uncertainty and tells us nothing about the source of that uncertainty. Although other characteristics can be examined and patterns and correlations with factors that could potentially be causally related to uncertainty can be found, causation cannot be concluded from this dataset.

3.2 Research Question

This paper will answer what personal, school-related and work-related characteristics of high school students are linked to career uncertainty. It will also address whether or not career uncertainty is predictive of a student’s achievement in school. While achievement on its own is not a complete measure of a student’s likelihood of

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success, it does provide at least an idea of whether uncertainty is correlated with success in school, which is one measure used to predict future success.

4. Methodology

4.1 Data

The Education Longitudinal Study of 2002 (ELS:2002) base-year to first follow-up public-use dataset provides the data for the analyses. ELS:2002 is a longitudinal study that follows a nationally representative cohort of students from high school into post-secondary education and the labor-force. Students, along with their parents, school administrators, and teachers, completed questionnaires about themselves and the students’ secondary school experiences. The information available for public use at the time of this paper is from the base-year questionnaire, conducted in 2002, and the first follow-up questionnaire, conducted in 2004, when additional seniors were surveyed to ensure a nationally representative sample of 12th graders.64

Data collection for ELS:2002 was sponsored by the National Center for Education Statistics (NCES) of the Institute of Education Sciences, U.S. Department of Education. A national probability sample of 752 public, Catholic, and other private schools was drawn, and schools with students enrolled in the 10th grade in the spring term of the 2001-02 school year were eligible for selection. Out of 17,591 eligible sophomores, 15,362 completed a questionnaire. In the first follow-up, the 10th graders previously surveyed in the base year, now 12th graders in 2004, were surveyed, as well as students in the cohort

64 The cohort was surveyed again in 2006, and will be surveyed in 2010 or 2012 so that their later outcomes may be studied. The 2006 data is only available for “restricted use.”
who had dropped out sometime between 10th and 12th grades. Weighting was used to compensate for unequal probabilities of school selection and non-response among students.

4.2 Sample

The study sample consists of 11,633 students whose responses were available (not missing) for the outcome variables, 10th grade career decision status, 12th grade career decision status, and 12th grade student achievement (12th grade math score). Females make up 51.1% of the sample, and the racial/ethnic backgrounds of the students were distributed as expected. White students comprise 59.3% of the sample, black students 11.4%, Hispanic students 12.6%, Asian students 9.6%, and other students (e.g., Pacific Islanders, American Indians, students of mixed race) represent 5.2% of the sample. The Socioeconomic status (SES) breaks down to 19.9% of the sample in the lowest quartile, 47.7% in the middle two quartiles, and 30.5% in the highest, or “upper SES” quartile. The education expectations of the sample are fairly high, with 41.0% expecting to obtain a master’s degree or higher, 36.0% expecting to graduate from a 4-year institution, 7.9% expecting to attend some college, 4.0% expecting to graduate from high school, and just 0.4% expecting to not graduate from high school. Table 1 provides further descriptive statistics.
**Table 1 - Personal Characteristics of Students in the Sample**  
*n = 11,633 students*

<table>
<thead>
<tr>
<th>Demographic Background</th>
<th>% sample</th>
<th>Academic Background</th>
<th>% sample</th>
<th>Extracurricular Experiences</th>
<th>% sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td>Education Expectations</td>
<td></td>
<td>Parental Involvement</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>51.1%</td>
<td>Less than high school</td>
<td>0.4%</td>
<td>Discuss jobs</td>
<td>90.6%</td>
</tr>
<tr>
<td>Male</td>
<td>48.9%</td>
<td>High school</td>
<td>4.0%</td>
<td>Discuss ACT/SAT</td>
<td>70.3%</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td>Some college</td>
<td>7.9%</td>
<td>Discuss college</td>
<td>69.2%</td>
</tr>
<tr>
<td>White</td>
<td>59.3%</td>
<td>College</td>
<td>36.0%</td>
<td>Paid Work Experience</td>
<td>83.8%</td>
</tr>
<tr>
<td>Black</td>
<td>11.4%</td>
<td>Master’s or higher</td>
<td>41.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>12.6%</td>
<td>School Attendance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>9.6%</td>
<td>Skip 3 or more times</td>
<td>8.6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>5.2%</td>
<td>Skip once or twice</td>
<td>15.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>Never skip</td>
<td>73.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Younger</td>
<td>27.3%</td>
<td>Taking/taken AP Test</td>
<td>30.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Older</td>
<td>72.7%</td>
<td>Taking/taken SAT or ACT</td>
<td>84.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socioeconomic Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low SES</td>
<td>19.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid SES</td>
<td>47.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High SES</td>
<td>30.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Missing.** In all, 28.4% of student were missing or classified as nonrespondent on the outcome variables and thus dropped from the analytic sample, reducing the number of observations from 16,252 to 11,633 students. About 14.5% of responses regarding 10th grade decision status are missing or nonrespondent, 9.0% of student responses regarding 12th grade decision status are missing or nonrespondent, and 15.67% of responses for 12th grade achievement are missing. Significant differences emerge between the race/ethnicity, gender, age, and socioeconomic status of students who are missing/nonrespondent and students who responded to these questions. Missing students are more likely to be black or Hispanic, male, older, and from the lowest socioeconomic status. Black and Hispanic students make up 15.3% and 16.6% of the

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65 “Nonrespondent” represents students who did not fill out the student questionnaire, but information about that student was provided by one or more of the other questionnaires in the survey (i.e. administrator, parent, and/or teacher).

66 The “p” value for chi square tests run on each of these variables is 0.000 for each variable, implying that the differences are significant.
missing observations, respectively, compared to 12.5% and 14% of the whole dataset. Whites are also less likely to be missing, making up 39.8% of missing observations but 54% of the dataset. Females make up 38.8% of missing observations and 48% of the whole dataset. Younger students account for 17.8% of the missing observations, while they are 25% of the whole dataset. Students from the lowest socioeconomic status are 28.2% of the missing observations and 22% of the whole dataset. In comparison, students in the middle socioeconomic status are 39.7% of the missing observations and 45% of the whole dataset, and students from the highest socioeconomic status are only 17% of the missing observations, while they are 27% of the whole dataset.

