RELIGIOUS SIMILARITY AMONG SIBLINGS

A Thesis

by

LAYTON MARSHALL FIELD

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2011

Major Subject: Sociology

RELIGIOUS SIMILARITY AMONG SIBLINGS

A Thesis

by

LAYTON MARSHALL FIELD

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Approved by:

Co-Chairs of Committee,	Jeff Ackerman
	William McIntosh
Committee Member,	Sarah Gatson
Head of Department,	Mark Fossett

May 2011

Major Subject: Sociology

ABSTRACT

Religious Similarity Among Siblings. (May 2011)

Layton Marshall Field, B.S., Texas A&M University

Co-Chairs of Advisory Committee: Dr. Jeff Ackerman
Dr. William McIntosh

For many individuals, religious development begins in the family. Previous literature has confirmed this assumption and demonstrated that parents play a dominant role in the development process. There is a gap in the current literature regarding how other family members could also potentially contribute to religious development. This project takes the first step towards understanding how siblings may influence religious development by investigating the extent to which siblings share similar religiosity levels. Hierarchical linear models are applied to data from the National Longitudinal Study of Adolescent Health in order to assess whether siblings share similar religiosity levels. This project also investigates potential explanations of this similarity.

The results of this thesis demonstrate that siblings share common levels of religiosity. The similarity was still moderate after controlling for known predictors of adolescent religiosity such as parental influence, religious affiliation, race, and age. Sibling communication also explained a small proportion of sibling religious similarity. The results of this project leave open the possibility that siblings may contribute to one another's religious development. Suggestions for future research are discussed.

ACKNOWLEDGEMENTS

I would like to thank my co-chair, Dr. William McIntosh, and committee member, Dr. Sarah Gatson, for their tremendous help and guidance throughout this process. I would especially like to thank Dr. Jeff Ackerman for helping me develop and refine my research question and for teaching me to pay attention to every little detail. I must also thank all of my classmates and colleagues who provided useful insights to my thesis, as well as the tips and hints necessary to complete this step in my academic career.

Most importantly, I would like to thank my wife and daughter for their unfailing support and perseverance. I would not have made it to this point without their love. Finally, I want to thank all of our family members for giving of their time so graciously to care for my daughter so that my wife and I could complete our theses on time. Without such profound help we would have never been able to make it.

TABLE OF CONTENTS

Page

Page

LIST OF TABLES

Page

INTRODUCTION

Over the past three to four decades the study of religion within the discipline of sociology has continued to expand. The majority of this work describes the benefits and drawbacks of religious beliefs and behaviors. Few researchers, however, spend much, if any time discussing the development of religion (Regnerus, Smith, and Smith 2004). The few articles that have detailed religious development typically stem from the psychological perspective, which focuses on personality, emotions, and other internal stages of development (Regnerus et al. 2004). Other aspects of religious development have received much less attention often due to a lack of available data. For years, surveys failed to incorporate meaningful religious variables. Of the studies that do include measures of religiosity the variables are weak and inconsistent at best (Regnerus et al. 2004). Nevertheless, as more studies include measures of religiosity researchers have begun to further investigate religious development. Researchers are also examining the social nature of religion and explore the social contexts of religious development (See Myers 1996; Regnerus et al. 2004). Many recent researchers acknowledge that to truly understand the development of religion studies must go beyond the psychological analysis and explore the social contexts surrounding the individual such as family, friends, and schools.

This thesis follows the style of *American Sociological Review*.

The family is a crucial part of the social context because the family is typically the first form of social influence. In many cultures children spend their most formative years under the watchful guidance of parents and others in their immediate family. Some cultures, however, accentuate the extended family by involving all family members in the daily life of children. Regardless of family style, children are exposed to many social norms and behaviors through the family. The family is therefore in a position to strongly influence the behavior and development of children. Familial influences on religiosity ought to be particularly strong because it is predominately the family that introduces religion to children. The family will not be the only source of influence but nonetheless a very powerful influence. Within the family parents provide the bulk of religious influence. Yet, the parents may not be alone in encouraging or discouraging religious development.

This research project examines the religiosity of siblings to determine if siblings share similar levels of religiosity. It also examines the circumstances that explain this similarity. In other words, if siblings do exhibit comparable levels of religiosity this project explores whether certain factors explain this relationship. Logically, siblings will likely display similar levels of religiosity. Research on religious development has shown that parents, friends, and schools all impact an individual's religiosity (Regnerus et al. 2004; Uecker 2009). In fact, parental religiosity is a very strong predictor of offspring's religiosity (Myers 1996). Since siblings often share parents, friends, and schools siblings will likely also have similar religious beliefs and religious behaviors. However, no study to date has looked exclusively at the similarity or difference between sibling religiosity.

Existing research on sibling relationships has found that siblings influence one another on a range of outcomes such as educational attainment, drug and alcohol abuse, and sexual activity (Diop-Sidibé 2005; Gossrau-Breen, Kuntsche, and Gmel 2010; Oettinger 2000; Vakalahi, Harrison, and Janzen 2000). But again, no prior research has examined sibling relationships within the context of religion. Thus, this project will fill a gap in the existing literature by determining the extent of religious similarity among siblings and the conditions under which the similarity varies. For example, similarity in age, gender, and levels of communication between siblings could explain some of the religious similarity found among siblings.

It should be noted that the discussion thus far has not distinguished between correlation and causation. Asserting that siblings influence each other's religiosity implies a causal relationship. However, it must be made clear that the focus of this study is on correlations only. Evaluating causation would require more complex longitudinal data that is beyond the scope of this project. Nevertheless, establishing similarity between sibling religiosity is the first logical step towards investigating a causal relationship. This will serve as the foundation for more advanced inquiry into the relationship between siblings' religiosity.

The results of this study extend beyond religious research. Although my main goal is to further our understanding of religious socialization, the implications of this research are relevant to other areas. As echoed by researchers from various disciplines, sibling relationships have been neglected for far too long (Kramer and Conger 2009). Consequently, I hope to further our understanding of sibling relationships more

generally and appeal to researchers interested in better understanding how siblings influence one another.

LITERATURE REVIEW

Distal Versus Proximal Religiosity

Good research requires thoughtful definitions. This is true of virtually every academic discipline. Definitions impact a study's results and interpretations. For example, the definition of statistical significance commonly refers to an alpha level of .05. If the alpha level is redefined as .01 then the same results may no longer be statistically significant. Thus, a simple change in the definition of statistical significance alters the interpretation.

Within sociology of religion, for example, the term secularization has various meanings. Some authors refer to secularization as the decline of institutional religion in modern western society with extinction as the only logical outcome (Stark and Finke 2000). Other authors define secularization as merely the growing indifference towards religion (Bruce 2002). Still other authors define secularization as the marginalization of religion in society (Casanova 1994). These various approaches to the concept of secularization will alter how secularization is measured and how the results are understood. Definitions, therefore, are very important but unfortunately they are often incomplete when it comes to the concepts of religiosity and spirituality.

The definition of spirituality and religiosity have plagued researchers for decades and continues to be problematic today (Benson 2004). The lack of definitional clarity has incited debate as to whether religiosity and spirituality are synonymous, ordered, or completely separate constructs (Benson 2004). Some authors use religiosity and spirituality interchangeably (Cotton, Zebracki, Rosenthal, Tsevat, and Drotar 2006).

Others, however, believe spirituality is a subset of religiosity (Cotton et al. 2006). Finally, others believe the concepts are totally independent (Zinnbauer, Pargament, and Scott 1999). Before the social scientific study of religion can emerge as a mainstream area within social sciences the definition of religiosity and spirituality must be settled (Benson 2004).

There is no consistent measure of religiosity and the inconsistent definitions create several problems. Researchers working with similar data can find different outcomes depending on how each researcher measures religiosity. When no consistent measure exists then it is difficult to gauge shifts or trends in religiosity over time. Any trend could be the result of changing definitions and not in response to real changes in the population. Furthermore, adjusting the definition or cutoff points for religiosity may dramatically change results (Bruce 2002). Finally, various conceptualizations warrant different measurement strategies. Even two concepts that only differ on a small point may use two totally different measures. For example, religiosity is often measured by the frequency of attending religious services per week. Religiosity could also be measured by the hours a person spends praying each week. The two related but different measures may produce different results.

Over the past several decades research on religion has relied heavily on single item measures of religiosity. Typically, researchers utilized a single question addressing religious salience or frequency of participation, which purportedly represents the totality of a respondent's religious experience. This methodological approach would not be taken seriously in other contexts. Imagine that researchers only used a single question

concerning education to determine a respondent's socio-economic status and ignored the other conventional measures such as wealth and income. Or perhaps an author tries to classify personality, mental health, or criminal history based on a single item. Research relying on such proxy measures of complex constructs could not likely encompass the entirety of the concept in question. Researchers in other areas would find it difficult to get studies published using simplistic measures of complex phenomena. Nevertheless, researchers employ single item measures of religiosity with the assumption that such an approach adequately gauges the complexity of the religious experience.

There are, however, exceptions to this trend where researchers have gone beyond simple measures of religiosity and spirituality by using advanced scales. Examples are particularly found within psychology of religion (see Hill and Hood 1999). But even in such cases the scales are often so specialized they cannot be applied to other populations. For instance, many scales are appropriate for western religions such as Christianity but are not suitable for other religious systems (Benson 2004). Research on religion, therefore, has been hampered by inconsistency in defining terms as well as developing adequate measures.

The debate over definitions and measures of religion in sociology began with Comte, Marx, Durkheim, and Weber. The controversy, however, intensified in the 1950's when some scholars claimed that religion was relative to the individual and therefore nearly impossible to measure with a general definition (Allport 1950; Zinnbauer et al. 1999). The question of whether or not religiosity is unidimensional or multidimensional came to the forefront of the debate a decade or so later. Glock and

Stark (1965) suggested five dimensions of religiosity that were quickly accepted by many researchers. Some authors criticized the speed by which researchers flocked to this new approach without careful examination of the constructs (Clayton and Gladden 1974). Clayton and Gladden (1974) criticized the five dimensional approach and asserted that logically the five dimensions could be reduced to a single dimension. For example, Clayton and Gladden (1974) defined religiosity as "primarily a commitment to an ideology" wherein the other "so-called dimensions are merely expressions of the strength of that core commitment" (p 142). Furthermore, Clayton and Gladden (1974) submitted the five dimensions to a second order factor analysis revealing that all five proposed dimensions ultimately correspond to a single dimension.

