

An Evolutionary Investigation of the Tradeoffs That Accompany High Religiosity

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Abstract

The study examines the complex interaction between religiosity, personality traits, and behavior within human group dynamics. It delves into evolutionary psychology's relevance in understanding social adaptations crucial for human ancestors' success within religious contexts. Using various standardized surveys like the Big Five Inventory, Religious Orientation Scale, Dark Triad, and Risk Propensity Scale, it aims to identify correlations among these factors. Specifically, this research predicts that the relationships between dispositional personality traits, openness or Machiavellianism for example, and behavioral traits, for example the propensity for taking risks, is moderated, affected, by whether an individual is religious or a-religious. By employing regression analysis, it will explore how religiosity affects relationships between the predictor and outcome variables. Anticipated findings could uncover connections unique to religious and a-religious individuals, shedding light on evolved behaviors' impact on social groups. This research offers insights into religious psychology, emphasizing the complexity of behavior within social contexts.

Keywords: Religiosity, Personality Traits, Human Group Dynamics, Evolutionary Psychology, Moderating Variable.

An Evolutionary Investigation of the Tradeoffs That Accompany High Religiosity

In the vast history of human existence, the relationship between religion and behavior has implicitly affected the journey of humans from the ancient environment of our early ancestors to the societal environment of modern day. Affecting this complex relationship are the nuances of human behavior, personality traits—which have brought about inquiry, fascination, and controversy regarding what exact role they play in our psychology. Using an evolutionary perspective, this study delves into the complexities of the relationship between personality traits, religiosity, and how they might affect or predict behaviors key to the survival of individuals and large groups of people.

For humanity to exist in its present form, our ancestors needed to be successful at two fundamental outcomes, required of all members of species that have ever existed: survive and reproduce. Over time, human behavior and cognition have evolved to enhance both survival and reproduction—and evolutionary psychology provides a unique lens to help understand those behavioral adaptations. In the animal kingdom, there are species abound whose members show little, if any, helping behavior toward one another and yet they continue to prosper and evolve. The other path that members of various species, including humans, have taken is one where helping behavior is central to their survivability and this phenomenon has been put forth as the basis of social groups (see Hamilton, 1964).

Helping behaviors have been categorized into two distinct types; the first is kin-related and the second is non-kin-related (Hamilton, 1964). Studies have shown that our decision-making process is closely tied to how related we are to other individuals, leading to behavior that will benefit related individuals over unrelated individuals (Kruger, 2001; Hamilton, 1964). At some point in evolutionary history, humans began to form social bonds that extended beyond

genetically related kin, and social groups of unrelated individuals became common (Dunbar, 1998; Dunbar, 2009). Helping behavior, in this environment, among individuals who are not closely related, non-kin, began to occur and the most common form is *reciprocal altruism*, helping another individual with the expectation that they will later help you (Trivers, 1971). This, however, involved risk on the part of the individual providing the assistance as they garner no immediate benefit to their own survivability or ability to reproduce. The expectation for non-related others to reciprocate has been put forth as the reason as to why we are predisposed to detect cheaters within social contexts (Cosmides & Tooby, 1992). This cheater-detection process is but one of many social psychological processes that seemingly results from large-scale reciprocal altruism.

The ability to form social groups beyond genetically related others has been suggested as one of the key elements to the success of humanity and is a core aspect of human social psychology. Further, Dunbar (1992) suggested that humans, even in the early stages of its evolution, displayed the tendency to form large social groups. For large social groups to be advantageous to both the individual and the group at large, certain behaviors and cognitive processes developed—and among these is religion. There are two leading perspectives on religion from an evolutionary perspective (Wilson & Wilson, 2007). The first is that religion arose as an adaptation to solve specific evolutionary challenges found in the ancestral environment (Buss, 2002; Wilson & Wilson, 2007). Examples of these challenges still exist today such as navigating group dynamics, living in unpredictable environments, coping with anxiety and death salience, and maintaining a sense of safety and security. Religious components help to address those challenges such as promoting cooperation, managing anxieties, and providing moral frameworks for social cohesion and unity (Buss, 2002; Buss, 2005; Lenfesty &

Fikes, 2018; Sanderson, 2008; Soeling & Volland, 2002; Wilson, 2002). The second view is that religion is an evolutionary byproduct that resulted from cognitive processes that arose and evolved for other purposes such as attribution theory, pattern identification, and seeking causes for environmental events (Boyer, 2003; Boyer, 2008; Kirkpatrick, 1999).

In either case, it can be surmised that humans have evolved a wide range of behaviors that have influenced and increased survival over the course of their evolutionary history. Highlighted here are a sample of those behaviors and their theorized link to religion. Group cohesion rituals are thought to be used in the formation of social bonds with others to increase chances of survival, fostering cooperation, a sense of community, and promoting a sense of belonging (Norenzayan, 2013). Cooperation is central to this premise, with the formation of groups key to having a sense of safety and increasing access to readily available resources. Humans developed behaviors that saw benefits to helping others without an immediate and direct benefit to oneself, and altruism itself could not work without a system of checks and balances to prevent being taken advantage of. To promote social harmony and prosocial behavior, a few systems developed over time that gave individuals reasons to engage in pro-social behavior. Among these are moral codes, possibly the precursors to religion, systems to detect cheaters, and systems to punish those that engaged in anti-social behavior and instill fear to prevent recurrence. These concepts have similarities or direct ties to religious tenets and seemingly have group level benefits in that the end goal was social harmony. Group level benefits of religious adherence or doctrines have seen little focus, rather, purported benefit/cost analysis of religion has mainly remained at the individual level.

Overview

Religion has been studied, from a psychological standpoint, in terms of both its purported *benefits* or in terms of its negative aspects and *harmful effects*. Studies have shown evidence of both with research pointing towards judging Religion's effect by its complete body of both positive and negative aspects (DeSteno, 2019). Often, the critiques of religion address its very premise, for example the notion that religious beliefs are often maintained not because they are true, but because individuals believe it is important for others to believe in them (Dennett, 2007). Others acknowledge and highlight the role religion has had, not on the individual, but on human societies. Dogmatism, superstition, and intolerance are often tied to most forms of religion, harming social cohesion, moral guidance, and perpetuating any subsequent maladaptive behaviors and norms (Cassell, 2015; Dennett, 2007; Haidt, 2012). How religion interacts with the individual has also been the subject of criticisms, with research showing that, while religion emphasizes morality, it implicitly also emphasizes group loyalty, authority, purity, which can lead to moral conflicts with outgroups, creating intergroup tension (Haidt, 2012). Neuberg et.al. (2014) proposed various mechanisms religion influences that increases intergroup conflict—establishing religion as the moderating factor between competition for resources and the incompatibility of differently held beliefs (in-group/out-group dynamics).