In sum, black and Hispanic students, male students, and students from the lowest socioeconomic status are more likely to be missing and thus dropped from the sample. This hinders full confidence in the generalizeability of this study’s results to the general population, as black, Hispanic, and male students, and students from the lowest socioeconomic status are underrepresented. Additionally, these students who are missing may in fact be more likely to be uncertain about their future career and may traditionally score lower on achievement tests, and so not counting these students may weaken the results of this study. For example, looking at Table 2, 36.4% of male sophomores reported career uncertainty, while only 29.8% of female sophomores reported the same. This difference may in fact be even stronger if the missing males are similar to the males who responded, i.e. uncertain at a higher rate than females. Table 2 also shows that a lower percentage of black sophomores reported uncertainty compared to white and Hispanic sophomores, and Hispanic sophomores had a higher percentage of uncertainty
than both groups, so the implications of students missing more likely missing from these racial groups may balance out. Younger students and students from the lowest socioeconomic status are also slightly more uncertain than older students and students from mid and high socioeconomic strata, so their absence from the study sample may also make the incidence of uncertainty appear lower than it actually is. Additionally, the results of the regression analyses may be skewed if the students who are missing also have some unknown characteristic(s) that this study does not measure that makes them more or less likely to be uncertain. However, while these missing observations have the potential to skew the results in unpredictable ways, this dataset still contains 11% black students and 12.6% Hispanic students, which is much higher than most other studies examining career uncertainty.

4.3 Variables

Outcomes. Four regression analyses will be used to address the research question. The dependent variables will be 10th grade career uncertainty, 12th grade career uncertainty, and 12th grade achievement. Uncertainty in 10th grade is measured by a dichotomous variable representing students’ responses to the question, “Write in the name of the job or occupation that you expect or plan to have at age 30” (see Figure 1) from the base-year questionnaire. Uncertainty is defined as “I don’t know” (1) compared to all other occupations (0), and is renamed 10uncertainty. (Student responses for occupation are coded according to 17 categories [see Figure 2]). Uncertainty in 12th grade is coded in the same way as 10th grade uncertainty, using the student’s response to the same question on the first follow-up questionnaire. Student achievement in 12th grade is
measured by the student’s scores on the math test administered by the survey team during the first-year follow up survey.\textsuperscript{67} The variable’s value is the raw math score converted to a z-score\textsuperscript{68} in order to normalize the results, and renamed $z12achieve$.

Four additional variables on uncertainty are used in order to test whether students who are continuously uncertain (uncertain in both 10\textsuperscript{th} and 12\textsuperscript{th} grade) fare any better or worse academically than those who had a clear career expectation at least one of the two years. The variable $byuncertain$ is a dichotomous variable coded (1) if the student was uncertain in 10\textsuperscript{th} grade (the base year survey) but not in 12\textsuperscript{th} grade, and (0) otherwise. The variable $fluncertain$ is a dichotomous variable coded (1) if the student was uncertain in 12\textsuperscript{th} grade (the first year follow up) but not in 10\textsuperscript{th} grade, and (0) otherwise. The variable $con\_uncertain$ is a dichotomous variable coded (1) if the student was uncertain both in 10\textsuperscript{th} and 12\textsuperscript{th} grade, and (0) otherwise (capturing both those students who were uncertain either in 10\textsuperscript{th} or 12\textsuperscript{th} grade only, and those students who did not report career uncertainty in “0”). A dichotomous variable, $totuncertain$, was also created in order to represent whether a student has ever been uncertain, either in 10\textsuperscript{th} or in 12\textsuperscript{th} grade, and is coded (1) if the student was ever uncertain, (0) otherwise.

**Demographic information.** Gender, race/ethnicity, age, and socioeconomic status comprise the measures of students’ personal characteristics included in the models. All demographic variables represent the student’s response in 10\textsuperscript{th} grade, assuming that the student’s demographics do not change in any significant way between 10\textsuperscript{th} and 12\textsuperscript{th} grade.

\textsuperscript{67} The ELS:2002 math test included arithmetic, algebra, geometry, data/probability, and advanced topics. Test questions were selected from previous assessments, including NELS:88, NAEP, and PISA.

\textsuperscript{68} A z-score reflects how many standard deviations above or below the sample mean a raw score is.
Gender is a dichotomous variable with (1) female and (0) male and relabeled female, using males as the comparison group. Race/ethnicity has been divided into five dichotomous variables, named white, black, Hispanic, Asian, and other.\textsuperscript{69} The identified race/ethnicity is coded as (1), and those not in the group are coded as (0). In the models, White is used as the reference group. Age (younger) has been converted to a dichotomous variable in order to capture any differences between older and younger students who may be at different stages of development. Students born on or after June 1986, or 15 years 9 months old at time of survey (representing students at least 4 months younger than the median age and the youngest 27\% of the sample), are (1), and students born before June 1986 are (0).\textsuperscript{70} Socioeconomic status is measured with three dichotomous variables, named lowSES, midSES, and highSES. Socioeconomic status combines mother’s and father’s education, mother’s and father’s occupation, and family income. The variables are coded with the named socioeconomic status as (1), and others as (0). MidSES is used as the reference group.

\textbf{Academic background.} Student achievement in 10\textsuperscript{th} grade, 10\textsuperscript{th} grade education expectations, 10\textsuperscript{th} grade school attendance, whether the student has taken or plans on taking an Advanced Placement (AP) test, and whether the student has taken or plans on taking the SAT or ACT represent the student’s academic background and experiences.

\textsuperscript{69} Other includes American Indian/Alaska Native, and multiracial responses.

