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The Role of Religion and Gender in Shaping STEM Education and Workforce Participation

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The Role of Religion and Gender in Shaping STEM Education and Workforce Participation

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

August 2016

Dedication

This dissertation is dedicated to my patient husband and wonderful children. Thank you for making my life infinitely richer.

Acknowledgements

Thank you to my parents for your tireless cheer and willingness to wait up for me.

Thank you to my husband and children for everything you do and everything you are every single day. Jeff, without you there is no way.

My deepest thanks to all the professors who generously shared their time and energy in serving on my committee: Jennifer Glass, Christopher G. Ellison, Robert Crosnoe, Mark Regnerus, and Rebecca Callahan.

To my dissertation chair, Jennifer Glass, thank you so much for your tremendous patience, insight, and support. Thank you for sharing your space with me and going so far above and beyond the call of duty so very many times. Thank you too, for saving me on a rainy day. Your tremendous kindness would be impossible to repay.

To Christopher Ellison, who taught me as an undergraduate, helped me apply and attend UT, read and edited countless renditions of my master's thesis, and has always been a source of kind words and support. Thank you!

To Mark Regnerus for giving me countless opportunities to teach.

Thank you to my graduate school family: Andrea Henderson-Platt, Aida Ramos, and Mieke Thomeer-McBride. Thank you for your advice, your willingness to respond to so many panicked emails, and your friendship.

Thank you to my dear friends as well: Danielle LeBlanc, Mitchell Hayenga, Aishwarya Nagarajan, and Melanie Johnson, for listening to my wordy hypothesizing.

Finally, a special thank you to Phil Cantu and Shannon Cavanagh for generously sharing your time and statistical expertise.

This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan

Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (http://www.cpc.unc.edu/addhealth). No direct support was received from grant P01-HD31921 for this analysis.

This research uses data from the AHAA study, which was funded by a grant (R01 HD040428-02, Chandra Muller, PI) from the National Institute of Child Health and Human Development, and a grant (REC-0126167, Chandra Muller, PI, and Pedro Reyes, Co-PI) from the National Science Foundation. This research was also supported by grant, 5 R24 HD042849, Population Research Center, awarded to the Population Research Center at The University of Texas at Austin by the Eunice Kennedy Shriver National Institute of Health and Child Development. Opinions reflect those of the authors and do not necessarily reflect those of the granting agencies.

The Role of Religion and Gender in Shaping STEM Education and Workforce Participation

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The University of Texas at Austin, 2016

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To many, STEM jobs offer tremendous economic opportunities. However, women and girls move away from STEM at multiple points in the education-to-work pipeline and are underrepresented in STEM employment. Researchers have been aware for some time of conservative Protestant discomfort with science, which suggests that conservative Protestants may also move away from STEM at multiple stages in the education-to-work pipeline. Conservative Protestants often hold traditional gender attitudes which may also lead conservative Protestant boys and girls down different educational pathways.

This work consists of three analytical chapters, tracking one cohort of respondents from high school through young adulthood. It asks (a): do conservative Protestants behave in importantly different ways at three key stages in the STEM education-to-work pipeline? and (b) do conservative Protestant boys and girls experience different, gendered educational pathways? These questions are answered looking specifically at: high school science outcomes, college major selection, and STEM workforce participation. Data come from the National Longitudinal Study of Adolescent to Adult Health (Add Health).

Multiple methodologies, including OLS and multinomial logit analyses, were used to address these questions.

Chapter Two examines high school science course-taking and GPA, looking at multiple facets of adolescents' religious social worlds, and finds significant gaps in conservative Protestant science course-taking and GPA . Students' religious affiliations, those of their parents, and religious friendship networks all played distinct roles in impacting science course-taking and GPA.

Chapter Three follows these students into young adulthood, looking specifically at the impact of adolescent religious affiliations and the persistence of religious affiliations on the choice to major in STEM. It looks specifically at the interrelationship between gender and religion in these educational decisions.

Finally, Chapter Four follows student further, into young adulthood and the labor market. It looks specifically at the ways that conservative Protestant religious affiliations shape engagement in the STEM labor market for both men and women.

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Chapter One: Introduction

America's obsession with technological innovation is, in itself, nothing new. The cotton gin and lightbulb, telegraph, telephone, and television have each, in their time, radically transformed American life. United States doctors and researchers have also helped expand and improve human life. The National Institutes of Health (NIH) helped fund the Human Genome Project which led to unprecedented insight into both the complexity of DNA and promises of a future in which genetic diseases that have plagued mankind since it first walked upright may be eradicated. Engineers, biologists, and other scientists across discipline have begun proposing and developing a host of new technologies to harness energy from the sun, wind, water, and other natural forces to wean industries off of their dependence on harmful fossil fuels. The pace of these scientific and technological innovations has been increasing dramatically across time (Kayal and Waters 1999).

No one is unaffected by these changes. In their personal lives, individuals increasingly rely on online resources to find businesses, entertainment, directions, and jobs. They use social media platforms to maintain connections to loved ones, share images and updates. Such platforms also open a gateway for increased bullying of vulnerable adolescents, a form of aggression which can lead victims to take their own lives (Hinduja and Patchin 2010). When people go to the doctor, they are exposed to new diagnostic tools and treatments. Indeed, medical researchers are proposing a near-future date in which scientific and technological advances result in a medical experience with treatments personalized to the individual patient (Hamburg and Collins 2010).

In the workforce, STEM innovations have changed the jobs of many who do not directly work in such fields. Public school teachers are expected to adapt classroom techniques to include the use of a host of technical devices (Gray, Thomas, and Lewis 2010, Earle 2002). Likewise, technological innovations are substantially altering the field of nursing (Courtney, Demiris, and Alexander 2005). Even construction and manufacturing, two fields historically seen as a reliable source of blue collar jobs, are increasingly dependent on STEM skills and innovations (Levinson 2013, Armor et al 2002). This process whereby increasingly large portions of the U.S. Labor market require at least some STEM skills has led many to warn government officials, leaders of industry, and education administrators of the dangers of a growing skills-gap between those seeking work and those sectors of the economy most in need of labor (Daggett 2002). People who lack skills in science, technology, engineering, and mathematics may find themselves increasingly shut out of even non-STEM labor.

As consequence of these realities, the extent to which the STEM workforce reflects the diversity of thoughts, perspectives, and demographics in the broader American population affects not just STEM workers, but all of us. Technological innovations and scientific research do not occur in values or perspective neutral environments. Instead they are tremendously shaped by the experiences, priorities, and values of those engaged in STEM work.

Acknowledging the deep significance of STEM diversity concerns, Social scientists and education researchers have begun conducting studies analyzing the factors that shape the pursuit and attainment of STEM education. This research has been complicated by the question of how STEM itself is defined. Some areas of the sciences, such as nursing, have been traditionally dominated by women and are not widely considered to be STEM fields. Instead, definitions of STEM generally focus on such careers as: computer science, engineering, and academic or

laboratory scientific research. This distinction is important because the way we measure STEM informs our understanding of the forces driving gender and other gaps in STEM pursuit and attainment. Addressing these concerns about the ways that definition shapes comprehension, Riegle-Crumb and King (2010) proposed splitting college STEM majors into two distinct groups: the physical sciences and engineering, and biological sciences.

Splitting STEM into two separate fields in this way has allowed researchers to highlight substantial gender and race/ethnic gulfs in science and mathematical performance and degree attainment (Beede et al 2011, Riegle-Crumb and Grodsky 2010). Some researchers have argued that these disparities in schooling are partially driven by gendered ideas about what fields of study are appropriate or attainable for girls (Peltz 1990). These theories are supported by research showing that girls, particularly white girls, may lack confidence in their abilities in school math and science courses (Crosnoe, Riegle-Crumb, and Mueller 2007). Others have suggested that teachers' perceptions' of students contribute to gendered gaps (Dee 2007, Riegle-Crumb and Humphries 2012). There is compelling evidence that these gendered gaps in high school have begun to close (Riegle-Crumb, Farkas, and Mueller 2006). Research also shows that for girls, having female friendship networks can encourage math course-taking (Riegle-Crumb, Farkas, and Mueller 2006).

While this evidence of declining gaps in high school is encouraging, significant gaps remain during the college major selection process (Ma 2009, Dickson 2010). Evidence indicates that women make up only 35% of STEM college degree earners, though they outnumber men in college attendance (Beede et al 2011, Carrell, Page, and West 2009). Even when high school science performance is controlled for, gendered gaps in major selection persist (Riegle-Crumb et al 2010). While both men and women appear to exit STEM occupations at high rates, these gaps

have nonetheless been further exacerbated by the disproportionate attrition of female workers from STEM positions (Glass et al 2013, Cech et al 2011, Dohm and Shniper 2007). The potential economic consequences for women, race/ethnic minorities, and other groups are profound. Lacking science and math skills and certifications, they may, in coming decades, find themselves increasingly shut out of quality STEM jobs, competing for a shrinking pool of non-STEM low-status and low-skill work. Additionally, regardless of what, if any, field of labor those shut out of STEM ultimately find employment in, their lives are still tremendously shaped by STEM innovations. The absence of their own voices, perspectives, and values from the creation of these innovations can, as consequence, have profound repercussions throughout the labor market and broader American society.

The absence of women and race/ethnic minorities from these fields is profoundly important. Also important, and understudied, is the prospect that other groups may be likewise shut out of STEM occupations. Conservative Protestants make up roughly a quarter of Americans, and are growing even as many other Americans increasingly turn away from religion (Hout, Greenly and Wilde 2001). They also occupy a unique cultural space of both heightened gender norms and historical scientific distrust. The extent to which conservative Protestants are shut out of STEM can represent a loss both for STEM fields which are projected to grow and, as consequence of their inability to retain workers, are often concerned about labor shortages and to this large portion of the American population (Langdon et al 2011).The STEM classification schema established by Riegle-Crumb and King (2010) has been useful in highlighting gendered and racial disparities in STEM, however, it may be less beneficial in examining these religious differences in STEM outcomes. Indeed, despite an ever-growing body of research and policies seeking to understand and reduce these significant in the STEM workforce, very little attention

has been paid to the substantial role that religious affiliation plays in shaping children and adults' educational experiences and trajectories. This oversight is especially noteworthy both in light of the commonly-held assumption that conservative and evangelical Protestant religious groups are particularly hostile toward scientific theories, knowledge, values, and education; and because such groups constitute a substantial and growing proportion of the American population. Conservative and evangelical Protestants represent 2.3% of Americans according to data from the Pew Forum (2008). While membership in nearly all other American religious traditions has been on the decline in recent years, evangelical and conservative Protestant denominations continue to grow steadily and are projected by many scholars to grow still more in coming years (Hout, Greenly, Wilde 2001, Scheitle, Kane, and Van Hook 2011).

In order to test the relationship between conservative Protestant religious affiliations and STEM outcomes, particularly in Chapters Three and Four, this dissertation will rely on a slightly different schema for sorting STEM college majors and occupations. Discussions of conservative Protestant opposition to science have generally focused on a few key areas of schism: scientific theories of evolution, attitudes about the sacredness of life, and beliefs about cosmologies (Lawson and Worsnop 1992, Evans and Hudson 2007, Evans and Evans 2008). In order to test possible conservative Protestant differences in the STEM education-to-work pipeline, this dissertation will divide STEM into two separate groups. The first is those majors that are generally at the heart of these conflicts: biosciences, physics, chemistry and earth sciences. The second is those majors which have been left out of discussions of conservative Protestant science concerns but are often central to discussions of STEM: engineering, computer sciences, and technologies. The details of how these splits are constructed for college majors (Chapter Three) and STEM occupations (Chapter Four) are presented in the appendix.

The effects of religious affiliation on STEM pursuit may be especially profound for girls. Women and girls are often more religious than men and boys and attend religious services more often. This means they may be more susceptible to religious messages than boys. In addition to the impact of conservative religious cosmology, involvement in conservative denominations puts adolescent girls in an environment that places strong emphasis on traditional gender roles and identities. As consequence, Conservative Protestant affiliation may act as a gender 'pressure cooker' for adolescent girls, intensifying the effects of traditional gender socialization on self-concept and self-esteem. Girls raised in conservative Protestant denominations are far more likely than their peers to eschew work in favor of motherhood, to marry at young ages, and to ascribe to traditional gender roles (Frejka and Westoff 2008, Glass and Nath 2006, Glass and Jacobs 2005, Uecker and Stokes 2008, Eggenbeen and Dew 2009). Such gendered life course trajectories may lead conservative Protestant girls away from STEM fields.

This dissertation will address these oversights by analyzing the relationships between religious affiliation, gender, and STEM performance in-depth. Chapter Two will explore the ways that students' personal, parental, and social network religious affiliations impact science course pursuit and performance during high school. Chapter Three will follow children into post-secondary school educational decision-making, evaluating the role of religious affiliations and engagement in STEM major selection. Chapter Four will follow students still further into adulthood, examining the relationship between religious affiliations and STEM occupational engagement. Finally, Chapter Five will synthesize these results in order to present a larger picture of the ways that involvement can shape gendered STEM trajectories. It will discuss the implications of these findings and directions for further research.

The remainder of this chapter details conceptual and theoretical frameworks which underlie the analyses in later chapters.

Context and Theoretical Framework

Context

In nearly every facet of adult life, the positive effects of education on life-course outcomes have been observed. Researchers have found a consistent link between higher education and lower problematic alcohol consumption, lower likelihood of smoking, and lower BMI (Paljarvi et al 2012, Strandberg-Larsen et al 2008, , Grittner et al 2012, Crosnoe 2006, Hermann et al 2011). Perhaps as consequence of improved health behaviors, higher education levels were also associated with substantial increases in longevity (Brown et al 2012, Lleras-Muney 2005). Increased education leads to improvements in mental health and marital stability (Mirowsky and Ross 2003 Behrman, Rosenzweig, and Taubman 1994, Behrman and Rosenzweig 2002, Behrman and Rosenzweig 2006, Lefgren and McIntyre 2006). These effects of education on multiple life outcomes are one reason researchers are concerned with the consequences of inequality for education access and outcomes. However, the relationship between religious affiliations and the academic trajectories of boys and girls remains largely unexplored.

Theoretical Frameworks

Researchers offer several competing theoretical frameworks to explain differences between the behaviors of conservative Protestants and others. This analysis will contrast two types of approaches: those focused on religion/science conflict and those which focus on gender heightened conservative Protestant life courses. Religion/science conflict theories often take one

of two forms; either cognitive dissonance theories which argue that conservative Protestants are incapable of internalizing scientific information because such information conflicts with prior belief commitments and cultural isolationist theories which focus on conservative Protestant distrust of science as a value-laden cultural institution. While religion researchers often focus on these two approaches in isolation, this dissertation will analyze them collectively as indicative of a religion-based discomfort with science and STEM themselves. Gender-heightened life course theories focus on evidence of conservative Protestant gender socialization and conservative Protestant's different life course trajectories as the source of occupational and educational disparities.

Conservative Protestant Isolationism and Cognitive Dissonance

Researchers examining conservative Protestantism have often focused particularly on a unique world-view shared by conservative Protestants. These groups proudly define themselves in opposition to what they see as the dangerous cultural pluralism and moral relativism of the world at large and they draw strength from an understanding of themselves as embattled and socially isolated or ostracized (Smith et al 1998). This "separatist cultural strategy", which emphasizes the distinction between self-regarded moral conservative Protestant communities and the broader American culture, is even stronger among fundamentalist conservative Protestants, who seek disengagement and distance from American communities more generally (Smith et al 1998, Woodberry and Smith 1998). This disengagement and distance is apparent in the complex relationship conservative Protestants often have with social institutions. Many Fundamentalist Protestants seek to isolate themselves from social institutions, while at the same time other groups

of evangelical conservative Protestants, often seek to reform these institutions through engagement and political activity.

This almost paradoxical relationship is exemplified in their approach the institution of education. Studies note a political and cultural opposition to the institution of public secular school systems among some conservative Protestant adults, particularly fundamentalists, Charismatics, or Pentecostals (Sikkink 1999). These adults are often inclined to view the world of public education as a dangerously immoral or corrupting influence on the lives of their children (Sikkink 1999, Darnell and Sherkat 1997) This political opposition to public education often focuses particularly on science curriculum, including discussions of the age of the earth and evolution, as objectionable and contrary to the "biblical truths" espoused by conservative Protestants. Although conservative Protestants are particularly likely to distrust educational institutions, they are also likely to directly engage with them (Sikkink 1999). This engagement often takes the form of attempts to reform or alter social institutions, like the much-reported efforts of some conservative evangelicals to add Creationism to public school science curriculum. These efforts on the part of conservative evangelicals to engage with educational institutions is particularly important insofar as they contradict commonly-held assumptions about the low levels of conservative Protestant educational investment. Evidence does show that fundamentalist and Pentecostal Protestants, those Protestants especially likely to distrust education, are significantly less likely to obtain a college degree than others. However, the same does not hold true for evangelical conservative Protestants who obtain education levels largely in-line with the rest of Americans though it is possible that they may disproportionately select religious colleges and universities (Beyerlein 2004).

Conservative Protestant parents who do disapprove of public education appear to have a particularly strong negative impact on their children's educational trajectories (Sherkat and Darnell

1999). Sherkat and Darnell (1999) find evidence that fundamentalist conservative Protestant parents encourage their children to distrust educational institutions and to opt out of higher education. This decreased likelihood that conservative Protestant children will pursue higher education persists even when fundamentalist parents are willing to finance higher education for their children and also appears in families where children and parents' religious beliefs differ (Sherkat and Darnell 1999).

The influence of conservative Protestant parents on the gap between their children's academic performance and degree attainment may be especially likely to increase in the future. Recently, a growing number of conservative Protestant parents have chosen to remove their children from public and even private schools in favor of homeschooling (Isenberg 2007). This flight has been aided by the increase in internet usage that has allowed conservative Protestant parents in different geographical areas to band together to design curriculum for their children (Andrade 2008).

This movement away from public education is arguably the strongest possible rejection of education as a secular cultural institution. Few quality studies have been conducted so far examining the phenomenon of homeschooling, particularly as it relates to religious beliefs and little data exists to examine this group. Isenberg (2007) notes that evangelical conservative Protestants are especially likely to homeschool their children, although they remain a minority of homeschoolers nationwide.

This adoption of homeschooling by conservative Protestants is often couched in terms of cultural isolationism, emphasizing the preservation of conservative Protestant religious values and beliefs in the face of an increasingly secular society (Stevens 2003). This movement among evangelical conservative Protestants is especially worthy of examination as, despite generally

supporting public education and holding high levels of education compared to other conservative Protestants, they are increasingly rejecting public schooling for their own children (Carpenter 2000).

While information on how homeschooling influences higher education pursuit and degree attainment remains largely anecdotal and uncertain, based on lecture materials and documents adopted by that movement, homeschooled conservative Protestant children are especially unlikely to invest in education, particularly in STEM fields. This de-emphasis on STEM education may well be two-fold, arising both from a rejection of commonly held scientific beliefs about evolution and the origin of the universe and from the challenges faced by conservative Protestant parents in providing high-school level education in subjects like physics, biology, and chemistry within the limitations of a home-school environment. Conservative Protestant parents engaged in homeschooling might also find it difficult to match the proficiency of educators in teaching higher-level math courses that college-bound students receive in public and private high schools.

The consequence might be that even the most diligent and well-meaning conservative Protestant parents engaged in homeschooling are ill-equipped to prepare their children for the rigors of STEM college courses. These effects might be especially heightened among children of conservative Protestants who perceive conflicts between their religious beliefs and the tenants of modern scientific knowledge. This might be the most extreme result of Conservative Protestant desires for cultural isolation and tendencies toward academic disinvestment.

Proponents of this theory of cultural isolation and academic disinvestment have provided some evidence that subgroups of conservative Protestant children are generally less invested in pursuing college preparatory course trajectories or lack the resources to pursue and complete college education (Sikkink 1999, Darnell and Sherkat 1997, Stevens 2003). However, none have

looked specifically at the important question of STEM course-taking and employment. This question is significant since Conservative Protestants are perceived to be especially distrustful of science.

The psychological concept of cognitive dissonance focuses on the difficulties individuals experience when faced with two conflicting beliefs or ideas (Aronson 1969). The implication of cognitive dissonance is that people have difficulty reconciling or accepting apparently conflicting moral systems or pieces of information. This theory has been extended by some to argue that the multitude of potential conflicts between conservative Protestant affiliations and scientific understanding hamper the abilities of religious individuals to internalize and apply scientific concepts. Evidence suggests that freshman undergraduates sort themselves into majors in response to this perceived conflict between science and their religious beliefs (Schietle 2011). Further, when students were exposed to scientific theories like evolution in biology courses, students with conservative religious beliefs were much less likely to accept these theories than their cohorts, a gulf that impacted differences in reflective reasoning skills (Lawson and Worsnop 1992).

While discussions of these theories often focus on conflicts over evolution and its impact on abilities in fields like biology or anthropology, there are many more areas of potential conflict. Conservative Protestants who believe in biblical accounts of the origins of life tend to disagree with modern scientific evidence about the age of the earth, an area of disagreement that might particularly limit conservative Protestant performance in the geosciences, physics, and astronomy. Conservative Protestants are also unlikely to believe in the existence of phenomenon like global warming despite the efforts of some ministers and leaders to persuade them otherwise (McCammack 2007). This would hamper their abilities to perform in fields like meteorology and environmental sciences. In fact, despite the tendency of popular analysis to focus only on the issue

of evolution, it is clear that Conservative Protestants who believe in biblical literalism find areas of conflicting belief in nearly every scientific field.

Cognitive dissonance theories would suggest that this multitude of conflicts make it unlikely that Conservative Protestants would pursue STEM fields or perform well in STEM courses. This theory would further suggest that conservative Protestant students would be disadvantaged in pursuing college degrees even in non-STEM fields because a more rigorous set of courses in math and science are at the center of many high school's college preparatory course trajectories.

Cognitive dissonance has also been used to explain the seeming drop in religious affiliations among young college students. Some point to college as a time during which the world of young adults expands, exposing them to beliefs and ideas and giving them opportunities to engage in behaviors, that fundamentally conflict with the beliefs and socialization they received from parents and community members (Hoge, Johnson, and Luidens 1993).

Both cognitive dissonance and cultural isolationist theories would argue that religiously conservative students either struggle with or avoid those high school science courses often required for pursuing higher education, particularly in STEM fields. Additionally, conservative Protestant students who do attend college would be unlikely to pursue STEM majors. In the workplace, conservative Protestants may be particularly unlikely to work in STEM fields, both because they may be disproportionately likely to exit out of STEM educational pipelines and because exposure to STEM workplaces which often include many irreligious individuals and require commitment to scientific values which conflict with conservative Protestant religious belief commitments may be uncomfortable.

Gendered Religious Life-Courses

More recently, scholars have begun to argue that religious identities, like other aspects of individual experience, vary across the life course. Many researchers have debated whether education is responsible for a decline in religious participation in young adulthood (Hill 2009, Hill 2011, Mayrl and Oeur 2009, Uecker et al 2007, Bryant, Choi, and Yasuno 2003). Religious engagement certainly tends to decline in young adulthood before returning to previous levels later in life, particularly during childbearing (Uecker et al 2007). This life course variation in religious involvement might indicate that the influence of religion on academic involvement grows and wanes at different parts of the average individual's life cycles. This indicates the importance of measuring both religious engagement and STEM decision-making at multiple stages of the life course.

Further, scholars have noted denomination and regional variations in age-at-marriage, age-at-first-birth, and total fertility (Frejka and Westoff 2008, Glass and Nath 2006, Glass and Jacobs 2005, Uecker and Stokes 2008, Eggenbeen and Dew 2009). Multiple studies find that involvement with conservative Protestant or Mormon religious communities are associated with delayed sexual debuts among adolescents, "tamer" sexual practices, and fewer lifetime sexual partners (Wilcox, et al 2001, Rostosky et al 2003, Regnerus 2007, Uecker 2008). However, for conservative Protestant and Mormon youth, religious affiliations are also associated with greater risk of teen pregnancy and earlier ages at marriage (Regnerus 2007). Attempts by conservative Protestant groups to control teen sexual activity often rely heavily on gendered stereotypes, emphasizing girl's chastity and discouraging girls from recognizing or exploring their sexuality (Regnerus 2007). They also encourage conservative Protestant girls to develop idealized conceptions of romantic love which might push them to seek marriage at earlier ages (Regnerus 2007). This

encouragement for conservative Protestant girls to focus on and prioritize marriage and romantic love may have a profound impact on their educational priorities and their willingness to confront gender stereotypes in pursuit of STEM majors or employment

Young men marrying and having children at early ages might feel pressure to eschew higher education in favor of job training and quicker access to steady paychecks. Young women whose educational engagement is repeatedly disrupted by childbirth are more likely to exit school before completion (Xie and Shuman 2005, Preston 2004). The influence of religious engagement on fertility and marriage, might cause even engaged, STEM-minded conservative Protestant women to pursue other trajectories that require less education or are more tolerant of repeated disruptions.

The influence of these early transitions to adulthood on academic pathways can have particularly powerful consequences for women's access to STEM education and employment. Xie and Shuman (2005) found evidence that women who married and had children during the education process or early in their careers were significantly more likely to abandon science fields or find themselves in lower-paying, lower-prestige science jobs.