By contrast, a myriad of benefits has been tied to religion, and supported by scientific research. DeSteno (2021) discussed at length in his book the positive role religion plays in human psychology. From emotional regulation and social bonding, to coping mechanisms, resilience, and life satisfaction (DeSteno, 2021). Research has shown religion's benefit and impact on mental health; a positive correlation with happiness and hope; impact on resilience during internal religious crisis (Abu-Raiya et al., 2016; Flannelly & Galek, 2010; Francis et al.,

2017; Kämmerle et al., 2014; McCullough & Worthington, Jr., 1999); however, most, if not all, factors have been studied independent of each other.

Evolutionary psychology has provided theories of the origin of religion and its adaptive nature to promote benefits within a social context, little research has been conducted on its advantageous and deleterious effects, both at the individual level and the group level. Similar in premise that evolutionary adapted traits can come with both an advantages and disadvantages, brightly colored birds signaling to potential mates that they are available but also increasing their visibility to predators as an example, there exists the possibility that religiosity can possess the same duality. Prior research has shown correlations between high levels of religiosity and personality traits like agreeableness, *suggesting* that religiosity is a predictor of agreeableness in individuals (Ashton & Lee, 2021). Agreeableness has long been operationalized and defined as cooperative, considerate, compassionate, and conflict avoidant by nature (Goldberg, 1993; Goldberg, 2013). The traits of an agreeable personality all have prosocial qualities that seemingly fit well within a group dynamic that seeks to maintain group cohesion, promote cooperation, and mitigate antisocial behaviors. Within this context, a potential link between agreeableness and altruistic behaviors may be found, with religion acting as a potential moderating effect, which is a variable that either effects or establishes a link between two other independent variables. Łowicki and Zajenkowski (2017) conducted research that established a link between lack of empathy and Dark Triad personality traits, with religion acting as the moderator between the two variables. As discussed, prior, evolutionary studies often will investigate adaptations and behaviors in terms of what survival benefit, or disadvantage, they might provide an individual, and how they have been shaped by the pressures and challenges encountered in the ancestral environment. Additionally, they are also viewed in terms of how those adaptations either fit our

current environment or are mismatched with it—and whether they operate at an individual level or at the group level. Within this framework, this study sought to address the following research questions:

1. Do religious individuals, relative to a-religious individuals, tend to score relatively high on group-oriented variables and lower on selfish-oriented variables? (Table 1.)
2. What correlations exist between personality traits and both social and evolutionarily adaptive behaviors within individuals identified as high in religiosity? (Table 2.)
3. Can the results be framed within an evolutionary perspective, identifying variables in terms of their advantageous and disadvantageous nature to the individual and group level, respectively?
4. Do personality traits map onto evolutionarily adapted behaviors for pro-social behavior when controlled for religion? In other words, do certain personality traits, such as agreeableness, predict pro-social tendencies across levels of religiosity?

Table 1. Conceptual Presentation of Self-Oriented versus Group-Oriented Variables

<u>Construct / Measure</u>	<u>Self-Oriented Variables</u>	<u>Group-Oriented Variables</u>
Personality: Big Five Measured with TIPI	Extraversion, Emotional Stability,	Openness, Conscientiousness, Extraversion, Agreeableness,
Personality: Dark Triad Measured with Dirty Dozen	Narcissism, Machiavellianism, Psychopathy	–
Risk: Risk Propensity Measured with ROS-R	Low Risk → Selfish	High Risk → Prosocial
Social Values: Social Orientation Measured with SVO	Egoist, High Competitor	Altruistic/Prosocial, Low Competitor

*Note that the details of these measures are found in the forthcoming *Methods* section.

My thesis addresses a gap in literature where religion, evolutionary psychology, and personality psychology intersect. To date, I have found no data or research that has sought to identify the psychological correlates of personality traits and behavioral tendencies within a religious personality context. Rather, prior studies have focused on personality traits that map onto religious adherence, the mental health benefits of religion, and religion and happiness, as examples (Abu-Raiya et al., 2016; Haney & Rollock, 2020; Haddad & Angman, 2016; Ladd et al., 2007). Additionally, little to no research has discussed religion as a moderating effect between predictor and outcome variables with an evolutionary perspective—addressing their potential advantageous and disadvantageous aspects to both the individual and group.

Hypothesis

Based on the considerations contained in the introduction and research questions, the following hypothesis are presented, they are also summarized in table 2. The first prediction is that religiosity moderates the relationship between personality predictor variables such as consciousness, emotional stability, Machiavellianism, and outcome variable risk propensity. Specifically, for individuals with high religiosity, a positive correlation is expected between these variables, while a negative correlation is expected for individuals with low religiosity (see table 2). The second prediction is that religiosity moderates the relationship between predictor variables such as openness, extraversion, psychopathy, and outcome variables such as altruistic (prosocial) behavior and selfishness (anti-social). Specifically, it is expected that both high and low levels of religiosity will show positive correlations between these variables; however, the effect will be significantly stronger for individuals with high religiosity compared to those with low religiosity (see table 2). Lastly, it is expected that religiosity will significantly predict the orientation of values where individuals with high religiosity are expected to exhibit more group-

oriented values compared to individuals with low religiosity, who are expected to demonstrate more self-oriented values (see table 1).

