

## MORAL INTUITIONS AND RELIGIOSITY AS SPURIOUSLY CORRELATED LIFE HISTORY TRAITS

PAUL R. GLADDEN<sup>\*</sup>, JESSICA WELCH, AURELIO JOSÉ FIGUEREDO,  
W. JAKE JACOBS

Ethology and Evolutionary Psychology Department, Psychology University of Arizona

**Abstract.** Religions promote moral rules of behavior and religiosity is associated with some types of moral intuitions, but there is no ultimate-level explanation for this association. Religiosity has recently been used as an indicator of a multivariate measure of slow Life History (LH) strategy. In this study, we predicted that LH strategy relates to increased strength of moral intuitions as measured by morally dumbfounding intuitions, reactions to violations of the ethics of autonomy, community, and divinity, and disgust sensitivity. Results of an exploratory factor analysis revealed that a 3-factor solution was optimal: (1) Religiosity (2) Moral Intuitions, (3) LH strategy. Comparisons of three path-analytic structural models indicated that only one model had an acceptable fit. In that model, slow LH strategy directly influenced religiosity and moral intuitions, which were, as a result, spuriously correlated. We discuss implications for LH theory and for the relation between religion and moral intuitions.

**Keywords:** moral intuitions, religiosity, Life History theory, cooperation, disgust

Religions promote moral rules of behavior that deem some acts impermissible, some permissible, and others obligatory. People often appeal to these religious moral rules when attempting to justify their intuition that actions, including ones that do not directly harm others, are morally wrong (see HAIDT and HERSH 2001 for examples involving masturbation and homosexuality). Although religiosity and some types of moral intuitions are associated (HAIDT and HERSH 2001), whether or not religiosity directly influences these moral intuitions has not been investigated. Further, there is no well-substantiated ultimate-level explanation for why this asso-

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<sup>\*</sup> Corresponding author: PAUL R. GLADDEN, Department of Psychology, University of Arizona, PO Box 210068, Tucson, AZ 85721-0068, USA, Fax: (520) 621-9306, E-mail: pgladden@email.arizona.edu

ciation exists. Religious conservatism, for example, is implicated in deeming a broader domain of behaviors as wrong, including behaviors that elicit a disgust reaction, but lack direct harm (HAIDT and HERSH 2001; HAIDT and GRAHAM 2007). But why (ultimately) religiosity and these particular moral intuitions are associated is currently unexplained.

We examined whether individual differences in Life-History (LH) strategy (RUSHTON 1985; KAPLAN and GANGESTAD 2005; FIGUEREDO et al. 2006) account for the association between religiosity and strength of moral intuitions. First, we describe recent work on moral intuitions. Then we describe Life History theory and its predicted relation to both religiosity and moral rule following. Next, we describe how we tested multiple causal models of Life History strategy, religiosity, and moral intuitions.

### SOCIAL-INTUITIONIST MODEL OF MORAL JUDGMENT

HAIDT, KOLLER and DIAS (1993) demonstrated that many people judge disgusting and disrespectful, but otherwise harmless actions (e.g., eating your already dead dog for dinner) to be morally wrong, despite an inability to articulate any well-reasoned argument for why the actions are wrong. Further, these people are likely to agree that there should be cross-cultural rules for preventing and punishing such actions. HAIDT and HERSH (2001) labeled the phenomenon where moral judgments are maintained without supporting reasons to defend those judgments “moral dumbfounding”. These findings led to the development of the Social-Intuitionist Model (SIM) of moral judgment (HAIDT 2001; HAIDT et al. 1993). The SIM predicts that moral judgments are usually made intuitively, automatically, and without conscious reasoning. Situations that elicit moral judgment are evaluated implicitly and result in affectively-valenced intuitions that manifest themselves in awareness as feelings (good-bad) (HAIDT and BJORKLUND 2008). These feelings cause moral judgments (or *are* moral judgments, see PRINZ 2008). According to the SIM, moral reasoning follows the (already made) moral judgment, as people provide a *post-hoc* rationale for why the act was right or wrong. In this view, moral judgment is similar to judgment of aesthetic beauty – judgment happens effortlessly and that the *experience* of the moral intuition is that it is objectively good or bad (HAIDT, KILLER and DIAS 1993; HAIDT 2001; HAIDT and BJORKLUND 2008).

PRINZ (2008) extended the SIM, suggesting that moral emotions *constitute* moral judgments rather than being caused by them. According to this view, judgment of an action as wrong is inseparable from the fact that one has a negative emotional sentiment toward that action. Rather than moral judgment “following on the heels of” the emotion, the emotion one has toward the action constitutes moral judgment. In other words, there is no true distinction between moral emotions (intuitions) and moral judgments. PRINZ (2008) points out that this account is a more parsimonious model of moral judgment.

