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Examining the Mechanisms of Religious Ecology on Population Health and Material Well-Being

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EXAMINING THE MECHANISMS OF RELIGIOUS ECOLOGY ON
POPULATION HEALTH AND MATERIAL WELL-BEING

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Sociology

by

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Abstract

A growing body of research has addressed the relationship between community-level religious environments and important aspects of well-being, such as mortality, crime, and social mobility. This research argues that the prevalence of specific religious traditions shapes these important outcomes through a variety of mechanisms. While there is no shortage of mechanisms proposed by authors - such as local attitudes towards public institutions, gender norms, and social networks - these mechanisms remain themselves untested. A notable critique of this literature suggests that without evidence supporting the existence of these mechanisms as described, scholars involved in this research run the risk of committing an ecological fallacy. In this dissertation, I test a variety of proposed mediators of the effects of religious environments on three different aspects of well-being. Using extensive county-level datasets, I examine the roles of institutional investment and access, local health behaviors, and the teen birth rate in explaining observed effects of religious traditions. Results of the study analyses produce evidence which supports and complicates previous theorization in this area of study. There do in fact appear to be mechanisms through which the religious environment influences well-being, but these mechanisms do not uniformly or completely explain the effects of religious traditions. Findings from this dissertation highlight the importance of the cultural environment in shaping U.S. population health and well-being and suggest future directions for research in this area.

Chapter 1. Introduction

The lifestyles, health, and prosperity of Americans are closely tied to the cultural makeup of the communities in which they live. As a central component of the cultural landscape, America's religious traditions play a pivotal role in shaping many of the most pressing issues in our time, including mortality, crime, social mobility, racial inequality, and economic development (Beyerlein and Hipp, 2005; Blanchard, 2007; Blanchard et al., 2008; Clark and Stroope, 2018; Lee and Bartkowski, 2004; Mencken et al., 2006). While the past two decades have seen a rapid expansion in research demonstrating these effects, the social mechanisms responsible are still not fully understood. Exploring the complex linkages between the religious landscape and important community outcomes, such as mortality and social mobility, is an essential step in the development of this area of research. If ecological research on religion is to take its subject seriously, it must rigorously examine the social processes through which religious traditions influence communities.

While most research through the late 1990s largely overlooked the structural aspects of religion, the effects of the religious landscape have received much attention since the turn of the century. Developments in statistical techniques, coupled with the increased availability of high-quality county-level datasets have allowed researchers to gain an understanding of religion as an attribute of the spaces within which individuals – religious and nonreligious alike – are located. Multiple explanatory mechanisms have been proposed to account for why religious ecology (the religious landscape) influences critical aspects of community well-being. While attempting to explain the effects of specific religious traditions, researchers have highlighted the role of religious theology in shaping social capital, public health and hospital funding, social support, community trust and norms of reciprocity, and the stratification system (Blanchard et al., 2008;

Lee, 2010). Additionally, recent research has proposed that the values of local religion embed themselves in local culture and color the social desirability of important life decisions, such as whether one should attend college, what age one should marry, and whether a married woman should fully participate in the labor market (Clark and Stroope, 2018).

Previous research has provided valuable insights into religion's role in shaping communities and their attributes, but there are important gaps to be addressed. First, despite it being frequently cited as a pathway through which civically engaged denominations (e.g. Catholics) might lower mortality rates, research has not yet examined the effects of public health investment on mortality. Similarly, investment in educational and public institutions has been suggested to be a way in which religious traditions shape economic opportunity in their communities. While these assertions are supported by contemporary understandings of American religious traditions, they have never been rigorously examined, nor has the strength of the connection between religious ecology and public investments been measured. Second, scholars have noted the role of religious ecology in determining life chances in American communities, but the means through which these community-level attributes exert themselves are still very much unexplored. Lastly, the relative strength of each of the proposed mechanisms has not been compared across multiple outcomes. For example, it may be that institutional investment is the most important factor in determining a community's capacity for social mobility but is only modestly impactful in influencing mortality rates and other metrics of population health.

My dissertation attempts to address these issues by conducting advanced county-level analyses using data compiled from sources including the 2010 Religious Congregations and Membership Study, the U.S. Census of Governments, the National Center for Health Statistics, and the Equality of Opportunity Project. The public availability of these diverse county-level

data provides an opportunity to incorporate numerous factors into a single analysis – granting an increased ability to control for potentially confounding covariates and allowing for more rigorous and intricate methodological techniques. In order to account for the complex relationships between religious traditions and American communities, I apply a number of statistical techniques including weighted-least-squares and fixed-effects regression modeling and indirect effects analyses.

I organize my dissertation into three distinct but related papers. Following an introductory chapter, I investigate the role of public health investment as a mechanism through which religious ecology influences county-level mortality rates (Chapter 2). In order to examine the additive and mediating effects of religious environment and public health investment on mortality rates, I use county data from the 2010 RCMS, the 2012 U.S. Census of Governments, and the NCHS and estimate a series of weighted least squares regression and fixed effects models. Additionally, I conduct tests of indirect effects to better understand the relative strength of this relationship. Results demonstrate a significant and meaningful relationship between religious environment and local investment in public health. Models testing the relative strength of this investment in explaining the effect of religious ecology suggest distinct relationships between various denominations and local investment in public health.

In Chapter 3, I address the diversity of religious environment's mechanisms of influence across different health outcomes by linking religious traditions with rates of low weight birth. In this chapter, I use data from the National Center for Health Statistics' National Vital Statistics System to highlight the role of the prenatal health environment in explaining a significant degree of the total influence of religious environments on infant birthweight. I find that religious traditions have significant and distinct associations with various aspects of the prenatal health

environment, and that these associations explain a significant and sizable portion of observed effects of religious traditions on infant birthweights.

In Chapter 4, I address the gap in research on the consistency of the proposed mechanisms by examining institutional investment's role in the social mobility process. Combining Census of Governments data with intergenerational mobility data from the Equality of Opportunity Project, I conduct structurally similar analyses to those in previous chapters in order to observe the impacts of institutional investment on a distinctly different aspect of well-being. Findings demonstrate a significant relationship between distinct religious traditions and public spending on education, and that this relationship significantly mediates the total observed effect of religious traditions on intergenerational mobility.

My dissertation contributes to expanding our knowledge on the complex relationship between religion and community well-being by attempting to detangle and clarify the underlying pathways of this relationship. Doing so is the logical next step in maturing an important and growing area of research in social science. In addition to informing future theorizing and research in this area of study, my work may be relevant to public policy concerned with reducing social inequality, as well as policy concerned with improving health and mortality outcomes. The social and cultural determinants of health and social mobility have been the subject of a great deal of recent attention, from academics, health administrators, and policymakers alike. By further illuminating these determinants, this study contributes to a growing understanding of the complex relationship between local culture and well-being in America's communities.

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Chapter 2. Investment in Local Health-Shaping Institutions: Reconsidering the Role of the Religious Environment

2.1 Introduction

In the past half century, a considerable amount of research has examined the role of religion as a key covariate of individual mortality. In this literature, scholars have highlighted the importance of denominational membership (Goldstein 1986, 1996; Lyon et al. 1976, 1978; Phillips 1975) and religious attendance (Ellison et al. 2000; Hill et al. 2005; Hummer et al. 1999; Musick et al. 2004) in determining personal health and mortality risk. Over the past decade, a growing body of research has emerged which recognizes the importance of local religious environment as a key covariate of mortality. Building upon a rich literature that includes Durkheim's ([1897] 2002) classic study of suicide and Stark's (1984, 1996) analysis of religious ecology and deviance, researchers have demonstrated that particular religious traditions appear to have distinct and meaningful impacts on county-level mortality rates (Bartkowski, Xu, & Garcia, 2011; Blanchard et al. 2008; Lee 2010). The religious ecology literature suggests a variety of mechanisms through which local religious contexts affect well-being. These mechanisms, though diverse and specific, can be broadly grouped into three vectors of influence: social networks, civic engagement, and attitudes towards public health infrastructure (Bartkowski, Xu, & Garcia, 2011; Beyerlein & Hipp 2005; Blanchard et al., 2008; Clark & Stroope, 2018; Tolbert et al. 1998, 2002).

Although valuable in highlighting potential explanations for the apparent influence of religious environment on key aspects of population well-being, the proposed mechanisms in this body of literature have yet to be empirically assessed. It may therefore be that the ecological findings in this growing body of literature are artifacts of aggregate, individual-level factors

rather than macro-to-micro processes. This study attempts to address this issue by directly examining the connections between religious environment, local institutional investment, and local mortality.

This manuscript makes three unique contributions to this body of research. First, it further develops theory on religious ecology and mortality to include a more holistic view of local investment. Second, using data from the 2010 U.S. Census of Governments, the RCMS Churches and Church Membership Survey, and the NCHS Compressed Mortality File, it empirically examines the proposed relationship between institutional investment and the religious environment. Lastly, this study investigates the direct effect of religious environments on mortality rates, the indirect effect through institutional investment, and highlights salient new directions for research concerned with cultural covariates of public health.

2.2 Religious Context and Mortality

The study of religious contexts and mortality traces back to the origins of sociology. In *Suicide* (1897 [2002]), Durkheim argued that the social control found in an area characterized by intense, collective religion protected residents from the harmful “anomie” found in modernity. Drawing upon the structuralist view of local religion pioneered by Durkheim, scholars developed the theory of religious ecology – also known as the “moral communities” theory (Stark et al. 1980, 1982; Welch et al. 1991). Contemporary research employing the religious ecology theory typically examines the “market share” or proportional dominance of specific religious denominations in an area. This perspective is concerned with both the demographic preponderance of adherents of a religious tradition and the cultural schemas that accompany those traditions.

Researchers have studied the effects of religious contexts on a broad range of outcomes (Adamczyk et al., 2016; Stark, 1984, 1996). County-level studies of the ecological effects of religion have demonstrated linkages to important social indicators of well-being, including crime (Beyerlein & Hipp, 2005; Lee & Bartkowski, 2004), intergenerational mobility (Clark & Stroope, 2018), economic well-being (Mencken et al., 2006; Tolbert et al., 1998, 2002), residential segregation (Blanchard, 2007), and population health (Blanchard et al., 2008, Bartkowski, Xu, & Garcia, 2011; Ellison et al., 1997). The wide span of religious context effects underscores the importance of uncovering the reasons for this influence. Correspondingly, researchers studying the effects of religious environments have suggested specific mechanisms for the relationships between particular religious ecologies and various social outcomes.

A nascent body of research on religious contexts and mortality suggests both a general effect of the religious environment on mortality as well as pronounced denominational differences in this process (Bartkowski, Xu, & Garcia, 2011; Blanchard et al., 2008; Garcia, Bartkowski, & Xu, 2018). This literature suggests that doctrinal characteristics which differentiate major religious traditions act to produce an unequal landscape of public health and mortality. Conservative Protestant denominations, such as evangelicals, fundamentalists, and Pentecostals, are characterized by an “otherworldly” theological orientation that emphasizes personal salvation and the afterlife (Greenberg 2000; Smith 2000). It is important to distinguish evangelicals from their more insular fundamentalist and Pentecostal cousins, however, by their theological mandate to engage with and reform wider society. Similarly engaged, “this-worldly” denominations - such as mainline Protestants and Catholics - are characterized by greater religious imperatives to address inequality and improve societal conditions. This body of

research argues that these contrasting doctrinal orientations towards social engagement and worldliness shape both all-cause and certain cause-specific mortality rates.

Applying theory to the study of health and mortality, scholars have suggested a number of explanatory mechanisms for the influence of religious contexts. The mechanisms proposed in this literature are diverse, often specifically tailored to the public health outcomes and research questions of each study. For example, Lee and Bartkowski (2004) emphasize local religion's role in facilitating social ties and integration, and in fostering civic engagement, in their study of juvenile homicide. By contrast, Blanchard and colleagues (2008) argue that the effects of American religious traditions on mortality rates can be attributed to network closure and denominationally distinct orientations towards investment in public health infrastructure. Although the mechanisms of religious ecology proposed by this area are numerous and specific, they can generally be grouped into three broad avenues of influence: social networks, civic engagement, and attitudes towards public health infrastructure.

While compelling and grounded in contemporary understandings of the theological content in America's diverse religious traditions, none of the proposed mechanisms in the religious ecology literature have been empirically assessed. This gap in our knowledge, coupled with the ecological nature of the concepts and available data, leaves unclear the extent to which previous findings are the result of the mechanisms proposed. It is also unknown which of these mechanisms – if any – are most influential in the health process. It is necessary to methodologically engage with the mechanisms of religious ecology in order to gain a more comprehensive understanding of this process. Therefore, this study attempts to empirically examine the role of institutional investment as a mechanism of local religion's effects on mortality.

2.3 Institutional Investment and Health

A key hypothesized mechanism linking the theological content of American religious traditions and mortality is through denominationally distinct orientations towards local spending on public health. Blanchard and colleagues (2008) argue that the intensely individualistic underpinnings of conservative Protestant theology act to de-emphasize the role of institutions in ameliorating social disparities, and thus act to suppress support for investments in healthcare infrastructure and health-related social services. Catholics and mainline Protestant denominations are said to facilitate a local culture that is more supportive of these institutions and encourages public investment in them. Additionally, Catholics and mainline Protestants routinely operate and support full healthcare hospital systems and health-related charities, which are hypothesized to reduce mortality by increasing access to medical personnel and needed health equipment for residents in an area.

Over the past two decades, a growing body of public health research has begun to bring local health investment and its impacts on public health and mortality into sharper relief. In Singh's (2014) systematic review of this literature, she draws two notable conclusions. First, existing evidence largely suggests a positive correlation between public health spending and improvements in local mortality and morbidity outcomes. Second, these findings are complicated somewhat by inconsistent evidence that local health spending improves existing disparities in health between residents. This suggests that while religious traditions' hypothesized influence on local health investment may or may not affect racial or economically driven health disparities, there is a clear pathway through which religious traditions may influence net morbidity and mortality.