Table 2. Conceptual Presentation of Proposed Correlations Between Variables with Religiosity as a Moderating Variable

<u>Predictor Variable (High)</u>	<u>High Religiosity (Moderating Variable) Expected Correlation¹</u>	<u>Outcome Variable</u>
Openness	Positive	Risk Propensity ²
Conscientiousness	Positive	Machiavellianism
Extraversion	Positive	Selfishness (Egoist Behavior) ²
Agreeableness	Positive	Altruism (Prosocial Behavior) ² ; Selfishness (Egoist Behavior)
Emotional Stability	Positive	Risk Propensity
Narcissism	Positive	Selfishness (Egoist Behavior) ² ; Risk Propensity
Machiavellianism	Positive	Risk Propensity
Psychopathy	Positive	Altruism (Prosocial Behavior)
Altruism (Prosocial Behavior)	Negative	Conscientiousness
Selfishness (Egoist Behavior)	Negative	Extraversion
Selfishness (Competitor Behavior)	Positive	Extraversion ²
Risk Propensity	Negative	Selfishness (Egoist Behavior) ²
Risk Propensity	Positive	Altruism (Prosocial Behavior)

1. Note that for participants categorized as low in religiosity or a-religious, the opposite direction of the correlation is predicted unless otherwise indicated. 2. For participants categorized as low in religiosity or a-religious, the same correlation is expected but with a smaller effect.

Methods

Understanding the role of religion in shaping human behavior and social interactions is a multidimensional endeavor that involves careful methodological considerations. This study aimed to identify correlations among personality traits, dispositions, and behavioral tendencies—using religion as the moderating variable. Therefore, the methodology necessitated a comprehensive approach encompassing several quantitative measures and standardized psychological surveys to capture the appropriate data for analysis.

Participants

Participants were recruited from diverse religious backgrounds, ensuring representation across diverse belief systems and practices are present, including non-religious or a-religious individuals. Participants needed to be at least 18 years of age to participate and have listed English as their primary language. No other exclusion criteria were included. The study was distributed to individuals via the SUNY New Paltz Sona system, and the SUNY New Paltz ListServ. Additionally, the study was distributed using social media platforms Instagram, Facebook, and X (formerly Twitter). Only participants recruited through the SUNY New Paltz Sona system were compensated for their participation in the study. Individuals participating via Sona received credit toward their psychology major for completing the survey. No other participants were compensated for their participation. The study had limited to no adverse effects on participants due to its correlational survey approach and having no experimental manipulation.

Design

The is quantitative and correlational in design and was conducted in an online format through Qualtrics software. Data collection took place over a one-month period during the spring 2024

semester. Religiosity served as the moderating variable for the study between the predictor variables (personality traits) and the outcome variables (risk propensity and social values). The study did not have experimental conditions and only participants who completed the survey in its entirety were included in the data analysis.

Materials

Several scales were selected for use in this study and are summarized in Table 3. with their accompanying dependent variables in addition to being outlined here.

The Ten Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003), a scale that includes 10 items that assess the Big Five personality traits (openness, conscientiousness, extraversion, agreeableness, and emotional stability). The scale employs a 1 to 7 Likert scale, and participants indicate to what degree they agree or disagree with statements that describe them with 1 indicating they Strongly Disagree and 7 indicating they Strongly Agree.

The Dirty Dozen (Jonason & Webster, 2010), a scale that includes 12 items that assess the Dark Triad personality traits (Machiavellianism, narcissism, and psychopathy). The scale employs a 1 to 7 Likert scale, and participants indicate to what degree they agree or disagree with statements that describe them with 1 indicating they Strongly Disagree and 7 indicating they Strongly Agree.

The General Risk Propensity Scale (GRiPS) (Zhang et.al., 2019), a scale that includes 8 items measuring an individual's tendency or disposition towards taking risks in various domains of life. The scale employs a 1 to 5 Likert scale and participants indicate to what degree they agree or disagree with statements regarding taking risk across different situations with 1 indicating they Strongly Disagree and 7 indicating they Strongly Agree.

The Duke University Religion Index (DUREL) (Koenig & Büssing, 2010), a scale that includes 5 items measuring three dimensions of religiosity: organizational, nonorganizational, and intrinsic religiosity. The first item measures organizational religiosity through a single item asking participants to select how often they attend religious meetings on a scale of 1, more than once, to 6, never. The second item measures nonorganizational religiosity through a single item asking participants how often they spend engaging in private religious activities on a scale of 1, more than once a day, to 6, rarely or never. The last three items measure intrinsic religiosity on a Likert scale with participants indicating how true, 1 definitely true, to not true, 5 definitely not true the item is in their lives.

Religious Orientation Scale Revised (ROS-R) (Gorsuch & McPherson, 1989), a scale that included 14 items measuring intrinsic and extrinsic religiosity. The measure employs a 1 to 5 Likert scale, and participants indicate to what degree they agree or disagree with statements pertaining to religion in their lives with 1 indicating they strongly disagree and 5 strongly agree.

Social Values Orientation (SVO) (Van Lange, 1999), is a 9-item measure of an individual's social values orientation and is used to determine if a participant is either altruistic (prosocial), egoist, or competitor based on their responses. The scale asks sets of questions where participants are to imagine being randomly paired with another, anonymous, person; both will be making choices that determine how many points they and the other person will receive. The participant will have one of three choices: choice 1 will allocate a disproportionate number of points favoring the participant; choice 2 will allocate an even number of points between the participant and the other person; and choice 3 will allocate a disproportionate number of points favoring the other person.

Table 3. Self-Report scales and corresponding dependent variables.

<u>Construct and Measure Used to Tap Construct</u>	<u>Dependent Variable</u>
Personality Traits: <i>The Ten Item Personality Inventory</i> (TIPI; Gosling, Rentfrow, & Swann, 2003) ¹	Openness, Conscientiousness, Extraversion, Agreeableness, Emotional Stability.
Personality Traits: <i>The Dirty Dozen</i> (Jonason & Webster, 2010) ²	Narcissism, Machiavellianism, Psychopathy
Risk: <i>The General Risk Propensity Scale</i> (GRiPS) (Zhang et.al., 2019) ³	Risk Propensity
Religiosity: <i>The Duke University Religion Index</i> (DUREL) (Koenig & Büssing, 2010) ⁴	Organizational, Nonorganizational, & Intrinsic: Religiosity
Religiosity: <i>Religious Orientation Scale Revised</i> (ROS-R) (Gorsuch & McPherson, 1989) ⁵	Intrinsic & Extrinsic: Religiosity
Social Values: <i>Social Values Orientation</i> (SVO) (Van Lange, 1999) ⁶	Social Orientation: Altruistic (Prosocial), Egoist, or Competitor

Table 3. 1. 10 items assessing Big Five Personality traits using 1-7 Likert scale; 2. 12 items assessing dark personality traits using 1-7 Likert scale; 3. 8 items assessing risk propensity using 1-5 Likert scale; 4. 5 items assessing organizational, non-organizational, and intrinsic religiosity using frequency scale and 1-5 Likert scale; 5. 9 items assessing intrinsic and extrinsic religiosity using 1-5 Likert scale; 6. 9 items assessing social values of altruism, egoist, and competitor attitudes in social situations using a choice based measure in allocating resources.