### VARIABILITY IN MORAL INTUITIONS AND RELIGIOSITY

According to the anthropologist Richard Shweder and colleagues (SHWEDER et al. 1997), there are three big “ethics” of morality: the ethic of autonomy, the ethic of community, and the ethic of divinity. These three ethics describe domains of action that humans moralize. Violations of rules related to each of these domains produce automatic emotional reactions (moral intuitions) (ROZIN et al. 1999). Further, the extent to which people moralize these three domains is thought to vary among individuals and cultures (HAIDT and JOSEPH 2004).

A violation of the ethic of autonomy directly hurts another person, or is a violation of another’s individual rights or freedoms. Anger is associated with perceived violations of this ethic (ROZIN et al. 1999). Justifications for the wrongness of these violations typically invoke concepts of harm, rights, justice, freedom, fairness, individualism, and free choice. A violation of the ethic of community occurs when a person fails to carry out his/her duties within a community, or to the social hierarchy. Contempt is associated with perceived violations of this ethic (ROZIN et al. 1999). Justifications for the wrongness of these violations typically invoke concepts such as duty, role-obligation, respect for authority, loyalty, group honor, interdependence, and the preservation of the community. A violation of the ethic of divinity is perceived as disrespecting the sacredness of God, or causing impurity or degradation to oneself or to others. Disgust is associated with perceived violations of this ethic (ROZIN et al. 1999). Justifications for the wrongness of these violations typically invoke concepts such as sin, the natural order of things, sanctity, and protection of the soul or the world from degradation and spiritual defilement (ROZIN et al. 1999).

Refining SHWEDER et al.’s (1997) “Big-three of morality” into five more specific domains, HAIDT and JOSEPH (2004, 2007) argued that humans evolved domain-specific moral modules that produce automatic emotional reactions (moral intuitions) in response to perceived moral violations and that there are individual and cultural differences in the output of these moral modules. HAIDT and GRAHAM (2007) argued that secular Westerners tend to limit their moral domain to violations of the ethic of autonomy, while most cultures including the American “religious right” have a broader moral sphere that includes the ethic of community and ethic of divinity. In other words, religious conservatives tend to perceive a wider array of actions as morally wrong than do secular liberals. HAIDT (2008) argued that these traditional conceptions of morality (ethics of community and divinity) aim to regulate selfishness within a group and facilitate cooperative communities.

HAIDT and HERSH (2001) found that conservatives moralize homosexual sex acts, unusual masturbation, and consensual incest more than liberals. According to HAIDT and HERSH (2001), such acts are perceived as violations of the ethic of divinity. Thus, they are related to concerns with purity and spiritual defilement (ROZIN et al. 1999). Perceived purity violations occur when rules regarding bodily activities such as menstruation, food, sex, bathing, or the handling of corpses are

transgressed (HAIDT and JOSEPH 2004) and are thought to explain why many people become morally dumbfounded by disgusting, but otherwise harmless actions (e.g., a man having sex with a dead chicken before cooking and eating it; HAIDT et al. 1993).

Because disgust is thought to mediate moral judgments in response to violations of the ethic of divinity (ROZIN et al. 1999), individuals high on disgust sensitivity are predicted to believe in the purity of God, the human body, and the sacred soul leading to judgment that purity violations are morally wrong. The results of multiple studies support this prediction by demonstrating that implicitly elicited disgust (e.g., through hypnotism or seating subjects at a dirty desk) leads to increased strength of moral judgment (see HAIDT and BJORKLUND 2008 for a review).

Disgust is also thought to have originally evolved by promoting avoidance of disease-causing agents (i.e., pathogens and parasites), but to have later been elaborated to function in moral disgust (HAIDT et al. 1997; HAIDT and JOSEPH 2004; NAVARETTE and FESSLER 2006). Consistent with this hypothesis, NAVARETTE and FESSLER (2006) demonstrated that both disgust sensitivity and perceived disease vulnerability predict ethnocentrism (see also NAVARETTE, FESSLER and ENG 2007). Furthermore, THORNHILL and FINCHER (2007) reported that, across 56 countries, both the number of infectious diseases and parasite severity predict level of cultural collectivism, which shares features with American conservatism. These results supported the idea that collectivism is an adaptive tactic that guards against parasitic infection (THORNHILL and FINCHER 2007). Both “core” (disease-avoidance) disgust and moral disgust are predicted to depend, at least in part, on a single “purity” module that (originally) evolved to avoid biological contaminants (HAIDT and JOSEPH 2004). Consistent with this prediction, MOLL et al. (2005) found that both types of disgust depend, in part, on overlapping brain regions, which suggests that the two classes of disgust are strongly related (see also JONES 2007 for a relevant discussion). To our knowledge, however, there is no ultimate-level explanation for why individuals differ in their level of disgust sensitivity or why disgust-sensitivity is associated with religiosity. The present study examined these questions by investigating relations among Life History strategy, moral-intuitions, and religiosity.

