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Article

# Can Religiosity Be Explained by ‘Brain Wiring’? An Analysis of US Adults’ Opinions

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**Abstract:** Studies examining how religion shapes individuals’ attitudes about science have focused heavily on a narrow range of topics, such as evolution. This study expands this literature by looking at how religion influences individuals’ attitudes towards the claim that neuroscience, or “brain wiring,” can explain differences in religiosity. Our analysis of nationally representative survey data shows, perhaps unsurprisingly, that religiosity is negatively associated with thinking that brain wiring can explain religion. Net of religiosity, though, individuals reporting religious experiences are actually more likely to agree that brain wiring can explain religiosity, as are individuals belonging to diverse religious traditions when compared to the unaffiliated. We also find that belief in the general explanatory power of science is a significant predictor of thinking that religiosity can be explained by brain wiring, while women and the more highly educated are less likely to think this is true. Taken together, these findings have implications for our understanding of the relationship between religion and science, and the extent to which neuroscientific explanations of religiosity are embraced by the general US public.

**Keywords:** religiosity; religion and science; brain; neuroscience; attitudes; opinions; United States

## 1. Religion and Views of Science

Much research has illuminated the centrality of religion in shaping attitudes around a myriad of scientific and technological findings and issues. Some of this work has focused on morally-charged scientific issues such as abortion, the use of human embryonic stem cells, and reproductive genetic technologies (Ecklund et al. 2017; Emerson 1996; Evans 2002; Evans and Hudson 2007). Other research has focused on how religion shapes attitudes towards scientific claims that seem to undermine the plausibility of certain religious tenets, such the age of the earth or the origins of life (Baker 2013; Hill 2014; Ecklund and Scheitle 2018).

Little research, though, has examined the public’s thoughts about whether science can explain religion itself. That is, rather than simply looking at narrow scientific issues that challenge the moral or epistemological claims of religion, extant research has not considered science as a general explanation for religion, or how religious beliefs and adherence might shape attitudes towards a scientific explanation for religion itself.

Scientific explanations for the origins of religion were explored by early anthropologists and sociologists (e.g., Malinowski 1948; Tylor 1871). In studying the religious beliefs and systems of “less developed” societies, or religion’s “elementary forms,” individuals like Durkheim (Durkheim 1995) thought they could discern the fundamental social source and function of religion. More recently, though, scientific claims concerning the origins of religion have come from a different area of science. Specifically, research in the area of neuroscience has explored how religious beliefs and experiences map

onto the brain and examined whether knowledge of the brain might explain differences in individuals' religiosity (Albright 2000; Ashbrook and Albright 1997; Hamer 2004). Research in cognitive science and psychology have further advanced this stream of thought by examining the links between specific cognitive processes and religiosity in an effort to identify 'natural' cognitive origins and pathways for religious beliefs (Barrett 2000, 2004, 2011), and highlighting the psychological and emotional dimensions of religious beliefs and experiences (see Emmons and Paloutzian 2003).

How does the general public feel about the possibility that religiosity might be determined by "brain wiring"? Such a claim would seem to reduce religion to entirely material or physical mechanisms. This would seem for many to conflict with the principle that divine or supernatural intervention is possible, which is a core belief for many religious Americans and a key lens through which they interpret and evaluate science (Ecklund and Scheitle 2018). Or is it possible that religious Americans can reconcile such beliefs with claims concerning the role of the brain in religiosity? Research on the public's attitudes towards evolution, for instance, has found that some religious individuals interpret evolution as the mechanism being utilized by God, and therefore have no objection to the idea of evolution. Will the public similarly view the brain as another tool used by God? It is with these questions in mind that we seek to demystify assumptions that religious Americans are inherently at odds with science by instead examining public attitudes empirically. By examining public perceptions, our analysis affords insight into the extent to which neuroscientific explanations of religiosity are embraced by the general US public, and whether neuroscience may represent a potential site of overlap or tension between religion and science, which may have implications on our understanding of the faith-science interface more broadly.

