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INVESTMENT IN LOCAL HEALTH-SHAPING INSTITUTIONS: RECONSIDERING THE ROLE OF THE RELIGIOUS ENVIRONMENT

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Abstract

A body of research dating back to Durkheim has linked religious environments to population health and mortality rates. Scholars have argued that local religious subcultures influence population health through important pathways, including a community's propensity to invest in health-shaping institutions – such as public hospitals. A noticeable shortcoming of this literature, however, is a lack of evidence that these mechanisms exist as proposed. This study uses county-level data from the 2010 Religious Congregations and Membership Study and the 2012 U.S. Census of Governments to examine contextual religion's relationship with public investment in health-shaping institutions. Findings suggest that associations between religious traditions and institutional investment explain a significant and notable portion of the total effect of these traditions on mortality rates. This manuscript applies a more refined approach to studying health-shaping investment, and the results suggest interesting new directions in the study of cultural determinants of population health.

Keywords

Religion; Population; Community; Health; Mortality

In the past half century, a considerable amount of research has examined the role of religion as a social determinant 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. Building on this body of work, scholars have increasingly recognized the importance of local religious environment as a key covariate of mortality. Referencing 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

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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 areas 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, few empirical studies assess the mechanisms proposed in this body of literature. Scholars have also argued that the ecological findings in this growing body of literature are artifacts of aggregate, individual-level factors rather than macro-to-micro processes (Lim & MacGregor, 2012). 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 white and black mortality rates, indirect effects through institutional investment, and highlights salient new directions for research concerned with social determinants of public health.

Background

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 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.

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 reduces 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 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.

Theory and Hypotheses

Institutional Investment and Religious Ecology

Scholars applying the religious ecology hypothesis argue that one way that 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 local religion as an important social institution may generally influence investment in other, 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 may increase the likelihood that some residents will be more invested in the long-term well-being of the communities to which they are increasingly attached.

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. Mainline Protestants and Catholics are invested in community health and routinely operate hospital systems and health-related charities. The structuralist theology undergirding the Catholic and mainline Protestant tradition is expected to further increase community support for public, institutionally-based solutions to community problems – such as mortality (Hypothesis 1).

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 2). 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 3)

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 4).

Religious Ecology and Black Protestants

Black churches are central pillars of black culture in America (Billingsley, 1999; Taylor et al., 2004). Formed during Reconstruction and in a period of intense racial barriers to inclusion, black churches provided a space for blacks to define their religious identity beyond the plantations (Lincoln and Mamiya, 1990). They have historically served as the backbone of the black community and provided important sources of community cohesion, values, and avenues for political activism (Cavendish, 2000; Ellison and Sherkat, 1995). Despite the importance of black Protestant churches in black experience, research on religious environments and health has paid little empirical attention to these institutions¹.

There are reasons to expect that black Protestants shape local health and investment in public institutions linked to health. Black Protestants have been found to be more likely to support greater general public spending. The US Religious Landscape Study estimates black Protestant support for more public services and bigger government to be 70% (USRLS; Pew Forum on Religion and Public Life, 2014). Despite this support for a general increase in government spending, there are several reasons to expect support for health-shaping institutions to be substantially lower in areas with a greater proportion of black Protestants.

First, mistrust of secular medicine is well-documented among American blacks, and within the black Protestant community (Armstrong et al., 2013; Boulware et al., 2013). Despite efforts to reduce discrimination in the healthcare system, such as increasing diversity in the medical workforce (Dennis, 2001; Mitchell and Lassiter, 2006), cultural sensitivity training (Cooper et al., 2002; Sequist et al., 2010), and increasing awareness to biases in clinical decision making (Dennis, 2001), American blacks still experience discrimination and

¹A notable exception to this is the work of Harris and Ulmer (2017), who investigated the relationship between black Protestants and violence – including homicide.

inequities in care. Armstrong and colleagues (2013) find that accounting for lived experiences of discrimination explains black skepticism in healthcare institutions. This mistrust is additionally undergirded by a well-known history of harmful experiments on black Americans, such as the American eugenics movement and the Tuskegee clinical trials (Corbie-Smith 1999; Gamble 1999; Paul 1998; Reverby 2001).