Procedure

Participants completed this study online using Qualtrics. They provided informed consent by selecting ‘next’ after reading the consent protocol. Participants completed a demographic information section first and then each scale, consecutively, with one attention check item inserted mid-way through. Participants were debriefed, online, and thanked for their participation. Participants taking the survey for SONA credit were automatically given credit in the SUNY New Paltz Psychology participant pool system via embedded link at the end of the survey.

Data Analysis

Due to the correlational nature of the study, data analysis will be conducted using multiple regression in SPSS software to examine how the relationship between the predictor variables (personality traits) and outcome variables (risk propensity and pro-sociality) change based on the levels of the moderating variable (religiosity). Additionally, to determine if there is a direct, linear, relationship between religiosity and the dependent variables of the scales used, simple correlational analysis will be employed. Binary Logistic Regression was employed to determine, separately, if independent variables predicted outcome variables, and to determine if religiosity moderated this relationship. The social values orientation scale is categorical thus to analyze required a different regression technique.

Results

Presented here are the findings of the study investigating the complex relationship between religiosity, personality traits, and behavior within human group dynamics. The study delved into the evolutionary psychology framework to understand the social adaptations crucial for the success of human ancestors within religious contexts. Utilizing standardized and modified surveys, correlations and prediction models were explored. A series of post-hoc analysis was conducted to examine relationships between various predictor variables (agreeableness, extraversion, psychopathy) and two dependent variables (risk propensity and modified risk propensity scales). These variables were selected to gather supporting data for significant findings found during the planned data analysis (see Table 4., Table 5., and Table 7.).

Participants

Data were collected from 149 participants ($n=149$) ranging in age from 18 to 73 years of age ($M= 27.58$, $SD = 12.08$). Further analysis were conducted by sex assigned at birth (24.2%

male, 74.5% female, and 1.3% preferring not to say), gender identity (24.8% male, 68.5% female, 4.0% non-binary, 1.3% transgender, 0.7% other, and 0.7% preferring not to say), and education level (0.7% less than high-school diploma, 19.5% High-school or equivalent, 40.95% some college, 16.8% associate's degree, 13.4% bachelor's degree, 8.1% master's degree, and 0.7% Doctoral degree).

Religiosity

Two separate items were employed in the study to determine religiosity. The first was a single item dichotomous question, prompting participants to indicate whether they were religious by selecting either “yes” or “no” response option. Descriptive statistical analysis of the data revealed the frequency distribution for participants' self-reported religiosity (yes/no). Of the total sample ($n=149$), 25.5% ($n=38$) reported considering themselves religious, while the majority, constituting 74.5% ($n=111$), indicated that they do not consider themselves to be religious. Furthermore, frequency distribution for participants indicating religious affiliation revealed the following data. Among 149 participants, the majority identified as having no religion, comprising 48.3% ($n=72$) of the sample. Christianity, encompassing Catholicism, Protestantism, and Orthodox Christianity among others, was the second most reported religious affiliation, accounting for 36.2% ($n=54$) of the sample. Islam, Buddhism, and Judaism were less prevalent, with 1.3% ($n=2$), 2.7% ($n=4$), and 4.7% ($n=7$) of the participants identifying with these religions respectively. Additionally, 6.7% ($n=10$) of the participants reported affiliations with religions not listed in the survey.

To determine if there was a significant difference between religious faiths in levels of religiosity, a one-way analysis of variance (ANOVA) was performed. The results of the ANOVA revealed a significant difference in religiosity scores (ROS-R) between the religious groups

($F(5,143) = 19.812, p < .001$). The effect size further supported the finding, with an Eta-squared ($\eta^2 = 0.409$), suggesting that approximately 40.9% of the variance in religiosity scores can be explained by religious group membership. These results indicate that religious group membership significantly influences religiosity levels as measured by the ROS-R scale.

Table 4.

Moderating Variables

Linear Regression: Personality Traits * Religiosity (ROS) Predicting Risk Propensity						
Predictor Variable	<i>B</i>	SE	β	<i>t</i>	<i>p</i>	95% CI
Extraversion * Religiosity (ROS)	.133	.055	.690	2.428	.016*	(.025, .242)
Agreeableness * Religiosity (ROS)	-.144	.083	-.764	-1.729	.086	(-.309, .021)
Conscientiousness * Religiosity (ROS)	.109	.082	.592	1.326	.187	(-.053, .271)
Emotional Stability * Religiosity (ROS)	-.073	.063	-.394	-1.153	.251	(-.198, .052)
Openness * Religiosity (ROS)	-.094	.099	-.505	-.956	.340	(-.289, .101)
Light Personality Traits * Religiosity (ROS)	.053	.136	.234	.391	.697	(-.216, .322)
Machiavellianism * Religiosity (ROS)	.033	.077	.114	.430	.668	(-.119, .185)
Psychopathy * Religiosity (ROS)	.214	.090	.673	2.371	.019*	(.036, .392)
Narcissism * Religiosity (ROS)	.091	.075	.341	1.218	.225	(-.057, .239)
Dark Personality Traits * Religiosity (ROS)	.157	.097	.451	1.622	.107	(-.034, .349)

** significant at the $p < .001$ level * significant at the $p < .05$ level

Table 4. The Results of Multiple Linear Regression Analysis for the relationship between Personality Traits, Religiosity (ROS), and Risk Propensity ($n=149$).

