

**Reciprocal Influences of Education on Values Concerning Family,
Careers and Society**

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Abstract

For many reasons, education has long been recognized as an important influence on attitudes and values, being especially powerful because schools were designed explicitly for the purpose of disseminating new information and ideas. Although most research conceptualizes education as merely the number of years of school a person has completed, this paper goes beyond this simple approach and considers both school attendance and the content of the curriculum. We do this by focusing on both college attendance and the majors that young people pursue while they are in college. Our motivating hypothesis is that attitudes toward family, careers, and society are affected differentially by the major in college. We hypothesize that majors in the humanities and social sciences will result in less positive attitudes toward the importance of marriage, living close to parents, and other aspects of family life. In our examination of the influence of certain majors on attitudes and values, we also consider the possibility that attitudes and values influence the choice of major. We conducted our analyses by examining the influence of initial major on subsequent attitudinal changes and examining the influence of initial attitudes on subsequent changes in major. The detailed analyses suggest that there is an effect of majoring in the humanities and social sciences on family attitudes and values, with such majors placing less emphasis than others on marriage, children, and living close to parents. Students in the humanities and social sciences also place more emphasis than others on correcting social inequalities, finding purpose in life, and making a contribution to society. At the same time, we found that placing strong emphasis on family matters does not appear to have any causal influence on staying in the humanities and social sciences. That is, people giving strong importance to family matters do not seem any more or less likely than others to leave the humanities and social sciences. However, among college students who decide to change majors, the destination major seems to be influenced by the importance placed on family life. Students who place strong importance on family matters and who switch majors are less likely than those placing less emphasis on the family to go into the humanities and social sciences. And, placing emphasis on societal contributions and self fulfillment leads to choosing the humanities and social and natural sciences over the trades. There are, thus, a multitude of intricate causal forces connecting attitudes and values to college experience.

Introduction¹

This project is motivated by a desire to study educational influences on attitudes, values, and beliefs concerning central dimensions of life, particularly those centered on family, careers, and society. Our focus is on high school students and the way various dimensions of their attitudes and values change during the transition to adulthood. We are particularly interested in describing and explaining the ways family, career, and societal values and attitudes are influenced by educational experiences during the years following high school. We examine the effects of two main dimensions of post-high school education: enrollment in college and the type of educational program followed. Of particular interest in this paper is the kind of post-high school education received, as indicated by the major field of study of college students. In our research we examine college major and how it affects the attitudes and values of individuals concerning a range of family, career, and community relationships and activities.

Our emphasis upon the college majors of students is motivated by the recognition that colleges are not homogeneous but are very heterogeneous organizations providing an extraordinary range of experiences and influences for their students. Colleges provide major courses of study ranging from music to anthropology, from engineering to history, from biology to sociology, from business to English, and from physics to the humanities. The primary philosophies, world views, perspectives, and emphases of these various fields of study vary widely, with the consequence that student exposures to various streams of thought and influence can be very different. We believe that differential exposure to various philosophies and

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perspectives will have fundamentally different influences on the attitudes and values of young people as they experience college and incorporate their college experiences into their identities concerning family, careers, and society.

Our research is also motivated by the understanding that attitudes and values concerning family, careers, and society are not just inert elements molded by schools and other social institutions, but are also active forces influencing decisions and experiences concerning both the decision to attend college and the choice of majors within college. That is, there is a reciprocal influence of such attitudes and values on the decision to choose or change a college major. People make the decision to attend college and choose a particular major based, at least in part, on the values and attitudes they have concerning careers, society and family.

Given the hypothesized reciprocal nature of the causation between college majors and attitudes and values, it is necessary to consider simultaneously the causal influence in both directions. We take that approach in this paper, where we consider the nature of the college experience and the choice of a major and examine both the causes and consequences of heterogeneous experiences in college.

We study the reciprocal influences of college attendance and major field of study and attitudes and values concerning family, careers, and society using a unique data set, the Monitoring the Future Study. The Monitoring the Future Study is particularly valuable for our purposes because it has been interviewing high school students about their experiences and attitudes since 1975. Every year Monitoring the Future draws a large and representative sample of high school seniors in the United States. Beginning with the class of 1976, a randomly-selected sample from each senior class has been re-interviewed bi-annually after high school on a continuing basis. At each interview students are asked a wide range of questions about their

attitudes and values concerning family, careers, and society. In each of the follow-up interviews information is obtained about college attendance and program of study. This panel study, thus, permits in-depth examination of college experiences and their relationship to values concerning several important dimensions of life.

Theoretical Motivation

This research project is particularly significant in today's world because education has long been considered one of the leading forces of social change throughout the world (Thornton 2005; Cleland 2001; Jejeehoy 1995; Thornton and Lin 1994). Theorists in multiple fields have outlined numerous reasons why schools and educational attainment would affect a wide range of human values and behaviors, including earnings, wealth, family behavior and processes, interpersonal relationships, religion, and values about the universe, family, social relations, freedom, and equality. In addition, numerous empirical studies around the world consistently show that educational achievements are strongly related to these central dimensions of human life (Jennings 1993; Thornton 2005; Kahl 1968; Axinn 1993; Axinn and Yabiku 2001; Barber 2004; Ghimire et al. forthcoming; Heaton and Forste 1998; Cleland 2001; Hill and King 1993; Jejeebboy 1995; Schultz 1993; Inkeles 1969; Inkeles and Smith 1974; Bledsoe and Cohen 1993; Caldwell and Caldwell 1997; Cleland and Wilson 1987; Phelan et al. 1995; King and Elder 1998; Price and Hsu 1992; Quillian 1996; Alwin et al. 1991). This research consistently shows that higher levels of education are associated with greater emphasis on individuals and their achievements and less emphasis on families, marriage, and intergenerational relationships. More educated people also tend to be less restrictive concerning divorce, cohabitation, premarital sex, unmarried cohabitation, and childbearing outside of marriage. Similarly, educational attainment

is positively associated with greater emphasis on careers, financial achievement, leadership, community service, and fulfillment.

Although there are multiple avenues through which school attendance and achievement can influence a range of human behaviors and values, one of the most important is the role of education as a conduit distributing, legitimizing, and endorsing new ideas and views of the world. After all, unlike many other institutions producing change, schools are explicitly designed to provide students new information about the world—including new theories and ways of viewing the world (Thornton 2005). Schools are also explicitly designed to provide students literacy, numeracy, and other cognitive skills that permit them to engage the larger world more fully after they complete their formal educations. Thus, compared to the less educated, the well-educated have much more access to new ideas and perspectives that can shape world views and beliefs later in life. Thus, it should not be surprising to find schools and educational attendance to be key modes of spreading new ideas.

Of course, one of the central features of the past several hundred years has been the creation and distribution of numerous new ideas that have had profound influence on social systems and beliefs. Many of these ideas have been distributed through educational institutions and related mechanisms such as the mass media and government programs. Given the historical importance of families, careers, and communities in the lives of individuals, it would be surprising if this plethora of new ideas did not significantly change people's attitudes and values toward family, careers, and society.

At the risk of oversimplifying, we identify three powerful streams of thought that have powerful implications for family, career, and societal beliefs and attitudes. We identify and label these as Science, Developmentalism, and Postmodernism. We make no claim that these three

perspectives or approaches are exhaustive of the major ideas affecting individuals or that they are mutually exclusive. Instead, we identify them as important unifying themes. Furthermore, and very importantly for our purposes, they are both distributed unevenly across the major disciplines of academia and have important implications for attitudes and beliefs about family, careers, and society. In the paragraphs that follow, we discuss these general ideas and how they would be expected to relate to college majors and individual attitudes and values

Science

We begin with science and the elements associated with it that can affect basic values and approaches to family, careers, and social life. Among the most important, is the creation of a structure of authority and epistemology that is separate from family, community, government, and religious leaders and institutions. Science provides a methodology that relies on the powers of human observation, experimentation, and the correction of old ideas and perspectives with new information. Over the course of the past several centuries, science has created an extensive institution of personnel, books, journals, and legitimacy that serves as an alternative authority structure to other institutions. And, to the extent that the new institution of science brings information and perspectives that conflict with those of other institutions, it has the potential of undermining the authority and relevance of those other institutions.

Science has, of course, been the source of many new perspectives that have conflicted with many long-cherished views in Western society and culture. Among the most important of these are the vastness of the universe and its implications for the place of the earth in the cosmos. This is the current extension of the Copernican shift from the earth at the center of the universe to the sun at the center. Now, even our solar system is viewed as one among many in the cosmos, making the earth seem like an insignificant speck in the universe. In addition, specific

scientific theories of the universe and life on earth—including the big bang theory and biological evolution—provide key alternatives to God as the answer to the questions of “where did we come from” and “why are we here”. The big bang and evolution provide the only widely recognized way to answer these fundamental questions without having a faith in God, thereby providing a person the option of disbelieving in God.