A few years later, Gorsuch (1984) looked at previous research that utilized a multidimensional measure of religiosity and found that researchers using factor analysis often failed to properly rotate the factors. Once the factors are properly rotated, a single dimension appears to underlie all the other dimensions. Gorsuch (1984) also noted that perhaps the resolution to the multiple dimensions/single dimension controversy "could be *both/and* rather than either/or" implying that at times religiosity may be best understood as unidimensional but elsewhere it may be more beneficial to define religiosity using multiple dimensions (p. 232).

While there is evidence in the literature that supports a unidimensional approach to religiosity, some researchers still consider religiosity as multidimensional. According to some researchers, a shift in the cultural understanding of the terms religion and spirituality in the 1960's and 1970's necessitates a multidimensional approach (Hill,

Pargament, Hood, McCullough, Swyers, Larson, and Zinnbauer 2000). For example, baby boomers during this time period began to reject the rigid structure and constraints of mainstream organized religion in favor of a New Age form of spirituality (Hill et al. 2000). In this context, religiosity and spirituality began to represent distinct concepts for some people. Nevertheless, researchers continue to disagree on whether religiosity and spirituality are distinct or synonymous.

However, there is improvement in terms of how many dimensions characterize religiosity. Rather than the five dimensions proposed in early research, many researchers today that take the multidimensional approach consider religiosity to consist of only two components, namely, distal religiosity and proximal religiosity (Cotton et al. 2006). Distal religiosity refers to individual observable behaviors typically associated with formal institutional religions such as church attendance, frequency of prayer, or participation in religious studies (Day, Jones-Sanpei, Smith Price, Orthner, Hair, Moore, and Kaye 2009). Proximal religiosity refers to the internalized motivations for religious behavior such as the respondent's beliefs, the importance of faith to the individual, and how often his or her beliefs impact daily decisions (Day et. al 2006). Some authors have referred to distal religious behavior as religiosity and proximal religious behavior as spirituality (Cotton et al. 2006).

The terms distal religiosity and proximal religiosity are basically a restatement of the relationship between religiosity and spirituality but with one significant improvement, they are both included under the title of religiosity. Researchers still disagree as to whether distal and proximal religiosity represent distinct dimensions but

the emergence of consistent terminology is likely a step in the right direction. Many researchers still believe religiosity and spirituality represent two distinct dimensions (Cotton et al. 2006). Other researchers, however, acknowledge that religiosity and spirituality are intimately intertwined in the religious experience to the extent that rarely does one exist without the other (Hill et al. 2000).

If distal religiosity and proximal religiosity are part of the same experience, general comprehensive measures of religiosity should include both proximal and distal religiosity. A researcher investigating socioeconomic status would not separate out income, wealth, and education into three different variables. Most likely the researcher would combine these variables into a suitable index so that the measure of socioeconomic status includes all three variables. At times it may be appropriate to isolate one aspect of socioeconomic status. For example, the researcher may be interested in how the income component of socioeconomic status correlates with a particular outcome. However, if the researcher uses a general measure of socioeconomic status, the measure will likely include all three aspects.

This project applies similar logic to the measure of religiosity. At times, a researcher may choose to highlight one particular aspect of religiosity by investigating distal or proximal religiosity independently. Yet, when employing a general comprehensive definition of religiosity, as this project does, the measure should include both proximal and distal components with the assumption that distal and proximal religiosity are part of the same experience. Prior literature does contain support for this logical argument as well as support for the empirical argument that distal and proximal

religiosity can be considered unidimensional (Cotton et al. 2006; Zinnbauer et al. 1999). For the purposes of this project religiosity will refer to a comprehensive measure incorporating distal and proximal religiosity. However, this project will rely on principal components analysis as detailed in the methods section below to confirm or reject this decision to treat the construct as unidimensional.

Recognizing the complex and immense history surrounding the definition and dimensionality of religiosity, this project does not seek to provide a solution to the longstanding debate. Rather, this project will follow the advice of prior researchers by developing a pragmatic measure of religiosity (Platvoet and Molendijk 1999). The goal of the pragmatic approach is to define religiosity in a manner that fits the context of the study and operationalizes the definition appropriately. In the context of this thesis, religiosity concerns a general definition. This thesis is not as concerned with the possible sub-dimensions but focuses on the dominant distinction between religious and non-religious individuals.

Religious Socialization

Within sociology of religion there are a number of studies detailing the effects and benefits of religiosity but fewer articles discuss the actual development of religiosity (Regnerus et al. 2004). The select articles that do discuss religious development can be categorized into three theoretical perspectives: the channeling perspective, the spiritual capital perspective, and the religious modeling perspective.

Researchers adhering to the channeling perspective believe the parental influence on religious development is mediated by an adolescent's peers and religious community

(Martin, White, and Perlman 2003). Essentially, the parents channel or direct their children into particular peer groups and religious communities. The bulk of religious development is a direct result of peers and the religious community and only indirectly through the parents. The parents do have a small direct influence on religious development. Yet, by placing children into particular groups the greater part of parental influence is mediatory. Under this perspective the parental role is still essential but not sufficient.

The spiritual capital perspective alternatively builds on the household production model developed by Gary Becker nearly fifty years ago (See Becker 1964). The household production model views each family as a small scale firm engaged in producing goods (Iannaccone 1990). These goods can be concrete outcomes like cooking meals, or washing clothes. The goods may also be of a more abstract nature such as love and affection. The spiritual capital perspective relates this production model to the family's production of religiosity. The production of religiosity, as with other goods, entails the input of resources to obtain the desired good. In terms of religiosity, resources include time, religious education, parental-child interaction, transportation to religious services, and a number of other resources. The family can then utilize such resources to generate religious experiences. The spiritual capital perspective thus posits that children accumulate religious goods by participating in the production process as members of the family (Iannaccone 1990). Families with very religious parents are going to engage in more religious activities. Increasing the number of religious activities increases the opportunity for children within the family to accumulate spiritual capital.

Furthermore, if siblings actively participate in religious activities then siblings will also increase the available opportunities to accumulate spiritual capital.

Finally, the spiritual modeling perspective borrows heavily from social learning theory. According to spiritual modeling adolescents will imitate the behavior of respected figures, predominately parents (Regnerus et al. 2004). From this perspective children develop religiosity by observing and participating in the behavior of their parents. As opposed to the channeling perspective, the spiritual modeling perspective assumes parents have a direct effect on the development of religiosity in their children. The spiritual modeling perspective assumes children learn religion mainly from their parents but not only their parents. Children and adolescents may also look to other role models outside of their parents as well. In the context of this study, respected figures could perhaps include siblings.

Each of these three theoretical explanations of the development of religion has at least one point in common. All three perspectives place a strong emphasis on the parents and the family as sources of religious development. Nonetheless, each perspective emphasizes different roles for parents. For example, channeling theory suggests an indirect parental influence on children's religiosity. The spiritual capital theory emphasizes a cooperative effort between parents and children. Finally, the spiritual learning theory focuses on how parents and respected figures model the desired behavior. Therefore, parents are important regardless of how they influence offspring. But parents and the family are not the only source of influence when it comes to the development of religiosity.

Researchers are increasingly acknowledging the ecological nature of religious socialization (Regnerus et al. 2004). The term ecological refers to the multiple contexts that exert some influence on individuals. Persons as social creatures do not evolve in isolation. Rather people tend to grow and develop in multiple groups. In other words, humans are "linked" by dynamic relationships with a number of different contexts and individuals, which must all be considered and respected (Regnerus et al. 2004:29).

This is true of many human characteristics. Language, for example, depends on the groups a person is exposed to as he or she grows. No person is born with the knowledge of any particular language. As the person grows he or she typically takes on the dominant language of his or her family, school, or workplace depending on a number of other characteristics. Imagine a married couple emigrates from Mexico to the United States. Soon after immigrating the couple has a child. As that child develops he or she will very likely initially be exposed to Spanish assuming the parents know very little English. However, as the child begins attending school his or her knowledge of the English language expands. From this example parents clearly play a role in the development of the child. Nevertheless, the parents are not the only factors to consider. When the child attends school he or she is exposed to more English. Likewise, as that child forms friendship networks the friends will exert an influence on language development. Therefore, language is not solely attributable to parents even though parents may be the most important influence initially.

A growing number of researchers within the study of religion have sought to apply the same logic to the development of religion. In essence, the ecological

perspective asserts that no single predictor of religiosity exists in isolation (Regnerus et al. 2004). For example, the relationship between age and religiosity is not independent of gender or race. The effect of parents is not independent of schools and friends. Therefore, the ecological perspective suggests future research on religiosity at least acknowledge the existence of multiple avenues of influence. The ecological framework does not disregard or diminish channeling theory, spiritual capital theory, or spiritual modeling theory. An ecological approach merely suggests a better explanation of religious development likely includes aspects of all of these theories as well as possible factors not specified in any of these theories.

In an attempt to better understand all of the important factors, researchers have identified three key seminal agents that pertain to religious development: parents, friends, and schools (Regnerus et al. 2004). Much of the research on religious development to date agrees that the parental influence is very important and the parental influence on the intergenerational transmission has been well documented (Hoge, Petrillo, and Smith 1982; Hunsberger and Brown 1984; Myers 1996; Okagaki and Bevis 1999; Regnerus et al. 2004). An increase in parental religious service attendance strongly relates to an increase in adolescents' attendance (Regnerus et al. 2004). The effect of parental attendance on adolescent attendance was twice as high as the effect of friend's attendance or the type of school attended. Surprisingly, the parental influence remains significant, although decreases, as the adolescent ages and autonomy between parent and adolescent increases (Regnerus et al. 2004). Other studies have also found similar results. For example, one study found that parental religiosity has a strong

positive effect on adult offspring's religiosity (Myers 1996). Moreover, even in the last stages of life parental religiosity has an effect on offspring. For example, a study of respondents age 66 and older found that respondents whose parents encouraged their children to become more involved in religion attended church services more regularly, prayed more frequently, and tended to be more "deeply committed" to his or her faith (Krause and Ellison 2007:120).

Friends and schools also play a role in religious development although not to the same extent as parental influence (Regnerus et al. 2004). Adolescents that attend protestant schools are nearly four times as likely to attend church services compared to adolescents attending secular schools (Uecker 2009). Furthermore, when the respondent's friends report a decrease in church attendance, the probability of the respondent attending church services decreases considerably (Regnerus et al. 2004). Friends and schools do impact the development of religiosity but bear in mind both friends and schools are linked to the parents and family. Channeling theory posits that schools and communities will have a strong influence on children's religiosity but the parents channel their children into different schools, communities, and friendship networks. Likewise, this illustrates the need for an ecological approach in that no factors exist independent of all the others.

