A Reproductive Approach to Religion

by

Jordan W. Moon

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Graduate Supervisory Committee:

Adam B. Cohen, Chair
Douglas T. Kenrick
Michael E. W. Varnum
Frank J. Infurna

ARIZONA STATE UNIVERSITY

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ABSTRACT

One salient aspect of most world religions is an emphasis on reproductive morality—rules about which types of sexual behaviors and familiar structures are acceptable. In Chapter 1, I introduce the theoretical background of the dissertation, including the Reproductive-Religiosity Model. Then, in one theoretical paper (Chapter 2) and two empirical papers (Chapters 3 and 4), I consider the cultural and social implications of religious proscriptions on sexual behavior. In Chapter 2, I review the Reproductive-Religiosity Model, which posits that religions are especially attractive to people who desire monogamous, long-term mating strategies. I also discuss the implications of this model for cultural evolution. In Chapter 3, I look at the social implications of these religious proscriptions. That is, if restricted attitudes toward sexuality are strongly linked to religious belief, it follows that people's stereotypes of religious people may track this relationship. Three studies showed that people tended to trust religious targets more than nonreligious targets, but that this effect seems to be due to inferences about religious targets' reproductive strategies—that is, people trusted religious targets because they perceived them more likely to be interested in starting a family. In Chapter 4, I examine patterns of religiosity across the world through a rational choice lens, positing that people are more likely to be religious when religion can help them fulfill their goals. Analysis of two global datasets shows that men, more so than women, tend to be less religious in countries with greater gender equality. Finally, Chapter 5 summarizes results and discusses future directions for this line of research.

TABLE OF CONTENTS

iii

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

OVERVIEW

"What religions do is bound up with the lives of ordinary people, with steering them through the phases of their existence, and not with arguments about with whom a married man spends eternity after resurrection or whether or not the Prophet Mohammed traveled from Arabia to Jerusalem in a single night."
(Reynolds & Tanner, 1995, p. 13)

Where do religions come from and why do they persist? Here, I present a reproductive approach to religious beliefs and behaviors, rooted in the premise that religion is largely driven by its ability to solve real problems in people's lives (Reynolds & Tanner, 1995; Wright, 2009). This approach extends the Reproductive-Religiosity Model (Weeden et al., 2008), which proposes that people engage with religion strategically. In particular, because most religions place special emphasis on sexual morality (Hone et al., 2021; Moon, 2021; Reynolds & Tanner, 1995; Weeden et al., 2008; Weeden & Kurzban, 2013), religion is a powerful tool for those who benefit from such proscriptions.

Evolutionary Approaches to Religion

Throughout human history, the vast majority of people have believed in and interacted with supernatural agents (Norenzayan, 2010). Indeed, religion is so pervasive that most people throughout history might not have referred to themselves as religious (Reynolds & Tanner, 1995; Wright, 2009)—that is, the supernatural was so common that it did not set people apart from each other any more than a belief in gravity is considered special today. From an evolutionary perspective, the persistence of religion poses an

interesting puzzle: Why would any organism voluntarily submit to a cultural institution that demands not only time and resources, but also curtails many freedoms?

Many evolutionary approaches to religion focus on cooperation. The details often differ—for example, some view religion as a biological adaptation (Johnson, 2005; Johnson & Bering, 2006) as a cognitive byproduct that was shaped by evolution (Norenzayan et al., 2016). Still, these approaches both rely on the logic that people are more likely to behave when they are being watched by others, and that an observant deity provides a powerful incentive for people to cooperate with others (Johnson, 2015; Norenzayan et al., 2016).

The effects of beliefs in God or gods does seem to inhibit cheating and promote prosocial behavior. Reminders of religious concepts seem consistently to promote prosocial behavior (e.g., giving in economic games); this effect seems to be small but consistent, and has replicated in a diverse set of cultures (Purzycki et al., 2016; Shariff et al., 2016). Further, and consistent with this approach, people tend to be more religious in environments that require cooperation: societies with certain subsistence styles (e.g., farming) or that have greater political complexity are more likely to have moralizing gods (Botero et al., 2014; Peoples & Marlowe, 2012).

What a Reproductive Approach Adds

Although religions seem to enhance cooperation, is cooperation the primary or most salient outcome? The Reproductive-Religiosity Model, introduced by Weeden and colleagues (2008) argues that religions are largely about reproductive support. Weeden et al. (2008) analyzed data from undergraduates and from the General Social Survey; consistent with prior studies, they found zero-order correlations between religiousness

2

and several variables, including the frequency of being drunk, self-control, agreeableness, conscientiousness, and several cooperative behaviors and attitudes (e.g., lying to one's parents, shoplifting, cheating on exams). They also found strong correlations between religiousness and reproductive variables, such as sociosexuality (favorable attitudes toward and a disposition to engage in short-term sexual relationships), desire to have a family, opposition to divorce, and homosexuality.

Although these analyses suggested that religion was related both to cooperative and reproductive variables, they also analyzed whether these relations hold when controlling for other variables. Their results found consistently that reproductive variables consistently predict religion, even when controlling for other variables. However, after controlling for reproductive variables, nearly all the personality or cooperativeness variables were no longer significant predictors of religiousness (Weeden et al., 2008). Weeden and colleagues interpreted these results to mean that mating strategies largely seem to drive religious affiliation, and that correlations of religion with other variables may often be spurious, as these other variables are also associated with mating strategies.

Since this paper, several lines of evidence have hinted at the importance of mating strategies in explaining religion. First, Weeden and Kurzban (2013) showed that the same pattern of results holds across major world regions in the World Values Survey: reproductive morality consistently predicts religiousness ($r = .36$), whereas religiousness is weakly or not significantly predicted by cooperative moral variables after controlling for reproductive morality ($r = -.04$). Similarly, Schmitt and Fuller (2015) found that

religiousness was associated with less permissive sexuality across the major regions of the world.

The above papers tended to rely on partial correlations to make inferences about the functions of religion. In addition to correlation evidence, there is some longitudinal evidence for the link between mating strategies and religiousness. For example, young adults often become less religious, and this is especially true if they hope to engage in short-term sexual relationships (Weeden, 2015). As for adults, another study used latent growth models to examine different trajectories of religiousness across adulthood, finding that one latent class tends to become more religious in middle-adulthood, but to become somewhat less religious in later adulthood, after their children have left the home (McCullough et al., 2005). Taken together, these studies suggest that people are often attracted to religion, at least in part, depending on their reproductive goals. When they wish to follow a committed mating strategy or to raise children, religion is a useful tool. When they do not have such goals, religion becomes considerably less useful.

Overview of Chapters

This dissertation consists of three separate papers, each of which takes a reproductive approach to some aspect of the psychology of religion. Taken together, these papers show the value of this approach to several aspects of religion, including what attracts people to religion, what stereotypes and perceptions people have of the religious, and how religion might vary across the world.

Chapter 2 is a paper published in *Current Opinion in Psychology* (Moon, 2021), which discusses why world religions are so concerned with sexual behavior. This paper reviews evidence for the Reproductive-Religiosity Model, then focuses on how religions

actually influence reproductive outcomes. That is, if people are drawn to religion because of its reproductive affordances, it follows that religious individuals should have some reproductive advantages over nonreligious individuals. Finally, I discuss the implications of reproduction for the cultural evolution of religions, suggesting that high-fertility lifestyles and norms about sexuality may help certain religious variants to become more common (see also Rowthorn, 2011; Van Slyke & Szocik, 2020).

Chapter 3 is an empirical paper consisting of three experiments published in *Psychological Science* (Moon et al., 2018). Several lines of research have shown that people are more willing to trust religious (vs. nonreligious) individuals (e.g., Gervais et al., 2011; Hall et al., 2015; Tan & Vogel, 2008). Many researchers had attributed this to religious individuals' belief in punishing gods—that is, if punishing deities are effective in reducing cheating, it follows that this might foster trust for social perceivers. In this paper, my colleagues and I examined whether this finding might instead be linked to the reproductive nature of religions. We found that people's stereotypes about religious individuals reflect their commitment to family, parenting, and monogamy, and that this stereotype seemed to explain why religious people are often more trusted. In fact, Experiment 2 showed that, when information about a target's "dating preferences" is given, their religion is no longer a significant determinant of their perceived trustworthiness.

Chapter 4 consists of two global analyses of religiousness, in press at *Proceedings of the Royal Society B: Biological Sciences* (Moon et al., 2022). This paper first presents a paradox: many religious traditions seem to favor men at the expense of women (Aksoy, 2017; Blake et al., 2018; Strassmann et al., 2012), yet women are generally more

religious than men. In this paper, my colleagues and I examine cross-cultural variation in religiousness for men and women as a function of country-level gender equality. We posited that many of the reproductive affordances of religion would be less useful for men in countries with greater gender equality—for instance, men in egalitarian countries are less able to force women to veil or to use menstrual huts. In both samples, our results showed that men are consistently less religious in countries with greater gender equality, whereas the effect of gender equality on religiousness for women is either null or very small. We interpret these results through a rational choice lens, which suggests that people's religious engagement depends largely on how well their goals align with religious practices and norms.

In sum, the three papers presented here each take a reproductive approach to the scientific study of religion, showing that considering how religions influence reproduction (and vice versa) is crucial for a complete understanding of religion and its effects. This approach has implications not only for religious belief, but also in explaining the social implications of religion and how religious belief varies cross-culturally.

CHAPTER 2

WHY ARE WORLD RELIGIONS SO CONCERNED WITH SEXUAL BEHAVIOR?

ABSTRACT

Many religions emphasize the importance of sexual morality. This article argues mating strategies are central to understanding religion. I highlight the reproductive-religiosity model, which suggests that religious behavior is partly motivated by preferences for restricted mating strategies. I then discuss how religion can lead to reproductive benefits. Specifically, religions can make parenting a relatively safer strategy by increasing paternal certainty, which drives men toward parental investment, and alloparenting, which reduces offspring mortality rates. Next, I discuss the social implications of reproductive-religiosity, including mate selection and trust. Finally, I discuss the potential role of mating strategies in the evolution and cultural evolution of religion and discuss future directions for developing an approach to religion rooted in mating interests.

INTRODUCTION

This paper outlines an evolutionary approach to religious belief and behavior, focusing on the ways in which religion may influence and be influenced by mating or reproductive behavior. Religions thrive to the extent that they meet some need or fulfill some desire (Reynolds & Tanner, 1995), and perhaps no human need or desire is "closer to the engine of the evolutionary process" (Buss, 2002, p. 201) than sexual behavior. I first outline the reproductive-religiosity model, which posits that religion serves to promote committed, highly invested, and long-term mating strategies and to impose costs on behavior inconsistent with these mating strategies. Religion, then, is especially attractive to those wishing to follow such a committed mating strategy. I then describe how religions might influence reproductive outcomes, particularly by facilitating high-investment and high-fertility mating strategies. Next, I discuss how mating strategies might influence the social aspects of religion; that is, people have stereotypes about religion that track these mating strategies, and this has implications for mate preferences as well as trust and cooperation. Lastly, I explore the implications of reproductive religiosity for cultural evolution.

Mating Psychology Influences Religious Belief: The Reproductive-Religiosity Model

Religious belief is complex, and relies on several cognitive and cultural foundations (Mercier et al., 2018). To believe, people must be able to conceptualize deities and also need to live in a culture where religious belief is deemed appropriate. Once these foundations are in place, motivational processes influence religious belief.

According to the reproductive-religiosity model, one especially important motive in religious belief and behavior is mating strategy—those who prefer high-investment,

committed reproductive strategies tend to be more religious across the world (Rigo &
Saroglou, 2018; Schmitt & Fuller, 2015; Weeden et al., 2008; Weeden & Kurzban,
2013). This committed mating strategy is often operationalized as *restricted*
sociosexuality—less permissive attitudes about casual sex, and a decreased likelihood of
desiring and engaging in such relationships (Schmitt & Fuller, 2015).

Longitudinal data suggest that, when people are interested in sexual novelty (e.g.,
young adults) they tend to become less religious (Weeden, 2015), but people interested in
family life tend to be especially drawn toward religion, particularly when raising children
(McCullough et al., 2005). Rather than religion instilling arbitrary rules about sex in
adherents, these findings suggest that people who prefer such high-commitment mating
strategies may actually be drawn to religion *because* it supports these strategies (for a
review, see Moon et al., 2019).

Religions Influence Sexual and Reproductive Behavior

Mating strategies can influence religion, but are religions successful in providing
reproductive benefits to adherents? The most obvious approach to this question is to
examine fertility rates—overall, religious people across the world indeed tend to have
more children (Blume, 2009; Frejka & Westoff, 2008; Rowthorn, 2011; Zhang, 2008),
perhaps due to norms for large families (Norenzayan et al., 2016). In addition to these
norms, however, religions might increase fitness by making certain mating behaviors less
costly. Specifically, several religious practices may serve to make parenting a relatively
"safe" strategy—perhaps especially for men (Blake et al., 2018; Međedović, 2020).
Below, I discuss how religion might alter two fundamental *life history tradeoffs* (Hill,
2019) in ways that might facilitate parental investment as well as high fertility lifestyles.

Parenting vs. Mating Effort. Parenting is no small investment—in fact, in strict evolutionary terms, men often benefit by avoiding parenting effort when possible, opting instead for additional mating opportunities (Buss & Schmitt, 2019; Heath & Hadley, 1998). The high cost of parenting is amplified by *paternal uncertainty*—fathers face some risk of investing resources into children that are not genetically related to them. These risks influence how "safe" parenting is. Accordingly, men may be more reluctant to invest in their children when paternal uncertainty is high (Scelza et al., 2020).

How might religion bolster paternal certainty? Simply by increasing the costs of extramarital sex, religions should be able to reduce the frequency of cuckoldry. Some studies suggest that religious individuals are less likely to engage in extramarital affairs (e.g., Burdette et al., 2007). Perhaps more impressively, religious cultures may also influence the sexual behavior of members of other religions: In countries with higher proportions of Muslims, both Muslims and non-Muslims are less likely to report having had premarital sex (Adamczyk & Hayes, 2012). Experimental evidence suggests that religious reminders may even cause immediate psychological shifts, such as increased condemnation of sexual promiscuity (Hone et al., 2021) and, in men, a reduction of behaviors associated with an unrestricted mating strategy (McCullough et al., 2012). In sum, religions likely create environments that shift the cost/benefit ratio of different behaviors in a way that favors committed mating strategies, and these shifts might reduce the prevalence of unrestricted sexual behavior.

Certain religious rituals or traditions may also serve to make infidelity less likely. For instance, one study found that women were rated as less attractive when veiled, which may reduce unwanted sexual advances and thus sexual opportunities for veiling

women (Pazhoohi & Hosseinchari, 2014). Perhaps the best evidence for a religion's effects on paternal certainty comes from a study among the Dogon of Mali, West Africa. Dogon men who practice their indigenous religion (but not Christianity) are less likely (1.3% vs. 2.9%) to face cuckoldry, which the authors attribute to the menstrual taboos, including menstrual huts, which allows men and their families to monitor wives during and after menstruation (Strassmann et al., 2012).