This life-course view of religious engagement pays less attention to perceived direct conflicts between conservative Protestant affiliations and science, or conservative Protestant rejections of science and education, than to the effects of marriage and family formation experienced by conservative Protestants as the source of variation in educational attainment. This approach indicates the importance of examining the relationship between religious affiliations and STEM educational trajectories at multiple points in the life course.

This differential timeline theory also suggests the powerful importance of gender socialization and gender roles in boys' and girls' educational trajectories, particularly in STEM

fields. Religiously conservative boys anticipating early fatherhood might be most likely to focus on careers that require little education relative to their returns in pay whereas religiously conservative girls anticipating early motherhood would be especially drawn to occupations that emphasize nurturing and tolerate multiple disruptions in LFPs. The remainder of this chapter will provide an overview of subsequent analyses

Dissertation Overview

I will use each of the two models discussed above to evaluate the various ways in which religious involvement can influence boys' and girls' disparate STEM performances and outcomes from education to early adulthood. This work will highlight the oft-neglected role of religion in influencing educational outcomes and early career decisions. The data used for Chapters 2-4 of this dissertation will come from the National Longitudinal Study of Adolescent to Adult Health (Add Health) dataset. The Add Health is a multi-wave longitudinal study which began with a nationally representative sample of adolescents who were in grades 7-12 during the 1994-1995 academic year. Students' school representatives and parents were also interviewed in order to provide a complete picture of school environment. Following the 1994-1995 data collection, four subsequent in-home surveys have been completed with the original participants. The most recent data collection was completed in 2008, when sample respondents were 24-32.

In Chapter Two, I will focus on students' personal religious affiliations, parental religious affiliations, and religious friendship networks and their impact on science course pursuit and performance. I will evaluate the roles of students' religious affiliations, and their engagement in religious behaviors in shaping each of these outcomes. I will further evaluate the ways in which

these relationships vary for boys and girls- and particularly the ways that religious friendship networks differentially impact high school science course-taking and GPA.

In Chapter Three, I will use Wave III college major data in order to construct and test models of the relationship between STEM major selection and conservative Protestant affiliations and involvement. In order to focus most specifically on the question of religion/science conflict, I will divide college majors into those sciences which are seen as challenging religious beliefs, and STEM fields like technology that are unrelated to broader theories of cosmology. I will particularly evaluate the ways that these relationships vary for young men and women's' post-secondary school STEM educational choices.

In Chapter Four, I will use Wave IV of the Add Health data set to test the relationships between religious engagement and affiliation and STEM occupation selection, looking particularly at the effects of religious affiliation change and family status

Finally, in Chapter Five, I will conclude by summarizing the key findings and interactions established in Chapters 2-4. I will place these findings within a larger picture of STEM education and employment, gender, and religious involvement. I will discuss the importance of these findings given the increasing proportion of conservative Protestants in the U.S. population and discuss areas for future research.

Chapter Two: Religion and Gender in High School Science

A multitude of factors beyond simple ability shape students' performances and course-taking decisions in high school and college. These range from tremendous economic disparities in school and teacher quality; to institutional racism and sexism, and differential expectations about future employment opportunities, to more individualized influences like family stability and intimacy, friendship networks and peer pressures, and internalized conceptions of one's self and abilities (Betts 1995, Card and Krueger 1998, Borman and Kimball 2005, Ferguson 2000, Riegle-Crumb and Grodsky 2010, Buchmann, DiPrete, and McDaniel 2008, Teachman and Paasch 1998, Cavanagh and Formby 2012, Cavanagh, Schiller, and Riegle-Crumb 2006, Crosnoe et al 2008, Riegle-Crumb, Farkas, and Mueller 2006). These factors reinforce the reality that schools, as social institutions, often reproduce, rather than reduce inequalities.

Students who enter school with socioeconomic disadvantages often start behind their peers and never catch up (Mayer 2002, Ansalone 2009). Racial and ethnic minorities are often subject to more aggressive disciplinary treatment, a disparity that many posit puts a subset of students in the 'school-to-jail pipeline' (Ferguson 2000, Mendez and Knoff 2003, Rocque and Paternoster 2011). Students who enter with fewer skills in English may find themselves deprived of access to gifted courses or put into lower 'tracks' from which they can rarely escape (Callahan 2005, Janzen 2008, Olivio 2003).

Gender, too, can be powerful in shaping boys' and girls' academic experiences regardless of their qualifications and aptitudes within a particular field. While girls have made significant headway in closing gendered gaps in college pursuit and the attainment of bachelor's degrees and

can even experience advantages in some coursework, they are still often also subject to gender socialization that treats some courses of study as less appropriate for girls or women (Barone 2011, Buchmann and DePrete 2006, Hussar and Bailey 2011, Jacobs 1999, Xie and Shauman 2003). Researchers focusing on the experience of boys, have noted that boys are increasingly less likely relative to their female cohort to complete college degrees and more likely to encounter disciplinary problems (Mendez and Knoff 2003, Weaver-Hightower 2003, Jones and Myhill 2004)

While less frequently studied, religious influences also appear to be significant in high school as well. Religious teens tend to engage in fewer risky behaviors, including reduced drug-taking, fewer risky sexual practices, and delinquent behavior among others (Regnerus and Elder 2003, Litchfield, Thomos, and Li 1997, Bartkowski and Xu 2000, Regnerus 2003, Cole-Lewis et al 2016). Religious involvement has also been positively associated with mental health during the stressful period of adolescence (Wright, Frost, and Wisecarver 1993, Chandry, Blum, and Resnick 1996, Cole-Lewis et al 2016) Further, religiously engaged students in both high- and low- risk settings experience significant academic dividends (Regnerus and Elder 2003, Regnerus 2000, Lehrer 2006 Lehrer 2004, Glanville, Sikkink, and Hernandez 2008)

While religious engagement is positively associated with multiple adolescent and educational outcomes, associations with conservative Protestant denominations in particular are often seen as detrimental to education and as reducing the positive association between religious involvement and adolescent outcomes more generally (Regnerus 2003, Darnell and Sherkat 1997). Conservative Protestant affiliation, particularly coupled with a low level of religious engagement, has often been associated with lower educational completion or fewer academic dividends (Lehrer 2004, Lehrer 2006). Some researchers argue that a diversity of outcomes exist within conservative Protestant communities, with evangelical students generally experiencing better than average

academic outcomes and fundamentalists experiencing gaps (Beyerlein 2004). Researchers have not looked as closely at the ways that religious involvement can either increase or decrease performance in particular academic areas- most particularly in STEM educational attainment. Scheitle and Ecklund (2016) did find that religiously unaffiliated parents were more likely than conservative Protestant, mainline Protestant, Catholic, or Jewish parents to say they would recommend their children pursue pure STEM careers such as physics. They found that this association disappeared when more applied STEM careers, like medicine, were studied (Schietle and Ecklund 2016).

Additionally, while religious involvement can play a critical role in the internalization of gender socialization and norms and the extent to which girls embrace traditional gender roles; the interrelationship between gender, religious identification, and STEM performance outcomes is largely unexplored (Moore and Vanneman 2003, Glass and Jacobs 2005, Glass and Nath 2006). This lack of exploration is particularly important, given evidence suggesting an important role of religious involvement in boys and girls overall academic outcomes (Sherkat and Darnell 1999, Lehrer 2004, Lehrer 2006). This chapter will address gaps in existing literature by: a) focusing specifically on the influence of conservative Protestant religious affiliations on science course-taking and GPA, b) looking particularly at the intersection of religion and gender in shaping science education outcomes, and c) separating out individual religious engagement, parental religious involvement, and peer-network religious influences on boys' and girls' science course-taking and performance at the high school level.

Theoretical and Empirical Background

Religious Involvement and Educational Outcomes

Substantial evidence has demonstrated religious differences in academic experiences (Darnell and Sherkat 1997, Stevens 2003, Beyerlein 2004, Sherkat and Darnell1999, Sikkink 1999, Lehrer 2004, Lehrer 2006, Glanville, Sikkink, and Hernandez 2008, Kim 2015). Given the reality of religion as a multi-dimensional social phenomenon, it is unsurprising that the mechanisms of this relationship are complex. Researchers evaluating the relationship between religious activity and academic engagement, find that higher levels of involvement are associated with positive academic dividends and increases in overall schooling (Kim 2015, Regnerus and Elder 2003, Regnerus 2000, Lehrer 2006 Lehrer 2004, Glanville, Sikkink, and Hernandez 2008, Mueller and Ellison 2001). Others, looking at the nature of religious affiliation, have found that conservative Protestants, fundamentalist Protestants, and those with no religious affiliation generally experience poorer academic outcomes than peers involved with other religious traditions (Darnell and Sherkat 1997, Lehrer 2004, Beyerlein 2004, Massengill 2008).

Some researchers have proposed that parental religious involvement is particularly important in shaping children's academic outcomes (Sherkat and Darnell 1999, Sikkink 1999, Muller and Ellison 2001, Scheitle and Ecklund 2016). Others suggest a relationship between religious involvement and academically successful peer networks as an important mechanism for academic achievement (Glanville, Sikkink, and Hernandez 2008). Barrett et al (2007) find that students' perceptions about the dominant religious attitudes of peer groups impact their own religious involvement, an impact which can also shape academic engagement and outcomes. Few, if any, researchers, would suggest that religion operates solely through one facet of engagement or through one social source; but the result of articles focusing on only one or two mechanisms of

religious engagement and one or two measures of academic attainment can be a body of research which often seems internally inconsistent. It also can make the conceptualization of a unified theory explaining the relationship between religious involvement and educational outcomes difficult.

Several theories about the relationship between religious involvement and educational performance have been proposed to explain religious differences in academic outcomes. These theories can be generally classified as: cultural isolationist and cognitive dissonance theories and gendered religious life-course theories.

Proponents of cultural isolationism and disinvestment focus on evangelical conservative Protestants, a subset of conservative Protestants in their analyses and arguments. They find that many members of evangelical conservative traditions define themselves on the basis of their opposition to dominant cultural norms (Smith et al 1998, Woodberry and Smith 1998). These groups, researchers argue, often view themselves as being under constant attack from decadent or dangerous social forces and rely on isolationist strategies to avoid those threats. Such opposition often focuses particularly on public schools which are seen sites of 'cultural indoctrination' in which children are taught dominant sociocultural attitudes. Other researchers disagree, suggesting that it is fundamentalist or Pentecostal, rather than evangelical affiliations which lead to reduced educational outcomes (Beyerlein 2004). For some isolationist parents, this opposition can lead to an abandonment of schools in favor of home-schooling, an area of research which is deeply under-explored, though some research does suggest that home-schoolers behave in ways largely similar to religious school attending peers (Uecker 2008).

Of course, not all, perhaps not even most, conservative Protestant parents are in a position to commit the time and financial resources necessary to engage in home-schooling. It is these

parents whose children are captured in the Add Health data. If unable to remove their children from public education entirely, conservative Protestant isolationists might encourage their children to greet the educational process with distrust and skepticism (Darnell and Sherkat 1997, Stevens 2003, Sherkat 2011). Just as they seem to discourage their children from pursuing higher education, they may likewise discourage children from taking more rigorous high school courses. Supporters of cultural isolationist theories have found evidence that conservative Protestant parents who disapprove of education appear to have significantly negative influences on their children's academic performances (Darnell and Sherkat 1999). Some evidence also suggests that religious association influences parental likelihood of encouraging children to pursue particular educational trajectories (Scheitle and Ecklund 2016). None have looked specifically at the impact of conservative Protestant parents on children's STEM course-taking and major selection, however. This issue may be particularly important given the growth of STEM-related jobs as a proportion of the American economy and the difficulties individuals face obtaining higher level science skills after missing key foundational courses (Xue and Larson 2015, Xie and Shauman 2003).

Many researchers have expressed some skepticism about either the existence of conservative Protestant isolationism when it comes to academic pursuits or the extent to which it influences behavior. They note that, for many conservative Protestant parents, disapproval of academic institutions takes the form of attempts to reform rather than withdraw from schools (Sikkink 1999). They further find that some conservative Protestants, particularly evangelical conservative Protestants, were as likely to obtain college degrees as many of their peers (Beyerlein 2004). Additionally, other researchers have noted that conservative Protestants have seen a growth

in college degree attainment over time, though this has not significantly affected the persistence of overall religious gaps (Massengill 2008).

A complimentary theory relies on the psychological concept of cognitive dissonance, focusing on the difficulties individuals experience when faced with two conflicting beliefs or ideas (Aronson 1969). The implication of cognitive dissonance is that people have difficulty reconciling or accepting apparently conflicting moral systems or pieces of information. This theory has been extended by some, who argue that the multitude of potential conflicts between conservative Protestant affiliations and scientific understanding hamper the abilities of religious individuals to internalize and apply scientific concepts. Evidence suggests that freshman undergraduates may sort themselves into majors in response to this perceived conflict between science and their religious beliefs (Schietle 2011). Further, when students were exposed to scientific theories like evolution in biology courses, students with conservative religious beliefs were much less likely to accept these theories than their cohorts, a gulf that impacted differences in reflective reasoning skills (Lawson and Worsnop 1992).

While proponents of cognitive dissonance often focus on conflicts over evolution and its impact on abilities in fields like biology or anthropology, there are many more areas of potential conflict. Conservative Protestants who believe in biblical accounts of the origins of life tend to disagree with modern scientific evidence about the age of the earth, an area of disagreement which might particularly limit conservative Protestant performance in the geosciences, physics, and astronomy. Conservative Protestants are also unlikely to believe in the existence of phenomenon like global warming despite the efforts of some ministers and leaders to persuade them otherwise (McCammack 2007, Korver-Glen, Chan, and Ecklund 2014). This would hamper their abilities to perform in fields like meteorology and environmental sciences. In fact, despite the tendency of

popular analysis to focus only on the issue of evolution, it is clear that conservative Protestants who believe in biblical literalism may find areas of conflicting belief in nearly every scientific field.

Cognitive dissonance or cultural isolationist theories appeal to many because they reflect broader social assumptions about a war between religion and science. However, they have not been explored with rigor in this context. Further, research into religious diversity among academic scientists, suggests that while academic scientists as a whole are less religious than the broader American population, this lower rate of religiosity is at least partially explained by the selection of non-religious individuals into the sciences rather than from an aversion among the religious (Ecklund and Scheitle 2007)

Gendered Life Course Religiosity

Recently, scholars have begun to argue that religious identities, like other aspects of individual experience, vary across the life-course. Many researchers have debated whether education is responsible for a decline in religious participation in young adulthood (Hill 2009, Hill 2011, Mayrl and Oeur 2009, Uecker et al 2007, Bryant, Choi, and Yasuno 2003, Lee 2002). Many argue that while religious engagement tends to decline in young adulthood, it returns to previous levels later in life, particularly after marriage (Uecker et al 2007). Researchers also find that, when measurements of the importance of religion in one's life rather than religious activity is the focus of study, college declines in religion decline substantially (Uecker, Regnerus, and Vaaler 2007) Additionally, college-going young adults appear to experience fewer changes in their beliefs

during young adulthood than their non-college attending peers and smaller declines in religious participation (Uecker and Mayrl 2007, Uecker, Regnerus, and Vaaler 2007)

Another understanding of the religious life-course may be based on the idea that religious affiliation and participation themselves often contributes to individuals' different life course trajectories. Scholars have noted denomination variations in age-at-marriage, age-at-first-birth, and total fertility (Frejka and Westoff 2008, Glass and Nath 2006, Glass and Jacobs 2005, Uecker and Stokes 2008, Eggenbeen and Dew 2009). Attempts by conservatively religious groups to control teen sexual activity often encourage conservative girls to develop idealized conceptions of romantic love which might push them to seek marriage at earlier ages (Regnerus 2007). For conservative Protestant and Mormon youth, for instance, religious affiliation is associated with greater rates of teen pregnancy and earlier ages at marriage (Regnerus 2007). In addition to younger age-at-first birth, women with higher levels of religious salience generally have higher fertility rates than less-religious or non-religious women (Hayford and Morgan 2008, Frejka and Westoff 2008). Such fertility rates may lead to multiple disruptions in education and labor-force participation and lower career and education outcomes; disruptions increased by lower labor force engagement post-childbirth for conservative Protestant women (Glass and Nath 2006, Glass and Jacobs 2005, Xie and Shuman 2005, Preston 2004) Conservative Protestant boys and men may also make different early academic choices, though evidence of a link between conservative Protestant affiliation and different employment or familial behaviors is mixed (Bartkowski and Hempel 2009, Civettini and Glass 2008, Bartkowski and Xu 2000, Wilcox 2002, Gay, Ellison, and Powers 1996, Bartkowski 2001).

This life-course view of religious engagement pays less attention to perceived direct conflicts between conservative Protestant affiliations and science, or conservative Protestant

rejections of science and education, than to the effects of different life-course trajectories on variation in educational aspirations and attainment. This theory would suggest that conservative Protestant men, with a focus on early roles as future fathers and breadwinners, would make different academic choices than their peers. Likewise, conservative Protestant girls, may be focused on future roles as wives and mothers. This differential focus coupled with more aggressive gender socialization associated with conservative religious doctrines, may increase the tendency of these girls to engage in educational pathways traditionally defined as female. Their earlier age at marriage and differential fertility patterns may inhibit high-school to college trajectories, and they may experience more disruptions along academic or career pathways due both to higher average fertility rates and a tendency to opt out of the workforce for longer periods after childbirth. This theory inherently suggests the importance of a gender-focused approach to issues of religious differences in science.

Religious Involvement and Gender Socialization

Although little work has evaluated the relationship between religious involvement, gender, and education directly, there is a wealth of research pointing to religious-based differences in attitudes toward gender issues and gendered behaviors. Devout women tend to hold more conservative attitudes toward gender roles and family responsibilities than other women (Hayford and Morgan 2008). Likewise, conservative Protestant or fundamentalist attitudes and affiliations were associated with traditional gender attitudes and beliefs in gender stereotypes for both women and men, though the exact nature of these relationships often varied by respondents' gender (Hunt 2001, Peek, Lowe, and Williams 1991, Hoffman and Miller 1997, Bartkowski 2001). Moore and

Vanneman (2003) found that the proportion of conservative Protestants within a community often were associated with more traditional attitudes on gender issues, even among the unaffiliated.

These religious attitudes toward issues of gender, like other attitudes and beliefs about gender and gendered behaviors, are transmitted to the children of conservative Protestants and fundamentalists (Miller and Glass 1989, Fan and Marini 2000, Min, Silverstein, and Lendon 2012). Parental religious involvement is not only associated with children's educational outcomes and teen risk taking behaviors, but also has a powerful role on children's attitudes toward such issues as sexuality and childbearing (Regnerus 2003, Sherkat and Darnell 1999, Pearce 2002).

Regnerus (2007) notes the ways in which conservative religious reliance on gendered stereotypes, which emphasize concepts of female purity and discourage girls from recognizing or exploring their sexuality, impacted both girl's conceptions of romantic relationships and marriage, and their behavioral practices. He notes that in some cases, these stereotypes led to an emphasis on the concept of the 'good girl' as one obedient to religious gender socialization, an emphasis which was often detrimental to healthy sexual practices (Regnerus 2007).

Much of the current scholarly work applying gender socialization theories to religious individuals and experiences has focused on either attitudes toward current political debates on abortion access or equal rights, or on sexual, family, or fertility practices. Less attention has been paid to the ways that specifically religious gender socialization may serve to exacerbate or mitigate the impact of broader gender stereotypes in other areas of life; even as broader research into gender has shown evidence of disparate impacts of gender socialization on nearly every aspect of life. For instance, while scholars have examined the interrelationship between religious engagement, gender, and overall academic outcomes, the impact of this interrelationship on STEM outcomes in particular is largely unexplored. This absence has occurred even as education and gender scholars

and public discourse increasingly focuses on STEM education and employment as a critical factor in American economic success.

Gender Socialization and STEM classes

Much popular and academic attention in recent years has been paid to gender disparities in educational experiences and attainment. Studies have found that girls historically lagged behind boys in math performance, were more likely to regard difficulties in math courses as a sign of inability, and were more likely to view math courses as hostile to them, and math-related careers as incompatible with their anticipated roles as adult caregivers (Hyde and Kling 2001, Jacobs 1991, Johnson, Oesterle, and Mortimer 2001, Eccles and Wigfield 2002, Catsambis 1994, Correll 2001, Eccles 1994).

These disparities may arise quite early and can be transmitted cross-generationally. Bielock et al (2010) found that elementary school girls were likely to internalize their female teachers' math anxieties. The substantial majority of elementary school teachers are women, and girls observing their female teachers' anxieties during mathematics lessons were more likely to internalize messages that mathematics were not appropriate for girls (Bielock et al 2010). Teacher perceptions play a critical role in the messages girls internalize across the academic process. For white girls in particular, some evidence exists of math teacher gender bias in assessing ability (Riegle-Crumb and Humphries 2012). Riegle-Crumb and Humphries (2012) find that this difference in teacher perception varies based on the rigor of courses, with teachers more likely to depend on racial and gender stereotypes in classes where base levels of performance are more variable rather than in higher level or remedial courses.

The impact of teacher assessment on students' outcomes has been well documented, suggesting that the continued reliance of math teachers on gender stereotypes may have long-term

implications for girls' achievement and academic and employment decision making (Trouilloud 2002). Evidence suggests that girls are increasingly closing gaps in math performance and course-taking. However, gendered differences in reasons for taking math courses and academic routes persist and some evidence remains of gendered differences in math and science outcomes (Crosnoe et al 2008, Bae et al., 2000; Riegle-Crumb, 2006; Shettle et al, 2007; Xie and Shauman 2003, Crosnoe et al 2008, Catsambis 1994).

Beyond math courses, teacher perceptions impacted boys' and girls' grades across a multitude of courses. Teacher bias seemed to play a significant role in the assignment of grades, with teachers assigning girls lower grades in math and science and higher grades in language arts (Mechtenberg 2009). Traced across the life course, these biased assessments played a significant role in college pursuit, major selection, and occupational outcomes (Mechtenberg 2009).

These negative stereotypes about which subjects are appropriate for girls can be internalized by young girls and affect science achievement and pursuit. Additional research on gender differences in science achievement find a female disadvantage, particularly among children of separated or divorced parents and in the physical sciences (Smith 1992, Burkham, Lee, and Smerdon 1997, Brotman and Moore 2008) Additionally, as with math skills, girls on average are more critical of their abilities in science, a difference which is especially important as self-perception can shape performance outcomes (DeBacker and Nelson 2000, Crosnoe, Riegle-Crumb and Muller 2007). These differences may be particularly significant when girls make decisions about whether or not to pursue math or science majors in college, where a gendered gulf in pursuit and attainment persists (Brotman and Moore 2008, Linn and Hyde 1989, Xie and Shauman 2003, Brotman and Moore 2008). These early gulfs in math and science course work can have long term consequences, as high school math and science course-taking is correlated with college science

success and STEM careers in adulthood. These decisions to avoid or embrace STEM courses have profound, long-term, socioeconomic implications (Brotman and Moore 2008, Sadler and Tai 2007, Xie and Shauman 2003). Early academic decisions and the social forces that influence them can set girls on paths that leads them away from STEM majors, careers, and salaries.

Researchers exploring influences on teen decision making have repeatedly found that peer networks play a vital role in influencing boys' and girls' experiences in high school (Crosnoe et al 2008, Warr 2002, Fuligni et al 2001). While most of this literature has focused on the influences of peer networks on various behaviors, some education researchers have also examined the role that gendered networks play in shaping academic performances and course-taking decisions. Friendship networks appear to be especially important for girls when it comes to math and science course-taking. Riegle-Crumb et al (2006) found that, for both boys and girls, association with a peer network of academically successful same-sex peers, led students to pursue higher level courses in all fields; an effect that was particularly strong for girls in math and sciences. They posited that this relationship arose because such peer networks offset and undermine traditional stereotypes about 'boy' or 'girl' courses. Crosnoe et al (2008) noted that the academic performance of students' friends was a key predictor in their math course trajectories, an effect that was particularly strong for girls. Academically strong friends also appeared to increase the academic advantages of already high performing students, creating a cumulative advantage effect (Crosnoe et al 2008, Ceci & Papierno, 2005). Disparities, then, can accumulate between successful and unsuccessful students even when both groups are provided with positive mentors and resources.

While some researchers have suggested that parental involvement is less important than peer influences, a plethora of evidence points to the continued importance of family in shaping

students' educational trajectories (Crosnoe 2001a, Crosnoe 2004, Cavanaugh, Schiller, and Riegle-Crumb 2006, Pearson, Mueller, and Frisco 2006). Familial instability can have a significantly detrimental impact on students' academic outcomes (Smith 1992, Cavanaugh, Schiller, and Riegle-Crumb 2006, Cavanaugh and Formsby 2012). Additionally, greater parental engagement can pay dividends in children's math and science performance (McNeal 1999, Muller 1995).

The confluence of these factors, schools as places in which gender norms are reinforced, the role of conservative religious institutions in enforcing and shaping gendered behavioral norms, and the influence of peers and parents on students' behaviors and priorities, suggest that STEM performance and course-taking can become an intensely gendered issue for religious boys and girls. For girls engaged in conservative Protestant denominations, the pressure to perform gendered roles in academic settings can come from a multitude of sources. Not only do they receive the same sorts of pressures from schools and teachers that all female students do, they may experience additional religious pressures to conform to gendered roles, where these norms are enforced on all sides.