Besides providing an answer to questions about the origin of humans, evolution is beginning to offer answers to the meaning of humanity and the ways humans behave and interact. One of the most important elements here is the equation of humans with animals. The theory of evolution provides an alternative view to the idea that people are a little lower than the angels or made in the image of God by suggesting that we are closely related to the apes and may indeed have apes as ancestors. This viewpoint—and the growing understanding of the marvelous abilities of the animals—also shrink the uniqueness of human beings. Also relevant here is the naturalistic equation of mind and brain. As a matter of course, neuroscientists now think of mind and brain as two sides of the same coin. In addition, contemporary psychology—through both talk therapy and pharmacology--represents a direct method for reaching happiness and fulfillment.

These attributes of science can have an important influence on the attitudes and values of individuals who come into contact with the philosophies of science. Of particular importance are the challenges of science to the theology and authority of religion. And, to the extent that religion supports values centered on the importance of family life, by weakening the power of religion, an increased emphasis on scientific approaches could undermine support of families and increase support of individuals. Similarly, science is often associated with progress and the improvement of society which could foster positive attitudes and values toward societal progress.

Developmentalism

A second stream of thought that can substantially affect the beliefs and values of individuals is developmentalism. The roots of developmentalism lie in the perspectives of the ancient Greeks and Romans and permeated the teachings of the early church leaders. Then, the leaders of the enlightenment of the 1600s and 1700s used these ideas to head in new directions, with profound implications for beliefs concerning family and social life. As we outline below, it is extremely likely that this same developmental perspective is an influence on many dimensions of individual values (Thornton 2005).

Oversimplifying, we note that the most important creation of the developmental thinking of the 1700s and 1800s was a narrative of progress. In this developmental story societies were seen as progressing from social systems like those outside of Western Europe and then moving step by step through increasingly advanced stages of civilization until reaching the perceived pinnacle of advancement in Western Europe. Thus, society was believed to have progressed from having the kinds of economic, social, political, religious, and familial systems existing outside the West to those at the pinnacle of development in the West.

Even more importantly for our purposes, this story of human history provides a framework for evaluating human institutions and a roadmap for achieving future progress. On the evaluative side, things associated with the contemporary West received the legitimacy of history as being progressive, modern, enlightened, and to be emulated. And, things that were outside the West, especially those very dissimilar from those in the West, were labeled as traditional and backward and designated for elimination.

Among the elements of life that came to be associated with backwardness and the poor life were numerous dimensions such as an emphasis on extended families that included at least

grandparents, parents, and grandchildren, high levels of parental authority, great inequality, and family and group solidarity. Other elements were labeled as good and progressive including an emphasis on such things as nuclear rather than extended families, freedom, high levels of equality, and individualism. Freedom, equality, individualism, education, and careers were not only believed to symbolize progress but to be mechanisms for reaching the good life.

Interestingly, as Thornton (2005) documents, this developmental framework became a blueprint for future progress and a model for specifying the good life. In essence, the past history of development was projected into the future. Just as past progress had brought less communalism and less emphasis on institutions and authority, future progress would also bring more individualism and less emphasis on external authority. The long-term evolution of society from having a high degree of control and individual inequality to having freedom and equality would continue into the future. Similarly, it was believed that the emphasis on extended families, parental authority, and the wide influence of the family would decline in the future as they had in the past. In addition, freedom, equality, and individual agency would increasingly be specified as fundamental human rights.

Acceptance of developmentalism, thus, has many implications for individual attitudes and values. We expect that this developmental philosophy would be associated with individuals having values and attitudes favoring both individual and societal progress and improvement. Individuals strongly influenced by developmental thinking would also be likely to highly endorse freedom and equality and be committed to the elimination of social and economic injustices of many kinds. We also expect such individuals to endorse individualism and have a weaker commitment to family relationships.

Postmodernism

A third important strand of intellectual thought affecting universities and their students is postmodernism. An essential element of postmodernism is relativism which includes the rejection of absolute or universal standards or criteria and an emphasis upon individual judgment. Knowledge, truth, morality, and priorities from a postmodern perspective are seen as constructs of socio-cultural conditions rather than as absolute dictums or pronouncements from society, religion, or universal standards. They are thus seen as a function of local cultures, historical periods, or sociopolitical interests. As a result, both truth and morality are seen as varying across history, geography, and culture rather than being absolutes for all times, places, and peoples. The relativistic perspectives of postmodernism, thus, suggest that there are many ways to the truth, goodness, fulfillment, and morality.

Postmodernism is also associated with epistemological doubt—the idea that knowledge and certainty are exceptionally difficult to attain. This position suggests that instead of knowledge being given absolutely, it is constructed by human beings through their sometimes faulty capacities of observation and reasoning. A related element of postmodernism is its emphasis upon the place of social and political power in constructing the truth. Here postmodernism suggests that what counts as truth is defined at least in part in terms of social and political power. That is, social and political power can give authorities the means to define what is true and enforce that definition on others with alternative viewpoints. A similar line of reasoning argues for the importance of power relationships in defining morality or what is right and appropriate. In this way, the moral is what those in power say it is. This kind of reasoning can be especially corrosive to family, community, and religious institutions because it suggests that long-standing historical power relations have been historically defined and views of morality and the good life have no higher basis than raw power.

The postmodern approach to human affairs has become particularly widespread in the academic world in recent decades. It has materially affected many disciplines, with old institutions and authority structures deconstructed in order to understand their social origins and use of power in influencing human conceptions of truth, morality, and how to achieve fulfillment. It is our hypothesis that this relativistic and questioning approach learned in college can have particularly powerful effects on values and attitudes concerning family, careers, and society. More specifically, we expect it to be related to an emphasis on the individual and his/her autonomy at the expense of family relationships. It is also likely to lead to a lower valuation of societal and family authority, less emphasis on material progress and careers, and more importance to finding personal meaning and fulfillment in life.

College Majors

We believe that the college experience today exposes many students to the fundamental ideas and principles of Science, Developmentalism, and Postmodernism. These ideas and principles are taught and disseminated through courses, campus-wide lectures, and the literature students assimilate. Consequently, we would expect that all students would be influenced by these principles to some extent—in this way, making the college experience as a whole different from the experience of those who do not attend college.

At the same time, as we mentioned earlier, college is not a homogeneous but a heterogeneous experience. A particularly important differentiating force in college is the fact that all students must choose a major or specialization area. These college majors probably differ in important ways in how much Science, Developmentalism, and Postmodernism they incorporate and disseminate. We believe that the Humanities and some of the Social Sciences typically have a strong Postmodernist content, with its emphasis on relativity, individualism,

personal fulfillment, and less respect for social authority. The Natural Sciences, on the other hand, have a strong Science content, with its emphasis on rationality, empirical evidence, and naturalistic explanations. We would expect that some of the social sciences, including Sociology and Economics would have a strong Developmentalist content, with its emphasis on progress, freedom, equality, and individualism. At the same time, we expect that the more trade-oriented majors such as engineering and business and the vocational trades would place more emphasis on practical utilitarian approaches with less emphasis on Science, Developmentalism, and Postmodernism. We also expect these latter majors to give greater importance to career success and financial well-being than the other majors.

Our focus on schooling in the young adult years is supported by a strong emphasis in the social science literature concerning the fact that those years are particularly impressionable ones. Experiences and events during those years are especially important in that they are often the most remembered throughout life (Scott and Schuman 1989). In addition, an extensive body of research suggests that attitudes and values during the young adult years are particularly volatile, while during the later years attitudes and values become more crystallized and stable (Alwin 1994; Thornton and Binstock 2001). Furthermore, college appears to be an experience that leads to a shifting of values during the college years but more stability in the years following college (Jennings 1993). In fact, the dislocation of attitudes and values associated with college attendance are sufficiently large and stressful for many students that they report them as important experiences (Jennings 1993).

The explicit role of education, including the type of college and curriculum, have received considerable attention in the social science literature. Although we do not consider the type of college attended in this paper, we note that Guimond (1999) has focused on the effects of

attending a military college while Newcomb and his colleagues have studied the effects of attending an innovative elite college (Newcomb 1943; Newcomb et al. 1967; Alwin et al. 1991). An extensive literature documents important correlations between the major of a student and that student's values and attitudes. A consistent theme in the literature is that students majoring in business, management, accounting, and related disciplines, as compared to others, place more emphasis on occupational success, the making of money, and the goals of industry (Easterlin 1995; Easterlin and Crimmins 1991; Leppel et al. 2001; Duff and Cotgrove 1982; Jennings 1993). The research of Easterlin and Crimmins (1991; also see Easterlin 1995) even suggests that trends in the college majors chosen by students in the 1970s and 1980s are directly related to the values students place on economic success. Business majors also tend to place less emphasis than do other majors on freedom, empathy, protecting the environment, finding personal fulfillment, performing community service, fostering equality, and correcting social injustices (Shiarella and McCarthy 2000; Sidanius et al. 2003; Jennings 1993; Bécares and Turner 2004). In fact, the reputation of business majors for placing emphasis on material success and downplaying social and environmental responsibilities has led some business colleges to explicitly introduce social responsibility and community service into their curriculums (Zlotkowski 1996; Hogner 1996; Kolenko et al. 1996; Ridener 1999).