Offspring Quantity vs. Quality. Religions may also make parenting a more viable strategy by mitigating tradeoffs between offspring quality and quantity. Generally, there is a tradeoff between offspring quantity and "quality" (i.e., survival)—the number of children tends to covary positively with child mortality rates (Hill, 2019). However, this tradeoff seem to be less steep for religious parents.

Shaver et al. (Shaver et al., 2019) suggest that alloparenting may explain this phenomenon. Religious parents are likely to receive parenting help from co-religionists, and pooling resources together provides efficient means to reduce child mortality while maintaining high fertility rates. In other words, religious people get the best of both worlds in the quality vs. quantity tradeoff, meaning they can pursue a relatively high-fertility reproductive strategy but with high survival rates among offspring.

What does this mean for religious individuals? Some of the most salient life history tradeoffs people are forced to make are mitigated by religious cultures—religious people are able to follow a reproductive strategy that allows them simultaneously to have high fertility, high paternal certainty, and low child mortality rates. Given these reproductive benefits, it is no wonder religions are able to persist.

Social Implications

11

In social interaction, people want to know how others will behave, and often rely on stereotypes and other information. Given the associations between religiosity and sexuality, it makes sense that religious people might be perceived as sexually restricted, interested in parenting, and faithful mates. These inferences may be important in both mating and non-mating domains.

Mate Choice. Slone and others (Bulbulia et al., 2015; Slone, 2008; Slone & Van Slyke, 2016; Van Slyke & Szocik, 2020) have proposed a sexual selection approach to religion, arguing that religion provides a solution to a simple coordination problem: mate choice. Men and women both want mates that are faithful, but men are more likely to seek short-term, sexual relationships (Buss & Schmitt, 2019). This conflict provides incentives for people to deceive potential mates about their intentions—men might feign long-term commitment to gain short-term sexual opportunities, whereas women might lie about their willingness to have sex to secure long-term commitment (Buss, 2017).

Religion may offer a solution to this coordination problem. Given the constraints that religions impose on sexuality (as discussed above), religion might be a reliable signal about someone's potential mate qualities. Religion may allow both men and women to signal that they are interested in a long-term, committed, high-investment mating strategy, thus reducing the uncertainty inherent in mate choice (Slone, 2008). Consistent with this hypothesis, Irons (Irons, 2001) states that men of the island of Utila might desire religious wives because they are often away from home and, thus, concerned about their wives being faithful.

Trust. Inferences about religious individuals' mating strategies might also be relevant beyond mating domains. People generally trust religious individuals more than

nonreligious individuals (Hall et al., 2015; Tan & Vogel, 2008). However, it is not clear whether such effects are due to religious beliefs *per se* or whether social perceivers infer some specific set of traits. One set of studies in the United States explored the possibility that perceptions of restricted sexuality facilitate trust toward religious individuals. Religious people were rated more trustworthy than nonreligious individuals, but also as more "committed" (i.e., likely to be faithful mates, dedicated parents, etc.), and perceptions of a committed mating strategy statistically mediated the effect of religion on trust. Moreover, when people were presented as either religious or not and as either committed or uncommitted, it was the committed mating strategy—not religion—that promoted trust. Thus, religious people may be trusted, at least in part, because they are perceived to follow a sexually restricted, long-term mating strategy (Moon et al., 2018).

Taken together, these findings suggest that reproductive-religiosity has important implications for social interaction, and that these are not necessarily attributable to specific religious beliefs. Rather than reflecting intuitions about specific religious beliefs (e.g., trusting those with specific religious beliefs), these results suggest that people sometimes use religion as a social cue to infer specific sets of traits, such as restricted sexuality or closed-mindedness (Jackson et al., 2015; Moon et al., 2018, 2020), and that these inferences drive attitudes and behavior toward religious individuals.

Implications for Cultural Evolution

Many theories emphasize the role of cooperative advantages in explaining the evolution or cultural evolution of world religions (Johnson, 2015; Norenzayan et al., 2016). Again, however, mating strategies may explain a surprising amount about the nature of world religions (Baumard & Chevallier, 2015; Blume, 2009; Slone & Van

13

Slyke, 2016; Van Slyke & Szocik, 2020). Most straightforwardly, religions with high fertility will naturally grow, even in the face of high detection rates (Rowthorn, 2011).

However, mating systems promoted can influence cultural evolution in other ways, independent of a cooperative benefits. For example, although most cultures throughout history practiced some degree of polygyny, monogamy has been a remarkably successful cultural variant. Henrich et al. (Henrich et al., 2012) argue that normative monogamy is so successful because it has group-beneficial effects: First, unmated men are especially prone to antisocial and criminal behavior, and monogamy pushes many of these men toward marriage and fatherhood, which are associated with reductions in testosterone and a shift toward parenting effort and away from mating effort (Grebe et al., 2019). Further, by reducing the intensity of intrasexual competition, monogamy reduces the need for low status men to engage in impulsive, status-enhancing behavior; women are also forced to compete in polygynous households, and ethnographic evidence suggests some women even fear their children will be poisoned by co-wives (Henrich et al., 2012). Thus, although not all religions promote monogamy, enforcing monogamy can give religions a relative advantage in cultural evolutionary processes (Van Slyke, 2017).

Another line of research suggests that the family systems imposed by the early Roman Catholic Church, including taboos on cousin marriage, led to massive psychological shifts, resulting in the psychological uniqueness of Western societies (Schulz et al., 2019). These family structures may have caused cultures to become more independent, more cooperative with strangers, and ultimately to develop a historically unprecedented psychological profile.

Future Directions

Religion largely has to do with human needs (Reynolds & Tanner, 1995). In that spirit, I have presented a model of religion that places one human need—mating behavior—at the forefront. Religion certainly has implications for cooperation, mental health, culture, and intergroup relations, and deserves analysis at different levels of explanation (Mercier et al., 2018). Though mating strategies do not explain everything about religion, one can go surprisingly far in explaining religion using this approach.

Cross-Cultural Variation. Future research would do well to examine cross-cultural variation in religion through a reproductive lens. Although the link between sexuality- and marriage-related attitudes and behavior is impressively consistent across cultures (Saroglou, 2019), there is some cultural variation in how religions approach sexuality, marriage, and family. For instance, some religions might suppress female sexuality more than others, or use different rituals (Ellingson & Green, 2013; Reynolds & Tanner, 1995). One promising approach to explaining this variation is the adaptation of behavioral ecology to cultural variation (Botero et al., 2014; Sng et al., 2018; Sosis & Bulbulia, 2011). This view examines how different features of an environment can evoke different distinct patterns of behavior. For example, in environments where parental care is expected to be especially critical, one might expect an increase in practices that mitigate the threats of infidelity, such as veiling (Pazhoohi & Kingstone, 2020).

Similarly, some environmental features (e.g., encountering strangers more frequently) may make it more important for individuals to use religion to "signal" underlying commitments (Irons, 2001). Tracking the commitments people need to display might help explain, for example, specific patterns of who is religious and which religious signals they send to others (Aksoy & Gambetta, 2016; Irons, 2001; Yaffe et al., 2018). A

15

fruitful research program might explore how ecology, by enhancing certain concerns, needs, or desires, might increase the prevalence of religious practices that solve these problems.

Future research might also explore when religion is and is not successful in influencing mating behavior. Although I have argued that religions are often successful, people are highly motivated to follow their mating strategies and are often adept at circumventing religious rules—either by ignoring them or by using mental gymnastics to justify their behavior. For example, infanticide was common when it was banned in Christianity and Islam. However, Christians in medieval Europe often circumvented these prohibitions by labeling children as less than human—as *changelings* that had replaced real children (Hrdy, 1999; cited in Kunz, 2009). Similarly, although the Western Church viewed cousin marriage as immoral (Schulz et al., 2019), it was possible to gain an exception for a fee to the Church (Davidson & Ekelund, 1997).

The Celibacy Puzzle. If religions serve to enhance fertility, the presence of celibate clergy presents an interesting puzzle. Throughout history, religious leaders and shamans often had increased access to sexual opportunities (Buss, 2002; Wright, 2009). Yet Christianity, as well as some other religions, have on occasion mandated celibacy for certain religious leaders (Reynolds & Tanner, 1995).

There are several potential explanations for this phenomenon. First, people may be more likely to enter the priesthood and voluntary celibacy when fewer mates are available (or if mates are less desired) (Deady et al., 2006; Qirko, 2002)—that is, because mating opportunities are few, becoming celibate (and potentially gaining status within one's group) represents a smaller opportunity cost. Second, positions that require

celibacy may draw benefits for one's kin (Qirko, 2002). For example, they could gain status or access to resources that make their kin more attractive mates or aid in raising children. In pursuit of these goals, extreme self-denial, such as life-long celibacy, likely helps them gain credibility and trust (Singh & Henrich, 2020). Finally, there is the possibility that vows of celibacy are not always kept: To the extent that celibate men have access to clandestine mating opportunities, any offspring they do have are likely to well cared for by other men (Freyd & Johnson, 1992).

Conclusion

In all, the approach to religion outlined here takes into account the interplay between human needs and the implications of religion for them. Religious systems and the norms they promote have enormous implications for people's goals and needs, and they benefit some people more than others. I suggest that people are attuned to the implications of religious systems for their goals and needs. For some people, religion will be a useful tool, providing security and enhancing their fitness; for others, religion is an obstacle or a burden.

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CHAPTER 3

RELIGIOUS PEOPLE ARE TRUSTED BECAUSE THEY ARE VIEWED AS SLOW

LIFE-HISTORY STRATEGISTS

ABSTRACT

Religious people are more trusted than nonreligious people. Although most theorists attribute these perceptions to the beliefs of religious targets, religious individuals also differ in behavioral ways that might cue trust. We examined whether perceivers might trust religious targets more because they heuristically associate religion with slow life-history strategies. In three experiments, we found that religious targets are viewed as slow life-history strategists, and that these findings are not the result of a universally positive halo effect; that the effect of target religion on trust is significantly mediated by the target's life-history traits (i.e., perceived reproductive strategy); and that, when perceivers have direct information about a target's reproductive strategy, their ratings of trust are driven primarily by his or her reproductive strategy, rather than religion. These effects operate over and above targets' belief in moralizing gods, and offer a novel theoretical perspective on religion and trust.

INTRODUCTION

Research has consistently demonstrated that religious targets are viewed as more trustworthy than nonreligious targets (e.g., Tan & Vogel, 2008) and, similarly, atheists tend to be distrusted (Gervais et al., 2011). Gervais and colleagues (2017) found that, across 13 nations, the majority of people—even atheists—tend to associate immoral behavior with atheism.

The prevailing view on religion, irreligion, and trust posits that intuitions about religion and trust are the result of cultural group selection, with shared beliefs in punishing deities allowing large scale cooperation to evolve (Norenzayan et al., 2016; Purzycki et al., 2016; Roes & Raymond, 2003). In this view, religious behavior should facilitate trust primarily toward co-religionists, and particularly when it is diagnostic of belief in moralizing deities. This framework has garnered significant empirical support (e.g., Shariff et al., 2016).

Here, we propose an additional reason why religious behavior might cultivate trust. Specifically, religious individuals tend to differ from nonreligious individuals in more than merely belief—they also tend to behave in ways consistent with a *slow life-history strategy* (i.e., they tend to be sexually restricted, invested in family, non-impulsive, and non-aggressive; Baumard & Chevallier, 2015). These traits are associated with cooperativeness and prosociality. One possibility, then, is that perceivers use religious affiliation or behavior as a cue to infer these traits. Perception of these traits may facilitate trust above and beyond shared belief in supernatural punishment, and may be particularly important in explaining why religious behavior can also facilitate trust in outgroup perceivers (Hall et al., 2015; McCullough et al., 2016).

A Life-History Framework

Evolutionary biology's life-history (LH) theory has been used to account for a wide range of behavior, both in humans and in other animals (Stearns, 1992). This theory considers the tradeoffs individuals make to navigate the challenges unique to their environment. In a harsh or unpredictable environment, where the future is less certain, a "fast" LH strategy makes more sense—fast strategists tend to mate early and frequently, discount the future more steeply, display more aggression, and engage in riskier behavior that may have more immediate payoffs (Frankenhuis et al., 2016). In contrast, individuals who come from stable, predictable ecologies tend to adopt a "slow" LH strategy, entailing a later sexual debut, fewer sexual partners, greater parental investment, lower levels aggression and risk-taking, and greater investment in education. These traits and behaviors tend to cluster reliably together on a fast-slow continuum (Ellis et al., 2009) and represent functional adaptations to specific ecologies (Frankenhuis et al., 2016).

LH strategies have important implications for sociality, as extended prosociality and social trust are risky for actors in unpredictable environments (Petersen & Aarøe, 2015; Wilson et al., 2009). Not surprisingly, then, fast strategies and associated traits (e.g., temporal discounting, risk taking, unrestricted sexuality) are highly correlated with several noncooperative or antisocial behaviors (Curry et al., 2008; Ellis et al., 2012; Jonason et al., 2009).

Social perceivers are keenly aware of the implications of LH strategy on their interactions with others, as they intuitively link LH cues (e.g., ecology) with suites of corresponding LH traits (Williams et al., 2016). Because trust is highly related to cooperation (Simpson, 2007), one might expect individuals perceived as fast LH

strategists to be considered poor cooperators and, thus, less trustworthy than those viewed as slow strategists.

Religious Individuals as Slow Life-History Strategists

Recent work has linked religiosity to slow LH strategies (for a review, see Baumard & Chevallier, 2015). Religious individuals tend to display many of the traits evoked by predictable ecologies, including lower levels of temporal discounting, greater self-control, and sexual restrictedness (Carter et al., 2012; McCullough & Willoughby, 2009; Schmitt & Fuller, 2015; Weeden et al., 2008; Weeden & Kurzban, 2013). Religious individuals are much more likely to follow a *committed reproductive strategy*[1], pursuing high-commitment, monogamous relationships, fewer sexual partners, and high parental investment. Some theorists even view religion and moral intuitions as a consequence— rather than a cause—of the reproductive or LH strategies people take (Gladden et al., 2009; Weeden & Kurzban, 2013).