In recent years, the Robert Wood Johnson's Culture of Health initiative has challenged researchers and public health professionals to look beyond the health sector to improve public health outcomes. A product of this greater focus outside the healthcare sector has been a line of research underlining important associations between nonhealth spending and population health (Bradley et al., 2016; McCullough et al., 2012; McCullough & Leider, 2016). Spending in areas such as: fire protection, K-12 education, libraries, and housing and community development has been found to significantly improve county-level health outcomes (McCullough & Leider, 2016). These findings suggest that researchers studying religious ecology's effects on population health should account for the effects of investment in nonhealth institutions.

Applying the religious ecology framework, religious institutions are expected to facilitate community integration and collective efficacy – particularly in rural areas. These institutions also foster residential stability and residential integration (Irwin et al., 2004; Irwin, Tolbert, & Lyson, 1999), both of which are expected to increase residents' attachment to the long-term well-being of their communities. Specific theological aspects of various religious traditions are likely to augment this commitment to community well-being by shaping perceptions of which institutions are helpful or harmful to the community. It can be expected, therefore, that there is a general influence of local religion on institutional investment. It can also be expected that there are consequential distinctions between denominations due to specific theological differences.

2.4 Institutional Investment and Religious Ecology

Scholars applying the religious ecology hypothesis argue that one way in which denominational religious contexts shape population health is by encouraging or suppressing investment in public health infrastructure (Blanchard et al., 2008; Lee, 2010). It is unlikely, however, that the cultural characteristics that may encourage or discourage local communities to

invest in institutions linked to mortality are solely limited to hospital systems. Rather, they can be expected to influence investment in many institutions linked to health outcomes, both within and outside the healthcare sector. To best investigate the relationship between religious environment and mortality, this research broadens the conceptual mechanism of institutional investment to include all major local institutions linked to mortality, including education, public safety, and fire prevention – among others.

There are several notable reasons to expect that the practice of local religion may generally influence investment in public institutions. First, by congregating individuals who might by no other means interact with one another, local religion produces an avenue through which information about public affairs can circulate. Information about the consequences of funding shortfalls of local institutions such as hospitals and schools may encourage support for investments in these institutions. Second, religious institutions anchor populations to a place and increase residential stability (Irwin et al., 2004; Irwin, Tolbert, & Lyson, 1999). Greater residential stability should increase the likelihood that residents will be more invested in the long-term well-being of the communities to which they are increasingly attached. Distinct denominational theologies likely shape the ways in which communities act in the interests of this well-being. However, by fostering various aspects of local community, religious traditions are expected to express diverse, significant associations with investment in public institutions (Hypothesis 1).

2.5 Denominationally Distinct Effects on Institutional Investment

While the social and demographic impacts of the local practice of religion suggest a broadly positive relationship between local religion and local investment, there are significant theological differences amongst American religious traditions that suggest distinct relationships

with local institutions linked to mortality. First, the otherworldly character of conservative Protestant theology is anticipated to markedly decrease support for investments in secular institutions. By contrast, the this-worldly orientations of mainline Protestantism and Catholicism are expected to be more amenable towards investments in these institutions. The structuralist theology undergirding the Catholic tradition is expected to further increase community support for public, institutionally-based solutions to community problems – such as mortality (Hypothesis 2). Although there are numerous social metrics in which Catholics and mainline Protestants have achieved parity, the more individualistic theology found in Protestantism suggests that mainline Protestants may be expected to provide less support to public institutions than Catholics (Hypothesis 3).

Several important considerations complicate the relationships between these religious traditions and institutional investment. First, following prior research (Bartkowski, Xu, and Garcia, 2011; Blanchard et al., 2008; Clark & Stroope, 2018), this study acknowledges important denominational distinctions among conservative Protestant denominations. Namely, the theological mandate for engagement with secular institutions which characterizes evangelical denominations is expected to encourage support for these institutions. However, the individualism which defines much of evangelical Protestant theology is often at odds with institutionally-based approaches to ameliorating social problems – such as inequality or disease. Evangelicals additionally contend with many of the ideological underpinnings of these institutions, such as biological science, evolution, and secular education. These conflicting theological pressures suggest that the evangelical connection to investment in public institutions should be expected to be modest or mixed (Hypothesis 4). By contrast, the insular nature of fundamentalist and Pentecostal denominations – in combination with an antagonistic view of

secular institutions – is likely to significantly suppress support for investment in public institutions linked to reduced mortality (Hypothesis 5)

Local investment in public institutions ranging from K-12 education to hospital systems has been linked to improved mortality outcomes in American communities (Bradley et al., 2016; McCullough & Leider, 2016). If religious denominations demonstrate an influence on this local investment, then it should be expected that this investment explains a portion of the total effect of religious denominations on mortality rates. It is predicted, therefore, that accounting for institutional investment in models predicting mortality will explain a significant portion of the effect of religion on mortality (Hypothesis 6).

2.6 Data and Method

Hypotheses are tested using data from the 2010 U.S. Census, the 2010 Religious Congregations and Membership Study, the 2012 U.S. Census of Governments, and the National Center for Health Statistics' Compressed Mortality File from 2012-2014. In order to observe the time-sensitive pathways proposed above, it is necessary to observe first, local demographic factors and the religious environment; second, the investment behaviors of these communities; and finally, mortality outcomes. Accounting for the dimension of time in this process allows this study to further clarify the direction of the relationships between religious environment, institutional investment, and mortality rates. The units of analysis for this study are all counties in the contiguous US for which data are available from the sources listed above (final n= 2,641).

2.6.1 Age- Sex- Race-Adjusted Mortality

The dependent variable is the age, sex, and race adjusted all-cause mortality rate of U.S. counties from 2012-2014. These data come from the NCHS Compressed Mortality File from

2012-2014. They can be secured via the Center for Disease Control’s online WONDER system. Mortality rates are standardized to the 2010 U.S. population. Standardization removes variance in the dependent variable – mortality in this case – that is due to the unequal distribution of age, sex, and race across counties. The age, race, and sex standardization of mortality rates follows the technique employed by Blanchard and colleagues (2008), updated to the 2010 population. This is represented by the formula:

$$m = \frac{\sum m_a P_a}{P} \times 100,000$$

Here, m represents the age, sex, race specific mortality rates, P_a represents the number of persons in the standard population (2010 U.S. population) for a specific age, race, sex group, and P is the total 2010 population. Mortality rates are aggregated from 2012-2014 to avoid suppression of reported mortality in counties below a minimum reportable threshold of deaths in a year. Additionally, following the gold standard in mortality research, models predicting mortality are weighted according to the inverse of the variance in the 2012-2014 mortality rate.

2.6.2 Institutional Investment

Data for the institutional investment variables employed in this study are from the 2012 U.S. Census of Governments. Institutional investment is operationalized as the total local public spending on institutions that have been linked to mortality. In the course of the following analyses, this takes the form of three indices: (1) health and hospital spending, (2) nonhealth spending linked to mortality, and (3) total investment. The categories of nonhealth spending included in the indices are fire protection, K-12 education, protective inspections, housing and community development, sewerage, public libraries, and parks and recreation. These categories of spending are included in the analysis following recent ecological research demonstrating the

importance of these institutions in shaping health and mortality inequalities (Bradley et al., 2016; McCullough & Leider, 2016). The Total Investment Index is an aggregation of spending on both health and hospitals and on the nonhealth institutions previously listed.

2.6.3 Independent Variables

The independent variables in this study encompass measures of: (1) denominational dominance of religious traditions, (2) economic structure, and (3) demographic controls. Measures of denominational dominance are calculated using the 2010 Religious Congregations and Membership Study. Denominational dominance is calculated as the number of adherents of a specific religious tradition in an area, divided by the total population of that area. Adherents are classified as fundamentalist or Pentecostal, evangelical Protestant, mainline Protestant, and Catholic according to a common classification scheme employed in the literature (Blanchard et al., 2008; Bartkowski, Xu, & Garcia, 2011; Clark & Stroope 2018). See Appendix for the specific denominational coding of subgroups. Fundamentalists and Pentecostals are aggregated to account for their doctrinal similarities concerning secular institutions as well as the comparatively small numbers and the clustered distribution of Pentecostals across U.S. counties. This operational grouping is supported by previous research that corroborates the similarities between fundamentalist and Pentecostal congregations in this process, due presumably to their similarly otherworldly theologies (Lee, 2010).

Economic structure is measured in 2010 using U.S. Census data on income inequality within a county, here operationalized as the Gini coefficient. In the analyses, the Gini coefficient is partitioned into a series of binary variables in order to address established nonlinear aspects of the relationship between inequality and mortality (James & Cossman, 2006; McLaughlin & Stokes, 2002; McLaughlin et al., 2001). A measure of absolute household income is also

included in the analyses in order to account for income inequality amongst counties.

Demographic controls include percent black, metropolitan status¹, percent married, percent older than 65, and dummy variables for the major Census regions (the Southern region is held as the contrast). Descriptive statistics for all study variables are shown in Table 2.1.

2.6.4 Analytic Strategy

This study applies a two-stage modeling strategy. First, fixed effects regression analyses² predicting local health and nonhealth spending are presented. These models are weighted according to the log of the total county population. Three models are presented in Table 2.2, predicting health and hospital spending, nonhealth spending, and total spending. By distinguishing between various types of public spending, these models are able to observe distinct relationships that American religious traditions have with different aspects of public investment.

Next, fixed effects regression analyses of age-, sex-, and race-adjusted mortality rates are presented. In order to examine the direct and indirect effects of religious environment on mortality, two nested models are estimated. In Model 1 (reduced model), mortality rates are regressed on measures of religious environment and control variables. Model 2 (full model) includes a measure of institutional investment. The change in value of the coefficient of an

¹ Measures of the log of population size are a commonly used control in macrolevel research but are excluded from the analyses due to exceedingly high variance inflation factor (VIF) statistics (>6) detected across all models. Measures of metropolitan status and a weighting scheme sensitive to population size are used in order to account for the issue of population distribution. Results from fixed effects models replacing metropolitan status with the log of population size did not differ appreciably from those presented in Tables 2.2 and 2.3.

² Analyses of spatial autocorrelation in institutional investment and mortality produced Moran's I statistics of 0.576 and 0.459, respectively. This indicates moderate spatial clustering of the dependent variables. Accordingly, hierarchical analyses of these variables revealed that roughly 48% of the variance in mortality rates and 41% of the variance in institutional investment are attributable to the state level. This may be due to specific state policies regarding investment and population health. These findings suggest that state fixed effects models are an appropriate method of accounting for these spatial effects.

independent variable [b(d)] represents the indirect effect of that variable through institutional investment.³ To test the significance of indirect effects, the method described by Clogg et al. (1995) is employed. However, to allow for unconditional variance when estimating the standard error of the indirect effect [s(d)], this study applies the formula suggested by Allison (1995). This yields a more conservative estimate of s(d) and results in a more stringent test of significance.

In order to clarify the directional relationships proposed in this research, appropriate prudence was exercised when considering the years in which variables were measured. Demographic control variables and religious adherents are measured in 2010. Institutional investment and the availability of healthcare providers are then measured in 2012. Finally, mortality rates are aggregated from 2012-2014, representing the subsequent years for which mortality data were available at the time of analysis. By observing these county-level attributes in this sequence, the susceptibility of the analyses to reverse causality is reduced.

2.7 Findings

The results of the fixed effects regression analyses of local health and nonhealth spending are presented in Table 2.2. American religious traditions are hypothesized to express diverse, significant associations with investments in institutions linked to lower mortality rates (Hypothesis 1). Models 1, 2, and 3 provide support for this hypothesis, with several notable exceptions discussed below. The first two models decompose total local investment into two distinct and exclusive indices – health and hospital spending (Model 1) and all other local spending linked to mortality (Model 2). Model 3 predicts total institutional investment. These

³ Unstandardized indirect effects coefficients are provided in Table 2.3, in order to aid interpretability and maintain relatability with previous research. These coefficients are standardized, however, in the process of testing significance.

models demonstrate that certain religious traditions have distinct relationships with various forms of local institutional investment.

The hypothesized denominational differences in support for institutional investment also find support in these models. Greater proportional dominance of Catholicism is expected to be associated with increased institutional investment (Hypothesis 2). The models in Table 2.2 provide robust support for this hypothesis. Across all models, Catholics are significantly associated with increased investment. In fact, greater proportional dominance of Catholics is robustly associated with the most significant increase in institutional investment among religious traditions. In contrast, mainline Protestantism is found to provide lesser support to public institutions linked to mortality than Catholicism (Hypothesis 3), and this is supported across all models.⁴ This finding is noteworthy, given the numerous social and economic measures in which mainline Protestants and Catholics have achieved parity.

The models in Table 2.2 demonstrate meaningful differences amongst conservative Protestant denominations, supporting Hypotheses 4 and 5. Evangelicals are expected to have a modest or mixed association with institutional investment (Hypothesis 4). Across all models, evangelical Protestants are found to have a modestly positive, though insignificant relationship with investment – in contrast to their more insular Protestant cousins. Fundamentalist and Pentecostal denominations are expected to reduce support for institutional investment (Hypothesis 5), and this hypothesis is supported by the analyses – with the notable exception of

⁴ In order to better understand the relationship between mainline Protestants and institutional investment, additional fixed effects models are estimated for each component of total institutional investment. Mainline Protestants are positively associated with investments in libraries and negatively associated with fire protection, protective inspections, housing and community development, and parks and recreation. Mainline Protestants are found statistically no more or less likely to invest in elementary education, health programs, or public hospitals than the general population.

healthcare and hospital spending (Model 1). The increased significance in Models 2 and 3 of the association between fundamentalist and Pentecostal denominations and local investment provides further support for the inclusion of non-healthcare measures of public investment when considering the mechanisms of religious ecology. In this instance, models observing only health and hospital investment would ignore much of the total health-shaping investment influenced by fundamentalists, Pentecostals, and mainline Protestants.