## 2. Religion, Body, and Mind

Within the domain of religion scholarship, the embodied effects of religious beliefs, practices, and experiences has been a robust site of examination. For instance, there continues to be extensive research on religiosity as a mechanism of coping with stress and buffering the deleterious physical and mental health consequences of perceived experiences of discrimination (Bierman 2006; Ellison and Levin 1998; Williams et al. 1991). These findings signal potential psychosocial benefits of religious adherence and expression, in addition to a possible mind-body connection worthy of enduring exploration. In a similar vein, social scientific studies of religion have increasingly pointed to cognitive understandings of religion as a dynamic site in which to advance our understanding of religion, specifically the cultural dimensions of religious beliefs, narratives, and identities (see Wuthnow 2007).

However, this strain of literature departs from research that views cognitive processes and, more specifically, "brain wiring" not just as a means of describing religious beliefs and experiences but also *explaining* human dispositions towards religiosity. In fact, such work has claimed evidence of a "God spot" or "God module" in the brain that facilitates transcendental experiences and a connection with the divine (Albright 2000; Ashbrook and Albright 1997; Hamer 2004). In so doing, such work has encountered criticism from some social scientists who view such claims as essentializing or reducing religious expressions and experiences to biological characteristics (see Wuthnow 2007). Nonetheless, research has significantly grown in recent years, particularly among neuroscientists, in the domain coined neurotheology (McNamara 2006, 2009; Newberg 2010). This stream of work seeks to understand the science behind religious and spiritual experiences through individuals' biological, psychological, and neurological responses. In other words, it examines how our neural processes are related to religious beliefs and practice.

For example, in order to interrogate the effects of religious expression on the brain and how the brain might have an impact on religious expression, neuroscientists like Andrew Newberg (2010) conducted brain scans on nuns, Buddhists, and a diverse range of other religious practitioners across faith traditions both before and after engaging in religious and spiritual activities such as prayer and meditation, tracing changes in neurological activity. Indeed, he observed that after engaging in such practices, activity in different parts of the brain were altered. For instance, the area of the brain that has

been linked to processing sensory information and developing spatial connections between oneself and others, the parietal lobe, appeared to become deactivated after repeated ritual practices, suggesting that the sensory boundary between one's sense of self and one's relationship with others or with God may become blurred overtime through these practices, and potentially amplify these connections (Ambrosino 2019; Newberg 2010). In addition, findings suggest that not only did participants who consistently meditated for eight weeks perceive that their memory had improved and that they had more mental clarity, but these perceptions were supported by brain scans and memory tests (Conan 2010; Newberg 2010).

Similarly, a team of neuroscientists in Canada asked a group of fifteen nuns to recall meaningful religious or mystical experiences while in a functional magnetic resonance imaging (fMRI) machine scanning their brain activity (see Pearson 2006). Although the nuns were not actively praying, these memories alone activated certain parts of the brain, like the caudate nucleus, which other research finds is linked with emotions such as happiness. Meanwhile, other work in neuroscience has found evidence of a specific gene variation that appears to be linked to individuals having an increased tendency toward spiritual experiences (Hamer 2004), further amplifying discourse around an inherent predisposition to religious and spiritual commitment. Despite the significant increase in this domain of research, some neuroscientists like Fingelkurts and Fingelkurts (2009) suggest that future work ought to use these tools to describe rather than explain religiosity, given other factors that may also be at play.

### 3. Perceptions of Brain Science's Power

Beyond the scholarly debates of social scientists, theologians, and neuroscientists, in recent years, books such as neuroscientist Andrew Newberg's (2010) *Principles of neurotheology* has garnered increasing public attention (Blumberg 2014; Conan 2010), signaling growing public interest in and consumption of research that engages with the interplay between brain science and religion. In fact, public discourse around this intersection has increasingly surfaced among religious Americans, specifically Christians, suggesting that neuroscience may represent a potential site of synergy between religion and science—despite being an interface often fraught with perceptions of tension (Ecklund and Scheitle 2018). For example, recent articles and op-eds in such outlets as *Christianity Today* have cast neuroscientific findings as complementary to Christian values and ideals (Egnor 2018; Moll 2016; Ortberg 2014).