The Present Work

One way perceivers might ascertain the likely disposition and cooperative value of others is through LH information, and religion may serve as a valuable heuristic about the LH tactics and, thus, trustworthiness of others. In three experiments, we examined

[1]   We use the term "committed reproductive strategy" to denote the restricted sexual lifestyles associated with religion, and we view it as a crucial component of a slow LH strategy. However, slow LH strategists tend to have *fewer* offspring, whereas religious individuals tend to have significantly higher fertility rates than nonreligious individuals (Rowthorn, 2011). We view this inconsistency as the result of cultural evolution (i.e., religions that promoted fecundity were more likely to spread; Richerson & Boyd, 2005; Rowthorn, 2011) and maintain that the psychology of these "committed strategists" is fundamentally "slow." We view investment in offspring (or *quality*) as more indicative of LH strategy than *quantity* of offspring (Ellis et al., 2009). For further discussion on fundamental LH tradeoffs, see Del Giudice, Gangestad, and Kaplan (2015).

whether religious targets are viewed as slow LH strategists and, if so, whether this effect might partly explain why religious individuals are generally deemed more trustworthy. In Experiment 1, we demonstrated that religious (compared to nonreligious) targets are viewed as "slower" in several specific dimensions of LH strategy (i.e., reproductive strategy, impulsivity, aggression, education, and ecology), and were also deemed more trustworthy. In Experiment 2, we manipulated targets' reproductive strategies (a significant mediator in Experiment 1) in addition to their religion. We found that direct information about LH strategy (i.e., the target's "dating preference") tended to override the effects of religious information (cf. Williams et al., 2016). In Experiment 3, we attempted to generalize these results, finding that perceived reproductive strategy statistically mediated trust toward both Christian and Muslim targets in a professional domain. These results suggest that perceivers utilize religion as a LH cue, and trust religious people more because of the (slow) LH strategy they are assumed to take.

EXPERIMENT 1

Experiment 1 had two aims: to examine whether perceptions of religious targets might accurately be categorized as slow LH perceptions and, if so, whether these perceptions might influence trust.

Method

Participants. We conducted a pilot study to estimate the effect of religious information on perceived LH traits. Based on this effect size, we determined we would need 196 participants to detect our effect. As our resources allowed, our final sample exceeded this target. Three hundred thirty six (195 female) workers on Amazon's Mechanical Turk (MTurk) located in the United States received $0.25 each to complete a

survey on "social perceptions." Participants who had taken part in the pilot study were

not able to participate. Participants' ages ranged from 19 to 71, with a median of 33 (M =

36.25, SD = 12.73). We excluded 45 participants (including from descriptive statistics)

who failed at least one of two attention checks—either answering a question that they

were instructed to skip (because participants were unable to *unclick* the question buttons

to refrain from answering a question, participants who realized this error and later

acknowledged it in their comments to researchers at the end of the study were treated as

passing this check) or failing to select "2" in a question that simply instructs participants

to click the "2" choice in a multiple choice question.

Procedure and measures. Participants completed a 3-item religiosity scale (1 =

not at all, 7 = *deeply or extremely*, e.g., "How strongly do you believe in God?", α = .95)

based on Cohen, Malka, Rozin, and Cherfas (2006). They also responded to two

additional measures included for a separate research question: the attitude facet subscale

of the Sociosexual Orientation Inventory-Revised (SOI-R; e.g., "Sex without love is

okay", α = .76) on a 1 (*strongly disagree*) to 9 (*strongly agree*) scale (Penke &

Asendorpf, 2008) and five items assessing self-perceived mate value (e.g., "Members of

the opposite sex are attracted to me", α = .88) on a 1 (*strongly disagree*) to 7 (*strongly

agree*) scale (Landolt et al., 1995).

Adapting the methodology of Hall et al. (2015), we randomly assigned

participants to view one of four fictitious dating profiles, varying in target sex (male or

female) and target religion ("Devoted Christian" vs. "Non-religious"). After viewing the

target dating profile, participants answered questions about their perceptions of the target

on several dimensions (in random order), using a 7-point scale (1 = *extremely unlikely*, 7

= *extremely likely*). Finally, participants entered demographic information, including age, gender, sexual orientation, and religious affiliation.

We computed scores for five separate (perceived) LH variables: *reproductive strategy* (seven items, e.g., "Faithful romantic partner", α = .90), *non-aggression* (three items, e.g., "Physically aggressive" [reverse coded], α = .86), *non-impulsivity* (two items, e.g., "Impulsive" [reverse coded], $r = .32$, $p < .001$), *education* (two items, e.g., "Invested in his/her education", $r = .78$, $p < .001$), and *hopeful ecology* (single item, "comes from a rough neighborhood" [reverse coded]). We also included one item in which we expected religious targets to be viewed as "fast"—how likely they are to want several children (Rowthorn, 2011). Finally, we assessed perceived mate value (four items, e.g., "Gets a lot of attention from women/men", α = .90) and trust (single item).

Results

Are religious targets viewed as slow strategists? We compared perceptions of religious and nonreligious targets in each LH domain (i.e., reproductive strategy, aggression, impulsivity, education, and ecology) as well as mate value and trust (see Fig. 1). We were interested in target sex and participant sex only to the extent that they might moderate the hypothesized main effect of religion on perceived LH traits. Because we failed to find evidence that either target or participant sex moderated the effect, we report the results of independent *t*-tests comparing religious and nonreligious targets (see Table 1). For analyses including these variables, see Supplemental Analyses in the Supplemental Material.
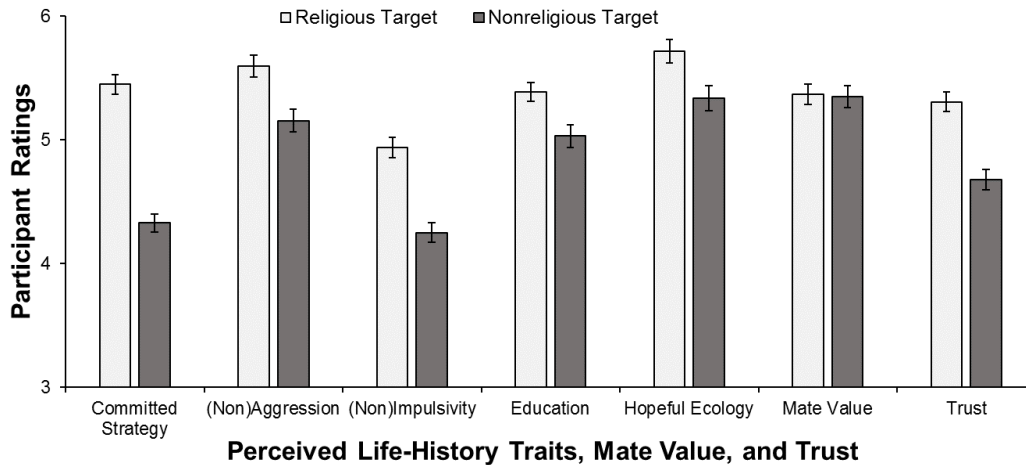
*Figure 1.*Results from Experiment 1: mean LH inferences, estimated mate value, and trust as a function of target religious claims. Error bars represent ± 1 SE.

As predicted, religious (vs. nonreligious) targets were judged more likely to follow a committed reproductive strategy, less impulsive, less aggressive, more educated, and originating from more hopeful ecologies (i.e., less likely to come from a "rough neighborhood"). Consistent with past research, religious targets were also trusted significantly more than nonreligious targets. Importantly, religious targets were not favored universally, as they were judged similarly in mate value. We consider this to imply that effects of target religion on perceived LH traits are not due to an overall halo effect.

Table 1. Effects of Target Religion on Perceived Life-History Traits, Mate Value, and Trust in Experiment 1.

	Religious Target (*n* = 166)		Nonreligious Target (*n* = 170)				95% CI for the difference	Cohen's *d*
	M	*SD*	*M*	*SD*	*t*	*p*		
Reproductive Strategy	5.45	1.01	4.33	0.92	10.66	<.001	[0.91, 1.33]	1.16
(Non)Impulsivity	4.94	1.06	4.25	1.05	5.96	<.001	[0.46, 0.91]	0.65
(Non)Aggression	5.60	1.14	5.16	1.19	3.49	<.001	[0.19, 0.69]	0.38
Education	5.39	1.00	5.03	1.20	2.98	.003	[0.12, 0.60]	0.33
Hopeful Ecology	5.72	1.21	5.34	1.32	2.76	.006	[0.11, 0.65]	0.30
Mate Value	5.37	1.07	5.35	1.14	0.15	.885	[-0.22, 0.25]	0.02
Trust	5.31	1.04	4.68	1.10	5.42	< .001	[0.40, 0.86]	0.59

Note: Each row represents the results of an independent *t*-test (*df* = 334) comparing perceptions of religious and nonreligious targets.

Do LH intuitions mediate effects on trust? We performed a parallel multiple mediation analysis (Hayes, 2012) in which we tested whether the effect of portraying a target person as religious had on participant ratings of trust were significantly mediated by perceived LH traits. We used 5,000 bootstrapped iterations to compute a bias-corrected 95% confidence interval (CI) for the indirect effects.

As shown in Figure 2, the effect of target religion on trust was significantly mediated by perceived reproductive strategy, *b* = 0.36, *SE* = 0.09, 95% CI = [0.19, 0.55], as well as perceived education, *b* = 0.09, *SE* = 0.05, 95% CI = [0.03, 0.21]. Other indirect effects were not significant, nor was the direct effect, *b* = 0.07, *SE* = 0.11, *p* > .250. This analysis suggests that religious individuals are viewed as trustworthy in part because they are slow LH strategists, and perceived reproductive strategy seems to be a particularly strong determinant of trust.
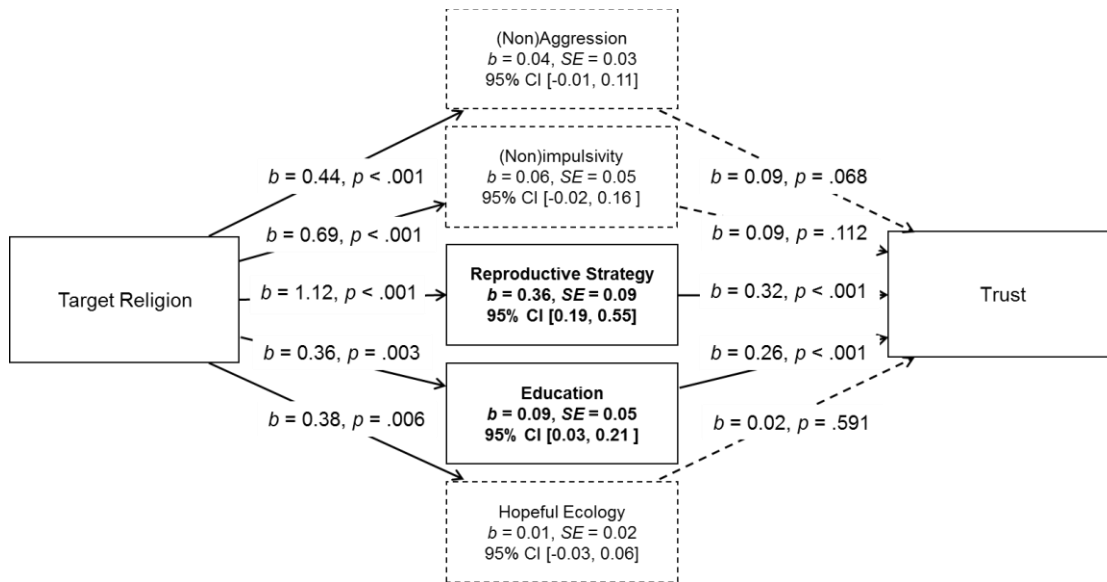
Figure 2. Parallel multiple mediation model depicting the effect of target religion on trust as mediated by perceived LH traits in Experiment 1. The variable for target religious claims was dummy coded (0 = nonreligious, 1 = religious).

Does participant religiosity moderate the effect of target religion on trust?

Although religious targets were trusted more than nonreligious targets, one possibility is that this effect was driven solely by religious participants. Thus, we tested whether participants' self-reported religiosity moderated the effect of target religion on trust. We regressed target religion (dummy coded), participant religiosity (centered), and their interaction on trust. While religiosity had no main effect ($p > .250$), there was a main effect of target religion, $t(332) = 10.82$, $p < .001$, $b = 1.11$, 95% CI = [0.91, 1.32], qualified by a significant interaction between target religion and religiosity, $t(332) = 2.92$, $p = .004$, $b = 0.17$, 95% CI = [0.05, 0.28]. Simple slope analyses suggested that the effect was strongest for participants high in religiosity, $t(332) = 5.91$, $p < .001$, $b = 0.96$, 95% CI = [0.64, 1.28], but remained marginally significant for those low in religiosity, $t(332) = 1.78$, $p = .076$, $b = 0.29$, 95% CI = [-0.03, 0.61]. That is, even participants low in religiosity (1.38 on a 1 to 7 scale) tended to trust the religious target more than the target

33

who ostensibly shares their beliefs. This finding is consistent with recent research suggesting that nonreligious individuals associate atheism with immorality, albeit to a lesser extent than more religious individuals (Gervais et al., 2017).

We additionally used Model 59 of PROCESS (which allows the moderator to interact with all three paths in the model; Hayes, 2012) to test whether the indirect effect of target religion on trust (via perceived reproductive strategy) held at varying levels (± 1 SD) of participant religiosity. We were specifically interested in whether this effect held for participants low in religiosity. The indirect effect was stronger among more religious participants, but remained significant at all levels of participant religiosity: low, $b = 0.46$, $SE = 0.11$, 95% CI = [0.28, 0.71], average, $b = 0.63$, $SE = 0.08$, 95% CI = [0.48, 0.82], and high, $b = 0.78$, $SE = 0.13$, 95% CI = [0.54, 1.05]. The direct effect was not significant at any level of religiosity (ps > .246).

EXPERIMENT 2

Experiment 1 demonstrated that religious targets are viewed as slow LH strategists and are more trusted, and a mediation analysis suggested that religious people are more trusted because of their perceived slow LH strategy (especially their reproductive strategy). We reasoned that, if perceivers view religious targets as trustworthy primarily because they also view them as committed reproductive strategists, providing direct information about their committed reproductive strategies may "override" the effects of religious claims (for a similar design, see Williams et al., 2016). That is, we hypothesized that perceivers would base their ratings primarily on direct LH information (i.e., a target's reproductive strategy) rather than a cue (religion) that imperfectly predicts LH information. To test this hypothesis, we utilized a concurrent

34

double randomization design, independently manipulating both targets' religious claims as well as their reproductive strategies. This design allowed us to test the causal effect of the the proposed mediator (perceived reproductive strategy) on trust (Pirlott & MacKinnon, 2016). Additionally, we measured perceptions that the target believed in divine punishment ("big gods"), to see if effects of LH strategy on trust would operate over and above the potential effect of the target's perceived belief in big gods.