Table 2.3 presents findings from fixed effects regression analyses of age-, race-, and sex-adjusted mortality rates. Model 1 applies a modeling strategy similar to that of Blanchard and colleagues (2008) and finds evidence that supports previously hypothesized relationships between religious traditions and mortality rates. Fundamentalist and Pentecostal denominations are found to be associated with increases in mortality, whereas Catholics, mainline Protestants, and evangelical Protestants are associated with decreased mortality rates. The total investment index is introduced in Model 2 and each standardized unit increase in this index is associated with 9.653 fewer deaths per 100,000 residents per year. Accounting for institutional investment produces noticeable movement in the coefficients of mainline Protestant, fundamentalist and Pentecostal, and Catholic denominations – but not for evangelical Protestants. The coefficient for Catholics, for example, increases noticeably and loses significance when institutional investment is included in the model. This suggests that a pathway through which Catholics lower mortality rates is through investment in local institutions linked to mortality.

While a useful rough measure of institutional investment's role as a pathway through which the religious environment may influence mortality, changes in unstandardized parameter estimates are not by themselves definitive evidence of this effect. To address this issue, this study tests the significance of the indirect effects of religious environments on mortality through

institutional investment. Significant indirect effects are present for fundamentalist and Pentecostal, mainline Protestant, and Catholic denominations. Approximately 37% ($0.156/0.419$) of the total effect observed in Model 1 of Catholic denominations on mortality rates is mediated by institutional investment. Thus, counties with greater proportionate dominance of the Catholic tradition have higher institutional investment and correspondingly lower mortality rates. Contrastingly, by accounting for institutional investment, the negative association between mainline Protestants and mortality increased in intensity by approximately 20%. Taken together with the negative association between mainline Protestants and institutional investment, it can be inferred that mainline Protestant denominations increase mortality by decreasing institutional investment, but this single mechanism does not explain the entirety of their relationship with mortality.

Institutional investment appears to play a less prominent role in explaining the influence of otherworldly religious contexts. Roughly 5% of the total effects of fundamentalist and Pentecostal denominations, and 2% of evangelical denominations are explained through institutional investment. Though there is denominational unevenness in these results, the findings support the hypothesis that accounting for institutional investment will account for a significant portion of the total effects of religious traditions (Hypothesis 6).

Table 2.1. Descriptive Statistics

Variables	Mean	S.D.
Mortality		
Age, Race, Sex-Adjusted Mortality	735.185	149.451
Institutional Investment		
Health & Hospital Investment	1.070	0.228
Non-Healthcare Investment	0.897	0.502
Total Investment Index	0.812	0.595
Religious Environment		
Fundamentalist & Pentecostal	15.600	15.885
Evangelical	4.268	4.759
Mainline Protestant	10.767	8.697
Catholic	11.668	12.265
Economic Environment		
Average Household Income	46.047	11.568
Gini Quartiles		
Quartile 1	0.244	0.429
Quartile 2	0.257	0.437
Quartile 3	0.260	0.439
Quartile 4	0.240	0.427
Demographic Controls		
Percent Black	8.665	13.996
Percent Married	54.060	6.719
Percent 65+	16.989	4.175
Region		
SO	0.456	0.498
MW	0.334	0.472
WE	0.140	0.346
NE (Contrast)	0.070	0.256
Metropolitan Status		
Metropolitan Area	0.418	0.493
Not Metropolitan Area (Contrast)	0.582	0.493

Notes: n= 2,641 U.S. counties and county-equivalents. Religious environment is measured as the percentage of each religious tradition's adherents in a county's total population. Average household income is measured in thousands.

Table 2.2. Fixed-Effects Models Predicting Local Health and Nonhealth Spending in 2012

	<i>Health and Hospital Index Model 1</i>		<i>Nonhealth Investment Index Model 2</i>		<i>Total Investment Index Model 3</i>	
	b	s.e.	b	s.e.	b	s.e.
Religious Environment						
Fundamentalist & Pentecostal	-0.0020	0.0016	-0.0247***	0.0021	-0.0265***	0.0023
Evangelical	0.0042	0.0051	0.0050	0.0070	0.0063	0.0075
Mainline Protestant	-0.0024	0.0027	-0.0150***	0.0037	-0.0187***	0.0040
Catholic	0.0182***	0.0013	0.0131***	0.0018	0.0165***	0.0019
Relative and Absolute Income						
Average Household Income	0.0086***	0.0012	0.0294***	0.0016	0.0308***	0.0017
Income Inequality (Gini Coefficient)						
Quartile 1	-0.4256***	0.0456	-0.3782***	0.0624	-0.5507***	0.0672
Quartile 2	-0.3975***	0.0381	-0.3445***	0.0522	-0.4707***	0.0562
Quartile 3	-0.2467***	0.0304	-0.2114***	0.0416	-0.2489***	0.0448
Quartile 4 (Contrast)	-	-	-	-	-	-
Controls						
Percent Black	-0.0005	0.0015	0.0095***	0.0020	0.0101***	0.0021
Percent Married	-0.0350***	0.0038	-0.0564***	0.0052	-0.0623***	0.0056
Percent 65+	0.0098**	0.0037	0.0348***	0.0050	0.0230***	0.0054
Region						
South	0.5158***	0.0499	1.3367***	0.0682	1.4342***	0.0735
Midwest	0.3512***	0.0454	0.4778***	0.0546	0.5653***	0.0668
West	0.9414***	0.0476	1.4337***	0.0569	1.5591***	0.0701
Northeast (Contrast)	-	-	-	-	-	-
Metropolitan Status						
Metropolitan Area	-0.0252	0.0379	0.2003***	0.0518	0.3025***	0.0558
Not Metropolitan Area (Contrast)	-	-	-	-	-	-
Intercept	2.4581***	0.1783	1.6586***	0.2438	2.0408***	0.2625
R ²	0.4860		0.5518		0.5898	

*p<.05 **p<.01 ***p<.001

Notes: n= 2,641 U.S. counties and county-equivalents. Religious environment is measured as the percentage of each religious tradition's adherents in a county's total population. Health expenditure indexes are log-transformed in order to reduce skew. Models include fixed effects for states. Models are also weighted by total population.

Table 2.3. Fixed-Effects Models Predicting 2012-2014 Age- Race- and Sex-Standardized Mortality Rate

	Model 1 (Reduced)		Model 2 (Full)		Indirect Effect through Institutional Investment	
	b	s.e.	b	s.e.	b(d)	s(d)
Religious Environment						
Fundamentalist & Pentecostal	5.522***	0.202	5.236***	0.207	0.286***	0.063
Evangelical	-2.215***	0.609	-2.165***	0.605	-0.05	0.118
Mainline Protestant	-0.969**	0.321	-1.160***	0.321	0.191**	0.07
Catholic	-0.419**	0.16	-0.263	0.161	-0.156***	0.041
Institutional Investment						
Total Investment Index (ln)	-	-	-9.653***	1.655	-	-
Relative and Absolute Income						
Average Household Income	-2.769***	0.143	-2.483***	0.15	-0.286***	0.056
Income Inequality (Gini Coefficient)						
Quartile 1	42.018***	5.814	37.252***	5.845	4.766***	1.4
Quartile 2	46.348***	4.772	41.998***	4.809	4.350***	1.197
Quartile 3	41.343***	3.76	38.662***	3.771	2.681***	0.86
Quartile 4 (Contrast)	-	-	-	-	-	-
Controls						
Percent Black	1.399***	0.195	1.486***	0.195	-0.087*	0.04
Percent Married	-2.102***	0.487	-2.779***	0.498	0.677***	0.149
Percent 65+	-2.497***	0.434	-2.279***	0.433	-0.218*	0.092
Region						
South	-82.796***	6.007	-68.166***	6.475	-14.630***	2.762
Midwest	-17.017**	5.447	-11.708*	5.489	5.309***	1.39
West	-68.074***	5.642	-53.375***	6.147	-14.699***	2.744
Northeast (Contrast)	-	-	-	-	-	-
Metropolitan Status						
Metropolitan Area	36.445***	4.744	39.303***	4.74	-2.858**	1.038
Not Metropolitan Area (Contrast)	-	-	-	-	-	-
Intercept	955.457***	22.454	980.474***	22.722	-	-
Mean Squared Error	23.912		23.613		-	
R ²	0.5556		0.5613		-	

*p<.05 **p<.01 ***p<.001

Notes: n=2,641 U.S. counties. Religious environment is measured as the percentage of each religious tradition's adherents in a county's total population. Average household income is expressed in thousands. Models include fixed effects for states. Models are also weighted by inverse variance of the 2012-2014 mortality rate.

2.8 Discussion

Previous scholarship has hypothesized that one way in which the religious environment drives mortality inequalities among U.S. communities is through shaping health-related spending in those communities (Blanchard et al., 2008; Garcia, Bartkowski, & Xu, 2017; Lee, 2010). For the first time, this study empirically assesses this relationship. Specifically, this research advances the literature on religious environment and population health by: (1) broadening the operational treatment of health spending to include non-healthcare institutions linked to population health, (2) evaluating the association between local religious traditions and health-related spending, and (3) uncovering complex relationships between specific religious ecologies, institutional investment, and mortality rates. Results demonstrate that American religious traditions have diverse, significant relationships with investment in public institutions linked to population health (Hypothesis 6).

Findings indicate a strong, positive association between Catholics and institutional investment, and this relationship mediates a sizable portion of the total observed effect of Catholics on mortality rates. Conversely, mainline Protestants are found to have a negative relationship with investment in most health shaping public institutions, and by accounting for this relationship the negative association between mainline Protestants and mortality is increased by roughly 20%. Evangelicals have a modestly positive, though insignificant relationship with investment. Accordingly, this relationship is not found to significantly mediate the total effect of evangelical denominations on mortality. In contrast to their evangelical cousins, fundamentalist Protestants and Pentecostals are found to have a significant, negative relationship with total institutional investment. This relationship modestly, but significantly, mediates their total effect on mortality rates. The distinction between these conservative Protestant subgroups is possibly

the product of more antagonistic relationships with secular institutions, such as public schools and hospitals.

In substantive terms, these findings support the theoretical underpinnings of research applying the religious ecology thesis to population health. Empirically identifying a meaningful mechanism through which contextual religion shapes population health challenges the assertion that the observed effects of religious ecology are artifacts of the ecological fallacy. This possibility, though diminished by the results of this study, remains an inexorable shortcoming of current methodological techniques available in ecological research. Future research examining other mechanisms of religious ecology may bring greater clarity to this point of contention. Ultimately, however, multilevel analyses may be necessary to fully disentangle structural forces from artifacts of aggregation.

A notable limitation of this research is that it does not directly address religious homogeneity when considering the influence of contextual religion. This remains a significant blind spot in research on the proportional dominance of religious traditions. It may be, for instance, that there are important threshold effects in this process – that certain religious traditions express their influence on institutional investment or mortality rates differently once passing a specific threshold of proportional salience. Future research investigating religious homogeneity and the religious ecology thesis will be instrumental in developing our understanding of contextual effects, religion, and population health.

Two notable findings in this study suggest new directions for research in this area of study. First, counter to the suggestions of previous research and the historical convergence of mainline Protestants and Catholics across a variety of axes of inequality, the two traditions appear to have opposing relationships with institutional investment. Catholics are found to

significantly increase institutional investment across the board, in line with previous theorizing in the literature (Blanchard et al., 2008; Garcia, Bartkowski, & Xu, 2017; Lee, 2010). While mainline Protestants are associated with lower mortality rates, as found in previous research, they are found to reduce investments in many institutions linked to mortality rates. The structural theological underpinnings of Catholicism, compared to the individualistic theology common in Protestantism, suggests that Catholics should be expected to have a larger positive influence on institutional investment than mainline Protestants. However, previous research has hypothesized that mainline Protestants should still increase these investments.

The finding that mainline Protestants decrease institutional investment may partially be the result of limitations of Census of Governments data, which track only investments in public institutions. It is possible that mainline Protestants invest in communities in ways which are not measured by these data, such as private schools and religious hospital systems. It is also possible that low retention rates among mainline Protestant denominations play a role in this process. Shrinking or fragmenting social networks within mainline Protestant communities may decrease community attachment and investment. Future research should further examine the role of mainline Protestants in the investment process in order to further clarify these divergences.

Second, the analyses in this study suggest that institutional investment does not function universally to mediate the effects of religious denominations. For example, evangelicals express a significant total effect on mortality rates, but have no significant relationship with institutional investment. Accordingly, institutional investment explains virtually none of the total effect of evangelicals on mortality. Catholics, however, have a strong association with investment, and this explains a sizable portion of the total observed effect of Catholics on mortality. Additional theorizing is needed to explain the unevenness in mediation across religious traditions.

Researchers should also consider potential unevenness when addressing other proposed mechanisms of religious environments, such as social networks.

This research has sought to illuminate complex intersections between cultural forces, material conditions, and population health. The findings herein suggest that by further examining the mechanisms of religious ecology, researchers can develop a more rigorous understanding of an important influence on public health inequalities in the United States.

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Chapter 3. Low Birth Weight and the Cultural Environment: Exploring America's Complex Landscape of Prenatal Health

3.1 Introduction

Low Birth Weight (LBW), defined as a live birth with a newborn weighing less than 2500g, is a well-established predictor of current and future infant health and mortality (Kramer, 1987; Kumar, 1984). This condition results in substantial human costs and poor health outcomes, including impaired growth and mental development, increased risk of infant mortality, morbidity and chronic adult diseases (Goldenberg et al., 1996a; Hack et al., 1991; Thornton, 2001; Williams et al., 1982). LBW imposes substantial costs to the health sector and society as a whole, with costs associated with LBW representing approximately 10% of all health care costs for U.S. children (Lewit et al. 1995). Accordingly, LBW is a major public health issue facing this country.

While LBW is an important issue for society as a whole, there are significant disparities in the rates of LBW across social and geographic contexts. A growing body of epidemiological research has linked these disparities to racial and ethnic background, location and the environment, and socioeconomic status (Valero de Bernabé et al., 2004). Risk of LBW has been found to vary widely by population and location. Observed rates of LBW for non-Hispanic blacks are roughly twice that of non-Hispanic whites, for instance (Cnattingius et al., 1992; Roth et al., 1998; Goldenberg et al., 1996b, 1997; Ziadeh, 2001). Given the prevalence and potentially devastating social consequences of LBW, it is important to identify contextual factors which may contribute to or ameliorate these disparities.