Majors in the social sciences and humanities are also frequently identified as having relatively unique values and attitudes. For example, they tend to place more emphasis on the environment, an attribute shared by those majoring in biology (Hodgkinson and Innes 2001). They also tend to place more emphasis on egalitarianism, tolerance, and freedom and less emphasis on business (Sidanius et al. 2003; Jennings 1993; Duff and Cotgrove 1982; Biddle et

al. 1990). Psychology and nursing students have been reported to be higher than others on empathy (Bécares and Turner 2004).

As we noted earlier, there are several causal explanations for the correlation between college major and attitudes and values. Most fundamental here is the issue of the direction of the causality – from college major to attitudes and values or the opposite direction from attitudes and values to college major – an issue that is well recognized in the literature (Jennings 1993; Guimond 1999; Sidanius et al. 2003; Duff and Cotgrove 1982; Thistlethwaite 1973; Biddle et al. 1990). Unfortunately, much of the empirical research on this topic has been cross-sectional and cannot directly address the direction of causality.

Nevertheless, there are studies using complex panel data that have attempted to evaluate the reciprocal causation between college major and attitudes and values (Jennings 1993; Thistlethwaite 1973; Bécares and Turner 2004; Ethington and Wolfle 1988; Duff and Cotgrove 1982; Sidanius et al. 2003; Biddle et al. 1990; Guimond 1999). That research is very uniform in documenting the existence of correlations between major and attitudes and values very early in the college experience (Jennings 1993; Duff and Cotgrove 1982; Thistlethwaite 1973; Sidanius et al. 2003; Biddle et al. 1990). In fact, there is some evidence suggesting that such correlations have their roots back in high school or even earlier (Jennings 1993; Ethington and Wolfle 1988). These early correlations are often interpreted as reflecting the selectivity of majors on attitudes and values, with attitudes and values influencing the choice of a major. However, this conclusion is speculative as it ignores the actual causal connections during the elementary and secondary school years that produced the early college correlation.

There is also considerable evidence suggesting that the college experience exposes people to new ideas and peer groups and in doing so changes attitudes and values. For example,

Jennings (1993) and Guimond (1999) have observed changes during and after college that they attribute to such socialization mechanisms.

However, other researchers looking at the influence of college major on subsequent attitudes and values report little causal influence in this direction. (Duff and Cotgrove 1982; Thistlethwaite 1973; Sidanius et al. 2003 Biddle et al. 1990). This has led some to the suggestion that the major thrust of the causal mechanisms producing the correlation is the selectivity of college major on attitudes and values. If this interpretation were correct, attitudes and values would be the active causal force (rather than college major) producing the correlation between major and values and attitudes.

This paper contributes to this debate by examining the reciprocal causation between college experiences and attitudes and values using a unique data set that follows young adults from the senior year in high school to the young adult years. This data set permits us to evaluate changes in both majors and values and attitudes during the college years.

As noted earlier, one of our two fundamental hypotheses is that college attendance in general and the experience in a specific major will influence attitudes and values about family, careers, and society. We test this hypothesis by relating college major to subsequent attitudes and values concerning family, careers, and society.

We believe that college majors can influence individual attitudes and values in several ways (Guimond 1999). One important mechanism is through the information and ideas disseminated by professors and the scholarly literature students come into contact with. That is, the formal curriculum can influence the values and attitudes of students. A second mechanism is more informal and focuses on the peer relationships of students. Here we suggest that the

student peers in the various majors can vary dramatically and that new students entering majors can learn and assimilate the attitudes and beliefs of their disciplinary peers.

Although we believe that the comparison of the attitudes and values of people following different courses of instruction will provide useful information on the effects of college attendance and curriculum, we also recognize that these cross-major comparisons will provide an underestimate of the overall influence of college attendance. The reason is that virtually all college students are exposed to some extent to the forces of Science, Developmentalism, and Postmodernism. This is because almost all colleges have a common core curriculum that everyone takes. There are also fairly common distribution requirements, with the explicit purpose of ensuring a broad education in many different disciplinary traditions. There are also campus-wide speakers that draw students from a wide range of majors. In addition, dormitories, extracurricular activities, and innumerable peer interactions informally distribute what is learned in one area across the entire campus. So, in practice, this mixing would make the comparison of results across majors less marked. However, we believe that this mixing would not totally remove the influence of college majors on important attitudes and values.

Our second fundamental hypothesis is that there are many ways in which students are selected on the basis of their attitudes and values into various college majors. In America students are not randomly assigned to a major, but choose it on the basis of their goals and interests. Students also probably have some ideas about the extent to which the underlying philosophies and approaches of a major and the occupations they lead to match their own values and beliefs. Furthermore, the college experience provides substantial additional information along these lines, with some students who initially decide upon a major becoming disillusioned

with it and deciding to change their major in mid-stream. We test this hypothesis by relating current attitudes and values to subsequent decisions about college majors.

Our basic research strategy is to begin our analysis with the information from the study participants during their senior year in high school. This information provides us a baseline of information about family, career, and community attitudes and values at that point in the life course. Then, we follow the students over the subsequent years of the important transition to adulthood and examine how their attitudes and values change. Of particular interest to us are the ways in which changes in attitudes and values vary systematically by experiences in college. More specifically, we examine how changes in attitudes and values across a time period is affected by educational activities at the beginning of that same period of time. We also consider the ways in which attitudes and values influence subsequent decisions about college major.

Data and Methods

Our investigation of the reciprocal influences of education on values concerning family, careers, and social consciousness relies on data from the Monitoring the Future Study (MTF). Each year since 1975 MTF has interviewed approximately 16,000 high school seniors in the United States using a multistage sampling strategy (Bachman et al. 2000). Each cohort is nationally representative of high school seniors in the coterminous United States, and includes students that attend both public and private schools. Beginning in 1976 and every year thereafter, a subset of approximately 2400 students has been drawn from the high school senior sample using stratified random sampling procedures and asked to participate in follow-up studies. These mail-in follow-up surveys update demographic information and replicate attitudinal and behavioral measures originally collected during the high school contact. The first reinterview for one-half of the sample takes place one year post-high school and the first

reinterview for the remaining 1200 students occurs two years after high school graduation. The entire subset is then reinterviewed every two years starting from the initial one or two year post-high school contact. This every-other-year strategy continues until respondents reach 35 years of age; thereafter individuals are surveyed once every 5 years. The overall design yields a set of longitudinal panel data rich in demographic, behavioral, and attitudinal measures that make it possible to examine changes in these areas over time.

The baseline interview takes place at the high school, and follow-up interviews are done primarily via mail or occasionally by telephone. Every interview contains an identical set of core demographic measures asked of all sample respondents. In addition, at the baseline interview each respondent is assigned one of six sets of attitudinal measures that are repeated throughout all years of study participation. The follow-up samples are considered to be self-weighting, but because base year illicit drug users are over-sampled, all analyses use weights to adjust for the differential selection probabilities.

The high school contact plus each follow-up interview contained measures that asked the young men and women to rate various aspects of life on a four-point importance scale, with "not important" at the bottom of the scale, and "extremely important" at the top. These measures included the importance of marriage and family life, the importance of dealing with social issues and purpose in life, the importance of personal career goals and material aspirations, and several additional themes. A complete description of these measures, along with their exact wordings and coding can be found in Table 1.

One concern with our measures is that attitude measures that use rating scales tend to be positively correlated (Alwin and Krosnick 1985). This could be due to assimilation effects of reporting (Tourangeau, Rips and Rasinski 2000), where the response of the first answer sets a

precedent for the following questions. Also, ratings tend to be more susceptible to response styles, that is, some people may tend to agree to things more often or are more likely to give extreme answers (Alwin and Krosnick 1985). To adjust for the possibility that some respondents will have these effects operating on their responses, we transformed each individual importance response to represent its level of importance relative to the respondent's mean score of all importance measures in the series. Consequently, instead of analyzing an absolute score, we analyze the importance of a particular item relative to the mean importance of all of the items. In essence this standardizes their responses, and eliminates effects due to response styles and assimilation effects on reporting.

Our analyses also controlled for the year of initial survey, (5 year cohorts with the oldest group -- those originally interviewed from 1976 through 1980 -- as the omitted category), region (Northeast, South, and West, with Midwest as the reference group), gender (female), race (black or African-American), parental education (in years), political preferences, (ranging from strongly Republican to Strongly Democrat), political beliefs, (if radical), and religion, (Catholic, conservative Protestant, unaffiliated, other/none, with mainstream Protestant omitted).