Outside the influence of parents, friends, and schools other family processes and structures influence adolescents' religiosity as well. In terms of family structure, adolescents living with married biological parents were 36% more likely to attend religious services than adolescents living in stepfamilies (Day et al. 2009). Moreover,

the number of siblings in a family also seems to have an effect. When looking at adolescents at 16 years of age, one study found each additional sibling in the family increased the likelihood of weekly religious attendance by 20% (Day et al. 2009).

In summary, this section has discussed the three prevailing theoretical approaches to religious development. Channeling theory, spiritual capital theory, and spiritual modeling theory all suggest that parents and the family are the primary influences of religious development. The ecological perspective to religious development builds on these prior theories by investigating multiple spheres of influence even outside of the family. These theoretical frameworks lay the groundwork for understanding religious socialization. However, there are a number of individual traits and characteristics that are known correlates of religiosity that must be examined in further detail.

Correlates of Religiosity

Age

Several studies on religiosity have noted that religiosity changes as a person ages. The effect of age on religiosity however is not entirely clear. Some studies have found a curvilinear relationship between age and religiosity (Argue, Johnson, and White 1999). Other studies have found religiosity decreases over time (Chaves 1991). Finally, some studies have found changes in religiosity correlate with life course events.

In terms of a curvilinear relationship, one article found as age increased religiosity increased (Argue et al. 1999). Yet, religiosity increased faster in the younger years and then the change in religiosity flattens out in the later stages of life. Other

researchers have discovered a decrease in religiosity as age increases (Chaves 1991). However, Argue and colleagues (1999) critiqued these findings. Argue and colleagues (1999) replicated the slight decrease in religiosity by using a sample from the 1980's just like the prior studies. Then, the researchers controlled for period effects and the decrease in religiosity completely disappeared. Furthermore, the age effect doubled demonstrating that many of the previous studies claiming a negative relationship between age and religiosity are not properly controlling for period effects (Argue et al. 1999).

Some studies have found multiple trends within the same data set. One study used qualitative interviews of 129 respondents over the age of 65 found four distinct patterns of religiosity (Ingersoll-Dayton, Krause, and Morgan 2002). The authors of this study categorized all 129 interviews into the four categories of increasing, stable, decreasing, and curvilinear. Those respondents placed in the increasing category described an increase in religiosity as growing closer to God as well as increasing the amount of time spent in prayer. For these respondents an increase in religiosity was often accelerated by life transitions such as marriage and the birth of children (Ingersoll-Dayton et al. 2002). Respondents placed in the decreasing category claimed they became less interested in religion over time often in response to negative church interactions such as disillusionment with fellow church goers. A slightly smaller group of respondents in the study exhibited the curvilinear pattern discussed previously in which the respondents claimed religiosity increased more rapidly in the younger years but began to level off as the respondent became older. Finally, many of the respondents

described stable religiosity over time. Stable, in this context simply means the respondents' religiosity did not fluctuate much at all.

This study suggests that the relationship between age and religiosity relies on contextual factors. Take for instance the decreasing trend. A decrease in religiosity was only found in respondent's who had a negative interaction with a religious group. Outside of that context no other decreases were found. However, the authors caution that the results of the study may be somewhat misleading and must be interpreted appropriately. The stable pattern may be interpreted by some as proof that religiosity is not related to age. Yet the group of stable respondents included mostly respondents who had high levels of religiosity over their lives. This result does not suggest age and religiosity are unrelated but perhaps there is a ceiling of religiosity. Similarly, the decreasing pattern often referred to a decreased participation in religious functions and not necessarily a decrease in importance of religious belief. The authors suggest a decrease in religious participation is perhaps a consequence of decreased mobility as individuals age and not necessarily attributable to a genuine change in religious beliefs (Ingersoll-Dayton et al. 2002).

Several other studies have found a marked decrease in religiosity as adolescents emerge into adulthood (Uecker, Regnerus, and Vaaler 2007). Many researchers attribute the secularizing effect of higher education for this decline suggesting as adolescents attend universities and are exposed to secular ideologies the adolescents are less likely to maintain previous religiosity levels. However, Uecker and colleagues (2007) found the decrease in religiosity was actually only a decrease in the frequency of religious

participation but there was little to no change in the importance of religion to the respondents. Going a step further, Uecker and colleagues (2007) found a notable decrease in adolescents who did not attend college. Respondents that did not attend college decreased in the frequency of participation and self reports of religion importance. As a result, this study challenges the secular higher education thesis by showing individuals who do not attend college are more likely to decrease in religiosity compared to individuals who do attend college.

Gender

Studies of religiosity and gender have consistently found that women report more frequent participation in religious services and higher levels of religious importance at all stages of life (Miller and Hoffmann 1995). Initially there were two prevailing theories as to why women tended to be more religious than men. The first theory suggests the differential socialization of men and women accounts for the differences in religiosity (Suziedelis and Potvin 1981). According to this perspective, certain personality traits such as obedience, nurturing, and submissiveness correlate with higher levels of religiosity. Women are socialized to develop these traits more fully than men and therefore will express higher levels of religiosity. Subsequent research bolstered the claims of differential socialization theory by demonstrating that even within genders the distribution of these roles and traits correlates with higher levels of religiosity (Thompson 1991). Essentially, Thompson (1991) found when controlling for feminine characteristics the relationship between gender and religiosity disappeared. This means

that men that exhibit more feminine characteristics are likely to be more religious than men that do not express feminine characteristics.

The second common explanation for why women have higher levels of religiosity than men involves the "structural location" of women in society (Miller and Hoffmann 1995:64). Part of the structural location of women has to do with women's decreased participation in the labor force (Luckmann 1967). Because women are less likely to work full time or even part time than men, women have more time to devote to religious activities. Similarly, this perspective asserts that the lack of work on the part of women also creates a need for an alternate source of personal identity and commitment that religion can provide (Miller and Hoffmann 1995). This perspective also suggests that women's structural location in the home may also relate to higher levels of religiosity. For example, rearing children is more often associated with women. Raising children typically requires the parent to instill some sort of morality in the child. Therefore, since women more often are responsible for raising the children and developing moral sensibilities women will tend to be more religious (Miller and Hoffmann 1995). However, very little empirical support has been found to support the child-rearing hypothesis. Some support has been found for the relationship between participation in the labor force and religiosity. One study, using a sample of individuals from Australia, found a negative correlation between workforce participation and religiosity (Vaus and McAllister 1987). A similar study, however, applying the same methodology and definitions of religiosity to a sample from the United States found no

relationship between workforce participation and religiosity (Vaus 1984). The evidence for structural location theory is mixed at best.

More recent research on the difference between men and women suggests gender differences in religiosity are better explained by differences in risk averse-behavior (Miller and Stark 2002). For example, Miller and Stark (2002) following on Miller and Hoffman (1995), document a correlation between risk averse attitudes and religiosity in which individuals who avoid risky behavior are more inclined to be religious. Since women tend to engage in more risk-averse behavior, they are more likely to be religious than men. Similarly, some researchers have found adolescents with more strategic inclinations (a more strategic decision maker) are higher on religiosity scales compared to adolescents that score lower on the strategic "planfulness" scale (Regnerus and Smith 2005:31). This implies that individuals that plan in advance are more likely to be religious.

Clearly, women tend to exhibit higher levels of religious behavior than men. To date, the structural location theory has not been able to provide defensible explanations. The more recent research on risk-aversive behavior and strategic inclinations really seems to build on differential socialization theory. Ultimately, it appears that gender differences in religiosity are a result of socialization. Therefore, an individual's religiosity is likely related to the personality traits and characteristics he or she was taught to value. Perhaps this is one instance where "nurture" has the upper hand over "nature."

Race

Race is also known to impact an individual's religiosity. For example, African Americans tend to attend church services, youth groups, and religions functions more frequently than White individuals. Both African Americans and Whites are more likely to attend church services than all other racial categories (Smith, Denton, Faris, and Regnerus 2002). Similarly, African Americans are more likely to attend youth groups and other religious functions than Whites and other racial categories (Smith et al. 2002).

Religious Affiliation

Religiosity also varies by religious affiliation. More conservative groups such as Mormons as well as churches with large proportions of African American members (African Methodists) tend to have higher levels of participation, mainline groups have more moderate levels of participation, and religious minorities (Jewish, Buddhist, Quaker and "Other" groups) exhibit the lowest levels of religious participation (Smith et al. 2002).

Sibling Relationships

The extent to which siblings share religious beliefs and behaviors is of primary interest in this study. Research has linked sibling relationships to numerous outcomes. Researchers have found that siblings influence one another on behaviors ranging from drinking to education. For example, one study found a link between siblings and drinking, when the older sibling modeled the behavior the researchers found an increase of drinking behavior in the younger siblings (Gossrau-Breen et al. 2010). Other studies have found similar results regarding drug use and sexual activity, namely when the older

siblings engage in such behavior the younger siblings are more likely to also engage in the behavior (Diop-Sidibé 2005; Gossrau-Breen et al. 2010; Vakalahi et al. 2000). Likewise, various forms of educational achievement such as high school graduation have been linked to sibling relationships (Oettinger 2000). Clearly, siblings resemble one another on several different outcomes. Logically, this should also be true when it comes to religiosity.

Prior research highlights two possible frameworks as to how siblings socialize one another: deidentification theory and social learning theory. Deidentification refers to the process by which siblings develop personalities, skills, and preferences that differentiate them from other children in the family in order to maintain a sense of uniqueness (Whiteman, Becerra, and Killoren 2009). In this case the sibling seeks out skills which differentiate themselves from the other children in the family. This approach suggests siblings may not be inclined to participate in the behaviors of the older sibling for fear of being constantly labeled as the younger sibling.

The social learning perspective can be very useful in understanding a number of aspects pertaining to individual development. Sibling relationships are just one instance in which social learning theory is advantageous. Researchers taking the social learning approach assert siblings learn by modeling the behavior of an older sibling or by engaging in behavior that is endorsed by older siblings even if the older sibling does not engage in the behavior (Whiteman et al. 2009). For example, as noted above if an adolescent has an older sibling engaged in drinking alcohol the younger sibling is far more likely to also drink compared to adolescents whose older siblings do not drink. The

social learning perspective predicts that older siblings are going to have a profound influence on younger siblings.