This study aims to advance this area of research by examining the role of the religious environment in shaping infant birth weight. To this end, this manuscript makes three unique

contributions. First, it uncovers sizable denominational associations with rates of LBW using data from the National Center for Health Statistics' National Vital Statistics System and the 2010 Religious Congregations and Membership Study. Second, it draws upon and extends prior theory and research to provide a theoretical framework for understanding how religious contexts may influence aspects of the prenatal health environment linked to LBW. Finally, this study empirically tests this framework by conducting indirect effect analyses of the mediating aspects of the prenatal health environment proposed.

3.2 Structural Explanations of Low Birth Weight and Religious Contexts

There is a growing body of research concerned with the role of structural forces on infant birth weights. Previous epidemiological studies have highlighted many social and environmental risk factors for LBW, including maternal education level, age, ethnicity, marital status, socioeconomic status, tobacco and alcohol consumption, and exposure to toxic substances (Bompioni et al., 1980; Diaz et al., 2001; Holt et al., 1997; Roth et al., 1998; Sprauve et al., 1997). At the contextual level, scholars have begun to outline the influence of geospatial and community factors on LBW outcomes (Morenoff, 2003; Pickett and Pearl, 2001). Proposed mechanisms of community influence include residential stability, rates of violent crime, ethnic composition, voluntarism, rurality, and social capital (Gorman, 1999; Morenoff, 2003; Roberts, 1997).

The epidemiological body of literature on structural explanations for low birth weight have contributed to a more robust understanding of infant health inequalities but have historically ignored the role of the cultural environment. Why should the cultural environment be expected to play a role in this process? The “religious ecology” body of literature suggests several key ways in which local religion – a key component of the cultural environment – may

impact birth weight outcomes. The religious ecology perspective is concerned with the prevalence of specific religious traditions and with the cultural schemas which accompany those traditions. Scholars applying this perspective have found evidence linking the religious environment to numerous aspects of community well-being, including crime (Beyerlein and Hipp, 2005; Stark, 1996; Stark et al., 1982), mortality (Dwyer et al., 1990; Blanchard et al., 2008), residential segregation and sexual orientation discrimination (Blanchard, 2007; Adamczyk et al., 2016), and intergenerational mobility (Clark and Stroope, 2018).

Studies of health outcomes and the religious environment date back to the origins of sociology (Durkheim, [1897] 2002). Recently, scholars investigating the relationship between religion and infant health have linked religious attendance and denominational contexts to infant morbidity and mortality (Burdette et al., 2012; Bartkowski et al., 2011). This line of research provides a useful theoretical model with which to predict the influence of religious environments on LBW outcomes but has not yet addressed it directly. Further, none of the proposed mechanisms of religious environments on infant health have been directly examined. Below, I describe two commonly proposed mechanisms in the religious ecology literature which I will empirically examine in this paper.

3.3 Local Healthcare Environment

Researchers utilizing the religious ecology perspective have previously suggested that an important mechanism through which the religious environment influences community health outcomes is through the healthcare environment. Blanchard and colleagues (2008) argue that distinct theological components of American faith traditions make certain traditions more and less likely to invest in public health resources. “This-worldly” denominations such as mainline Protestants and Catholics are proposed to be more likely to support investments in public health

infrastructure, due to a greater focus on addressing social inequality and structural causes of illness and mortality. By contrast, conservative Protestants are characterized by an “otherworldly” orientation which promotes community actions centered around personal salvation instead of social problems. Importantly, evangelical Protestants are distinguished from other conservative Protestant groups - namely fundamentalists and Pentecostals - by a greater proclivity to engage with the secular world.

More recently, scholars applying the religious ecology perspective have tied investment in local health resources to infant health outcomes (Bartkowski et al., 2011; Garcia et al., 2017). These scholars argue that specific theological orientations shape local attitudes towards secular institutions which influence population and infant health. Garcia and colleagues (2017) found that greater proportions of Catholic and mainline Protestant adherents were associated with lower infant mortality rates, which they attribute to a greater emphasis on community-level care and civic-mindedness. They correspondingly cite restricted prenatal health resources, resulting from the anti-institutional characteristics of conservative Protestant traditions, in explaining higher rates of infant mortality among communities with greater numbers of conservative Protestants.

Quality and access to care are important predictors of infant birthweight. The number of antenatal visits, timing of first visit, and quality of care have all been linked to higher birthweights (Gortmaker, 1979; Peoples and Siegel, 1983; Sokol et al., 1980; Taffel, 1978; Terris and Glasser, 1979). Proposed epidemiological explanations for these effects center around the role of improved health knowledge among mothers and resulting healthier behaviors as well as the influence of preventative medicine across the term of pregnancy. If indeed American religious traditions influence local support for public hospitals and other infrastructure linked to

public health, then this effect may represent an important pathway between the religious environment and LBW.

The unique doctrinal orientations of several key denominations suggest a number of notable relationships between these denominations and the local healthcare environment. The this-worldly orientations of Catholics and mainline Protestants suggest that these denominations increase local support for public health investment, and through providing direct healthcare resources (e.g. religiously-affiliated hospital systems) increase access to care. Otherworldly orientations among evangelical and fundamental Protestants and Pentecostals are by contrast expected to reduce support for local investment and decrease local access to care.

3.4 Health and Fertility Behaviors

The normative and attitudinal environment surrounding fertility and gestation represent another pathway through which religious theologies may influence LBW. Religious traditions may influence the normative environment by providing scripts and by shaping prominent vocabularies of action. Believers often adopt many of the scripts and positions of their faith traditions, and some religious ecologists have argued that interactions with believers and institutions dominated by believers can influence the attitudes and behaviors of nonbelievers (Borgonovi, 2008; Ruiter and De Graaf, 2006; Traummuller, 2009). This “spillover effect” is argued to result in religious traditions shaping the desirability of certain actions among the residents of a community by acting as a source of feedback for behaviors (Ruiter and De Graaf, 2006; Stroepe et al., 2015).

There are a number of ways which religious traditions may shape local norms surrounding health behaviors that can compromise or complicate pregnancies. Consumption of

alcohol, smoking, and exposure to secondhand smoke have been linked to LBW and infant mortality (Kramer, 1987). Smoking during pregnancy can affect intrauterine growth and gestational duration through fetal exposure to carbon monoxide and nicotine. Nicotine is believed to cause uterine vasoconstriction – leading to less total oxygen delivered to the fetus (Quigley et al., 1979). Similarly, fetal exposure to alcohol can adversely affect intrauterine growth via fetal hypoxia or decreased incorporation of amino acids into protein (Abel, 1982).

Religious traditions appear to play a significant role in shaping the smoking and drinking behaviors of adherents. Previous survey-based research has found that religiosity has a protective effect against alcohol and tobacco use (Cochran et al., 1988; Ellison et al., 2008a, 2008b; Page et al., 2009). Specific denominations differ in theological orientations towards alcohol use. Resultingly, conservative Protestants have been found to have lower rates of alcohol use than mainline Protestants and Catholics (Ellison et al., 2008a, 2008b; Garcia et al., 2013). However, key in the process of normative spillover is the interaction between religious adherents and nonadherents. Insular conservative Protestant denominations, such as fundamentalists and Pentecostals, discourage these interactions and reduce total influence on nonadherents. Denominations which encourage engagement with external individuals and groups are more likely to shape the social desirability of smoking and drinking behaviors. Previous research using survey-level data has been able to observe the proposed effects of religious theology on individual adherents, but community-level effects remain unexplored.

Religious orientations towards worldliness suggest a number of relationships between religious traditions and tobacco use. Fundamentalists, Pentecostals, and evangelicals are more skeptical of secular medicine and may be more likely to emphasize the importance of faith rather than preventative care in health outcomes. This-worldly denominations, such as mainline

Protestants and Catholics may be more likely to weigh medical warnings from secular institutions about the dangers of tobacco use more heavily when making decisions to smoke. Higher rates of those denominations which may cause greater drinking and smoking in an area can increase the risk of exposure of gestating women to secondhand smoke and increase the risk that some of these women smoke and drink themselves. Higher rates of those denominations which suppress these behaviors may provide protections to pregnant women and fetuses by reducing exposure and the risk of maternal use of alcohol or tobacco.

Finally, maternal age plays a highly important role in shaping infant birth weights. A large body of epidemiological research has found that risks of low birth weights are highest during the extremes of the maternal age distribution. Teenage mothers and mothers above the age of 35 bear a significantly higher risk of pregnancy complications and LBW (Cnattingius et al., 1992; Goldenberg et al., 1997; Roth et al., 1998). Religion plays an important role in shaping attitudes towards sex and contraceptives and has been linked with adolescent sexual behavior and teenage pregnancy (Ovadia and Moore, 2010; Regnerus, 2007; Thornton and Camburn, 1989). Conservative Protestants are associated with a more restrictive stance against teenage sexuality and contraceptive distribution (Regnerus, 2007). Accordingly, communities with a greater proportional dominance of conservative Protestants should be found to have less support for public sexual education programs and contraceptives distribution. Teenagers in these communities may have less access to, and information about, contraceptives – thus increasing rates of pregnancy. Catholics and mainline Protestants, by contrast, are more moderate in their attitudes towards these programs. This moderation may act to lower teen pregnancy by increasing access to contraceptives.

By shaping attitudes towards sex and contraceptive use, religious traditions are expected to subsequently and meaningfully influence teen birth rates. The powerful link between teen births and LBW indicates that this should be a major pathway through which religion shapes LBW outcomes.

3.5 Data

Data for the analyses were from the 2012 Census of Governments, the 2012 County Health Rankings, the 2010 Religious Congregations and Membership Study, and the National Center for Health Statistics Vital Statistics File from 2012-2014. By measuring data at these time points, it is possible to increase the clarity surrounding directional relationships among the study variables. The study sample represents 2,236 counties in the contiguous United States⁵.

3.5.1 Low Birth Weight

Low birth weight is defined as the live birth of an infant weighing less than 2500g. This study uses a measure of county-level birth weight outcomes from the NCHS Vital Statistics System, operationalized as the percent of total live births defined as low birth weight. Birth data from 2012, 2013, and 2014 were aggregated when calculating this variable in order to reduce missing cases in counties where the total year-to-year fertility may fall below the minimum reportable threshold.

3.5.2 Religious Environment

The religious environment is operationalized within this study as the denominational

⁵ Missing data are due to missing data within both the U.S. Census of Governments and the National Center for Health Statistics' Vital Statistics File. Missing values within the Vital Statistics File is primarily due to suppressed values where fertility fell below the minimum reportable threshold and are excluded to avoid identification of private persons.

dominance of specific religious traditions in an area. Denominational dominance is specifically calculated as the total adherents of a particular tradition within a county, divided by the total population within that county. Adherents data are from the 2010 Religious Congregations and Membership Study and are coded according to the classification scheme developed by Blanchard et al. (2008)⁶. Adherents are therefore coded as fundamentalist, evangelical, Pentecostal, mainline Protestant, or Catholic. After calculating the proportional dominance of each tradition, each religious environment variable is then standardized. Coefficients of these variables within the analyses can therefore be interpreted as per an increase or decrease in the standard deviation of that religious tradition.

3.5.3 Prenatal Health Environment

This study investigates the mediating role of four aspects of the prenatal health environment in explaining a portion of religion's influence on infant birth weights. These aspects include (1) public spending in institutions linked to public health, (2) the percent of residents in a community without access to healthcare, (3) unhealthy behaviors linked to LBW, and (4) the teen birth rate. Data for these variables come from the 2012 U.S. Census of Governments, the Robert Wood Johnson Foundation's 2012 County Health Rankings, and the National Center for Health Statistics' Vital Statistics System from 2012-2014.

Data for institutional investment, as measured in this study, are from the 2012 U.S. Census of Governments. Census of Governments data provide highly detailed accounting of local public spending in institutions associated with public health. In the study analyses, institutional investment is represented by an index variable comprised of spending data in the

⁶ See Appendix for the denominational coding of subgroups.

following categories: health and hospital spending, K-12 education, protective inspections, sewerage, parks and recreation, and public libraries. Previous research has associated these categories of public spending with other critical aspects of local health, such as mortality rates (Bradley et al. 2016; McCullough & Leider, 2016).

Data on residents' access to healthcare are from the Robert Wood Johnson Foundation's 2012 County Health Rankings dataset. The percentage of residents who could not access healthcare is estimated using the U.S. Census American Community Survey – Small Area Health Insurance Estimates (SAHIE) measure of the percentage of the population (<65) which was uninsured, as well as the ratio of the population to primary care physicians, derived from the Health Resources and Services Administration's Area Resource File (ARF). Areas with low rates of insurance coverage often have fewer health resources and providers available, making it more difficult for even insured residents to access quality healthcare. The methodological advantage to utilizing an index of the percent uninsured and the ratio of residents to primary care physicians is the ability to incorporate a measure of structural resources with cost and access prohibitive individual-level factors.

Many of the leading causes of death in the United States are attributed to unhealthy behaviors. Within the analyses of this study, unhealthy behaviors are represented by an index of these measures of birth weight influencing factors – tobacco use, alcohol use, and obesity. The 2012 County Health Rankings data provide this index, estimated using data on those three factors from the Behavioral Risk Factor Survey (BRFSS). The associations between LBW and alcohol and tobacco use, as well as maternal obesity are well-established within epidemiological literature (Kramer, 1987). Religious traditions often explicitly offer guidance to adherents concerning the use of drugs, alcohol, and tobacco, as well as acceptable diets and levels of

activity. The associations between religious beliefs, unhealthy behaviors, and infant birth weights emphasize the inclusion of this index within the analyses.