\textsuperscript{70} Age at time of survey was calculated by using the average base year survey date for the sample, March 2002 (spring of students’ sophomore year of high school). The median age of the sample is 16 years 1 month old. The youngest students surveyed were 14 years 4 months old at time of survey, and the oldest students were 19 years 3 months old at time of survey. Approximately 90\% of the sample fell between the ages of 15 years 5 months and 16 years 11 months at time of survey.
Student achievement in 10th grade is an important measure of overall achievement and gives a broad picture of how the student is performing academically. Student achievement in 10th grade is measured by a composite of 10th grade scores on math and reading tests administered by the survey team. The variable’s value is the composite score, converted to a z score in order to normalize the results, and renamed \textit{z10achieve.} Education expectations in 10th grade is measured by five dichotomous variables, \textit{expect<HS, expectHS, expect<college, expectcollege,} and \textit{expectcollege+}, in which the student does not expect to finish high school, expects to finish high school or earn a GED, expects to attend some college (less than a four year degree), expects to graduate from a four year college, or expects to get a postgraduate education, respectively. Students’ 10th grade school attendance is measured by how often the student reported skipping/cutting classes. Three dichotomous variables are used, named \textit{skipclass>3, skipclass1or2,} and \textit{skipclassnever,} in which the student skipped class more than or equal to three times that year, once or twice that year, or had never skipped class that year, respectively. The variables are coded using the named response as (1) and other responses as (0). Students who never skip are the comparison group.

Whether the student has taken or plans on taking an Advanced Placement test is a dichotomous variable that equals (1) if the student had ever taken or planned on taking an AP test at the time of survey (12th grade), and (0) otherwise, and renamed \textit{APtest.} Whether a student has taken or plans to take the SAT or ACT college entrance exams is a dichotomous variable that equals (1) if the student has taken or plans to take the SAT or
ACT, and (0) if the student had not or didn’t plan to, hadn’t thought about it, or did not know whether they would take one of the exams, and renamed SATorACT.

**Extracurricular experiences.** Whether the student ever discussed the future as it relates to college and career with his or her parents, and whether the student ever worked for pay outside of the house are used to measure other factors that may impact a student’s career decision status and provide a more detailed look at which students are uncertain.

The frequency of the student’s discussions with parents regarding the future are measured in three dichotomous variables, *discussjobs, discussACT/SAT,* and *discusscollege,* and represent the frequency with which 12th grade students discussed with their parents: a) jobs he or she would like to have or should apply to after high school, b) preparation for the ACT or SAT, or c) going to college. Each measure is coded as (1) if the student and parent discussed the topic sometimes or often, and (0) if the topic was never discussed. Paid work experience is measured by a dichotomous variable coded so (1) represents whether the student has ever worked for pay not around the house at the time of the first follow up survey (spring of 12th grade), and (0) represents students who have never worked for pay outside of the home.

**4.4 Data Analysis**

A total of four models are used to answer the research questions. The first two models are logistic regressions, because a dichotomous measure of uncertainty is used as the dependent variable in both models. The logistic regressions estimate the likelihood of career uncertainty occurring, and the results are reported here in odds ratios. This means, in the example of age, that the odds ratio of younger equals the odds of being uncertain
for younger students divided by the odds of being uncertain for older students, and indicates how much more likely younger students are to be uncertain than older students, all else equal. The fit of logistic models are tested using the log likelihood ratio, the Wald statistic, and the pseudo R-squared. The log-likelihood is the log of the probability that the dependent variable can be predicted by the independent variables, and varies from 0 to minus infinity, with larger negative numbers indicating a good fit. The Wald chi-square statistic is used to test whether of the relationship between the dependent and independent variables is significantly different from zero. McFadden’s pseudo R-squared suggests the improvement to the model by adding the predictors, compared to a model that only includes the dependent variable and independent variable of interest. The closer the pseudo R-squared value is to zero, the lower the probability that the model without predictors is a better fit.

The second two regressions are Ordinary Least Square (OLS) regressions, because the continuous variable measuring 12th grade student achievement is the dependent variable in both models. OLS regression coefficients predict the change in the dependent variable when the corresponding variable changes by one unit. The goodness of fit is measured by the R-squared, a number between 0 and 1, which

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72 Garson, "Logistic regression.
represents the proportion of variation in the dependent variable that is explained by the included independent variables.

**Model 1.** To analyze the characteristics of uncertain high school students, I use a logistic regression model to estimate the likelihood of the student ever experiencing career uncertainty (either in 10th or 12th grade) as the dependent variable and the student’s demographic background (gender, race, age, and socioeconomic status), academic background (10th grade achievement, educational expectations, school attendance, plans to or has taken an AP test, and plans to or has taken the SAT or ACT), parents’ involvement in discussing the student’s future, and whether student had paid work experience during high school as the independent variables. This regression captures differences in the occurrence of uncertainty for students with high or low academic achievement levels, holding demographic and academic background, parental involvement, and work experience equal. This regression also shows if students who fall into certain categories (i.e. racial minorities, female, low parental involvement, and/or no work experience) are more or less likely to experience uncertainty, and if estimated differences between groups are statistically significant, or the results allow 90%, 95% or 99% confidence that the results did not occur by chance.

**Model 2.** To analyze whether earlier (10th grade) achievement is a significant predictor of later (12th grade) uncertainty, I use a logistic regression with 12th grade uncertainty as the dependent variable and 10th grade achievement as the independent variable of interest, adjusting for differences across demographic background, academic
background, parental involvement and work experience, to see if there is variation in 12th grade uncertainty uniquely connected to 10th grade achievement.

**Model 3.** To determine if uncertainty in 10th grade is a significant predictor of student achievement in 12th grade, I use an OLS regression model to test whether 10th grade uncertainty accounts for a significant amount of variation in the student’s 12th grade math scores, independent of demographic and academic background, parental involvement and work experience, which are factors that may influence a student’s achievement outside of his or her career uncertainty.

**Model 4.** To examine the relationship between continuous versus periodic uncertainty and student achievement, I use an OLS regression using 12th grade achievement as the dependent variable and whether the student was continuously uncertain as the independent variable of interest, and hold demographic background, academic background, parental involvement, and work experience constant. This regression identifies if continuous uncertainty, compared to students who were only uncertain in 10th or 12th grade or were never uncertain, is significantly related to a student’s achievement after the personal characteristics are taken into account.

5. **Results**

5.1 Select Descriptive Statistics

I first ran chi-square tests to see which groups’ uncertainty rates probably did not occur at random. As is also evident from the charts representing the descriptive statistics, many of the above- or below-average uncertainty rates across background and

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75 Full descriptive statistics about every variable can be found in Charts 1-7.
experience characteristics did not happen by chance. Specifically, the chi square test was statistically significant (p < 0.01) for black, Hispanic, and Asian students, as well as females and students from the lowest socioeconomic status, see Charts 1 and 2 (statistical significance is noted in Charts 1-5 by * = p < 0.10, ** = p < 0.05, and *** = p < 0.01).