Second, despite efforts to reduce racial discrimination within healthcare and education, racial disparities in care and educational attainment persist – likely reinforcing mistrust among black Protestants in these institutions (Boulware et al. 2013). These inequities also reduce the relative value for black Protestants to invest time and resources in supporting these institutions. Relative to their predominantly white counterparts, black Protestant faith communities have historically had less to gain from strengthening these institutions and less capital to support them with.

Finally, less than 10% of all U.S. counties contain more than 30% black residents. Fewer than 3% of all counties have a black majority, making independent political salience of blacks exceedingly rare. Previous research suggests that whites are less likely to support spending on public goods in areas with visible black populations and institutions (Duncan, 1999; Hirschfeld, 2018; Putnam, 2007). Greater proportional dominance of black Protestants may increase the visibility of blacks in an area, resulting in heightened racial conservatism among whites. Additionally, black Protestant mistrust in secular health-shaping institutions mirrors that of white conservative Protestants and may act to reinforce and amplify the anti-institutional theology of those denominations.

Skepticism towards health-shaping institutions among black Protestants, in tandem with local white disinvestment, is expected to produce local environments less amenable to investment in these institutions (Hypothesis 5). This reduced investment is expected to explain a significant portion of the total effect between black Protestants and mortality (Hypothesis 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, the U.S. Religious Landscape Survey, 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 $n = 2,640$).

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. To test for racially distinct denominational associations with mortality, race-specific age and sex-standardized mortality rates are calculated separately. 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.

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) aggregate health-shaping 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.

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, historically black 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 B for the specific denominational coding of subgroups. To further test associations between denominationally based attitudes towards spending and subsequent local spending, a

variable was created using data from the nationally representative U.S. Religious Landscape Survey (n=35,556). Each of the study denominations were weighted according to the prevalence of members that would “rather have a smaller government providing fewer services” (USRLS; Pew Forum on Religion and Public Life, 2014).² The anti-spending ideology variable therefore represents an estimate of the proportion of residents favoring less spending and is calculated using the religious composition of the area.

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, percent married, percent older than 65, percent urban, the log of population size, and dummy variables for the major Census regions (the Northeast region is held as the contrast). Descriptive statistics for all study variables are shown in Appendix A.

Analytic Strategy

This study applies a two-stage modeling strategy. First, state fixed effects regression analyses³ 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 1, 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-specific 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 independent variable [b(d)] between the reduced (b_1^*) and the full model (b_i) represents the indirect effect of that variable through institutional investment.⁴ To test the significance of indirect effects, the method described by Clogg et al. (1995) is employed. The test statistic follows a Z distribution and is calculated as:

²-The USRLS does not report spending opinions among smaller religious traditions lacking sufficient sample size. As a result, some smaller conservative Protestant traditions included in the RCMS data do not have representation in the USRLS and cannot be included when calculating denominational weights. Because the largest traditions in each denomination are best-represented, the anti-spending attitudes variable is a useful but imperfect estimate of anti-spending attitudes and may underestimate the influence of the smallest church groups.

³-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.

⁴-Unstandardized indirect effects coefficients are provided in Table 2, in order to aid interpretability and maintain reliability with previous research. These coefficients are standardized, however, in the process of testing significance.

$$Z_{\text{indirect effect}} = b(d)/s(d)$$

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):

$$s(d) = \left[s^2(b_1^*) + s^2(b_i) - 2(s^2(b_1^*) \left(\text{MSE}_{\text{Full}}^2 / \text{MSE}_{\text{Reduced}}^2 \right)) \right]^{1/2}$$

This yields a more conservative estimate of $s(d)$ and results in a more stringent test of significance. Black and white age- and sex-standardized mortality are independently assessed in subsequent nested models in order to observe denominational associations with race-specific outcomes.

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, susceptibility to reverse causality is reduced.