Another variable consistently associated with LBW within epidemiological literature is maternal age. Teen births are a leading predictor of low infant birth weights, along with other forms of infant morbidity and mortality (Valero de Bernabé et al., 2004; Kramer, 1987). This study measures the teen birth rate using data from the National Center for Health Statistics Vital Statistics System. The teen birth rate is represented as the birth rate per 1,000 females ages 15-19 in each county. In order to reduce missing and suppressed cases, teen birth rate data are aggregated from 2012, 2013, and 2014.⁷

3.5.4 Demographic Controls

Demographic control variables are measured in 2010 using U.S. Census data in order to account for county characteristics that may shape the health environment and LBW. Two measures of the economic environment are included in the analyses. Income inequality is represented by the Gini coefficient, partitioned into a series of binary variables. This technique is designed to address the potential for a nonlinear relationship between income inequality and LBW, such as is the case between inequality and other measures of health (James & Cossman, 2006; McLaughlin & Stokes, 2002; McLaughlin et al., 2001). In order to account for absolute income, a measure of average household income is also included in the analyses. Additional demographic controls include percent black, percent Hispanic, percent urban, percent unemployed, percent married, percent of the population younger than 18, percent older than 65,

⁷ Aggregating these years of teen birth data significantly improves the quality and accuracy of the data, particularly in rural counties. It also, however, reduces the temporal protection against reverse causality between teen birth rates and LBW. While the causal relationship and direction between maternal age and LBW is well-established, it is important to acknowledge this limitation of the data when considering teen birth rate's role as a mediating variable.

and the log of the total population. A series of regional dummy variables are also included in the models in order to control for any unobserved regional effects.

3.6 Analytic Strategy

The analyses in this study are organized into two stages. First, in order to observe the relationship between the religious environment and aspects of the local prenatal health environment, models are estimated predicting four important aspects of the prenatal environment. Four models are presented in Table 3.2. These predict institutional investment, access to care, local health behaviors, and the teen birth rate. This modeling strategy makes it possible to observe the diverse effects of different religious denominations on different aspects of the local health environment that may be linked with low birth weights.

Next, in order to observe the direct and indirect effects of religious traditions on infant birthweights, a series of nested models are estimated. Six models predicting percent low birthweight are presented in Table 3.3. A reduced model, with only religious environment and control variables are estimated, in order to estimate the total effect of the religious environment on birth weights. This total effect is then decomposed in further models. A sequence of models follow which sequentially introduce each aspect of the prenatal health environment into the model. A final model includes all four prenatal health environment variables simultaneously, in order to observe the total indirect effect of the religious environment through the study's four prenatal health environment variables.

Indirect effects within this study are calculated as the change of the coefficient of an independent variable between the reduced model and subsequent models. This change represents the indirect effect of that variable through the aspect(s) of the prenatal health environment

included in the full model. To test for the significance of indirect effects, I apply the method applied by Clogg et al. (1995). I rely upon the formula suggested by Allison (1995) when estimating the standard error of the indirect effect in order to allow for unconditional variance and a more conservative estimation of significance.

3.7 Findings

In order to clarify the relationships between the religious environment and the prenatal health environment, a series of unstandardized regression models predicting four components of the prenatal health environment were conducted. These models are presented in Table 3.2. Model 1 predicts total local public spending on institutions linked to public health. Model 2 predicts the estimated percentage of adults without access to healthcare. Model 3 predicts an index of unhealthy behaviors. Finally, Model 4 predicts the teen birth rate. Together these models highlight the complex relationships between religious traditions and various aspects of the prenatal health environment. The models in Table 3.2 provide evidence which both supports and complicates previous theorization on the relationship between religious traditions and the health environment.

Pentecostals and fundamentalists share similar otherworldly and anti-secular orientations and these theological similarities are reflected across the models. Both traditions are associated with lower institutional investment, no significant influence on access to care, increased unhealthy behaviors, and higher teen birth rates. Evangelicals, though similarly otherworldly in orientation, are distinguished by their engagement with secular society. They are associated within these models with worse access to care but are also associated with fewer unhealthy behaviors and a lower teen birth rate.

Table 3.1. Descriptive Statistics

Variables	Mean	S.D.
Low Birth Weight		
Percent Low Birth Weight	8.258	2.046
Prenatal Health Environment		
Total Investment Index (ln)	0.856	0.632
Percent Couldn't Access Care	15.430	5.529
Unhealthy Behaviors Index	0.054	2.634
Teen Birth Rate	43.503	18.930
Religious Environment		
Pentecostal (ln)	0.165	0.783
Fundamentalist	-0.002	0.980
Evangelical	-0.079	0.855
Mainline Protestant	-0.156	0.779
Catholic	-0.064	0.926
Economic Environment		
Average Household Income	0.005	1.051
Income Inequality (Gini Coefficient)	-	-
Quartile 1 (Contrast)	-	-
Quartile 2	0.253	0.435
Quartile 3	0.272	0.445
Quartile 4	0.253	0.435
Demographic Controls		
Percent Urban	0.455	0.299
Percent Unemployed	8.250	3.381
Percent Married	53.471	6.669
Percent Black	9.431	14.779
Percent Hispanic (ln)	1.337	1.098
Percent <18	22.844	3.234
Percent 65+	16.628	4.073
Total Population (ln)	10.673	1.279
Region		
SO	0.468	0.499
MW	0.304	0.460
WE	0.152	0.360

Notes: n= 2,236 U.S. counties and county-equivalents. Religious environment is measured as the standardized percentage of each religious tradition's adherents in a county's total population. Household income is standardized for interpretability.

Table 3.2. Unstandardized OLS Regression Coefficients Predicting the 2012 Local Prenatal Health Environment

	<i>Total Inv. Index (ln)</i>		<i>% Can't Access Care</i>		<i>Unhealthy Behaviors</i>		<i>Teen Birth Rate</i>	
	Model 1		Model 2		Model 3		Model 4	
	b	s.e.	b	s.e.	b	s.e.	b	s.e.
Religious Environment								
Pentecostal (ln)	-0.0383***	0.0113	-0.0046	0.1113	0.1326**	0.0415	2.0152***	0.3017
Fundamentalist	-0.0667***	0.0127	0.1189	0.1252	0.1534**	0.0466	2.5963***	0.3391
Evangelical	0.0179	0.0117	0.4652***	0.1146	-0.0864*	0.0427	-1.1630***	0.3104
Mainline Protestant	0.0403**	0.0139	-1.2672***	0.1364	-0.1965***	0.0508	-1.7898***	0.3693
Catholic	0.0347**	0.0112	-0.3734***	0.1098	-0.1448***	0.0410	-0.4253	0.2974
Relative and Absolute Income								
Income Inequality (Gini Coefficient)	-	-	-	-	-	-	-	-
Quartile 1 (Contrast)	-	-	-	-	-	-	-	-
Quartile 2	-0.0248	0.0245	0.0833	0.2402	-0.2561**	0.0896	0.2235	0.6506
Quartile 3	0.0045	0.0262	0.1696	0.2568	-0.4657***	0.0958	1.7562*	0.6957
Quartile 4	0.0574	0.0296	0.5721*	0.2902	-0.9455***	0.1082	0.8165	0.7861
Average Household Income	0.1637***	0.0133	-1.7673***	0.1302	-0.7460***	0.0486	-5.9560***	0.3528
Controls								
Percent Black	0.0023**	0.0008	-0.0143	0.0083	0.0013	0.0031	0.0622**	0.0224
Percent Hispanic (ln)	0.0216*	0.0100	0.5943***	0.0980	-0.5704***	0.0366	2.3049***	0.2656
Percent Urban	-0.1781***	0.0502	-1.8204***	0.4921	-0.1606	0.1835	5.8325***	1.3331
Percent Unemployed	0.0091**	0.0034	0.2954***	0.0335	0.1535***	0.0125	0.5893***	0.0908
Percent Married	-0.0106***	0.0024	0.0349	0.0234	-0.05341***	0.0087	-0.5985***	0.0633
Percent <18	0.0049	0.0040	0.0848*	0.0397	0.2178***	0.0148	2.9092***	0.1074
Percent 65+	0.0312***	0.0036	-0.0053	0.0356	0.0976***	0.0133	0.9231***	0.0966
Total Population (ln)	0.3684	0.0120	-0.0174	0.1172	-0.1673***	0.0437	-3.2044***	0.3175
Region	-	-	-	-	-	-	-	-
Northeast (Contrast)	-	-	-	-	-	-	-	-
South	0.6283***	0.0401	3.6166***	0.3928	0.8342***	0.1465	6.8257***	1.0641
Midwest	0.3267***	0.0370	0.9473**	0.3632	0.1567	0.1354	1.3109	0.9838
West	0.5753***	0.0429	0.8993*	0.4202	-1.9182***	0.1567	-2.3148*	1.1382
Intercept	-3.6599***	0.1814	7.0563***	1.7787	-2.1270**	0.6633	13.2074**	4.8184
R ²	0.6489		0.5586		0.7281		0.7217	

Notes: *p<.05 **p<.01 ***p<.001

N=2,236 U.S. counties and county-equivalents.

Table 3.3. Unstandardized OLS Regression Coefficients Predicting Percent Low Birth Weight in U.S. Counties from 2012-2014

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6 (Full - Prenatal Health Environment)	
	(Reduced)		(Full - Total Inv. Index)		(Full - % Can't Access Care)		(Full - Unhealthy Behaviors)		(Full - Teen Birth Rate)			
	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.
Religious Environment												
Pentecostal(ln)	-0.0074	0.0367	-0.0125	0.0368	-0.0071	0.0362	-0.0303	0.0361	-0.0888*	0.0350	-0.0891*	0.0347
Fundamentalist	0.2082***	0.0413	0.1994***	0.0415	0.2012***	0.0406	0.1817***	0.0406	0.1034**	0.0395	0.0984*	0.0392
Evangelical	-0.0750*	0.0378	-0.0726	0.0378	-0.0473	0.0373	-0.0601	0.0371	-0.0281	0.0358	-0.0093	0.0355
Mainline Protestant	-0.1363**	0.0445	-0.1309*	0.0450	-0.0609	0.0451	-0.1023*	0.0443	-0.0640	0.0427	-0.0084	0.0429
Catholic	0.1337***	0.0362	0.1383***	0.0363	0.1559***	0.0357	0.1587***	0.0356	0.1508***	0.0342	0.1756***	0.0340
Prenatal Health Environment												
Total Inv. Index (ln)	-	-	-0.1325	0.0687	-	-	-	-	-	-	-0.0612	0.0644
% Can't Access Care	-	-	-	-	0.0595***	0.0069	-	-	-	-	0.0387***	0.0067
Unhealthy Behaviors	-	-	-	-	-	-	0.1729***	0.0184	-	-	0.0730***	0.0187
Teen Birth Rate	-	-	-	-	-	-	-	-	0.0404***	0.00244	0.0346***	0.0026
Intercept	8.9920***	0.5868	8.5071***	0.63805	8.5723***	0.57935	9.3598***	0.5769	8.4589***	0.5547	8.1927***	0.6015
Mean Squared Error	1.4693		1.4675		1.4222		1.4138		1.3085		1.2772	
R ²	0.6491		0.6496		0.6604		0.6624		0.6876		0.6950	

*p<.05 **p<.01 ***p<.001

Notes: n= 2,236 U.S. counties and county-equivalents. Religious environment is measured as the standardized percentage of each religious tradition's adherents in a county's total population. Identical control variables to models in Table 3.2 were included when calculating these models but are excluded from the table.

Mainline Protestants and Catholics are both distinguished by a theological orientation towards addressing social problems and a greater tendency towards engagement with the secular. They are associated with a greater degree of investment in institutions linked to health, greater access to care, and fewer unhealthy behaviors. Importantly, however, Model 4 outlines a meaningful departure between these two traditions in their influence on teen births. Mainline Protestants are found to significantly reduce the teen birth rate, where Catholics have no significant relationship with teen births.

In order to assess whether the religious environment affects low birth weight outcomes, and to what degree different aspects of the prenatal health environment account explain these effects, a series of nested models were calculated. These six models are provided in Table 3.3.⁸ Model 1 observes the relationship between the religious environment and low birth weight outcomes, including demographic and financial controls. This model uncovers meaningful effects between religious traditions and LBW and establishes a baseline for the decomposition of these effects in the following models. Catholics and fundamentalists are found to increase incidents of low birth weight, while evangelicals and mainline Protestants decrease LBW in an area. Pentecostals are not significantly associated with LBW in this model.

Models 2, 3, 4, and 5 introduce variables for important aspects of the prenatal health environment. These models, when compared against the baseline (Model 1), indicate the relative influence of each aspect in the total effect of religious environments on LBW. Model 6 includes variables for each health environment variable simultaneously, measuring the influence of the total prenatal health environment. While a useful visualization of the prenatal health

⁸ Control variables included in models in Table 3.2 are also included in calculating models from Table 3.3 but are omitted in the truncated table for legibility. Full models are available upon request.

environment's role as a pathway between religious environments and LBW, changes in unstandardized coefficients are not conclusive evidence of an indirect effect.

To address this issue, a series of indirect effect analysis significance tests were conducted, according to the technique recommended by Clogg et al. (1995) and the correction for estimating the standard error of the indirect effects demonstrated by Allison (1995).⁹ The indirect effect of the religious environment on LBW through aspects of the prenatal health environment is represented by the changes in unstandardized coefficients of the religious environment variables when variables representing the prenatal health environment are introduced. Importantly, coefficients are standardized when calculating the statistical significance of the indirect effect. This process allows for greater interpretability of the influence of these variables on LBW while maintaining a rigorous test of significance across different models. In the interest of interpretability, Table 3.4 presents changes in the coefficients of religious environment variables and the accompanying statistical significance as a result of the inclusion of various aspects of the prenatal health environment in the models.

Model 1 represents the reduced model, and as such has no indirect effects to measure. Model 2 includes an index of institutional investment. In previous literature, institutional investment has been commonly theorized to be an important mechanism through which religious environments affect health outcomes. While religious traditions were found in Table 3.2 to influence counties' propensity for investing in institutions linked to health, the models in Table 3.3 suggest that these institutions do not significantly impact the incidence of LBW. The results

⁹ Due to truncation of the tables, indirect effects analyses for control variables are not included in Table 3.3. Supplementary tables can be provided upon request.

of Model 2 in Table 3.4 provide further evidence that institutional investment does not function as a mechanism through which religious traditions influence LBW.