Method

      Participants. We sought to obtain at least 100 participants per cell for a 2×2 design, allowing for potential exclusions based on attention checks. Thus, we recruited 445 participants (203 female, 2 not reported) via TurkPrime (Litman et al., 2017) to complete a survey about "impressions of others" in exchange for $0.50. Ages ranged from 19 to 72, with a median age of 33 ($M = 35.12$, $SD = 10.37$). Participants were restricted to the United States, and we restricted availability to those who had not participated in Experiment 1 or our pilot study. We also excluded 30 participants who failed at least one of two attention checks instructing them to select "6" to demonstrate that they are paying attention; these participants were excluded from all analyses, including the descriptive results above.

      Procedure and measures. The procedure was similar to Experiment 1. Participants first responded to an 8-item measure of religiosity (based on Cohen et al., 2006) using a 7-point scale (1 = *not at all*, 7 = *deeply or extremely*, e.g., "How religious are you?", $\alpha = .97$), the SOI-R attitude facet ($\alpha = .85$), and a measure of belief in "big gods" on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*, e.g., "I believe God

35

punishes people for immoral behavior", α = .96) based on the "big god" beliefs posited by Norenzayan et al. (2016).

Next, participants randomly viewed a social media style profile varying in sex (male or female), religious claims ("Devout Christian" or "Non-religious"), and "dating preferences" ("I don't see myself settling down any time soon, I enjoy playing the field and meeting a lot of new people" or "My goal is to find that special someone, settle down, and start a family"). Distractor information was identical for all conditions.

After viewing the profile, participants indicated how likely they thought it was that several traits or behaviors applied to the target, using a Likert-type scale (1 = *extremely unlikely*, 7 = *extremely likely*). We assessed the following LH perceptions: *reproductive strategy* (same scale as Experiment 1, α = .94); *impulsivity* (7-item scale, e.g., "Acts impulsively", α = .93), *opportunistic behavior* (3-item measure, e.g., "Physically aggressive", α = .92), *ecology* (3-item scale, e.g., "Came from a rough neighborhood", α = .82), and *education* (2-item measure, e.g., "Invested in his/her education", $r = .82$, $p < .001$). We also assessed how much targets were perceived to believe in big gods (using the same beliefs as the participant measure, but directed at the target; α = .98) and trust (6-item measure adapted from Hall et al., 2015, e.g., "Is trustworthy", α = .93), and four distractor items unrelated to LH strategy (i.e., athletic, stylish, annoying, and reserved).

Results

Collapsing across participant and target sex[2], analyses consisted of a series of 2 (Target Religion) × 2 (Target Reproductive Strategy) ANOVAs—one for each outcome measured (see Table 2, Fig. 3). Measures of perceived reproductive strategy and belief in moralizing gods suggest that the manipulations had significant effects: committed strategists (vs. uncommitted strategists) were in fact judged more likely to be committed strategists, $F(1, 441) = 592.66$, $p < .001$, $\eta_p^2 = .573$, and so were religious (vs. nonreligious) targets, $F(1, 441) = 22.13$, $p < .001$, $\eta_p^2 = .048$. Religious (vs. nonreligious) targets were viewed as significantly more likely to believe in big gods, $F(1, 439) = 589.21$, $p < .001$, $\eta_p^2 = .573$, and so were committed (vs. uncommitted) strategists, $F(1, 439) = 25.89$, $p < .001$, $\eta_p^2 = .056$.

There was a main effect of target religion on perceived impulsivity, such that religious targets were judged somewhat less impulsive than nonreligious targets. However, target reproductive strategy had a considerably stronger effect, such that committed strategists were viewed as significantly less impulsive than uncommitted strategists. Further, there were significant main effects of target strategy (but not target religion), such that committed (vs. uncommitted (vs. uncommitted) strategists were viewed as "slower" in several ways—less likely to exhibit opportunistic behavior, more likely to come from an abundant or predictable ecology, and more likely to be educated and invested in education. Finally, religious targets were viewed as marginally more

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[2]   Although we were primarily interested in the effects of target religion and target reproductive strategy, we manipulated target sex to be consistent with Experiment 1. Results of the 2 (Target Sex) × 2 (Target Religion) × 2 (Target Reproductive Strategy) for each outcome are reported in the Supplemental Analyses in the Supplemental Material. Results do not alter conclusions.

trustworthy than nonreligious targets ($\eta_p^2 = .008$), but target reproductive strategy had a

markedly stronger effect, with committed strategists being rated as significantly more

trustworthy ($\eta_p^2 = .197$).

Table 2. Effects of Target Religion and Target Reproductive Strategy on Perceived Life-History Traits and Trust in Experiment 2

Outcome	df	Target Religion			Target Reproductive Strategy		
		F	η_p^2	p	F	η_p^2	p
(Non)Impulsivity	1, 441	16.37	.036	< .001	323.72	.423	< .001
(Non)Opportunistic Behavior	1, 441	2.63	.006	.106	24.31	.052	< .001
Hopeful Ecology	1, 441	3.29	.007	.070	7.04	.016	.008
Education	1, 441	0.06	.000	.814	62.02	.123	< .001
Trust	1, 440	3.69	.008	.055	108.15	.197	< .001

Note: Each row represents the results of a 2 (Target Religion) × 2 (Target Reproductive Strategy) ANOVA with the outcome as a dependent variable. The tests reported represent the main effect of each factor, respectively. Degrees of freedom apply to both main effects. The Target Religion × Target Reproductive Strategy interaction was not significant for any of the outcomes measured ($ps > .102$).
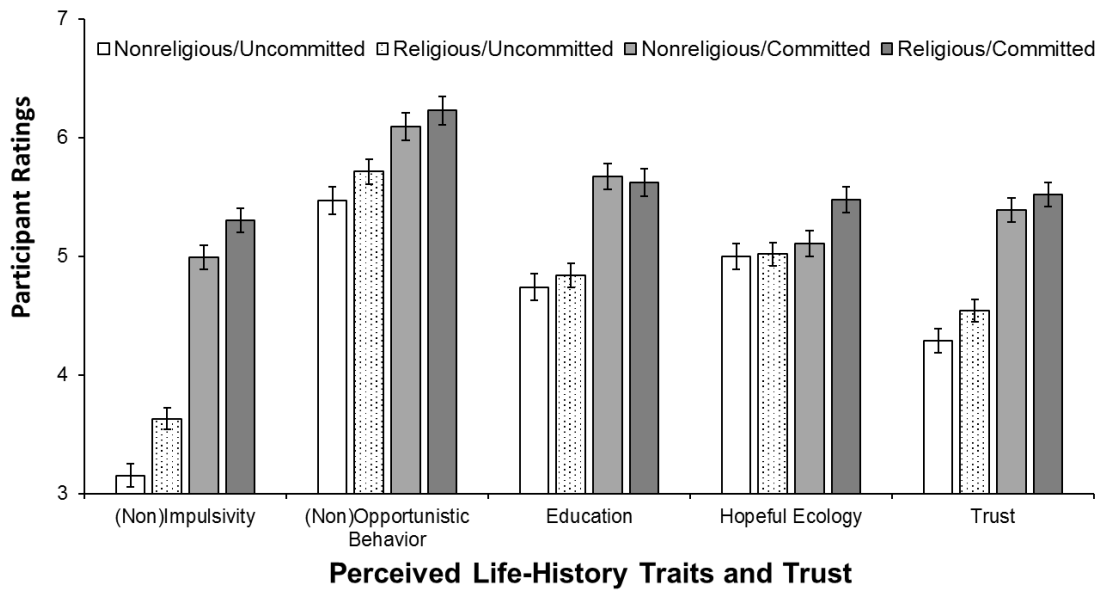

Figure 3. Results from Experiment 2: mean LH inferences and trust as a function of the target's religious claims and reproductive strategy. Error bars represent ± 1 SE.

Do belief in big gods or LH traits mediate the effect of committed reproductive strategies on trust? One possibility is that, although ratings of trust seem to track reproductive strategy rather than religion, perceivers assume that committed strategists are more likely to believe in God or gods. Gervais and colleagues (2017) found, for instance, that a priest who molested children was rated likely to be an atheist. Indeed, our analysis did indicate that committed strategists were judged somewhat more likely to believe in big gods. To test whether this might explain the effect on trust, we conducted a mediation analysis to examine whether the main effect of target reproductive strategy on trust could be explained partially by their perceived greater belief in big gods. This analysis used the same approach to mediation as Experiment 1.

With perceived belief in big gods as the only mediator (i.e., Reproductive Strategy → Big God Beliefs → Trust), the indirect effect was significant, $b = 0.05$, $SE = 0.02$, 95% CI = [0.01, 0.11], suggesting significant mediation. The direct effect of reproductive strategy was still significant, $b = 0.96$, $SE = 0.10$, 95% CI = [0.77, 1.16].

To examine whether other LH traits (e.g., impulsivity, opportunistic behavior) might mediate the effect, we conducted a multiple mediation analysis to estimate the effect of reproductive strategy on trust with the following mediators: perceived big god beliefs, non-impulsivity, non-opportunistic behavior, education, and hopeful ecology (see Fig. 4). In this model, perceived big god beliefs did not significantly mediate the effect, $b = 0.004$, $SE = 0.09$, 95% CI = [-0.01, 0.03]. However, three of the four LH variables significantly mediated the effect of reproductive strategy on trust: non-impulsivity, $b = 0.59$, $SE = 0.09$, 95% CI = [0.43, 0.79], non-opportunistic behavior, $b = 0.09$, $SE = 0.03$, 95% CI = [0.04, 0.17], and education, $b = 0.28$, $SE = 0.05$, 95% CI = [0.19, 0.39], but not

hopeful ecology, $b = -0.008$, $SE = 0.01$, 95% CI = [-0.03, 0.01]. The direct effect was not

significant in this model, $b = 0.05$, $SE = 0.09$, 95% CI = [-0.13, 0.23].
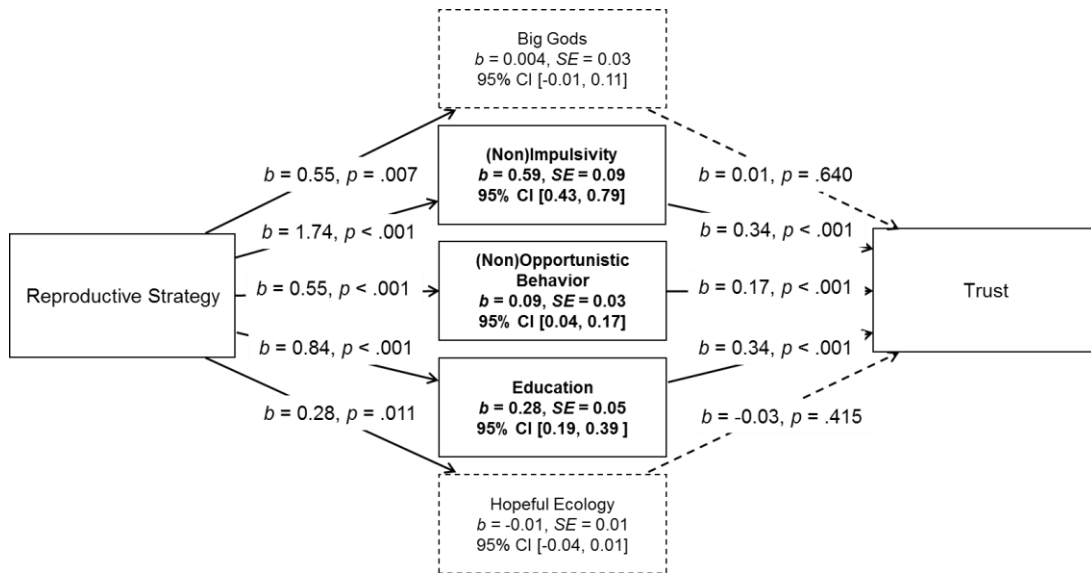
Figure 4. Parallel multiple mediation model depicting the effect of target reproductive strategy on trust as mediated by perceived LH traits and perceived big god beliefs in Experiment 2. The variable for target reproductive strategy was dummy coded (0 = uncommitted, 1 = committed).

Does participant religiosity moderate the observed effect? We again tested

whether participant religiosity might qualify the observed effects. We regressed target

religion (contrast coded: -0.5 = nonreligious, 0.5 = religious), target strategy (contrast

coded: -0.5 = uncommitted, 0.5 = committed), participant religiosity (centered), and their

interactions on our trust measure. In this model, there was a significant effect of target

religion, $t(436) = 2.45$, $p = .015$, $b = 0.25$, 95% CI = [0.05, 0.44], and a main effect of

target strategy, $t(436) = 10.32$, $p < .001$, $b = 1.03$, 95% CI = [0.83, 1.23], such that

religious (vs. nonreligious) targets were trusted more, and committed (vs. uncommitted)

targets were trusted more. There was one significant interaction (all other ps > .250)

between target strategy and participant religiosity, $t(436) = 3.73$, $p < .001$, $b = 0.20$, 95% CI = [0.09, 0.30], such that more religious participants tended to rate the committed (vs. uncommitted) strategists as especially trustworthy. Probing the interaction at low (-1 SD) and high (+1 SD) values of participant religiosity revealed that participants low in religiosity tended to trust the committed targets more than the uncommitted targets, $t(436) = 4.65$, $p < .001$, $b = 0.66$, 95% CI = [0.38, 0.93], and that participants high in religiosity also trusted the committed targets more than the uncommitted targets and did so to a greater extent, $t(436) = 9.86$, $p < .001$, $b = 1.40$, 95% CI = [1.13, 1.68]. This finding is consistent with our claim that reproductive strategy largely overrides the heuristic value of religion.

EXPERIMENT 3

Experiments 1 and 2 operationalized the target person's religion as Christianity; however, other researchers (Gervais et al., 2011; Hall et al., 2015) have demonstrated that both Christian and Muslim targets are trusted more than nonreligious targets. In Experiment 3, we tested whether perceived reproductive strategies mediate trust toward both Christian and Muslim targets. Further, whereas Experiment 1 used dating profiles and Experiment 2 used social media profiles, we sought to generalize our results to a professional context.

Method

Participants. Based on the smaller effect sizes found in Experiment 1, we estimated that we would need at least 301 participants for adequate (.80) power. Three hundred ninety-two (210 female) participants received $0.50 to complete a survey on person perception via TurkPrime, again excluding past participants. Participant ages

41

ranged from 18 to 77, with a median of 32 (M = 34.89, SD = 11.11). We excluded 20 participants from all analyses (including descriptive statistics) who failed one or more attention checks of the same kind used in Experiment 2.

Procedure and measures. Participants completed the same measures as Experiment 2: religiosity (α = .96), SOI-R attitude facet (α = .83), and big god beliefs (α = .96). They then viewed a randomly assigned profile from a "business- and employment-oriented social networking website." Each profile was a young male listed as an accountant; under the "What to know about me" section, he self-identified either as a devoted Christian who attends church regularly, a devoted Muslim who attends mosque regularly, or a nonreligious person who does not follow any particular religion. Other distractor information was included and held constant across profiles. To avoid priming mating, we neither included any information about nor explicitly manipulated target reproductive strategy.