Prediction 1: Personality Traits and Religiosity Predicting Risk

In the first analysis I investigated the potential link between religiosity as a moderating variable on the relationship between personality predictor variables and the behavioral outcome variable of risk propensity. Linear Regression technique was employed, and results are shown in Table 4. Moderation analysis for risk propensity as the outcome variable, extraversion and

religiosity (ROS) as the predictor, revealed that the model was significant, $F(3,145) = 9.686$, $p < .001$, $R^2 = 0.167$. Additionally, the moderation effect was significant, $\beta = 0.690$, $p = .016$; $CI = [0.025, 0.242]$. This suggests that the interaction between extraversion and religiosity influences risk propensity scores beyond the individual effects of these variables. To further support this finding, correlation analysis was conducted, and the findings indicate that in participants who scored low in extraversion, no significant correlation was found between religiosity scores (ROS) and risk propensity (GRiPS) (Pearson coefficient $r = -.041$). Furthermore, participants who scored high in extraversion also did not have a significant correlation between their religiosity scores and risk propensity scores (Pearson coefficient $r = .153$).

Moderation analysis of additional predictor variables revealed an additional significant finding. The model using psychopathy as the predictor variable to determine risk propensity, did not yield statistically significant results $F(3,145) = 1.898$, $p = .132$, $R^2 = 0.038$. However, the moderation effect, including religiosity, was significant, $\beta = 0.673$, $p = .019$; $CI = [0.036, 0.349]$, suggesting that the relationship between psychopathy and religiosity have some marginal influence on risk propensity scores, although the overall model fit remains weak. To investigate this finding further correlational analysis indicated that there was no significant relationship between religiosity scores and risk propensity scores in both participants high in psychopathy (Pearson coefficient $r = -.067$) and low in psychopathy (Pearson coefficient $r = .200$). Further investigation with additional variables may be warranted to better understand the factors affecting risk propensity in this model.

In the second analysis I investigated the potential link between religiosity as a moderating variable on the relationship between personality predictor variables and the behavioral outcome variable of a modified risk propensity scale that was focused towards taking risks for the benefit

of your group. The reliability of the measurement instrument was assessed using Cronbach's Alpha, yielding a score of $\alpha = 0.893$ for reliability. Linear Regression technique was employed, and results are shown in Table 5. The model using Agreeableness as a predictor variable approached statistical significance $F(3,145), p=0.072, R^2= -0.047$; however, the moderation effect was significant, $\beta = -1.053, p=.017; CI= [-0.331, -0.033]$. Additionally, individuals scoring high in agreeableness did not have religiosity and risk propensity scores that correlated significantly (Pearson coefficient $r = -.250$) nor did those participants scoring low in agreeableness (Pearson coefficient $r = .039$). These results suggests that the interaction between agreeableness and religiosity significantly influences Risk Propensity-M scores, in such that risk propensity (modified) is mitigated by an individual that is high in agreeableness and high in religiosity.

Furthermore, similar to the previous model, using psychopathy as a predictor variable yielded a statistically insignificant model, $F(3,145), p=.114, R^2= 0.40$; with a statistically significant moderation effect. Although the individual predictors did not show a significant effect, the interaction between psychopathy and religiosity appears to have an influence on Risk Propensity-M scores, $\beta = 0.616, p = .031; CI = [0.016, 0.342]$. Risky behavior for the benefit of the group also did not have significant relationships with religiosity in both individuals scoring low in psychopathy (Pearson coefficient $r = -.203$) and high in psychopathy (Pearson coefficient $r = .137$). This adds supporting evidence for the interaction between psychopathy and religiosity affecting risky behavior for the benefit of a group rather than the self.

Table 5.

Moderating Variables

Linear Regression: Personality Traits * Religiosity (ROS) Predicting Risk Propensity (Modified)

Predictor Variables	<i>B</i>	SE	β	<i>t</i>	<i>p</i>	95% CI
Extraversion * Religiosity (ROS)	.081	.053	.457	1.526	.129	(-.024, .188)
Agreeableness * Religiosity (ROS)	-.182	.075	-1.053	-2.414	.017*	(-.331, -.033)
Conscientiousness * Religiosity (ROS)	.077	.075	.460	1.036	.302	(-.070, .225)
Emotional Stability * Religiosity (ROS)	-.041	.059	-.243	-.704	.482	(-.157, .075)
Openness * Religiosity (ROS)	-.042	.091	-.247	-.461	.646	(-.223, .139)
Light Personality Traits * Religiosity (ROS)	-.014	.129	-.067	-.109	.914	(-.268, .241)
Machiavellianism * Religiosity (ROS)	.055	.070	.208	.787	.433	(-.083, .193)
Psychopathy * Religiosity (ROS)	.179	.082	.616	2.174	.031*	(.016, .342)
Narcissism * Religiosity (ROS)	.040	.067	.165	.596	.552	(-.093, .174)
Dark Personality Traits * Religiosity (ROS)	.129	.088	.404	1.458	.147	(-.046, .303)

** significant at the $p < .001$ level * significant at the $p < .05$ level

Table 5. The Results of Multiple Linear Regression Analysis for the relationship between Personality Traits, Religiosity (ROS), and Risk Propensity Modified ($n=149$).

Prediction 2: Personality Traits and Religiosity Predicting Social Behavior

To address the relationship between personality predictor variables and outcome variable: social values orientation (SVO), with religiosity as a potential moderating variable, Binomial Logistic Regression was employed with the results shown in Table 6. The analysis aimed to examine the predictive power of personality traits on Social Values Orientation (Prosocial Behavior), moderated by religiosity revealed no statistically significant effects for most of the personality traits on SVO as indicated by the Wald statistics and associated significance levels. Two personality traits, Openness ($p=.072$) and Psychopathy ($p=.060$) approached statistical significance, with the former having an odds ratio (ExpB) of 1.796, meaning for each one-unit

increase in Openness, the odds of having a Prosocial score increased by 79.6%, and, despite this, both lacked the predictive power needed to draw conclusions and cannot be considered statistically reliable.

Table 6.