Despite this growing body of literature across disciplines and seemingly growing public interest, there is little research to date that examines how the public views this relationship. Some recent studies suggest that neuroscientific evidence may have limited impact on lay understanding and thinking. In fact, in interviews with residents in the UK regarding their views on “brain research,” O'Connor and Joffe (2014) found little evidence to suggest that neuroscientific understandings and ideas have permeated the public consciousness, with many respondents perceiving such research as distinct or removed from their own experience of the social world. Further, in their examination of the extent to which neuroscientific concepts of the self and personhood have disseminated the general public and shaped public consciousness, O'Connor and Joffe (2013, p. 254) found that even when these ideas do reach the public consciousness, “neuroscientific ideas have assimilated in ways that perpetuate rather than challenge existing modes of understanding self, others and society.”

Taken together, the limited but growing extant literature on religion and neuroscience has illuminated this intersection as fertile ground in which to extend previous work examining religion as a sensory, emotional, and embodied experience (Inbody 2015) by examining its cognitive dimensions as well (Barrett 2011; DiMaggio 1997; Emmons and Paloutzian 2003; Turner 2007). However, significant gaps remain in our understanding of this intersection, specifically in terms of public perceptions of this relationship and the extent to which everyday Americans perceive that science can explain religiosity. Thus, here we address this gap by drawing on original, nationally representative survey data of US adults.

#### 4. Data

Data for this study come from the Religious Understandings of Science (RUS) survey. The survey was fielded in December 2013 and January 2014 using the GfK KnowledgePanel, an online probability sample of US adults. Households are recruited into the panel after being selected from a sampling frame of residential addresses. Households lacking internet access are provided a laptop and internet service. At the time of the RUS survey, the KnowledgePanel consisted of about 50,000 individuals. Panelists who completed the survey are compensated with incentive points that they can redeem for cash or other rewards. The KnowledgePanel has been assessed by and utilized in a large number of studies from a wide range of scholarly disciplines (e.g., [Chang and Krosnick 2009](#); [Pedulla and Thébaud 2015](#); [Betz et al. 2016](#); [Barringer et al. 2017](#)).

For the RUS survey, GfK randomly selected 16,746 panelists to be invited to complete the survey. This total included an oversample of 878 individuals who stated upon entering the panel that they worked in science-related sectors. Of those who were invited, 10,241 individuals completed the survey. Weights were computed to account for the oversample of individuals working in science-related occupations as well as patterns of non-response. The weights are utilized in the analyses presented here. For these analyses, we exclude individuals with missing values on measures of interest, leaving an analytic sample of 9845 individuals.

#### 5. Measures

The primary outcome of interest in this analysis comes from a question on the RUS survey asking respondents their level of agreement with the following statement: “Differences in people’s religiosity can be explained by the fact that their brains are wired differently.” Possible responses were (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, and (5) strongly agree.

##### 5.1. Religiosity, Religious Tradition, and Religious Experiences

It would seem reasonable to hypothesize that individuals’ own religiosity may shape whether they think religiosity can be explained away by brain wiring. To account for this, we measure individuals’ religiosity using a scale of three items. The first item comes from a question asking, “To what extent do you consider yourself a religious person?” Possible responses were (1) not religious at all, (2) slightly religious, (3) moderately religious, and (4) very religious. The second item measures individuals’ religious service attendance. This was measured ranging from (1) never to (9) several times a week. The third item assessing individuals’ religiosity comes from a question on the survey asking, “About how often do you pray?” Offered responses ranged from (1) Never to (11) Several times a day. These items were standardized when creating the religiosity scale, which has a Cronbach’s alpha of 0.86.