Findings

The results of the fixed effects regression analyses of local health and nonhealth spending are presented in Table 1. American religious traditions express diverse, significant associations with investments in institutions linked to mortality rates. Models 1, 2, and 3 provide support for previous research which assumed the presence of these associations, 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 aggregate health-related spending. Model 4 also predicts aggregate health-related spending using the prevalence of anti-spending ideology as a predictor, rather than individual denominations. These models demonstrate that certain religious traditions have distinct relationships with various forms of local institutional investment and that anti-spending ideology nested within these religious traditions is associated with less local spending.

The hypothesized denominational differences in support for institutional investment also find support in these models. Greater proportional dominance of Catholicism and mainline Protestantism is expected to be associated with increased institutional investment (Hypothesis 1). The models in Table 1 provide robust support for this hypothesis. Across all models, Catholics are significantly associated with increased investment. Similarly, mainline Protestants are also associated with greater health and hospital spending, although no significant effects of these denominations are found for nonhealth spending or aggregate health-shaping investment. In supplemental analyses presented in Appendix C, individual mainline denominations express distinct relationships with investment. This suggests a

greater degree of diversity in mainline attitudes towards secular institutions. This diversity may be masking the effects of this group in the models in Table 1. Historically black Protestants are associated with a significant decrease in nonhealth and aggregated institutional investment, providing support for the hypothesis that skepticism among black Protestants towards these institutions reduces investment in them (Hypothesis 5).

The models in Table 1 demonstrate meaningful differences amongst conservative Protestant denominations, supporting Hypotheses 2 and 3. Evangelicals are expected to have a modest or mixed association with institutional investment (Hypothesis 2). Across all models, evangelical Protestants are found to have a statistically 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 3), and this hypothesis is supported by the analyses – with the notable exception of fundamentalists and healthcare and hospital spending (Model 1). The increased significance in Models 2 and 3 of the association between fundamentalist 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 case, models observing only health and hospital investment would ignore much of the total health-shaping investment influenced by fundamentalists.

Previous research evaluated the role of the religious environment in shaping age-, race-, and sex-standardized mortality (Blanchard et al. 2008). Comparable fixed effects regression and indirect effects analyses of age-, race-, and sex-standardized mortality rates can be found in Appendix C. In the present study, fixed effects regression models indicate substantively distinct effects of religious traditions on black and white mortality rates. Therefore, I present separate analyses of white and black mortality in Tables 2 and 3.

Table 2 presents findings from fixed effects regression analyses of age- and sex-standardized white 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. The proportional dominance of fundamentalist, Pentecostal, and historically black Protestant denominations is found to be associated with increases in mortality, whereas that of Catholics, mainline Protestants, and Evangelicals is associated with decreased mortality rates. Aggregate health-shaping spending is introduced in Model 2 and each standardized unit increase in this index is associated with 11.021 fewer deaths per 100,000 residents per year. Accounting for institutional investment produces noticeable changes in the coefficients of the religious traditions included in the analyses. The coefficient for historically black Protestants decreases markedly, for example. This suggests that white mortality is increased by reduced institutional investment in places with greater proportional dominance of black Protestants.

While an interpretively useful 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 clear evidence of this effect⁴. 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, evangelical, mainline Protestant, and historically black Protestant denominations.

In order to examine the composite effect of religion-based anti-spending ideology on mortality, I conducted a separate fixed-effect regression analysis of these attitudes and white mortality rates. This analysis indicated that an increase of 10% in local anti-spending attitudes is associated with a 22.351 increase in white mortality rates.

Table 3 presents findings from fixed effects regression analyses of age- and sex-standardized black mortality rates. These models apply identical independent and control variables to those in Table 2. Notably, the effect sizes for fundamentalists, Pentecostals, and historically black Protestants are markedly increased. Interestingly, unlike with white mortality, mainline Protestants do not express a protective effect for black mortality. Aggregate health-shaping spending is included in Model 2 and is associated with 26.754 fewer deaths per 100,000 residents per year. Fundamentalists, evangelicals, mainline Protestants, and historically black Protestants see significant indirect effects through institutional investment. Reduced institutional investment explains 12.43% of the total observed effect, supporting the hypothesis that one avenue through which black Protestants increase mortality rates is through institutional disinvestment (Hypothesis 6).