Messages received in conservative Protestant, evangelical, or fundamentalist churches that place primacy on women and girls as caregivers, mothers and wives may emphasize the idea that girls should seek to please others, and may push them simultaneously to be good students and to steer clear of academic areas that are inappropriate for girls or where girls may particularly fear failure. These messages may be reinforced by conservative Protestant parents who both perform these gendered roles within the home and hold a particular set of expectations for daughters' interests, goals, academic pathways, and in-school behaviors.

Such messages may be even further enforced for religiously conservative girls by a network of similarly religiously affiliated peers who implicitly police their behaviors, interests,

and choices. Thus, conservative Protestant, evangelical, and fundamentalist girls may find themselves trapped in a 'gender pressure cooker' where they are surrounded by friends, peers, teachers, parents, and religious institutions which actively encourage and reinforce particular stereotypes about gender.

This phenomenon should be particularly visible when girls engage with science and mathematics courses in high school. They may, at once, feel pressure to take appropriate coursework to demonstrate that they are 'good girls' and be more likely to believe gendered stereotypes about what academic fields girls perform best in. If the pressure cooker has an impact on the behavior of girls in school then, in addition to expected albeit declining gender differences in high school STEM outcomes, conservatively religious girls may be further disadvantaged. They may be especially unlikely to take additional elective science courses, but rather exit science coursework at an earlier point. They may also experience performance penalties in keeping with the perception that science and math are 'boy' subjects.

In the remainder of this chapter I will: a) Establish three conceptual models discussing possible relationships between religious engagement and STEM outcomes, b) Test these models using Add Health data, and c) Discuss the results of these tests and their implications for understanding the relationship between gender, religious engagement, and STEM education.

Conceptual Models

Two different possible relationships exist between religious involvement and STEM educational trajectories for conservative Protestant students. These relationships are based on the two types of theories of religion and science education introduced in Chapter One and discussed above. These are: cultural isolationism and cognitive dissonance theories and gendered religious

life course theories. Each of these theories lends itself to a different conceptual understanding of the interrelationship of religion, gender, and science and each forecasts different statistical results.

The first of these three models is that of cultural isolationism and cognitive dissonance. This theory argues that particular sub-populations of conservative Protestants may be particularly distrustful of educational institutions. These sub-populations may be especially disinterested in pursuing higher level academic pathways and may generally be disengaged in schooling. They are more likely to object to elements of science on moral grounds, disapproving of the presence of scientific claims in political debates. Cognitive dissonance approaches argue that, as consequence of prior religious belief commitments, conservative Protestants may have difficulty internalizing scientific concepts and theories. If this cultural isolationist/cognitive dissonance model holds, we would expect to see several distinct patterns emerge when studying high school science course-taking and performance. First, we would expect conservative Protestant students to take fewer average science courses than other students, in keeping with a general disinvestment in the institution of education. We would also expect to see them perform more poorly in the science classes they do take. Second, we would expect to see significant effects of friend and parental affiliations on course-taking, in keeping with the conception of conservatively religious Americans as members of closely-knit and culturally isolated communities. Finally, we would see these effects as being consistent across genders as the rejection of broader American social institutions and the internalization of religious truths is unlikely to be a gender-specific phenomenon.

If, however, conservative affiliations produce differences in science achievement not as consequence of any philosophical opposition to science itself, but as consequence of differential religious life courses, we would expect to see substantial and consistent differences between conservative Protestant boys and girls in science course-taking and grades. Conservative Protestant

girls, in keeping with the internalization of gendered religious socialization, would be likely to perform more poorly in science courses than other girls. Conservative Protestant boys should experience no such GPA deficits relative to their male peers but may take fewer elective science courses, anticipating employment and fatherhood post-secondary school rather than college preparation. For girls, having conservatively affiliated parents and friends should create a gender socialization 'pressure cooker', meaning that conservatively religious parents or friends should also be associated with larger science gaps for girls. Conservatively religious friends should not have a similar impact on boys, who are receiving different messages about gendered academic aptitudes and expectations.

Data

Data for this chapter come particularly from Waves I and III of the Add Health and the AHAA study conducted in concordance with the Add Health (Bearman, Jones and Udry 1997). The Add Health dataset, as discussed in Chapter One, is a nationally representative longitudinal study of American students. The first wave of the survey was conducted in the years 1994-1995 and sampled students in 7^{th}-12^{th} grade. A large, stratified, in-school survey was conducted (n=90,118) students in the first wave of data, with a subsequent in-home survey of a subset (n=20,745) of these students. In addition to this in-home survey of students, researchers also collected surveys from one of the students' resident parents (n= 17,670), most frequently the resident mother. Additionally, school administrators (n=172) at the 132 schools from which Add Health respondents were drawn were surveyed as well and provided additional information about schools.

The third wave of the survey was conducted in the years 2001-2002 when respondents ranged in age from 18-27. This wave succeeded in re-interviewing 15,197 of Wave I respondents, approximately 73% of the initial sample. At that time, respondents were asked to sign a form authorizing the release of their high school transcripts. These transcripts form the education component of the Add Health and were collected and analyzed in the separately funded AHAA study.

The AHAA collected transcripts for the last high school of record for (n=12,217) Wave III respondents who signed transcript release forms. This comprised approximately 91% of Wave III respondents. The transcript data includes measures of both the sequence of course-taking and of academic performance. This data is particularly beneficial in addressing potential inaccuracies that might arise from self-reporting, in arranging coursework into logical sequences consistent with other large academic surveys, and in providing additional school information.

This chapter restricts the analytical sample to (n=10,632) students who completed both Waves I and III of the survey, have data on friendships, have associated parental surveys, and have associated transcript data from the AHAA. In order to address the issue of causal ordering, respondents were further restricted to students in 9^{th} grade or earlier grades at Wave I (n=5,873). Table (2-1) below shows the resulting sample sizes from these restrictions and the effects of these restrictions on the unweighted proportional representation of girls, and of race/ethnic and religious groups represented in the resulting sample. In analysis, the sample was weighted using the longitudinal analytic weights constructed by and recommended by the Add Health (Chen and Chantala 2014).

Missing Data and Collinearity

There is much debate within the literature about the best method of addressing the issue of missing data. Some researchers argue that, in cases where data is missing at random, list-wise deletion of missing cases is the most straightforward methodology, and frequently differs minimally from other methods in shaping subsequent findings (Efromovich 2011, Muller 2009, Koul, Muller, and Schick 2012). However, list-wise deletion or complete case analysis also has limitations. For example, this method may generate results with larger standard errors, biased parameter estimates, and wider confidence intervals (Weinfurt et al 2002). The resulting analysis may also have less power. Others argue in favor of mean imputation of missing values in order to maintain a robust sample size and retain the information available in the non-missing data associated with each case (Schafer and Schenker 2000, Myunghee1997). However, mean imputation, because it assumes missing cases will present 'average' values, can lead to an underestimate of variance and inaccurate assessments of the precision of results (Schafer and Schenker 2000).

In this chapter and all subsequent analytical chapters, I use multiple imputation to address missing data. Multiple imputation, like mean imputation, allows the researcher to maintain a larger sample size. Unlike mean imputation it uses other data available within the survey to aid in maintaining variance during the estimation of missing values (Schafer and Schenker 2000, Myunghee 1997). There is also a great deal of debate within the field about the appropriate number of imputations to use for best results. Most recommendations range between 3 and 50 imputations as optimal depending on such factors as the proportion of data which is missing (van Buuren, Boshuizen, and Knook 1999, Kenward and Carpenter 2007, Horton and Lipsitz 2001, Schafer and Olsen, 1998, Schafer 1999, Graham, Olchowski, and Gilreath 2007, White et al. 2011, Bouhlila

and Sellaouti 2013). White et al (2011) suggested that researchers use a rule of thumb wherein the number of imputations corresponds to the proportion of data which is missing. For example, in a case where 20% of data was missing, 20 imputations should be used. A clear consensus on this issue does not yet exist.

In this case, the analytic variables generally contain few missing cases. The variables in this chapter with the largest number of missing cases, parental self-reported income, had roughly 13% of cases imputed. Most of the other missing cases represented less than 5% of responses on a given variable. In keeping with more conservative recommendations, 20 imputations were used. The appendix includes a list of the number of missing cases imputed for key measures in all chapters. Additionally, ancillary analysis was conducted using list-wise deletion of missing cases, and were largely consistent with results obtained using this imputation methodology.

Any time multiple indicators are used to examine a phenomenon, the possibility of multicollinearity arises. To test for multi-collinearity, I examined tolerance and variance inflation factor (VIF) statistics. VIF values across models were consistently below 2 and in most cases below 1.5. These values are safely below those established by varied recommended thresholds which range ranging between 4-10 (Von Eye and Schuster 1998, Cohen et al 2003).

Dependent Variables

In order to distinguish between disinterest in taking scientific coursework and poor performance in science curriculum, two separate measures are analyzed within this chapter. The first, measuring the highest science course a student passed, comes directly from the AHAA transcript data. Science courses were sequenced by AHAA researches using the Classification of

Secondary School Courses (CSSC). The CSSC was constructed to provide a logical standard for researchers and educators to use when classifying courses at different schools and when analyzing transcript data. It has been used in most major educational surveys and thus allows for consistency in analysis across most major datasets and with existing literature. Under the CSSC, and thus within the AHAA, science courses were classified as: 1. Basic or Remedial Science, 2. General Earth Sciences, 3. Biology, 4. Chemistry, 5. Biology/Chemistry II, and 6. Physics.

One limitation of this dependent variable is that students are not required to take science courses in one set order and can skip over some 'steps' in this sequence. For instance, a student who takes biology, then skips to physics would have the same value under this measure as a student who took the intervening chemistry and advanced science coursework. This measure also does not include students who attempted, but failed, a particular science course.

The second dependent measure presented in this chapter is student cumulative science GPA. This measure comes directly from the AHAA dataset and is coded on a traditional 0 to 4 scale with 0 representing an F and 4 representing an A. In this case, as such a simplified construction inherently reduced the sensitivity of measurement, I present the results of the original, unaltered, measure of science performance.

This measure does have some limitations. For instance, unlike the GPA methodology established in many school districts, this measure is not tied to the difficulty of the course. As consequence, an A in a regular level biology course is treated as having the same value as an A in a pre-advanced placement (Pre-AP) or advanced placement (AP) biology course, and an A in basic science has the same proportionate weight as one in physics. To control for this second form of variability, a measure of the highest science course taken by a student was included in GPA

models. The descriptive statistics for these dependent variables and those variables discussed below are presented in Table 2.1.

Given the gender-charged nature of discussions of math aptitude and the wealth of literature pointing to gender variations in math, additional analyses of personal religiosity were conducted using highest math passed and math GPA as dependent variables. The findings of these analyses are presented in the appendix, but not discussed in this chapter.

Key Independent Variables

In order to address issues of temporal ordering, measures of religious affiliation, friend affiliation, and religious involvement were constructed based on students' Wave I survey responses. In keeping with much of the current literature on the impacts of religious involvement on various facets of life, Protestant religious denominations were coded largely along the schema established by Steensland et al. (2000) with the exception of African American Protestants who were separated into larger categories rather than coded as one group. Classifying African Americans into several broader categories rather than one group allows for the distinction between race/ethnic effects and those of a particular religious ideology.

The resulting denominational measures are a series of separate dummy variables signifying conservative Protestant, mainline Protestant, or other Protestant group affiliations. Unlike the GSS used in Steensland et al (2000), Baptists in Wave I of the Add Health were classified in one large group. This clustering can obscure significant differences in belief across Baptist groups. In order to address this issue, Baptists who agreed with the question "Do you agree or disagree that the sacred scriptures of your religion are the word of God and are completely without error?" were

coded as conservative Protestants while Baptists who disagreed were coded as mainline Protestants. The breakdown of this classification schema is presented in the appendix. Additional variables for the unaffiliated and Catholics were constructed as well. Jews, Muslims, and those affiliated with other religious groups represented too small a proportion of student respondents to analyze separately, and are thus combined into one 'other religion' group. Parents' religious affiliations were coded using the same schema and the breakdown of parental religious denominations is presented in the appendix as well. Measures of friend's religious affiliations, drawn from friends' responses to the same affiliation question (discussed below) also used this denominational schema.

Much of the research into the influence of religion has noted the importance of analyzing religion as a multi-faceted phenomenon (Levin, Taylor, and Chatters 2005, among others). Researchers have noted variations in the impact of personal religious beliefs and the social impacts of religious involvement, for instance, in shaping individuals' experiences and behaviors. These variations have been noted in research into religious involvement and education as well (Regnerus 2003, Darnell and Sherkat 1997, Lehrer 2004, Lehrer 2006, Beyerlein 2004) In keeping with this approach and utilizing the data available through the Add Health, I separately analyze students' personal religious engagement, the engagement of their parents, and the religious involvement of social networks.

In this case, personal religious behaviors were constructed using two measures of religious engagement: prayer and church attendance. For prayer, students were asked "How often do you pray?" and chose: once a day, once a week, once a month, less than once a month, or never. For attendance, students were asked "In the past 12 months, how often do you attend religious services?" and choose between: once a week or more, once a month or more but less than once a

week, less than once a month, or never. For ease of interpretation, I joined both sets of responses into one measure of student devoutness and standardized the resulting measure with higher values corresponding to greater religious behaviors (alpha=.84). Additional analyses were conducted with prayer and attendance used as separate analytical measures coded with higher numbers representing greater frequency, and are presented in the appendix.

Social religious engagement was measured through an analysis of respondents' friendship network data. In Wave I, Add Health respondents were asked to nominate up to five friends of each sex. Friends who were also Add Health participants were then tied to initial respondents using their unique identification numbers, allowing researchers to have friends' responses on all measures. Using the variable construction discussed above, dummy variables were established measuring the religious affiliation of each of respondent's closest male and female friends respectively as discussed above. I then constructed ratios to determine the proportion of all friends, male friends, and female friends affiliated with particular religious traditions.

I also constructed measures of the religiosity of friendship networks by constructing means of friend's religious devotion measures (discussed above). These measures were separated for male and female friends respectively and collectively. Additionally, a control for the number of friends respondents reported was included in analytical models. In gender specific models this control was restricted to friends of each gender.

Particularly for respondents who were still in middle school at Wave I, religious involvement is heavily shaped and influenced by parental religious engagement. Students may be involved with a church or frequent attenders not because they themselves have an interest in religious engagement or believe the tenants of a particular tradition, but because of parental pressures. Additionally, as discussed above, parental modeling of religion and gender practices

can have a profound effect on children. As consequence, utilizing the resident parent survey, measures of parental religious devotion and parental affiliation were constructed using the methodologies discussed above. There is a risk in analyzing parents' personal religious devotion, that such a measure might become a proxy for students' engagement. More religiously involved parents may be more likely to take their children to services with them. In order to distinguish between the effects of parents' personal religious devotion and the likelihood that religious parents are more likely to take their children to religious services, a separate measure of joint service attendance is included in analysis. This measure is based on responses to two questions "Which of the following things have you done with your biological mother in the past four weeks: Have you gone to a religious service or church-related event?" and "Which of the following things have you done with your biological father in the past four weeks: Have you gone to a religious service or church-related event?". In the resulting measure 1=attendance with either or both parents and 0=no attendance. The correlations between these various religion and religious network measures are presented in Tables 2.3 and 2.4.

In order to separate the influence of familial religious attendance itself from that of overall familial intimacy, an additional 14-point scale of students' reports of activities and conversations with parents at Wave 1 was also constructed. One point was assigned for a positive response to each of the following questions for either parent: "Which of the things listed on this card have you done with your [mother/adoptive mother/stepmother/foster mother/etc. or father/adoptive father/stepfather/foster father/etc.] in the past four weeks: gone shopping, played a sport, talked about somebody you are dating or a party you went to, gone to a movie/play/concert/museum/sports event, had a talk about a personal problem you were having, talked about your school work or grades, worked on a project for school, or talked about other

things you are doing in school?**".** The Cronbach's alpha for the resulting measure had a scale reliability coefficient of .92.

Ancillary analyses of the relationship between parent-child discord in affiliation and science course pursuit and performance were conducted and are presented in the appendix.

Several controls for potential confounding variables are also included in this analysis. These include dummy measures of school urbanity (with suburban as the reference category in analysis), measures of the geographic region of the school (with Midwest serving as the reference category), measures of resident parent marital status (with married serving as the reference category), a measure of parental income at Wave I, student age, the year in which respondents entered high school, race/ethnicity of respondents, whether respondents were born in the United States, and the language respondents speak at home. Additionally, a control for whether respondents came from a Catholic school (1= catholic school) was included. In analyses of friend influences, the above referenced control measure of respondents' network size was included and in analyses of parental influences, the above discussed control measure of familial intimacy was included. Additionally, as discussed above, in models of cumulative science GPA, a control for the highest science course taken by the respondent was included.

Analytical Strategy

Both dependent measures are analyzed using ordinary least squares (OLS) regression. Table 2.5 presents a series of models on the influence of students' personal religious engagement with results for highest science course taken. Table 2.6 presents the same models for cumulative science GPA. Table 2.7 presents models of parental religious devoutness, whether parents bring children to services, and parental religious denomination for highest science passed. Table 2.8

presents the same models for cumulative science GPA . Finally, Tables 2.9 through 2.11 present the impact of religious social networks on highest science completed and cumulative science GPA respectively. All analytic tables are weighted using the weights established by and recommended by the Add health (Chen and Chantala 2014).

Ancillary Analyses

Several ancillary models were also tested for this chapter and are included in the appendix. As mentioned above, cumulative math GPA and math course completion, which are also tied to STEM outcomes and frequently act as the site of gender disparities, were tested against respondents' religiosity and are included in the appendix. While religious service attendance and prayer frequency were heavily correlated, with a high Cronbach's alpha, in studies of other outcomes, they often play distinctly different roles. Analyses separating these measures are included in the appendix.

There are many reasons why students and parents may report different religious affiliations, particularly given the young ages of students. Ancillary analyses of instances in which students did not report the same religious affiliation as parents were conducted and are included in the appendix. Finally, ancillary analyses examining the interaction between affiliation and engagement for boys and girls were conducted and are included in the appendix. These interactions were largely insignificant. Further analyses of this relationship between affiliation and engagement, evaluating conservative Protestants with high or low levels of religious engagement, also showed no significant differences and are not included.

Results

Table 2.1 presents the effects of sample restrictions on key demographic measures of the sample population. First it displays demographics for the full transcript data, then demographics for the age restricted sub-sample. It provides demographics separated by gender.

The analytic sample was slightly whiter than the full transcript sample, slightly less likely to be Hispanic, and more likely to be African American. The younger analytic sample was largely similar to the full transcript sample, though slightly less Catholic and more conservative Protestant. Table 2.2 presents descriptive statistics for key variables used in analysis. These statistics are gender separated. Consistent with girls' higher rates of college graduation, a larger proportion of female respondents reported intending to attend college. Girls were more religiously active than boys, consistent with higher rates of female religiosity. Parents of boys and girls reported similar levels of religious activity. Boys had larger standard deviations in both dependent measures, though their mean scores on both were slightly lower than those of girls. Most students of both sexes had parents who were married at Wave I, spoke English at home and were raised in suburban homes. A small subset (3%) of respondents attended catholic schools.

Table 2.3 displays correlations for religious denomination measures used in this chapter. There was a great deal of harmony between students' reported religious affiliations and those of parents, though the size of correlations was not consistent across affiliations. Catholics, religious minorities, and conservative Protestants had large and significant correlations between parent and child affiliations while other Protestants and the unaffiliated had significant, but smaller correlations.

Table 2.1: Sample Characteristics

	Boys Samples		Girls Samples	
	Transcript	Analytic	Transcript	Analytic
African American	.16	.20	.22	.23
Hispanic	.19	.13	.15	.12
NH White	.57	.61	.57	.62
Other Race	.12	.09	.11	.07
Native Born	.71	.73	.72	.74
English at Home	.89	.93	.91	.94
Conservative Protestants	.25	.27	.26	.28
Mainline Protestants	.27	.28	.28	.28
Other Protestants	.03	.02	.03	.03
Catholics	.26	.24	.26	.23
Other Religions	.05	.05	.04	.04
No Religion	.12	.12	.11	.11
Sample Size	5687	2483	6337	2882

The correlations suggest that in-school friendship networks are not religiously homogenous. Most friendship network correlations were small in size and insignificant. Likewise, there is little relationship between parents' religious affiliations and those of students' friends. Because friendship networks variables are restricted to friends who also participated in the Add Health survey, it is possible that religious students have separate networks of friends from school and from their places of worship. Friends from services but not schools would not be captured in this survey data.

Table 2.4 displays the correlations of religious involvement variables. Consistent with the lack of denominational homogamy in friendship networks, the devoutness of friendship networks was generally unrelated to respondent or parental religious affiliations. Students' and parents' religious engagement were more significantly correlated. Given the average age of respondents in the subsample, this level of positive correlation is unsurprising.

Table 2.2: Descriptive Statistics

	Boys		Girls	
	Mean	Std. Dev	Mean	Std. Dev
African American	.20		.23	
Hispanic	.13		.12	
NH White	.58		.58	
Other Race	.09		.07	
Native Born	.73		.74	
English at Home	.93		.94	
Rural	.18		.18	
Urban	.29		.28	
Suburban	.50		.50	
College Intent	.52		.63	
South	.38		.38	
West	.19		.17	
Northeast	.14		.15	
Married Parents	.75		.73	
Catholic School	.03		.03	
Student Religion Measures				
Conservative Protestant	.27		.28	
Mainline	.28		.28	
Other Protestant	.02		.03	
Catholic	.24		.23	
Other Religion	.05		.04	
Not Religious	.12		.11	
Religious Activities	-.09	1.02	.08	.98
Parent Religion Measures				
Parent Conservative Protestant	.27		.29	
Parent Mainline	.26		.25	
Parent Other Protestant	.09		.09	
Parent Other Religion	.05		.04	
Parent Catholic	.31		.28	
Parent Not Religious	.05		.06	
Parent Religious Activities	-.01	1.01	.01	.99
Dependent Variables				
Highest Science Passed	3.93	1.76	4.14	1.56
Cumulative Science GPA	2.16	1.03	2.44	.98

Table 2.3: Network Correlations

	Parent Denominations						Friend Denomination					
	1	2	3	4	5	6	1	2	3	4	5	6
Respondent Denom.												
1. Conservative Prot.	.62***	-.19***	.04***	-.08***	-.36***	-.10***	.02	.00	-.01	.02	.02	.00
2. Mainline Prot.	-.13***	.54***	-.08***	-.05***	-.26***	-.07***	.02t	.02	.00	.03*	.00	.01
3. Other Prot.	.09***	-08**	.43***	-.03t	-.01	-.06***	-.02	.04	-.01	.00	-.01	-.01
4. Other Religion	-.34**	-.26***	-.11**	.70***	-.12***	-.09***	-.00	.00	-.03t	-.02	-.00	-.01
5. Catholic	-.33*	-.28***	-.15**	-.11***	.78***	-.08***	-.00	-.02	.00	-.00	.00	.02
6. Not Relig.	-.12***	-.01	.02	.03**	-0.11**	.36***	-.03	-.02	.01	-.00	.01	.00
Friend Denom.												
1. Conservative Prot.	.01	.04**	-.01	-.01	.02	.01						
2. Mainline Prot.	-.02	.03	.01	.01	-.04t	.02						
3. Other Prot.	-.01	.01	.02	-.00	.01	-.01						
4. Other Relig.	.02	.00	.01	-.01	.00	.03						
5. Catholic	-.02t	.03	.01	.00	-.01	.01						
6. Not Relig.	-.01	-.02t	-.01	.01	-.03*	.00						

Students' conservative Protestant affiliations were significantly and positively correlated with personal religious activities, parents' religious activities, and religious service attendance with parents. Students' lack of religious affiliation was, unsurprisingly negatively correlated with personal and parental religious activities. Students' mainline Protestant affiliations were significantly positively correlated with the likelihood of attending services with parents.

The concentration of conservative Protestant in ones' friendship network was largely unrelated to other measures of religious involvement, with the exception of measurements of network devoutness. Friendship networks with greater concentrations of conservative Protestant friends were likely to be more devout as well. The same was true for concentrations of mainline friends, though the association was not as large. Greater concentrations of irreligious friends were negatively correlated with friendship network devoutness.

Parents' conservative Protestant affiliations were significantly positively associated with taking children to services, parents' own religious activities, but negatively related to the devoutness of friendship networks. Unaffiliated parents were significantly negatively associated with children's religious engagement.

Table 2.5 displays the OLS coefficients for respondents' early religious affiliations and the highest science course they received transcript credit for. Results are separated by gender. Model 1 presents the relationship between Wave I religious affiliations and highest science course completed on school transcripts. Both conservative Protestant boys and girls had lower science course completion than other students, though the size of the effect was larger for boys. For both boys and girls, an absence of religious affiliation was more negatively associated with science course completion than conservative Protestant affiliations; the size of this effect was much larger for boys.