Table 3.4. Unstandardized Indirect Effects Coefficients of the Religious Environment on Low Birth Weight

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	(Reduced) b(d)	(Total Inv. Index) b(d)	(% Can't Access Care) b(d)	(Unhealthy Behaviors) b(d)	(Teen Birth Rate) b(d)	(Prenatal Health Environment) b(d)
Religious Environment						
Pentecostal(ln)	-	0.0051	-0.0003	0.0229	0.0814***	0.0817***
Fundamentalist	-	0.0088	0.0070	0.0265	0.1048***	0.1098***
Evangelical	-	-0.0024	-0.0277*	-0.0149	-0.0469*	-0.0657**
Mainline Protestant	-	-0.0054	-0.0754***	-0.0340*	-0.0723**	-0.1279***
Catholic	-	-0.0046	-0.0222*	-0.0222	-0.0171	-0.0419

*p<.05 **p<.01 ***p<.001

Notes: n= 2,236 U.S. counties and county-equivalents. Religious environment is measured as the standardized percentage of each religious tradition's adherents in a county's total population.

Model 3 measures the indirect effect of the religious environment on LBW through the accessibility of care in counties. The percentage of residents without access to care was not found to significantly explain any of the total effects of Pentecostals or fundamentalists. It was, however, found to explain a significant degree of the total effects of evangelicals, mainline Protestants, and Catholics. Although access to care and institutional investment similarly measure structural aspects of the healthcare environment, the differences in observed effects between models 2 and 3 suggest a different mediating process than what has been previously theorized. It may be that civically-engaged denominations encourage local spending with greater emphasis on assistance to groups with less access to healthcare in addition to influencing total spending. If this is the case, then it may be this emphasis that improves LBW outcomes. It may also be that those traditions which readily engage with secular institutions encourage the full use

of these resources, where traditions with a more antagonistic relationship with secular institutions discourage the full use of these resources.

Model 4 explores the role of health behaviors as a mediating factor. While religious traditions were found to have large and significant impacts on unhealthy behaviors in Table 3.2, these unhealthy behaviors only marginally explain the influence of religious traditions on LBW, with mainline Protestants representing the only group with a significant indirect effect. Model 5 measures the indirect effect of religious traditions on LBW through the teen birth rate. A substantial degree of the total effects of religious traditions on LBW is explained by teen birth rates. Previous research has shown close ties between maternal age and birthweight, and this is supported by the findings of Model 5.

Model 6 includes all prenatal health environment variables in order to test the total mediating effect of the prenatal health environment as operationalized in this study. With the exception of Catholics, each religious tradition has a significant and substantial indirect effect on LBW through the prenatal health environment. Collectively, the models in Table 3.4 demonstrate nuanced, meaningful, and significant mediation of the effect of religious traditions on LBW through the prenatal health environment. Among the aspects of the prenatal health environment tested, the teen birth rate appears to be most substantial in determining LBW outcomes.

3.8 Discussion

Low birth weight is an important and well-established predictor of infant health and mortality with substantial and lasting societal costs. Correspondingly, LBW is a serious public health issue in American communities. This study uses extensive county-level data to investigate the influence of the religious environment on LBW outcomes. In so doing, it: (1) contributes

meaningfully to the body of epidemiological research concerned with understanding and reducing the incidence of LBW, (2) further refines theorization on the mechanisms through which the religious environment influences health, and (3) provides evidence suggesting fruitful new avenues for researchers and policymakers to address certain public health issues.

The analyses in this study find significant associations between American religious traditions and birth weight outcomes, as well as meaningful distinctions between these traditions. Increases in the proportional dominance of fundamentalist Protestants and Catholics are associated with increases in the percent of LBW births. By contrast, greater proportional dominance of evangelicals and mainline Protestants is associated with a lower incidence of LBW. These findings are themselves interesting, as Catholics and mainline Protestants have achieved parity on many important aspects of well-being (Lehrer, 1999). The divergence of Catholics from mainline Protestants on this outcome may be due to Catholic theological positions and attitudes towards fertility and the use of contraceptives. Catholic theology has historically rejected artificial contraception, notably prohibited by Pope Paul VI in “*Humanae Vitae*” (Pope Paul VI, 1968). Catholics and fundamentalists hold similar attitudes towards fertility behaviors and LBW, and it may be that these similarities explain a portion of why these two traditions increase LBW.

In a second stage of analyses, this study decomposes total and indirect effects of the religious environment on LBW in order to better understand the mechanisms at work in this process. I test the significance of four aspects of the prenatal health environment through which religious traditions could be hypothesized to influence infant birth weights. These aspects of the prenatal health environment include investment in public institutions linked to health, access to care, unhealthy behaviors, and the teen birth rate. Previous research has hypothesized that local

health spending could be one way through which religious environments can shape infant health (Blanchard et al., 2008; Bartkowski et al., 2011; Garcia et al., 2017). The analyses in this study do find significant associations between religious traditions and local spending, however these associations do not explain a significant degree of the relationship between religious traditions and LBW. Access to care, however, is both significantly associated with religious traditions and explains a significant portion of the total effects of religious traditions on LBW. It may therefore be that previous research was correct to underscore the role of the healthcare environment in explaining some of religion's impacts on public health, but that the critical factor may not be the presence of health resources in an area, but access to those resources.

Fewer unhealthy behaviors in areas with more mainline Protestants were found to explain a modest but significant portion of mainline Protestants' effects on birth weights. Unhealthy behaviors, however, were not found to significantly mediate the effects of other religious traditions. Health behaviors may matter modestly in explaining the effects of religious traditions. The teen birth rate, however, was found to be the largest indirect effect in the models – explaining a significant and sizable degree of the total effect of all religious traditions in the scope of the study, with the exception of Catholics. Among the mechanisms tested within this study, it is the teen birth rate and access to healthcare which are most meaningful in explaining the effects of religious traditions on inequalities in infant birthweights.

The findings in this study support the epidemiological call for a greater emphasis on improving access to care in American communities. The robust associations between religious traditions, critical components of the local health environment, and infant well-being underscore the importance of awareness among healthcare professionals and policymakers of the role of religious communities in shaping public health. As research continues to illuminate the

connections between religion and public health, policymakers should strive to make use of these lessons to improve the effectiveness of public health programs. Future research should also seek to investigate specific avenues through which public health initiatives might best apply lessons from this body of research. For example, reinforcing existing programs with culturally-sensitive materials, improving awareness of and access to healthcare resources among communities characterized by more insular religious denominations, and focusing teen pregnancy prevention efforts on areas dominated by fundamentalists and Catholics – with appropriate sensitivity towards the theological underpinnings and concerns of those traditions.

An important limitation of this research is that it does not address the issue of spending on private institutions important to public health, such as religious hospitals and schools. U.S. Census of Governments data are limited to public spending, therefore somewhat limiting the scope of institutional investment able to be measured here. Given the importance of religious hospitals in schools in the daily lives and health decisions of many Americans, it is important for future research to address the role of these private institutions in explaining the effects of religion on infant and adult health.

Another important limitation of this study is that it does not address religious homogeneity. The issue of homogeneity in this area of research remains underexamined. The possibility that religious groups express their effects differently at particular thresholds of proportional dominance remains an important consideration for research concerned with religious environments. Future research is needed to clarify the existence of these thresholds, as well as the degree of linearity between religion and different aspects of public health.

Despite these limitations, this study addresses the role of religious environments in shaping infant birth weights – a crucially important covariate of infant health and mortality, as

well as future adult health. It uncovers notable denominational associations with low birth weight, identifies and empirically tests mechanisms of this relationship, and offers general lessons about the importance of these relationships in shaping infant health. The findings of these analyses suggest numerous pathways through which future research may help inform and improve public health initiatives aimed at reducing health inequalities in American communities.

3.9 References

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Chapter 4. Intergenerational Social Mobility and Educational Investment: Disentangling the Effects of Cultural Environments on Opportunity

4.1 Introduction

Intergenerational social mobility is an important aspect of opportunity and well-being in American communities. A growing body of research has begun to extensively map and scrutinize America's unequal landscape of social mobility (Chetty et al. 2014, 2018). Understanding the causes of this unequal landscape is an important step in understanding inequality in America. Scholars have argued that community-level factors such as poverty rates, educational infrastructure, the historical prevalence of slavery, and the religious environment play an important role in shaping this unequal landscape (Chetty et al. 2014, 2018; Clark and Stroope, 2018; Berger, 2018).

The religious ecology literature is concerned with the preponderance of specific religious traditions within an area. The denominational makeup of the religious environment has been linked to a number of important aspects of community well-being, such as residential segregation (Blanchard, 2007), crime (Lee & Bartkowski, 2004), and mortality (Blanchard et al. 2008; Bartkowski et al. 2011). Applying this perspective to the study of intergenerational mobility, Clark and Stroope (2018) found significant denominational associations with rates of upward mobility. In order to explain these effects, the authors proposed that religious theology shapes mobility rates through influencing community social network structure, gender norms, and local investment in public education. While useful in providing a framework to interpret these associations, a notable shortcoming of this research is the lack of empirical tests of these proposed mechanisms.

A recent critique of the religious ecology literature emphasizes the substantial importance of empirically testing the proposed mechanisms of the religious environment. Lim and MacGregor (2012) argue that current methodological limitations of techniques used in ecological research call into question whether researchers are observing real community-level effects or simply the aggregation of individual-level traits. Previous research relying exclusively on these techniques carries a high risk of committing an ecological fallacy. In order to address this shortcoming in the literature, this study attempts to investigate the role of a commonly proposed mechanism of the religious environment in explaining the relationship between major religious traditions and intergenerational social mobility. Linking U.S. Census of Governments data to county-level data from the Equality of Opportunity Project and the Religious Congregations and Membership Study, I test the relationships between religious traditions and local spending on public education. I then employ indirect effects analyses to evaluate whether, and to what extent, spending on education explains observed effects of religious traditions on intergenerational mobility.

Results of the analyses in this study indicate a number of important denominational effects in this process. Catholics, mainline Protestants, and fundamentalists are significantly associated with educational expenditures and those associations accordingly explain a significant degree of their total observed effects on intergenerational mobility. By contrast, evangelicals and Pentecostals are not significantly associated with educational spending, nor do educational expenditures appear to explain any meaningful degree of the effects of these denominations on mobility rates. These results support and complicate theorization on a key hypothesized mechanism of the religious environment. Further, this study addresses an important critique of

ecological research in this area by finding evidence of a community-level mechanism through which the cultural environment shapes opportunity.

4.2 Religious Environments

Previous scholarship has addressed the role of religion as a trait not just of individuals or groups, but of places. The Religious Ecology perspective (Stark et al. 1980, 1982; Welch et al. 1991) is concerned with the preponderance of adherents of specific religious traditions in a community and the cultural schemas that accompany these traditions. Researchers applying this perspective have found associations between various types of religious environments and many important metrics of well-being – such as all-cause and cause-specific mortality (Blanchard et al. 2008), crime (Beyerlein and Hipp, 2005), residential segregation (Blanchard 2007), and social mobility (Clark and Stroope, 2018). Previous studies have primarily measured the religious environment via the proportional dominance of Catholics, mainline Protestants, and conservative Protestant subgroups.

Religious environments have been proposed to influence community well-being through a diverse range of pathways. Researchers have cited social networks and social support (Blanchard et al., 2008; Lee, 2004, 2010), gender norms (Clark and Stroope, 2018), cultural spillover (Ruiter and De Graaf, 2006; Stroope et al., 2015), and institutional investment (Bartkowski et al., 2011; Garcia et al., 2017) as potential mechanisms through which the religious environment shapes important community-level outcomes. While useful in contextualizing the observed associations between religious traditions and various outcomes, this research has yet to empirically test the existence and strength of these mechanisms. Gaining a better picture of the role those mechanisms play in the relationship between local religion and

community well-being is a necessary step in addressing the possibility of the ecological fallacy (Lim and MacGregor, 2012).

4.3 Religious Environments and Intergenerational Mobility

Religion has long been linked to material well-being by social scientists. Religious beliefs and affiliations have been consistently associated with income and wealth outcomes (Keister, 2003, 2008, 2010; Steen, 1996; Wilder & Walters 1998). At the individual level, there is also strong evidence that religious beliefs shape labor force participation, occupational decisions, and educational attainment (Darnell & Sherkat, 1997; Lehrer, 1999; Smith & Faris, 2005) – key predictors of intergenerational mobility. At the ecological level, recent research has found important relationships between the religious environment and mobility rates.

Clark and Stroope (2018) found distinct denominational relationships with intergenerational mobility. Communities with a greater preponderance of mainline Protestants, Catholics, and evangelical Protestants were found to have significantly higher rates of intergenerational mobility. By contrast, fundamentalist Protestant and Pentecostal communities were found to have significantly lower intergenerational mobility. In attempting to explain these observed differences, the authors outline several specific mechanisms through which they suggest religious traditions shape mobility rates. Specifically, they cite social network effects, gender roles, and investment in public institutions as means through which the theological content of specific religious traditions influences the intergenerational opportunity of Americans.

Scholars applying the religious ecology perspective have often cited the potential influence of religious beliefs and practices on social networks (Beyerlein & Hipp, 2005; Blanchard et al., 2008; Lee, 2010). Insular denominations, such as fundamentalist Protestants

and Pentecostals are argued to create fewer, stronger ties within communities and to discourage engagement with secular society – in favor of a greater emphasis on church needs and events. By contrast, evangelical theology encourages engagement with, and the reformation of, wider society. Evangelical Protestants, mainline Protestants, and Catholics are argued to foster greater community engagement and more ties cutting across social groups. Similarly, scholars point to theological attitudes towards “worldliness” when explaining the relationship between the religious environment and community resources that influence well-being. Religious traditions more antagonistic towards secular medicine and education which place a primary emphasis on personal salvation over worldly concerns are argued to reduce support for investment in local institutions – such as hospitals and public schools. Religious traditions placing greater emphasis on the amelioration of societal inequalities and social problems, however, are argued to increase support for investment in these institutions (Blanchard, 2008).

While rooted in previous research, the mechanisms which previous researchers have used to explain the influence of religious environments on intergenerational mobility and other metrics of well-being are still incomplete and sensitive to an important methodological shortcoming. In a critique of research on this topic, Lim and MacGregor (2012) suggest that many previous findings regarding the religious environment may actually be artifacts of aggregation rather than the results of the mechanisms proposed. The sensitivity of this research to the ecological fallacy makes distinguishing between the effects proposed by researchers and aggregate, individual-level traits a necessary step in the development of this area of research.