As with white mortality rates, I conducted a separate analysis of anti-spending ideology and black mortality rates. This analysis indicated that an increase of 10% in anti-spending religious ideology is associated with a 59.083 increase in black mortality rates – more than twice that of the corresponding increase in white mortality rates.

Together, Tables 2 and 3 demonstrate that the mortality effects of local religion are not one-size-fits-all. Black and white mortality rates appear to be quite differently associated with religious traditions. These associations are also differently attenuated by institutional investment. Though there is denominational unevenness in these results, the findings generally support the finding that accounting for institutional investment will account for a significant portion of the total effects of religious traditions (Hypothesis 4).

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, 2018; 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. Anti-spending attitudes nested within religious traditions are associated with reduced spending at the local level.

The findings in this study underscore the importance of “this-worldly” and “otherworldly” theological orientations. Traditions marked by distinctly “otherworldly” theological orientations are associated with lessened community support for local institutions. Among “otherworldly” traditions, insularity appears to strengthen anti-institutional theological positions and reduce local investment in health-shaping institutions.

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.

The relationships between religious traditions and public institutions have been explored by previous research. At the local level, many health services and departments interact frequently with religious traditions. In fact, Barnes and Curtis (2009) find that 83.1 percent of local health departments actively partnered with faith communities in some way. Larger health departments were more likely to partner more extensively with religious groups, likely due to greater available resources in larger jurisdictions. However, given the health concerns of rural communities and the centrality of religious institutions in these spaces, partnerships in smaller jurisdictions and rural areas may provide the greatest return on investment. With wide health disparities between urban and rural spaces, this conduit may represent a missed opportunity by local health departments to reach disadvantaged populations via important hubs of rural social life.

Both local and federal outreach efforts (e.g. Health and Human Services’ Center for Faith and Opportunity Initiatives) might also take note of findings in this area of research. This study finds that insular religious traditions are strongly and disproportionately associated with black mortality rates, and that the religious environment may meaningfully contribute to health disparities. Outreach relying on religious groups’ predisposition to engagement will likely widen existing health disparities between these traditions and between communities populated by these traditions. Further, the findings in this research echo lessons from the Robert Wood Johnson Foundation’s Culture of Health initiative. Health is shaped by institutions outside of the healthcare sector, and investment in non-healthcare social services has significant, positive associations with population health (McCullough and Leider, 2016). An important step through which health disparities may be reduced, therefore, may be through reducing alienation between faith communities and non-healthcare institutions.

A notable contribution of this study is the inclusion of historically black Protestants into scholarship on the religious environment and health. Black Protestant denominations, historically distinct from other Christian traditions in America, are associated with lower rates of institutional investment. This association is unlikely to be due to attitudes about

ideal levels of total public spending, however. Rather, negative associations between black Protestants and local health-related spending are more likely to be the result of structural disadvantage, skepticism among black Protestants of the health care system, disparities in political salience, and heightened racial conservatism among whites.

This study also reveals that white and black mortality rates are differently associated with religious environments. Black mortality appears, in general, to be more sensitive to the religious environment than white mortality. This sensitivity extends to primarily-white traditions, suggesting that it is not only what black Protestants believe, but what their white neighbors believe that matters for black mortality. Negative correlations between black Protestants and local investment, coupled with positive associations between black Protestants and mortality, underscore the need for conversations and collaboration between black churches and those institutions which shape mortality. Additionally, institutional investment appears to be more than twice as effective at reducing black mortality rates than white mortality rates. Greater investment in black communities, coupled with a culturally and theologically sensitive outreach effort (see: Campbell et al., 2007), may be an important step towards reducing health disparities.

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.

An important theoretical limitation regards religion as social capital. It is possible that religious traditions covary with different types of social capital influential for support for local spending and local mortality rates. An additional conceptual limitation of the study is the potential for reverse causation. While careful attention was paid to the years in which variables were measured, it remains a possibility that local resources may shape the appeal of or survivability among certain religious traditions but not others.