Our analyses required respondents to have had their first recontact interview no later than two years post high school graduation, and to have had a minimum of three sequential follow-up interviews. The sample was also restricted to those supplying four full sets, (i.e. no missing data), of importance data—at the high school contact as well as during the next three follow-up surveys. In addition, respondents were required to provide valid post-secondary education status data at the first follow-up in order to remain eligible for these analyses. With these restrictions,

the sample we use in our research includes 4173 individuals originally interviewed between 1976 and 1995.²

At each follow-up survey, MTF asked respondents to categorize their current school status into the following 12 areas: none, office and clerical, vocational and technical, biological sciences, business, education, engineering, humanities and fine arts, physical sciences and mathematics, social sciences, other academic fields, and academic, but undecided about which major field. For the purposes of our analyses we grouped college majors into six categories: “Trades” (clerical, vocational/technical, business, education, and engineering); Natural Science (biological science, physical science/math); Social Science; Humanities; Other/Undecided; and No College.

Our objective is to investigate both the influence of college major on values and attitudes and the effects of values and attitudes on choice of college major. We now turn to our approach in analyzing the effects of college major on values and attitudes and then turn to our approach in examining the effects of values and attitudes on the choice of major.

The Effects of College Major on Values and Attitudes

Our basic strategy to identify the effects of college major on attitudes is to follow individuals across time and see how changes in attitudes and values are associated with early school enrollment and choice of major. This strategy allows us to control for the possibility that initial values and attitudes influence the choice of college major. It is not valid to conclude from correlations between college major and values that the college experience generated those values as it is entirely possible that the values led a student to choose a congenial college major.

² The number of cases available for analysis was also restricted by the fact that only one-fifth of the original sample was asked the set of attitudinal questions of interest to this project.

Therefore, we control for initial values when estimating the effect of college major on later values.

Controlling for initial attitudes is *not* a simple matter of including the initial values in an ordinary least squares regression. The inevitable measurement error in the initial value data means that simply including the observed initial value measure in an OLS regression would only partially control for the true initial value. In particular, measurement error tends to bias downward the OLS estimate of how persistent an attitude is. In other words, measurement error can lead to the illusion of quick mean-reversion as the measurement error in the initial period is replaced by the measurement error in a later period. The slower underlying mean reversion of the true attitudes means that these attitudes are more persistent than they appear in such an OLS specification. Fully controlling for initial attitudes in the light of that greater persistence requires a higher coefficient on the initial attitudes.

In order to fully control for initial attitudes, it is essential to accurately estimate the true persistence of the underlying attitudes. Therefore, we use a structural measurement error model—estimated using LISREL—that allows us to consistently estimate the true persistence of the underlying attitudes and therefore to consistently estimate the other parameters of interest. Our model is displayed in Figure 1.

Our analytical model in Figure 1 can be conceptualized as both a measurement error model and an effects model. The measurement model follows the procedure of using three waves of panel data on a single item to estimate the measurement structure (Heiss 1960; Alwin 1989; also see Thornton and Binstock 2001 for an example of applying this procedure to attitudes about the family and related matters). As Figure 1 shows, we use a model with a single latent true score (η), which has an indicator (A) at three points in time (Senior year in high

school (0), Wave 1 (1-2 years after high school), and wave 3 (5-6 years after high school)). The indicator (A) is conceptualized as consisting of the true score (η) and measurement error (ϵ). The error is assumed to be randomly distributed, and the variance of that error is assumed to be equal across waves. Another important assumption is that the relationship between the true score and the indicator remains constant and equal to 1 across waves.

The stability of the underlying constructs (τ) indicates the extent to which individual attitudes scores (after partialing out measurement error) correlate across waves. This uses a Markovian or lag-1 process in which each latent or underlying (η) score is assumed to be only the product of the previous true score and a disturbance (ζ) (Alwin 1989, Jöreskog 1970, 1974). Note that η_0 can only affect η_3 through η_1 and therefore does not have an independent effect on η_3 .

The other aspect of this model is the effects of the predictor variables. More precisely we estimate the effect (β_1) of college major at Wave 1 on the true score of the attitude at time 3. Although similar effects were estimated for time 1, these are not reported. A similar set of effects are estimated for the controls, where β_2 represent the matrix of effects of 11 different controls on the true attitude score at time 3. Both College major at time 1 and the controls are associated with the true attitude score in high school (η_0) and with each other.

In the structural measurement error models cited, the separate identification of measurement error variance and persistence is possible because of the measurement of the same attitude at three different points in time. Intuitively, measurement error reduces the correlation in measured attitudes at different times by the same amount regardless of the length of time elapsed between the two measurements, while regression to the mean of the true attitudes reduces the correlation in measured attitudes more the longer the gap in time between the two measurements.

An alternative strategy for identifying the effects of college major on religiosity in the face of nonrandom selection into college majors would be to find an instrumental variable for college major. But it is very difficult to isolate anything in our data set that would have a strong effect on college major that does not also have the potential to affect attitudes through other avenues besides college major (thereby making it an invalid instrument).³

The Effects of Attitudes and Values on College Major

We believe that attitudes and values are likely to have important effects on the initial choice of college major. However, these effects are very difficult to disentangle from the effects of other forces that influence both attitudes and college major. For example, it is possible that initial college majors are influenced heavily by parental attitudes, which are not measured in our data set. Because these parental attitudes are likely to be correlated with child attitudes, a correlation between major and initial attitudes could arise even in an extreme case in which the child's attitudes had no causal effect on the child's college major. Although it is not possible to escape such issues entirely, we focus on our respondent's changes in majors after an initial choice of a major, which we hope will be more indicative of the college student's own preferences than the initial choice of major. For one thing, given the hassle involved, a college student is only likely to change a major if the desire to do so is reasonably strong. Second, to the extent parents are a big influence on choice of major, one can presume their preferences are imprinted on the initial major, so any change away from that is more likely to reflect the child's own preferences. Third, by definition, a student changes majors at a later age than the age at

³ Since we expect selection bias into college majors to work primarily in the direction of students choosing college majors that will tend to reinforce their preexisting tendencies, the greatest danger for over interpretation of results in our approach would be if there were a strong tendency for people in this age range to have preexisting beliefs reinforced over time, *regardless of college major*. Given the overwhelming pattern in attitudinal research of attitudes tending to regress towards the population mean, we do not believe this to be a serious issue.

which the initial major was chosen; that additional age will typically put more psychological distance away from parental authority. Given the limitations of our data set, this focus on changes in major is the cleanest test possible for the effect of the student's own attitudes on his or her college major.

Given the well-known phenomenon of status-quo bias (the tendency to just stay put), we break our analysis of changes in major into two pieces: the analysis of the decision to leave one's initial major and the analysis of which major to choose instead. Intuitively, one can think of this as analyzing the attraction or repulsion of the initial major and the attraction or repulsion of alternative majors. In our analysis, we look first at how a student's attitudes and values are related to variations in retention in different initial majors and then at how those attitudes and values are related to the alternative major chosen.

Results

Association of College Major and Values at Time 1 and Time 3

We begin our analysis of the interrelationships between college major and attitudes and values concerning family, careers, and society with the data in Table 2 where we show the association between major and values at Time 3 and between major and values at Time 1. Table 2 indicates the raw relationship between attitudes and majors coming from all effects remaining after controlling for basic demographic factors. With the trades as a reference group,⁴ we regress attitudes on major to show the association at the first follow-up interview and at the third follow-up interview. The raw relationship at the third follow-up interview can be thought of as the relationship that would be apparent to casual empiricism—as when one predicts the likely attitudes of acquaintances from their college major and other demographic facts. The raw

⁴ Since most college students go into what we classify as “trades,” using this as the reference parcels out reasonably well the typical effect of college per se as opposed to a specific major. We note below cases in which the trades seem different from the overall average college experience.

relationship at the first follow-up interview shows how much of the relationship is already there early on, before there is much chance for the actual experience in a major to account for the relationship. Each of the effects in Table 2 was estimated from a separate OLS equation containing the one listed variable and all the control variables.

Non-Attendees

Looking first at the Time 3 predictions of attitudes and values with Time 3 major at the end of the college years for most people, we observe substantial associations. Of particular importance are some dramatic differences between those who do not attend college and those in the trades (the omitted category of college experience). People who do NOT attend college generally place higher than average importance on family oriented items. They are generally very high on giving their kids more opportunities than they had and living near their parents. They are also a little more positive than the trades and the natural sciences on marriage, but much higher on marriage than those in the humanities and social sciences.