Variances from the average uncertainty rates for whites and other races are not statistically significant. It is unclear what the implications are for relationship between uncertainty and demographics, since black students are on average much less uncertain than white students, and Hispanic and Asian students are on average more uncertain than white students. The significantly higher uncertainty rates for students from the lowest socioeconomic status implies that uncertainty may fall in disadvantageous ways, especially if the relationship is not explained by the other mitigating variables in the regression models.

### Chart 1 - Variations in Uncertainty from the Mean: Race

* = p < 0.10, ** = p < 0.05, and *** = p < 0.01
Every education expectation is also significant at $p < 0.01$, see Chart 3. Specifically, as education expectations increase, the uncertainty rates decrease, with students who expect to obtain a master’s degree or higher finally having lower uncertainty rates than the sample average. Among students who do not expect to graduate from high school are the most extreme, almost 80% report career uncertainty. Slightly more than 35% of students who expect to earn a master’s degree or higher report career uncertainty, which is almost a 25% lower uncertainty rate than the sample average.
Students who skip class three or more times report significantly greater uncertainty \((p < 0.10)\) and the below-average uncertainty rate for students who never skip class is also significant \((p < 0.05)\). Students who have taken an AP test or the SAT or ACT test also report lower uncertainty \((p < 0.01)\), see Chart 4. These uncertainty rates fall in expected ways, especially in light of uncertainty rates across education expectations. Students who skip more often and are perhaps at a higher risk of dropping out report more uncertainty than the sample average, and more uncertainty than students who never skip classes. In the same way, students who have taken an AP, SAT, or ACT test have lower uncertainty rates than the average, perhaps because taking these tests reflects a consideration for a postsecondary education, which is tied to career choices.
The lower uncertainty rates for students who talk with their parents about either jobs for the future, taking the ACT/SAT, or college with their parents are not due to chance either (p < 0.01). Finally, from findings presented in Chart 5, students who have paid work experience are less uncertain than those without such experience (p < 0.01). Students who participate in any of these activities, on average, have lower uncertainty rates than the sample average, although no measure, except but discussing college with parents, have uncertainty rates more than 2 percentage points lower than the average.
T-tests on achievement and 12\textsuperscript{th} grade uncertainty and 10\textsuperscript{th} grade uncertainty indicate that uncertainty may be significantly related to achievement. This means that, without accounting for any other factors, student achievement differs for students with different uncertainty. If this relationship exists after background, academic, and experience-related characteristics are taken into account, this may indicate that uncertainty could be detrimental for students. However, a simple t-test is not enough to determine causation, since the analysis does not adjust for differences in other factors that are usually related to achievement and may be related to uncertainty.

Finally, the descriptive statistics in Charts 6 and 7 show an intriguing pattern. The percentage of students who reported uncertainty in either time period is quite high, 47.4%. However, the percentage of students who are continuously uncertain (uncertain in both 10\textsuperscript{th} grade and 12\textsuperscript{th} grade) is only 15.5%. Of the 33\% of 10\textsuperscript{th} graders who were uncertain, 47\% of them are not uncertain by 12\textsuperscript{th} grade, and of the 30\% of 12\textsuperscript{th} graders who are uncertain, 48\% of them were not uncertain when surveyed in 10\textsuperscript{th} grade. These
numbers show considerable mobility in and out of uncertainty, with almost half of students who report career uncertainty in a given year reporting a specific career expectation the next or previous survey.

From these results I expect that black students will have lower odds of uncertainty, and Hispanic and Asian students will have higher odds of uncertainty than white students. Similarly, I expect that females will have lower odds of uncertainty than males, and students from the lowest socioeconomic status will have higher odds of being...
uncertain than those from the middle socioeconomic status. I also predict that skipping 3 times or more will at least slightly increase the odds of being uncertain compared to never skipping, and that students who have taken an AP test or the SAT or ACT test will be less likely to be uncertain than students who have not taken the tests. Finally, these results suggest that students who discuss the future with their parents will have lower odds of uncertainty, as will students who have paid work experience in high school.

5.2 Characteristics of Uncertain Students

The results reported for Models 1 and 2 are odds ratios, which compare the likelihood of reporting uncertainty among students with different characteristics (see Table 2 for full results table). Overall, the model examining the characteristics of students who were ever uncertain in 10th and/or 12th grade (Model 1) has a very low pseudo R-squared, which is 0.049, which means that only roughly 5% of the variation in uncertainty is explained by this model. Clearly the factors measured here do not account for many of the differences in uncertainty between students. Of the variation the model does account for, the odds ratios are mostly predictable given the raw uncertainty rates by population (Charts 3-7), but the model also offers a few surprises.