Table 2.4: Activities Correlations

	1	2	3	4
Religious Activities				
1. Respondent Religious Activities		.43***	.35***	.00
2. Parents Take Children to Services			.39***	.03*
3. Parent Religious Activities				.01
4. Friends Religious Activities				
Respondent Denominations				
Conservative Protestant	.23***	.17***	.35***	.00
Mainline Protestant	.02	.43***	-.06**	.02
Other Protestant	.09***	.06***	.07***	-.04***
Not Religious	-.41***	-.03t	-.11***	-.02
Catholic	.05***	-.03t	.01	-.01
Other Religion	.04t	-0.00	-.04***	-.00
Friend Denominations				
Conservative Protestant	.01	.03t	.01	.44***
Mainline Protestant	-.01	-.03	-.02	.26***
Other Protestant	.01	.02	-.01	.10***
Not Religious	-.02t	-.00	-.00	-.20*
Catholic	-.02	-.00	.02	.12***
Other Religions	.09***	-.02	-.05**	.09***
Parent Denominations				
Conservative Protestant	.12***	.16***	.14***	-.01*
Mainline Protestant	-.01	-.01	-.08**	.04***
Other Protestant	.02*	.04**	.00	.01
Not Religious	-.22***	-.14**	-.04t	.01
Catholic	.02t	-.05***	-.03**	.01
Other Religion	-.06**	.02	-.07***	.01

Model 2 shows the relationship between religious activities and highest science course passed for boys and girls. Consistent with a wealth of literature on the positive effects of religious engagement on adolescents, greater frequency of religious activities were positively associated with science course completion. The gains associated with activities were greater for boys than girls, but experienced by both.

When demographic controls were included in Model 3, the negative effects of conservative Protestant affiliations for girls disappeared. The same is not true for boys. Though control measures reduced the size of the association, conservative Protestant boys still took significantly fewer science courses than their male peers.

Table 2.5: Student Religion and Highest Science Passed: OLS Coefficients

	Model 1		Model 2		Model 3	
	Boy	Girl	Boy	Girl	Boy	Girl
Conservative Protestant	-.38**	-.28**			-.28*	-.16
Other Religion	-.03	.17			-.26	.10
Other Protestant	-.38	-.56*			-.44	-.38
Not Religious	-1.04***	-.40**			.02	.54
Catholic	.23t	-.05			.09	-.06
Religious Activities			.39***	.18***	.30***	.31**
Age					.03*	-.16***
Other Race					-1.14	-.86*
Hispanic					-.16	-.63*
African American					-.06	-.49*
South					.01	.29*
West					-.32*	.01
Northeast					.10	.43***
Married Parents					-.13	-.15
Parent Income					.75***	.38**
Native Born					-.25*	-.16t
Catholic School					.45t	.28
English at Home					-.19	-.62**
Rural					-.01	-.05
Urban					-.13	.12
Constant	4.11***	4.28***	3.93***	4.11***	5.76**	6.67***

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001
Male n=2483, Female n=2882

Table 2.6 displays the relationship between cumulative science GPA across high school courses and student religious affiliations and engagement. Consistent with gaps in in conservative

Protestant course completion, conservative Protestants had lower cumulative science GPAs. Model 1 shows the association between early adolescent religious affiliations and ultimate science course GPA for boys and girls. Conservative Protestant boys experienced larger GPA deficits among their peers than conservative Protestant girls, but both experienced significant negative associations between affiliation and GPA. As with highest science passed, an absence of religious affiliation was more negative for GPA for both boys and girls than conservative Protestant affiliations. Supportive of prior research, in Model 2, greater levels of religious engagement were associated with better science course performance for both boys and girls; though the effects were slightly larger for boys.

In the full model, demographic control measures failed to explain the negative relationship between youthful conservative Protestant affiliations and science GPA for boys. For girls, when demographic controls were included, conservative Protestant affiliations were unrelated to science GPA. This is consistent with science course pursuit, where conservative Protestant boys experienced significant deficits when full controls were included but girls did not.

Table 2.7 presents the relationship between parent religious affiliations and activities and children's ultimate science course-taking outcomes. Model 1 presents the association between parent religious affiliations and children's science course-taking outcomes. Consistent with personal religious measures, parents' conservative Protestantism was negatively associated with science course attainment for both boys and girls. The size and significance of parent gaps were much larger than those of students' personal affiliations. Performance gaps were larger in Model 1 for boys than girls. As was true of science course-taking boys and girls whose parents reported no religious affiliations experienced greater deficits than students whose parents reported conservative Protestant affiliations.

Table 2.6: Student Religion and Cumulative Science GPA: OLS Coefficients

	Model 1		Model 2		Model 3	
	Boy	Girl	Boy	Girl	Boy	Girl
Conservative Protestant	-.26**	-.18**			-.18*	-.09
Other Religion	.10	.12			-.02	.01
Other Protestant	.11	-.32t			.23	-.27
Not Religious	-.41***	-.29**			.18	.32*
Catholic	.02	-.08			-.05	-.04
Religious Activities			.17***	.13***	.14**	.20***
Highest Science Passed					.26***	.32***
Age					-.07*	-.06*
Other Race					-.09	-.41
Hispanic					-.22*	-.38**
African American					-.38***	-.49***
South					.05	.15*
West					.11	.20**
Northeast					-.19*	-.08
Married Parents					.05	.04
Parent Income					.19***	.11**
Native Born					-.08	-.01
Catholic School					.18	-.11
English at Home					.10	-.06
Rural					-.14t	-.05
Urban					-.13t	-.09t
Constant	2.25***	2.55***	2.14***	2.43***	1.81**	1.79**

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001
Male n=2483, Female n=2882

Model 2 displays the relationship between parents' religious activities and children's science outcomes. Parents' religious activities were positive for boys, but insignificant for girls. Children who went to religious services with their parents experienced large benefits in science course completion, though the effects were somewhat larger for boys.

Table 2.7: Parent Religion and Highest Science Passed: OLS Coefficients

	Model 1		Model 2		Model 3	
	Boy	Girl	Boy	Girl	Boy	Girl
Parent Religion						
Conservative Protestant	-.64***	-.35***			-.41*	-.01
Other Religion	-.07	.55**			-.05	.50*
Other Protestant	-.39t	.06			-.40	-.01
Not Religious	-.75**	-.44**			-.04	-.00
Catholic	.13	-.04			.08	.02
Parent Activities						
Religious Activities			.10*	.02	.12*	.04
Attend with Children			.58***	.42***	.37**	.30**
Closeness with Parents					.03	.06***
Age					-.20**	-.16***
Other Race					-1.30t	-.89**
Hispanic					-.16	-.54**
African American					.01	-41**
South					-.03	.32**
West					-.38*	-.03
Northeast					.05	.40**
Married Parents					-.15	-.19
Parent Income					.70**	-.33***
Native Born					-.25*	-.15
Catholic School					.48*	.30
English at Home					-.05	-.54**
Rural					-.07	.02
Urban					-.09	.12
Constant	4.12***	4.24***	3.78***	4.01** *	5.90***	6.39***

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001
Male n=2483, Female n=2882

In the full model, sons of conservative Protestants continued to take fewer science courses. This is consistent with students' own conservative Protestant affiliations, where gaps remained in

full models for boys but not girls. They also remained larger for boys than gaps associated with personal affiliation.

Table 2.8 displays OLS coefficients of the relationship between parents' religious affiliations and activities and students' cumulative science GPAs. In Model 1, the negative effects of parent conservative Protestantism in science GPA was large for both boys and girls relative to their peers. Unlike prior models, Conservative Protestant boys and girls experienced GPA disparities of similar size in this model.

In Model 2, parents' religious involvement was unrelated to boys' and girls' science course performances. Whether parents reported attending services with children was more beneficial to cumulative science GPA than students' self-reported religious activities. In Model 3, the effects of parent conservative Protestantism were explained for boys when demographic controls were included in analysis. This was not the case for daughters of conservative Protestant parents, who continued to achieve lower science course performance. This finding, too, contrasts to earlier tables in which conservative Protestant boys and sons of conservative Protestants experienced negative science outcomes in full control models. This also suggests that, for girls, parent's conservative Protestantism is more important than personal conservative Protestantism in reducing overall science GPA.

The final three tables in this chapter present the effects of religious social networks on students' science performance and pursuit. Table 2.9 shows the OLS coefficients of all reported friends on both boys and girls. Table 2.10 presents the effects of gender separated social networks on boys' science course pursuit and performance. Table 2.11 presents the effects of gender separated social networks on science outcomes for girls.

Table 2.8: Parent Religion and Cumulative Science GPA: OLS Coefficients

	Model 1		Model 2		Model 3	
	Boy	Girl	Boy	Girl	Boy	Girl
Parent Religion						
Conservative Protestant	-.34***	-.37***			-.05	-.17**
Other Religion	.04	.21t			.06	.05
Other Protestant	.01	-.05			.07	-.23
Not Religious	-.10	-.21t			.18	.17
Catholic	-.01	-.17**			-.00	-.07
Parent Activities						
Religious Activities			-.01	.01	.02	.06*
Attend with Children			.37***	.29***	.17*	.15**
Closeness with Parents					-.00	.02t
Age					-.06*	-.05*
Other Race					-.13	-.46t
Hispanic					-.16	-.35***
African American					-.36**	-.46***
South					.05	.17**
West					.11	.20**
Northeast					-.20*	-.10
Married Parents					.07	.06
Parent Income					.19**	.09*
Native Born					-.08	-.00
Catholic School					.22	-.10
English at Home					.16	.07
Rural					-.15t	-.02
Urban					-.11	-.07
Highest Science Taken					.26***	.32***
Constant	2.22***	2.61***	2.03***	2.36***	1.48*	1.59***

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Male n=2483, Female n=2882

In Table 2.9 Model 1 shows the relationship between peer networks' religious affiliations and students' science course pursuit and performance for both boys and girls. This model shows no association between conservative Protestant peer network affiliations and science outcomes.

Only possession of a network of friends engaged in minority religions was associated with science outcomes, and only for cumulative science GPA.

Consistent with other research demonstrating effects of academically positive peer networks on students' course outcomes, possession of a more religiously devout social network in middle school or early high school was positively associated with boys' and girls' science course-taking and science GPAs. When demographic controls were included in full models, the effects of networks' religious activities on GPA disappeared, though they persisted for course-taking.

Table 2.10 displays the associations of gender specific social networks and boys' science course-taking and performance. Models 1 and 2 present the associations between friendship network religious density and science course-taking and performance separately by network gender. Neither male nor female friendship networks' religious density were meaningfully related to science outcomes. Models 3 and 4 display associations between network devoutness and science outcomes. While both male and female friendships were positively associated with science course-taking and GPA, the religiosity of male friendship networks had larger relative impacts on both outcomes than female friendship networks. In full models, friendship network religious activities were only positively associated with science course taking. The size of the effect of male and female networks were similar, though the significance of the association remained larger for male networks.

Table 2.10 displays the associations of gender-specific social networks and girls' science outcomes. Models 1 and 2 present the associations between gender specific religious network density and science outcomes. For girls, conservative Protestant friendship networks of either sex were unrelated to science outcomes. Only a network dense in female Catholic friends was

associated with science outcomes; this association negative and, in the case of course-taking, marginal.

Table 2.9: All Friends' Religion: OLS Coefficients

	Model 1		Model 2		Model 3	
	Classes	GPA	Classes	GPA	Classes	GPA
Friends' Religion						
Conservative Protestant	.08	.06			-.02	.02
Other Religion	.12	.19*			.09	.16t
Other Protestant	.27	-.11			.24	-.17
Not Religious	.22	-.01			.25t	-.02
Catholic	-.24	-.03			-.20	.08
Friends' Activities						
Religious Activities			.33***	.19***	.02***	.02
Age					-.19***	-.05**
Other Race					-.95**	-.36t
Hispanic					-.34**	-.28***
African American					-.21t	-.41***
South					.19	.12*
West					-.18*	.17**
Northeast					.26*	-.17**
Married Parents					-.12	.07
Parent Income					.59***	.16***
Native Born					-.20**	-.05
Catholic School					.47**	.09
English at Home					-.51**	.05
Rural					-.04	-.09t
Urban					.07	-.07t
Highest Science Taken						.30***
Constant	4.18***	2.29***	3.80***	2.15***	6.49***	1.48***

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; n=5,365

Table 2.10: Boys' Friends Religion: OLS Coefficients

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA
Boy Friends' Religion												
Conservative Protestant	.01	.05							-.06	.04		
Other Religion	-.00	.07							.07	.10		
Other Protestant	.03	-.21							.04	-.24		
Not Religious	.30*	.10							.26	.00		
Catholic	-.16	.00							-.30t	-.00		
Girl Friends' Religion												
Conservative Protestant			-.13	-.12							-.19	-.02
Other Religion			.13	.11							.11	.09
Other Protestant			-.03	-.02							.26	.14
Not Religious			-.05	.03							-.03	.19
Catholic			-.08	.13							-.19	.10
Friends' Activities												
Male Friends' Religious Activities					.38***	.21***			.02***	.00t		
Female Friends' Religious Activities							.28***	.14*			.02*	.00
Other Race									-1.14	-.06	-1.29	-.11
Hispanic									-.04	-.16t	-.05	-.18t
African American									.02	-.35***	-.03	-.38***
Parent Income									.81***	.21***	.82***	.21**
English at Home									-.28	-.08	-.26**	.10
Highest Science Taken										.27***		.27***
Constant	4.00***	2.11***	3.99***	2.03***	3.68***	2.00***	3.80***	2.07***	6.16***	1.45*	6.33***	1.44*

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Controlled for Urbanicity, Age, Parent Marital Status, Catholic School and Region ; n= 2,483

Models 3 and 4 present associations between gender-specific network religiosity and science outcomes. For boys, the religiosity of same-sex peers was a more power powerful positive force in science outcomes. For girls, the greater religious activities of both male and female peers were positively associated with course taking. Only the religious activities of male peers were significant for overall science GPAs.

In full models 5 and 6, nearly all religious associations were explained, with the exception of a marginally significant negative association between networks dense in Catholic female friends and science course-taking, and a continued positive relationship between overall science GPA and the religiosity of peer networks of both sexes.

Discussion

Results show that conservative Protestant students of both sexes experience significant gaps in science course completion and performance relative to others. For boys, these effects were generally larger in size than for girls. Controlling for demographic measures, college intent, and the positive effects of religious activities explained the effects of personal conservative Protestant affiliations for girls, but not for boys. In full models conservative Protestant boys still took fewer science courses and performed more poorly in science course-work than their male peers.

Parents' conservative Protestant affiliations were also strongly negatively associated with both boys' and girls' cumulative high school science performances. Indeed, these effects were generally larger in size than those of students' reported affiliations. For science course completion, effects for boys were much larger than for girls and they persisted when demographic controls were added to full models. Conversely, the impact of parent affiliation on overall science GPA was similar for boys and girls and persisted only for girls in full models. The effects of conservative

Protestant parents on girl's science course GPAs were the only ones which were not explained in full models.

That the affiliation of parents was more significant than that of students in shaping science outcomes is worth noting. Cognitive dissonance frameworks would suggest that it is the internalization of religious messages which shapes disparities; a supposition which would assume students' personal religious affiliations would be more powerful drivers of high school science disparities. The impact of parent conservative Protestantism on outcomes for boys may be an indication that boys are being significantly impacted by parental messages about what areas of interest or future occupations are appropriate.

In contrast to the generally large role of peers in shaping adolescent behaviors, the density of conservative Protestant friendship networks was largely unrelated to both boys' and girls' high school science outcomes. This finding, too, is somewhat unexpected. Other research has noted that peer networks are often powerful drivers of adolescent behavior. It is possible that for conservative Protestant students' friends not present in the Add Health data would be more influential than in-school friendship networks. This finding, and the relative religious heterogeneity of in-school networks does not support the theory that conservative Protestants students, distrustful of education as a cultural institution, would gravitate toward co-religionist peers in school.

While both boys and girls negatively experienced conservative Protestant affiliations, some important gender differences in the extent of deficits and the persistence of deficits were highlighted by sex-segregated models. Conservative Protestant boys and the sons of conservative Protestant parents experienced larger deficits in science course completion than girls did. For boys, these relationships also persisted when demographic controls were added to models. That these effects were often stronger for boys is surprising, in light of gendered messages about appropriate

Table 2.11: Girls' Friends' Religion: OLS Coefficients

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA
Boy Friends' Religion												
Conservative Protestant	-.03	-.00							-.04	.04		
Other Religion	.20	.14							.17	.01		
Other Protestant	-.01	-.15							.16	-.01		
Not Religious	.17	-.04							.06	-.11		
Catholic	-.10	-.07							-.12	.08		
Girl Friends' Religion											.00	.02
Conservative Protestant			.00	-.04							.15	.00
Other Religion			.07	.06							.25	-.16
Other Protestant			.36	-.15							.21	.04
Not Religious			.20	.03							-.26t	-.06
Catholic			-.16t	-.12*								
Friends' Activities												
Male Friends' Religious Activities					.26**	.17***			.01*	.00		
Female Friends' Religious Activities							.25**	.07			.02**	.00
Other Race									-.87*	-.42t	-.85*	-.43t
Hispanic									-.64**	-.38**	-.61***	-.36**
African American									-.43**	-.44***	-.41	-.45***
Parent Income									.40***	.12**	.40***	.12***
English at Home									-.69**	.00	-.68**	.03
Highest Science Taken										.33***		.34***
Constant	4.19****	2.50***	4.23***	2.54***	4.02***	2.37***	3.98***	2.40***	6.52***	1.34*	6.68***	1.56**

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Controlled for Urbanicity and Region , Parent Marital Status, and Number of Friends n=2,882

fields of study for girls. It is possible that this difference arises because girls of all religious affiliations already receive gendered messages about science as an inappropriate field of study while boys as a whole are often encouraged to explore science as a 'masculine' subject.

In only one situation conservative Protestant girls experienced science penalties relative to their same-sex peers that boys did not. The effects of parental conservative Protestantism on girls' overall science GPAs were not explained in full models as they were for boys. This finding may suggest that, conservative Protestant girls are receiving gendered messages about science from their conservative Protestant parents which hamper their attainment above and beyond gendered messages all girls receive about such subjects. The precise nature of this mechanism may worth exploring in qualitative analyses.

These findings do offer some support for cultural isolationist or cognitive dissonance science conflict theories. Both conservative Protestant boys and girls experienced some gaps in science course-taking and GPA. However, cognitive dissonance theories which focus on the internalization of religious theories would suggest that personal religious affiliations should produce more substantial gaps than parental religious affiliations. This was unsupported by data. Cultural isolationism also would suggest that conservative Protestant students may gravitate to co-religionists in schools who would reinforce scientific opposition. This analyses found no evidence that conservative Protestant peers affected the science course-taking or GPAs of conservative Protestant boys and girls. Additionally, cognitive dissonance theories do not explain gender differences in science outcomes, unless one assumes boys somehow absorb religious messages more successfully than girls; an assumption which has no particular support in literature of higher rates of female religious engagement.

This chapter focuses on high school science courses as an important first step in STEM pipelines and shows early deficits. However, education and religion are both long-term institutional processes and it is valuable to examine them at multiple points in time. The following chapter looks at college STEM major selections.

Chapter Three: Religion, Gender and Post-Secondary Education

High school science course-taking is an important early step in STEM educational pipeline, but it is not the only one. This chapter will follow Add Health participants into post-secondary school STEM educational paths. I first analyze existing literature on religious and gender gaps in STEM educational involvement at the college level. Next I apply existing theories in religion and science literature to the analytical frameworks established by STEM education researchers, and discuss the ways that these theories may explain and predict religious variations in post-secondary school STEM educational pursuits. Finally, I discuss and test competing models which may predict and explain religious and gendered variations in post-secondary school STEM education using data from Wave III of the Add Health dataset. Results are then discussed in light of existing research into STEM educational pathways and religious variations in academic attainment.

Theoretical and Empirical Background

STEM and Gender

It is increasingly clear that piece-meal approaches to educational issues, while often necessitated by data limitations, can stand in the way of our understanding of education as a long-term process and its' subsequent impact on employment, work-life balance, and family outcomes. In examining education at only one moment in time, we can sometimes fail to see influences which shape every step on an educational pathway and the ways in which individual pathways begin to diverge. Crosnoe highlights this issue, emphasizing the necessity of taking a life-course approach to studies of education (2000, 2001a, 2001b). Individuals are shaped by multiple social contexts

which change in different stages of the life course. These influences and the structure of broader social institutions shape individuals' access to opportunities and life course trajectories. Life course approaches allow us to regard educational attainment as a process across time (Elder 1998, Crosnoe 2000, Crosnoe 2001a, Crosnoe 2001b).

Other education and work researchers, examining educational processes have similarly argued in favor of a 'pipe-line' approach to the understanding of educational pathways, particularly as they apply to issues of diversity in STEM degrees and career trajectories (Young 2005, Xie and Shauman 2003). The pipeline approach supports an understanding of education as a long-term process. It often focuses on pivotal moments in education; like the decision to select out of a college major, in explaining long-term outcomes for education and employment. Researchers engaged in this pipeline approach often focus on ways in which particular pipelines 'leak', either allowing or pressuring particular groups to exit at disproportionate rates (Harris and Tienda 2010). This problem is especially important as gendered attrition through a 'leaky' STEM educational pipeline means that the pools of women entering the STEM workforce is already significantly drained (Xie and Shauman 2003, Legewie and DePrete 2012, Carrell, Page and West 2009, Maple and Stage 1991).

STEM education has been a focus of many concerns about leaky pipelines and about the social forces which shape access to opportunities (Xie and Shauman 2003, Young 2005). Engineering, math, and sciences are fields of study which often require a great deal of specialized training. As consequence, missing out on early steps in the STEM career pathway, such as taking fewer high school science courses (see Chapter Two) or selecting non-STEM college majors, can permanently keep individuals out of the STEM labor-force and away from potentially high-paying, benefits rich, career opportunities (Young 2005, Xie and Shauman 2003). Given these high stakes,

a great deal of attention has been paid to the mechanisms through which women and particular race/ethnic groups 'leak' out of the STEM pipeline or the ways in which different life course choices impact education outcomes, workplace prestige, and advancement opportunities (Young 2005, Xie and Shauman 2003).

In post-secondary education, one point in the STEM pipeline process that has been the focus of research is the selection of a college major. A host of factors influence major selection including: race/ethnicity, family socio-economic status, closeness with parents, and gender (Thompson 2003, Berger 1988, Ma 2009, Porter and Umbach 2006). There is some evidence that gender differences in major selection are larger in effect than other demographic factors like race/ethnicity or family background in influencing in major selections (Dickson 2010, Ma 2009). Students choosing a major often engage in a gendered self-sorting process, leading many into gender concentrated fields, a process that can have long-term economic ramifications (Mastekaasa and Smelby 2008, Berger 1988, Thomas and Zhang 2005, Thomas 2000, Nores 2010, Ma 2009). For girls, such fields often include education or social work. For boys, these choices include many STEM fields; such as engineering, mathematics, computer sciences, and physics.

Many mechanisms have been proposed to explain this sorting process. Some contend that early education in science and math, with gendered gaps in attainment are a key source of later college and employment variations (Correll 2001, Eccles 1994, Moakler and Minsun 2014). These arguments suggest that women's selection away from STEM majors is largely influenced by early deficits in science and math performance and aptitude; implying that gendered gaps are established early in educational pathways and persist into college and employment. Chapter Two found evidence that conservative Protestant girls experienced greater gaps in science course-taking and performed more poorly in science classes than other girls. However, the impacts of religious

affiliation were often similar or larger for boys. Researchers using multiple metrics of early achievement to examine gendered differences, have repeatedly found that, while early gaps are significant, they are insufficient to explain the size of disparities in STEM major selection (Riegle-Crumb et al 2012, Dickson 2010). And there is growing evidence that high school gender gaps in science and math course-taking have declined or disappeared (Riegle-Crumb, Farkas, and Muller 2006, Crosnoe et al 2008).

Other researchers have focused on the association between major selection and occupation; arguing that men and women self-sort on the basis of gendered occupational priorities. Ma (2009) argued that women were more likely to select into fields associated with altruism and intrinsic rewards. These fields, with their focus on care-giving and service are associated with gender socialization which encourages girls to derive their sense of self-worth from their abilities to please others (Seymour 1999). Conversely men, were more likely to select into fields with extrinsic rewards including future earnings potential or status (Ma 2009). Such fields, with their focus on attainment, are associated with socialization processes which encourage boys to base their identity on achievement or competition (Seymour 1999). Others have found that these preferences, particularly male concerns about future earnings, appear to be more significant than girls' confidence in math or science ability in shaping this sorting process (Zafar 2013, Wiswall and Zafar 2015).

Many researchers, while not eschewing the role of socialization in shaping gendered differences, have looked at factors beyond socialized identities or early aptitudes in explaining gaps in STEM majoring (Carrell, Page, and West 2009, Griffith 2010, Blickenstaff 2005, Correll 2001). Mann and DePrete (2013) argue that multiple forces shape major segregation, not all of which pertain to future employment. Instead they argue that women may be partially discouraged

from STEM majors because such fields of study often restrict opportunities to engage with other fields during the educational process. They argue that in STEM fields where both educational and occupational opportunities are more flexible women have gained greater ground (Mann and DePrete 2013). They do also suggest that multiple different forces like concerns about work-life balance or experiencing STEM fields as unfriendly environments may also influence major segregation.

Indeed, in a review of thirty years of research into gender differences in STEM majoring, Blickenstaff (2005) found that researchers had offered nine major different explanations for gender differences in STEM. These explanations included claims of inherent biological differences, a lack of female role models or of academic preparation, the absence of positive childhood experiences with the sciences, gendered socialization, pedagogy favoring male students, and classroom climates that were 'chilly' towards women. Some of these explanations, particularly those focused on inherent biological variations, were unsupported by evidence and incapable of explaining the scale of the gender gap (Blickenstaff 2005). Others; particularly 'chilly climate' arguments and arguments focused on an absence of female role models are more substantiated.