Two notable findings in this study suggest new directions for research in this area of study. First, a greater proportional dominance of mainline Protestants was found to increase public health and hospital investment but were not found to significantly increase nonhealthy or total spending.⁵ When disaggregated, however, this picture becomes more complex. Appendix D contains results from supplemental analyses of individual mainline Protestant denominations and institutional investment. Mainline Protestant traditions have divergent and unique associations with institutional investment. The disappearing effect of mainline

⁵In 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.

Protestant support for public institutions seen in Table 1 appears to be the result of this internal diversity. These results suggest unexplored denominational diversity among mainline Protestants and challenge the conceptualization of these groups as a monolithic group. Additionally, mainline Protestants and Catholics routinely operate private health, hospital, and educational institutions. Places with religious alternatives to public institutions may see reduce support for public options because of perceived redundancies. Future research should examine the role of religious alternatives in influencing public attitudes towards public institutions.

Second, the analyses in this study suggest that institutional investment does not function universally to mediate the effects of religious denominations. For example, institutional investment does not significantly mediate the effects of Catholics or of Pentecostals, even though these groups are significantly associated with changes in local investment. Further 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 local culture, 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.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Appendix

Appendix A:

Descriptive Statistics

Variables	Mean	S.D.
Mortality		
Age, Race, Sex-Standardized Mortality	735.021	149.875
Age and Sex-Standardized White Mortality	809.852	140.091
Age and Sex-Standardized Black Mortality	617.463	429.781
Institutional Investment		
Health & Hospital Investment	1.069	0.228
Non-Healthcare Investment	0.896	0.501
Aggregate Health-Shaping Investment	0.810	0.594
Religious Environment		

Variables	Mean	S.D.
Fundamentalist	13.603	15.365
Pentecostal	0.053	1.621
Evangelical	4.265	4.762
Mainline Protestant	10.791	8.754
Catholic	11.800	12.626
Historically Black Protestant	1.452	3.183
Prevalence of Anti-Spending Ideology	25.269	10.163
Economic Environment		
Average Household Income	46.020	11.560
Gini Quartiles	-	-
Quartile 1	0.243	0.429
Quartile 2	0.256	0.436
Quartile 3	0.240	0.427
Quartile 4 (Contrast)	-	-
Demographic Controls		
Percent Black	8.649	13.984
Percent Married	54.059	6.717
Percent 65+	16.998	4.189
Percent Urban	43.350	29.429
Population Size (ln)	10.484	1.332
Region		
SO	0.456	0.499
MW	0.334	0.460
WE	0.140	0.360
NE	0.070	0.255

Notes: n= 2,640 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. Measures of institutional investment are standardized and log-transformed in order to address skew.

Appendix B:

Classification Schema of Protestant Denominations

Evangelical	Fundamentalist
Allegheny Wesleyan Methodist Connection	Baptist General Conference
Associate Reformed Presbyterian Church	Church of God (Anderson, Indiana)
Brethren Church (Ashland, Ohio)	Baptist Missionary Association of America
Brethren in Christ Church	Church of the Nazarene
Christian Churches and Churches of Christ	Churches of Christ
Christian Reformed Church	Conservative Baptist Association of America
The Christian and Missionary Alliance	Duck River and Kindred Baptists Associations
Cumberland Presbyterian Church	Enterprise Baptist Association
Evangelical Lutheran Synod	General Six Principle Baptists
Evangelical Mennonite Church	Independent Fundamental Churches of America