The odds ratios from Model 1 show that females have slightly lower odds than males of being uncertain. Specifically, female student’s odds of being uncertain are 0.85 times (p < 0.01) lower than a male’s odds. Black students are actually less likely than white students to be uncertain, while Hispanics and Asians are both more likely than whites to experience career uncertainty. A black student’s odds of being uncertain are 0.69 times (p < 0.01) lower than a white student’s; a Hispanic student’s odds of being
| Table 2 – Regression Results for Models Examining Characteristics of Uncertain Students |
|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| n = 11,633 students                          | Model 1 (ever uncertain)                      | Model 2 (12th uncertainty)                    | Model 3 (12th achievement)                    | Model 4 (12th achievement)                    |
| Career Uncertainty                           | Career Uncertainty                             | Career Uncertainty                             | Career Uncertainty                             | Career Uncertainty                             |
| Continuously uncertain                      | 0.015                                         | 0.015                                         | 0.015                                         | 0.015                                         |
| Uncertain in 10th grade                     | -0.010                                        | -0.010                                        | -0.010                                        | -0.010                                        |
| Demographic Background                      | Demographic Background                        | Demographic Background                        | Demographic Background                        | Demographic Background                        |
| Gender - female                              | Gender - female                               | Gender - female                               | Gender - female                               | Gender - female                               |
| -female                                      | 0.849***                                      | 0.886**                                       | -0.274***                                     | -0.027***                                     |
| Black                                        | 0.689***                                      | 0.746***                                      | -0.657***                                     | -0.656***                                     |
| Hispanic                                     | 1.170**                                       | 0.980                                         | -0.401***                                     | -0.402***                                     |
| Asian                                        | 1.355***                                      | 1.242**                                       | 0.126***                                      | 0.124***                                      |
| Other                                        | 0.968*                                        | 1.126                                         | -0.251***                                     | -0.251***                                     |
| Age - younger                                | 1.104*                                        | 1.048                                         | 0.104***                                      | 0.104***                                      |
| Socioeconomic Status (ref: midSES)          | Socioeconomic Status (ref: midSES)            | Socioeconomic Status (ref: midSES)            | Socioeconomic Status (ref: midSES)            | Socioeconomic Status (ref: midSES)            |
| LowSES                                       | 0.954                                         | 0.982                                         | -0.237***                                     | -0.237***                                     |
| HighSES                                      | 1.195***                                      | 1.114*                                        | 0.282***                                      | 0.261***                                      |
| Academic Background                          | Academic Background                            | Academic Background                            | Academic Background                            | Academic Background                            |
| 10th grade achievement, z-score              | 0.944~                                        | 1.037                                         | -0.135***                                     | -0.135***                                     |
| Less than high school                        | 3.231***                                      | 1.759*                                        | -0.834***                                     | -0.839***                                     |
| High school                                  | 1.251*                                        | 1.073                                         | -0.411***                                     | -0.413***                                     |
| Some college                                 | 0.819**                                       | 0.818**                                       | -0.280***                                     | -0.279***                                     |
| Master's or higher                           | 0.458***                                      | 0.616***                                      | 0.211***                                      | 0.214***                                      |
| School Attendance (ref: never skip)          | School Attendance (ref: never skip)           | School Attendance (ref: never skip)           | School Attendance (ref: never skip)           | School Attendance (ref: never skip)           |
| Skip once or twice                           | 1.037                                         | 1.017                                         | -0.135***                                     | -0.135***                                     |
| Skip 3 or more times                         | 0.913                                         | 0.956                                         | -0.115***                                     | -0.114***                                     |
| Taken AP Test, 12th grade                    | 0.934                                         | 0.911~                                        | 0.545***                                      | 0.545***                                      |
| Taken SAT or ACT Test, 12th grade            | 0.897~                                        | 0.932                                         | 0.462***                                      | 0.463***                                      |
| Parental Involvement                         | Parental Involvement                          | Parental Involvement                          | Parental Involvement                          | Parental Involvement                          |
| Discuss jobs                                 | 0.644***                                      | 0.541***                                      | 0.004                                         | 0.006                                         |
| Discuss ACT/SAT                              | 1.102**                                       | 1.144**                                       | -0.132***                                     | -0.132***                                     |
| Discuss college                              | 0.749***                                      | 0.690***                                      | 0.098***                                      | 0.099***                                      |
| Paid Work Experience by 12th grade           | 0.758***                                      | 0.728***                                      | 0.131***                                      | 0.132***                                      |
| Intercept                                    | -0.458                                        | -0.469                                        | -0.458                                        | -0.469                                        |
| Log-likelihood ratio                         | -7493.5                                       | -6639.6                                       | -0.049                                        | -0.049                                        |
| Pseudo R² / R²                               | 0.049                                         | 0.031                                         | 0.419                                         | 0.419                                         |
| Wald statistic                               | 503.63                                        | 293.03                                        | -      | -                |

*marginally significant at p < 0.15; *significant at p < 0.1; **significant at p < 0.05; ***significant at p < 0.01*
uncertain are 1.17 times \( (p < 0.05) \) higher than a white student’s, and an Asian student’s odds of being uncertain are 1.36 times \( (p < 0.01) \) higher than a white student’s odds of being uncertain.

Students in the youngest 27.3\% of the sample only had slightly higher odds of uncertainty. Younger students’ odds of being uncertain are only 1.1 times \( (p < 0.10) \) higher than older students’ odds, and so not strongly related. This implies that age and development matter, but not in a substantive way. Unexpectedly, students from the highest socioeconomic status’ odds of being uncertain are 1.2 times \( (p < 0.01) \) higher than students from the middle socioeconomic status. Differences in the odds of being uncertain between low and middle SES are not significant.

The strongest relationship emerges between education expectations and uncertainty. Students who do not expect to graduate high school have significantly greater odds of being uncertain 3.23 times \( (p < 0.01) \) higher than students who expect to graduate college. This is expected, since students who plan on dropping out are likely not thinking about their long term future, and probably do not have a good grasp on what career options are even available to them. Similarly, students who only expect to graduate high school have odds of uncertainty 1.25 times \( (p < 0.10) \) higher than students who expect to graduate college. On the other hand, students who expect to attend at least some college (but not graduate) have 0.82 times \( (p < 0.05) \) lower odds of uncertainty than students who expect to graduate college. Additionally, students who expect to obtain a master’s degree or higher have odds of being uncertain 0.46 times \( (p < 0.01) \) lower than
students who expect to graduate from college. This shows a clear trend between lower education expectations and increased odds of having career uncertainty.

Students with paid work experience have odds of uncertainty 0.76 times ($p < 0.01$) lower than students who did not work for pay during high school. This implies that work experience uniquely shapes a student’s career decision status. However, it is impossible to determine if work experience is actually causally related since the model does not adequately control for other factors that both impact uncertainty and may be related to a student’s likelihood to seek out paid work during high school.

Some factors surprisingly do not change the odds of having career uncertainty. The number of times a student skipped class was not significantly related to uncertainty, nor are the variables representing those students who have taken or are planning on taking an AP test or the SAT or ACT. These variables are more significantly related to uncertainty without taking the mitigating factors into account, which implies that having taken an AP test or the SAT or ACT is only related to uncertainty through its relationship to other factors like education expectations.