After viewing the profile, participants responded to the same series of perceived LH measures used in Experiment 2, again on a 1 (*extremely unlikely*) to 7 (*extremely likely*) scale: *reproductive strategy* (α = .91), *non-impulsivity* (α = .88), *non-opportunistic behavior* (α = .94), *education* (r = .78, p < .001), and *ecology* (α = .76). Participants responded to five face-valid "accountancy trust" items (e.g., "You would trust him with your bank account information", α = .89). Next, to measure general trust, they responded to the 6-item trust measure used in Experiment 2 (Hall et al., 2015), which we combined with Cottrell, Neuberg, and Li's (2007) established trust measure (e.g., "Honest", α = .95). We used the same measure of the target's perceived belief in big gods (α = .98) and distractor items as Experiment 2.

42

Results

        As shown in Table 3, target religion had a significant main effect on general trust, $p < .001$. Pairwise comparisons revealed that both the Christian ($p < .001$) and the Muslim ($p = .043$) targets were judged more trustworthy than the nonreligious target. Although the pattern of means was similar in the exploratory accountancy trust scale (see Fig. 5), the main effect of target religion was not significant ($p > .250$), and there were no significant pairwise differences ($ps > .148$).

        The patterns for other LH variables were similar to Experiment 1, with some slight exceptions. First, the Muslim and nonreligious targets were rated similarly on non-opportunistic behavior and ecology (possibly due to the inferred racial dimension of being Muslim). Second, target religion had no main effect on perceived education ($p > .250$), perhaps because the target identified himself as an accountant, leaving less ambiguity. Most importantly, the Christian and Muslim targets were both rated as more committed reproductive strategists than the nonreligious target ($ps < .001$).

Table 3. Effects of Target Religion on Perceived Life-History Traits and Trust in Experiment 3.

Outcome	Nonreligious Target (n = 131)		Christian Target (n = 130)		Muslim Target (n = 131)		F	p	η^2
	M	SD	M	SD	M	SD			
Reproductive Strategy	4.33_a	0.85	5.58_c	0.97	5.31_b	1.11	58.83	< .001	.230
(Non) Impulsivity	4.59_a	0.99	5.23_b	0.90	5.02_b	0.99	15.01	< .001	.072
(Non) Opportunistic	5.34_a	1.31	5.82_b	1.23	5.35_a	1.36	5.79	.003	.029
Education	5.53_a	0.98	5.70_a	1.17	5.72_a	1.17	1.24	.291	.006
Hopeful	4.81_{ab}	1.04	5.04_b	1.10	4.61_a	0.99	5.53	.004	.028
Ecology	4.91_a	0.93	5.44_c	1.03	5.16_b	1.04	8.94	< .001	.044
General Trust	4.66_a	1.32	4.90_a	1.30	4.78_a	1.39	1.04	.353	.005
Accountancy Trust									

Note: Each row represents main effect of a one-way ANOVA (df = 2, 389) comparing perceptions of nonreligious, Christian, and Muslim targets. Means with different subscripts are significantly different from each other (p < .05).
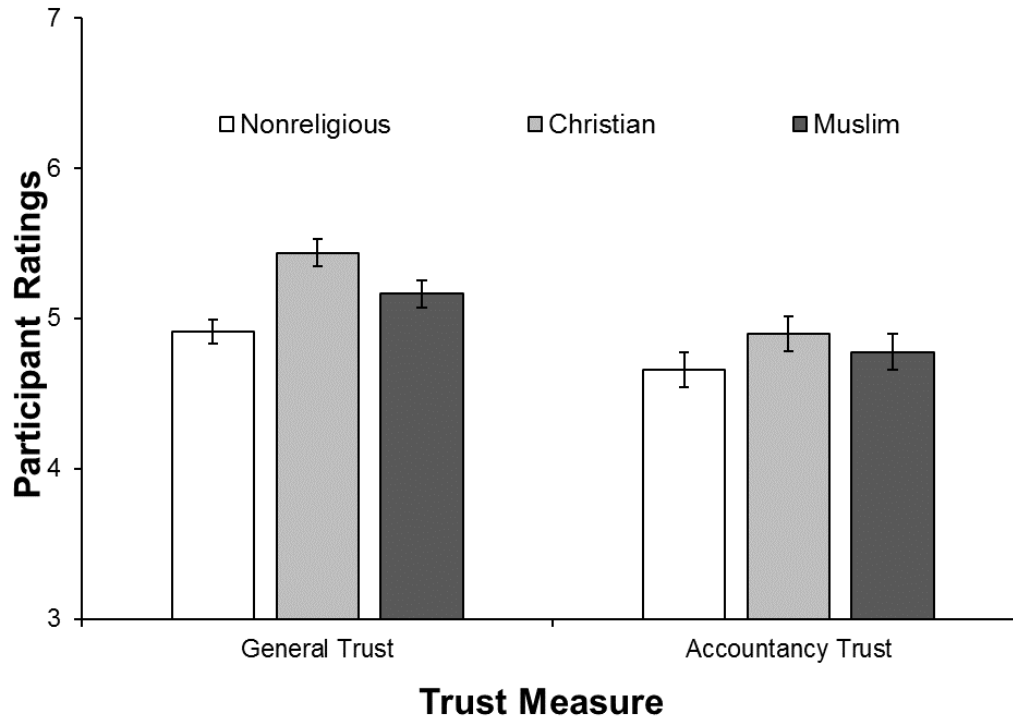
Figure 5. Results from Experiment 3: mean trust ratings as a function of target religion. Error bars represent ± 1 SE.

Do LH perceptions mediate the effect on trust? Following Hayes and Preacher (2014), we used 5,000 bootstrapped iterations to compute a bias-corrected 95% CI for the indirect effects, using two dummy coded variables to represent the effect for the Christian condition (Nonreligious = 0, Christian = 1, Muslim = 0) and the Muslim condition (Nonreligious = 0, Christian = 0, Muslim = 1).

Consistent with Experiment 1, perceived reproductive strategy arose as a significant mediator of general trust for both Christian and Muslim targets (see Fig. 6). Non-impulsivity was also a significant mediator for both targets, and non-opportunistic behavior was a significant mediator for the Christian target only. The direct effect was

not significant for the Christian target, $b = -0.10$, $SE = 0.09$, 95% CI = [-0.27, 0.08], or

for the Muslim target, $b = -0.15$, $SE = 0.09$, 95% CI = [-0.32, 0.02].
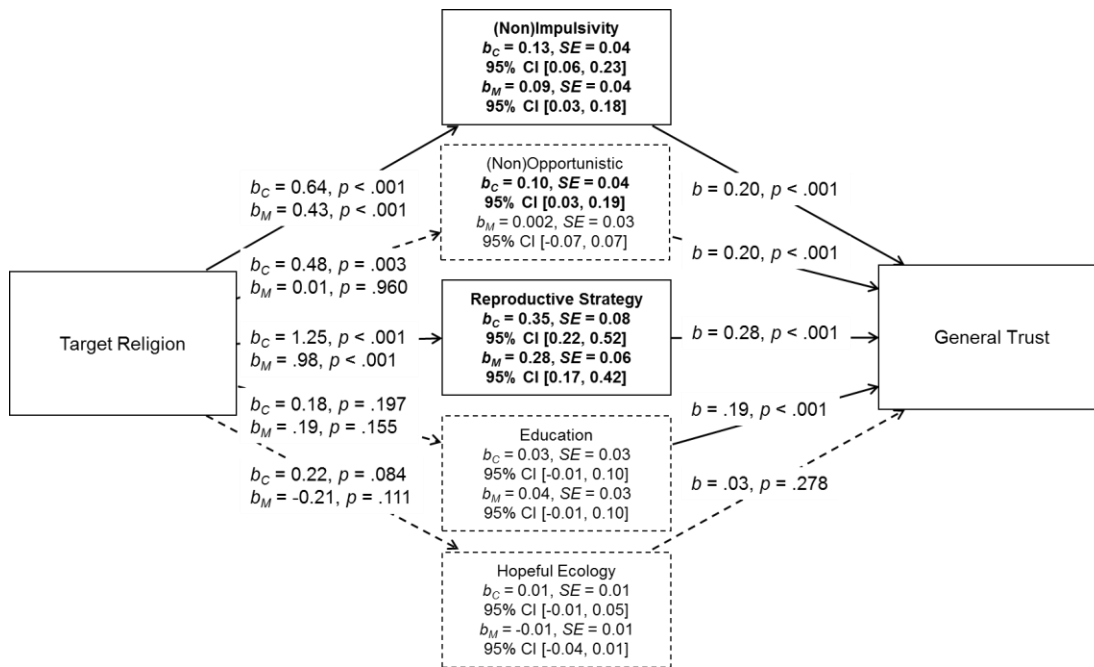
Figure 6. Parallel multiple mediation model depicting the effect of target religion on general trust as mediated by perceived LH traits in Experiment 3. Where there are two coefficients, b_C shows results for the Christian condition, and b_M shows results for the Muslim target, relative to the nonreligious condition.

Using the accountancy trust scale yielded similar results; reproductive strategy

was a significant mediator for both the Christian, $b = 0.34$, $SE = 0.10$, 95% CI = [0.15,

0.56], and the Muslim target, $b = 0.27$, $SE = 0.08$, 95% CI = [0.12, 0.45]. Non-

impulsivity also mediated the effect for the Christian, $b = 0.17$, $SE = 0.06$, 95% CI =

[0.07, 0.31], and the Muslim target, $b = 0.11$, $SE = 0.05$, 95% CI = [0.04, 0.23]. Other

indirect effects (non-opportunistic behavior, education, and ecology) were not significant.

The direct effects were slightly, but significantly negative for both the Christian, $b = -$

0.38, $SE = 0.15$, 95% CI = [-0.68, -0.08], and the Muslim target, $b = 0.30$, $SE = 0.15$,

95% CI = [-0.59, -0.02].

Does participant religiosity moderate the effect? We again tested whether

participant religiosity moderated the effect of target religion on trust. Using the general

trust scale and the same dummy coded variables, the Christian target was trusted

significantly more than the nonreligious target, $t(386) = 4.15$, $p < .001$, $b = 0.51$, 95% CI

$= [0.27, 0.75]$, and the Muslim target was trusted marginally more, $t(386) = 1.89$, $p =$

$.059$, $b = 0.23$, 95% CI $= [-0.01, 0.47]$. Participant religiosity significantly moderated the

effect toward the Christian target, $t(386) = 3.45$, $p = .001$, $b = 0.22$, 95% CI $= [0.09, 0.34]$,

but not toward the Muslim target ($p > .250$). Simple slope analyses revealed that

participants high in religiosity were more trusting toward the Christian target, $t(386) =$

5.53, $p < .001$, $b = 0.93$, 95% CI $= [0.60, 1.26]$, but the effect was not significant for

participants low in religiosity ($p > .250$).

Using the accountancy trust scale, neither the Christian ($p = .190$) nor the Muslim

($p > .250$) target were rated more trustworthy than the nonreligious target. However,

religiosity again moderated the effect for the Christian target, $t(386) = 3.79$, $p < .001$, $b =$

0.32, 95% CI $= [0.15, 0.49]$. Simple slope analysis revealed that, among participants high

in religiosity, the Christian target was rated as a more trustworthy accountant than the

nonreligious target, $t(386) = 3.72$, $p < .001$, $b = 0.83$, 95% CI $= [0.39, 1.28]$. However,

among participants low in religiosity, the Christian target was judged to be a marginally

less trustworthy accountant than the nonreligious target, $t(386) = -1.72$, $p = .086$, $b = -$

0.41, 95% CI $= [-0.87, 0.06]$.

As in Experiment 1, we again used Model 59 of PROCESS (Hayes, 2012) to test

whether the indirect effect of target religion on general trust (via perceived reproductive

strategy) held across levels (± 1 SD) of participant religiosity, and specifically whether

this effect held even for those participants low in religiosity We computed two separate analyses comparing the nonreligious target to the Christian and to the Muslim, respectively. For the Christian target, the mediation effect was significant at the low, $b = 0.76$, $SE = 0.13$, 95% CI = [0.52, 1.05], average, $b = 0.81$, $SE = 0.10$, 95% CI = [0.63, 1.02], and high, $b = 0.77$, $SE = 0.17$, 95% CI = [0.47, 1.16], levels of religiosity. The direct effect was significantly *negative* at the low, $b = -0.68$, $SE = 0.15$, 95% CI = [-0.98, -0.38], and average, $b = -0.23$, $SE = 0.11$, 95% CI = [-0.46, -0.01], levels of religiosity, but not at high religiosity ($b = 0.22$, $p = .223$).

For the Muslim target, the indirect effect was also significant at the low, $b = 0.54$, $SE = 0.12$, 95% CI = [0.32, 0.79], average, $b = 0.61$, $SE = 0.08$, 95% CI = [0.45, 0.80], and high, $b = 0.66$, $SE = 0.14$, 95% CI = [0.42, 0.99], levels of religiosity. The direct effect was again significantly negative at the low, $b = -0.37$, $SE = 0.15$, 95% CI = [-0.67, -0.08], average, $b = -0.37$, $SE = 0.11$, 95% CI = [-0.58, -0.16], and high, $b = -0.36$, $SE = 0.16$, 95% CI = [-0.68, -0.05], levels of religiosity.

GENERAL DISCUSSION

We investigated whether religious targets are viewed as slow LH strategists and, if so, whether this may explain effects of religious claims on trust. Experiment 1 demonstrated that religious targets (compared to nonreligious targets) were rated as "slower" across LH domains, but were not judged to be more appealing mates (i.e., it was not a universal "halo" effect). They were also rated as more trustworthy, and the effect of target religion on of trust was statistically mediated by perceived reproductive strategy. Experiment 3 showed that this mediation holds for both Christian and Muslim targets in a professional domain.

48

Experiment 2 independently manipulated both the religion and reproductive strategy of targets to test whether "direct" LH information might take precedence over religion in influencing ratings of trust. When participants were given targets' reproductive strategies, the same religious manipulation used in Experiment 1, which had a significant effect, became markedly less important, and target religion had only a marginally significant effect on trust.

Past research has posited that religious individuals are trusted in part because they believe they are being watched by a morally concerned god (Gervais et al., 2011). Here, we tested a novel explanation for the robust finding that religious targets tend to be trusted more than nonreligious targets. Whereas these two explanations are not mutually exclusive, our data suggest the effects of LH intuitions operate above and beyond shared beliefs in monitoring gods to cultivate trust. Consistent with Hall and colleagues (2015), our data suggest that perceivers are perhaps less concerned with targets' specific beliefs, and more interested in the likely behavior they can infer from religious information. Because religion is not the only behavior cue (and may not even be the strongest), the presence of other information may diminish the effect of religion or, in some cases, override it.