Deidentification and social learning both essentially explain variation. In the context of this thesis, deidentification and social learning can help understand the variation in religiosity that exists among siblings. However, it is helpful to distinguish how deidentification and social learning differ in terms of explaining variation. Social learning explains why siblings increase in similarity over time. Deidentification explains why siblings decrease in similarity over time. Both approaches really require longitudinal data analysis, which is not part of this project. It is impossible in the context of a cross sectional analysis to determine if siblings are increasing or decreasing in similarity. Therefore, it will be impossible to determine if deidentification or social learning theory is a more appropriate approach in the study of sibling religiosity.

As noted previously, the ecological nature of religious socialization requires researchers to acknowledge as many avenues of influence as possible. However, to date no study exists which specifically examines the similarity of sibling religiosity. Consider what we already know about sibling relationships. From prior studies we know that siblings spend more time with each other than they do with parents or friends (Kramer and Conger 2009; Updegraff, McHale, Whiteman, Thayer, and Delgado 2005). Some of this time could be spent engaging in religious activities. Next, siblings share unique family experiences only they can understand, which sets the sibling relationship apart from any other (Kramer and Conger 2009). Once again, perhaps older siblings spend time teaching younger siblings about faith and religion. Or maybe siblings attending a

religious service together interpret something that happens in the service in a similar fashion, like an inside joke. Finally, the intensity and range of emotions shared between siblings on a daily basis is vastly different from the relationship children have with parents (Tucker and Updegraff 2009). The emotional relationship between siblings can allow for a unique transmission of meaning, in this case religious meaning that will differ from parents. For example, the inside joke can have a lasting meaning for each sibling while the parents are completely unaware of the experience taking place. Therefore, taking into account the time siblings spend with each other, the number of shared experience to which only siblings can relate, and the intense emotional relationship siblings impart, it is logical to assume siblings will exhibit similar levels of religiosity.

This short literature review has suggested that religious socialization takes place in the family. Parental religiosity has proven to be more influential than either schools or friends. The sibling relationship is a very unique relationship and based on the time siblings spend together as well as the emotions shared siblings will likely exhibit similar levels of religiosity. The nature of the sibling relationship allows for the transference of knowledge, skills, and experiences from one sibling to the next in a way that shapes sibling outcomes possibly including religion. Thus, religious socialization likely takes place in the family, and sibling relationships are at least partially responsible for such socialization.

HYPOTHESES

Hypothesis 1: *Siblings will share similar levels of religiosity.*

Siblings spend time with the same friends, attend the same schools, and grow up with the same parents. As noted above, all of these groups are known to influence the religiosity of individuals. Therefore, because siblings share so many similar experiences they are likely to express similar levels of religiosity.

Hypothesis 2: *The similarity in age will account for a proportion of the similarity between sibling religiosity.*

Based on the literature surrounding the relationship between age and religiosity it is clear that siblings of the same age will likely exhibit similar levels of religiosity. Siblings of a similar age will likely encounter similar life transitions at approximately the same time. Life transitions, as demonstrated above, correlate with religiosity. Siblings of similar ages are also likely to share social networks that may also lead to similar levels of religiosity.

Hypothesis 3: *Siblings who are of the same gender are more similar on religiosity than are sibling of different genders.*

This hypothesis stems from two assumptions found in the prior literature. First, women tend to exhibit higher levels of religiosity than men (Miller and Hoffmann 1995). Consequently, female siblings should have higher levels of religiosity than male siblings. The second assumption relies on research showing sibling relationships containing a male and female sibling will be lower in quality when compared to same sex sibling relationships (Jenkins and Dunn 2009). Lower quality relationships in this sense imply

that the relationship is less intimate and the siblings are less likely to confide in one another when dealing with difficult problems. The lower quality relationship could in turn lessen the influence one sibling has on the next and explain some of the similarity between sibling religiosity.

Hypothesis 4: *The level of communication between siblings will explain a proportion of the similarity between sibling religiosity.*

Some researchers have found that siblings spend more time with one another than with parents or friends and siblings have a very unique relationship unlike any other (Kramer and Conger 2009; Updegraff et al. 2005). Because siblings spend a large amount of time with one another and as a consequence of the intense relationship they often share siblings will likely exhibit similar levels of religiosity. Unfortunately, this sample only contains limited measures of the frequency of sibling communication. Therefore, this hypothesis will focus on the nature of sibling relationships. Essentially, since siblings share close emotional connections they often confide in one another (Tucker and Updegraff 2009). I hypothesize that the frequency with which siblings approach one another concerning personal problems will explain a proportion of the religious similarity between siblings.

METHODS

Sample

The National Longitudinal Survey of Adolescent Health (Add Health) is a nationally representative study which began in 1994. This survey was intended to measure numerous aspects of adolescent growth and development. The Add Health survey has currently released four waves of data. The survey began in Wave 1 with two collection phases. First, about 90,000 students between 7 through 12 grade were selected from 164 schools across the United States. The schools were stratified by: region, urbanicity, school size, school type, percent white, percent black, grade span, and curriculum. In the second phase about 20,000 students were selected from the initial 90,000 for an additional in-home survey containing more sensitive questions. Each subsequent wave of the Add Health survey followed up with respondents from the Wave 1 in-home survey.

My project focuses on Wave 3 from the Add Health survey. Wave 3 was conducted from 2001 through 2002 when the participants were ages 18-26. In wave 3 15,170 respondents completed the survey. I selected this wave for a specific reason. As discussed above, parental religiosity exerts a strong influence on adolescent religiosity. Researchers often separate parental influence into two different dimensions, externalized compliance and internalized conformity (Peterson, Rollins, and Thomas 1985). Other researchers have used slightly different terminology for these dimensions of social influence such as public compliance and internalized attitude change (Maass and Clark 1983). This thesis will use the terminology from Peterson and colleagues (1985) since

this project addresses parental influence similar to Peterson and colleagues (1985) as opposed to the group influence characterized by the work of Maass and Clark (1983).

Externalized compliance refers to adolescent behavior that occurs as a result of parental monitoring. Externalized compliance can also take place when children seek rewards or try to avoid punishment (Peterson et al. 1985). Internalized conformity on the other hand refers to the process in which children internalize the norms the parents are trying to instill in them. This type of social influence may begin as external compliance but overtime behaviors that are preferred only due to parental oversight often become part of the person's internal belief system (Peterson et al. 1985). When siblings still live at home the parents are very likely to monitor the behavior of their children and may require children to participate in religious activities. In that case siblings could exhibit similar levels of religiosity simply because they are forced to participate in particular religious activities. It would be impossible to determine if that similarity is the result of parental oversight, if the siblings are simply being forced to participate in the same behavior, or if younger siblings are imitating the behavior of older siblings. It would be impossible to separate out the different influences at that stage in the life course.

Respondents in wave three, however, are leaving home, getting married, and having children of their own. Presumably, respondents at this stage in life will be less influenced by parents in terms of external compliance. Once adolescents leave home, attend college, or get married the parents will likely have less direct control over their children's daily behavior. Consequently, at wave three the extent to which the participants still behave in ways that are favored by their parents will be largely a result

of internalized conformity rather than external compliance. This means if siblings share similar levels of religiosity at wave three it is not likely the similarity is only due to parental monitoring.

Sample Weights

In order to claim national representation the Add Health data must be properly weighted. The sample weights account for the oversampling of certain groups and for the probability of selection into the study. One of the oversampled groups in the Add Health survey is referred to as the genetic sample. This sample contains twins, full siblings, half siblings, and non-related siblings (adopted) to conduct specific genetic analyses. Originally, the Add Health survey was only going to rely on siblings found in the original set of respondents. However, the number of siblings contained in the initial sampling frame was too small. Therefore, Add Health recruited siblings from outside the initial sampling frame meaning the first sibling attended one of the original 164 schools but his or her sibling(s) recruited into the study did not attend one of these schools. Consequently, a large number of sibling pairs do not have information necessary to construct sample weights (Chantala 2001). Nevertheless, Add Health user guides suggest that “a thorough description of the characteristics of the genetic sample would be very helpful to someone wanting to generalize your results to their own group of interest” (Chantala 2001:2). As a result, the inability to claim a nationally representative sample is not a fatal flaw though the results ought to be interpreted cautiously and only in appropriate contexts.

Measures

Dependent Variable

As I've discussed, there is little consensus among researchers regarding how to measure religiosity. Some authors suggest proximal measures of religiosity account for most of the effect religiosity has on various outcomes and yet much of the research on religiosity still utilizes distal measures (Cotton et al. 2006). As detailed above, some researchers now advocate for a combined measure of religiosity containing both distal and proximal measures. For this thesis I have created a scale that includes measures of both proximal and distal aspects of religiosity in hopes of developing a more comprehensive measure of religiosity.

The religiosity variable is unique to this study and therefore must be defined very carefully. There are several steps involved in creating this measure of religiosity. First, I identified ten questions in the Add Health survey measuring various aspects of religious beliefs and behaviors. The questions include: how often the respondent attends religious services, how often the respondent participates in special religious activities (i.e. Bible classes, retreats, youth groups, etc.), how important religious faith is to respondent, how many hours the respondent spends in an average week doing religious activities in the home, how often the respondent prays privately, how important is the respondent's spiritual life, if the respondent bases daily actions on religious beliefs, does the respondent consider himself/herself a religious person, and to what extent the respondent considers himself/herself a spiritual person.

One of the complexities that stems from combining ten variables into a single measure is found in the response categories for each question. Since many of the questions have a different number of response categories, including a few interval level items, simply adding the responses on different questions and summing them to form a scale would be very misleading. For example, consider the case where one of the interval questions ranges from 1 to 100. If a respondent was a zero on every religious question but a 99 on a single interval level question the respondent would be incorrectly classified as highly religious. The simplest method to compensate for this problem is to standardize each response before summing them into a scale. However, in this case that is not necessary because this project subjects the ten questions to principle components analysis which standardizes the responses as part of the process. Principal components analysis (PCA) is a variable reduction method that groups variables into factors which optimizes the shared variance between items (Hatcher 1994). PCA will reduce these ten variables into the smallest number of factors possible.

Preliminary analyses determined that the scale comprised of these ten variables was in fact unidimensional. This result confirms the decision discussed in the literature review to combine distal and proximal aspects of religiosity into a single scale. The process of principal components analysis and specific results are discussed at length in the results section of this paper.