The odds ratios in both Models 1 and 2 are identical in direction (when the variable is statistically significant), and very similar in magnitudes and statistical significances, which is expected since the two models measure very similar concepts. Whether 10th grade uncertainty is included in the dependent variable, as opposed to only 12th grade uncertainty, the relationships of the various factors with uncertainty does not seem to change in any substantial way. This indicates students’ characteristics do not vary significantly depending on their period of uncertainty.
5.3 Achievement and Uncertainty

One important difference between Models 1 and 2 is that when testing whether overall achievement in 10th grade is related to whether or not students are ever uncertain in 10th and/or 12th grade, as Model 1 does, the result is marginally significant. However, when testing whether 10th grade achievement predicts 12th grade uncertainty, the significance disappears. Student achievement in 10th grade does not appear to have any relationship to uncertainty in the 12th grade. From Model 1, students with one standard deviation higher achievement than the mean are 0.94 times (p < 0.10) less likely to be uncertain. This result is only marginally significant and is not a substantially large change in odds, which indicates that while there is a real difference in achievement between the students who are likely to be uncertain, the odds of being uncertain are still very close to 1, or equal between students of different achievement levels. The results from Models 3 and 4 tell the same story. In neither model does the variable on career uncertainty (10th grade uncertainty in Model 3 and continuously uncertain in Model 4) matter to achievement. In other words, 10th grade uncertainty is not a good predictor of 12th grade achievement, and continuous uncertainty, compared to periodic uncertainty or being certain about a future career, is not significantly related to 12th grade achievement either.

5.4 Other Results

Discussing future job options with parents is significantly related to the odds of being uncertain. Students who discuss future jobs sometimes or often with their parents are 0.64 times less likely to be uncertain (p < 0.01) than students who never discuss the issue with their parents. Similarly, parent-student discussion at least sometimes is also
positively related to uncertainty. Additionally, the odds are 0.75 (p < 0.01) lower for students who discuss going to college with their parents compared to students who do not discuss the issue. Discussing the ACT/SAT is marginally related to the odds of being uncertain, but the odds do not change meaningfully (odds ratio = 1.1 and p < 0.10). In contrast, in Models 3 and 4 suggest that discussing the ACT/SAT with parents is significantly related to both 10th and 12th grade uncertainty (p < 0.01), although students who discuss the tests with their parents are predicted to have lower achievement than students who never discuss the tests. These results further indicate that academic factors are not a major part of the story for uncertain students. Simply thinking about and talking about college is not related to certainty about future careers. However, a non-academic, directly career-related factor like discussing future jobs with parents does reduce the odds of being uncertain.

6. Discussion

In general, the findings indicate that uncertainty is not detrimental to students, nor are students who are typically marginalized, such as minorities and students from a low socioeconomic status, generally more likely to be uncertain.

A developmental theory of career decision-making is supported by the findings, since younger students are slightly more likely to be uncertain than older students. The magnitude of the relationship is not large, but the cutoff for younger students is only four months younger than the median age, so variation in maturity levels is not likely to be high among students in the same year of high school.
This study also to some extent supports social learning theory, or the idea that environmental factors play a role in career choice. The results for race are a good example of how uncertainty could either be beneficial or deleterious. The results provide no clear sign that minorities are uniformly more likely to be uncertain than white students. In fact, black students are actually less likely to be uncertain, while Hispanic and Asian students are more likely to be uncertain than white students. Reaching a career decision is an important step in a student’s development, but if a career decision is made prematurely, students may limit their potential by closing off other opportunities, although students do not appear to suffer emotional damage in the long term if their high expectations are not realized. The variation among racial groups could potentially be masking a stronger relationship between achievement and uncertainty if black students’ lower rate of uncertainty represents premature career decisions.

The fact that students from a high socioeconomic status are more likely to be uncertain than those from a middle socioeconomic status is somewhat surprising. It may indicate that the higher access and opportunity money provides also offer more options, which could leave students from wealthier families more uncertain. In this example, uncertainty is actually a good thing if it represents increased opportunity and access for students. Additionally, students from the higher socioeconomic status may attend college at higher rates, thus suggesting more of these students can comfortably postpone career decisions. In addition, their parents may offer more support, so launching a career search may be less pressing. The interpretation for gender is more ambiguous. Female students

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76 John R. Reynolds and Chardle L. Baird, "Is there a downside to shooting for the stars?" American Sociological Review 75 no. 1 (2010).
are less likely to be uncertain, but only slightly. This could support developmental theory, since adolescent females are generally more mature than males. It may also indicate that females experience less uncertainty because they still consider a narrower range of occupations than their male peers, more often choosing what they perceive to be “gender appropriate” positions (like teaching or nursing). In this example, female students’ career decisions are made more quickly, because fewer positions are considered.

The connection between a student’s education expectations and uncertainty is more straightforward than with his or her demographic factors, although the causes of the relationship are not. In general, the lower the expectation, the more likely the student is to be uncertain. Chart 3 shows this vividly, and Models 1 and 2 confirm the trend. Students who anticipate dropping out of high school have substantially higher odds of being uncertain than students who anticipate graduating from college. Possible dropouts likely may not be considering potential career options in the short term, let alone what career they can expect at age 30. Students who only expect to graduate high school are also more likely to be uncertain, although the relationship is not as strong. On the other hand, students who expect to attend at least some college are less likely to be uncertain than those who expect to graduate college. This is possibly because most two-year programs are usually focused on a specific career or type of career. It makes sense that students who expect to graduate from a four-year college may be slightly more uncertain, since they anticipate having the time to make the final decision later. Finally, those who anticipate pursuing education beyond a four-year degree are much less likely to be
uncertain. Again, students who have this expectation likely have something specific in mind (i.e. doctor, lawyer, counselor) that requires a post-graduate education.

Students’ experiences also seem to be related to uncertainty. Students who discuss their future jobs and college plans with their parents both have lower odds of uncertainty. Students who receive some guidance in their decision-making should be closer to a decision than students without assistance. Students with paid work experience are less likely to be uncertain. The relationship may not be causal, but this finding confirms some previous literature, providing further evidence that gaining experience in the workforce may help inform students as they make their career decisions. Additionally, some of the literature on the effects of work experience found that students with work experience had lower academic achievement. This study, however, found the opposite. Both models testing predictors of achievement (Models 3 and 4) found a significant positive relationship between work experience and 12th grade achievement. Stated differently, students with paid work experience are less likely to be uncertain and are predicted to have higher achievement, indicating that this exposure to the workforce may benefit students’ academic performance.