### LIFE HISTORY THEORY

Life History (LH) theory is a mid-level theory derived from evolutionary biology. It describes how organisms strategically allocate inherently limited bioenergetic and material resources toward various adaptive activities (e.g., survival vs. reproductive effort). Although originally applied to interspecies-level comparisons (MACARTHUR and WILSON 1967), LH theory has recently been used to describe intraspecies-level variation within humans and other animals (RUSHTON 1985; FIGUEREDO et al. 2004, 2005, 2006, 2007).

According to LH theory, organisms must tradeoff resource investments toward one component of fitness for investments toward another. Selection is predicted to favor optimal resource allocations within the limits of these constraints (KAPLAN and GANGESTAD 2005; FIGUEREDO et al. 2006). The major predicted LH tradeoffs are (1) Somatic Effort (resource investment in individual survival) vs. Reproductive Effort (resource investment toward producing new organisms), (2) Parental Effort vs. Mating Effort, (3) Quality vs. Quantity of Offspring, and (4) future vs. present reproduction (KAPLAN and GANGESTAD 2005). The optimal allocation of resources towards different components of fitness is predicted to vary based on the stability of local environmental conditions. In other words, organisms should be adaptively sensitive to factors such as amount and nature of mortality risk (intrinsic versus extrinsic), unpredictability in resource availability, and local population density (REZNICK, BRYANT and BASHEY 2002; FIGUEREDO et al. 2006). Based on these conditions, individuals should shift their relative amount of resource investment along each of the four dimensions listed above, resulting in more resources devoted toward solving the adaptive problems most crucial to their LH strategy. For example, organisms are predicted to developmentally shift toward higher somatic effort over reproductive effort in stable environments. Further, where an individual falls on each of these dimensions should relate to one another (i.e., the dimensions are likely to be highly correlated). Therefore, in principle, all individuals could be placed along a single continuum of LH strategies often referred to as the “slow” to “fast” LH continuum.

Slow LH strategies are favored when mortality risk is low, material resources are predictable, and when the local population density is near environmental carrying capacity levels. Slow LH individuals are biased toward investments in somatic effort over reproductive effort, parental effort over mating effort, quality over quantity of offspring, and future over present reproduction. Conversely, fast LH strategies are favored when mortality risk is high, material resources are unpredictable, and when the local population density is below environmental carrying capacity. Fast LH individuals are biased towards investments in reproductive effort over somatic effort, mating effort over parental effort, quantity over quality of offspring, and present over future reproduction.

To facilitate a slow LH strategy, slow LH individuals are predicted to possess a cluster of well-coordinated traits (specialized tactics) and fast LH individuals are predicted to possess a different set of coordinated traits (FIGUEREDO et al. 2006). A poorly coordinated LH strategy would be maladaptive. For example, if a fast LH individual was constantly planning for the future or delaying reproduction, such an individual would have a poorly coordinated set of tactics because investment in such traits would likely be wasted in an unpredictable environment where mortality risk is high. Such an assortment of traits would likely be outcompeted by individuals with a more well-coordinated set of LH traits. Similarly, slow LH individuals who were constantly making risky decisions that risked their long-term survival would be outcompeted by individuals who were more risk-averse. Confirming the

prediction of nonrandom clusters of LH-relevant traits in humans, FIGUEREDO and colleagues (2004, 2005, 2006, 2007) demonstrated that a wide-variety of LH traits cluster into a single latent “K-factor” (i.e. slow LH-factor) (e.g., Romantic relationship quality, mother relationship quality, father relationship quality, altruism towards children, altruism towards kin, altruism towards friends, altruism towards community, religiosity, foresight, planning). Further, this latent factor predicts general health and both mental and physical functioning (FIGUEREDO et al. 2004, 2007). This is consistent with the prediction that slow LH individuals will be biased towards high somatic effort. The K-factor is thought to be a multivariate measure of slow LH strategy. In the present study, we used two short-form measures of slow LH as a proxy for this factor.