Independent Variables

Since I will be using a two level hierarchical model there will be independent variables describing characteristics of the family and the individual. The first individual level variable looks at the age of the siblings. Age will be calculated as a continuous interval measure in years. I will take the respondent's date of birth and calculate age at the time of interview. If the respondent is 18 years and 6 months old his or her age will be converted to 18.5 years old. Research on religiosity has shown that age is correlated with the encounter of certain life experiences such as college attendance, marriage, birth of children, and so on (Argue et al. 1999; Ingersoll-Dayton et al. 2002; Uecker et al. 2007). Siblings that are close in age will likely encounter these stages of life around the same time. Since this project is looking a single snapshot in time, siblings that are close in age should share similar life experience and should share similar levels of religiosity. Consequently, the age of siblings should explain some of the similarity among sibling religiosity.

The second main independent variable will represent the similarity or difference in the gender of each sibling. Stormshak et al. (2009) illustrate how gender in sibling relationships impacts the socialization that takes place between siblings. For example, looking at pairs of siblings, two female siblings tend to stay closer in terms of emotional support than two male siblings as they grow older (Stormshak, Bullock, and Falkenstein 2009). Therefore, I will create a gender differential variable representing each respondent's gender in relation to the average gender of the family. If there were only two siblings in each family a simple dichotomy would suffice but since there are several

children in some families the dichotomy will not work. To model the difference in gender each respondent will be initially coded as 0 for male and 1 for female. Then an average gender will be calculated for each family. For example, in a family with two girls and one boy the average family gender is .67:

$$.67 = \frac{1+1+0}{3}$$

Then each respondent's score will be subtracted from this average. Each female in this case will have a differential score of -.33 and the male will have a differential score of .67. This way each female to female relationship has the exact same score. Thus, families with a score of 1 are composed of all female siblings and when the gender average is 0 the family contains all male siblings. Conceptually, this calculation represents the extent to which gender is shared between siblings. In a simple regression equation this variable might not provide a clear interpretation, however in the context of a multi-level model investigating the intraclass correlation coefficient the interpretation is meaningful.

The last main independent variable deals with sibling communication. One question measures the frequency of sibling communication using a question that asks respondents how often he or she asks the sibling for help when he or she has personal problems, problems at school, or problems at work with responses ranging from never to very often. This variable will be operationalized as family level variable. If every family in the sample only contained two children then the variable could remain at the individual level. However, several families have three or more children in the sample. In such cases, each sibling would have multiple communication scores corresponding to

each sibling relationship. Therefore, sibling communication is measured as the average level of communication for each family.

Other individual level variables will be included that control for the effects of race, religious preference, gender, and whether or not the individual still lives at home. Race will be coded as a series of dichotomous variables broken into four categories of White, Black, Hispanic, and Other. Gender and if the sibling lives at home will both be measured as dichotomous variables.

The questions regarding religious preference in the Add Health data set allow the respondent to pick from approximately thirty religious affiliations with sub groups associated with several of them. For example, a person can be Catholic but are also classified as traditional, moderate, liberal, or none. To make the comparison of different religious preferences manageable and meaningful I will follow precedent and reduce all of the possible affiliations into seven categories: Mainline Protestant (*mlprot)*, Evangelical Protestant *(evprot)*, Black Protestant *(bprot)*, Catholic *(Cath)*, Jewish *(Jew)*, Other *(othrelig)*, and None *(norelig)* (Steensland, Park, Regnerus, Robinson, Wilcox, and Woodberry 2000). The method developed by Steensland et al. (2000) builds upon prior classification schemes but moves away from an ordinal ranking to a pure nominal ranking. Before Steensland and colleagues, the standard system of categorizing religious affiliation developed by Smith (1990) did not take into account historical factors in separating Protestant denominations. Furthermore, Smith (1990) ranked the differing denominations on a “fundamentalist-moderate-liberal continuum” (Steensland et al. 2000:293). The method developed by Steensland et al. (2000) has altered religious

classifications by making them purely nominal and including additional information regarding history, organization, and beliefs. Finally, this method has been employed in prior research dealing with this particular data set (See Uecker 2009; Uecker et al. 2007).

At the family level of analysis I will include two control variables, parental religiosity and the total number of siblings. As stated in the above literature review parental religiosity directly relates to adolescent religiosity (Myers 1996). For that reason, I will include a variable to account for the effect parents' religiosity has on the siblings. Parental religiosity was obtained in the first wave of data collection so I will import those measures from wave 1 for each of the siblings. The last variable represents the total number of siblings present in the family. Some researchers have found that religiosity is correlated with the size of the family such that as the family size increases religiosity increases (Wilkinson and Tanner 1980).

Multilevel Models

Prior literature suggests that family level measures as well as individual level measures are important to consider. It is possible to put both family level and individual level variables into an ordinary least squares regression model. However, including both types of variables in a normal regression model violates the assumption that observations are independent and the regression model will produce inaccurate standard errors. For this reason, I will use multilevel models (MLM). MLMs were developed to use measurement at two or more levels of analysis, while still producing accurate standard errors (Bryk and Raudenbush 1992). In the context of families, this type of analysis will allow me to accurately estimate effects and standard errors at the family level as well as

the individual level. Because the added complexity of a MLM is only necessary when the assumption of independent observations is violated, I initially ran an ANOVA to verify that there is in fact dependence among the observations. This project is unlike traditional research that uses MLMs, however, where the focus is on the regression coefficients. While I do report the usual regression coefficients, the focus of this project is on the intraclass correlation coefficient (ICC).

Technically, the intraclass correlation coefficient is the ratio of the variance that exists between groups compared to the variance within groups (Tabachnick and Fidell 2007). In more simple terms, it may be easier to think of the ICC as analogous to Pearson's correlation coefficient. For families with only two children we could simply calculate Pearson's *r* if we wanted to determine how similar two siblings are to one another. But this cannot be done for families with three or more children. For this reason I will use the ICC. No matter how many children are in each family the ICC can be defined as the degree of resemblance between individuals belonging to the same family (Snijders and Bosker 1999).

Mathematically, the ICC can be defined by the following equation:

$$p = \frac{\tau^2}{\tau^2 + \sigma^2}$$

where:

p = intraclass correlation coefficient

τ^2 = variance between groups

σ^2 = variance within groups

$\tau^2 + \sigma^2$ = total variance

The intraclass correlation coefficient typically ranges from zero to one although it can be negative under certain rare circumstances. ICC scores closer to one indicate members within the family are very similar (Ackerman 2003; Kenny, Kashy, and Cook 2006; Kenny, Mannetti, Pierro, Livi, and Kashy 2002). The same ANOVA calculated at the beginning of this analysis also confirmed that the ICC is statistically significant (p = .001).

In the first step of the analysis I tested a null model. This model included only the dependent variable. The model provides the full intraclass correlation coefficient, and demonstrates how similar siblings are when grouped by family alone. The initial ICC found in the null model will test my first hypothesis that the siblings' religiosity is related. The second model included all of the control variables holding the slopes of each as fixed across groups. This model produced a partial ICC. Adding the control variables to the model should decrease the ICC and indicate the extent to which the variables explain sibling similarity.

Next, I introduced one main independent variable at a time. For example, Model 3 includes all the control variables plus the variable describing the age of the siblings. The fourth model includes gender. The fifth model adds the level of communication among siblings and the last model includes all the variables in this project. Thus, with each subsequent model there should be a change in the ICC relative to the null model. If the ICC decreases with addition of a variable it means that variable explains a proportion of sibling similarity.

RESULTS

Principal Components Analysis

To determine whether it is appropriate to consider religiosity as unidimensional or multidimensional I preformed a principle components analysis. Principle components analysis is a complicated process relying on several steps that ultimately produces a meaningful scale or set of scales. The first step is to determine how many latent factors are required to adequately summarize a given set of measurements. This step evaluates five criteria to determine the appropriate number of factors. First, the Kaiser criterion (eigenvalue-one criterion) suggests the inclusion of components with an eigenvalue of 1 or greater (Kaiser 1960). Typically, the eigenvalue-one criterion accurately retains the correct number of components (see Browne 1968; Linn 1968). Nevertheless, I did not rely solely on this criterion. As displayed in Table 1, there is only a single factor with an eigenvalue greater than one.

Table 1. Eigenvalues Resulting from Principal Components Analysis

Factor	Eigenvalue
1	5.02707734
2	0.94038174
3	0.79204221
4	0.77406171
5	0.60785268
6	0.47540287
7	0.41228140
8	0.38878645
9	0.34153340
10	0.24058020

The second step in principal components analysis is to create a scree plot. The scree plot simply graphs the eigenvalues (see Figure 1 below). Researchers then look for a sharp break between two components. All the components before the break should be included and all components after the break are dropped from subsequent analyses. More simply stated, the sharp change in slope usually indicates the cutoff point. The graph below clearly shows a dramatic change in the slope following the second component. Thus, according to this test only a single factor should be retained. But before I drop the second factor from analysis I will look at the amount of variance the single factor explains.

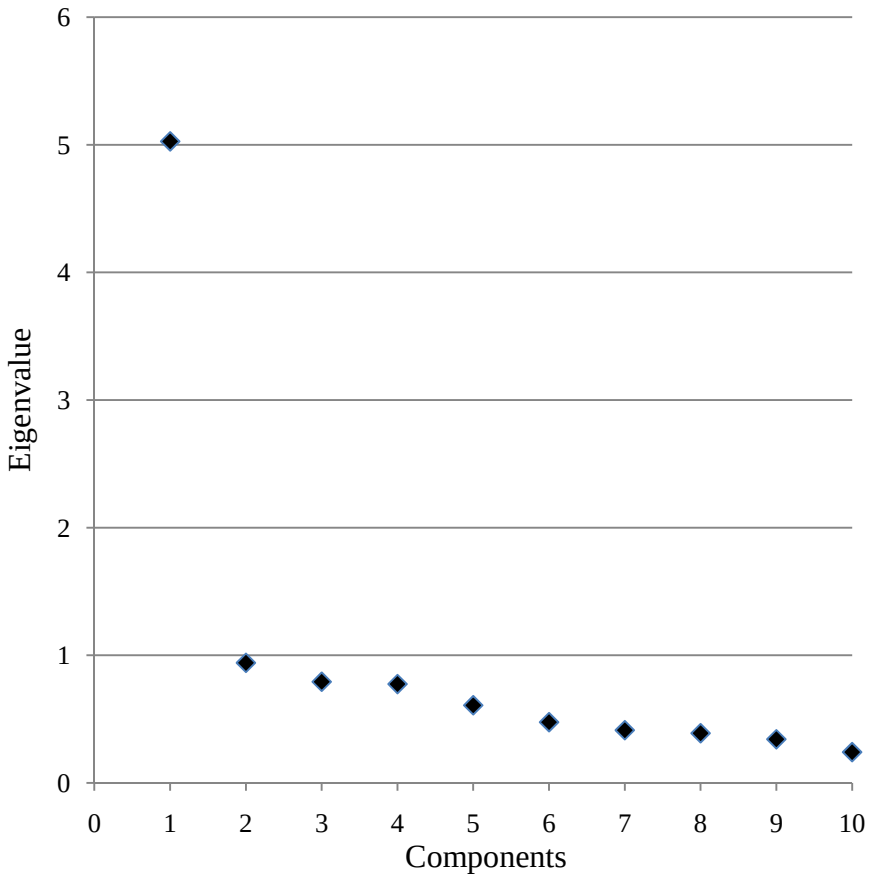

Figure 1. Scree Plot of Eigenvalues

The amount of variance each component accounts for is found on Table 2. Following the example of Hatcher (1994), I initially wanted to retain enough components to account for at least 70% of the cumulative variance if possible. However, in order to reach the arbitrary 70% cutoff I would have to include at least 4 factors. In this case that would be a poor decision since factors 3 and 4 have very low eigenvalues. The second factor does explain about an extra 9.5% of the cumulative variance but that is not enough of a reason to retain the second factor. At this point there is only enough evidence to retain one factor because the second factor has an eigenvalue that is less than

one, the second factor failed the scree plot test, and the second factor only contributes 9.5% in terms of cumulative variance.