Hughes (2000) examined the 'chilly climate' thesis which contends that women are more likely to feel uncomfortable or unwelcome in STEM courses and fields; and thus that they might 'leak' out of spots in the STEM pipeline. He found that women in STEM undergraduate courses reported feeling less respect from instructors and male peers, and feeling that course materials were male-centric (Hughes 2000). Allan and Madden (2006) undertook a qualitative analysis of chilly climates in higher education and found that many women undergraduates reported discomfort with male professors who made sexually explicit jokes as a way of building rapport with students, or with both male students and professors who seemed to operate on the basis of

gender stereotypes. Indeed, there is evidence of pervasive science faculty biases in favor of male students (Moss-Racusin et al 2012). These feelings of being unwelcome, or welcome only as objects for the male gaze may be part of why STEM faculties, with their high proportion of male professors, experience such high rates of female 'leakage'.

Female college students who took courses with female professors had, on average, greater science and math course performance, greater persistence in math and science course-taking, and greater likelihood of STEM degree attainment (Carrell, Page, and West 2009). The effects of female faculty in STEM on degree attainment are particularly strong for undergraduate women with strong abilities in STEM fields (Carrell, Page, and West 2009). In addition to female faculty, the proportion of women and minority graduate students in STEM fields is heavily associated with the persistence of undergraduate women in these fields (Griffith 2010). This association has led some researchers to advocate for greater focus on fostering mentor relationships between faculty and female and minority STEM undergraduates (Tsui 2007, Carrell, Page, and West 2009, Blickenstaff 2005).

This confluence of a lack of positive female role models and 'chilly' academic climates may contribute to the lower levels of self-efficacy reported by women pursuing degrees in STEM fields. The concept of self-efficacy focuses on both confidence in one's skill-set and in one's abilities to effect change (Mara et al 2009). Women in STEM engineering appear to suffer from declining self-efficacy across the educational process; a feeling which may lead them to select out of STEM pathways during college (Mara et al 2009). Some have similarly found that encouraging undergraduate women in STEM fields to engage in self-affirmation can improve their in-major performance and persistence (Walton et al 2015). Others have focused on the creation of

supportive all-female STEM educational environments as increasing women's self-assessments and persistence in STEM pipelines (Szelényi and Inkelas 2011).

Science, STEM, and Religion

One issue which significantly affects research into gendered STEM fields and the validity of findings, is the question of what precisely constitutes a STEM major or education. It has become clear over time that many scientific fields, particularly biological or life science majors are fairly representative in gender and race/ethnic composition (Riegle-Crumb and King 2010). When viewing STEM majors as a collective field including both biological sciences and engineering fields, we can both over-estimate disparities in biological sciences and underestimate gaps in other fields. These include engineering, computer science, and physics where substantial gender and race/ethnic variations remain (Riegle-Crumb and King 2010, Ma 2009). While relative parity exists in some sciences, these may not be what policy makers and researchers refer to when they discuss gender and STEM. Instead, they are more likely to focus on fields driving technological innovations; such as engineering or computer sciences. These technological fields are key drivers of the apparent gender gap in STEM education (Ma 2009, Riegle-Crumb and King 2010, Beede et al 2011, Turner and Bowen 1999, Glass et al 2013).

Explicating the distinctions within STEM majors may be particularly important to discussions of religious differences in college major choice and the relationship between religious affiliations and gender gaps in STEM. Much of research into religion and science has looked at the sciences as a single broad category and focused on attitudes toward science as an institution rather than the impact of such attitudes on science-specific educational outcomes. This approach

builds off of an important and substantial body of academic evidence highlighting religious divides over issues of science.

This apparent divide crosses centuries and was responsible for the deaths of many early scientific and mathematical geniuses at the hands of religious leaders who regarded their hypotheses as heresy. There are likely few religious groups that do not have some history of violent rejection of some scientific theory. In American history, it is conservative and fundamentalist Protestants who have unique histories of, largely non-violent, conflicts with modern scientific theories. Examinations of this history often focus on the Scopes Trial, in which evolution and creationism did battle in front of civil authority, as a pivotal moment in conservative American Protestant traditions (Grabiner and Miller 1974). This focus often places biology at the center of analyses of the intersection of religion and education, particularly on the college level. Indeed, many researchers begin with the presupposition that conservative Protestants in college science will be uncomfortable with scientific theories of evolution and focus on testing the extent to which such discomfort informs behaviors (Lovely and Kondrick 2008, Brazelton et al 1999, Johnson and Edward 1987). When measuring the pre- and post- course attitudes of religious undergraduates they find that religious students often do not experience substantial reversals in their religious convictions or may become more opposed to theories of evolution (Lovely and Kondrick 2008, Brazelton et al 1999). These studies often rely on either a single unit of a course or a single university for survey participants. As consequence they often suffer from small sample size, making generalizability challenging. And they do not evaluate whether discomfort with one element of a science curriculum, evolution, impacts conservative Protestants' decisions to major in either biological sciences or STEM majors more broadly.

Ellison and Musick (1995) argued that, beyond a circumscribed focus on evolution and biology, several elements of conservative Protestant religious philosophies might exist in conflict with scientific institutions. They highlight decades of research surrounding a concept of scientific materialism which focuses on two areas of broad philosophical conflict: questions about the fundamental reality of the universe, and an emphasis on the scientific method as the only acceptable means of ascertaining truth. Both of these concepts, they note, seem to undermine Western religious arguments about the meanings of god and truth (Ellison and Musick 1995). Their analysis, which focused on several elements of particularly conservative Protestant religious philosophies such as biblical literalism and perceptions of sin as the source of broader conflicts, noted that conservative Protestants who supported such philosophies reported greater moral and pragmatic skepticism of the value of science.

Research focused particularly on emerging and young adults suggest that this perception of religion and science in conflict is evolving across generations (Scheitle 2011, Longest and Smith 2011). They note that conservative Protestants and members of many other religious traditions are still less likely than the unaffiliated to believe that scientific exploration should be free of all moral or religious constraints (Longest and Smith 2011). But, conservative Protestants and other affiliated emerging adults are more likely to believe that religion and science are compatible than their unaffiliated peers (Longest and Smith 2011). Scheitle (2011a) found that most undergraduates did not regard religion and science as conflicting belief systems and that, during college, they were likely to move further away from this perception of conflict. Ecklund and Scheitle (2007) found that younger academic scientists were also more likely to believe in God than older academic scientists, suggesting that younger academics see fewer conflicts between religion and science.

These findings point to the importance of examining the ways that religious affiliations impact actual college STEM major decision-making processes.

While there is research on undergraduates' religious affiliations and attitudes about elements of science, fewer studies have examined the relationship between religious affiliations and actual college major selections. One longitudinal study did evaluate this intersection; but focused on the impact of the choice of a scientific college major on students' subsequent religious beliefs. Schietle (2011b) used four separate conceptual measures of religiosity: religious struggles, religious skepticism, religious commitment, and spiritual questioning to assess the specific impact of scientific college education on undergraduate religious engagement. He found little evidence that students in the natural sciences experienced greater declines in these dimensions of religiosity than students in other major fields. (Scheitle 2011b).

Studies of religious engagement and academic field of study often treat either biological or natural sciences as major categories; either contrasting them to all other major choices, or establishing dichotomies between social and natural sciences (Scheitle 2011, Ecklund and Park 2009, Ecklund and Scheitle 2007). They also often start later in educational pipelines, focusing on academic scientists or professors rather than undergraduates. In contrasting natural and social sciences, researchers have found minimal differences in academic scientists' beliefs in religion and science conflict (Ecklund and Park 2009). In a study separately evaluating physics, chemistry, biology, sociology, economics, political science, and psychology, Ecklund and Schietle (2007) found that, while absence of adolescent religious affiliations appeared to lead people to select into academic sciences, engagement with academic sciences did not necessitate a loss of religious commitments.

Looking specifically at the nature of conservative religious affiliations, Ecklund and Park (2009) found that religiously conservative scientists were less likely to believe in religion-science conflict than those raised in liberal religious traditions (Ecklund and Park 2009). However, they did note that highly educated scientists at elite institutions were also more likely to have been raised with no religious background and were more likely to be currently unaffiliated (Ecklund and Park 2009). While these studies and those examining specific science courses provide interesting insight into the ways that religious individuals approach academic sciences, they also often focus on particular elements of belief or activity rather than conservative Protestant affiliations. Further, in splitting natural and social sciences into discrete categories, or focusing on particular sciences, they stand in contrast to understandings of STEM as a discrete analytic category.

This difference between the approaches of religion and education researchers is not simply esoteric. Examinations of religious opposition to science often focus specifically on facets of biological and earth sciences or on fields like astronomy as sources of fundamental conflict. They don't tell us whether these conflicts discourage religious students either from pursuing majors in biological sciences or from all STEM fields. Likewise, research comparing academics in the natural sciences to those in social sciences can lead to interesting insights about how religious involvement operates in academic institutions, but it does not tell if conservative Protestant students may be disproportionately selecting out of majors which could lead toward lucrative careers.

In order to address these disparities in interpretation I will rely on the categorization of STEM majors established in Riegle-Crumb and King (2010) with one significant modification. Given the focus of conflict on scientific fields associated with particular theories about life like

evolution and on competing cosmologies, I will utilize a different within-STEM sorting system designed to focus on this divide. STEM fields associated with theories at the heart of the religion-science divide, like biology and physics will be sorted into one 'cosmology major' group. Those which require a certain level of early scientific proficiency but do not rely on such cosmologies, like computer science, mathematics, and engineering, are sorted into one broader 'non-cosmology' major. This allows both for an examination of whether, following early deficits in science established in Chapter Two, conservative Protestant students select away from all STEM fields or from specific fields that often are at the heart of religion-science conflict discussions.

Chapter Two analyzed separate gendered patterns in conservative Protestant performance. Few studies look at the intersection of religion, college education, and gender. This gap is surprising given evidence that conservative religious engagement increases girl's anticipation of maternal and familial obligations (Sherkat 2000, Pearce 2002). Daughters of either Catholic or religiously engaged mothers were more likely to disapprove of childlessness and report desiring larger families (Pearce 2002). Women who placed such high priorities on anticipated family engagement were less likely to select into science majors than women without such priorities (Ware and Lee 1988). Conservative religious engagement is also associated with more conservative gender attitudes on a host of topics (Moore and Vanneman 2003, Pearce 2002, Sherkat 2000). Gender socialization has been shown to lead girls out of STEM fields and into ones traditionally regarded as more feminine (Blickenstaff 2005). These findings suggest that affiliations with particular religious traditions may further influence girls to select non-STEM majors.

Secularization and Education

College campuses are not representative of the broader American population. While women have recently begun to outpace men in college degree attainment, other populations are still poorly represented (Goldin, Katz and Kuziemko 2006). Members of particular race/ethnic groups are significantly underrepresented among the college-going (Fletcher and Tienda 2010). Likewise, low-SES family backgrounds can stand in the way of college degree pursuit for many (King 1996). Religious affiliations shape attendance as well. Stroope, Franzen, and Uecker (2015) found that involvement with fundamentalist congregations reduced individuals' likelihood of attending college. Conservative Protestants continue to lag behind others in college degree attainment, even as their educational attainment has grown (Massengill 2008, Stroope, Franzen, and Uecker 2015).

Many have argued that, among conservative Protestant students who do participate in post-secondary education, college will have a secularizing effect, reducing religious engagement and beliefs. These arguments are based on the belief that college, as a time during which the world of young adults expands, exposes them to beliefs and ideas that may fundamentally conflict with early religious teachings and gives them opportunities to engage in behaviors that fundamentally conflict with the beliefs and socialization they received from parents and community members. This conflict, many argue, leads those young adults who enter college as members of conservative Protestant traditions to abandon practices and beliefs (Hadaway and Roof 1988). Much research into these questions finds the opposite.

Lee (2002), examining a 1994 cohort of college students, found that for a majority of religious undergraduates college attendance generally strengthened, rather than reduced religious convictions. This association was particularly strong among college students who continued to

participate in religious services (Lee 2002). This protective impact of college engagement has been supported in other literature. A study comparing high school graduates who did not attend college to those who did, found that those who did not attend college experienced much greater declines in religious attendance and in the reported importance of religion their lives (Uecker, Regnerus, and Vaaler 2007, McFarland, Wright, and Weakleim 2010).

Nor is there evidence that college attendance turns conservative Protestants into mainline or liberal Protestants. Indeed, students who attended college appeared much less likely to experience a liberalization of belief commitments than those who did not (Mayrl and Uecker 2011). Regardless of the specifics of affiliation, those who attended college were also less likely to exit their denominations than those who did not (Uecker, Regnerus, and Vaaler 2007). These findings point to the importance of evaluating both adolescent religious affiliations and persistence of belief commitments when evaluating students' college behaviors. They do not, however, look specifically at the association between belief commitments and college major selection. It is possible that students who were raised in conservative Protestant groups during adolescence and those who maintain conservative Protestant beliefs may be more likely to select away from STEM majors.

In the remainder of this chapter I will: a) Establish three conceptual models discussing possible relationships between religious engagement and STEM major, b) Test these models using multiple waves of Add Health data, and c) Discuss the results of these tests and their implications for understanding the relationship between gender, religious engagement, and STEM major selection.

Conceptual Models

As discussed in Chapter Two, two broad theories have been applied to discussions of religion and science education: cultural isolationist and cognitive dissonance theories of religion/science conflict and gendered religious life course theories. Cognitive dissonance and cultural isolationist theories focus on conservative Protestant discomfort with or opposition to science as drivers of science-avoidance. Conversely, gendered religious life course theories, which have been generally less articulated in the context of education itself, suggest that conservative Protestant students may proceed along different life courses than their peers which lead away from higher education and that religious boys and girls may behave in distinctly different ways.

Cultural isolationist and cognitive dissonance theories, with their focus on scientific theories like evolution or the nature of the universe as the source of conservative Protestant discomfort with science, would suggest that conservatively religious students of both sexes would be likely to select away from particular STEM fields. Those fields are generally encompassed within physics and biological sciences, which by their definition, often focus on issues at the heart of the religion and science debate. These theories entail the assumption that religious students approach these sciences having already internalized religious precepts about such issues as creationism. This means that adolescent affiliations with conservative Protestant groups should push college students away from majors which entail the teaching of non-religious cosmologies. Cognitive dissonance and cultural isolationism do not support the argument that religious students should avoid computer science or engineering; fields which have generally less to do with theories of life.

Gendered religious life course theories, which note the earlier age-at-marriage and earlier and higher fertility rates among conservative Protestant adults suggest that conservative Protestant men may be particularly likely to select into engineering and technology majors with their promise of larger fiscal rewards, in anticipation of future roles as bread-winners. Conversely, conservative Protestant women preparing for early marriage and child-birth, may be particularly likely to see science and technology workplaces as incompatible with anticipated family obligations. Or, as consequence of being raised in gender-traditional environments, conservative Protestant girls may also assume such fields are either inappropriate for women or 'too hard'. Gendered religious life course theories would require fidelity to adolescent religious affiliations during the transition to adulthood, as it is persistence in these affiliations, with their influence on the timing of life course events, that drive differences in type of postsecondary education and majors.

Data

Data used to analyze the conceptual models discussed above come from Waves I, II, and III of the National Longitudinal Study of Adolescent Health (Add Health). As discussed in the two previous chapters, the Add Health is a nationally representative longitudinal study of American adolescents. The first wave of the survey drew a large, stratified, in-school sample of (n= 90, 118) students who were in grades 7^{th}-12^{th} in 1994-1995. A subset of respondents (n=20, 745) were selected for a subsequent in-home survey which included multiple questions about religious engagement. Wave 2, conducted in 1996, re-interviewed 14,738 respondents (71% of initial respondents). The third wave of the survey re-interviewed approximately 73% of initial Wave 1 respondents (n=15,197) in the years 2001-2002 when respondents ranged in age from 18-27. The third wave included questions regarding post-secondary education and recorded

respondents' reported fields of study. At Wave III some respondents had completed college degrees, while others were in the process of pursuing bachelors' degrees.

This chapter looks at a distinct subset of survey respondents; those who reported having begun or completed college degrees by Wave III. The unweighted proportions of Wave III respondents and those of the subset of Wave III respondents who completed or were participating in college education are reported in Table 3.1 below. Table 3.2 presents descriptive statistics of the college-restricted sample. In analyses, the sample was weighted using longitudinal analytic weights constructed and recommended by the Add Health researchers (Chen and Chantala 2014).

Table 3.2 presents descriptive statistics for the full Wave III and college subsamples. This population. Conservative Protestants make up a smaller portion of college-goers than of Wave III sample respondents more generally. Subsequent ancillary analysis presented in the appendix present the odds of attending college by adolescent religious affiliation and find that in this sample; consistent with a broader literature of conservative Protestant underrepresentation among college students, both conservative protestant men and women were significantly less likely to attend college by Wave III.

Missing Data and Multicollinearity

As discussed in Chapter Two, there is much debate about the best methods of addressing the issue of missing data. (Efromovich 2011, Muller 2009, Koul, Muller, and Schick 2012, Weinfurt et al 2002). In this chapter and all analytical chapters, I use multiple imputation to address missing data. Multiple imputation, allows the researcher to maintain a larger sample size and use data available within the survey to aid in maintaining variance during the estimation of missing values (Schafer and Schenker 2000, Myunghee 1997). There is also a great deal of debate

within the field about the appropriate number of imputations to use with recommendations range between 3 and 50 imputations depending on a multitude of factors (van Buuren, Boshuizen, and Knook 1999, Kenward and Carpenter 2007, Horton and Lipsitz 2001, Schafer and Olsen, 1998, Schafer 1999, Graham, Olchowski, and Gilreath 2007, White et al. 2011, Bouhlila and Sellaouti 2013). White et al (2011) suggested that researchers use a rule of thumb wherein the number of imputations corresponds to the proportion of data which is missing. For example, in a case where 20% of data was missing, 20 imputations should be used.

In this chapter, the analytic variables generally contain few missing cases. The variable with the largest number of missing cases, parental self-reported income, had roughly 13% of cases imputed. Most of the other missing cases represented less than 5% of responses on a given variable. In keeping with more conservative recommendations, 20 imputations were used. Ancillary analysis was conducted using list-wise deletion of missing cases and was largely consistent with results obtained using this imputation methodology.

When examining multiple measures of religious involvement, there is always a risk of multicollinearity distorting findings. STATA statistical software offers multiple diagnostic tools for testing for potential collinearity in analyses using variance inflation factors (VIF), tolerance tests, and eigenvalues. These analyses showed no evidence of collinearity issues with any models discussed in this chapter. The VIF and tolerance of models were well within normal parameters and eigenvalues were not of a size to suggest collinearity issues.

Dependent Variables

In order to test whether conservative Protestant students are likely to select away from all STEM majors, I construct a binary outcome variable (1=STEM) which includes majors in physics,

biological sciences, pre-medical fields, engineering, and computer science among others. To look more specifically at within STEM segregation using multinomial logistic regression, I constructed a categorical variable coding non-STEM majors, majors in STEM fields requiring engagement with scientific cosmologies, and STEM majors that did not engage with cosmologies into separate values. Cosmology majors include physical and biological sciences; fields which entail engagement with theories of the age of the earth, the nature of the universe, reality, and evolution. Non-cosmology majors include fields like engineering, mathematics, and computer science. The choice to major in these fields is often associated with early engagement with high school sciences and maths, but such majors do not entail consistent engagement with scientific cosmologies. The list of all major fields included in each STEM major category are specified in the appendix.

Independent and Control Variables

This analyses uses two separate measures of denominational affiliation. The first is the Wave 1 student denominational affiliations outlined in Chapter Two. As in Chapter Two, and in keeping with much of the current literature on religious involvement; Protestant religious denominations in all three waves were coded according to the schema established by Steensland et al. (2000), with the exception of African American protestants who were separated into larger categories rather than coded as one group. Classifying African Americans into several broader categories allows for the distinction between race/ethnic effects and those of a particular religious ideology. As Wave I of the Add Health groups all Baptists into one larger analytic category, obscuring key theological differences, responses in this category were split using student responses to a question measuring biblical literalism. Baptists who reported biblical literalist beliefs were coded as conservative Protestants, all others were coded as mainline.

The resulting denominational measures are a series of separate dummy variables signifying conservative Protestant, mainline Protestant, or other Protestant group affiliations. Other Protestants include such groups as Mormons and Jehovah's Witnesses who ascribe to many elements of Protestant theology, but frequently also hold non-conventional beliefs as well. The breakdown of this classification schema is presented in the appendix. Additional variables for the unaffiliated and Catholics were constructed as well. Jews, Muslims, Hindus and those affiliated with other religious groups, were too small to be analyzed individually and are combined into one 'other religion' category. In analyses, consistent with the literature examining religious affiliations, mainline protestants were used as the reference category

As discussed in Chapter Two, and in concordance with research emphasizing the importance of using multiple measures of religion, I constructed a measure of personal religious behaviors at Wave I using two measures of religious engagement: prayer and church attendance. For prayer, students were asked "How often do you pray?" and chose: once a day, once a week, once a month, less than once a month, or never. For attendance, students were asked "In the past 12 months, how often do you attend religious services?" and choose between: once a week or more, once a month or more but less than once a week, less than once a month, or never. For ease of interpretation, I joined both sets of responses into one measure of student devoutness and standardized the resulting measure with higher values corresponding to greater religious behaviors. The Cronbach's alpha of the resulting measure was .84.

Research into religious involvement in college often focuses on persistence or exits from religious affiliations and activities in college as associated with substantially different behaviors. In order to test differences between those who persisted in religious affiliations during young adulthood and those who abandoned youthful religious practices during this period, I constructed

additional measures of religious denomination persistence and changes in denominational activities.

In this instance, two phenomena with inconsistent timelines are at the heart of these analyses: educational pathways, which are frequently delayed and disrupted and religious involvement, and religious practices, which experience frequent disruptions across the life-course. Add Health respondents stretched across grades 7th-12th in Wave I and some undoubtedly experienced delays in beginning college or disruptions during college. Further, different colleges have different policies regarding college major declaration. Young adulthood is also a period defined by short-term disruptions in religious affiliations and engagement or exits from religious affiliations. In order to approximate religious persistence during college and its resulting impact on major selection, I adopted the following methodology.

For respondents who reported having completed bachelors or higher degrees before Wave III interviews were conducted (n=1,790) Wave II religious measures were used to approximate religious affiliations during college. For respondents who reported being currently enrolled in a four-year college at Wave III, Wave III religion response variables were used to construct persistence measure (n=3, 265).

This measure does not account for the timing of college major selection; for instance, respondents may have made decisions about their majors in early high school and report attending college during Wave III. It also cannot account for respondents who were religiously disengaged in Wave II when deciding on a college major, then rejoined religious organizations in college at Wave III. A small portion (n=459) of respondents participated in the Wave III survey but not the Wave II survey. I used Wave III religion variables to approximate religious persistence in college for these respondents. For such respondents, it is clear that causal ordering may be reversed. Thus,

this methodology must be regarded as a rough attempt to address temporal ordering, and no causal assertions can be made with certainty.

Additionally, the Add Health changed the coding structure for religious denominations at Wave 3. This change included greater specificity in the coding of Baptist and other denominations. These more specific denominations were coded to maintain consistency with Waves I and II.

Religious fidelity was measured as a series of denomination-specific dummy variables with respondents who reported the same religious affiliations at Wave I and the closest Wave to college coded as 1 and all others coded as zero. Because the focus of analyses is those who maintained affiliations, no distinctions were drawn between those who left for other religious affiliations or exited religion entirely. In order to maintain logical comparisons, mainline Protestants who maintained fidelity are included in analyses and all respondents who left affiliations represent the reference groups.

For persistence in religious activities, I constructed a measure subtracting Wave I participation from participation at the wave selected according to the above specified schema, so that increasing participation was associated with larger numbers. The resulting measure was then coded as a binary outcome variable (1=increased religious activity).

Several controls for potential confounding variables are also included in this analysis. These include measures of parental income at Wave I, respondent age, race/ethnicity, whether respondents were born in the United States, the geographical region and urbanity of respondents' original schools, and respondents' marital status.

Analytical Strategy

Table 3.1 presents unweighted key proportions of populations in all of Wave III and of the restricted college sample. Table 3.2 presents descriptive statistics for this restricted college sample.

In order to evaluate the selection of a STEM major over any other field, I employ logistic regression analyses comparing the selection of all STEM majors to non-STEM fields. As in all analyses in this chapter, I restrict the sample to students who are either currently attending college, or have completed bachelors or higher degrees at Wave III. Also, as in other analyses, results in this chapter are separated by gender. Table 3.3 presents the results of this analysis in odds ratios.

To more fully explore the distinction between STEM fields, I also engage in multinomial logistic regression analysis comparing the likelihood of selecting cosmology-requiring STEM majors and non-cosmology STEM majors to non-STEM majors. These results are presented in Tables 3.5a and 3.5b respectively. In each table results are separated by gender, to allow for comparison of gender-specific religious patterns. They are also presented in relative risk ratios for ease of interpretation.

All analytic tables are weight using the weights created and recommended by Add Health researchers (Chen and Chantala 2014).

Ancillary Analyses

A wealth of evidence has established religious differences in college degree attainment, though evidence exists of cohort differences in impact. As discussed above, ancillary logistic regression comparing those who did not pursue college and early religious affiliations and activities were conducted and are presented in the appendix. This analysis does not consider

whether respondents entered college later than Wave III, but are largely consistent with evidence of lower college attendance among conservative Protestants.