At the same time, those who do not attend college are very low on values emphasizing the general importance of public achievement and contribution: the importance of success, being a leader, and contributing to society. Furthermore, they are not just low relative to the trades but to about all the majors. Also, those who do not attend college rate more highly than those in the trades on the importance of finding purpose and correcting social inequalities (but this is primarily because the trades are distinctive from all other groups and not because of differences between the non-attenders and other groups). It also appears that those who do not attend college, on average, rate the importance of friendships less strongly than do most of the other groups. This suggests that friendship patterns may be a factor in the college experience.

Interestingly, most of the distinctiveness between those not attending college and others were there at Time 1, at the beginning of the college years. However, most, but not all, of the differences just discussed were at least somewhat weaker at Time 1 than at Time 3, suggesting that some causal action must be going on between Time 1 and Time 3 to produce the Time 3 relationships.

Humanities and Social Sciences

Moving to the humanities and social sciences, we observe that, for the most part, they have similar associations with the value indicators, leading us to discuss them together. We begin by noting that students majoring in the humanities and social sciences do not give very much importance to the socioeconomic elements of success centering on money and work. That is, they consistently rate lower than those in the trades and most other majors in the importance of success, cash, and steady work. At the same time, those in the humanities and social sciences place relatively low emphasis on family matters. This can be seen by the fact that they rate low the importance of marriage, giving kids more opportunities, and being near parents.

These observations about the students majoring in the humanities and social sciences naturally lead to the question: on what dimensions are they particularly high? The answer is that they tend to place much greater importance than others on self fulfillment, social awareness, and making contributions to society. This can be seen from the fact that they give very high importance to correcting social inequalities, finding purpose in life, and contributing to society. They are clearly looking to make a difference in society. Interestingly, those in the humanities, but not those in the social sciences, also place relatively great importance on living away from the part of the country they are living in, suggesting that their community-mindedness is not particularly focused on their current community, but more generally.

As with the people not attending college, most of the associations for people majoring in the humanities and social sciences were present at the beginning of the college years. However, the earlier observation of lower correlations at Time 1 for those not attending college is not as applicable here for those in the humanities and social sciences. One of the most interesting things here is that some effects were noticeably bigger at Time 1 than Time 3. For example, those majoring in the humanities and social sciences placed great importance on having new experiences at the end of high school, but not at the end of college. Something happened in the interim to change that relationship. It is possible that the experience of majoring in the social sciences and humanities was enough of an enriching new experience as to satiate the desire for new experiences.

Natural Sciences

Turning now to the natural sciences and comparing students majoring in them with the other students (ignoring the nonstudents), we see that their importance ratings are difficult to categorize easily. They are, for example, very low (compared to the trades) on money, steady work, giving children more opportunities, and living near parents, but not so low compared to those in the humanities and social sciences. Also, when compared with the trades, they seem to be very high on living away from this part of the country and contributing to society, but this distinction does not hold up when comparing them with the humanities and social sciences. Interestingly, most of these relationships were present at Time 1 as well as at Time 3.

The Trades

Virtually everything that there is to say about the trades is implicit in the above comments; however, here we make some of the highlights explicit. Compared to the other students, those in the trades consistently rate highly the money items: success; cash; and steady

work. They also consistently rate highly the family items: marriage, opportunities for children, and living near parents. They also care considerably less about correcting inequalities, living in other parts of the country, finding purpose, and contributing to society.

The results of Table 2 are, thus, in many ways consistent with our theoretical reasoning. The people who do not attend college and those who major in the trades oriented majors tend to place the most emphasis on the family related matters of marriage, children, and parents, whereas those majoring in the humanities and social sciences tend to place less importance on these family matters. Similarly, the values of correcting social inequalities and finding purpose in life tend to be rated highly important by those majoring in the social sciences and humanities, but not by those who major in the trades and those who do not attend college. And, as we expected, those in the trades are higher than other students in the importance placed on financial success as indicated by having money and steady and successful work.

Effects of College Major on Attitudes and Values

We now turn our attention from the relationships of college major measured at Time 1 and values at Time 1 and major measured at Time 3 and values at Time 3 to the ways in which majors at Time 1 predict values measured at Time 3. Table 3 displays the results of the structural measurement error regressions estimated for this purpose. With the initial value controlled in the model, we interpret the coefficient on college major as the causal effect of college major on the value at a later point in time. The key identifying assumption is that all important correlations between college major and the innovation in attitudes are captured by the variables we include in our analysis. We estimate here the part of attitudes in the third follow-up interview that could not be predicted by knowing the *true* attitudes at the first follow-up interview. For every attitude we study in this paper, the true attitude at the first follow-up

interview would be a powerful predictor of the attitude at the later interview. By itself, a high value of the attitude at the first follow-up interview always predicts a high value of the attitude at the later interview, but one that has regressed toward the mean to an important extent. Thus, when we look at the effect of college major on attitudes in Table 3, we are comparing the attitude resulting when in a particular college major to the alternative of regressing toward the mean at the normal rate. This means that a major which helps students to *maintain* an attitude in which they are particularly high to begin with gets credited with affecting their attitudes relative to the implicit alternative of that attitude tending to wear away over time as normal social contacts tend to bring a student's attitude back toward the average attitude. This is important even when we have the "trades" as a reference group, since, as Table 2 indicates, the average attitudes upon entering various majors are quite different, giving a different direction to mean-reversion in each case

As noted earlier, we obtain these estimates through LISREL procedures and display them in Table 3, estimating each effect in a separate equation containing only the variable in question, its Time 1 counterpart, and all the control variables. In addition to the effect of college major on Time 3 attitudes we show the effect of Time 1 attitudes. Note that because of the similarity of effects in Table 2 for students majoring in the humanities and social sciences, we combine them in the analyses reported in Table 3.

Non-Attendees

Looking first at the effect of no college attendance, as compared to students majoring in the trades, we see that almost all of the estimates in Table 3 are smaller than those in Table 2. Furthermore, there are only three statistically significant effects (positive or negative) of not attending college on attitudes and values at Time 3 when controlling Time 1 values. Two

positive effects of not attending college are for placing more importance on giving more opportunities to children and in living away from this part of the country. The positive effect on the importance of giving more opportunities for children might be less a reflection of increased importance placed on children and more of a reflection of the fact that the non-attenders might indeed have fewer opportunities and resources for themselves and recognize a need for their children to have more opportunities than they themselves have had. In addition, the non-attenders place less importance on recreation and hobbies, which could also reflect their lower earning capacity and desire to emphasize work time over leisure time activities. So, all in all, when we investigate the causal influence of Time 1 major on Time 3 values with Time 1 values controlled, there are relatively few estimated effects for not attending college as compared to those majoring in the trades. That is, those not attending college and those majoring in the trades are very similar at Time 3 once their attitudes and values at Time 1 are taken to account.

Natural Sciences

Turning now to the natural sciences, we see that there is a tendency for majoring in the natural sciences to lead to a downplaying of financial success. More explicitly, the natural science majors place considerably less importance in later interviews on steady work and making lots of money than any other group of college students, including those in the humanities and social sciences. It appears that there is something about the college experience for those in the natural sciences that leads to less emphasis on money than one might expect. Also, note that it is the students majoring in the natural sciences who have a greater than expected increase in emphasis upon leadership during the college years. Majoring in the natural sciences also leads to placing more importance on correcting social inequalities than does majoring in the trades, with the estimated effect being similar to that as for those majoring in the humanities and social

sciences. These data show no evidence that majoring in the natural sciences leads to a downplaying of family relationships, a lack of interest in community affairs, or an increased emphasis on material goods.

Humanities and Social Sciences

Moving now to the humanities and social sciences, we see that our earlier observations about people majoring in these fields placing more emphasis than those in the trades on correcting social inequalities, finding purpose in life, and contributing to society holds up in this more restrictive analysis. These were big positive correlations in the static models of Table 2, and the new observations based on dynamic approaches reported in Table 3 suggests that there are probably effects of majoring in the humanities and social sciences on these related values.

Also, recall that in the static analysis, those majoring in the humanities and social sciences placed less importance than others on family matters. The results of the dynamic analysis reported in Table 3 suggest that there may be a causal influence of such majors on views of the importance of family relationships. The estimated effects are all negative, with the effects on giving children better opportunities and living close to parents and relatives being statistically significant at the .10 level or greater. However, the effects estimated in these dynamic models are less than those estimated from the static models.

Also observe that the generally negative correlations of majoring in the humanities and social sciences and values about financial success that we saw in the static analysis do not generally hold up in the dynamic analysis (Table 3). The only statistically significant negative effect of such majors is for the importance of steady work, with virtually no dynamic effect on being successful in work and having lots of money. It, thus, appears that majoring in the

humanities and social sciences has little dynamic influence on values about being successful and financially well off.

Trades

Turning to an explicit look at the trade majors, which is redundant to the extent that we have summarized the main effects of the other majors (but worth summarizing separately), we see that the main thing is that the trades majors (compared to those in other college majors) are more into the importance of steady work. Majoring in the trades may also lead people to place less importance on correcting social inequalities. These estimated effects are consistent with our expectations.