Table 2. Proportion of Variance Explained by Each Factor

Factor	Proportion Variance Explained	Cumulative Variance Explained
1	0.5027	0.5027
2	0.0940	0.5967
3	0.0792	0.6760
4	0.0774	0.7534
5	0.0608	0.8141
6	0.0475	0.8617
7	0.0412	0.9029
8	0.0389	0.9418
9	0.0342	0.9759
10	0.0241	1.0000

Finally, after considering the eigenvalue, scree plot, and proportion of variance, the final step of principal components analysis involves evaluating whether or not each resulting factor is interpretable. Many researchers consider this to be one of the most important steps (Hatcher 1994). The computer is only grouping variables together based on a mathematical formula with no regard to interpretability. Therefore, it is essential for the resulting components to have substantive meaning. For example, if I were to include measures of athletic ability in a scale measuring religiosity, the process of principle

components analysis may return a component that includes how often a woman prays along with how fast she runs, how high she jumps, and how fast she swims. The component may pass all of the above tests but still have no meaningful interpretation in the context of religiosity.

One way to investigate the interpretation of a new factor is to look at the factor loadings. Factor loadings refer to how each survey question relates to the resulting factor. Typically, researchers will utilize some form of rotation like Varimax rotation before establishing factor loadings. Varimax rotation is a form of orthogonal rotation which maximizes the factor loadings but maintains un-correlated factors (Hatcher 1994). However, rotation is only necessary when more than one factor is retained. Therefore, since I only have a single factor I do not need to use rotation. Once again, using the precedent set by Hatcher (1994) I will use .40 as a cutoff for factor loadings, meaning any variable that loads at .40 or higher on factor 1 will be included in the final measure. Table 3 below contains the results of factor loadings. All ten variables load on factor 1 at .48 or above. The wording for the question regarding religious activities in the home is vague but since it does load at .48 I decided to keep the question. Therefore, I will keep all ten questions in my final scale of religiosity.

Table 3. Factor Loadings for Each Survey Item

Survey Item Description	Factor 1
How often have you attended religious services? (past 12 months)	0.73801
How often have you participated in Religious activities? (past12 months)	0.57719
How important is religious faith to you?	0.62043
In an average week how many hours do you spend on religious activities at home?	0.48040
How often do you pray privately?	0.76943
How important is your spiritual life to you?	0.82625
I am being led spiritually.	0.66644
I employ my religious beliefs as a basis for how to act and live on a daily basis.	0.75391
To what extent are you a religious person?	0.80204
To what extent are you a spiritual person?	0.77657

Finally, I retained a single factor and all ten questions from the survey. The last step in principal components analysis involves calculating standardized weights to be applied to each response in the data set. Subsequently, the weighted items are combined to produce a one dimension scalar measure of religiosity including all ten of the original questions from the survey. Higher scores on the scale indicate higher levels of religiosity. I also tested the scale for reliability using Cronbach's Alpha, which returned an alpha of .89.

Descriptive Statistics

Table 4 displays descriptive statistics. The average age of individuals in this sample is 22.4 years old. The percentage of respondents with no religious affiliation appears high at 20.4%. However, this is consistent with the approximately 18% of respondents in the Add Health survey who self-identify as having no religious affiliation.

Table 4. Descriptive Statistics (N=3844)

	Mean	Std Dev	Range
Religiosity	0	1	-2.0-3.5
Age	22.4	1.76	18-27.3
Sibling Communication	1.87	1.11	0-4
Religious Affiliation (%)			
Jew	0.6		0-1
Mainline Protestant	9.4		0-1
Evangelical Protestant	18.9		0-1
Black Protestant	12.8		0-1
Catholic	22.7		0-1
Other	15.2		0-1
None	20.4		0-1
Race (%)			
Black	23.6		0-1
White	54.9		0-1
Hispanic	14.2		0-1
Other	8.1		0-1
Female (%)	52.1		
Living at Home (%)	38.2		0-1

Multilevel Models

Table 5 reports the coefficients produced by the multilevel models. The results of coincide with existing research in the religion literature (e.g., Regnerus et al. 2004). As expected, parental religiosity, predicts adolescent religiosity. Likewise, religious affiliation, gender, and race all predict religiosity in a similar manner as reported in prior research (Argue et al. 1999; Myers 1996; Regnerus et al. 2004).Sibling communication also predicts individual religiosity. The positive relationship suggests that as sibling communication increases religiosity increases. The standardized coefficient for sibling communication (.08) is not much smaller than then the coefficient associated with parental religiosity (.13).

Table 6 reports the intraclass correlation coefficients (ICC) for each model. The null model, which contains only the dependent variable and intercept, indicated a full ICC of .454. This means that 45.4% of the variation in religiosity among siblings is associated with differences found between families. In simpler terms, the ICC of .454 indicates that siblings are moderately similar to one another while also exhibiting a fair amount of dissimilarity. The null model supports my first hypothesis that siblings share similar religiosity levels.

In Model 1 I added the control for parental religiosity and number of children in the family. This model returned a partial ICC of .417. This represents an approximate 9% decrease from the null model. The decrease in the intraclass correlation coefficient indicates that parental religiosity explains a portion of the religious similarity of siblings.

Table 5. The Effect of Parental Religiosity, Religious Affiliation, and Sibling Communication on Religiosity[+]

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	b	Std B	b	Std B	b	Std B	b	Std B	b	Std B	b	Std B
Parental Religiosity	.06* (.01)	.21	.04* (.01)	.13	.04* (.01)	.13	.04* (.01)	.13	.04* (.01)	.13	.04* (.01)	.13
Number of Children	.07 (.05)	.03	.02 (.05)	.01	.02 (.04)	.01	.02 (.04)	.01	.04 (.04)	.01	.04 (.04)	.02
Jew (Ref=Catholic)	-	-	-.10 (.19)	-.01	-.09 (.19)	-.01	-.09 (.19)	-.01	-.13 (.19)	-.01	-.13 (.19)	-.01
Mainline Protestant	-	-	.45* (.06)	.13	.45* (.05)	.13	.45* (.05)	.13	.45* (.05)	.13	.45* (.05)	.13
Evangelical Protestant	-	-	.63* (.05)	.25	.63* (.05)	.25	.63* (.05)	.25	.63* (.05)	.25	.64* (.05)	.25
Black Protestant	-	-	.41* (.07)	.14	.41* (.07)	.14	.41* (.07)	.14	.41* (.07)	.14	.41* (.07)	.14
Other Religion	-	-	.44* (.05)	.16	.44* (.05)	.16	.44* (.05)	.16	.44* (.05)	.16	.46* (.05)	.16
No Religious Affiliation	-	-	-.55* (.04)	-.22	-.55* (.04)	-.22	-.55* (.04)	-.22	-.55* (.04)	-.22	-.54* (.04)	-.22
Female	-	-	.19* (.03)	.10	.15* (.04)	.10	.19* (.03)	.10	.16* (.03)	.09	.09* (.04)	.05
Black (Ref=White)	-	-	.51* (.05)	.22	.51* (.05)	.22	.51* (.05)	.22	.52* (.05)	.22	.52* (.05)	.22
Hispanic	-	-	.25* (.05)	.09	.25* (.05)	.09	.25* (.05)	.09	.25* (.05)	.09	.25* (.05)	.09
Other Race	-	-	.29* (.06)	.08	.29* (.06)	.08	.29* (.06)	.08	.29* (.06)	.08	.29* (.06)	.08
Home	-	-	.02 (.03)	.01	.02 (.03)	.01	.02 (.03)	.01	.02 (.03)	.01	.02 (.03)	.01
Age	-	-	-	-	.01 (.01)	.01	-	-	-	-	.01 (.01)	.01
Sibling Gender	-	-	-	-	-	-	.13 (.28)	.02	-	-	.18 (.28)	.01
Sibling Communication	-	-	-	-	-	-	-	-	.07* (.01)	.08	.08* (.01)	.08

[+] MLM regression coefficients with standard errors in parentheses

* $p < .05$

Table 6. Religious Similarity Among Siblings

	Within Group Variance	Between Group Variance	ICC[a]
NULL	.546	.453	.454
Model 1 (Parental Religiosity & Number of Children)	.552	.395	.417
Model 2 (Model 1 + Controls)	.477	.216	.312
Model 3 (Model 2 + Age)	.477	.216	.312
Model 4 (Model 2 + Gender)	.477	.216	.312
Model 5 (Model 2 + Sibling Communication)	.476	.210	.306
Model 6 (All Variables)	.477	.210	.306

[a] Intraclass correlation coefficient defined as the between group variance divided by the total group variance

The second model incorporates all the other control variables including the number of children in the family, religious preference, gender, race, and whether or not the respondent still lives at home. The second model resulted in a partial ICC of .312. Once again, the decrease in the ICC indicates that these control variables partially explain why siblings are similar. Because the ICC decreased substantially between Models 1 and 2, I entered each control individually to determine which variable was

responsible for the large ICC decrease. Religious affiliation accounted for nearly the entire decrease. The other control variables minimally decreased the ICC or not at all.

The third model includes all the control variables but also adds the main independent variable for age. The partial ICC corresponding to this model remains stable at .312. Likewise, the next model adding the variable accounting for gender remained consistent at an ICC of .312. Model 5 adds the measure of sibling communication which causes the ICC to decrease to .306. The last model with all the control variables plus the main independent variables (age, gender similarity, sibling communication) estimates an ICC of .306.