Indeed, our results suggest that simply knowing someone's reproductive strategy was sufficient to diminish drastically the effect of religion. Given the relative consistency of trust ratings based on religious information (both in our data and in past research), it is striking that any single piece of additional information might diminish or override this phenomenon. This finding may present a hopeful picture for anti-atheist bias in interpersonal contexts. Cottrell and Neuberg (2005) proposed that prejudices toward

49

different groups are rooted in the specific threats they are perceived to pose. Individuals often act in ways to counteract specific prejudices—Black men might whistle classical music to self-present as non-threatening, and obese individuals might practice excellent hygiene to avoid being seen as a disease threat (Neel et al., 2013). One simple way for nonreligious individuals to counteract prejudice, then, might be to present themselves as family-oriented or invested in monogamous relationships.

Viewing religion as a LH cue may further lead to nuanced hypotheses about when religious individuals might *not* be favored. Given the specific traits that religion seems to cue, it may be possible to find instances where the same religious individuals are viewed positively (e.g., trustworthy) on one hand, but negatively (e.g., closed-minded) on the other. Further, whether an individual views religion favorably or not may depend on his or her current motives (Cohen & Moon, 2017).

Some have provocatively claimed that religiosity is essentially a reflection of mating or LH strategies (Weeden et al., 2008); in this view, religion is motivated mainly by restricted and monogamous sexual strategies. In our view, religion is a complex and nuanced phenomenon that cannot be reduced to any single motive. Nonetheless, our data suggest that perceivers may use religion heuristically to infer committed reproductive strategies and a suite of slow LH traits. These traits may, in turn, influence perceptions of trust.

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CHAPTER 4

MEN ARE LESS RELIGIOUS IN MORE GENDER-EQUAL COUNTRIES

ABSTRACT

Sex differences in religiosity are cross-culturally common and robust, yet it is unclear why sex differences in some cultures are larger than in others. Although women are more religious than men in most countries, religions frequently provide asymmetrical benefits to men at the expense of women. Two global analyses (51 countries and 74 countries) found that country-level gender equality was consistently and negatively associated with religiousness (i.e., religious attendance, reported importance of God, and frequency of prayer) for men, more than for women, leading to a larger sex difference in religiousness in more gender-equal countries. Results were especially robust for religious attendance, and hold accounting for country-level wealth, as well as individuals' religious affiliation, moralization of sexuality, age, and education levels. We interpret results through a rational choice lens, which assumes that people are more drawn to religion when it is consistent with their reproductive goals.

INTRODUCTION

Sex differences in religiosity represent one of the most consistent findings in the psychology of religion, and are often described as nearly universal (Beit-Hallahmi, 2014; Stark, 2002). Some researchers have suggested that women (vs. men) are more prone to religious beliefs because they have a greater propensity for mentalizing (the ability to reason about and represent other's minds) (Norenzayan et al., 2012), decreased risk tolerance (Roth & Kroll, 2007), and greater empathic concern (Jack et al., 2016)—all of which are associated with greater religious belief. Yet women are not always more religious—in some cultures these differences are minimal or even reversed (Irons, 2001; Schnabel et al., 2018; Yaffe et al., 2018). As of yet, it is unclear why there is cultural variation in sex differences in religiosity.

We draw on the rational choice model of religious engagement, which suggests that people adopt religious beliefs and practices depending on whether their goals are congruent with religious lifestyles (McCullough et al., 2005; Sherkat & Wilson, 1995). We also take a functional approach, based on the premises that religious beliefs and practices are sensitive to context or "facts on the ground" (Reynolds & Tanner, 1995; Wright, 2009). That is, rather than providing only symbolic benefits or comfort, many religious beliefs and rituals may be tools that developed through cultural evolution because they promote reproductive success.

In particular, religions seem closely linked to control of reproductive behaviour. Most religions impose rules about sexuality and sex roles—who can have sex and with whom, who cares for children, and how families are structured (Reynolds & Tanner, 1995). One of the most consistent correlates of religiousness worldwide is an opposition

to sexual promiscuity—i.e., *restricted sociosexuality* (Schmitt & Fuller, 2015; Weeden & Kurzban, 2013). A rational choice approach might predict that people who prefer high-investment, long-term, monogamous mating strategies will be drawn to religion precisely because it seeks to make sexual promiscuity more costly though anti-promiscuity norms and punishment (McCullough et al., 2005; Moon et al., 2019; Weeden et al., 2008). None of this is to suggest that religion is necessary to control others' sexual behaviour, but that supernatural enforcement is one of several cultural tools of social control—one that is particularly powerful (Fitouchi & Singh, 2022).

There is indeed evidence that religious norms and practices can affect several life history trade-offs (Moon, 2021). All organisms must choose how to allocate energy into growth, somatic maintenance, and reproduction—taken holistically, there is a fitness trade-off between future and current reproduction (Hill, 2019). This can be conceptualised as spanning three fundamental trade-offs: current vs. future reproduction, quality vs. quantity of offspring, and mating vs. parenting effort (Del Giudice et al., 2015). To the extent that religions increase paternal certainty (Boster et al., 1998; Strassmann et al., 2012), they can increase the incentives for men to invest in parenting (Gaulin & Schlegel, 1980; Scelza et al., 2020). There is also a trade-off between offspring quality and quantity, such that greater numbers of offspring are generally associated with less investment in each child (Lawson & Mace, 2009). This trade-off seems to be less steep among religious individuals, however, likely as a result of increased biparental care and alloparenting, in which parents, extended relatives, and non-relatives provide care and resources for offspring (Shaver et al., 2019, 2020). Thus, religion can be especially

appealing to individuals following these high-investment mating strategies, whereas people who seek sexual promiscuity may benefit more from eschewing religion.

What are the benefits of religion for women? Women invest more in offspring than men (e.g., nine months of pregnancy as well as time spent in child care), and are more discriminating in selecting mates (Buss & Schmitt, 1993; Hrdy, 1999). Mate choice is the best way for women to advance their reproductive fitness; the regulation of monogamy that religion often affords protects that choice by incentivizing their partner to invest in their relationship and offspring. Indeed, because some males are more sought after as mates than others; these high quality males have higher reproductive rates than females, and benefit from minimizing their investment across many offspring (Kokko & Jennions, 2003). One straightforward benefit of religion for women, then, is it can prevent desertion of high value mates. That is, religious norms make it more costly for men to abandon their current mates or offspring by imposing sanctions or social pressure. This is especially true for religions that promote normative monogamy, which causes a more equitable distribution of mates (Henrich et al., 2012). In sum, women tend to be more interested in long-term exclusive relationships than men (Buss & Schmitt, 1993), and religion might appeal to them for this reason. This seems to partially explain sex differences in religiosity: some analyses have found that sex differences in religiosity disappear or are reduced when accounting for sociosexual attitudes (Weeden et al., 2008).

However, religious norms often go beyond simply prohibiting promiscuity, and many religious practices seem to benefit men at the expense of women. This asymmetry can take several forms. Women may be blamed for their own rape (Freymeyer, 1997) and held responsible for the sexual misconduct of men (e.g., through rules about modesty).

Specific religious rituals or taboos may also benefit men at the expense of women—several scholars have outlined how veiling seems more consistent with male (vs. female) interests, for instance as a tool for mate guarding (Aksoy, 2017; Blake et al., 2018; Pazhoohi & Hosseinchari, 2014; Pazhoohi & Kingstone, 2020). Further, some rituals seem designed specifically to suppress female sexuality. Among the Dogon of Mali, the indigenous religion promotes menstrual taboos, which includes women being exiled in uncomfortable menstrual huts. Use of these huts (e.g., after a woman's most recent childbirth) sends an honest signal that a woman is fertile, leading husbands and their families to engage in precautions to avoid cuckoldry (e.g., postmenstrual copulation). Genetic data reveal that men who practice the traditional religion, as opposed to other religions (e.g., Christianity), have significantly lower risk of cuckoldry (Strassmann et al., 2012)[3].

For men in particular, these religious benefits might depend on context. The extent to which women and men share equal rights, responsibilities, and opportunities in society (i.e., gender equality) may alter the incentives for men and women to engage with religious beliefs and practices. In cultures with less gender equality, the subjugation of women to advance men's interests might be more acceptable—and women may also be less empowered to prevent their oppression. Thus, in these countries, religion might be

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[3] As pointed out by a reviewer, any benefit of paternal certainty could be offset if religious women mate with nonreligious men at a higher rate than nonreligious women mate with religious men, which would give the nonreligious men a higher fertility rate, even with lower paternal certainty. We suggest that this is unlikely, as people are extremely likely to prefer mates of similar religious backgrounds (i.e., religious homogamy), and likely do so in part because of inferences about their propensity for fidelity or interest in a high-investment mating strategy (Bulbulia et al., 2015; Buss & Barnes, 1986; Irons, 2001; Moon et al., 2018; Slone, 2008).

more useful to men as a tool of social influence. In contrast, in more gender-equal

cultures that discourage restrictive religious practices for women, religion may afford

fewer reproductive benefits to men because they cannot impose social control over

women, and thus religion is less appealing.

Consistent with this notion, we hypothesized that gender equality would interact

with sex, such that sex differences in religiousness (i.e., women being more religious than

men) would be larger in more gender-equal countries. We were agnostic about what

would drive this effect, only that the relationship between gender-equity and

religiousness would be more negative for men than it is for women. We note, however,

that many wealthy countries tend to have greater gender equality and are often more

secular (Norris & Inglehart, 2004), so it would be surprising to find a positive slope for

either men or women.

Our hypothesis was derived by considering several recent findings documenting a

"gender equality paradox"—in more egalitarian societies, sex differences are often larger.

This pattern has been found with sex differences in personality (Costa et al., 2001;

Schmitt et al., 2017), moral judgments (Atari et al., 2020), career choice (Breda et al.,

2020; Stoet & Geary, 2018), and a variety of aesthetic preferences (Falk & Hermle,

2018). This pattern is perceived as paradoxical, as many people would intuit that gender

equality would reduce inequalities or allow boys and girls to be socialized in ways that

result in greater similarity. A common explanation is that egalitarian societies allow

individuals to make their own decisions with fewer institutional barriers and less regard

for what others might think. Rather than leading to the same outcomes for men and

women, it allows them to express their diverging preferences, thereby resulting in greater sex differences (Falk & Hermle, 2018; Schmitt et al., 2008; Stoet & Geary, 2020).

Sex differences in religiousness may follow a similar pattern. In societies with less gender equality, men may be better able to derive reproductive benefits from religion, resulting in higher religiousness among men. For women, however, the benefits of religious behaviour may be less dependent on the cultural context; for instance, religious groups tend to provide more frequent alloparenting, and this might be the case regardless of a society's gender equality; in fact, the benefits of alloparenting could be even larger in more egalitarian societies, where people are less embedded in kin networks that might otherwise engage in alloparenting (Shaver et al., 2020). That is to say, because women can acquire substantial reproductive benefits from religious involvement, there may be greater incentive for women (compared to men) to be religious, particularly in societies that have achieved greater gender equality.
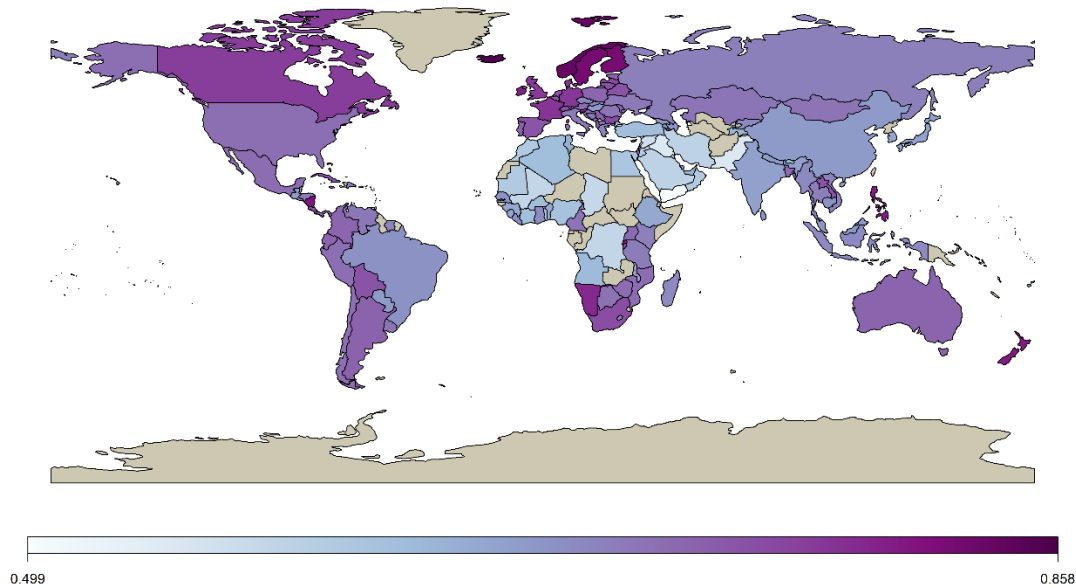
Figure 7. Global Gender Gap Index scores by country (World Economic Forum, 2018). Higher scores (darker colours) indicate greater gender equality. Countries with no data are in grey. Figure created using the rworldmap package (South, 2011).

Method

We compiled cross-cultural survey data from the World Values Survey, wave 6 (WVS6; (Inglehart et al., 2014)) and the combined European Values Survey and World Values Survey, wave 7 (EVS/WVS; (EVS/WVS, 2021)), which we combined with archival data on gender equality (the Global Gender Gap Index, or GGGI). We used multilevel modelling to predict religiousness as a function of gender equality, participant sex, and their interaction. We analysed the WVS6 and then replicated our results using the EVS/WVS7 to rule out the possibility that the effects were artefacts of the specific subset of countries in the WVS6.

Participants. Our sample size varied across models, depending on which questions were asked in different countries (sample sizes and the number of countries are specified for each model in Tables 1 and 2). In the WVS6 (Inglehart et al., 2014), the

largest sample size was 79,379 participants (largest number of countries was 51). In the

EVS/WVS (EVS/WVS, 2021), the largest sample size was 125,593 across 74 countries.

All data used in this paper are publicly available, and code to set up and analyse the

dataset can be found on the project's OSF page:

https://osf.io/kstgq/?view_only=b0493dd278984aed95f3e7196b9446e1.

      Individual-Level Measures. We assessed religious attendance with a single item

ranging from 1 (*more than once a week*) to 7 (*never, practically never*) in the WVS6

(V145) and the EVS/WVS file (F028) (EVS/WVS, 2021). We reverse-coded this variable

in both studies, such that higher scores represent more frequent attendance. We assessed

importance of God using a 1 (*not at all important*) to 10 (*very important*) measure that

was included in both samples (V152 in WVS6; F063 in EVS/WVS). Frequency of prayer

was assessed on a 1 (*several times a day*) to 8 (*never, practically never*) scale in the

WVS6 (V146 in WVS6); in the EVS/WVS, respondents of the WVS were asked this

question on the same scale (F063_WVS7), but respondents of the EVS were asked on a

separate 1 (*every day*) to 7 (*never*) scale. To convert them to the same scale, we rescaled

the WVS response options so that they ranged from 1 to 7 to match the EVS response

range (see our analysis file for details).