Effects of Attitudes on Stability of College Majors

In this section we turn the causal arrow around to see what effect attitudes have on the choice of majors. As we mentioned earlier, we do so using two different approaches. One is looking at the extent to which attitudes and values concerning family, careers, and community affect staying in a major. The second is looking at the extent to which various attitudes and values influence the choice of new majors among those who are in the process of changing majors during the college years.

We begin in Table 4 with the first set of analyses, showing the values that influence retention in a particular major that was initially chosen, considering the various major categories separately. Table 4 indicates how retention in a particular major depends on initial attitudes and values. We estimate the effects of attitudes and controls on retention in each major, separately for each of the initial majors. We interpret the coefficients on attitudes in Table 4 as the causal effect of a congenial match or uncomfortable mismatch between a student's attitudes and the

attitudes common in the major or other characteristics of the major.⁵ On this interpretation, a positive coefficient indicates that a high value of the attitude helps a student to stay in the major; a negative coefficient indicates that a high value of the attitude tends to cause a student to quit the major. The key identifying assumption is that we have managed to include all variables that have a strong correlation with both attitudes and changes of major in our regression.

Stability of Non-Attendance

As documented in Table 4, we observe a general pattern of strong family values encouraging continuity in remaining out of college—that is, discouraging non-students from enrolling in college. The signs of each of the family values are positive for remaining out of college, and the importance of living close to parents and relatives is large enough to be statistically significant. These data, therefore, suggest that family ties and perhaps the dislocations from moving away from family to attend college place a brake on college attendance among those who have not previously entered college.

Furthermore, it appears that the placement of great importance on being successful in work, contributing to society, and being a leader in the community all have substantial negative effects on remaining out of college. That is, each of these value dimensions seems to motivate people to leave their non-student status and enter postsecondary education. Clearly, high ambition of several different varieties has an important effect on the decision to enter school in the young adult years.

Stability in the Trades

⁵ Because of the measurement error, we expect the coefficients to be biased downward, but still expect them to show the direction of effects. Because we have estimated the size of the measurement error from the LISREL regressions, we could make a correction for the measurement error that would undo the bias, but we do not think this would qualitatively affect the results. Kimball, Sahm and Shapiro (2005) explain how one could do this. This note applies equally to Table 5, discussed below.

Interestingly, as one would expect, placing importance on occupational success seems to encourage people who are in the trades to continue in those majors. This is clear in that both the importance of success in work and having steady work have large and statistically significant effects on remaining in the trades. And, just as interesting is the fact that placing high value on the more community or fulfillment aspects of life lead to lower persistence in majoring in the trades. This general relationship can be seen by the fact that placing importance on correcting social inequalities, finding purpose and meaning in life, and contributing to society all have substantial negative effects, although only the effect of the importance of finding purpose and meaning in life is statistically significant.

Stability in the Natural Sciences, Humanities, and Social Sciences

Moving now to the natural sciences, the humanities, and the social sciences, we find that our value indicators have very few statistically significant effects on continuity in these majors. In fact, none of the coefficients for the natural sciences even approach statistical significance. Interestingly, the pattern of coefficients for the humanities and social science majors are not at all similar. This can be seen in the fact that the coefficients for the importance of correcting social inequalities are large for stability in each of these majors, but are in opposite directions. A similar phenomenon occurs for the importance of being successful in work. In addition, placing importance on contributing to society seems, as expected, to lead to high continuity in the humanities, but has virtually no effect among those in the social sciences. It could be that this pattern of results truly reflects different patterns in the two majors, or our sample sizes may be sufficiently small to produce sampling errors so large as to prevent reliable estimation. The large sampling errors are also evident in the fact that several substantial estimated effects do not approach statistical significance.

Destabilizing Effects of Stressing Leadership Options

Looking at stability in majors from an orthogonal perspective, we see that, despite high levels of sampling variability, one particular value factor has a consistent and substantial effect on motivating people to leave a major. That is, believing that community leadership is important. This can be seen in the consistent, although not always significant, negative effect of leadership importance on continuation in one's major. This would suggest that many young people enter a major with high aspirations for leadership opportunities, only to come to the conclusion that such opportunities are not as bountiful as hoped for in the chosen major. Or, alternatively, the leadership opportunities in their major may appear sufficiently slim as to make them think that the grass is greener in some other part of the college community. Thus, it appears that this perceived inability to make a difference in any particular major may be a strong motivator for the stirring of majors that occurs on college campuses. Interestingly, however, the impact of the importance of leadership does not appear to be as great on major shifting among college students as it does on the decision to leave the non-student status to attend college.

Effects of Attitudes on Major Destinations

We now shift our attention from major stability to an examination of the factors influencing the choice of major among those who leave a major. Table 5 indicates the effects of values on the new majors that major switchers move into when they change majors. Since there is an adding-up constraint that students must switch to something,⁶ we must again use the “trades” as a reference group. That is, we look at the likelihood of choosing a particular major compared to the likelihood of choosing one of the “trades.” We interpret the coefficient of attitudes in this regression as the causal effect of attitudes on what new major is chosen,

⁶ Since we view major as the type of college education rather than the quantity, we count a student as keeping the same major when he or she drops out of college.

conditional on having switched out of an earlier major. Again, the key identifying assumption is that we have managed to include all variables that have a strong correlation with both attitudes and changes of major in our regression.

Effects of Family Attitudes

As we can see from the top three rows of Table 5, there is a general tendency for strong family values to reduce entrance into the natural sciences, humanities, and social sciences. With the exception of one of the nine coefficients, all of the estimated effects are negative and substantial, and the estimated negative influence of the importance of a good marriage and family life on entering the humanities and the estimated negative influence of the importance of living close to parents and other relatives on entrance into the social sciences are statistically significant. Of course, the omitted major in these analyses are the trades, which suggests that placing importance on family values leads to choosing the trades over the natural sciences, humanities, and social sciences. Thus, the importance of family matters may be an important factor separating those majoring in the trades from those choosing other majors. We expected to find this separation between the trades and the humanities and social sciences, but did not expect it between the trades and the natural sciences.

Effects of Societal Attitudes

Another very important distinction is apparent in the comparison between the trades and the humanities, social science, and natural science majors. This is in regard to the importance of correcting social inequalities, contributing to society, and finding purpose and meaning in life. With one exception, all of the coefficients on these value factors positively influence the choice of the humanities, social sciences, and natural sciences, with many of these effects not only being statistically significant but large. Clearly, among those choosing new majors, placing

importance on societal contributions and self-fulfillment lead to choosing the humanities, social sciences, and natural sciences over the trades. Again, we expected there to be a distinction between the trades and humanities and social sciences on these dimensions, but did not expect it between the trades and natural sciences. Clearly, on the matter of choosing a new college major, the factors influencing the choice of the natural sciences seem to be similar to those influencing entrance into the humanities and social sciences.

Effects of Attitudes Toward New Experiences

Interestingly, placing importance on new ways to experience things is a factor influencing entrance into the natural sciences, but not the humanities or social sciences. This may indicate that the many new discoveries in the natural sciences may be particularly appealing to students looking for new experiences. One of the few additional coefficients that is statistically significant is the positive influence of the importance of being successful in work on choosing the humanities.

Summary and Conclusions

The research reported in this paper is consistent with our theoretical expectations in that there are strong associations between educational choices and attitudes and values concerning family, careers, and society. We consistently find that attitudes and values at the end of the college years are substantially related to college attendance and the choice of a major. Similar, although smaller, associations exist at the beginning of college as well.

The data are consistent in showing that people who do not attend college and those who major in the trades rate family matters as more important than do college students in other majors. People who do not attend college also place less importance on public achievement and making contributions to society than do those majoring in the trades, with the trades majors

placing less emphasis on these things than students in other majors. Those in the social sciences and humanities generally place less emphasis than other majors on family life and more emphasis on making a difference to society.

Although the overall associations between college attendance and attitudes and values are rather strong and clear, the exact causal forces producing these associations are less clear. It appears that the causal influences operate in both directions, but the specific causal effects appear weaker than the overall associations. That is, the data suggest that there are effects in both directions, but that the estimated effects in both directions are weaker than the overall associations that we observed.

More specifically, our results suggest that there is little difference between those not attending college and those attending college and majoring in the trades on subsequent attitudes and values. However, majoring in the natural sciences leads to less emphasis on financial success and more emphasis on community leadership than majoring in the trades. In addition, as we expected, those majoring in the humanities and social sciences over time increase their emphasis on correcting social inequalities, finding purpose in life, and contributing to society. At the same time, and as we expected, majoring in the humanities and social sciences leads to less importance being placed on family relationships. But, contrary to expectations, there seems to be little effect of majoring in the humanities and social sciences on attitudes toward financial success and security.