4.4 Educational Investment and Mobility

Education is an important institution in post-industrial economies and plays a central role in modern labor markets. A rich history of research has demonstrated net positive effects of

educational attainment on income and socioeconomic attainment (Becker, 1964; Blau & Duncan, 1967; Mincer, 1970; Willis & Rosen, 1979), though the rewards of educational attainment have also been shown to vary significantly across different populations and places (Boudon, 1974; Brand & Xie, 2010; Smith & Powell, 1990). Schooling develops important skills and provides influential credentials, networking opportunities, and information. Public schools help facilitate intergenerational mobility by providing educational to all, allowing for greater opportunity for those with limited access to other forms of schooling.

Public spending on schools and educational resources has been routinely associated with better educational outcomes and with mobility (Coleman, 1966; Hedges et al., 1994). A host of recent, multi-state studies support the claim that greater school spending and educational resources result in better graduation rates and test scores, lower dropout rates and greater income mobility (Biasi, 2015; Brunner et al., 2018; Cascio et al., 2018; Johnson & Jackson, 2018). Similar single-state studies have produced more mixed results, with some studies showing positive and significant associates between educational spending and mobility and others finding the relationship to be statistically insignificant (Cellini et al., 2010; Clark, 2003; Gigliotti & Sorensen, 2018; van der Klaauw, 2008). These findings taken together suggest a general net positive effect of educational investment on attainment and mobility but underscore the importance of accounting for contextual factors when considering the education-mobility landscape.

Schools are influential cultural institutions and function as key channels through which cultural orientations, values, and understandings are transmitted to youths (Coleman, 1993). The importance of education in transmitting values across generations gives religious groups a large stake in the education of new generations. Considering the range of cultural schemas contained

in America's diverse religious traditions, there are compelling reason to suspect that the interest of religious groups in education expresses itself upon support for funding for public, secular education. Religious traditions shape attitudes towards particular aspects of the content of secular schooling, such as evolution and sex education, create competing educational institutions, and influence attitudes towards the relative value of secular and religious investments.

The beliefs and values of conservative Protestants often conflict with secular content taught in schools, and adherents may have more antagonistic views towards secular education (Darnell and Sherkat, 1997). Generally characterized by literalist readings of many biblical texts, conservative Protestants often take issue with aspects of the content taught in public schools, such as material on sex, evolution, and history (Baker & Smith, 2015; Darnell & Sherkat, 1997; Stroope, 2011). Fundamentalists and Pentecostals in particular tend to be less supportive of engagement with secular education. Resultingly, they are less likely to be college-educated than both the nonreligious and other religious groups (Beyerlein, 2004; Smith & Faris, 2005). Evangelicals – as distinct from Pentecostals and fundamentalists – emphasize reforming and engaging with secular society while maintaining orthodox beliefs (Smith et al., 1998). Many evangelicals believe that public schools, colleges, and universities are important spaces for children to form and reinforce their religious identity (Schmalzbauer, 2002; Sikkink & Smith, 2000). As a result, evangelicals are more likely to be college-educated than fundamentalists and Pentecostals and are as or more likely to attain a college education than are mainline Protestants and Catholics (Beyerlein, 2004).

Mainline Protestants and Catholics are distinguished from conservative Protestant groups by a greater emphasis on addressing social inequality and combatting societal problems such as disease and crime (Smith & Emerson, 2000; Emerson et al., 1999). Recent gains in educational

attainment among Catholics have resulted in Catholics achieving parity with mainline Protestants among measures of educational attainment (Lehrer, 1999). Catholic schools have a number of advantages to public and other religious schools, including higher test scores, greater probabilities of college acceptance and completion, and higher future earnings (Neal, 1997). However, these schools may create institutional redundancies in certain communities, lowering the perceived need for investment in public schools where there are Catholic school alternatives. While the favorable attitudes towards secular education mainline Protestants and Catholics suggests a greater predisposition to support public schools, the prominence of Catholic schools in the educational landscape suggests that Catholic school spending may complicate this relationship.

4.5 Hypotheses

A growing body of research (Blanchard et al., 2008; Bartkowski et al., 2011; Clark & Stroope, 2018; Garcia et al., 2017) argues that institutional investment is an important pathway through which religious traditions shape community well-being. In order to evaluate the existence of such a pathway, I propose and test a number of hypotheses about the relationships between religious traditions, educational investment, and intergenerational mobility.

Evangelicals are characterized by a mandate to engage with and reform secular institutions through personal connections and view public schools as important spaces for religious self-definition (Sikkink & Smith, 2000). This orientation has resulted in very high rates of educational attainment among evangelicals (Beyerlein, 2004). However, conflicts between the secular content found in public school curricula and literalist or inerrantist readings of biblical texts create points of tension between evangelicals and public schools. These competing factors suggest a mixed or insignificant total effect on investment in public education (Hypothesis 1). As

distinct from evangelicals, fundamentalists and Pentecostals have a more insular orientation towards secular society and a more directly antagonistic relationship with secular education (Greenberg, 2000; Smith, 2000). As a result, fundamentalist and Pentecostal traditions are expected to reduce investments in public education (Hypothesis 2). Mainline Protestants and Catholics place a greater emphasis on ameliorating social inequality and are more likely to support public institutions (Beyerlein and Hipp, 2006; Vogt, 2007). Both mainline Protestants and Catholics are therefore expected to be associated with significant increases in investments in public education (Hypothesis 3).

Previous research has found a number of associations between major religious traditions and intergenerational mobility (Clark & Stroope, 2018). In order to test the role of educational investment in explaining some degree of these associations, it is necessary to measure the total associations of these traditions with investment. First, mainline Protestants and Catholics achieve high levels of education and place emphasis on community engagement and addressing societal problems such as racism and inequality (Beyerlein, 2004; Smith & Emerson, 2000; Emerson et al., 1999; Lehrer, 1999). Mainline Protestants and Catholics are therefore expected to increase intergenerational mobility (Hypothesis 4). Similarly engaged, evangelicals have very high rates of educational attainment and are argued to increase the number of ties across social groups in a community (Beyerlein, 2004; Darnell & Sherkat, 1997; Iannaconne 1988, 1994; Wuthnow, 1999, 2002). Therefore, evangelicals are also hypothesized to increase intergenerational mobility (Hypothesis 5). Fundamentalists and Pentecostals, by contrast, have lower rates of educational attainment and are argued to reduce the number of cross-group ties in an area. These traditions are expected to lower intergenerational mobility relative to other religious traditions (Hypothesis 6).

Religious organizations have a large stake in the education of new generations. Key theological differences between major American religious traditions undergird distinct orientations towards educational attainment, content, and secular institutions of learning. These distinct orientations suggest a number of effects of various denominations on levels of local support for the funding of public schools. Further, the centrality of education in the mobility process makes it likely that part of the total effect of religious environments on intergenerational mobility is significantly explained by differing levels of support for investment in these institutions (Hypothesis 7).

4.6 Data

Hypotheses are tested using county-level data from the Equality of Opportunity Project, the U.S. Census of Governments, the Religious Congregations and Membership Study, and the U.S. Census. Intergenerational mobility data are from the Equality of Opportunity Project and reflect perhaps the most extensive measurement of U.S. intergenerational mobility to date. County-level mobility data were created using de-identified tax returns of the entire U.S. population (Chetty et al., 2014). Educational investment measures are calculated using local governments expenditures data from the 1992 U.S. Census of Governments. These data are also linked at the county-level with religious adherents data from the 1990 Religious Congregations and Membership Study and socioeconomic and demographic controls from the 2000 U.S. Census. Using these years of data allows for a clearer interpretation of directional effects.

4.6.1 Intergenerational Mobility

Intergenerational mobility is operationalized as the absolute upward mobility of each U.S. county. Chetty and colleagues (2014) calculated absolute upward mobility as the expected

rank of children of parents at the 25th percentile in the national income distribution¹⁰. Data from the Equality of Opportunity Project were calculated using de-identified tax records for the total U.S. population. Approximately 10 million children were within the core sample used to calculate absolute upward mobility.

Absolute upward mobility, rather than relative mobility, is used in this study for the purposes of interpretation. Relative mobility allows for the capture of both upward and downward mobility, but this bidirectional characteristic also reduces clarity in interpreting changes in mobility. Increases in relative mobility may be equally caused by worse outcomes for the rich as by better outcomes for the poor. Absolute mobility, by contrast, allows for a clear directional interpretation of changes in mobility rates. Directional interpretation is particularly valuable when considering tests of indirect effects, as it may be that specific variables are more influential on upward mobility than on downward mobility.

4.6.2 Educational Investment

Data on local educational investment are derived from the 1992 U.S. Census of Governments. The Census of Governments provides comprehensive statistics about local governmental activities, covering the finances, employment, and payroll of state and local governments across the country. Measuring educational investment in 1992 shortly follows the measurement of local religion in 1990 and falls within the window of educational development for the 1980-82 Equality of Opportunity cohort. Total county-level per capita educational

¹⁰ Absolute upward mobility is calculated using rank-rank regression relative to the national income distribution, not the income distribution of each county. Using the national income distribution as reference reduces the influence on calculated mobility rates of variance in economic structure and county income distributions.

spending is calculated by linking and aggregating spending data from city, town, district, and county governments. In the analyses, this variable is log-transformed to control for skew.

4.6.3 Independent Variables

Independent variables included in the analyses consist of: (1) measures of the religious environment, (2) economic structure, and (3) demographic control variables. Measures of the religious environment are calculated using the 1990 Religious Congregations and Membership Study, capturing a period of time when the cohort is between the ages of 8-10. Proportional dominance is calculated as the number of adherents of a religious tradition in an area divided by the total population of that area. Religious adherents are classified as Catholic, mainline Protestant, fundamentalist, evangelical, and Pentecostal (Blanchard et al., 2008; Jones et al., 2002; Steensland et al., 2000). Conservative Protestant denominations are coded according to the method applied by Blanchard and colleagues (2008). Utilizing this classification scheme reduces the likelihood that any findings are due to an alternative coding strategy. This method of classifying conservative Protestant subgroups has also been found to capture important distinctions between subgroups that would be lost with aggregation (Blanchard et al. 2008; Clark and Stroope, 2018; Bartkowski et al., 2011).

Local economic structure is measured in 2000 using data from the Equality of Opportunity Project and the 2000 U.S. Census. Measures include (1) income inequality, operationalized here using the Gini coefficient, and (2) a disadvantage index including standardized measures of percent living in poverty, percent unemployed, and the percentage of the population which did not complete high school. Additional demographic controls include

percent black, percent Hispanic, percent living in an urban area, percent democrat¹¹, the log of the total population, percent population change, and regional dummy variables¹². Descriptive statistics for all variables included in the analyses are shown in Table 4.1.

4.7 Analytic Method

Analyses in this study are in two parts. First, two unstandardized regression models predicting educational investment are presented in Table 4.2. These models include a baseline containing control variables and a model including the denominational dominance of religious traditions. These models are designed to examine the influence of the religious environment on educational investment.

Next, regression analyses predicting absolute upward mobility are presented in Table 4.3. These models include a baseline model estimating the relationship between educational investment and intergenerational mobility, a reduced model containing only religious environment and demographic control variables, and a full model appending educational investment to the variables in the reduced model. Including nested reduced and full models allows for the estimation of indirect effects of the religious environment through educational investment.

Indirect effects are estimated using the change of the coefficient of an independent variable between the reduced and full models. This change represents the indirect effect of that variable through educational investment. In order to test the significance of these indirect effects,

¹¹ Political ideology may influence support for public expenditures. It may likely be the case that religious environments shape political environments and that local politics represent a mechanism of religion on well-being, but it may also be the case that the reverse is true. Political environment is controlled for in these models in order to reduce the possibility of observing cases in which political ideology might influence religious affiliation.

¹² The Northeast is held as the contrast within these models.

I utilize the technique described by Clogg et al. (1995), amended with the formula for the calculation of the standard error of the indirect effect suggested by Allison (1995). This formula results in a more conservative estimate of the standard error of the indirect effect, and correspondingly a more rigorous significance test.

4.8 Results

In order to observe the relationship between religious traditions and educational investment, two unstandardized regression models predicting per capita were estimated. These models test Hypotheses 1, 2, and 3 and are presented in Table 4.2. Model 1 is a baseline model including control variables. Model 2 includes religious environment variables. I hypothesized that evangelicals would be associated with a mixed or insignificant change in educational investment (Hypothesis 1), due to competing theological orientations towards engagement with the secular and the content of secular public schooling. The results in Model 2 support this hypothesis as evangelicals are found to have a very modest and statistically insignificant positive effect on per capita educational investment ($b = 0.004$; $p = 0.503$). Due to more direct theological conflicts with secular education and more insular orientations, fundamentalists and Pentecostals were hypothesized to suppress educational investment relative to other religious groups (Hypothesis 2). Results from the analyses generally support this hypothesis. However, Model 2 also complicates previous theorization on the relationship between Pentecostals and various forms of institutional investment, as they are associated within these models with a near-zero increase in educational investment ($b = 0.003$; $p = 0.549$). Fundamentalist Protestants are, by contrast, associated with a substantial decrease in per capita educational investment ($b = -0.064$; $p < .001$).

Table 4.1. Descriptive Statistics

Variables	Mean	S.D.
Intergenerational Mobility		
Absolute Upwards Mobility	43.555	5.425
Educational Investment		
Total Per Capita Educational Expenditures (ln)	-0.099	0.286
Religious Environment		
Fundamentalist	0.000	1.000
Pentecostal	0.000	1.000
Evangelical	0.000	1.000
Mainline Protestant	0.000	1.000
Catholic	0.000	1.000
Demographic Controls		
Percent Urban	42.729	28.668
Percent Black	8.977	14.430
Percent Hispanic (ln)	0.433	1.257
Disadvantage Index	-0.004	1.881
Gini Coefficient	0.382	0.083
Total Population (ln)	10.377	1.149
Percent Population Change	9.579	13.472
Percent Democrat	40.624	10.655
Region		
SO	0.464	0.499
MW	0.338	0.473
WE	0.125	0.331

Notes: n= 2,658 U.S. counties and county-equivalents. Religious environment is measured as the standardized percentage of each religious tradition's adherents in a county's total population.