      To control for religious affiliation, we created a factor variable with five levels

(Christian, Muslim, Eastern, Other, and nonreligious) using the variables for religious

affiliation (V144 in WVS6; F025 in EVS/WVS). Finally, our more complex models

sought to control for participant sociosexuality. As a proxy, and because the same items

were not available in both waves, we used attitudes about sex before marriage (V206) in

WVS6 and attitudes toward casual sex (F132) in EVS/WVS. We also controlled for age

(V242 in WVS6; X003 in EVS/WVS) and education level (V248 in WVS6; X025A_01 in EVS/WVS) in these models.

Country-Level Measure. We operationalized gender equality using the Global Gender Gap Index (GGGI), which is produced in an annual report by the World Economic Forum (World Economic Forum, 2018) (https://tcdata360.worldbank.org/indicators/af52ebe9). This measure accounts for four domains of gender equality: economic participation, education, political empowerment, and health/survival (World Economic Forum, 2018), and is the only independent estimate of gender equality that is reported annually (Stoet & Geary, 2020). We also report analyses using each sub-index of the GGGI in the Supplemental Material. For WVS6 we used the 2014 GGGI estimates, which was the final year of data collection. For EVS/WVS, we used the 2018 estimates, which were the most recent available in our dataset. In addition to gender equality, Models 3A, 3B, and 3C in both studies controlled for country-level GDP per capita (purchasing power parity) using data obtained from the World Bank (The World Bank, n.d.).

Analytic Approach. To account for the nested nature of the data (i.e., respondents nested within countries), we used multilevel modelling. All analyses were conducted using the lme4 and lmerTest packages (Bates et al., 2015; Kuznetsova et al., 2017) in R, using Satterthwaite estimation of degrees of freedom. Analysis scripts and results are available at https://osf.io/kstgq/?view_only=b0493dd278984aed95f3e7196b9446e1.

We conducted the same analyses for both samples. For our baseline models (i.e., Models 1A, 1B, and 1C), participants (level 1) were nested within countries (level 2). We

included country-level gender equality (centred), participant sex, and their interaction. At the country level, we estimated both random intercepts and random slopes of participant sex. Further, because countries are not independent, but share cultural and geographic features, we nested countries within the sub-regions specified by the United Nations (United Nations, 2019)—in this third level, we estimated only random intercepts. In all analyses, continuous predictors were grand-mean centred, and dichotomous variables were coded as 0 and 1. The statistical equation that represents these base models is reported in the Supplemental Material.

Our follow-up models added covariates to the baseline models. For Models 2A, 2B, and 2C, we accounted for participants' religious affiliation using the five-level religious affiliation variable. Next, our third models included several control variables: sociosexuality (i.e., attitudes toward sex before marriage or casual sex), education, and age, and country-level GDP per capita.

Model diagnostics for Models 1A, 1B, and 1C are reported in the Supplemental Materials. The outcome variables are ordinal but as they have several categories we treat them in our models as continuous (for a discussion of ordinal variables treated as continuous see Norman, 2010). We provide histograms of the distributions of residuals at the individual level, as well as for the random intercepts and slopes. In most cases the distributions reasonably approximated a normal distribution. Our full analysis files also contain formal tests for normality, though we note multilevel models are often robust to violations of these assumptions (Schielzeth et al., 2020).

Results

As shown in Tables 1 and 2, in both samples there was a significant interaction between gender equality and participant sex predicting religious attendance (Model 1A), importance of God (Model 1B), and frequency of prayer (Model 1C), such that the negative association between gender equality and religious belief, attendance, and prayer was stronger for men than women (see Fig. 8). Although the negative slope was consistent for men across religious outcomes, there was also a negative slope for women, but the effect was weaker and less consistent, reaching significance only for the importance of God and frequency of prayer.

Next, we added a variable to represent participants' religious affiliation, which we split into five groups: nonreligious, Christian, Muslim, Eastern religions, and Other (Models 2A, 2B, and 2C). This represents a relatively conservative analysis (i.e., whether or not someone is religiously affiliated vs. not affiliated explains much of the variance in religious attendance and belief, leaving less variance to be explained). Adding religious affiliation did not substantially alter results.

Finally, in addition to affiliation, we added control variables that have been theoretically or empirically linked to religiosity (Models 3A, 3B, and 3C). Given the strong link between sociosexuality and religion, we controlled for opposition to sex before marriage (in the WVS6 sample) and attitudes toward casual sex (in the EVS/WVS sample) as a proxy for sociosexuality (Schmitt & Fuller, 2015; Weeden & Kurzban, 2013). We also controlled for age (Bengtson et al., 2015; McCullough et al., 2005) and education (Hungerman, 2014). Finally, to account for differences in wealth between countries, we included country-level GDP per capita as a covariate.

After adding all controls, results were less consistent. In the WVS6, the predicted interactions were weaker. In the EVS/WVS, the interactions were more consistent for these two outcomes, even though the slopes were weak for both men and women. In all models predicting religious attendance, there was a significant interaction, such that gender equality was negatively associated with religious attendance for men, but not associated with religious attendance for women.

Overall, the results support our hypothesis that female > male sex differences in religiosity are larger in countries with greater gender equality, and that these results are driven largely by reduced religiosity of men in countries with greater gender equality. In nearly all of our models (except Models 3B and 3C in the EVS/WVS), this effect was statistically significant. For women, gender equality is negatively, but inconsistently, associated with importance of God and frequency of prayer. In no model was gender equality related to religious attendance for women.

Sub-Indices of Gender Equality. We ran Models 1A, 1B, and 1C with each sub-index of the GGGI: political power, economic participation, education, and health/survival. These analyses suggested that the gender equality paradox pattern was most strongly linked to gender equality in education and economic participation. There was no consistent effect for political power or health/survival. Results from these models are reported in the Supplemental Material. Although these analyses were exploratory, we view them as largely consistent with our framework, as it seems that facets of gender equality associated with women's independence from men drive the effect.

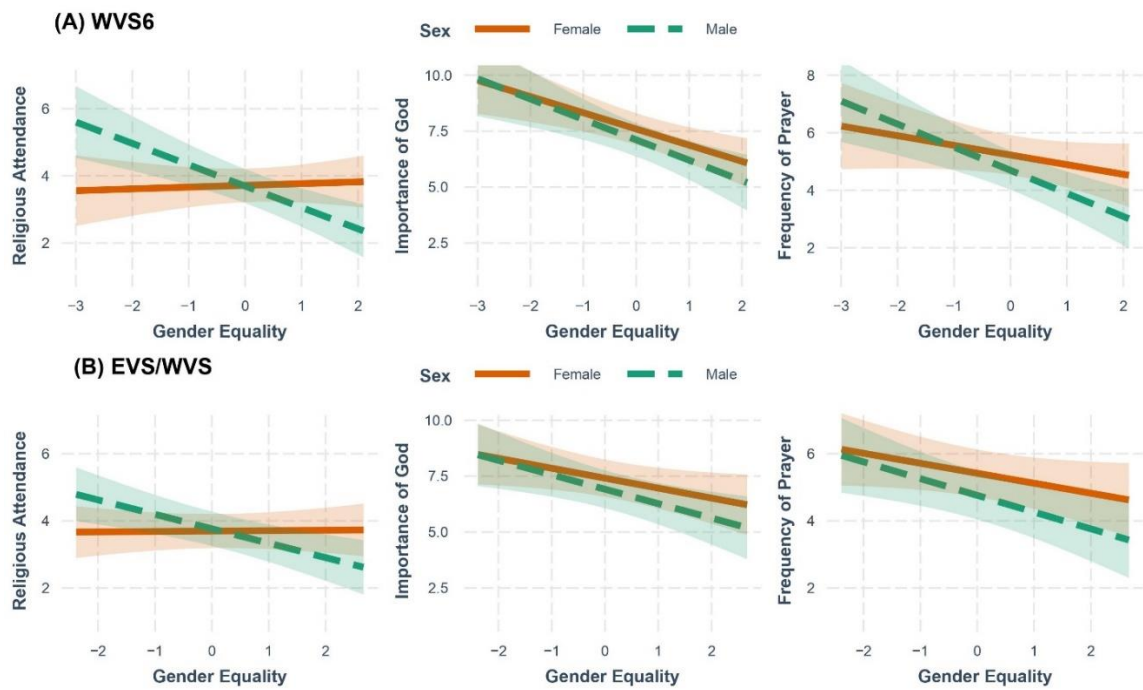*Figure 8.* Predicted values of religious attendance (left), importance of God (middle), and frequency of prayer (right) from Models 1A, 1B, and 1C. Y-axes are scaled to span all response options for each question, and higher scores indicate greater religiousness. Gender equality (x-axes) was standardized such that the mean is 0, and the standard deviation is 1. Shaded areas represent 95% confidence intervals.

Table 4. Fixed effects from multilevel models in WVS6

Predictor	(A) Religious Attendance				(B) Importance of God				(C) Frequency of Prayer			
	b	SE	df	p	b	SE	df	p	b	SE	df	p
Model 1	N = 79,379 (50 countries)				N = 78,537 (51 countries)				N = 78,462 (50 countries)			
GGGI (M)	-0.64	0.15	51.75	<.001	-0.91	0.25	44.61	.001	-0.80	0.20	49.31	<.001
GGGI (F)	0.05	0.15	50.62	.729	-0.72	0.22	45.46	.002	-0.34	0.22	53.85	.131
Sex	0.02	0.11	47.84	.846	0.48	0.06	49.30	<.001	0.53	0.13	47.61	<.001
GGGI × Sex	**0.69**	**0.11**	**47.96**	**<.001**	**0.19**	**0.06**	**50.08**	**.002**	**0.47**	**0.12**	**47.74**	**<.001**
Model 2	N = 76,767 (49 countries)				N = 76,371 (50 countries)				N = 77,352 (50 countries)			
GGGI (M)	-0.59	0.13	51.32	<.001	-0.69	0.21	44.68	.002	-0.68	0.17	49.14	<.001
GGGI (F)	0.03	0.13	51.24	.789	-0.57	0.18	46.25	.003	-0.27	0.19	55.93	.170
Sex	-0.08	0.11	46.79	.491	0.37	0.06	48.55	<.001	0.42	0.12	47.65	.001
GGGI × Sex	**0.63**	**0.11**	**46.90**	**<.001**	**0.13**	**0.05**	**49.30**	**.024**	**0.42**	**0.12**	**47.76**	**.001**
Christian	2.16	0.02	76709.83	<.001	2.62	0.02	76324.07	<.001	2.39	0.02	77303.23	<.001
Muslim	1.92	0.03	75741.56	<.001	2.82	0.04	75782.40	<.001	2.51	0.04	76956.81	<.001
Eastern	1.29	0.03	76343.25	<.001	2.14	0.04	76140.16	<.001	1.77	0.04	77196.26	<.001
Other	2.35	0.04	76701.46	<.001	2.85	0.05	76309.71	<.001	2.49	0.04	77273.83	<.001
Model 3	N = 68,404 (45 countries)				N = 68,515 (46 countries)				N = 68,987 (46 countries)			
GGGI (M)	-0.37	0.15	44.54	.016	-0.68	0.24	37.80	.008	-0.57	0.20	43.69	.006
GGGI (F)	-0.03	0.14	42.02	.816	-0.56	0.21	40.30	.009	-0.51	0.19	43.15	.009
Sex	0.03	0.09	42.98	.691	0.35	0.06	44.28	<.001	0.51	0.06	43.84	<.001
GGGI × Sex	**0.34**	**0.10**	**43.01**	**.001**	**0.11**	**0.07**	**44.47**	**.096**	**0.07**	**0.06**	**43.93**	**.301**
Christian	2.08	0.02	68356.08	<.001	2.48	0.03	68477.04	<.001	2.27	0.02	68960.95	<.001
Muslim	1.84	0.03	67554.71	<.001	2.64	0.04	67956.15	<.001	2.40	0.04	68614.34	<.001
Eastern	1.22	0.03	67956.63	<.001	1.95	0.04	68262.42	<.001	1.67	0.04	68820.93	<.001
Other	2.27	0.04	68341.55	<.001	2.67	0.05	68450.73	<.001	2.38	0.04	68927.58	<.001
Premarital Sex	-0.08	0.00	68347.76	<.001	-0.09	0.00	68460.98	<.001	-0.08	0.00	68944.45	<.001
Age	0.01	0.00	68343.47	<.001	0.01	0.00	68466.66	<.001	0.01	0.00	68936.74	<.001
Education	0.01	0.00	68360.97	<.001	-0.02	0.00	68448.53	<.001	0.02	0.00	68955.31	<.001
GDP	-0.18	0.15	40.48	.221	-0.10	0.21	41.11	.646	-0.22	0.21	42.04	.296

Note: The focal interaction is bolded. Full model details are available in the analysis file. GGGI = Global Gender Gap Index. Each religion represents a dummy code, with nonreligious as the reference group. Countries were nested within 14 sub-regions. Coefficients for GGGI (M) represent the slopes for males, and GGGI (F) represent the slopes for females. Sex is coded 0 = Male, 1 = Female.