It is possible, if not likely, that individuals’ specific religious tradition may influence their attitudes about the power of brain wiring to explain religiosity above and beyond their own religiosity. Given this, we include indicators created from a series of question on the RUS instrument that began by asking for respondents’ broad religious affiliation (“Religiously, do you consider yourself to be Protestant, Catholic, Jewish, Mormon, Muslim, not religious, or something else?”) and then asking follow-up questions about specific denominations or traditions within that broad affiliation. The analysis distinguishes between the following categories: (1) Evangelical Protestant, (2) Mainline Protestant, (3) Black Protestant, (4) Catholic, (5) Jewish, (6) Mormon, (7) Muslim/Hindu/Buddhist/Sikh/Jain, (8) Other religion, and (9) Unaffiliated (e.g., no religion, atheist, agnostic). In the analysis we use the unaffiliated category as the comparison group.

We also include a scale of items from the survey asking about individuals’ experiences with miracles or the divine. This scale is included as such perceived external interactions with the divine would seem likely to undermine an individual’s view that religiosity is simply a function of their brain. Respondents to the RUS survey were asked to identify whether they have “had any of the following experiences . . . ” These experiences included: (1) I witnessed a miraculous, physical healing,

(2) I received a miraculous, physical healing, (3) I felt called by God to do something, (4) I heard the voice of God speaking to me, and (5) I had a religious conversion experience. The Cronbach's alpha for this scale is 0.78.

### 5.2. Views on Explanatory Power of Science

Attitudes about the ability of neuroscience (i.e., "brain wiring") to explain differences in religiosity is likely not only a function of individuals' religious characteristics, but also their orientation and thoughts about the nature and power of science. The RUS survey included a couple questions that get at this issue. The first asked individuals their level of agreement with the following statement: "Given enough time, science will be able to provide a natural explanation for everything." The second asked individuals their level of agreement with this statement: "Science can only truly explain what can be seen and touched." For both items offered responses were (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, and (5) strongly agree. We do not combine these two items into a scale as preliminary analyses found that they were not highly correlated with each other ( $r = 0.06$ ).

### 5.3. Controls

We include several control measures in our analysis. The first group of controls is meant to account, at least indirectly, for individuals' likely knowledge of neuroscience. The first measure in this group represents individuals' self-reported interest in "new scientific discoveries." Offered responses were (1) not at all interested, (2) moderately interested, and (3) very interested. The second measure is simply individuals' educational level. This is measured as (1) less than a high school degree, (2) high school degree, (3) some college, and (4) Bachelor's degree or higher. The analysis utilized the less than high school degree category as the comparison group.

The second group of controls represents demographic differences between individuals. Included in this group are measures of individuals' gender, age, and race or ethnicity. Gender is measured with male as the reference group. Age is measured continuously and ranges from 18 to 93. Race and ethnicity are measured as (1) white, non-Hispanic, (2) black, non-Hispanic, (3) other, non-Hispanic, (4) Hispanic, and (5) Multiple races/ethnicities. Note that these demographic measures are taken from GfK's background variables on panelists from when they complete the initial entry survey to join the panel and were not directly asked on the RUS survey.

## 6. Results

Descriptive statistics for all the measures included in the analysis are shown in Table 1. Looking at the outcome variable of interest for this study, we find that just under 40% of US adults do not have an opinion either way about whether brain wiring can explain differences in religiosity. Of those US adults who do have an opinion, most do not agree that brain wiring can explain religiosity. A quarter of US adults strongly disagree with this claim, while another 21% disagree with it. Only about 15% of US adults agree that brain wiring can explain differences in religiosity, and only 3.5% strongly agree with this claim.

Next, we examine whether responses vary by individuals' religious characteristics, with Tables 2 and 3 providing an initial look. Specifically, Table 2 compares responses by respondents' religious tradition. Although the differences are not overwhelmingly large, this table suggests some variation in attitudes across religious tradition. For example, Evangelical Protestant (31.7%) and Jewish (35.6%) respondents are the most likely to strongly disagree that brain wiring can explain religiosity. If we look at the strongly agree side of the response scale, we see that Black Protestant respondents (8.2%) are the most likely to say that brain wiring can explain differences in religiosity.