When we examine the reciprocal influence of attitudes and values on choices about college and college major, we also find effects. As we expected, placing great importance on leadership and success seems to cause non-attenders to make the transition to college. In addition, placing strong emphasis on family relationships leads to a lower motivation for non-

attenders to enter college. Also, as we expected, an emphasis on financial success leads people to remain in the trades as opposed to leaving those majors, whereas emphasizing the correction of social inequalities, finding purpose in life, and contribution to society lead people to leave the trades majors. Interestingly, and contrary to our expectations, we find no important attitudinal effects on stability in the humanities and natural and social sciences.

However, while attitudes and values have only a limited influence on staying in a particular major, they have influence on the choice of a major among those changing major. Most notable here is that placing high importance on family relationships leads to entrance into the trades over the natural sciences, humanities, and social sciences. And, placing emphasis on societal contributions and self-fulfillment leads to choosing the humanities and social and natural sciences over the trades. So, clearly important attitudes and values influence the choice of a major.

Our results are thus consistent with the overall theoretical framework guiding this research. We believe that there are important differences among the college majors in world views and overall philosophies of life related to such things as science, developmentalism, and postmodernism. These world views and philosophies in the various college majors do influence the attitudes and values of students in those majors. And, at the same time students recognize at least implicitly, and perhaps explicitly, the differences among the majors and choose their majors based, at least in part, on their attitudes and values about family, careers, and society.

Table 1
Attitude and Value Question Wording, Means, Adjusted Means, and Standard Deviations for Base Year, 1st Follow-up,
and 3rd Follow-up (N=4173)

	Base Year			1 st Follow-up			3 rd Follow-up					
	Mean	Std. Dev	Adj. Mean ^a	Std. Dev	Mean	Std. Dev	Adj. Mean ^a	Std. Dev	Mean	Std. Dev	Adj. Mean ^a	Std. Dev
How important is each of the following to you in your life? 1=Not Important 2=Somewhat Important 3=Quite Important 4=Extremely Important												
Being successful in my line of work	3.50	.68	.61	.61	3.45	.70	.61	.63	3.33	.74	.54	.66
Having a good marriage and family life	3.67	.71	.78	.70	3.71	.66	.86	.66	3.73	.63	.94	.64
Having lots of money	2.67	.86	-.22	.80	2.51	.84	-.34	.78	2.46	.81	-.32	.76
Having plenty of time for recreation and hobbies	2.92	.78	.04	.70	2.87	.75	.02	.68	2.88	.76	.09	.67
Having strong friendships	3.57	.65	.68	.60	3.56	.65	.71	.59	3.45	.70	.66	.63
Being able to find steady work	3.63	.61	.74	.57	3.60	.64	.76	.58	3.56	.69	.77	.63
Making a contribution to society	2.70	.85	-.18	.70	2.69	.84	-.15	.68	2.68	.84	-.11	.68
Being a leader in my community	2.07	.92	-.82	.76	1.99	.89	-.85	.74	1.93	.88	-.86	.72
Being able to give my children better opportunities than I've had	3.38	.78	.49	.67	3.32	.82	.48	.71	3.28	.84	.49	.74
Living close to parents and relatives	2.20	.92	-.69	.86	2.29	.91	-.56	.84	2.39	.92	-.40	.86
Getting away from this area of the country	1.77	1.01	-1.12	.98	1.57	.89	-1.27	.87	1.44	.79	-1.35	.78
Working to correct social and economic inequalities	2.24	.88	-.64	.75	2.22	.87	-.63	.75	2.13	.85	-.66	.72
Discovering new ways to experience things	2.67	.87	-.21	.74	2.64	.85	-.21	.72	2.51	.85	-.28	.72
Finding purpose and meaning in my life	3.42	.80	.53	.70	3.43	.77	.58	.68	3.28	.83	.49	.73

^a Each variable was adjusted to reflect its level of importance relative to all the attitude and value measures in the series by subtracting the respondent's mean importance score from the respondent's score for that variable.

Table 2
Predicting Attitudes and Values at Time 3 from Time3 College Major and Attitudes and Values
at Time 1 from Time1 College Major ^a N=4173 (Z-Ratios in Parentheses ^b)

Dependent Variables	<u>Not in College</u>		<u>Natural Science</u>		<u>Humanities</u>		<u>Social Science</u>		<u>Other/Undecided</u>	
	Time3	Time1	Time3	Time1	Time3	Time1	Time3	Time1	Time3	Time1
Good marriage and family life	.074 (2.48)	-.007 (.24)	-.024 (.65)	-.027 (.75)	-.137 (2.63)	-.209 (3.31)	-.101 (2.38)	-.010 (.22)	.003 (.12)	-.074 (2.63)
Children better opportunities	.230 (7.07)	.102 (3.32)	-.108 (2.32)	-.066 (1.57)	-.212 (3.80)	-.130 (2.01)	-.137 (2.88)	-.183 (3.39)	.015 (.51)	-.031 (1.00)
Living close to parents/relatives	.154 (3.84)	.080 (2.17)	-.093 (1.72)	-.140 (2.64)	-.165 (2.51)	-.268 (3.81)	-.238 (4.48)	-.259 (4.44)	-.056 (1.51)	-.072 (1.93)
Correct social inequalities	.062 (1.90)	.038 (1.18)	.080 (1.74)	.039 (.86)	.278 (4.81)	.246 (3.65)	.367 (7.04)	.377 (6.18)	.085 (2.80)	.076 (2.37)
Purpose and meaning in life	.082 (2.30)	.102 (3.49)	.075 (1.60)	.102 (2.47)	.250 (4.56)	.227 (4.22)	.158 (3.57)	.068 (1.32)	.038 (1.25)	.055 (1.82)
Contribute to society	-.152 (4.92)	-.133 (4.47)	.153 (3.43)	.201 (4.52)	.228 (4.31)	.229 (3.98)	.252 (5.80)	.260 (5.09)	-.014 (.45)	.057 (1.91)
Successful in work	-.211 (6.03)	-.150 (5.17)	.020 (.51)	-.012 (.32)	-.136 (2.54)	-.172 (3.12)	-.066 (1.60)	-.119 (2.58)	-.012 (.46)	-.043 (1.60)
Lots of money	.053 (1.49)	.020 (.59)	-.214 (4.40)	-.146 (3.06)	-.269 (4.39)	-.282 (4.20)	-.180 (3.72)	-.206 (3.43)	.022 (.70)	-.034 (1.02)
Steady work	-.044 (1.34)	.023 (.86)	-.127 (3.10)	-.069 (1.97)	-.154 (2.80)	-.236 (4.13)	-.135 (3.35)	-.115 (2.70)	-.006 (.22)	-.019 (.75)
Leader in community	-.253 (8.02)	-.242 (7.63)	-.003 (.07)	.012 (.25)	.014 (.23)	.008 (.12)	.103 (2.12)	.072 (1.19)	-.030 (.96)	-.065 (1.95)
Away from this part of country	.113 (3.06)	.167 (4.40)	.159 (2.84)	.072 (1.39)	.143 (2.28)	.263 (3.49)	.057 (1.13)	.084 (1.30)	.036 (1.08)	.107 (2.81)
New ways to experience things	.007 (.22)	.070 (2.20)	.022 (.45)	.061 (1.35)	.083 (1.32)	.291 (4.77)	.007 (.15)	.133 (2.48)	-.053 (1.72)	.062 (1.92)
Strong friendships	-.068 (2.13)	-.060 (2.27)	.013 (.34)	-.010 (.28)	.143 (3.56)	.076 (1.72)	-.020 (.52)	-.011 (.25)	-.003 (.11)	-.007 (.29)
Recreation and hobbies	-.047 (1.47)	-.011 (.35)	.049 (1.16)	-.017 (.42)	-.066 (1.27)	-.043 (.80)	-.066 (1.53)	-.090 (1.70)	-.026 (.92)	-.012 (.42)

^a These analyses also control for year of initial survey, region, gender, race, parental education, political preferences and beliefs, and religious affiliation. Each coefficient comes from a separate equation containing all of the control variables but only one attitude value variable.

^b Z – Ratio is the coefficient divided by its standard error.