Evangelical Mennonite Brethren Conference	Interstate and Foreign Landmark Missionary Baptists Association
Evangelical Presbyterian Church	Jasper Baptist and Pleasant Valley Baptist Associations
The Association of Free Lutheran Congregations	The Missionary Church
Fundamental Methodist Church	National Association of Free Will Baptists
Lutheran Church, Missouri Synod	New Hope Baptist Association
Mennonite Church	Old Missionary Baptists Association
Mennonite Church, The General Conference	Primitive Baptist Associations
Plymouth Brethren Christian Church	Seventh Day Baptist General Conference
Presbyterian Church in America	Southern Baptist Convention
Primitive Methodist Church in the USA	Two-Seed-in-the-Spirit Predestinarian Baptists
Seventh-Day Adventist Church	Wayne Trail Missionary Baptists Association
The Wesleyan Church	Mainline
Wisconsin Evangelical Lutheran Synod	American Baptist Churches
Pentecostal	Christian Church (Disciples of Christ)
Assemblies of God	Episcopal Church
The Bible Church of Christ	Evangelical Lutheran Church
Church of the Brethren	Presbyterian Church (USA)
Church of God (Cleveland, Tennessee)	United Church of Christ
Church of God in Christ, Mennonite	United Methodist Church
Church of God of Prophecy	Historically Black Protestant
Church of God of the Mountain Assembly	African Methodist Episcopal Church
Fire Baptized Holiness Church, Wesleyan	African Methodist Episcopal Zion Church
International Church of the Foursquare Gospel	Christian Methodist Episcopal Church
International Pentecostal Church of Christ	Church of God in Christ
International Pentecostal Holiness Church	National Baptist Convention of America
Open Bible Standard Churches	National Baptist Convention, USA
Pentecostal Church of God	National Missionary Baptist Convention, Inc.
Independent Charismatic Churches	Progressive National Baptist Convention, Inc.

Appendix C:

Models Predicting 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	5.3026 ***	0.2223	5.1384 ***	0.2224	0.1643 **	0.0522
Pentecostal (ln)	12.5831 ***	1.8912	12.3255 ***	1.8788	0.2577	0.3824
Evangelical	-2.3880 ***	0.6056	-2.0280 ***	0.6043	-0.3600 **	0.1353
Mainline Protestant	-1.0642 **	0.3271	-0.9023 **	0.3260	-0.1619 *	0.0709
Catholic	-0.3410 *	0.1619	-0.2886	0.1610	-0.0524	0.0337

	Model 1 (Reduced)		Model 2 (Full)		Indirect Effect through Institutional Investment	
	b	s.e.	b	s.e.	b(d)	s(d)
Historically Black Protestants	3.7891 ***	1.0655	2.9267 **	1.0677	0.8624 ***	0.2567
Institutional Investment						
Aggregate Health-Shaping Investment			-14.9015 ***	2.4465		
Relative and Absolute Income						
Average Household Income	-2.7713 ***	0.1497	-2.4929 ***	0.1556	-0.2784 ***	0.0547
Income Inequality (Gini Coefficient)						
Quartile 1	43.1995 ***	5.9780	43.8785 ***	5.9383	-0.6790	1.2064
Quartile 2	47.1856 ***	4.8376	46.1106 ***	4.8079	1.0749	0.9880
Quartile 3	41.3607 ***	3.7666	40.1288 ***	3.7464	1.2320	0.7835
Quartile 4 (Contrast)	-	-	-	-	-	-
Controls						
Percent Black	0.8129 **	0.2582	1.0312 ***	0.2590	-0.2184 ***	0.0631
Percent Married	-1.9983 ***	0.4889	-2.5945 ***	0.4953	0.5962 ***	0.1387
Percent 65+	-2.7682 ***	0.4390	-1.9086 ***	0.4583	-0.8596 ***	0.1664
Percent Urban	0.7726 ***	0.1082	0.6029 ***	0.1110	0.1696 ***	0.0353
Population Size (ln)	-7.5323 ***	1.7905	3.3245	2.5178	10.8568 ***	1.8184
Region						
South	-83.2749 ***	6.0794	-65.8775 ***	6.6795	17.3974 ***	3.1066
Midwest	-19.3916 ***	5.4363	-13.5440 *	5.4839	-5.8475 ***	1.4543
West	-69.1515 ***	5.7282	-53.0803 ***	6.2712	16.0712 ***	2.8787
Northeast (Contrast)	-	-	-	-	-	-
Intercept	1029.6022 ***	31.2473	922.7313 ***	35.6510	-	-
Mean Squared Error	23.5371		23.2174		-	
R²	0.5617		0.5678		-	

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

Notes: n=2,640 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 expressed in thousands.