Table 3 compares responses by respondents' score on the religiosity scale. Specifically, it shows responses for those in the bottom 20% and in the top 20% on the religiosity scale. Here, we find somewhat stronger differences, with 62.2% of the most religious individuals disagreeing that brain wiring explains religiosity. This compares to 43.7% of the least religious individuals. Looking at the

other side of the response scale, we see that 13.1% of the least religious agree that brain wiring explains religiosity compared to 8.7% of the most religious individuals. In short, the most religious individuals appear less likely to believe that their religiosity can be explained by brain wiring when compared to their lesser religious counterparts.

**Table 1.** Descriptive Statistics.

	Mean or Percentage	Linearized Standard Error	Min-Max
<b>Differences in people’s religiosity can be explained by the fact that their brains are wired differently.</b>			
Strongly disagree	25.0%	–	–
Disagree	21.2%	–	–
Neither	39.5%	–	–
Agree	10.6%	–	–
Strongly agree	3.5%	–	–
<b>Religiosity</b>	–0.04	0.01	–1.63–1.69
<b>Religious Tradition</b>			
Evangelical Protestant	25.6%	–	–
Mainline Protestant	14.4%	–	–
Black Protestant	4.9%	–	–
Catholic	23.8%	–	–
Jewish	1.9%	–	–
Mormon	1.8%	–	–
Non-Judeo Christian	2.2%	–	–
Other	9.5%	–	–
Unaffiliated	15.8%	–	–
<b>Religious Experiences Scale</b>	1.2	0.003	1–2
<b>Given enough time, science will provide a natural explanation for everything.</b>	2.9	0.01	1–5
<b>Science can only truly explain what can be seen and touched.</b>	2.9	0.01	1–5
<b>Interest in Science</b>	2.15	0.01	1–3
<b>Education</b>			
Less than high school degree	12.3%	–	–
High school degree	29.4%	–	–
Some college	28.7%	–	–
Bachelor’s degree or more	29.7%	–	–
<b>Female</b>	52.0%	–	–
<b>Age</b>	47.4	0.23	18–93
<b>Race/Ethnicity</b>			
White, non-Hispanic	67.7%	–	–
Black, non-Hispanic	10.9%	–	–
Other, non-Hispanic	6.1%	–	–
Hispanic	13.9%	–	–
Multiple races/ethnicities	1.3%	–	–

Note: Religious Understandings of Science Survey; N = 9845; Due to rounding, some variables may not add precisely.

**Table 2.** Attitudes about Brain Wiring Explaining Religiosity by Religious Tradition.

<b>Differences in People's Religiosity Can Be Explained by the Fact That Their Brains Are Wired Differently.</b>	<b>Evangelical Protestant</b>	<b>Mainline Protestant</b>	<b>Black Protestant</b>	<b>Catholic</b>	<b>Jewish</b>	<b>Mormon</b>	<b>Non-Judeo Christian</b>	<b>Other</b>	<b>Unaffiliated</b>	<b>Overall</b>
Strongly disagree	31.7%	23.2%	20.3%	20.9%	35.6%	18.9%	19.9%	25.1%	23.7%	25.0%
Disagree	21.9%	21.8%	15.5%	20.7%	19.7%	32.9%	24.0%	19.8%	21.1%	21.2%
Neither agree nor disagree	35.1%	41.2%	46.1%	40.2%	32.5%	33.0%	35.7%	42.8%	42.0%	39.5%
Agree	8.1%	11.4%	9.7%	13.4%	10.8%	10.5%	17.9%	9.0%	9.7%	10.6%
Strongly agree	2.9%	2.2%	8.2%	4.6%	1.1%	4.5%	2.2%	3.0%	3.2%	3.5%
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
N	2605	1525	407	2366	227	182	159	880	1494	9845

Note: Religious Understandings of Science Survey; N = 9845; Due to rounding, some columns may not add precisely.