Table 4.2. Unstandardized OLS Regression Coefficients Predicting Total Per Capita Educational Investment in US Counties in 1992

	Model 1 (Baseline)		Model 2 (Full)	
	b	s.e.	b	s.e.
Religious Environment				
Pentecostal	-	-	0.003	0.005
Fundamentalist	-	-	-0.064***	0.008
Evangelical	-	-	0.004	0.006
Mainline Protestant	-	-	0.039***	0.006
Catholic	-	-	0.036***	0.006
Demographic Controls				
Percent Black	0.002***	0.000	0.002***	0.000
Percent Urban	-0.000	0.000	0.001**	0.000
Percent Hispanic (ln)	0.074***	0.005	0.066***	0.005
Gini Coefficient	-0.015***	0.079	0.019	0.073
Disadvantage Index	-0.018***	0.004	-0.004	0.004
Total Population (ln)	-0.034***	0.007	-0.025***	0.007
Percent Population Change	-0.001*	0.000	-0.000	0.000
Percent Democrat	0.000	0.000	-0.001*	0.000
Region	-	-	-	-
Northeast (Contrast)	-	-	-	-
South	-0.367***	0.023	-0.238***	0.025
Midwest	-0.223***	0.021	-0.211***	0.022
West	-0.133***	0.026	-0.069**	0.027
Intercept	0.492***	0.072	0.384***	0.071
R ²	0.2331		0.2920	

*p<.05 **p<.01 ***p<.001

Notes: n=2,658 U.S. counties. Religious environment is measured as the standardized percentage of each religious traditions adherents in a county's total population.

Table 4.3. Unstandardized OLS Regression Coefficients Predicting Absolute Upwards Mobility in U.S. Counties

	Model 1		Model 2		Model 3		Indirect Effect Through Ed. Spending	
	(Baseline)		(Reduced)		(Full)			
	b	s.e.	b	s.e.	b	s.e.	b(d)	s(d)
Religious Environment								
Pentecostal	-	-	-0.190**	0.065	-0.193**	0.065	0.003	0.009
Fundamentalist	-	-	0.148	0.098	0.212*	0.099	-0.064**	0.021
Evangelical	-	-	0.555***	0.078	0.551***	0.077	0.004	0.010
Mainline Protestant	-	-	1.211***	0.081	1.172***	0.081	0.039**	0.014
Catholic	-	-	1.645***	0.079	1.609***	0.079	0.036**	0.014
Educational Investment								
Per Capita Ed. Spending (ln)	2.398***	0.269	-	-	0.998***	0.249	-	-
Demographic Controls								
Percent Black	-0.125***	0.006	-0.109***	0.006	-0.111***	0.006	0.002*	0.001
Percent Urban	0.003	0.004	-0.008*	0.004	-0.007*	0.004	-0.001	0.001
Percent Hispanic (ln)	0.517***	0.073	0.301***	0.066	0.235***	0.067	0.066	0.671
Gini Coefficient	-7.971***	1.102	-7.168***	0.980	-7.188***	0.977	0.019	0.129
Disadvantage Index	-0.645	0.057	-0.445***	0.053	-0.441***	0.053	-0.005	0.007
Total Population (ln)	-1.396***	0.103	-1.039***	0.093	-1.014***	0.093	-0.025	0.014
Percent Population Change	-0.086***	0.006	-0.052***	0.006	-0.052***	0.006	-0.000	0.001
Percent Democrat	-0.054***	0.008	-0.081***	0.007	-0.080***	0.007	-0.001	0.001
Region	-	-	-	-	-	-	-	-
Northeast (Contrast)	-	-	-	-	-	-	-	-
South	-1.265***	0.339	-0.214	0.322	0.024	0.327	-0.238**	0.073
Midwest	-0.012	0.301	0.689*	0.281	-0.479	0.285	-0.211**	0.064
West	-1.084**	0.364	1.181***	0.341	1.251***	0.340	-0.069	0.048
Intercept	65.844***	1.003	62.235***	0.913	61.852***	0.915	-	-
Mean Squared Error	12.096		9.531		9.476		-	
R ²	0.5890		0.6761		0.6780		-	

*p<.05 **p<.01 ***p<.001

Notes: n=2,658 U.S. counties. Religious environment is measured as the standardized percentage of each tradition's adherents in the total population.

Catholics and mainline Protestants were hypothesized to increase educational spending (Hypothesis 3), and this is supported by the results of Model 2. Catholics are associated with a significant increase in per capita spending ($b = 0.036$; $p < 0.001$), as are mainline Protestants ($b = 0.039$; $p < .001$). These findings support previous theorization of mainline Protestants and Catholics as supportive of institutional investment.

In order to evaluate the effects of the religious environment and educational investment on intergenerational mobility, as well as the degree to which educational investment explains the effect of the religious environment on intergenerational mobility, a series of nested models were calculated. Results of these analyses are provided in Table 4.3. Model 1 provides a baseline model and finds that per capita educational spending is associated with substantial improvements in upwards mobility ($b = 2.389$; $p < .001$). Model 2 provides a reduced model and tests Hypotheses 4, 5, and 6. Mainline Protestants and Catholics were hypothesized to increase intergenerational mobility (Hypothesis 4), and this hypothesis is supported by Model 2. Evangelicals are also found to increase intergenerational mobility (Hypothesis 5). Fundamentalists and Pentecostals are found to reduce intergenerational mobility relative to other groups (Hypothesis 6), and Pentecostals are the only religious tradition in the models found to be associated with a decrease in mobility ($b = -0.190$; $p = 0.003$).

Educational investment was hypothesized to significantly explain a portion of the total effects of religious environments on intergenerational mobility (Hypothesis 7). In order to test this hypothesis, Model 3 includes a variable for educational investment and tests of indirect effects were conducted. The results of these tests can be found in a separate column in Table 4.3. Educational investment is found to significantly explain part of the total effects of mainline Protestants, Catholics, and fundamentalists. Pentecostals and evangelicals are not found to be

partly explained by educational investment. These findings support Hypothesis 7 and additionally suggest that not all mechanisms of the religious environment on community well-being are uniformly influential in explaining denominational effects.

4.9 Discussion

Previous research has found important associations between county-level religious environments and intergenerational social mobility (Clark and Stroope, 2018). As with much ecological research on religious effects, the theorized explanatory mechanisms of this relationship remain untested. Further, recent critiques of methods historically used in the study of religious contexts have raised concerns that without methodological advancements in this area, researchers run a high risk of committing an ecological fallacy (Lim & MacGregor, 2012). This study attempts to address this shortcoming by directly examining proposed mechanisms of religious environments' effects on an important axis of well-being. This study applies multi-stage analyses to county-level data from the Equality of Opportunity Project, the Religious Congregations and Membership Study, and the U.S. Census of Governments and finds evidence supporting and complicating the theorization and findings of previous research.

A first stage of analyses finds significant associations between major American religious traditions and educational investment. Study models show that the proportional dominance of Catholics and mainline Protestants are significantly associated with comparable increases in local educational spending. Evangelicals and Pentecostals express a near-zero and insignificant relationship with educational spending, while fundamentalists are associated with a sizeable and significant decrease in educational spending. These findings largely support previous theorization on the relationships between major religious traditions and institutional investment.

The second stage of analyses leverages nested regression models and indirect effect analyses in order to examine the role that educational investment has in explaining the total effects of religious environments on intergenerational mobility. Spending on public education is found to significantly explain a portion of the total effects of fundamentalists, mainline Protestants, and Catholics. Educational investment does not, however, explain a significant portion of the effects of evangelicals or Pentecostals. While these findings support the hypothesized role of educational investment as a mechanism of religious environments' effects, they also indicate that the relevance of this mechanism is not uniform across denominations.

U.S. Census of Governments data as used in this study provide extensive county-level measurements of public educational expenditures, but do not contain measures of religious or private school spending. Given the importance of public school alternatives in the educational landscape of many communities, the lack of data on these alternatives represent a notable limitation to the scope of this study. Future studies incorporating data on public school alternatives could further clarify the role of these institutions in the investment process. A separate study limitation concerns the operationalization of intergenerational mobility. While absolute upward mobility as operationalized by Chetty et al. (2014) constitutes an appropriate measure within the contexts of this county-level study, it is important to note the limits of this measure. Directional mobility measures increase the interpretability of coefficients – particularly important when conducting indirect effect analyses. However, the traits which make absolute upward mobility more direct interpretable also introduce new uncertainties. For example, it may be that the religious environment and educational spending interact differently with downward mobility differently than they do upward mobility. Future research should address this and other limits of this measure.

The findings of the analyses in this study suggest several additional fruitful avenues of research. The proposed role of educational investment in explaining the total effects of religious environments on intergenerational mobility is an important one, but researchers have also proposed other mechanisms which have yet to be investigated. Future research addressing the indirect effects of religious environments through social networks and gender roles would add further context to the relative mediatory strength of educational investment in this process. While the results of this study challenge the assertion that the observed effects of the religious environment are entirely the artifacts of aggregation, multilevel modeling may likely be necessary to fully disaggregate the effects of aggregation from those proposed by scholars.

Despite limitations, this study has advanced research on the American landscape of opportunity and has attempted to address an important critique of the religious ecology literature. Findings support the hypothesis that a key mechanism through which religious environments shape community well-being is through educational investment. This indicates that the observed role of the religious environment in shaping community well-being extends beyond the effects of aggregation.

4.10 References

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Chapter 5. Conclusion

A rich history of research dating back to the origins of sociology has linked religious environments with numerous aspects of community well-being (Blanchard et al., 2008; Durkheim, [1897] 2002; Stark, 1996; Stark et al., 1982). This dissertation represents an ambitious effort to advance this body of research. To do so, it addresses an important shortcoming of scholarship in this area, notably critiqued recently by Lim and MacGregor (2012). Though it has done much to discover and underscore relationships between local religious traditions and community well-being, little to no research has directly explored the specific mechanisms of these relationships.

An important step in further developing this area of research involves answering questions about three important aspects of these proposed mechanisms. First, is there empirical evidence that these proposed mechanisms exist, and that they exist as proposed? Second, to what degree do proposed mechanisms explain the observed effects of different denominations? Third, does the relative strength of the proposed mechanisms vary across different aspects of community well-being? This dissertation attempts to answer these questions with a series of three independent but closely related studies which, when considered collectively, suggest answers.

In Chapter 2, I find that associations between religious traditions and institutional investment explain a significant portion of the total effect of these traditions on county-level mortality rates. This finding supports previous theorization of local investment in public institutions as an important mechanism through which the religious environment shapes mortality. This study produces the first empirical evidence supporting a mechanism of the

religious environment and findings support important theoretical underpinnings of the religious ecology thesis.

Results in Chapter 3 show that religious environments are significantly associated with infant birth weights. The denominational dominance of major American religious traditions is also found to shape various influential aspects of the prenatal health environment, such as access to healthcare, health-related institutional investment, local health behaviors, and teen birth rates. These associations are found to significantly explain a sizable portion of the total effects of religious traditions on local rates of low birthweight. Among the proposed mechanisms tested, teen birth rates are found to have the greatest explanatory power.

In Chapter 4, I find that local spending on public schools is associated with the denominational dominance of several religious traditions. These associations explain a significant portion of the total effects of religious environments on intergenerational social mobility, but there are important denominational distinctions in this process. Educational investment appears important when considering the effects of fundamentalists, mainline Protestants, and Catholics but is insignificant when considering evangelical and Pentecostal effects. These findings suggest that the relative importance of each proposed mechanism may vary across denominations and caution against a one-size-fits-all approach to explaining religious effects.

Taken together, the results from this dissertation suggest numerous, complex pathways through which local religious traditions shape the welfare of American communities. This challenges the assertion that previous findings in the religious ecology literature are due primarily to an ecological fallacy and is an important first step towards a more refined approach to the study of cultural environments.

5.1 References

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Appendix. Classification Schema of Conservative Protestant Denominations

Evangelical	Fundamentalist
<p>Allegheny Wesleyan Methodist Connection Associate Reformed Presbyterian Church Brethren Church (Ashland, Ohio) Brethren in Christ Church Christian Churches and Churches of Christ Christian Reformed Church The Christian and Missionary Alliance Cumberland Presbyterian Church Evangelical Lutheran Synod Evangelical Mennonite Church Evangelical Mennonite Brethren Conference Evangelical Presbyterian Church The Association of Free Lutheran Congregations Fundamental Methodist Church Lutheran Church, Missouri Synod Mennonite Church Mennonite Church, The General Conference Plymouth Brethren Christian Church Presbyterian Church in America Primitive Methodist Church in the USA Seventh-Day Adventist Church The Wesleyan Church Wisconsin Evangelical Lutheran Synod</p>	<p>Baptist General Conference Church of God (Anderson, Indiana) Baptist Missionary Association of America Church of the Nazarene Churches of Christ Conservative Baptist Association of America Duck River and Kindred Baptists Associations Enterprise Baptist Association General Six Principle Baptists Independent Fundamental Churches of America Interstate and Foreign Landmark Missionary Baptists Association Jasper Baptist and Pleasant Valley Baptist Associations The Missionary Church National Association of Free Will Baptists New Hope Baptist Association Old Missionary Baptists Association Primitive Baptist Associations Seventh Day Baptist General Conference Southern Baptist Convention Two-Seed-in-the-Spirit Predestinarian Baptists Wayne Trail Missionary Baptists Association</p>
	<p>Pentecostal</p> <p>Assemblies of God The Bible Church of Christ Church of the Brethren Church of God (Cleveland, Tennessee) Church of God in Christ, Mennonite Church of God of Prophecy Church of God of the Mountain Assembly Fire Baptized Holiness Church, Wesleyan International Church of the Foursquare Gospel International Pentecostal Church of Christ International Pentecostal Holiness Church Open Bible Standard Churches Pentecostal Church of God Independent Charismatic Churches</p>

Vita

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