Appendix D:
State Fixed Effects Models Predicting Local Spending with Disaggregated Mainline Protestants

	<i>Health and Hospital Index</i>		<i>Nonhealth Investment Index</i>		<i>Aggregate Health- Shaping Investment</i>	
	Model 1		Model 2		Model 3	
	b	s.e.	b	s.e.	b	s.e.
American Baptist Churches (ln)	0.0591 ***	0.0071	0.0710 ***	0.0096	0.0857 ***	0.0100
Christian Church (Disciples of Christ)	-0.0195	0.0178	-0.0647 **	0.0243	-0.0861 ***	0.0252
Episcopal Church	-0.1784 ***	0.0258	-0.1582 ***	0.0351	-0.2463 ***	0.0370
Evangelical Lutheran Church	-0.0019	0.0041	-0.0012	0.0055	-0.0042	0.0057
Presbyterian Church	0.0257	0.0180	0.0553 *	0.0245	0.0662 **	0.0254
United Church of Christ	0.0240	0.0160	-0.0123	0.0218	-0.0217	0.0227
United Methodist Church	-0.0001	0.0053	-0.0244 ***	0.0072	-0.0228 **	0.0075

*
p<.05
**
p<.01

p<.001

Notes: n=2,640 U.S. counties. Religious environment is measured as the percentage of each religious tradition's adherents in a county's total population. Models include religious traditions and control variables included in the models in Table 1. Health expenditures indices and American Baptist Churches are logged in order to reduce skew.

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Highlights:

- Religious traditions are associated with local spending in institutions which influence public health.
- Fundamentalist, black Protestant, and Pentecostal traditions have strong negative associations with spending in these areas.
- These associations explain a significant portion of the total association between local religion and mortality.
- Black mortality rates appear to be more sensitive to religious contexts than white mortality rates.

Table 1:

State Fixed Effects Models Predicting Standardized Local Health and Nonhealth Spending

	Health and Hospital Index		Nonhealth Investment Index		Aggregate Health- Shaping Investment		Aggregate Health- Shaping Investment	
	Model 1		Model 2		Model 3		Model 4	
	b	s.e.	b	s.e.	b	s.e.	b	s.e.
Religious Environment								
Fundamentalist	0.0005	0.0004	-0.0035***	0.0006	-0.0036***	0.0007		
Pentecostal (ln)	-0.0097***	0.0025	-0.0152***	0.0045	-0.0201***	0.0050	-	-
Evangelical	0.0008	0.0009	-0.0020	0.0017	-0.0016	0.0019	-	-
Mainline Protestant	0.0017**	0.0005	0.0012	0.0010	0.0019	0.0011	-	-
Catholic	0.0012***	0.0003	0.0013*	0.0006	0.0016*	0.0007	-	-
Historically Black Protestant	-0.0027	0.0019	-0.0183***	0.0034	-0.0205***	0.0038	-	-
Prevalence of Anti-Spending Ideology	-	-	-	-	-	-	-0.0020*	0.0008
Relative and Absolute Income								
Income Inequality (Gini Coefficient)								
Quartile 1	-0.0732***	0.0127	-0.0516*	0.0231	-0.0867***	0.0258	-0.0816**	0.0261
Quartile 2	-0.6881***	0.0113	-0.0713***	0.0206	-0.0964***	0.0230	-0.0891***	0.0233
Quartile 3	-0.4679***	0.0106	-0.0514**	0.0192	-0.0717***	0.0215	-0.0791***	0.0218
Quartile 4 (Contrast)	-	-	-	-	-	-	-	-
Average Household Income	0.0005	0.0005	0.0121***	0.0009	0.0121***	0.0010	0.0152***	0.0009
Controls								
Percent Black	0.0012*	0.0005	0.0065***	0.0009	0.0077***	0.0010	0.0041***	0.0008
Percent Married	-0.0005	0.0009	-0.0038*	0.0016	0.0034	0.0018	-0.0058**	0.0018
Percent 65+	0.0031**	0.0011	0.0242***	0.0020	0.0252***	0.0023	0.0276***	0.0022
Percent Urban	-0.0006**	0.0002	-0.0001	0.0004	0.0001	0.0004	0.0004	0.0004
Population Size (ln)	0.1124***	0.0048	0.2342***	0.0087	0.3036***	0.0097	0.2894***	0.0095
Region	-	-	-	-	-	-	-	-
South	0.0650***	0.0179	0.4777***	0.0324	0.5116***	0.0362	0.4056***	0.0338