**Table 3.** Attitudes about Brain Wiring Explaining Religiosity by Religiosity.

<b>Differences in People's Religiosity Can Be Explained by the Fact That Their Brains Are Wired Differently.</b>	<b>Highest 1\5 on Religiosity</b>	<b>Lowest 1\5 on Religiosity</b>	<b>Overall</b>
Strongly disagree	37.6%	24.5%	25.0%
Disagree	24.6%	19.2%	21.2%
Neither agree nor disagree	29.2%	43.2%	39.5%
Agree	6.3%	10.0%	10.6%
Strongly agree	2.4%	3.1%	3.5%
	100%	100%	100%
N	1983	1993	9845

Note: Religious Understandings of Science Survey; N = 9845; Due to rounding, some columns may not add precisely.

Of course, variables like religious tradition and religiosity overlap with each other and other socio-demographic variables. To isolate the roles of these different factors we turn to Table 4. This table presents an ordinary least squares regression analysis predicting agreement that religiosity can be explained by brain wiring. The results are presented as unstandardized coefficients. Positive coefficients indicate that the predictor is associated with more agreement that religiosity can be explained by brain wiring, while negative coefficients indicate that the predictor is associated with more disagreement with this claim.

**Table 4.** Ordinary Least Squares Regression Models Predicting Agreement that Brian Wiring Explains Religiosity.

Differences in People’s Religiosity can Be Explained by the Fact That Their Brains Are Wired Differently.	Model 1: Religiosity	Model 2: Religious Tradition	Model 3: Religious Experiences	Model 4: Explanatory Power of Science
<b>Religiosity</b>	−0.12 **	−0.15 **	−0.17 **	−0.12 **
<b>Religious Tradition</b>				
Evangelical Protestant	−	0.06	0.06	0.11
Mainline Protestant	−	0.26 **	0.26 **	0.28 **
Black Protestant	−	0.38 **	0.38 **	0.38 **
Catholic	−	0.30 **	0.31 **	0.30 **
Jewish	−	−0.01	−0.01	−0.01
Mormon	−	0.30 *	0.29 *	0.33 **
Non-Judeo Christian	−	0.21	0.23	0.15
Other	−	0.12 *	0.13 *	0.16 **
Unaffiliated (ref.)	−	−	−	−
<b>Religious Experiences Scale</b>	−	−	12 *	0.12 *
<b>Given enough time, science will provide a natural explanation for everything.</b>	−	−	−	0.15 **
<b>Science can only truly explain what can be seen and touched.</b>	−	−	−	0.07 **
<b>Interest in Science</b>	−0.02	−0.02	−0.02	−0.05 *
<b>Education</b>				
Less than high school degree (ref.)	−	−	−	−
High school degree	−0.11 *	−0.11 *	−0.11 *	−0.10
Some college	−0.22 **	−0.22 **	−0.22 **	−0.19 **
Bachelor’s degree or more	−0.35 **	−0.35 **	−0.34 **	−0.30 **
<b>Female (ref. = Male)</b>	−0.14 **	−0.13 **	−0.14 **	−0.15 **
<b>Age</b>	−0.01 **	−0.01 **	−0.01 **	−0.01 **
<b>Race/Ethnicity</b>				
White, non-Hispanic (ref.)	−	−	−	−
Black, non-Hispanic	0.22 **	0.14 *	0.12 *	0.07
Other, non-Hispanic	0.17 *	0.16 *	0.15 *	0.11
Hispanic	0.22 **	0.15 **	0.14 **	0.08
Multiple races/ethnicities	0.04	0.06	0.05	0.04
R <sup>2</sup>	0.04	0.05	0.06	0.09

Note: Religious Understandings of Science Survey; N = 9845; \*  $p < 0.05$ ; \*\*  $p < 0.01$ .