Achievement on cognitive tests, while generally used as a proxy for student learning, is also used as a predictor of future success. Although not a perfect predictor, it math achievement is considered as such in this study. Evaluating potential current and future costs of uncertainty, such as to achievement, should be included in the literature, yet this is glaringly absent. This study shows that a student’s achievement is only marginally significantly related to uncertainty. Further, achievement is not a predictor of
whether a student will be uncertain in the future, and whether a student was uncertain in 10th grade is not significantly related to the student’s achievement. This implies three things: that low achieving students are not more likely to be uncertain; that uncertainty does not predict future low achievement; and more generally that students at both high and low achievement experience uncertainty at similar rates. Thus, using achievement as a measure of future success, uncertainty does not appear to be detrimental to students.

Limitations. A few limitations to this analysis must be considered. First, these models probably over-control for academic background factors. For example, the students who have taken an AP test are likely included among students who expect to graduate from college or higher and who have taken the ACT or SAT. This may mask variation in the variables of interest and possibly confound the results (when the effects of two or more predictors cannot be separated).

Second, causation cannot be determined from the results of these regression analyses, which is corroborated by the low pseudo R-squared. The models do not account for the many other possible causes of uncertainty theorized and identified in the literature (such as a lack of information or an internal conflict). The pseudo R-squared indicates that the demographic and academic background characteristics measured here do not completely account for which students may fall into these categories of uncertainty. These potential, unmeasured causes may be from the models, or operate through another measured variable. For example, a student’s initiative, which is unmeasured here, may be related to his or her uncertainty, but is probably positively related to whether or not the student has paid work experience. It is impossible to tell whether having paid work
experience is independently related to uncertainty, or if it is simply the student’s initiative that makes the difference, and is manifested through paid work experience in this study.

Finally, the marginal significance of achievement in Model 1 is an indication that there is probably a more complex relationship between achievement and uncertainty than these models are able to distinguish. For some students, achievement may affect their ability to make career decisions, while others’ achievement may be caused by their ability/inability to make career decisions. For others the two likely interact simultaneously.

Policy Implications. Perhaps the largest implication from these results is that uncertainty appears neither detrimental to students nor a problem in need of immediate resolution. Uncertainty rates do not divide cleanly between the “haves” and “have-nots,” and in some instances uncertainty is more likely among the “haves.” While making a career choice is still an important part of a student’s development, nothing from this study indicates that students who have not yet reached that decision have worse outcomes. Future research should be pursued to understand how much of this high school uncertainty persists through postsecondary education what the eventual outcomes for these students are in order to judge the effects of uncertainty on students into adulthood. Achievement is not sufficient to be the only measure against which uncertainty is judged.

7. Conclusion

Almost half of high school sophomores and/or seniors report being uncertain about what they expect their future career to be. The literature is mixed about how to
evaluate this uncertainty. Uncertainty is a normal and necessary stage according to
developmental theorists, while social learning theorists may point to external factors that
may cause delays of career decisions outside of the normal development process. Often a
student’s uncertainty is “diagnosed” in order to alleviate the condition, and some
literature has found that uncertainty is related to maladaptive psychological factors.
However, the past literature has neglected to examine what kinds of students experience
uncertainty, and whether these uncertain students actually achieve less, a problematic
outcome, in conjunction with their career uncertainty. From the analyses presented here,
academic achievement is not significantly related to uncertainty, and vice versa, adjusting
for differences among demographic and academic characteristics and experiences.

This paper finds that a student’s race and gender play a role in the odds of being
uncertain, as does the student’s socioeconomic status. However, these trends do not fall
in socially disadvantageous ways. Students with higher education expectations have
progressively lower odds of uncertainty, and students who discuss the future with their
parents and/or have paid work experience also have lower odds of being uncertain.

In conclusion, the results of this study show that there is no “stereotypically
uncertain” student. Uncertain students are more likely to be Hispanic or Asian, more
likely to be male and from a higher socioeconomic status, more likely to have lower
education expectations, and less likely to have discussed the future with their parents
and/or have paid work experience. However, none of these factors send strong warning
signals, and coupled with the lack of correlation with academic achievement, the
treatment of uncertainty definitively as a problem does not appear to be a wise policy, as
students with a variety of demographic and academic characteristics and all achievement levels experience uncertainty.
Appendix

Figure 1 – Question 64 on ELS:2002 Student Questionnaire, Base Year, 10th Grade
64. Write in the name of the job or occupation that you expect or plan to have at age 30.