As in Chapter Two, in recognition of the differential impacts of prayer and religious service attendance on various aspects of lived experiences, ancillary analyses separating attendance and prayer were conducted and are presented in the appendix as well.

Results

Table 3.1 provides descriptive statistics of the key population samples used in analyses, broken down by gender. In comparing the college sample to the larger population, there are several population distinctions. As has been reported several times, racial gaps in who attends college abound. In this case, non-Hispanic whites make up a larger portion of the college sample population than the population at large. The college-going sample also has a smaller proportion of respondents raised in conservative Protestant traditions and raised in religiously unaffiliated households than the general population. This points to an important reality, that the under-representation of conservative Protestants in college can, in itself, pose a significant barrier to later STEM employment. It has a larger relative proportion of respondents raised as Catholics, mainline Protestants, and respondents associated with other religious traditions.

Women in the college sample were slightly less likely to be from unaffiliated or Catholic backgrounds than men. African American women in the sample population were also more well-represented than African American men.

Table 3-2 presents descriptive statistics for the key measures used in analysis. Given their young ages, it is unsurprising that a small proportion of college sample respondents were married at Wave III. It is worth nothing the differences between children raised in religious traditions and

those who maintained such affiliations into emerging adulthood. All groups appear to have experienced attrition.

Table 3.1: Comparison of Sample Characteristics

	Men		Women	
	Wave 3	College	Wave 3	College
African American	.21	.18	.23	.22
Hispanic	.18	.13	.17	.13
NH White	.55	.61	.56	.64
Other Race	.05	.04	.03	.01
Native Born	.71	.67	.72	.68
Conservative Protestants	.27	.24	.29	.25
Mainline Protestant	.26	.28	.27	.30
Other Protestants	.03	.02	.03	.03
Catholics	.26	.29	.26	.28
Other Religions	.05	.06	.04	.06
No Religion	.13	.10	.11	.08
Sample Size	7,155	2,064	8,015	2,844

The descriptive statistics also report the proportion of college students participating in all STEM fields (approximately 12% of male students and 7% of female students respectively). Women were slightly more represented among cosmology STEM majors than non-cosmology STEM majors, likely as consequence of their representation in biological fields. Their relative absence from non-cosmology STEM fields, compared to male respondents, is consistent with their underrepresentation among engineers, computer scientists, and mathematicians. While the majority of both men and women had experienced declines in religious activity, a substantial proportion reported increases during this period.

The religious fidelity measures also show that students had often left adolescent religious affiliations by Wave III. The largest group of consistently affiliated respondents were Catholic students of both sexes.

Table 3.3 presents the odds ratios for selecting a STEM major relative to all other majors. Results are split by respondent sex. Model 1 displays the relationship between Wave I religious affiliations and college students' likelihood of selecting a STEM major. Adolescent conservative Protestantism was unrelated to the likelihood of picking any STEM major over a non-STEM field. Adolescent affiliation with a minority religion was positively associated with the selection of a STEM field for both men and women and being unaffiliated for men or Catholic for women was marginally associated with the increased likelihood of picking a STEM field.

Model 2 displays the relationship between fidelity of religious affiliation and likelihood of selecting a STEM field of study. Conservative Protestantism was unrelated to picking a STEM field of study for men. Consistently conservative Protestant women were significantly less likely to pick a STEM major over a non-STEM major than their female peers.

Model 3 displays the relationship between adolescent religious activities and the likelihood of picking a STEM field of study. For men, adolescent religious activities were unrelated to major choice. For women, increased religious activities were associated with decreased odds of selecting a STEM major rather than a non-STEM field. Model 4 displays the relationship between a growth in religious practices during emerging adulthood and STEM major selection. Increased religious practices were unassociated with the likelihood of selecting into any STEM field for both men and women.

Models 4 and 5 present these relationships when demographic control variables and all measures of religiosity are included in models. When demographic variables are included in Model 6, the association between consistent conservative Protestantism and the reduced likelihood of selecting a STEM field of study over a non-STEM field became marginal in significance.

Table 3.2: Descriptive Statistics

	Boys		Girls	
	Mean	Std. Dev	Mean	Std. Dev
African American	.18		.22	
Hispanic	.13		.13	
NH White	.61		.64	
Other Race	.04		.01	
Native Born	.67		.68	
South	.32		.34	
West	.21		.21	
Northeast	.16		.16	
Married Student	.07		.10	
Adolescent Religion Measures				
Conservative Protestant	.24		.25	
Mainline Protestant	.28		.30	
Other Protestant	.02		.03	
Catholic	.29		.28	
Other Religion	.06		.06	
Not Religious	.09		.08	
Religious Activities	.05	.97	.18	.94
Religion Fidelity Measures				
Conservative Protestant	.09		.10	
Mainline Protestant	.07		.09	
Other Protestant	.01		.01	
Catholic	.20		.20	
Other Religion	.03		.03	
Not Religious	.05		.04	
Growth of Religious Activities	.36		.39	
Major Classifications				
Cosmo Majors	.04		.04	
Non-Cosmo Majors	.08		.03	
All STEM Majors	.12		.07	

Table 3.3: Religious Involvement and All Stem Majors: Odds Ratios

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Adolescent Affiliations												
Conservative Protestant	1.15	1.00							1.21	1.13		
Other Protestant	1.45	1.21							3.13	1.15		
Other Religion	2.32*	1.83t							2.21	1.37		
Not Religious	1.86t	1.67							3.70t	.50		
Catholic	1.42	1.57t							1.70	1.57		
Religious Activities					.88	.81*			1.22	.71		
Religious Fidelity												
Conservative Protestant			1.38	.37**							1.83	.40t
Other Protestant			1.20	.66							2.58	.86
Other Religion			1.24	1.84							1.57	1.20
Not Religious			1.58	.82							2.37t	1.19
Catholic			.78	1.09							.96	1.54
Changing Religious Activity							1.12	1.18			.61t	.81
Age									1.89***	1.64***	1.97***	1.72***
African American									1.10	.87	.95	.94
Hispanic									.36*	.86	.37*	.76
Other Race									.17	-	.28	-
Constant	.10***	.06***	.14***	.08***	.14***	.08***	.13***	.07***	.00***	.00****	.00****	.00****

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Controlled for Parent Income, Urbanicity, Marital Status, US birth, and Region; Men n=2064, Women n=2844

Table 3.4 presents the non-cosmology STEM major portion of the multinomial logistic analyses of majors. In both Tables 3.4 and 3.5, non-STEM majors constitute the base outcome. Table 3.4 presents results separated by gender. In Model 1, adolescent conservative Protestant religious affiliations for both men and women were unrelated to the selection of a non-cosmology STEM major. In Model 2, respondents who maintained religious affiliations through the educational process are presented separated by gender. Women who maintained conservative Protestant affiliations were significantly less likely than their peers to select a non-cosmology STEM major than a non-STEM field. Conservative Protestant men were marginally more likely than other men to major in non-cosmology STEM fields.

In Model 3, adolescent religious activities were marginally associated with a reduced likelihood of choosing a non-cosmology STEM major over a non-STEM major for men, but unrelated for women. The growth of religious activities during emerging adulthood was unrelated to non-cosmology STEM major selection in Model 4.

In full Model 6, consistently conservative Protestant men were still marginally more likely than their peers to select into a non-cosmology STEM major than a non-STEM field. For women, the association between consistent conservative Protestant affiliations and major selection became insignificant.

Table 3.5 presents the cosmology STEM results from the multinomial logistic regression models. As discussed above, non-STEM majors were the analytical base outcome. As in all tables, results are split by respondent's gender. In Model 1, neither men nor women raised in conservative Protestant traditions were less likely to select cosmology-requiring STEM majors than non-STEM majors. For men, consistency of conservative Protestant affiliations, in Model 2, were unrelated to major selection. Women who maintained conservative Protestant affiliations were marginally less

likely to select into cosmology STEM majors than into non-STEM majors. In full models with demographic controls, neither men nor women who maintained affiliation were significantly more or less likely to select cosmology requiring STEM majors.

Discussion

In Chapter Two, there was evidence that conservative Protestant affiliations hampered students' performances in science courses and their pursuit of such courses, particularly for boys. In this chapter, analysis is restricted to those Add Health respondents who were either actively pursuing or had completed bachelor's degrees at Wave III with the purpose of testing whether early gulfs grew across the STEM educational process. I examine both Wave I adolescent religious affiliations and activities and the maintenance of such religious affiliations into emerging adulthood, a period associated with religious upheaval.

The findings from both sets of measurement do not support cognitive dissonance or cultural isolationist theories for conservative Protestants who attend college. The probability of choosing either STEM field was not negatively associated with adolescent conservative Protestant affiliations for either men or women. Likewise, men who maintained affiliations were no less likely to select STEM majors than other fields.

Only women raised in conservative Protestant affiliations who maintained such affiliations into adulthood were significantly less likely than their peers to select STEM majors than non-STEM majors and in full models for non-cosmology and cosmology STEM, such associations disappeared.

For either cognitive dissonance or cultural isolationism to be drivers of college-attending conservative Protestant STEM major avoidance, we would expect to see larger, more consistent effects for both sexes. It is, of course, possible that conservative Protestants who select out of

college experience cognitive dissonance when approaching the sciences. It is likewise possible, and in keeping with the ancillary analysis of college avoidance discussed above, that conservative Protestants who embrace isolationist thinking simply select out of college education. Nonetheless, this finding highlights the importance of college transitions as a pivotal moment in the conservative Protestant life-course. Conservative Protestants, particularly conservative Protestant men, who chose to attend post-secondary education appear to be capable of managing potential science-religion conflicts in a way absent in earlier educational moments. This finding is consistent with work noting that college attendance may be protective of religiosity across adolescence.

Findings do offer some support for the theory of gendered heightened religious life courses. Non-cosmology STEM majors include fields such as engineering, mathematics, and computer sciences that are known to be drivers of STEM gender gaps. Men who maintained conservative Protestant affiliations were marginally more likely than male peers to select a non-cosmology STEM major than a non-STEM field. Women who maintained conservative Protestant affiliations across educational processes were significantly less likely to select STEM majors, particularly non-cosmology STEM majors like engineering than to select non-STEM fields. However, this association was fairly small, and disappeared or became insignificant in full models with denominational controls.

Table 3.4: Religious Involvement and Non-Cosmology Stem Majors: RRR

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Adolescent Affiliations												
Conservative Protestant	1.10	1.91							1.25	1.37		
Other Protestant	1.69	4.94*							3.40	3.99t		
Other Religion	2.72**	2.95t							3.00t	2.34		
Not Religious	2.35*	3.83*							3.13	1.03		
Catholic	1.42	2.89							1.84	3.26t		
Religious Activities					.79t	.79			1.03	.82		
Religious Fidelity												
Conservative Protestant			1.62t	.35*							1.95t	.36
Other Protestant			1.03	1.83							2.27	2.22
Other Religion			1.62	2.45							1.83	3.02
Not Religious			2.30*	.59							3.01*	.44
Catholic			.71	1.63							.86	3.34t
Changing Religious Activity							.98	1.44			.51*	1.02
Age									1.84***	1.77***	1.94***	1.89***
African American									1.26	1.61	1.05	1.59
Hispanic									.40t	1.78	.42	1.38*
Other Race									.19	.00****	.37	.00***
Constant	.07***	.08***	.09***	.03***	.10***	.03***	.10***	.03***	.00***	.00***	.00***	.00***

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Controlled for Parent Income, Marital Status, US Birth, and Region; Men n=2064, Women n=2844

Table 3.5: Religious Involvement and Cosmology Stem Majors: RRR

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Adolescent Affiliations												
Conservative Protestant	1.02	.70							1.10	1.07		
Other Protestant	1.04	.00**							2.05	.00**		
Other Religion	1.32	1.47							.10*	1.03		
Not Religious	.82	.97							2.17	.33		
Catholic	1.29	1.10							1.20	1.02		
Religious Activities					1.25	.82t			2.71*	.67t		
Religious Fidelity												
Conservative Protestant			.97	.42t							1.45	.43
Other Protestant			1.69	.00***							5.94	.00***
Other Religion			.45	1.65							.11t	.53
Not Religious			.03***	1.05							.00***	1.57
Catholic			1.09	.87							1.36	1.11
Changing Religious Activity							1.57	1.01			1.13	.83
Age									2.07***	1.57***	2.01**	1.62***
African American									.39	.54	.43	.62
Hispanic									.21*	.23	.22	.22t
Other Race									.13*	.00***	.11	.00***
Constant	.03***	.05***	.04***	.05***	.03***	.09***	.03***	.04***	.00***	.00***	.00***	.00***

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Controlled for Parent Income, Marital Status, US Birth, and Region; Men n=2064, Women n=2844

Chapter Four: Religion, Gender, and Transitions to STEM Employment

A common metric of the success of education how well it prepares individuals for employment. Outside perhaps of the decline of manufacturing, no area of the American job market has been the focus of as much policy and academic attention in recent years as STEM. This attention is driven in part by the increasing importance of STEM to the American economy. The US Department of Commerce estimated that, in 2010, one in 18 American jobs were in STEM fields, and forecasted that STEM jobs were growing faster than any other segment of the American economy (Langdon et al 2011). Additionally, STEM jobs are, on average, substantially more well-compensated than similar positions in other fields (Langdon et al 2011).

Given the perceived centrality of STEM to the future of the American economy, inequality within the field is a subject of great concerns. Any population that is underrepresented in the STEM workforce may, likewise, be shut out of economic success and opportunities. Further, to the extent that STEM fields drive scientific innovations and shape technologies with which even non-STEM workers engage, a lack of diversity in STEM employment can have ramifications across American society (Daniels 2013). Women and many race/ethnic minority groups are disproportionately absent from STEM employment (Beede et al 2011, Lim et al 2013).

Less attention has been paid to the potential absence of conservative Protestants from the STEM job market. Conservative Protestants may be particularly likely to be under-represented in STEM fields, given evidence of conservative Protestant discomfort with some elements of science (Ellison and Musick 1995, Scheitle 2011, Longest and Smith 2011). In light of

conservative Protestant attitudes toward gender, fertility, and household divisions of labor, Conservative Protestant women may be particularly underrepresented in STEM occupations (Bartkowski and Hempel 2009, Lehrer 1995). This chapter will explore the representation of conservative Protestants in STEM fields and the ways that gender may inform variations.

First I will analyze existing literature on religious and gender differences in STEM workforce employment. Then I will apply existing theories about religion and science to the questions at the heart of this chapter. Finally, I will discuss and test multiple models which may predict and explain religious and gender variations in STEM employment. Finally, I discuss results in light of existing research into STEM employment.

Theoretical and Empirical Framework

There is no doubt that women are substantially under-represented among STEM workers. Approximately 25% of all STEM workers are women (Beede et al 2011). Of these, many are concentrated in lower-status positions (Xie and Shauman 2003, Fealing and Meyers 2012, Hill, Corbett, and St. Rose 2010). This inequality is exacerbated by STEM environments that are less friendly to women employees. Women working in STEM fields reported feeling that workplace climates were 'chilly' toward them (Gunter and Stambach 2005). STEM employers seemed to have difficulties creating environments that fostered the commitment of women employees (Glass et al 2013). These feelings of discomfort and the lack of accommodations for familial disruptions, lead to substantial and disproportionate attrition of women employees. Approximately 37% of STEM degree holders are women, but they represent approximately 25% of the STEM workforce (Beede et al 2011). A study of women engineers found that nearly one in five respondents had left STEM after a period of employment (Fouad and Singh 2011)

One driver of persistent gendered economic inequality is the tendency of men and women to sort themselves into different, gendered fields of work (Hanson and Pratt 1991, Glass 1990, Cech 2016, Gauchat, Kelly, and Wallace 2012). Women often select into fields like nursing or education which have been historically associated with caregiving and offer lower pay and fewer benefits (Gauchat, Kelly, and Wallace 2012). Conversely, men are more likely to select into fields like engineering, with high financial remuneration (Gauchat, Kelly, and Wallace 2012).

There is evidence, for the college educated, that this process begins during major selection with men choosing fields of study associated with greater financial rewards (Ma 2009). Women who are absent from STEM educational programs in college will not have the qualifications necessary to pursue either graduate STEM education or STEM employment opportunities. (Szelenyi and Inkelas 2011). Studies examining interventions which could encourage women to pursue post-graduate STEM education have focused on the importance of fostering mentoring relationships with faculty and the structure of learning methodologies as crucial to pursuit of post-graduate education (Rayman and Brett 1995, Sax 2001 Szelenyi and Inkelas 2011). The tendency of women in STEM to exit educational pipelines before graduate education impacts their abilities to pursue higher status work in STEM fields (Xie and Shauman 2003).

One perpetual explanation for the persistence of gendered occupational segregation has been that women are likely to self-sort into professions seen as more accommodating to child-rearing (Kennelly 2002). However, multiple studies have shed substantial doubt on this contention (Glass 1990, Cech 2016, Blau, Brummund, and Liu 2013, Stier and Yaish 2014). Glass (1990) found that women-dominated fields were often much less flexible and accommodating of family expectations than other fields. Women who worked in women-dominated professions often experienced larger wage penalties for fertility than women in other fields and did not receive any

greater job flexibility or other forms of compensation (Glauber 2011). Cech (2016) conducted a qualitative study of 100 graduate students of both genders and found that only a small minority of young men and women reported considering future familial responsibilities when preparing for occupations. This study found that women who reported anticipating caregiving responsibilities were more likely to select away from traditionally women-dominated fields of employment. (Cech 2016). Adolescent expectations of remaining childless were also associated with women's persistence in STEM fields (Glass et al 2013).

These findings should not be assumed to imply that women in STEM find work-life balance easy. Among STEM academics, women who were fairly satisfied with their employment still faced challenges in the workplace when they experienced disruptions due to familial obligations (Mavriplis et al 2010, Kahn and Ginther 2015). Approximately 1/3rd of women who reported exiting STEM employment cited family obligations as a reason for their exits (Fouad and Singh 2011). Professional women in STEM who remained married had increased rates of exit over time, as did women who had more children (Glass et al 2013).

In addition to the multitude of sources pushing women out of STEM labor fields and contributing to occupational segregation, women in STEM may experience greater vertical occupational segregation. The "glass ceiling" and "glass escalator" effects appears to be persistent across multiple industries, but may be even more difficult to eradicate in male-dominated fields like STEM (Huffman and Cohen 2004). Women are generally concentrated in lower status positions in scientific fields (Maume 1999, Xie and Shauman 2003). Women's work roles in male dominated industries, are generally more devalued than in less segregated fields (Cohen and Huffman 2003). Their communication styles in male-dominated academic workplaces are disadvantaged, making it difficult to receive the attention or respect necessary to rise in status

(Gunter 2009, Diekman et al 2016). A substantial proportion of women in STEM reported feeling sexual discrimination or stereotyping in workplace climates (Chubin, May, and Babco 2005, Fouad and Singh 2011). This feeling may lead to the internalization of negative messages. Women engineers were more likely to report a lack of confidence in their work; a feeling which pushed them to exit STEM careers (Cech et al 2011). The absence of women role models and a sense that there was no promotional path available to them, were strong motivational forces in women's decisions to exiting STEM occupations, particularly if mentors were men with 'stereotypical attributes' (Fouad and Singh 2011, Cheryan et al 2011).

Conservative Protestant women may be uniquely disadvantaged by these forces shaping STEM disparities. Research has found that women, particularly white women, raised in conservative Protestant faiths, experience substantially different labor market outcomes than others (Glass and Jacobs 2005). They were more likely to hold traditional gender beliefs about appropriate household labor, beliefs which significantly influenced their market behaviors (Glass and Jacobs 2005). White conservative Protestant women married at younger ages than other women (Lehrer 1995). They were also more likely to exit the labor force for a sustained period after childbirth or marriage (Glass and Nath 2006, Lehrer 1995, Sherkat 2000). The presence of young children in the home was also associated with the decline of conservative Protestant women's labor force participation rates (Lehrer 1995).

These labor force exits often came earlier and ended later than those of other women (Sherkat 2000). Conservative Protestant affiliation increased women's focus on household labor and their hours devoted to in-home labor relative to other women (Ellison and Bartkowski 2002). For those who did participate in the labor market, white women with fundamentalist religious beliefs were more likely to move into female-dominated occupations when married (Glass and

Nath 2006). Conservative Protestant women experienced differential paths at multiple points in the economic life course, generally increasing labor force and economic penalties (Lehrer 2004, Glass and Nath 2006).

These differential fertility pathways may be particularly difficult for conservative Protestant women engaged in STEM, where there is evidence that fertility and familial obligations already push women to leave for other occupational fields, leave the labor force entirely, or move to lower-status positions (Xie and Shauman 2003, Fouad and Singh 2011, Kahn and Ginther 2015). Women socialized in conservative Protestant households may also interact in ways traditionally defined as feminine, communication styles which are disadvantaged in male-dominated STEM occupations. As a result, conservative Protestant women may be particularly vulnerable to STEM labor force exits.

These forces are unlikely to similarly impact conservative Protestant men's experiences in STEM occupations. Conservative Protestant men are more likely to place emphasis on their familial roles and responsibilities than other men (Bartkowski and Xu 2000, Lehrer 1996). Conservative Protestant men often concern themselves more with their roles as fathers (Bartkowski and Xu 2000, Wilcox 2002). However, studies have found no evidence that conservative men change market behaviors in response to family caregiving (Civettini and Glass 2008). They may also feel particularly comfortable and supported as traditional fathers, given evidence that men in the STEM workforce often hold more traditional gender attitudes (Sassler et al, forthcoming).

In addition to family forces which may uniquely impact women, distrust of science may also drive disproportionate gaps in conservative Protestant STEM occupational engagement. There is no evidence, in Chapter Three, that college-going conservative Protestants are any less likely to

major in those STEM fields generally associated with religion-science conflict than others. However, sustained engagement within the workforce with scientific theories, morals, and ethics may be importantly different than taking a course addressing a particular scientific theory. It is possible that prolonged occupational engagement in STEM workforce environments may be meaningfully different than majoring in a STEM occupation in college and may lead to disproportionate exits among conservative Protestants.

This proposition has some support in recent work by Ecklund and Scheitle (2016) which finds that, while evangelical Protestant parents are less likely than unaffiliated parents to encourage their children to work in STEM careers like engineering or scientific research, they are no less likely than unaffiliated parents to suggest that their children enter fields like medicine. Some of these STEM-adjacent occupations may attract conservative Protestant students with STEM Bachelor's degrees but would not be defined as STEM under existing literature. They also may not require continuous engagement with scientific methodologies and cosmologies in the way that traditionally defined STEM occupations do.

These findings raise several questions. Are conservative Protestants as a whole less likely to be engaged in STEM jobs that often require continual interactions with scientific values and theories? Conversely, are conservative Protestant women, as consequence of anticipated or experienced work-life conflicts, particularly unlikely to be engaged in STEM employment?

In the remainder of this chapter I will: 1. establish two conceptual models discussing possible relationships between religious engagement and STEM employment, 2. test these models using data from Wave IV of the Add Health, and 3. discuss the results of these tests and their implications for understanding the relationship between gender, religious engagement, and STEM employment.

Conceptual Models

Two competing conceptual models form the framework for this analysis: cultural isolationism and cognitive dissonance and gendered religious life courses. The cultural isolationism and cognitive dissonance model focuses on conservative Protestant rejection of scientific institutions as immoral, corruptive or contrary to religious ideology, while the gendered religious life-course model focuses on the life course trajectories engaged in by conservative Protestants, with their greater emphasis on early family formation and family obligations.

Cultural isolationism and cognitive dissonance explanations for conservative Protestant religious rejection of science highlight moral objections to scientific values and theories. Cognitive dissonance focuses on the idea that conservative Protestants either have difficulty internalizing or experience discomfort when confronted with scientific truths. These explanations would suggest that, obtaining a STEM degree and working in the STEM labor market are two different experiences. Conservative Protestants who were generally comfortable engaging with STEM majors in college may nonetheless find the daily realities of STEM occupational environments, which can require continual engagement with scientific theories, principles, and values less satisfying. Additionally, conservative Protestants who feel that their beliefs are being either ridiculed or challenged by non-conservative Protestant STEM coworkers may feel more uncomfortable in STEM workplaces. They may then be more likely to select out of STEM occupations, in favor of participation in other areas of employment.

Conversely, the gendered religious life-course model makes no suggestion that conservative Protestants as a whole might make occupational decisions on the basis of discomfort with sciences or scientific workforces. Instead, it is based on a wealth of evidence demonstrating different conservative Protestant marriage and fertility rates and differences in conservative

Protestant attitudes about family life. It argues that conservative Protestant men and women experience different life course pathways than others; particularly pertaining to fertility, marital timing, and a sense of the importance of familial obligations. Conservative Protestant women may be more likely to opt out of STEM occupations, either as consequence of family obligations or due to perceptions that environments are unsupportive climates for anticipated family obligations.

Conversely, conservative Protestant men under this differential life-course model may be more likely to remain in technology occupations where pay is often greater, in order to fulfil their sense of responsibility as primary breadwinners. They may also be more comfortable in gender-conservative STEM environs (Sassler et al, forthcoming). Such workplaces may be particularly compatible with Conservative Protestant men's fatherhood, even if they are less supportive of conservative Protestant motherhood.