Model 1 begins by looking at the role of the control measures alongside the religiosity scale. We see first that, net of the other control measures, religiosity is significantly and negatively associated ( $b = -12, p < 0.01$ ) with agreeing that religiosity can be explained by how people’s brains are wired. This corresponds to what was suggested in Table 3. Turning to the control measures, we do not find a significant association between respondents’ interest in science and the outcome. We do, however, find that more educated individuals are less likely than those with less than a high school education to believe that religiosity can be explained by brain wiring. Similarly, women are less likely than

men to agree with this claim, as are older individuals. On the other hand, individuals who are black, another race, or Hispanic are significantly more likely than white individuals to agree that brain wiring explains religiosity.

Model 2 introduces the religious tradition indicators into the analysis. This model shows that, relative to the religiously unaffiliated, Mainline Protestants, Black Protestants, Catholics, Mormons, and individuals of other minority religions are all more likely to agree that brain wiring can explain religiosity. Keep in mind that this is net of religiosity, not an unadjusted difference between these groups. For the most part we did not see large differences between these groups in Table 2. Rather, these effects in Table 4 show that we would have expected larger differences in Table 2 given the higher religiosity scores of these groups relative to the unaffiliated. The other findings in Model 2 are largely the same as Model 1. In particular, religiosity is still significantly associated with less agreement that brain wiring explains religiosity.

Model 3 introduces the religious experiences scale. Contrary to what we might have expected, the analysis finds that personal religious experiences are significantly associated with agreeing that religiosity can be explained by brain wiring net of religiosity, religious tradition, and the other controls measures. In other words, if we take two individuals who are the same religious tradition, have the same level of religiosity, and are demographically the same, the analysis shows that we would expect the individual who reports experiences like hearing the voice of God to be more likely to agree that brain wiring underlies religiosity. It is possible that such individuals view God as working through the brain, and therefore these divine experiences are not perceived as contradictory to brain wiring explaining religiosity. The other findings in Model 3 are largely the same as those seen in previous models, including those findings previously seen for religiosity and religious tradition.

The final model, Model 4, introduces our measures of individuals' attitudes about the explanatory power of science. Both of our measures show a significant and positive association with agreeing that brain wiring can explain religiosity. This was expected for the first measure representing individuals' belief that "given enough time, science will provide a natural explanation for everything." That is, if a person thinks that science will eventually explain everything through natural means, then seeing brain wiring as an explanation for religiosity seems natural. On the other hand, the finding for the measure representing individuals' view that "science can only truly explain what can be seen and touched" is somewhat surprising, as conventional thinking about religion would lead us to believe that the public sees religiosity as something largely beyond the material. To the extent that "brain wiring" can be seen, however, it is possible that this finding is actually not that contrary to what might be expected.

Examining the other variables in Model 4 finds that some previous results have been altered by the inclusion of the power of science measures (i.e., science will provide natural explanation for everything; science can only explain what can be seen and touched). Interest in science, for example, becomes a significant negative predictor of seeing brain wiring as explaining religiosity once we take into account a person's view on the explanatory power of science. We also see that the racial and ethnic differences seen in the previous models have all become non-significant in Model 4. This suggests that a primary reason why black, other race, and Hispanic individuals were more likely to agree that brain wiring explains religiosity is because these groups view science as having more explanatory power than white individuals.

## 7. Discussion and Conclusions

In recent years, *neurotheology* has garnered increasing public and scholarly interest. This stream of work not only seeks to understand the science behind religious and spiritual experiences, but also represents a potential site of synergy between religion and science—a domain often charged, morally and politically, with perceptions of tension. While analyzing brain scans has illuminated a diverse spectrum of neurological and physiological responses that religious expression inspires, we know little about how the public perceives this relationship and, specifically, whether everyday Americans perceive that "brain wiring" can explain religiosity. Better understanding these perceptions

can provide insight into how such claims may be received as science of the brain continues to advance. Thus, we turn our attention here to attitudes among the general US public to examine the extent to which perceptions of these 'natural' dispositions towards religion have been embraced by the public consciousness.