DISCUSSION

The goal of this project was twofold. First, I wanted to determine if siblings were in fact similar in terms of religiosity. Second, I wanted to examine what explains the similarity. The first hypothesis addressed the similarity issue while hypotheses 2 through 4 focused on explanations.

Hypothesis 1 states that siblings share similar levels of religiosity. The intraclass correlation coefficient resulting from the null model (.454) indicates that siblings share levels of religiosity. There are a few possible interpretations as to why these siblings are similar. As discussed above, we know that parents influence children's religiosity (Regnerus et al. 2004). This social influence can be broken down into the two components of external compliance and internal conformity. It is possible that the siblings share similar levels of religiosity due to parental influence. Once again, however, parental influence in terms of external compliance is unlikely since most of the respondents in this wave of data no longer live at home. The parents are not likely to monitor the daily behavior of their children. Therefore, similarity at this stage in the children's life is not likely due to parental monitoring.

Nevertheless, the sibling similarity may still occur as a result of parental influence in terms of internalized conformity. However, the standardized coefficients in Model 6 indicate that parental religiosity is not necessarily the strongest predictor of adolescent religiosity (see Table 5). While this relationship is strong it is not strong enough to fully explain sibling religious similarity. Therefore, it is unlikely that siblings

share similar levels of religiosity simply because each sibling has internalized the norms demonstrated by the parents.

Some may dispute the entire discussion regarding the relationship between parental religiosity and offspring religiosity on the grounds that the measure of parental religiosity was taken from a different wave of data. The critique is legitimate since the measures of parental religiosity were recorded in wave 1 seven to eight years prior to the religiosity measure of the children taken at wave 3. It is possible that in the seven to eight years between data points the parent's religiosity has changed, either increasing or decreasing. If the parental religiosity has changed then the correlation between parental religiosity and offspring religiosity taken at the same point in time may be stronger. If so, then the argument that sibling similarity is explained by parental influence would have more credibility. However, we know from prior research that as individuals age the trajectory of religiosity tends to flatten out (Argue et al. 1999; Ingersoll-Dayton et al. 2002; Uecker et al. 2007). Therefore, if we assume that the parent's religiosity remains fairly stable from wave 1 to wave 3 it is feasible to assume that the relationship between parental religiosity and adolescent religiosity is moderately weak and the similarity found among siblings is not due solely to parental influence. Without actual data on parental religiosity at wave 3 it is impossible to say for certain whether or not parental religiosity is stable.

One substantial benefit to utilizing the intraclass correlation coefficient is the ability to incorporate additional variables in the model that may help explain religious similarity among siblings. With extra control variables added to Model 1, I obtained

what Kenny and colleagues (2006) refer to as a partial ICC. As detailed above, when the partial ICC decreases relative to the null or full ICC after including a variable said to account for a portion of the established similarity. If the partial ICC increases then the variable accounts for differences that exist at level 2, in this case families.

Returning to the discussion of parental influence, in the second model I added parental religiosity. The resulting ICC decreased from the null ICC by approximately 8% (from .454 to .417). This result indicates that parental religiosity explains a small portion of religious similarity among siblings. Thus far this thesis has found evidence that supports the first hypothesis that siblings do exhibit similar levels of religiosity, and this similarity is not solely attributable to parental religiosity. Nonetheless, the majority of the ICC has not been accounted for.

Next, in Model 2, I added all control variables and found a more substantial change in the ICC (from .417 to .312). I then proceeded to add the variables into the model individually and discovered that the majority of the change in the ICC occurred as a result of including religious preference. The magnitude of this decrease in the second model was unexpected. I initially assumed the large decrease would occur after including parental religiosity into the model since parental religiosity is a strong determinant of adolescent religiosity (Regnerus et al. 2004). However, religious affiliation explains more religious similarity among siblings than parental influence.

The next step in this project was to investigate potential moderators of this relationship. In the second hypothesis I stated that the similarity in age of siblings would account for a proportion of the similarity. When I added the variable representing the

individual's age the ICC remained stable at .312. This implies that similarity in sibling age does not explain why siblings share similar levels of religiosity.

The third hypothesis investigates whether or not the gender of each sibling moderates religious similarity. After adding the gender of the siblings the ICC held steady at .312. This result indicates that a difference in the gender of siblings has no effect on religious similarity. Although prior research has demonstrated that the gender of siblings impacts the relationship in the sense that male-to-male sibling relationships differ from female-to-female sibling relationships and both differ from male-to-female sibling relationships (see Jenkins and Dunn 2009). Nonetheless, my results indicate that while gender may moderate other aspects of sibling relationships, the gender of siblings does not moderate the religious similarity of siblings. I have found no evidence to support my third hypothesis.

The last hypothesis investigates whether or not the level of sibling communication explains any portion of religious similarity. After adding this variable to the model the ICC decreased slightly from .312 to .306. This result implies that the amount of sibling communication in a given family explains a small proportion of sibling religious similarity. This evidence fits into a social learning perspective. The social learning approach suggests that the ICC decrease after controlling for sibling communication provides some evidence that social learning is taking place. The more frequently siblings communicate the more opportunities each will have to influence the other and bring their religious behavior closer.

The standardized regression coefficients (see Table 5) are also consistent with a social learning perspective. The positive relationship between sibling communication and religiosity implies that as communication increases among siblings, religiosity also increases. Social learning theory would suggest that as siblings interact more frequently social influence is likely taking place. While a standardized coefficient of .08 is not a huge effect, this result is not much smaller than the coefficient associated with parental religiosity (.13). Because the coefficient is not extremely large the interpretation should not be overstated. Nevertheless, the result is interesting.

Similarly, the positive direction of the relationship between sibling communication and religiosity is interesting. This result shows that as communication between siblings increases religiosity also increases. Spiritual capital theory suggests that the individuals within the family engage in producing spiritual goods. When siblings communicate more frequently regarding serious problems, siblings may develop spiritual capital. This process could take place even if the capital in development is not overtly recognized as religious. Discussions of right versus wrong tend to take on some level of religious significance (Smith 2003). Siblings discussing issues like how to deal with a violent dating partner, when taking office supplies becomes stealing, or what it means to be a good person, may actually be engaged in the production of spiritual capital. Rational choice theory would then suggest that people will try to maximize the new spiritual capital effectively becoming more religious. Therefore, the communication that takes place between siblings, even siblings with low levels of religiosity, may lead to higher levels of religiosity.

Limitations

There are a few limitations to this research. First, this project utilized cross sectional data. The knowledge obtained by cross sectional data, in this case, was limited in comparison to what might be obtained with longitudinal data. While, I was able to establish that siblings are to some extent similar in terms of religiosity. However, longitudinal analyses are necessary to more fully understand when the similarity emerges and if it changes over time.

The second major limitation is that all siblings in a particular family may not have been included in the study. Only siblings within the proper age range were included in the Add Health survey. Therefore, if a family had a large age gap between siblings, it is likely that some of the siblings were excluded from the study based on the respondent's age. There is no reason to believe, however, that the inclusion of additional family members would alter these results dramatically.

Suggestions for Future Research

The results of this study indicate that siblings share similar levels of religiosity. However, this project could not fully explain why this similarity exists. Furthermore, there is still the issue of parental influence that is not yet clear. Therefore, the first step in furthering this research is to extend this cross-sectional research into a longitudinal analysis. Longitudinal research could model similarity in sibling religiosity over time while controlling for age, education, life course events, and parental attachment. Seeing how sibling similarity in religiosity changes over time along with measures of the parent-to-child relationship could allow us to further unravel the mystery of parental

influence. Similarly, longitudinal analysis would allow for researchers to investigate whether or not siblings influence one another's religiosity.

CONCLUSION

This project intended to establish whether siblings share similar levels of religiosity and if so what factors explain the similarity. It appears that siblings do indeed share similar levels of religiosity. In reference to characteristics that explain similarity, however, this project was only able to show that sibling communication really impacts sibling similarity. Other interesting findings from this thesis include the extent to which parental religiosity and religious preference did explain religious similarity among siblings. It was surprising how little parental religiosity and how much religious affiliation accounted for the similarity among siblings. These results emphasize the need for further investigation into the various types and strength of parental influence. Once again, the channeling approach to religious socialization may be very useful in future studies in combing the effect of religious affiliation and parental influence.

It is clear that we still do not understand many things about sibling relationships. This study demonstrated a clear connection between sibling's religious behaviors but was unable to provide a complete explanation for the similarity. More research is warranted to further unravel the family dynamics involved in religious socialization. Future studies should also pay more attention to the various types of parental influence. More studies are needed to better explain particular moderators of the parent-to-child relationship.

Finally, it will be difficult for any study to advance our understanding of religiosity before consistent terminology and measures are established. The need for

better conceptualizations about how religious beliefs and practices emerge and how they are altered as well as how religiosity is measured is clearly necessary.

REFERENCES

Ackerman, Jeff. 2003. "Delinquents and Their Friends: The Role of Peer Effects and Self-Selection." PhD dissertation Thesis, Department of Sociology: Program in Crime, Law, and Justice, The Pennsylvania State University, State College, PA.

Allport, Gordon W. 1950. *The Individual and His Religion, a Psychological Interpretation*. New York: Macmillan.

Argue, Amy, David R. Johnson, and Lynn K. White. 1999. "Age and Religiosity: Evidence from a Three-Wave Panel Analysis." *Journal for the Scientific Study of Religion* 38:423-435.

Becker, Gary S. 1964. *Human Capital; a Theoretical and Empirical Analysis, with Special Reference to Education*. New York: Columbia University Press.

Benson, Peter L. 2004. "Emerging Themes in Research on Adolescent Spiritual and Religious Development." *Applied Developmental Science* 8:47-50.

Browne, Michael. 1968. "A Comparison of Factor Analytic Techniques." *Psychometrika* 33:267-334.

Bruce, Steve. 2002. *God Is Dead : Secularization in the West*. Oxford, UK: Blackwell Publishers.

Bryk, Anthony S. and Stephen W. Raudenbush. 1992. *Hierarchical Linear Models : Applications and Data Analysis Methods*. Newbury Park, CA: Sage Publications.

Casanova, José. 1994. *Public Religions in the Modern World*. Chicago, IL: University of Chicago Press.

Chantala, Kim. 2001. "Constructing Weights to Use in Analyzing Pairs of Individuals from Add Health Data." Carolina Population Research Center, Chapel Hill: University of North Carolina.