Table 3
Predicting Time 3 Attitude from Time 1 Attitude and College Major at Time 1
Lisrel Models ^a (Z – ratios in parentheses ^b)

	Attitude ₁	No College	Natural Science	Humanities/ Social Science	Other/ Undecided
Dependent Variables (Attitude₃)					
Good marriage and family life	.670 (16.89)	.015 (.53)	-.038 (.94)	-.023 (.58)	.017 (.60)
Children better opportunities	.790 (19.05)	.088 (2.92)	-.020 (.46)	-.083 (1.99)	-.005 (.15)
Living close to parents/relatives	.640 (19.10)	-.021 (.61)	-.027 (.55)	-.081 (1.68)	-.061 (1.73)
Correct social inequalities	.680 (16.24)	.024 (.78)	.078 (1.79)	.086 (2.01)	.020 (.65)
Contribute to society	.770 (16.92)	-.027 (.90)	.032 (.75)	.085 (2.05)	.012 (.41)
Purpose and meaning in life	.690 (14.33)	.016 (.53)	-.001 (.03)	.082 (1.93)	.041 (1.30)
Successful in work	.660 (10.47)	-.023 (.074)	.043 (1.05)	.010 (.24)	.019 (.63)
Lots of money	.710 (26.69)	.029 (1.00)	-.120 (2.75)	-.032 (.78)	.004 (.13)
Steady work	.680 (13.28)	-.027 (.99)	-.120 (3.04)	-.068 (1.80)	-.020 (.73)
Leader in community	.700 (20.52)	-.027 (.90)	.100 (2.41)	.024 (.60)	.019 (.63)
Away from this part of country	.510 (13.30)	.063 (1.85)	.080 (1.66)	.041 (.89)	.019 (.56)
New ways to experience things	.810 (14.94)	-.012 (.37)	-.017 (.36)	-.088 (1.89)	-.047 (1.40)
Strong friendships	.790 (17.37)	-.013 (.49)	-.014 (.35)	.001 (.02)	-.026 (.96)
Recreation and hobbies	.680 (16.53)	-.062 (2.18)	.004 (.11)	.024 (.62)	.009 (.29)

^a These analyses also control for year of initial survey, region, gender, race, parental education, political preferences and beliefs, and religious affiliation. Each coefficient comes from a separate equation containing all of the control variables but only one attitude value variable.

^b Z – Ratio is the coefficient divided by its standard error.

Table 4
Predicting the Stability of Time1 College Majors through Time3 from the Time1 Attitude^a
(Stability Coefficients Calculated Separately for each Time1 College Major) (Z-ratios in Parentheses^b)

	Not in College N=1251	Trades N=1161	Nat Science N=356	Humanities N=188	Social Science N=223	Other/Undecided N=994
Independent Variables						
Good marriage and family life	.092 (.95)	-.045 (.28)	.167 (.80)	-.132 (.55)	-.011 (.04)	.099 (.95)
Children better opportunities	.124 (1.32)	.217 (1.56)	-.061 (.36)	.353 (1.42)	-.090 (.38)	.120 (1.27)
Living close to parents/relatives	.205 (2.39)	.038 (.34)	.073 (.53)	-.063 (.31)	.108 (.48)	.033 (.39)
Correct social inequalities	-.053 (.57)	-.170 (1.22)	-.003 (.02)	-.320 (1.26)	.363 (1.71)	.027 (.28)
Contribute to society	-.217 (2.13)	-.146 (1.00)	.165 (1.03)	.471 (1.82)	.075 (.29)	-.150 (1.42)
Purpose and meaning in life	-.023 (.22)	-.307 (2.14)	.084 (.43)	.200 (.74)	.179 (.78)	-.205 (1.96)
Successful in work	-.214 (2.10)	.309 (1.91)	-.032 (.15)	.278 (1.05)	-.230 (.80)	.144 (1.27)
Lots of money	.092 (1.07)	.023 (.18)	-.016 (.10)	-.220 (1.09)	-.069 (.32)	.108 (1.14)
Steady work	-.037 (.34)	.458 (2.66)	-.028 (.13)	-.146 (.58)	-.205 (.71)	.133 (1.10)
Leader in community	-.351 (3.38)	-.161 (1.20)	-.197 (1.24)	-.147 (.64)	-.211 (1.01)	.021 (.22)
Away from this part of country	.092 (1.17)	.202 (1.53)	-.050 (.36)	.015 (.08)	.026 (.13)	0.00 (0.00)
New ways to experience things	.049 (.50)	-.108 (.83)	-.214 (1.31)	.084 (.38)	.076 (.33)	-.030 (.31)
Strong friendships	-.101 (.90)	.071 (.42)	-.048 (.24)	.508 (1.46)	-.242 (.89)	-.218 (1.65)
Recreation and hobbies	.094 (.95)	-.216 (1.53)	.253 (1.42)	-.530 (1.79)	-.018 (.07)	-.115 (1.08)

^a These analyses also control for year of initial survey, region, gender, race, parental education, political preferences and beliefs, and religious affiliation. Each coefficient comes from a separate equation containing all of the control variables but only one attitude value variable.

^b Z – Ratio is the coefficient divided by its standard error.

Table 5

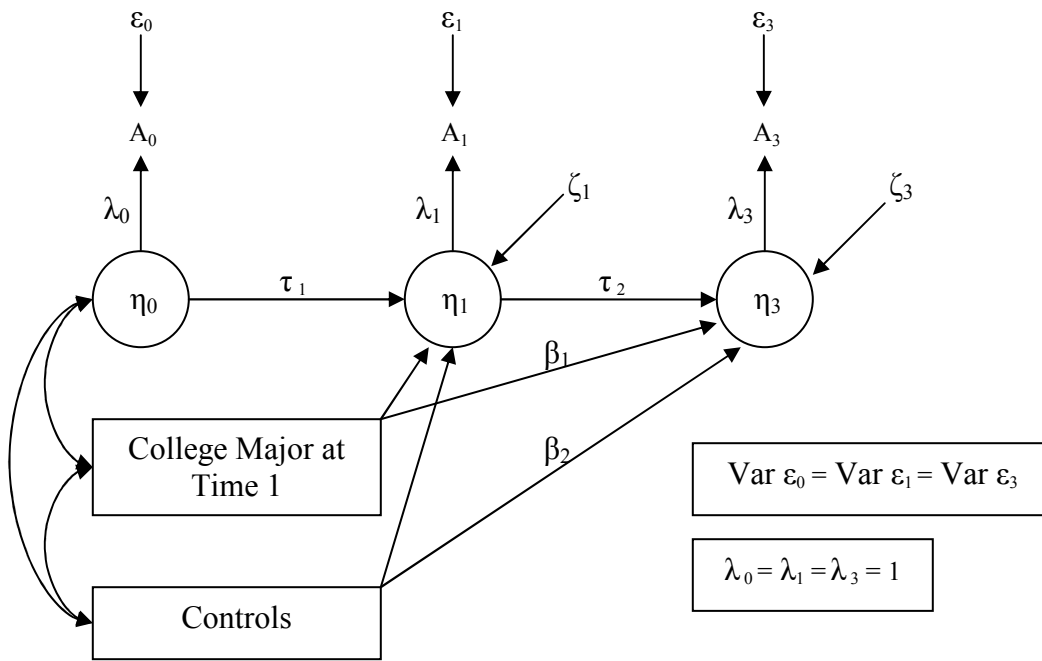
Multinomial Logistic Regressions Predicting the Time3 College Major from the Time1 Attitude for Individuals in College at Time1 Who Indicated a Change in College Major by Time3^a
(Trades is the Omitted Category) (Z-ratios in Parentheses^b) (N=888)

	Nat Science	Humanities	Social Science	Other/Undecided
Independent Variables				
Good marriage and family life	-.249 (1.26)	-.351 (1.87)	-.144 (0.90)	.076 (0.43)
Children better opportunities	-.261 (1.43)	-.171 (0.95)	-.169 (1.23)	.057 (0.41)
Living close to parents/relatives	.047 (0.28)	-.280 (1.56)	-.343 (2.58)	-.007 (0.06)
Correct social inequalities	-.091 (0.55)	.245 (1.41)	.306 (2.20)	-.038 (0.30)
Contribute to society	.381 (2.01)	.259 (1.36)	.266 (1.71)	.073 (0.52)
Purpose and meaning in life	.569 (2.21)	.413 (2.14)	.100 (.063)	-.235 (1.59)
Successful in work	.028 (0.14)	.415 (1.88)	.088 (0.54)	.130 (0.79)
Lots of money	-.224 (1.40)	.009 (0.05)	-.012 (0.09)	.119 (0.91)
Steady work	-.273 (1.31)	-.079 (0.36)	-.137 (0.79)	-.010 (0.06)
Leader in community	.042 (0.26)	-.060 (0.35)	.205 (1.51)	.261 (2.12)
Away from this part of country	.138 (0.95)	.003 (0.02)	-.027 (0.24)	-.262 (2.20)
New ways to experience things	.306 (1.87)	.065 (0.39)	-.066 (0.45)	-.141 (1.05)
Strong friendships	-.061 (0.57)	-.216 (0.96)	-.081 (0.45)	.073 (0.38)
Recreation and hobbies	-.430 (2.26)	-.140 (0.70)	-.026 (0.17)	.029 (0.19)

^a These analyses also control for year of initial survey, region, gender, race, parental education, political preferences and beliefs, and religious affiliation. Each coefficient comes from a separate equation containing all of the control variables but only one attitude value variable.

^b Z – Ratio is the coefficient divided by its standard error.

Figure 1
Measurement and Structural Effects Model of Attitudes and Values



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