Drawing on data from an original, nationally representative survey, we find that religiosity is negatively associated with thinking that brain wiring can explain religion. However, individuals reporting religious experiences are actually more likely to agree that brain wiring can explain religiosity, net of personal religiosity. In addition, we find that belief in the general explanatory power of science is a significant predictor of believing that religiosity can be explained by brain wiring, and that significant variation emerges across religious tradition such that Mainline Protestants, Black Protestants, Catholics, Mormons, and individuals of other minority religions are all more likely than the religiously unaffiliated to agree that brain wiring can explain religiosity, even net of personal religiosity. Taking these insights together, we suggest that the relationship between religion and attitudes around brain wiring cannot be examined solely through measures of individual religiosity. By taking religious affiliation and religious experiences into account, we find that there may be other dimensions of religious adherence, belief, and experience that are also critical to consider when interrogating the relationship between religion and scientific attitudes. This may have implications for our understanding of the faith-science interface more broadly, and specifically when religion itself is seemingly deconstructed by science rather than religion as having an impact on science.

Beyond our core research question interrogating the relationship between religiosity and attitudes about "brain wiring," several additional trends emerged that we consider noteworthy. Specifically, we observed that women are significantly less likely than men to believe that religiosity can be explained by brain wiring, as are individuals with higher levels of education compared to those with less than a high school diploma. We find these results particularly notable given the significant body of literature that has found that women both in the US and around the globe tend to be more religious than men (Schnabel 2015; Sullins 2006; Trzebiatowska and Bruce 2012). Scholars have offered a myriad of ideas to explain this phenomenon, but among the most critiqued by social scientists are those that suggest innate, physiological differences between men and women (see Sullins 2006 for review). Our findings contribute to this discourse by suggesting that women may be likely to disagree with these more essentialized, physiological explanations, given that they are less likely to view brain wiring as an explanation for religiosity, altogether. In addition, the significant difference observed in views on brain wiring across socioeconomic status, as reflected by trends across education level, stands out given previous work that examines the relationship between education and religiosity (Schwadel 2011). Specifically, we find that individuals with increasingly higher levels of education are *less* likely to perceive religiosity as a function of brain wiring. This suggests that more educated individuals may be more open to other interpretations or explanations, which may have broader implications given enduring disparities in access to educational opportunities in the US, particularly for racial and ethnic minorities and individuals of lower socioeconomic status. Further, while findings initially suggested that black, Hispanic, and other racial and ethnic minorities are more likely than white individuals to agree that brain wiring can explain religiosity, these racial and ethnic differences became non-significant after controlling for views about the explanatory power of science. These results illuminate the importance of attitudes around science in shaping views on religion, specifically for racial and ethnic minorities.

That said, we recognize some limitations in our data and analytic sample—both in terms of the small number of religious minorities (e.g., Muslims and Hindus) as well as the limited nature of our dependent variable. Thus, future work would benefit from the collection and analysis of interviews conducted with religious and non-religious US adults to examine specific sites (or potential cognitive pathways) that render perceived disagreement or integration.

Nonetheless, we argue that this study contributes to the limited but growing body of work on the intersection between religion and neuroscience by looking beyond intellectual discourse and

public debate and instead illuminating public perceptions of this intersection and, specifically, the role of religiosity and religious adherence in shaping public attitudes. In addition, we contribute to this increasingly interdisciplinary stream of scholarship by underscoring the importance of how diverse aspects of individuals' social locations—from gender to socioeconomic status—can also pattern views about cognition and religiosity above and beyond religious beliefs. Thus, we would encourage future work to continue taking other aspects of social context and positionality into consideration when examining this relationship. Further, while debate similarly endures within sociology as in other disciplines like psychology regarding how to define religion (see [Emmons and Paloutzian 2003](#)), shared across these sociological definitions is the notion that religion represents a social experience and process. Thus, by taking into account some social and interactional dimensions of religious experience, adherence, and group membership, we argue that a sociological perspective can enrich this vibrant site of growing interdisciplinary inquiry.

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