Binomial Logistic Regression

Personality Traits * Religiosity (ROS) Predicting SVO Pro Social Behavior						
Predictor Variable	<i>B</i>	SE	Wald	sig.	Exp(B)	-2 Log Likelihood
Openness* Religiosity (ROS)	.585	.325	3.242	.072	1.796	144.816
Conscientiousness* Religiosity (ROS)	-.052	.212	.060	.806	.949	150.948
Extraversion* Religiosity (ROS)	-.133	.166	.642	.423	.875	151.561
Agreeableness* Religiosity (ROS)	.418	.261	2.556	.110	1.518	144.028
Emotional Stability* Religiosity (ROS)	.018	.170	.011	.917	1.018	151.150
Light Traits* Religiosity (ROS)	.220	.395	.310	.578	1.246	147.437
Machiavellianism* Religiosity (ROS)	-.010	.199	.002	.962	.990	137.832
Narcissism* Religiosity (ROS)	-.083	.210	.157	.692	.920	149.715
Psychopathy* Religiosity (ROS)	-.495	.263	3.535	.060	.609	141.603
Dark Traits* Religiosity (ROS)	-.262	.282	.866	.352	.769	140.072

** significant at the $p < .001$ level * significant at the $p < .05$ level

Table 6. The Results of Binomial Logistic Regression Analysis for the relationship between Personality Traits, Religiosity (ROS), and SVO Prosocial Behavior ($n=149$).

An additional Binomial Logistic Regression analysis was performed to address the relationship between personality predictor variables and outcome variable selfish behavior (SVO) with religiosity as a potential moderating variable. Results for the analysis are shown in Table 7., and aimed to predict the likelihood of selfish behavior based on various predictor variables. Only one significant finding was identified in this analysis. Agreeableness emerged as having a negative relationship with selfish behavior when taken together with religiosity. The

negative beta coefficient ($B=-1.315$) suggests that as both agreeableness and religiosity increase by one unit, the odds of engaging in selfish behavior decrease by approximately 72.2% ($\text{Exp}B = 0.268, p=.050$). To further determine if the interaction between agreeableness and religiosity better predicts odds of selfish behavior, additional binomial logistic regression analysis was conducted. The results indicate that religiosity does not significantly predict the odds of reduced selfish behaviors ($B = -1.080, \text{Exp}B = .340, p = .372$) in participants scoring high agreeableness nor was it predictive in participants that scored low in agreeableness ($B = .520, \text{Exp}B = 1.683, p = .604$). Thus, the reduction in odds of selfish behavior can likely be attributed to the interaction effect between agreeableness and religiosity.

Table 7.

Binomial Logistic Regression

Personality Traits * Religiosity (ROS) Predicting SVO Selfish Behavior

Predictor Variable	<i>B</i>	SE	Wald	sig.	Exp(B)	-2 Log Likelihood
Openness * Religiosity (ROS)	-.187	.712	.069	.793	.829	43.529
Conscientiousness * Religiosity (ROS)	-.081	.507	.025	.879	.922	43.378
Extraversion* Religiosity (ROS)	.470	.421	1.243	.265	1.600	41.538
Agreeableness* Religiosity (ROS)	-1.315	.672	3.835	.050*	.268	39.354
Emotional Stability* Religiosity (ROS)	-.249	.448	.310	.578	.779	43.280
Light Traits* Religiosity (ROS)	-.528	.951	.308	.579	.590	43.023
Machiavellianism* Religiosity (ROS)	.592	.546	1.174	.279	1.807	42.084
Narcissism* Religiosity (ROS)	.541	.565	.917	.338	1.717	41.965
Psychopathy* Religiosity (ROS)	.807	.696	1.347	.246	2.242	41.084
Dark Traits* Religiosity (ROS)	.997	.715	1.943	.163	2.709	40.654

** significant at the $p < .001$ level * significant at the $p < .05$ level

Table 7. The Results of Binomial Logistic Regression Analysis for the relationship between Personality Traits, Religiosity (ROS), and SVO Selfish Behavior ($n=149$).

Prediction 3: Religiosity Predicting Group-Oriented Variables

Lastly, to test the hypothesis that high religiosity will predict higher scores on variables identified as group-oriented, and that religiosity would predict a participant's social values orientation, independent multiple linear regression analyses and binomial logistic regression were used to examine this model. To begin I conducted multiple linear regression analysis, Table 8., with Religiosity (ROS) as the predictor variable and group-oriented personality traits as the outcome variables. The results indicated that no significant relationship between religiosity and: Openness ($B = 0.182$, $\beta = 0.115$, $p = .161$, $CI = [-0.073, 0.438]$); Conscientiousness ($B = 0.170$, $\beta = 0.095$, $p = .248$, $CI = [-0.120, 0.461]$); Extraversion ($B = -0.088$, $\beta = -0.038$, $p = .642$, $CI = [-0.460, 0.284]$); and Agreeableness ($B = 0.181$, $\beta = 0.099$, $p = .228$, $CI = [-0.155, 0.478]$). These finding suggests that within the sample examined, religiosity was not significantly associated with the group-oriented variables presented and further research may be warranted to explore potential moderators or alternative explanations for the relationship, if any, between religiosity and personality traits.

Table 8.

Multiple Linear Regression Analysis

Religion (ROS) Predicting Personality Traits						
Outcome Variable	<i>B</i>	SE	β	<i>t</i>	<i>p</i>	95% CI
Openness	.182	.129	.115	1.409	.161	(-.073, .438)
Conscientiousness	.170	.147	.095	1.159	.248	(-.120, .461)
Extraversion	-.088	.188	-.038	-.466	.642	(-.460, .284)
Agreeableness	.181	.150	.099	1.210	.228	(-.155, .478)

** significant at the $p < .001$ level * significant at the $p < .05$ level

Table 8. The Results of Multiple linear Regression Analysis for the relationship between Religiosity (ROS), and Group-Oriented Personality Traits ($n=149$).

Finally, the results of the Binomial Logistic Regression for Religiosity predicting Social Values Orientation are presented in Table 9. Regarding religiosity to predict whether a participant was more likely to be identified as prosocial versus not prosocial, no significant findings were found as indicated by the poor fit of the model ($LL = 152.289$) in addition to the negligible B coefficient (-0.086), Wald statistic approaching zero (0.099), and $\text{Exp}(B)$ (0.917), showing that a one unit change in religiosity decreased the odds of prosocial behavior by less than 9%, thus explaining the lack of significance in the model ($p=.753$). Additionally, the model fit of religiosity predicting increased odds of identifying participants as selfish versus not selfish, was better, compared to the previous model ($LL = 42.600$), no significant findings were found ($B = -0.281$, Wald (0.163), $\text{Exp}(B) = 0.755$, $p=.686$). While the model did indicate that as religiosity increased by one unit, the odds of predicting selfish behavior decreased by 24.5%, the model was not statistically significant and drawing conclusions from this analysis was limited, as the change was negligible.