### LH STRATEGY AND MORAL INTUITIONS

Slow LH strategies are favored in stable and predictable environments that signal to the organism that resource investment in somatic effort, parental effort, and the future is likely to result in fitness payoffs (i.e., that the environment would support a slow LH strategy). Conversely, fast LH strategies are favored in unstable and unpredictable environments that signal to the organism that future survival is uncertain (i.e., investments in somatic effort, parental effort, or the future are unlikely to result in a fitness payoff) and, therefore, one must not delay in taking advantage of reproductive opportunities. Therefore, slow LH individuals would require more social stability and social order than fast LH individuals for their strategy to be optimal. Social disorder may signal unpredictability in the environment. Similarly, RUSHTON (1985) predicted that slow LH individuals would exhibit increased group altruism, social organization, and relatedly, social and moral rule following. Consistent with these predictions, general altruism (i.e., towards children, kin, friends, and community) and religiosity are each single indicators of the K-factor (FIGUEREDO et al. 2004, 2007). In order to promote and maintain social stability and order, slow LH individuals would need to encourage others to follow social and moral rules. Strength of moral intuitions could motivate these attempts to encourage others to follow social rules. In the present study, we tested the hypothesis that strength of moral intuitions would be increased in slow LH individuals.

There are additional reasons to suspect that slow LH individuals would need increased strength of moral intuitions to influence their own behavior and to encourage moral rule-following in others. First, as discussed, disgust is thought to have originally evolved to motivate the avoidance of dangerous pathogens and parasites (HAIDT and JOSEPH 2004; NAVARETTE and FESSLER 2006) to maintain health. Maintenance of health is a form of somatic effort predicted to be greater among slow LH individuals (FIGUEREDO et al. 2004, 2007). As noted, both core and moral disgust likely depend, in part, on a shared “purity module” (HAIDT and JOSEPH 2004; MOLL et al. 2005). Thus, if slow LH individuals exhibit increased dis-

ease-avoidance (somatic effort), they are likely to exhibit increased moral disgust as well. In the present study, we assumed that measurement of general disgust sensitivity serves as a suitable proxy measure of sensitivity to moral disgust because of the mutual dependence of both core and moral disgust on a purity module.

Typically, *moral* disgust is not thought to be a form of disease avoidance (e.g., HAIDT and JOSEPH 2004). Nevertheless, it is possible that some triggers of moral disgust do motivate disease avoidance or other health-related behaviors. In other words, moral disgust may sometimes manifest itself to encourage others to follow moral rules that, if broken, could put the group (and oneself) at risk for contracting disease. Indeed, if this were the original evolved function of both core and moral disgust, this would explain why disgust has become elaborated into a moral emotion.

Second, high altruism (slow LH) individuals would need to punish or deter free-riders that violated social rules aimed at facilitating collective cooperation (PRICE, COSMIDES and TOOBY 2002). Conversely, fast LH individuals that strictly followed social and moral rules or encouraged others to follow those rules may have lost short-term mating opportunities. In other words, social and moral rules are often aimed at increasing social stability and creating a risk-averse environment for the community. Thus, it may be disadvantageous for high-risk taking (fast) LH individuals to follow those rules as strictly as slow LH individuals. We sought to test the hypothesis that slow LH strategies predict increased strength of moral intuitions that would promote social and moral rule following. Specifically, we predicted that slow LH would relate to increased morally dumbfounding intuitions, increased reactions to violations of SHWEDERS et al.'s (1997) Big-three ethics (autonomy, community, and divinity), and increased disgust sensitivity.

To summarize, the present study had the primary aim of examining both the measurement and structural relationships among LH strategy, religiosity, and moral intuitions. Three alternative structural models were evaluated, testing whether: (1) religiosity mediates the relationship between LH strategy and moral intuitions; (2) moral intuitions mediate the relationships between LH strategy and religiosity; or (3) the common causal influence of LH strategy creates a spurious relationship between moral intuitions and religiosity.

## METHOD

### Participants

One-hundred and thirty-seven undergraduate students, 59 males and 78 females, enrolled in an Introductory Psychology course participated. The mean age of participants was 19 (SD = 1.1).

## Procedure

Participants completed a series of self-report questionnaires on a personal computer that measured their life history strategies, morally dumbfounding intuitions, disgust sensitivity, reactions to violations of three domains of ethics (autonomy, divinity, and community), religiosity, and feelings of spiritual transcendence. Participants signed up for the study, provided informed consent, and completed the questionnaires over the internet.