Data

Data in this chapter comes from the first, third, and fourth waves of the Add Health dataset. From the first wave of data, I utilize students' in-home surveys and surveys of students' resident parents (n=20,745) for early measures of religious activity. Wave I was conducted during the school year 1994-1995 when respondents were in grades 7-12. Wave III was conducted in 2001-2002, when respondents ranged in age from 18-26. Wave III re-interviewed roughly 72% of Wave I respondents (n=15,197), and recorded respondents' college major selections. Finally, approximately 76% of Wave I participates completed the Wave IV survey (n=15,701). The Wave IV survey was conducted in 2008 when respondents ranged in age from 24-32. The Wave 4IVsurvey asked questions about a host of life domains, including employment, relationships, and health. Occupational categories constructed using the system set forth in the 2000 SOC were built

from responses to labor market questions. Respondents who were not employed, but attending post-secondary educational programs at Wave IV (n=1,029) were excluded from analysis. Descriptive statistics for the sample population are presented in Table 4.1

Missing Data and Multicollinearity

As discussed in previous chapters, much disagreement exists about the best methods of addressing the issue of missing data. (Efromovich 2011, Muller 2009, Koul, Muller, and Schick 2012, Weinfurt et al 2002). Consistent with previous chapters, I use multiple imputation to address missing data. Multiple imputation, allows the researcher to maintain sample size and maintain variance in the estimation of missing values (Schafer and Schenker 2000, Myunghee 1997). There is also disagreement about the appropriate number of imputations to use with recommendations range between 3 and 50 imputations depending on a multitude of factors (van Buuren, Boshuizen, and Knook 1999, Kenward and Carpenter 2007, Horton and Lipsitz 2001, Schafer and Olsen, 1998, Schafer 1999, Graham, Olchowski, and Gilreath 2007, White et al. 2011, Bouhlila and Sellaouti 2013). White et al (2011) suggested that researchers use a rule of thumb wherein the number of imputations corresponds to the proportion of data which is missing.

In this chapter, the analytic variables generally contain few missing cases. The variable with the largest number of missing cases, household income, had roughly 8% of cases imputed. Other variables used in analyses had few missing cases (generally less than 5%). In keeping with more conservative recommendations, 20 imputations were used. Additionally, ancillary analysis was conducted using list-wise deletion of missing cases and was largely consistent with results obtained using this imputation methodology.

The use of multiple measures of religiosity often raises concerns about the risk of excessive interrelatedness and multicollinearity. Stata statistical software offers many tools for analyzing these risks using VIF, tolerance tests, and eigenvalues. Analyses using these tools found no evidence of collinearity. Model VIF values generally ranged between 1.03 and 1.54, well below thresholds for concern.

Dependent Variables

This chapter uses multinomial logistic regression analyses to compare STEM employment, employment in non-STEM fields, and unemployment; employment in non-STEM occupations is used as the base category in analyses. Occupation at Wave IV was measured using the 2000 standard occupational codes (SOC) established by the Bureau of Labor Statistics. STEM occupations under this classification schema include: computer scientists, engineers, mathematicians, and scientific researchers among others. The occupations coding for this measure are included in the appendix.

Key Independent Measures

In keeping with a significant body of literature showing that adolescent religious affiliations can impact adult behaviors, and taking advantage of the longitudinal data available in the Add Health, Wave I measure of religious affiliations and activities are used in analysis. As discussed in Chapter Two, Protestant religious denominations were coded according to the schema established by Steensland et al. (2000), with the exception of African American Protestants. The resulting denominational measures are a series of separate dummy variables signifying

conservative Protestant, mainline Protestant, or other Protestant group affiliations. Other Protestants included such groups as Mormons and Jehovah's Witnesses. The breakdown of this classification schema is presented in the appendix. Additional variables for the unaffiliated and Catholics were constructed as well. Jews, Muslims, Hindus and those affiliated with other religious groups, are combined into one 'other religion' category. I also use the measure of Wave I religion that I constructed in Chapter Two. This measure combines reported frequency of church attendance and frequency of prayer into one religious activity measure.

In order to test the different religious life-course pathways, I constructed measures recording whether respondents had left their adolescent religious affiliations for other religions, for irreligion, or maintained affiliations through Wave IV. I also constructed measures of whether respondents had joined conservative Protestant affiliations from other religions or from irreligion.

In constructing these religious pathway measures I rely on Wave IV measures of religious affiliation. These measures are limited in their ability to offer causal claims. Respondents may, for instance, have kids and leave the labor supply to raise them, becoming involved with conservative Protestant traditions after that time. However, given the nature of the religious life-course, where involvement frequently declines for a period during young adulthood, this measure was the closest approximation of adult religious affiliations and behaviors. Measures of Wave IV religious affiliations were measured using the Steensland et al (2000) schema, with the exception of African American Protestants as discussed above. One variation between the waves, is that Wave IV did not include questions about respondent's beliefs about the Bible. In order to separate the broad category of 'Baptists' presented in the data into meaningful analytical categories, I rely on respondents' self-identification as traditional, evangelical, or fundamentalist. The full categories are discussed in the appendix.

I also construct several interaction terms of respondent's marital status and number of kids and adolescent religious affiliations.

Controls

Multiple other measures are controlled for in these analyses. Controls for personal life include a measure of citizenship status at Wave IV (1=citizen), respondent age, whether they were married at Wave IV, and self-reported health at Wave IV. Controls for respondent's education level are also included with: less than high school, college, and more than college included in analyses, and high school used as the reference category. Additionally, since financial constraints can keep people working in jobs they would prefer to leave, a control for household income is included in analyses. Measures for the race of respondents is included in analyses with non-Hispanic white as the reference category.

Wave IV of the Add Health does not include measures of major selection. As consequence, Wave III measures of whether respondents reported having completed or being engaged in a STEM major are used to control for STEM majors (1=STEM major). These measures do not record whether respondents began STEM majors but left them for other fields; a common phenomenon. It also does not include respondents who began or completed a STEM degree after Wave III interviews but before Wave IV. Additional controls for the respondent's location and its relative urban density were included as well.

Analytic Strategy

This analysis uses multinomial regression to compare employees engaged in STEM occupations or unemployed at Wave IV to those employed in non-STEM fields. In order to evaluate the ways that religious engagement separately impacts men and women, I present separate models for men and women. The results are presented as relative risk ratios (RRR) for ease of interpretation.

Table 4.1 presents descriptive statistics for the variables used in analysis. Tables 4.2 presents the relationship between adolescent religion measures and occupation selection outcomes for men and women. Table 4.3 presents the conservative Protestant portions of analyses of religious affiliation change from adolescence. Table 4.4 presents analyses of interactions between marriage and religious affiliation. Finally, Table 4.5 presents interactions of religious affiliations and parenthood. All analyses in this chapter are weighted using the longitudinal weights established by and recommended for use with Add health data (Chen and Chantala 2014).

Ancillary Analyses

Additional analyses were conducted interacting STEM major at Wave III and religion measures. These results were not statistically significant and are not presented in the appendix. Logistic analyses of respondents who reported STEM majors at Wave III but were not employed in STEM fields at Wave IV are reported in the appendix as well. Finally, analyses of STEM-adjacent health occupations (defined in the appendix) were conducted and are presented in the appendix as well.

Results

Table 4.1 displays the descriptive characteristics of the sample population, split by respondent gender. At Wave IV, the majority of respondents were U.S. citizens. More women than men reported being currently or previously married. Women, on average, had more children than men, consistent with literature on gender differences in age-at-marriage and age at first birth. Consistent with evidence of women's greater religious involvement, fewer women than men reported being unaffiliated, and women reported higher levels of religious activities.

Table 4.2 reports the relationship between adolescent religious affiliations and practices and likelihood of working in a STEM field or being unemployed. Model 1 presents relationships between adolescent religious involvement and market behaviors. As in previous chapters, results are separated by respondents' reported gender. For women, adolescent affiliation with a conservative Protestant tradition was unrelated to the likelihood of selecting into a STEM occupation relative to selecting into a non-STEM occupation in Model 1; thought consistent with existing literature it was associated with an increased likelihood of being outside of the labor market. For men in the sample, adolescent affiliations with conservative Protestant traditions was actually associated with a decreased likelihood of being employed in a STEM occupation relative to employment in another field. Religious activities were unrelated to employment choices for men or women.

Model 2 includes a control for STEM education completion or engagement at Wave III. Unsurprisingly, for both men and women this measure is highly associated with employment in a STEM position at Wave IV. However, its inclusion in the model does not meaningfully alter the behaviors of men raised as conservative Protestant in selecting into non-STEM employment. In Model 3, when measures of respondents' education level and race along with other demographic

controls are included in analysis, conservative Protestant men are not significantly more or less likely to choose STEM employment than other men.

Table 4.1: Descriptive Statistics

	Men		Women	
	Mean	Std. Dev	Mean	Std. Dev
African American	.20		.23	
Hispanic	.16		.16	
NH White	.57		.56	
Other Race	.01		.01	
US Citizen	.97		.98	
Married	.37		.42	
Never Married	.54		.46	
Divorced/Widowed	.09		.12	
Number of Kids	.77	1.08	1.11	1.19
Adolescent Religion Measures				
Conservative Protestant	.28		.29	
Mainline	.26		.27	
Other Protestant	.03		.03	
Catholic	.25		.26	
Other Religion	.04		.04	
Not Religious	.13		.11	
Religious Activities	-.08	1.04	.08	1.00
Dependent Variables				
STEM	.08		.03	
Non-STEM	.67		.64	
Unemployed	.25		.32	
N	6,938		7,732	

In all three models women raised as conservative Protestants were not more or less likely to select STEM employment over non-STEM fields. However, consistent with existing literature on the market behaviors of conservative Protestant women, they were more likely to be unemployed in each model than they were to be employed in non-STEM fields.

Table 4.2: Adolescent Religion and Occupation: Relative Risk Ratios

	Model 1: Men		Model 1: Women		Model 2: Men		Model 2: Women		Model 3: Men		Model 3: Women	
	STEM	Unemp	STEM	Unemp	STEM	Unemp	STEM	Unemp	STEM	Unemp	STEM	Unemp
Adolescent Affiliations												
Conservative Protestant	.64*	1.17	1.11	1.56***	.65*	1.17	1.14	1.56***	.91	1.06	1.46	1.39**
Other Protestant	.91	1.11	.23	1.26	.85	1.11	.24	1.26	.99	1.13	.233	.98
Other Religion	.44	.59t	2.10	1.10	.42t	.59t	1.91	1.09	.37*	.57	1.71	1.15
Not Religious	.96	1.22	1.45	1.01	1.05	1.22	1.41	1.01	.95	1.19	1.23	1.17
Catholic	1.10	.95	1.71t	1.12	1.11	.95	1.70t	1.12	1.09	1.00	1.72t	1.10
Religious Activities	1.06	.97	.98	.96	1.07	.97	.95	.95	.88	.98	.82	1.07
STEM Education					4.81***	1.02	4.76**	1.06	4.52***	1.12	3.80***	1.25
African American									.48*	1.10	1.20	.78
Hispanic									1.02	.82	1.01	.78
Other Race									1.41	1.09	2.39*	1.16
Married									1.92**	.98	1.63*	1.41**
Number of Kids									.72**	.97	.61**	1.21***
Constant	.13***	.34***	.03***	.35***	.10***	.33***	.03***	.45***	2.86	.55	.09	.38

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Controlled for Age, Education Level, Urbanicity, Household Income, Health, and Location; Men n=6,938 Women n=7,732

In order to evaluate life-course variation in religion effects, Table 4.3 presents results separated by affiliation changes over time. The upper portion shows the experiences for adults who entered conservative Protestant affiliations after adolescence. The lower portion shows the associations for adults who left adolescent conservative Protestant affiliation after Wave I. For ease of interpretations, only the relative risk ratios pertinent to conservative Protestants are presented. Columns are split by respondent sex and present the relative risk ratios for being unemployed or employed in a STEM profession at Wave IV with employment in a non-STEM field as the base outcome.

Men who entered conservative Protestant affiliations after adolescences were not significantly less likely to be engaged in STEM fields over other fields. Men who entered conservative Protestant affiliations from irreligion were more likely to be unemployed at Wave IV, but the significance of the association was marginal. Both upper and lower tables show that men who maintained adolescent conservative Protestant affiliations were significantly less likely to be engaged in a STEM field than working in another field. In the bottom analyses, men who exited adolescent conservative Protestant affiliations for other religious traditions or for religious inactivity were not significantly less likely to select into STEM occupations than other fields. This finding suggests that, despite evidence that conservative Protestant boys had lower science GPAs and took fewer science courses than their male peers in high school, only men who maintained such affiliations were less likely to be employed in STEM fields than non-STEM occupations in early adulthood.

Women who joined conservative Protestant affiliations by Wave IV were no more or less likely to be engaged in STEM fields than to be working in non-STEM employment. Women who entered conservative Protestant affiliations after adolescence from other religious traditions were

marginally less likely to be unemployed. Exiting conservative Protestant traditions after adolescence did not impact women's likelihood of employment in STEM fields, unlike the pattern for men. Women who maintained affiliations from adolescent were significantly more likely to be unemployed than employed in non-STEM fields.

Models display relationships between religious associations and STEM occupation selection when Wave III STEM majors are included in analyses. This inclusion reduced the significance of consistent conservative Protestant men's likelihood of selecting a STEM occupation relative to another field. It did not alter former or current conservative Protestant women's likelihood of STEM employment.

Full models included controls for age, education level, race, number of children, house hold income, health, marital status, and the urban density of their area of residence. In these full models, consistent conservative Protestant men were no more or less likely to work in STEM fields. Nor were there significant patterns associated with religious entrances or exits. Formerly unaffiliated conservative Protestant women were more likely to work in STEM in full models, but this association was marginally significant. Women who entered conservative Protestant affiliations from irreligion or other traditions were significantly less likely to be unemployed than to work in non-STEM fields. Consistent conservative Protestant women were significantly more likely in both analyses to be unemployed at Wave IV.

Table 4.4 presents interactions between adolescent religious affiliations and marital and fertility behaviors for men and women. For ease of interpretation select relative risk ratios are presented. Separate models with Wave III STEM education and interaction terms were run but were not meaningfully different from those excluding education, and are not presented. Models

are separated by respondent sex. As in all regressions presented in this chapter, the base outcome is employment in a non-STEM field.

Married men and women with adolescent conservative Protestant affiliations were not significantly less likely to be engaged in STEM occupations at Wave IV in control free Model 1. Model 2 which included controls for respondent age, whether they were engaged or had completed STEM majors at Wave III, number of children, education level, household income, race, residence, and health at Wave IV did not yield new information about these relationships.

Table 4.5 displays interactions between adolescent religious affiliations and respondent's fertility patterns. Other research has highlighted the ways in which adolescent religious environs shape anticipated adult fertility practices and women's' labor force engagement. These analyses found no significant difference between adults' adolescent religious practices, parenthood, and occupational decisions in control-free Model 1. For women raised in conservative Protestant households, children did not significantly increase the likelihood of being outside of the labor force or working in non-STEM fields. For conservative Protestant men, parenthood also did not impact labor market behaviors. Full Model 2, with controls for STEM education at Wave III, age, household income, race, education level, marital status, and health did not yield additional significant findings.

Discussion

Contrary to expectations established by gendered religious life course models and college-going conservative Protestant men's comfort with STEM majors, it was men raised in conservative Protestant households who were significantly less likely to engage in STEM occupations than in

non-STEM labor. This association was generally driven (in Table 4.3) by men who maintained conservative Protestant affiliations into adulthood.

These effects were generally explained in full models which included controls for respondents' levels of education. This finding is consistent with Chapter Two which showed that conservative Protestant boys often experienced stronger science course avoidance and lower science course grades than their male peers and with evidence presented in the appendix, and in religion literature that conservative Protestants are less likely to attend college. This suggests that the decision to attend or avoid post-secondary education can profoundly shape the STEM occupational outcomes of conservative Protestant men.

There was little evidence of family effects for conservative Protestant men. Neither marriage nor parenthood interaction terms were associated with conservative Protestant men's' occupational selections. This finding is consistent with literature of conservative Protestant men's work-life balance practices.

For women raised in conservative Protestant traditions, adolescent affiliations were associated with an increased likelihood of being outside of the labor market at Wave IV. This finding is consistent with a wealth of evidence about conservative Protestant women's labor force participation. As with conservative Protestant men, these effects were largely driven by women who remained affiliated into adulthood. Women raised in conservative Protestant traditions who were in the work-force were no more likely to select out of STEM occupations than other women. Neither marriage nor fertility appeared to increase these effects.

Table 4.3: Affiliation Changes and Occupation: Select Relative Risk Ratios

	Model 1: Men		Model 1: Women		Model 2: Men		Model 2: Women		Model 3: Men		Model 3: Women	
	ST.	Un.	ST.	Un.	ST.	Un.	ST.	Un.	ST.	Un.	ST.	Un.
Joined												
From No Religion	.84	1.64t	1.97	.65	1.06	1.64t	1.90	.65	2.18	1.55	3.05t	.52*
From Other Religion	.71	.79	0.65	.77t	.73	.79	.67	.77t	.87	.79	.75	.72*
Stayed	.58*	.92	0.91	1.17*	.60t	.92	.93	1.17*	.86	.84	1.18	1.07*
Constant	.14***	.42***	.63***	.04***	.10***	.42***	.03***	.62***	3.13	.67	.04t	.36
Left												
For No Religion	.70	1.08	1.22	.87	.73	1.09	1.22	.87	.84	1.00	1.55	0.82
For Other Religion	.56	1.32	1.86	1.39	.58	1.32	1.87	1.29	.82	1.22	1.98	1.31
Remain	.64*	1.09	1.10	1.50***	.64t	1.98	1.09	1.50***	.82	1.00	1.29	1.42**
Constant	.13***	.35***	.03***	.49***	.10***	.35***	.02***	.49***	3.08	.58	.05t	.26t

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Model 2 includes STEM education measure. Full model is controlled for Age, Education Level, Race, Marital Status, Number of Children, Household Income, Health, Urbanicity and Location; Base outcome is non-STEM employment; Men n=6,938 Women n=7,732

Table 4.4: Adolescent Affiliations, Marriage, and Occupation: Select RRR

	Model 1: Men		Model 1: Women		Model 2: Men		Model 2: Women	
	STEM	Un.	STEM	Un.	STEM	Un.	STEM	Un.
Interactions								
Married Conservative Protestant	.81	1.48	.79	.88	1.27	.83	.78	.83
Married Other Protestant	.49	.07*	12.06***	1.08	.08*	.58	22.27***	.87
Married Other Religion	.08***	18.16*	0.65	1.22	13.07*	.08***	.66	1.14
Married Not Religious	1.68	.92	.20t	.86	1.41	1.80t	.21t	.81
Married Catholic	1.42	1.65	.45	.76	.92	1.48	.46	.73
Conservative Protestant	1.20	.55t	1.27	1.64**	.78	1.09	1.51	1.55**
Other Protestant	1.43	1.95	.00***	1.19	2.04	1.36	.00***	1.09
Other Religion	.78	.08**	.65	1.01	.06**	.75	2.00	1.05
Not Religious	.94	.94	2.82t	1.27	1.41	.99	3.44*	1.09
Catholic	.93	.93	2.56*	1.28	.93	.86	2.38t	1.27
Married	1.19	1.19	2.54*	1.68**	1.64	.91	2.62*	1.65**
Constant	.09***	.09***	.02***	.25***	2.40	.47	.04	.33

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Model 2 includes STEM education measure. Full model is controlled for Age, Education Level, Race, Marital Status, Number of Children, Household Income, Health, Urbanicity and Location; Men n=6,938 Women n=7,732

The base outcome in these analyses is non-STEM employment

Table 4.5: Adolescent Affiliations, Fertility, and Occupation: Select RRR

	Model 1: Men		Model 1: Women		Model 2: Men		Model 2: Women	
	STEM	Un.	STEM	Un.	STEM	Un.	STEM	Un.
Interactions								
Conservative Protestant Parent	.89	1.05	.80	.87	.86	1.06	.82	.89
Other Protestant Parent	.04**	.72	2.54**	1.21	.03***	.74	2.74**	1.18
Other Religion Parent	2.08*	1.04	1.11	1.11	.59	1.05	1.07	1.15
Not Religious Parent	.59	1.36*	.30t	.80	2.45**	.87	0.3	.98
Catholic Parent	.98	1.08	.69	1.43*	.97	1.10	0.62	.78*
Conservative Protestant	.74	1.09	1.45	1.66**	.94	1.00	1.47	1.64**
Other Protestant	1.98	1.48	.08*	.88	2.17	1.47	.07*	.80
Other Religion	.26**	.56t	1.94	1.05	.23**	.53t	1.50	1.00
Not Religious	1.08	.98	2.35t	1.07	1.42	.87	2.96*	1.01
Catholic	.98	.87	1.96t	1.43*	.97	.92	2.02	`.38t
Number of Kids	.69t	.89	.74***	1.41***	.73	.86	.79	1.31***
Constant	.12	.37***	.04***	.31***	2.09	.60	.05	.33

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Model 2 includes STEM education measure. Full model is controlled for Age, Education Level, Race, Marital Status, Number of Children, Household Income, Health, Urbanicity and Location; Men n=6,938 Women n=7,732

The base outcome is non-STEM employment

There was limited support for cultural isolationism and cognitive dissonance models of religion and science. Conservative Protestant men were less likely to be employed in STEM than non-STEM fields. Conservative Protestant women who worked were not less likely to work in STEM than in non-STEM occupations, but they were less likely to work.

A few caveats must be added. The population of Wave IV respondents is still fairly young (24-32) in a period when average age-at-first birth has been rising. This is also a sample of one narrow cohort- it is possible that looking at other cohorts would yield very different findings.

Chapter Five: Conclusions and Future Directions

Utilizing the longitudinal data available through the Add Health dataset, this dissertation followed the STEM trajectories of a single cohort of students from high school science course decision-making, through STEM labor force participation. Focusing on the influence of conservative Protestant affiliations on STEM participation this dissertation asked two significant questions: a. does involvement with conservative Protestant religious groups, with their greater levels of scientific distrust, impact the STEM educational and employment trajectories of conservative Protestant students? And b. Do the conservative gender attitudes of conservative Protestant groups have particularly deleterious effects on the STEM educational and employment outcomes of affiliated girls?

In order to address these questions, I first engaged with a wealth of literature which describes significant conservative Protestant opposition to and skepticism of the morals, values, and practices of scientists. I then worked to develop a framework for applying academic research on conservative Protestant opposition to science to education research focusing on disparities in STEM educational attainment and employment outcomes. I particularly note the depth of literature pointing to unique conservative Protestant attitudes toward gender, conservative Protestant gendered differences in educational and market behaviors, and the marital and fertility behaviors of conservative Protestants. I tied this literature to educational and work research pointing to significant gender differences in STEM attainment. Utilizing these two types of analyses I constructed a theoretical framework contrasting theories of religious opposition to science and theories about gendered religious life courses. I sought to evaluate ways that gender might differentially impact the STEM trajectories of conservative Protestant boys and girls. The results

of analysis suggest that adolescent conservative Protestant involvement is indeed associated with lower science course completion and science GPAs for both boys and girls. The influence of these early affiliations on college major selections or occupational selections were tracked across Chapters Three and Four.

This dissertation contributed to existing literature in several ways. First, it evaluated the impact of adolescents' religious involvement, the religious involvement of their parents, and the religious demographics of friendship groups, on high school science course completion and cumulative science GPAs. It applied the STEM major frameworks established in educational literature to an analysis of conservative Protestant major selection in college, focusing particularly on the differences between early religious affiliations and activities and the persistence of engagement in their associations through college. Finally, it tracked the Add Health cohort into actual employment, applying the STEM frameworks established in education and occupation research, to conservative Protestant labor force market practices.

This chapter: a. provides an overview of significant findings in the three empirical chapters, b. discusses the place of these findings in the broader literature on religion, gender, STEM education, and STEM employment, and c. highlights several important questions for future research into the relationship between religious involvement and STEM educational processes.

Chapter Two evaluated the high school science course taking and GPA outcomes of conservative Protestant students using OLS regression analyses. This examination found that conservative Protestant boys, net of demographic controls, took fewer science courses and had lower science GPAs than their male peers. Conservative Protestant girls also experienced science deficits relative to female peers, but these deficits disappeared in full models with demographic

controls. This finding was surprising in light of traditional gender conceptions of science as a 'boys' subject.

Parental conservative Protestant affiliations were likewise detrimental to adolescents' science course-taking and GPAs. The effects of parental affiliation were often larger in size than those of adolescents' affiliations. For boys but not girls, the inclusion of demographic controls reduced but did not explain the size of science course taking gaps relative to peers. For girls, but not boys, the inclusion of demographic controls reduced but did not explain the size of GPA penalties relative to female peers. This finding highlights the importance of evaluating both personal and parental religious affiliations when examining adolescent outcomes.

Chapter Two also evaluated the religious density of friendship networks. Despite a wealth of research highlighting the power of peer networks to shape adolescent outcomes, the density of conservative Protestant friendship networks were unrelated to high school science outcomes. This finding stands in contrast to expectations established by cultural isolationism that conservative Protestant networks would encourage the rejection of scientific values and institutions.