Table 9.

Binomial Logistic Regression

Religiosity (ROS) Predicting Social Values Orientation (SVO)

Outcome Variable	B	SE	Wald	sig.	Exp(B)	-2 Log Likelihood
Prosocial Behavior	-.086	.274	.099	.753	.917	152.289
Selfish Behavior	-.281	.695	.163	.686	.755	43.600

** significant at the $p < .001$ level * significant at the $p < .05$ level

Table 9. The Results of Binomial Logistic Regression Analysis for the relationship between Religiosity (ROS) and SVO Behaviors (Prosocial and Selfish Behavior), ($n=149$).

Discussion

The aim of this study was to investigate the role that religiosity plays between personality traits and behaviors, and whether religiosity has predictive power or moderating effects. The findings presented in the results section offer a comprehensive examination of the hypothesis and expected outcomes I set forth. By employing statistical analyses, including multiple regression and logistic regression techniques, the study endeavored to unravel the nuanced interplay among the variables identified. The results were somewhat mixed, and many of the main hypotheses were therefore unsupported. Despite this, there are some conclusions that can be drawn from the data and future directions are discussed.

Agreeableness

In two separate models that showed statistical significance, agreeableness was used as the predictor variable and had an interaction effect with religiosity in predicting 1. a tendency to engage in risky behavior for the benefit of a group and 2. in reducing the odds of selfish behavior. Agreeable personalities are characterized by an inclination to be cooperative, compassionate, and considerate in their interactions with others. They seemingly are able to internalize the core principles of religion, both the modern and the evolutionary explanations, specifically surrounding social identity. Religion, from an evolutionary perspective, may have provided a basis for social identity and ingroup cohesion, fostering cooperation and coordination among group members (Wilson, 2002). While agreeableness did not predict risky behavior for the benefit of a group as evidenced by a regression analysis, ($F(1,147)$, $R^2=0.001$, $p=0.780$), when including religiosity as a moderating variable, agreeableness did predict that risky behavior would reduce with higher levels of religiosity. This would seem to be counterintuitive; however, taken in the context of the scale employed, a modified version of GRiPS scale (Zhang et.al.,

2019), fits the adaptive nature of religion. The scale did not specify which group an individual would be willing to engage in risky behavior for (a limitation that will be discussed later), thus there exists the possibility that when faced with an ambiguous make up of a group, religious participants may be hesitant to risk anything for what may amount to a group of individuals who are not their reference or in-group.

Additional support was provided by the model predicting selfish behavior using the same variables. Alone, agreeableness did not decrease the odds of identifying selfish behavior in participants; however, when including religion, as in the prior model, the predictive power does become significant. In both its modern and evolutionary context, religion's adaptive function serves to promote group solidarity, coordinate behaviors, and resolve within group conflict serving to bind individuals together in cohesive social groups (Wilson, 2002). Additionally, religion also has been put forth as a system to assist in detecting cheaters within a group. One of the most harmful behaviors that can threaten such group stability and cohesion is selfish behavior, and even more so if the behavior is identified by the group at large. Thus, the effect religion has on an agreeable personality is to help ensure that selfish behavior is mitigated, in line with established evolutionary theories regarding religion.

Psychopathy

A more impactful example of the role religion plays between personality traits and behaviors is its role and impact on psychopathy. Psychopathy, much like other Dark Triad personality traits, is characterized by various manipulative, exploitative, and socially aversive tendencies. Chief among this characterization of a personality high in psychopathy is a lack of empathy, manipulative behavior, and impulsivity (Jonason & Webster, 2010). Impulsivity combined with a belief in a higher power, concepts of an afterlife, and the evolutionary view that

religion helps to manage fear (Wilson, 2002) may help to explain why there is a difference between those who are high in psychopathy alone, but do not score high in risk propensity, and those who are both high in psychopathy and religiosity, predicting an increase in risk tendency. Furthermore, the model also shows that those same individuals will also engage in risky behavior for the benefit of a group and was statistically different from the regression model without religiosity as a moderator, ($F=(1,147)=0.088$, $R^2=0.001$, $p=0.768$). Individuals may not fear the consequences of engaging in risky behaviors, but this has potential tradeoffs as outlined previously. To the individual, risky behavior is deleterious, putting oneself in danger is counterproductive to passing on their genes, potentially stymieing reproductive success. This same risky behavior, when enacted for the betterment of a group, is advantageous to its other members who will potentially see a benefit from these actions. Within a social group context, group members would benefit greatly from mitigating the potential social harm that accompanies psychopathy and religion offers an avenue by which to accomplish this.

Extraversion

Extraversion personality traits are marked by sociability, high energy, and a preference for group activities (Gosling, Rentfrow, & Swann, 2003). Religion might affect individuals high in extraversion due to its focus on sociality: cohesiveness, social identity, and focus on the collective. Appealing to an extraverted individual might be what Wilson (2002) states is religion's function as a cultural vessel, a method to convey and transmit or reinforce norms and values. An extraverted individual, for example, would do well within a religious context due to the ability to engage in social activities which in turn may help the individual to internalize the norms and values being delivered, possibly at a deeper level. As stated, prior, risky behavior on the part of the individual, that is not for the benefit of the group, is disadvantageous to the

group—an individual putting themselves in danger is putting a member of a group at risk without necessarily gaining an advantage. The current study showed that extraversion on its own predicted risk propensity ($B=0.202, p=.001$); however, once religiosity was added into the model, risk propensity seemingly diminished ($B= 0.133, p=.016$) and the model was less statistically significant, possibly showing that religiosity may have a mitigating effect.