☐ I don’t plan to work when I’m 30
☐ I don’t know

Figure 2 – ELS:2002 Occupation Categories
1 = 'Clerical'
2 = 'Craftsperson'
3 = 'Farmer, farm manager'
4 = 'Homemaker'
5 = 'Laborer'
6 = 'Manager, administrator'
7 = 'Military'
8 = 'Operative'
9 = 'Professional a'
10 = 'Professional b'
11 = 'Proprietor or owner'
12 = 'Protective service'
13 = 'Sales'
14 = 'School teacher'
15 = 'Service'
16 = 'Technical'
17 = 'Other'
<table>
<thead>
<tr>
<th>Concept</th>
<th>Operational Definition</th>
<th>Raw Variable</th>
<th>Transformation/Recode</th>
<th>Analysis Variable</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>Outcome &amp; Uncertainty Variables</strong></td>
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<tr>
<td>Career Uncertainty (ever)</td>
<td>Ever uncertain (either 10th or 12th grade)</td>
<td>byocc30</td>
<td>Create new variable</td>
<td>tothecareer1</td>
<td>Indicator variable coded = 1 if student reported career uncertainty in either 10th or 12th grade, zero otherwise</td>
</tr>
<tr>
<td></td>
<td>Continuous uncertain, both in 10th and 12th grade</td>
<td>f1occ30</td>
<td>=1 if 10th grade career uncertainty = 1 OR 12th grade career uncertainty = 1</td>
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<tr>
<td>Math Achievement (12th grade)</td>
<td>Math standardized score (first follow up)</td>
<td>f1txmstd</td>
<td>Create new variable</td>
<td>zachieve12</td>
<td>Continuous variable of student's 12th grade math scores, normalized into z-scores</td>
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<td>=1 if 10th grade career uncertainty = 1 AND 12th grade career uncertainty = 1</td>
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<td></td>
<td>=1 if f1occ30 does not =-1, else = 0</td>
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<td>Demographic Background Variables</td>
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<tr>
<td>Gender</td>
<td>Student's sex</td>
<td>bysex</td>
<td>Create new variable</td>
<td>female</td>
<td>Indicator variable coded = 1 if student's gender is female, zero otherwise</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>=1 if female, = 0 if otherwise</td>
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<tr>
<td>Race</td>
<td>Student's race/ethnicity</td>
<td>byrace</td>
<td>Create 5 new variables. White if BYRACE &lt; 7, Black if BYRACE not 3, Hispanic if BYRACE = 4 or 5, and Asian if BYRACE = 2, and Other if BYRAE = 1 or 6 (Indian or Multiracial), zero otherwise.</td>
<td>white, black, hispanic, asian, other</td>
<td>Five indicator variables coded = 1 if student's race is white (or black, hispanic, asian, or other, respectively), zero otherwise. White is the reference group.</td>
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<tr>
<td>Age</td>
<td>Student's year and month of birth</td>
<td>bydob_p</td>
<td>Create new variable</td>
<td>younger</td>
<td>Indicator variable coded = 1 if student's date of birth is on or after June 1986 (or 15yrs 8 months old at time of survey)</td>
</tr>
<tr>
<td>Concept</td>
<td>Operational Definition</td>
<td>Raw Variable</td>
<td>Transformation/ Recode</td>
<td>Analysis Variable</td>
<td>Description</td>
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<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>Socioeconomic Status</td>
<td>Quartile coding of socioeconomic status</td>
<td>byses2q</td>
<td>Create 3 new variables, = 1 representing lowest quartile, the two middle quartiles combined, and the highest quartile, otherwise zero</td>
<td>lowSES, midSES, highSES</td>
<td>Three indicator variables coded =1 if student's socioeconomic status is the lowest quartile (or second or third, or highest, respectively), zero otherwise. MidSES is the reference group.</td>
</tr>
<tr>
<td>Academic Background Variables</td>
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<tr>
<td>Math and Reading Achievement (10th grade)</td>
<td>Standardized test composite score - math/reading</td>
<td>bytxcstd</td>
<td>Create new variable, change achievement score to z-score</td>
<td>zachieve10</td>
<td>Continuous variable of student's 10th grade composite math and reading scores, normalized into z-scores <strong>Check after sample has been set, may need to z this twice</strong></td>
</tr>
<tr>
<td>Education Expectations (10th Grade)</td>
<td>How far in school student thinks will get composite</td>
<td>bytestep</td>
<td>Changed to 5 dichotomous variables: not planning on graduating hs, planning on getting hs degree or GED, planning on attending or completing 2 yr college or 4 yr but not completing, graduating college, and getting a masters, PhD, MD, or other advanced degree</td>
<td>noHS, HS, lesscollege, college, collegeplus</td>
<td>Five indicator variables coded =1 if student's education expectations were no high school degree (or high school degree/GED, planning on attending or completing 2 year college or 4 yr college but not completing, graduating college, or getting a masters, PhD, MD or other advanced degree, respectively), zero otherwise. Expectcollege is the reference group.</td>
</tr>
<tr>
<td>School Attendance (10th Grade)</td>
<td>How many times cut/skip classes</td>
<td>bys24b</td>
<td>Changed to 5 dichotomous variables: cut school never, 1-2 times, or &gt;=3 times</td>
<td>skip3, skip1or2, skipnever</td>
<td>Five indicator variables coded =1 if student cut/skip classes 10 times (or 7-9, 3-6, 1-2, or never, respectively), zero otherwise. Skipclassnever is the reference group.</td>
</tr>
<tr>
<td>Advanced Placement (12th grade)</td>
<td>Took or plans to take an Advanced Placement test</td>
<td>f1s21d</td>
<td>Created new variable, set =1 if old var = 3 or 4</td>
<td>APtest</td>
<td>Indicator variable coded = 1 if student has taken or plans to take an Advanced Placement test, zero otherwise.</td>
</tr>
<tr>
<td>Has taken or plans to take SAT/ACT (12th grade)</td>
<td>Plans to take SAT or ACT</td>
<td>f1s21c</td>
<td>Create new variable, =1 if F1S21C = 3 or 4, plans to take or has taken ACT or SAT</td>
<td>SATorACT</td>
<td>Indicator variable coded =1 if student has taken or plans on taking the ACT or SAT college entrance exam, zero otherwise.</td>
</tr>
<tr>
<td>Home/Extracurricular Experiences</td>
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</tr>
<tr>
<td>Parental - Involvement (12th Grade)</td>
<td>How often discussed what jobs would like to have, jobs to apply for after high school, preparation for ACT/SAT, and going to college with parents.</td>
<td>f1s64a, f1s64b, f1s64c, f1s64d, f1s64e, f1s64f, f1s64g, f1s64h</td>
<td>Create 3 new variables. Discussjobs = 1 if ___ or ___ = ____; discussACT/SAT = 1 if ____ = ____; and discusscollege = 1 if ____ = ____.</td>
<td>disjobs, disACT, disSAT, discollege</td>
<td>Three indicator variables coded =1 if parents discussed jobs to apply for after high school/what jobs student would like to have (and preparation for ACT/SAT, and going to college, respectively) sometimes or often, zero otherwise.</td>
</tr>
</tbody>
</table>
**Table 3 - Variable Definitions and Transformations**

<table>
<thead>
<tr>
<th>Concept</th>
<th>Operational Definition</th>
<th>Raw Variable</th>
<th>Transformation/Recode</th>
<th>Analysis Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paid Work Experience (12th Grade)</td>
<td>Ever worked for pay not around the house</td>
<td>f1x59</td>
<td>Create new variable, =1 if response is &quot;yes-currently working&quot; or &quot;yes, but currently unemployed&quot;</td>
<td>work12</td>
<td>Indicator variable coded = 1 if student ever worked for pay not around the house, zero otherwise <strong>Look at desc stats - if high incidence, don't use</strong></td>
</tr>
</tbody>
</table>
References


Hanson, Sandra L. “Lost talent: Unrealized educational aspirations and expectations among U.S. youths.” *Sociology of Education* 67, no. 3 (1994): 159-183.;