Chapter Three evaluated Add Health respondents who attended college. Using multinomial logistic regression analysis comparing students who majored in either cosmology or non-cosmology STEM majors to those who selected non-STEM majors; I tested whether conservative Protestant students were more likely to select out of STEM than their same-sex peers. I also looked at both adolescent religious affiliations and fidelity of those affiliations through the educational process. While adolescent affiliations were an early driver of boy's science disparities in high school, I found that college-going men raised in conservative Protestant traditions were no less likely than their peers to major in a STEM field than a non-STEM major. Adolescent religious affiliations also did not affect college-going conservative Protestant women's likelihood of

selecting a STEM major relative to their peers. Fidelity to conservative Protestant groups was significantly associated with a significantly reduced likelihood of selecting a non-cosmology STEM major for conservative Protestant women and a marginally significant increased likelihood of selecting non-cosmology STEM majors for men. For women, this relationship disappeared in full models with demographic controls. This finding highlights the importance of college attendance for conservative Protestants. Those conservative Protestants who do attend college appear to have found ways to navigate those forces which drove early disparities in science course outcomes. They were not particularly uncomfortable with cosmology STEM majors that required engagement with scientific theories about evolution, the universe or life.

Chapter Four followed Add Health respondents into Wave IV employment. I used multinomial logistic regression analyses to compare respondents who were employed in STEM occupations or unemployed to those engaged in non-STEM work. I found that women raised in conservative Protestant traditions who were employed in the labor force were not significantly less likely than other women to work in STEM fields. However, they were significantly more likely than other women to be outside of the workforce. This finding is consistent with other studies that have found that conservative Protestant women experienced longer and more frequent labor force disruptions. It was also consistent with theories suggesting that conservative Protestants inhabit gender heightened life courses.

Men raised in conservative Protestant traditions were significantly less likely to be employed in STEM occupations than non-STEM fields; though the significance of these associations disappeared in full models when education and demographic factors were controlled. This finding is consistent with evidence both of conservative Protestant boys' lower science course performance and GPA than male peers. That education and demographic control measures

explained these disparities is consistent both with STEM occupations as ones that generally require higher levels of educational investment and evidence in other research that conservative Protestants have generally lower levels of education than others. Such a finding also supports cultural isolationist models that suggest conservative Protestants may be distrustful of both education and science as amoral social institutions. Finally, I found that both conservative Protestant male STEM-avoidance and conservative Protestant female unemployment were largely driven by respondents who maintained adolescent belief commitments into Wave IV. This finding highlights the importance of examining religious belief commitments as part of a life-course process.

Collectively, these findings suggest several important things about the two questions which drove this analysis. First, there was indeed evidence that religion/science conflict impacted the trajectories of conservative Protestant Add Health respondents, particularly men who do not attend college. Conservative Protestant boys, net of demographic controls, took significantly fewer science course than their male peers and had significantly lower science GPAs. They were also significantly less likely to work in STEM fields at Wave IV, though demographic and education controls explained this difference.

However, among conservative Protestants who attend college (Chapter Three), there is no evidence of such conflict driving major selection. Adolescent conservative Protestant affiliations were unrelated to STEM major selection. Consistently conservative Protestant men were no less likely than their male peers to select a cosmology STEM major and were marginally more likely to select non-cosmology STEM majors. Consistently conservative Protestant women were marginally less likely to select these majors than female peers, but this disparity was absent in models with full demographic controls.

Cultural isolationist or cognitive dissonance models may indeed drive conservative Protestant men to disproportionately avoid STEM occupations. But it seems likely that this influence arises largely because conservative Protestants disproportionately select out of higher education. Conservative Protestants who chose to attend college did not appear to let any religion/science conflict issues impact their educational choices. While there is much that we know about conservative Protestant opposition to the sciences, we know very little about the portion of conservative Protestants who have successfully resolved such conflicts or who do not allow discomfort to affect real-world behaviors. Qualitative analyses which explore the attitudes of college-going conservative Protestants may shed light on what distinguishes them from conservative Protestants who eschew college.

The second question which framed this dissertation asked whether conservative Protestant women, as consequence of engagement with gendered religious life courses, were more likely to experience STEM disparities than other women. Conservative Protestant men and women appear to inhabit a gender-heightened life course. Among college-going conservative Protestants (Chapter Three), women were somewhat less likely than their female cohort to select into STEM majors. This difference in major selection was not reflected in avoidance of STEM occupations in favor of non-STEM ones for those conservative Protestant women who were engaged in the labor force at Wave IV. However, in the labor force as well, young conservative Protestant women were significantly less likely to be working at Wave IV than their female peers.

While analyses in these chapters focused on cultural isolationist and cognitive dissonance models and gendered religious life courses as two separate possible explanations, it is likely that both frameworks play a role in shaping conservative Protestant educational and occupational behaviors. Analyses examining the extent to which religion/science conflict narratives and

religious gender socialization co-occur in conservative Protestant households and work collectively to shape life-course processes could yield significant findings.

Contributions

This dissertation expands on existing research in several ways. First, it looks at multiple layers of religious social networks and their influence on students' high school science outcomes. Several studies of religion and students' educational outcomes have been conducted (Regnerus 2003, Darnell and Sherkat 1997, Lehrer 2004, Lehrer 2006, Beyerlein 2004). Many of these look particularly at conservative or fundamentalist Protestant disapproval of the institution of education in general or of scientific education in particular (Smith et al 1998, Woodberry and Smith 1998, Beyerlein 2004). Education research has also examined gender differences in course-taking, particularly in mathematics (Riegle-Crumb and Humphries 2012, Frank et al 2008, Crosnoe et al 2008, Bae et al., 2000; Riegle-Crumb, 2006; Shettle et al, 2007; Xie and Shauman 2003, Crosnoe et al 2008, Catsambis 1994). Some of those studies have looked at the demographics of friendship networks in their impact on course-taking (Riegle-Crumb et al 2006, Crosnoe et al 2008, Ceci & Papierno, 2005). However, none have looked at the separate influences of student, parental, and friendship network's religious affiliations and engagement in their impact on science course pursuit and performance. In Chapter Two, I examine each of these three influences separately in their impact on science course performance and persistence during high school.

Second, it applies the STEM framework applied by education researchers to the specifics of college students' major choices. Research into gender and education has found a host of gendered differences in how decisions about majors are made (Hanson, Schaub, and Baker 1997,

Zafar 2013, Ma 2009, Dickson 2010, Maple and Stage 1991). Some religious scholars have also looked specifically at the performance of religious students in biology courses or at the attitudes toward religion of academic scientists and toward science of religious parents. This study, in applying STEM major frameworks to the question of conservative Protestant college major selection shows that, in contrast to earlier disparities in high school persistence, only conservative Protestant girls were significantly less likely to major in non-cosmology STEM majors. Additionally, in separately evaluating adolescent religious influences and religious persistence, Chapter Three explicates a distinction between youthful religious environments and active commitment to religious philosophies in shaping college major selection.

Third, it looks specifically at adulthood religious practices and their relationship to career selection. While there are many studies highlighting conservative Protestant skepticism of and moral objections to various facets of the sciences, less work has been done examining the ways that such sentiments are translated to actual behaviors. This is particularly true of occupational decisions. Chapter Four finds that conservative Protestant men were significantly less likely than other men to be employed in STEM occupations, a difference explained in full models that included educational controls. In contrast to both substantial evidence of conservative Protestant distrust of science, and evidence of early penalties in high school science outcomes, conservative Protestant women were no less likely than other women in the labor-force to work in STEM fields than non-STEM occupations. However, they were much less likely to be employed at all during this period of young adulthood.

Finally, in utilizing longitudinal data, this study is able to track specific cohort of respondents across multiple stages of educational and occupational decision-making. This framework suggests that, while adolescent religious affiliations are associated with steep science

penalties in high school, their impact on the behaviors of college students or adults in the labor force are more complex.

Limitations and Future Directions

Data limitations left a few significant questions unanswered. There are many groups of respondents who may be important for examining conservative Protestant affiliations and STEM outcomes who are not present in the Add Health data. Children who were home-schooled or schooled at unaccredited private religious schools are not present in the data. There are reasons to believe such children may include high proportions of cultural isolationist conservative Protestants, given the distrust of such conservative Protestants of educational institutions. How well these home school or unaccredited school environments prepare teach religious children science and math skills necessary to compete in the American economy remains an open question. Do conservative Protestant students in these educational environments perform at the same level as those conservative Protestant students present in the Add Health data or do they experience greater science and math discrepancies? How are their long-term workforce outcomes shaped by these educational environments?

This study controlled for region and urbanity of schools, but there are many elements of school environment which remain unexplored. In the United States, local authorities have power over multiple elements of school environments. Communities with a substantial proportion of conservative Protestants and a school board dominated by conservative Protestant members may be tremendously and meaningfully different from those in more secular or religiously diverse communities. Such differences could not only impact local investments in and emphasis on

science, but on multiple elements of school environments and outcomes. These environmental influences would impact all students regardless of their personal religious affiliations, those of their parents, or those of their friends. These possibilities were not assessed in this analyses, but a study exploring the relationship between the religious density of a school district and student achievement both within and after secondary school could shed light on substantially under-explored areas.

The Add Health did provide adolescent network data that has been tremendously useful to many researchers, but information on friends' religious affiliations could only be obtained for friends who also participated in the Add Health. This means that the picture of religious network density used in analysis is incomplete. Cultural isolationist conservative Protestant students may have more intense friendships with co-religionists who did not attend Add Health schools. This study cannot ultimately measure how important such networks may be.

In Wave I, religious denominations were coded fairly broadly. Such coding likely makes sense in interviews of adolescents who may not have very clear ideas of the differences within Baptist or Presbyterian denominations. However, it limited my ability to analyze within conservative Protestant differences. Other studies have suggested that such differences may shape conservative Protestant attitudes toward science or education. It is possible they may influence which conservative Protestants attend or avoid college. If so, this means that college education does not generate differences among conservative Protestants but instead highlights pre-existing variations. A qualitative study examining the ways that conservative Protestant college students negotiate religious identity and coursework may offer interesting insights into how individuals reconcile potentially competing ethical frameworks. Do conservative Protestants who attend

college ignore competing messages? Do they interpret the tenants of their religion differently than others do?

Chapter Three of this study focused on conservative Protestants who attended college, but there are many conservative Protestants who do not attend college. These conservative Protestants may be driving many of the workforce discrepancies we see and may be the major force behind conservative Protestant stances on many other issues. A study focused on the post-secondary pathways taken by these conservative Protestants into the labor market would represent a valuable expansion on existing literature exploring religion and college-education. Is religious involvement, particularly attitudes toward science or education as corrupting institutions interfering with long-term occupational and socio-economic well-being?

In Chapter 3, I utilized reported college majors for four-year college goers in order to evaluate STEM Major selection. However, the Add Health did not collect information about the colleges themselves. Conservative Protestants who attend religious four-year colleges may have importantly different experiences than conservative Protestants who attend public or non-religious private colleges.

In Chapter 4, I also included a measure of STEM education in analyses. This measure is based on Wave III education data. However, at Wave IV, respondents were not asked to identify their college majors. As consequence I could not distinguish between students who abandoned Wave III STEM majors before graduation and those who remained committed until graduation. Because STEM majors have fairly high turn-over rates, this absence may be important. Likewise, I could not capture respondents who began STEM majors after Wave III. These limitations mean that STEM education measure used in Chapter IV analyses may be lacking in

analytical strength. A more accurate measure of STEM education might explain conservative Protestant men's' disproportionate absence from STEM occupations.

This dissertation focused on the attainment of a Bachelor's degree. Other studies have examined the religious beliefs and practices of academic scientists. There is a gap in examinations of educational pipeline between these moments. Do conservative Protestants select out of post-graduate studies? Do they select into particular academic fields? Do they choose areas of work like medicine which may appeal to religious conceptions of work as a calling or religious emphasis on caregiving or empathy?

In Chapter 4, this dissertation looked at occupation selection among conservative Protestants, focusing particularly on three outcomes: STEM employment, non-STEM employment, or unemployment. Several studies have highlighted the tendency of conservative Protestant women to exit the workforce earlier and for longer periods of time. This study focuses on fairly young adults (aged 32 or younger) at Wave IV. As consequence, it cannot examine conservative Protestant women's long-term workforce outcomes. Do conservative Protestant women, as consequence of these greater workforce absences, find themselves concentrated in lower status positions throughout their occupational lives? Are conservative Protestant women who begin in STEM careers more or less likely to return to such fields at later stages?

This dissertation focuses on a single cohort of respondents, which allows for tracking STEM decision-making at multiple steps of the life-course. However, it means that there may be unobserved generational differences in the extent to which both religious affiliations and gender shape the educational and occupational decisions of older or younger generations of respondents. This is particularly true of earlier waves of the Add Health data set which inherently occurred further back in time. Newer generations of conservative Protestants may experience fewer

penalties in science than the Add Health cohort. In STEM occupations, it is possible that older cohorts of conservative Protestants will be less well represented than younger respondents. Looking at multiple generations may suggest that religion/science conflict has declined across generations or, conversely, that it has remained particularly intractable. The latter finding would suggest that conservative Protestants are likely to be increasingly shut out of the labor market as more occupations require STEM skills.

Additionally, this study was focused on tracing STEM education-to-work trajectories. However, there are many methods of occupational sorting. For instance, conservative Protestant men and women may be more attracted to occupations they see as serving others or god. Likewise they may be concerned with occupations as religious callings. Conversely, they may be making occupational selections on the basis of concerns about work-life balance. An analyses of the forces which influence conservative Protestant occupational selection may yield many insights into both discussions of gender-heightened life courses and the ways that conservative Protestants think about labor.

Perhaps most importantly, a substantial question remains about the role of race in shaping these relationships. We know that religious affiliations are often experienced differently in different race/ethnic contexts, that white conservative Protestantism inhabits different experiential spaces than African American, Asian, or Hispanic conservative Protestantism. Additionally, disparities in science pursuit and performance, college attendance, major selection, and STEM employment vary tremendously by race. Gender differences in STEM vary meaningfully by race/ethnicity. An examination of the intersection of religion, race and gender and its impact on education and work outcomes would be a meaningful expansion of these findings.

Finally, while this study suggested that conservative Protestant men and women inhabit an environment of heightened gender socialization, it did not explore the mechanisms of such socialization. How do conservative Protestant parents encourage and reinforce gendered behaviors, in contrast to other parents? How do they engage with a social world that, at least in discourse, has become somewhat more gender-egalitarian? How do children reconcile potentially competing messages about gender behavior from parents and broader social environments? Qualitative studies of conservative Protestant child-rearing may increase our understanding of the forces shaping adolescent gender socialization and gendered conservative Protestant life-courses.

Appendix

Chapter Two

Wave 1 Student Denominations Coding

Conservative Protestants	Mainline Protestants	Other Protestants
Seventh Day Adventists	Baptists (not biblical literalists)	Christian Scientists
AME, AME Zion, CME	Christian Church (Disciples of Christ)	Jehovah's Witnesses
Assemblies of God	Congregational	Latter Day Saints (Mormon)
Baptists (restricted to biblical literalists)	Episcopal	Unitarians
National Baptists	Friends/Quakers	
Pentecostals	Lutherans	
Holiness	Methodists	
"Other Protestant"	Presbyterians	
	United Church of Christ	

Wave 1 Parent Denominational Coding

Conservative Protestants	Mainline Protestants	Other Protestants
Seventh Day Adventists	Baptists (not biblical literalists)	Christian Scientists
AME, AME Zion, CME	Christian Church (Disciples of Christ)	Jehovah's Witnesses
Assemblies of God	Congregational	Latter Day Saints (Mormon)
Baptists (restricted to biblical literalists)	Episcopal	Unitarians
Pentecostals	Friends/Quakers	
Holiness	Lutherans	
"Other Protestant"	Methodists	
	Presbyterians	

Math Outcomes: OLS

	Boys		Girls		Boys		Girls		Boys		Model 3: Girls	
	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA	Classes	GPA
Conservative Protestant	-.42***	-.10*	-.10***	-0.05					-.28*	-0.03	-0.23	0.01
Other Religion	.34**	-0.07	0.14	.13*					-0.34	-0.12	-0.05	0.1
Other Protestant	-.43**	-0.06	-0.27	.13*					0.17	-.17t	-0.35	0.15
Not Religious	-.63***	-0.05	-.91***	.00					0.11	-0.05	0.13	.17*
Catholic	0.06	-.09*	0.12	-0.02					0.04	-0.05	0.06	-0.03
Religious Activities					.51***	.10***	.32***	.07***	.23***	.09**	.31**	.09**
Age									-.05*	0.01	-.31***	-0.01
Other Race									0.06	0.13	-0.1	-0.24
Hispanic									-.28*	-.17**	0.23	-.21***
African American									-.33**	-.24***	0.07	-.32***
Married Parents									-0.03	.11*	-0.08	0.05
Parent Income									.43***	.06*	.64***	.04t
College Intent									.61***	0.16	.84***	.14***
Catholic School									.35*	-0.09	.74*	-0.03
English at Home									-0.08	-0.04	-.75*	-0.02
Picture Vocabulary Test									.03***	0	.05***	.01***
Highest Science Taken										.21***		.22***
Constant	6.02***	.68***	5.94***	.63***	5.62***	2.06***	5.93***	2.34***	1.26*	0.38	4.80**	0.17

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; Controlled for Urbanicity and Region

Attendance and Prayer Frequency

	Male		Female		Male		Female	
	Courses	GPA	Courses	GPA	Courses	GPA	Courses	GPA
Attend	.24***	.14***	.15***	.09***				
Pray					.11***	.07***	.16***	.07***
Constant	2.64***	1.77***	3.02***	2.19***	3.04***	1.89***	2.72***	2.20***

Children/Parent Affiliation Conflict

	Male		Female	
	Courses	GPA	Courses	GPA
Parent But Not Child				
Conservative Protestant	-.96***	-.45***	-.50*	-.40***
Other Protestant	-.32	.07	-.14	.24*
Other Religion	-.12	.14	.48t	.24
Not Religious	-.25	.12	-.18	-.05
Catholic	-.05	-.04	-.31t	-.32**
Constant	4.00***	2.14***	4.15***	2.47***

Student Affiliation/Activity Interactions

	Male		Female	
	Course	GPA	Course	GPA
Active Conservative Protestant	.20	.18t	.28*	.02
Active Other Protestant	.13	.27	-.18	-.24*
Active Other Religion	.03	-.14	-.44	-.24*
Active Not Religious	.24	-.11	-.10	-.04
Active Catholic	.19	-.02	-.07	-.04
Conservative Protestant	-.50***	-.35***	-.57***	-.28***
Other Protestant	-.46	-.61t	-.54	.00
Other Religion	0.04	0.17	0.27	0.05
Not Religious	0	0	0	0
Catholic	0.19	-0.09	-0.03	-0.06
Religious Activity	.24**	.22**	.27*	.20***
Constant	4.08***	2.50***	4.22***	2.22***

Chapter Three

College Major Classifications

Cosmology STEM	**Non-Cosmology STEM**
03. Natural Resources and Conservation 26. Biological and Biomedical Sciences 30. Multi/Interdisciplinary Studies -Biological and Physical Sciences 40. Physical Sciences	01. Agriculture, Agriculture Operations, and Related Sciences 11. Computer and Information Sciences and Support Services 14. Engineering 15. Engineering Technologies/Technicians 27. Mathematics and Statistics 30. Multi/Interdisciplinary Studies - Mathematics and Computer Sciences 41. Science Technologies/Technicians

Wave 2 Student Denominational Coding

Conservative Protestants	Mainline Protestants	Other Protestants
Seventh Day Adventists	Baptists (not biblical literalists)	Christian Scientists
AME, AME Zion, CME	Christian Church (Disciples of Christ)	Jehovah's Witnesses
Assemblies of God	Congregational	Latter Day Saints (Mormon)
Baptists (restricted to biblical literalists)	Episcopal	Unitarians
National Baptists	Friends/Quakers	
Pentecostals	Lutherans	
Holiness	Methodists	
"Other Protestant"	Presbyterians	
Nondenominational		
Weslayan Church		

Free Methodists		

Religious Affiliations and the Likelihood of Opting Out of College: Odds Ratios

	Model 1		Model 2		Model 3	
	Boy	Girl	Boy	Girl	Boy	Girl
Conservative Protestant	1.60***	1.72***			1.31*	1.52***
Other Religion	.76	.61**			.93	.49**
Other Protestant	1.60t	1.40**			1.59	.98
Not Religious	1.80***	2.16***			.42***	.53**
Catholic	.92	.98			.92	1.05
Religious Activities			.72***	.73***	.57***	.55***
Age					1.01	.92**
Other Race					.86	3.31**
Hispanic					1.49**	1.62**
African American					.92	.89
South					1.55***	.95
West					1.83***	1.22
Northeast					1.12	.64**
Native Born					1.27*	1.28**
Parent Income					.31***	.38***
Married					1.94***	2.48***
Rural					1.25t	1.18
Urban					.99	.97
Constant	2.13***	1.52***	2.50***	1.95***	1.89***	1.63***

Notes: t:p<.10; *=p<.05; **=p<.01; ***=p<.001; base outcome: four year college attendance or completion at W3

Adolescent Attendance and Prayer Frequency: Relative Risk Ratios

	Model 1		Model 2		Model 3	
	Male	Female	Male	Female	Male	Female
Non Cosmo Major						
Attend	.86t	.90			.95	.93
Pray			.89t	.90	.91	.94
Constant	.13	.04***	.14***	.05***	.14***	.05***
Cosmo Major						
Attend	1.14	1.00			1.13	1.06
Pray			1.08	.97	1.01	.94
Constant	.04***	.09***	.04***	.09***	.04***	.09***

Wave 3 Religion Measures

Conservative Protestant	**Mainline Protestant**	**Other Protestants**
Assemblies of God	American Baptist Churches in the USA	Christian Scientists
Southern Baptist Convention	Christian Church (Disciples of Christ)	Jehovah's Witnesses
Just Baptists	Congregational	Latter Day Saints (Mormon)
American Baptist Association	Episcopal/Anglican/Church of England	Unitarians
Baptist Bible Fellowship	Mennonite	Just Christian
Baptist General Conference	Lutherans	Independent
Conservative Baptist Association of America	Methodists	Other
		Inter-denominational Protestant

Baptist Missionary Association Free Will Baptist Just Protestant Fundamentalist Baptists Independent Baptists National Baptists National Baptist Convention USA Pentecostals Holiness “Other Protestant” Charismatic	Presbyterians General Association of Regular Baptists Quakers/Friends Reformed United Church of Christ	Korean United Church

Brethren		
Christian and Missionary Alliance		
Church of Christ		
Church of God		
Church of the Nazarene		
Evangelical Covenant Church		
Evangelical Free Church		
Four Square Church		
Mennonite		
Salvation Army		

Seventh Day Adventists		

Chapter Four

Occupational Classifications

From the Standard Occupational Classification and Coding Structure (SOC)

STEM Occupations	**STEM Adjacent Occupations**
15-0000 Computer and Mathematical Occupations 17-0000 Architecture and Engineering Occupations 19-0000 Life, Physical, and Social Science Occupations; excluding social sciences 25-0000 Education, Training, and Library Occupations; restricted to those teaching post-secondary sciences and mathematics	29-0000 Healthcare Practitioners and Technical Occupations 31-0000 Healthcare Support Occupations

Wave 4 Student Denominational Coding

Conservative Protestants	Mainline Protestants	Other Protestants
Assemblies of God	Anglicans	Anabaptists
Baptists (evangelical, fundamentalists, or traditional)	Baptists (all others)	"Christian"
Brethren	Church of England	Christian Science
Charismatics	Congregational	Independent
Christian and Missionary Alliance	Disciples of Christ	Jehovah's Witness
Church of Christ	Episcopal	Just Christian
Church of God	Friends	Latter-Day Saints
Church of the Nazarene	Quakers	Mormon
Evangelical Covenant Church	Lutherans	Interdenominational Protestant
	Methodists	Unitarian
	Presbyterians	

Evangelical Free Church	United Church of Christ	Universalist
Four Square Gospel		
Free Methodists		
Holiness		
Just Protestant		
Mennonite		
Pentecostals		
Reformed		
Salvation Army		
Wesleyan Church		

STEM major at W III, no STEM job at W IV.

	Odds Ratios	
Adolescent Affiliations	Men	Women
Conservative Protestant	0.73	1.23
Other Protestant	0.83	1.49
Other Religion	0.65	1.84
Not Religious	1.56	0.9
Catholic	1.29	1.07
Constant	.03***	.02***

Ancillary Health Occupations; RRR

	Men		Women	
Adolescent Affiliations	AH	UN	AH	UN
Conservative Protestant	0.87	1.11	1.04	1.23**
Other Protestant	1.14	1.3	0.95	1.34t
Other Religion	1.2	1.07	1.12	0.97
Not Religious	0.99	1.21t	0.91	1.02
Catholic	1.14	0.97	1.05	1.06
Constant	.18***	.35***	.38***	.48***

Base outcome: Non-STEM employment. STEM occupation was included as a separate outcome but is not presented here.

Occupation Selection and STEM Education: RRR

	Male		Female	
Adolescent x STEM major	ST	UN	ST	UN
Conservative Protestant	1.12	1.31	1.49	.67
Other Protestant	0.21	1.87	.00	.79
Other Religion	1.32	0.8	1.77	.70
Not Religious	0.86	1.32	2.85*	1.08
Catholic	.78t	1.08	1.01	1.04
Conservative Protestant	0.78	1.1	.88	1.25*
Other Protestant	1.36	1.19	.70	1.44*
Other Religion	0.69	1.19	1.32	.93
Not Religious	1.09	1.17	1.02	1.02
Catholic	1.02	0.94	1.01	1.02
STEM education	4.52***	.68t	2.26*	.95
Constant	.10***	.36***	.03***	.46***

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