Chaves, Mark. 1991. "Family Structure and Protestant Church Attendance: The Sociological Basis of Cohort and Age Effects." *Journal for the Scientific Study of Religion* 30:501-514.

Clayton, Richard R. and James W. Gladden. 1974. "The Five Dimensions of Religiosity: Toward Demythologizing a Sacred Artifact." *Journal for the Scientific Study of Religion* 13:135-143.

Cotton, Sian, Kathy Zebracki, Susan L. Rosenthal, Joel Tsevat, and Dennis Drotar. 2006. "Religion/Spirituality and Adolescent Health Outcomes: A Review." *Journal of Adolescent Health* 38:472-480.

Day, Randal D., Hinckley Jones-Sanpei, Jessica L. Smith Price, Dennis K. Orthner, Elizabeth C. Hair, Kristin Anderson Moore, and Kelleen Kaye. 2009. "Family Processes and Adolescent Religiosity and Religious Practice: View from the Nlsy97." *Marriage & Family Review* 45:289 - 309.

Diop-Sidibé, Nafissatou. 2005. "Siblings' Premarital Childbearing and the Timing of First Sex in Three Major Cities of Côte D'ivoire." *International Family Planning Perspectives* 31:54-62.

Glock, Charles Y. and Rodney Stark. 1965. *Religion and Society in Tension.* Chicago, IL: Rand McNally.

Gorsuch, Richard L. 1984. "Measurement: The Boon and Bane of Investigating Religion." *American Psychologist* 39:228-236.

Gossrau-Breen, Diana, Emmanuel Kuntsche, and Gerhard Gmel. 2010. "My Older Sibling Was Drunk - Younger Siblings' Drunkenness in Relation to Parental Monitoring and the Parent-Adolescent Relationship." *Journal of Adolescence* 33:643-652.

Hatcher, Larry. 1994. *A Step-by-Step Approach to Using the Sas System for Factor Analysis and Structural Equation Modeling*. Cary, NC: SAS Institute.

Hill, Peter C. and Ralph W. Hood. 1999. *Measures of Religiosity*. Birmingham, AL: Religious Education Press.

Hill, Peter C., Kenneth Pargament, Ii, Ralph W. Hood, Jr Michael E. Mccullough, James P. Swyers, David B. Larson, and Brian J. Zinnbauer. 2000. "Conceptualizing Religion and Spirituality: Points of Commonality, Points of Departure." *Journal for the Theory of Social Behaviour* 30:51-77.

Hoge, Dean R., Gregory H. Petrillo, and Ella I. Smith. 1982. "Transmission of Religious and Social Values from Parents to Teenage Children." *Journal of Marriage and Family* 44:569-580.

Hunsberger, Bruce and L. B. Brown. 1984. "Religious Socialization, Apostasy, and the Impact of Family Background." *Journal for the Scientific Study of Religion* 23:239-251.

Iannaccone, Laurence R. 1990. "Religious Practice: A Human Capital Approach." *Journal for the Scientific Study of Religion* 29:297-314.

Ingersoll-Dayton, Berit, Neal Krause, and David Morgan. 2002. "Religious Trajectories and Transitions over the Life Course." *International Journal of Aging & Human Development* 55:51-70.

Jenkins, Jennifer and Judy Dunn. 2009. "Siblings within Families: Levels of Analysis and Patterns of Influence." *New Directions for Child & Adolescent Development* 2009:79-93.

Kaiser, Henry F. 1960. "The Application of Electronic Computers to Factor Analysis." *Educational and Psychological Measurement* 20:141-151.

Kenny, David A., Deborah A. Kashy, and William L. Cook. 2006. *Dyadic Data Analysis*. New York: Guilford Press.

Kenny, David A., Lucia Mannetti, Antonio Pierro, Stefano Livi, and Deborah A. Kashy. 2002. "The Statistical Analysis of Data from Small Groups." *Journal of Personality and Social Psychology* 83:126-137.

Kramer, Laurie and Katherine J. Conger. 2009. "What We Learn from Our Sisters and Brothers: For Better or for Worse." *New Directions for Child & Adolescent Development* 126:1-12.

Krause, Neal and Christopher G. Ellison. 2007. "Parental Religious Socialization Practices and Self-Esteem in Late Life." *Review of Religious Research* 49:109-127.

Linn, Robert. 1968. "A Monte Carlo Approach to the Number of Factors Problem." *Psychometrika* 33:37-71.

Luckmann, Thomas. 1967. *The Invisible Religion; the Problem of Religion in Modern Society*. New York: Macmillan.

Maass, Anne and Russell O. Clark. 1983. "Internalization Versus Compliance: Differential Processes Underlying Minority Influence and Conformity." *European Journal of Social Psychology* 13:197-215.

Martin, Todd F., James M. White, and Daniel Perlman. 2003. "Religious Socialization: A Test of the Channeling Hypothesis of Parental Influence on Adolescent Faith Maturity." *Journal of Adolescent Research* 18:169-187.

Miller, Alan and John Hoffmann. 1995. "Risk and Religion: An Explanation of Gender Differences in Religiosity." *Journal for the Scientific Study of Religion* 34:63-75.

Miller, Alan S. and Rodney Stark. 2002. "Gender and Religiousness: Can Socialization Explanations Be Saved?" *The American Journal of Sociology* 107:1399-1423.

Myers, Scott M. 1996. "An Interactive Model of Religiosity Inheritance: The Importance of Family Context." *American Sociological Review* 61:858-866.

Oettinger. 2000. "Sibling Similarity in High School Graduation Outcomes: Causal Interdependency or Unobserved." *Southern Economic Journal* 66:631-648.

Okagaki, Lynn and Claudia Bevis. 1999. "Transmission of Religious Values: Relations between Parents' and Daughters' Beliefs." *Journal of Genetic Psychology* 160:303-318.

Peterson, Gary W., Boyd C. Rollins, and Darwin L. Thomas. 1985. "Parental Influence and Adolescent Conformity." *Youth & Society* 16:397-420.

Platvoet, Jan and Arie L. Molendijk. 1999. *The Pragmatics of Defining Religion : Contexts, Concepts, and Contests*. Boston, MA: Brill.

Regnerus, Mark D. and Christian Smith. 2005. "Selection Effects in Studies of Religious Influence." *Review of Religious Research* 47:23-50.

Regnerus, Mark D., Christian Smith, and Brad Smith. 2004. "Social Context in the Development of Adolescent Religiosity." *Applied Developmental Science* 8:27-38.

Smith, Christian. 2003. *Moral, Believing Animals : Human Personhood and Culture*. New York: Oxford University Press.

Smith, Christian, Melinda Lundquist Denton, Robert Faris, and Mark Regnerus. 2002. "Mapping American Adolescent Religious Participation." *Journal for the Scientific Study of Religion* 41:597-612.

Smith, Tom W. 1990. "Classifying Protestant Denominations." *Review of Religious Research* 31:225-245.

Snijders, T. A. B. and R. J. Bosker. 1999. *Multilevel Analysis : An Introduction to Basic and Advanced Multilevel Modeling*. Thousand Oaks, CA: Sage.

Stark, Rodney and Roger Finke. 2000. *Acts of Faith : Explaining the Human Side of Religion*. Berkeley: University of California Press.

Steensland, Brian, Jerry Z. Park, Mark D. Regnerus, Lynn D. Robinson, W. Bradford Wilcox, and Robert D. Woodberry. 2000. "The Measure of American Religion: Toward Improving the State of the Art." *Social Forces* 79:291-324.

Stormshak, Elizabeth A., Bernadette M. Bullock, and Corinna A. Falkenstein. 2009. "Harnessing the Power of Sibling Relationships as a Tool for Optimizing Social–Emotional Development." *New Directions for Child & Adolescent Development* 2009:61-77.

Suziedelis, Antanas and Raymond H. Potvin. 1981. "Sex Differences in Factors Affecting Religiousness among Catholic Adolescents." *Journal for the Scientific Study of Religion* 20:38-51.

Tabachnick, Barbara G. and Linda S. Fidell. 2007. *Using Multivariate Statistics*. Boston, MA: Pearson/Allyn & Bacon.

Thompson, Edward H. 1991. "Beneath the Status Characteristic: Gender Variation in Religiousness." *Journal for the Scientific Study of Religion* 30:381-394.

Tucker, Corinna Jenkins and Kimberly Updegraff. 2009. "The Relative Contributions of Parents and Siblings to Child and Adolescent Development." *New Directions for Child & Adolescent Development* 2009:13-28.

Uecker, Jeremy E. 2009. "Catholic Schooling, Protestant Schooling, and Religious Commitment in Young Adulthood." *Journal for the Scientific Study of Religion* 48:353-367.

Uecker, Jeremy E., Mark D. Regnerus, and Margaret L. Vaaler. 2007. "Losing My Religion: The Social Sources of Religious Decline in Early Adulthood." *Social Forces* 85:1667-1692.

Updegraff, Kimberly A.;, Susan M.; Mchale, Shawn D.; Whiteman, Shawna M.; Thayer, and Melissa Y. Delgado. 2005. "Adolescent Sibling Relationships in Mexican

American Families: Exploring the Role of Familism." *Journal of Family Psychology* 19:512-522.

Vakalahi, Halaevalu F., R. Steven Harrison, and Frederick V. Janzen. 2000. "The Influence of Family-Based Risk and Protective Factors on Adolescent Substance Use." *Journal of Family Social Work* 4:21 - 34.

Vaus, David A. De. 1984. "Workforce Participation and Sex Differences in Church Attendance." *Review of Religious Research* 25:247.

Vaus, David De and Ian Mcallister. 1987. "Gender Differences in Religion: A Test of the Structural Location Theory." *American Sociological Review* 52:472-481.

Whiteman, Shawn D., Julia M. Becerra, and Sarah E. Killoren. 2009. "Mechanisms of Sibling Socialization in Normative Family Development." *New Directions for Child & Adolescent Development* 2009:29-43.

Wilkinson, Melvin L. and William C. Tanner. 1980. "The Influence of Family Size, Interaction, and Religiosity on Family Affection in a Mormon Sample." *Journal of Marriage and Family* 42:297-303.

Zinnbauer, Brian J., Kenneth I. Pargament, and Allie B. Scott. 1999. "The Emerging Meanings of Religiousness and Spirituality: Problems and Prospects." *Journal of Personality* 67:889-919.

VITA

Name: Layton Marshall Field

Address: Sociology Department
Texas A&M University
MS 4351
College Station, TX 77843-4351

Education: B.S., Sociology, Texas A&M University, 2009
M.S., Sociology, Texas A&M University, 2011