69

Table 5. Fixed effects from multilevel models in EVS/WVS

Predictor	(A) Religious Attendance				(B) Importance of God				(C) Frequency of Prayer			
	b	SE	df	p	b	SE	df	p	b	SE	df	p
Model 1	N = 125,593 (74 countries)				N = 123,683 (73 countries)				N = 124,216 (74 countries)			
GGGI (M)	-0.43	0.13	76.57	.001	-0.64	0.23	73.18	.006	-0.50	0.17	74.77	.005
GGGI (F)	0.01	0.12	73.65	.919	-0.44	0.21	71.31	.040	-0.29	0.17	71.76	.078
Sex	-0.07	0.09	71.71	.425	0.49	0.05	70.17	<.001	0.66	0.05	71.44	<.001
GGGI × Sex	**0.44**	**0.08**	**71.81**	**<.001**	**0.20**	**0.05**	**70.71**	**<.001**	**0.20**	**0.05**	**71.84**	**<.001**
Model 2	N = 124,416 (74 countries)				N = 122,515 (73 countries)				N = 123,122 (74 countries)			
GGGI (M)	-0.42	0.10	77.58	<.001	-0.45	0.17	72.95	.012	-0.37	0.13	74.23	.005
GGGI (F)	-0.01	0.08	74.50	.899	-0.31	0.17	70.81	.072	-0.21	0.12	72.73	.093
Sex	-0.16	0.08	71.73	.052	0.36	0.04	70.38	<.001	0.55	0.04	71.57	<.001
GGGI × Sex	**0.41**	**0.08**	**71.81**	**<.001**	**0.14**	**0.04**	**70.92**	**.001**	**0.15**	**0.04**	**71.97**	**.001**
Christian	1.88	0.01	124129.04	<.001	2.89	0.02	122486.35	<.001	2.30	0.02	123021.72	<.001
Muslim	1.69	0.02	119206.30	<.001	3.47	0.03	120963.56	<.001	2.94	0.03	120088.48	<.001
Eastern	1.10	0.03	121364.95	<.001	2.31	0.05	121803.43	<.001	1.56	0.05	120851.57	<.001
Other	2.12	0.04	124327.95	<.001	3.33	0.06	122448.10	<.001	2.70	0.05	123053.47	<.001
Model 3	N = 114,642 (70 countries)				N = 114,079 (70 countries)				N = 113,483 (70 countries)			
GGGI (M)	-0.31	0.10	67.11	.002	-0.16	0.16	67.41	.318	-0.24	0.14	66.85	.085
GGGI (F)	-0.07	0.07	60.71	.357	-0.02	0.16	67.05	.920	-0.11	0.14	66.64	.433
Sex	-0.07	0.07	67.57	.357	0.29	0.04	67.42	<.001	0.52	0.04	67.34	<.001
GGGI × Sex	**0.24**	**0.07**	**67.59**	**.002**	**0.14**	**0.04**	**67.69**	**.001**	**0.13**	**0.05**	**67.43**	**.006**
Christian	1.78	0.01	114329.73	<.001	2.68	0.02	113981.34	<.001	2.11	0.02	113363.29	<.001
Muslim	1.60	0.02	110218.17	<.001	3.26	0.04	111461.65	<.001	2.78	0.03	110857.79	<.001
Eastern	1.03	0.03	111804.57	<.001	2.18	0.05	112792.25	<.001	1.42	0.05	111323.06	<.001
Other	1.99	0.04	114556.40	<.001	3.09	0.06	114019.92	<.001	2.49	0.05	113420.52	<.001
Causal Sex	-0.08	0.00	114577.33	<.001	-0.15	0.00	114056.14	<.001	-0.11	0.00	113455.94	<.001
Age	0.00	0.00	114567.52	<.001	0.01	0.00	114011.07	<.001	0.01	0.00	113440.18	<.001
Education	0.01	0.00	114585.03	<.001	-0.04	0.00	114039.26	<.001	-0.01	0.00	113459.37	.022
GDP	-0.16	0.12	63.61	.189	-0.92	0.19	55.47	<.001	-0.42	0.17	59.59	.014

Note: The focal interaction is bolded. Full model details are available in the analysis file. GGGI = Global Gender Gap Index. Each religion represents a dummy code, with nonreligious as the reference group. Countries were nested within 14 sub-regions. Coefficients for GGGI (M) represent the slopes for males, and GGGI (F) represent the slopes for females. Sex is coded 0 = Male, 1 = Female.

DISCUSSION

These data show that gender equality across cultures consistently and negatively predicts religious belief and behaviour among men, but the effect is small and inconsistent for women. This interaction between gender equality and participant sex holds in most of the models we ran, even when accounting for the clustering of countries within sub-regions, the religious denominations of participants, sociosexuality, age, education, and country-level wealth.

The results were particularly strong with religious attendance as an outcome; in all such models there was a consistent negative relationship between gender equality and religious attendance for men, but no effect for women. We suggest that religious attendance (vs. private religious behaviour or belief) is the outcome most relevant to our hypothesis. That is, it is attendance and overt participation that we would expect to be associated with the reproductive outcomes of interest. Overt religious participation may allow men to more easily monitor women, police sexual behaviour, or to signal their value as a mate via religious commitment.

In addition, the focal results were driven by gender equality in education and economic participation, but not political power or health/survival. These results could be consistent with the view of religion as a "costly signal" to indicate qualities such as trustworthiness, dedication to one's family, or even simply dedication to one's group (Bulbulia et al., 2015; Hall et al., 2015; Irons, 2001; McCullough et al., 2016; Moon et al., 2018; Slone, 2008; Sosis & Alcorta, 2003); gender equality might also influence the payoffs of using religion as a costly signal. For instance, there is some evidence that

women's economic dependence on men—which makes paternal certainty more critical—facilitates moralisation of promiscuity (Price et al., 2014). It follows, then, that women who are dependent on men (i.e., when gender equality is low) may prioritize signals of paternal investment and long-term commitment; this could in turn incentivise men in these societies to use religion as a signal of their willingness to invest in their offspring (Irons, 2001; Moon et al., 2018).

One could also predict the same pattern by considering other functions of religion. For example, religion fosters cooperation and ingroup cohesion (Norenzayan et al., 2016; Purzycki et al., 2016) and can help people manage their existential insecurities (Norris & Inglehart, 2004). Indeed, religions are especially attractive to people after facing mortal threats, such as intergroup conflict (Henrich et al., 2019). One alternative explanation, then, could be that countries that have achieved greater gender equality face fewer threats that require male coalitional coordination (e.g., warfare), therefore people (particularly men) in these countries are less likely to view religion as necessary. We reiterate, however, that our analyses are unable to reveal the mechanism behind the observed effects, or to adjudicate between alternative explanations.

Our hypothesis stems from a rational choice perspective on religion (McCullough et al., 2005), suggesting that engagement in religious behaviours and beliefs might stem partly from the reproductive benefits people acquire from them (McCullough et al., 2005; Moon, 2021; Weeden et al., 2008). Because religions often involve costly behaviour (Sosis & Bressler, 2003; Xygalatas et al., 2013), one should expect religious engagement to be more likely when the benefits outweigh the costs. If indeed one of the functions of religion is reproductive support that often favours men over women, and if the

72

manipulation of women in such ways (e.g., through modesty norms or proscribing sexual promiscuity) is less accepted in more gender equal societies, the costs may outweigh the benefits for men in these societies, resulting in lower religiousness among men.

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CHAPTER 5

DISCUSSION

Each paper in this dissertation approaches a different aspect of religion using a reproductive approach. Here, I summarize the results of Chapters 1-4 and detail several future directions that might extend the reproductive approach to religion.

Summary

In Chapter 1, I introduced the Reproductive-Religiosity Model, and discussed several of the key papers that spurred or resulted from this approach. In particular, this approach owes much to the work of Weeden and colleagues, who suggested that religion (as well as some other moral positions) largely reflect competition between different mating strategies (Kurzban et al., 2010; Pinsof & Haselton, 2016; Weeden, 2015; Weeden et al., 2008; Weeden & Kurzban, 2013). That is, people who follow monogamous mating strategies are more likely to benefit from norms that impose costs on sexual promiscuity, and religion provides a powerful tool to advance their interests.

Chapter 2 (Moon, 2021) reviewed evidence for the Reproductive-Religiosity Model, and extended this approach to consider the reproductive benefits of religion. I proposed that religion might offset trade-offs in individuals' life history. That is, in addition to simply having more children (Blume, 2009; Frejka & Westoff, 2008; Rowthorn, 2011; Zhang, 2008), religions can incentivize men to invest more in parenting because of higher rates of paternal certainty (Strassmann et al., 2012) and by making alternative strategies more costly. Further, because religious traditions often engage in alloparenting (i.e., pooling together resources to raise offspring), they also seem to achieve higher fertility rates without having higher rates of infant mortality (Shaver et al.,

2019, 2020). Finally, I also proposed that a reproductive approach is important for understanding the cultural evolution of religion. That is, religious beliefs are more likely to spread when adherents have high fertility rates, even if some children eventually leave the religion (Rowthorn, 2011), and the promotion of monogamous norms seems also to have important effects on societal cooperation (Henrich et al., 2012), which can help religions to spread.

In Chapter 3 (Moon et al., 2018), my coauthors and I explored the social implications of the Reproductive-Religiosity Model. We hypothesized that the effects of religion on perceived trustworthiness might be explained in part by intuitions about the relations between religion and mating strategies, rather than simply being a result of intuitions about religious targets' beliefs in punishing gods. Consistent with our predictions, we found that (a) people view religious individuals as sexually restricted, as interested in family and long-term mating, as higher in self-control, and less impulsive, (b) the perception of religious people as "committed reproductive strategists" statistically mediated the effect of religion on perceived trustworthiness, and (c) when participants were shown the target's "dating preferences" (i.e., whether he or she wanted to settle down and start a family or continue "playing the field"), religion no longer had an effect on perceived trustworthiness; instead, participants trusted targets who said they wanted to settle down.

Finally, Chapter 4 (Moon et al., 2022) applies the reproductive approach to a cross-cultural understanding of religion. This paper suggests that, if religion is a tool, and if people are largely drawn to religion when it is useful for their own goals, then any cultural dimension that makes this tool less useful should lead do decreased religiousness.

In particular, if religion is often used by men to advance their interests at the expense of women, and if a culture's level of gender equality affects men's ability to manipulate and control women, then it follows that religion might be less appealing to men in more egalitarian societies. Two global analyses using the World Values Survey and the European Values Survey suggested that this is the case—across multiple measures of religiousness, men (more so than women) tend to be less religious in countries with greater gender equality. This effect was especially consistent for religious attendance, and even held when controlling for participants' religious affiliations, sociosexual attitudes, and age.

Future Directions

This reproductive approach to religion can provide a generative framework for addressing religious phenomena. Below, I detail how this approach might fruitfully be applied and extended (including discussion of some extensions that have already been published).

Anti-Atheist Prejudice. Some subsequent work has already extended a reproductive approach as applied to social perception. For example, if part of the reason people distrust atheist is because they are perceived as being sexually promiscuous, it follows that people who are sexually restricted might harbor even greater anti-atheist prejudice, even when controlling for their own religious beliefs (Moon et al., 2020). Further, although most studies have focused on the myriad negative stereotypes of atheists (e.g., narcissistic, immoral, untrustworthy, etc.; Dubendorff & Luchner, 2016; Gervais, 2014; Harper, 2007), it might be possible that people view atheists positively in some ways. Recent work has suggested at least three domains in which atheists might be

viewed positively: they tend to be viewed as more fun, scientifically skilled, and open-minded (Moon et al., 2021).

Another future direction in anti-atheist prejudice would examine the moderating influence of different cultural of ecological factors. For example, religion in the United States seems highly diagnostic of mating strategies, leading to strong inferences by social perceivers. It could be the case that religion is less diagnostic of mating strategies in some societies; that is, if there is little variation in either mating strategies or in cooperativeness within a society, religion might provide a weaker signal for social perceivers. For example, in countries where there is very little crime, people might be less concerned with cues of others' trustworthiness, leading to weaker inferences based on religion.

Finally, future studies might explore how anti-atheist prejudice combines with other identities. For instance, it could be the case that people have intuitions about which groups of people are most likely to engage in anti-social behavior (e.g., young men). Religion might be especially powerful in fostering trust toward these groups, allowing them to counteract negative stereotypes.

Religion in Mating Markets. One straightforward prediction based on reproductive stereotypes of religious and nonreligious individuals is that people will use religion as a proxy for willingness to commit to long-term relationships. There is now some evidence that atheists are disadvantaged as long-term mates (Brown, 2021).

Further, if one function of religion for women is to secure mates who would otherwise be less likely to stay in committed relationships (as proposed above; Moon et al., 2022), one might also expect that people engage with religion strategically depending on their ability to attract mates. For example, it could be that men with greater ability to

find mates—who tend to be more sexually unrestricted (Arnocky et al., 2021)—might find religion less useful of a tool for their reproductive goals, and thus be less likely to become religious.

Proximate Mechanisms. Religious belief is often closely linked to a sense of meaning in life, and many people seek after religion precisely because it offers a sense of meaning (Park, 2013). Rather than being a competing explanation for religious belief, these perspectives might be complementary. For example, it could be that the propensity to find meaning in religion could be calibrated to the reproductive affordances posed by religion. One straightforward prediction, then, would be that the effect of religion on meaning is moderated by an individuals' reproductive goals (e.g., the relation might be especially strong among sexually restricted individuals). This would show how a more proximate cause (the desire for meaning) might lead individuals to pursue goals that are more evolutionarily relevant.

The Ecology of Religious Beliefs. As discussed in Chapter 1, moralizing religion tend to be more common in societies with pressing needs for cooperation (Botero et al., 2014; Peoples & Marlowe, 2012; Roes & Raymond, 2003). If a main function of religion is the regulation of sexual behavior, it should also generate predictions about the cross-cultural distribution of religious beliefs.

One possible application of this approach is to consider which types of environments impose challenges for reproduction or for fidelity. For example, in "harsh" environments, parental care from both fathers and mothers may be especially important; accordingly, people might be more willing in these societies to endorse the types of

religious practices that suppress female sexuality, such as veiling (Pazhoohi & Kingstone, 2020).

Conclusion

In all, a reproductive approach to religion certainly cannot explain all of religions. Religions help people find meaning, quell anxiety about their mortality, give them a sense of community, and much more. However, I suggest that this approach is very fruitful, as it can explain a surprisingly large portion of the variance in religious beliefs, is grounded in an interdisciplinary approach, and seems to provide insights about cross-cultural variation in religious phenomena.

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APPENDIX A

APPROVAL FOR INCLUSION IN STAPLED DISSERTATION

This dissertation includes two previously published works that have co-authors. For each of these works, I have been granted permission to include them in this dissertation.

APPENDIX B

CHAPTER 3 ETHICAL APPROVAL

EXEMPTION GRANTED

Adam Cohen
Psychology
480/965-7345
Adam.Cohen@asu.edu

Dear Adam Cohen:

On 9/28/2017 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Social Perceptions of Religious Individuals
Investigator:	Adam Cohen
IRB ID:	STUDY00006969
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Recruiting Scripts.pdf, Category: Consent Form; • Social Perception and Religion - Debriefing Script.pdf, Category: Participant materials (specific directions for them); • Consent Form - Undergraduate.pdf, Category: Consent Form; • IRB Protocol.docx, Category: IRB Protocol; • Social Pereption and Religion - Online Consent Form.pdf, Category: Consent Form; • Measures and Stimuli, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 9/28/2017.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

APPENDIX C

CHAPTER 4 ETHICAL APPROVAL

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Adam Cohen
CLAS-NS: Psychology
480/965-7345
Adam.Cohen@asu.edu

Dear Adam Cohen:

On 8/6/2020 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Religion, Morality, Prejudice, and Ecology
Investigator:	Adam Cohen
IRB ID:	STUDY00012265
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Country-level data sources.pdf, Category: Other; • Ecology and religion IRB.docx, Category: IRB Protocol; • Questionnaire, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Variables to analyze, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • WVS collection procedures.pdf, Category: Recruitment materials/advertisements /verbal scripts/phone scripts;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 on 8/6/2020.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).