General Discussion

While some hypotheses were not fully supported by the data, certain conclusions emerged shedding light on the cost-benefit dynamics of religiosity. Agreeableness, characterized by cooperative and compassionate tendencies, showcased an interaction with religiosity, particularly in predicting behaviors beneficial to group cohesion and reducing selfishness. Despite not directly predicting risky behaviors for group benefit, agreeableness displayed a significant reduction in such tendencies when coupled with higher religiosity levels. This suggests that religion, with its evolutionary roots in fostering group solidarity, may serve as a mechanism to deter behaviors conflicting with social cohesion, aligning with the established theories on the adaptive nature of religion.

Another significant finding to highlight here lies in the interaction between psychopathy, religiosity, and risk propensity. Individuals displayed a heightened inclination towards risky behaviors, especially for group benefit, compared to those high in psychopathy alone. This nuanced relationship underscores the potential trade-offs between impulsivity and belief in higher powers, wherein religion may mitigate the fear of consequences associated with risky actions. While risky behavior poses individual reproductive risks, within a group context, it can offer advantages, emphasizing the role of religion in mitigating social harm and fostering collective benefits. Thus, the study's results highlight the differential impacts of religiosity on

diverse personality traits, unveiling its potential to shape behaviors within social frameworks. The benefits individuals derive from religion can vary significantly based on their personality traits and dispositions. For example, the extent to which individuals experience existential concerns and existential angst may shape their receptivity of religion. Those grappling with existential questions may be more inclined to turn to religion for existential comfort and reassurance, coupled with a more open-minded and receptive personality, may find religion, and its core components, to be more appealing than others. In essence, while religion can offer a wide array of benefits, its impact on individuals is highly contingent on their unique personality traits, psychological needs, and existential concerns. Recognizing this diversity, as well as the diversity of religion in terms of its messages and purpose, underscores the importance of adopting a nuanced and person-centered approach when examining the role of religiosity in shaping human behavior.

Limitations and Future Directions

The current study had some limitations that arose once data analysis was completed. First, while the modified version of the risk propensity scale (GRiPS-M) tested well for internal consistency and reliability, no consideration for how the participant would interact with and interpret the instructions was given. Specifically, the term “for the group” was employed and this lacked the descriptive adjectives required to distinguish whether *group* referred to a participant’s own in-group, an out-group, or a random amalgamation of individuals. Thus, while conclusions were drawn from results involving this scale, it is important to understand this limitation and how participants may or may not have interpreted it. Despite this, there were significant differences in participants scores thus the underlying motivations need further exploration in future studies. Second, while the Social Values Orientation scale was applied in line with how

previous research utilized it, and despite it testing as expected for reliability ($\alpha = 0.920$), for a study like the current one where the context is highly specific and important, better instructions and specific vignettes for each of the nine items is needed. A majority of the participants scored all nine items with the same rating and, although one model found a significant result using the scale, to better disentangle the elements of pro-sociality, competitiveness, and selfish behavior, the scale may require a modification that disguises what is being tested in a more effective way. Additionally, the data may require better, more sophisticated methods of analysis that, currently, are not available to the researcher. One such approach is to test predictor (continuous) variables and outcome (categorical) variables while controlling for a variable such as risk, at varying levels of religiosity. A personality high in psychopathy, controlling for risk, may show different odds of exhibiting prosocial behavior or selfish behavior depending on level of religiosity. Comparing the low, medium, and high levels of religiosity in such a model could reveal at what point religiosity begins to have a significant impact on the individual (mitigating or exacerbating behavioral traits). Additionally, regression analysis for the study's variables were conducted independently, and the study did not take advantage of multiple linear regression; however, with several significant findings and others approaching statistical significance, future models may employ multiple linear regression may yield further significant findings.

The framework I laid out and used as the basis for my study did have some supporting data. In some cases, religion did as intended by mitigating risk. It delivered a message of one for all, increasing the likelihood of behaviors to benefit the group and decreasing the odds of selfish behavior. Yet even with these significant results, there were numerous others that were not and still others that approached significance but didn't quite meet the threshold. This mixed set of results led me to the following: that religious ideology, religious tenets, the messages that

religion from an evolutionary, ancestral environment perspective as well as a modern one does speak to different parts of an individual's personality. I began with the idea that the nuance is in the personality and this research now points me towards the idea that the nuance *is* indeed in the personality but also in religion. Future directions could take this research and tease apart the various facets of religion in the same way that researchers distinguished the various categories that compromise personality and apply as such. For example, the community and social cohesion aspect of religion could impact an individual high in openness more so than an individual who is high in emotional stability. Controlling group behavior might speak more to an agreeable individual versus an individual high in Machiavellianism. Instilling hope, attributing events to supernatural entities, might influence a person high in neuroticism versus an individual who is high in conscientiousness. Addressing the nuances of religious messages, tenets, beliefs, and their impact on various facets of personality in such a way, it could deepen our understanding of the interaction between human behavior and religiosity.

Conclusion

Evolutionary theory suggests that several traits and behaviors arose from a need, evolutionary adaptations to increase fitness at some level. Humans' evolutionary history tells us that, due to our social nature, adaptations that benefited the individual alone do not fully account for the success of an individual. Social behavioral adaptations were necessary for the reproductive success of human ancestors; however, few, if any, research has sought to understand religion, personality, and behavior in these terms.

This study delved into the intricacies of the relationship between personality traits, religiosity, and behaviors, attempting to shed light on their complex interplay. While the results did not allow for a deeper understanding of this relationship nor the study's aim, leaving a

majority of the hypothesis unsupported, the examination of agreeableness, psychopathy, and extraversion in relation to religiosity did provide for some intriguing patterns. Notably, religiosity emerged as a moderator in several models, impacting risk-taking tendencies and social behaviors, specifically selfishness, across the previously mentioned personality profiles. These limited insights still highlight the multifaceted nature of religious influence on human behavior and underscore the need for further exploration in understanding the underlying mechanisms driving them. Future research endeavors can build upon these findings to deepen our understanding of the intricacies between religiosity and many other facets of our personality. This research also has implications for views on religion, beliefs systems like it (spiritual for example), and for how we may proceed with research in the future to better understand just how religion relates to the different, and complicated, facets of our behaviors. Religion after all, like culture, natural phenomena, and biological processes, can only truly be understood once we shed light on its effects, functions, and origins.

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