	Health and Hospital Index		Nonhealth Investment Index		Aggregate Health- Shaping Investment		Aggregate Health- Shaping Investment	
	Model 1		Model 2		Model 3		Model 4	
	b	s.e.	b	s.e.	b	s.e.	b	s.e.
Midwest	0.0952 ***	0.0167	0.2158 ***	0.0303	0.2664 ***	0.0338	0.2507 ***	0.0330
West	0.1792 ***	0.0182	0.4470 ***	0.0331	0.5316 ***	0.0370	0.4801 ***	0.0368
Northeast (Contrast)	-	-	-	-	-	-	-	-
Intercept	-0.0223 **	0.0676	-2.6219 ***	0.1228	-3.5309 ***	0.1372	-3.3585 ***	0.1375
R²	0.3603		0.5638		0.6139		0.5990	

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

Notes: n= 2,640 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. Health expenditure indices are log-transformed in order to reduce skew. 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. Indices are log-transformed to address skew.

Table 2:

Models Predicting Age- and Sex-Standardized White Mortality Rates

	Model 1 (Reduced)		Model 2 (Full)		Indirect Effect through Institutional Investment	
	b	s.e.	b	s.e.	b(d)	s(d)
Religious Environment						
Fundamentalist	4.5731 ***	0.2057	4.4516 ***	0.2064	0.1215 **	0.0413
Pentecostal (ln)	11.1900 ***	1.7499	10.9989 ***	1.7429	0.1906	0.2820
Evangelical	-2.1219 ***	0.5603	-1.8557 ***	0.5606	-0.2662 *	0.1049
Mainline Protestant	-1.4537 ***	0.3027	-1.3339 ***	0.3024	-0.1198 *	0.0542
Catholic	-0.2442	0.1498	-0.2054	0.1494	-0.0387	0.0252
Historically Black Protestants	2.0179 *	0.9859	1.3801	0.9904	0.6378 **	0.2049
Intercept	1242.8256 ***	28.9133	1163.7835 ***	33.0723	-	-
Mean Squared Error	20.1522		19.9802		-	
R²	0.6557		0.6588		-	

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

Notes: n=2,640 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. These models were calculated using identical control variables to those included in Table 1 but are excluded here to preserve space.

Table 3:

Models Predicting Age- and Sex-Standardized Black Mortality Rates

	Model 1 (Reduced)		Model 2 (Full)		Indirect Effect through Institutional Investment	
	b	s.e.	b	s.e.	b(d)	s(d)
Religious Environment						
Fundamentalist	9.3753 ***	0.6809	9.0804 **	0.6845	0.2949 **	0.1140
Pentecostal (ln)	16.3757 **	5.7923	15.9131 **	5.7810	0.4626	0.6783
Evangelical	-2.9938	1.8548	-2.3475 *	1.8596	-0.6462 *	0.2802
Mainline Protestant	0.4851	1.0019	0.7758 *	1.0030	-0.2907 *	0.1412
Catholic	-0.5495	0.4960	-0.4554	0.4956	-0.0940	0.0628
Historically Black Protestants	12.4564 ***	3.2634	10.9081 ***	3.2852	1.5484 **	0.5749
Intercept	519.3789 ***	95.7057	327.5056 **	109.6996	-	-
Mean Squared Error	220.8017		219.8266		-	
R²	0.3262		0.3295		-	

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

Notes: n=2,640 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. These models were calculated using identical control variables to those included in Table 1 but are excluded here to preserve space.