## Measures

*Mini-K Life History Strategy Short Form* (FIGUEREDO et al. 2006) is a 20-item measure of slow LH strategy. This measure correlates around 0.7 with the full Arizona K-battery of questionnaires (FIGUEREDO et al. 2006). The scale, which ranges from  $-3$  (Disagree Strongly) to  $+3$  (Agree Strongly), includes items such as “I often make plans in advance” and “I often get emotional support and practical help from my blood relatives.” The Cronbach’s alpha in our sample was 0.76. The unstandardized mean score in our sample was 1.35 (SD = .59).

*High-K Strategy Scale* (GIOSAN 2006) is a 23-item measure of slow (High-K) LH strategy. The scale, which ranges from  $-3$  (Disagree Strongly) to  $+3$  (Agree Strongly), includes items such as “I don’t have major medical problems” and “The activities I engage in, both at work and elsewhere, are safe (not life threatening).” The Cronbach’s alpha in our sample was 0.90. The unstandardized mean score in our sample was 1.59 (SD = .78).

*Religiosity Scale* (15-items) (adapted from BRIM et al. 2000; FIGUEREDO et al. 2004, 2007) is a measure of traditional religiosity. The scale, which ranges from  $-3$  to  $+3$  includes such items as “I closely identify with being a member of my religious group” and “Religion was a major influence in my home when I was growing up.” The Cronbach’s alpha in our sample was 0.96. The unstandardized mean score in our sample was  $-.41$  (SD = 1.65).

*Spiritual Perspective Scale* (REED 1986) (10-items) is a two-subscale measure of one’s sense of connection to a higher being, nature, others, or to some purpose greater than oneself. The first subscale ranges from 0 (not at all) to 5 (about once a day) and includes items such as “In talking with your family or friends, how often do you mention spiritual matters?” The second subscale ranges from  $-3$  (Disagree Strongly) to  $+3$  (Agree Strongly) and includes items such as “Forgiveness is an important part of my spirituality” and “I seek spiritual guidance in making decisions in my everyday life.” The Cronbach’s alpha for our sample was 0.96. The unstandardized mean score in our sample was 2.51 (SD = 1.46).

*Morally Dumbfounding Intuitions* (adapted from HAITT et al. 1993) (25-items) is a measure composed of five emotionally bothersome, but harmless hypothetical scenarios. The scenarios describe a family eating their already dead dog (*dog*), a broken promise to dead mother (*mother*), having sex with a dead chicken before

cooking and eating it (*chicken*), cutting up and using an American flag for cleaning a bathroom (*flag*), and a brother and sister having sexual intercourse while using birth control and a condom (*siblings*). Participants were presented with five statements for each of the five scenarios and asked to evaluate on a scale from  $-3$  (Strongly Disagree) to  $+3$  (Strongly Agree) how much they agreed with each one. The five statements were:

1. It was wrong for (*the family to eat their dog*).
2. It would bother me if I actually saw someone (*eating their dead pet dog after it was run over by a car*).
3. (*The family*) should be stopped from (*eating their dead pet dog*).
4. (*The family*) should be punished in some way for (*eating their dead pet dog*).

5. Supposed you learn of two different foreign countries. In country A, people (*eat their dead pet dogs*) very often and in country B they never (*eat their dead pet dogs*). Do you agree that it is wrong for country A to (*eat their dead pet dogs*)? The Cronbach's alphas for each of the five scenarios (5-items each) were 0.83 (dog), 0.83 (mother), 0.92 (flag), 0.81 (siblings), and 0.84 (chicken). Each of the five subscales highly correlated with each other, indicating that they shared common variance and, thus, may be best represented as a single trait. Further, the combined Cronbach's alpha for all 25-items was 0.92, indicating high internal reliability across the five scenarios. We, therefore, combined each of the five scenarios into an average moral Dumbfounding factor scale that we labeled the moral *Dumbfounding* factor. The unstandardized mean score in our sample was 1.04 (SD = 1.13).

*Disgust Sensitivity Scale* (adapted from HAIDT et al. 1994) (32-items) is divided into two parts that measure sensitivity to the emotion of disgust. This first part was modified from its original true-false response format to a continuous scale format to be a more sensitive measure. The modified scale (16-items), which ranged from  $-3$  (Strongly Disagree) to  $+3$  (Strongly Agree), contains items such as "I think homosexual activities are immoral" and "I never let any part of my body touch the toilet seat in public restrooms." The second part of the scale (16-items) was modified to be a more sensitive measure as well. The original response format was 0 (Not at all Disgusting) to 2 (Very Disgusting). The modified scale, which ranged from 0 (Not at all Disgusting) to 3 (Very Disgusting), contains items such as "While you are walking through a tunnel under a railroad track, you smell urine" and "You hear about an adult woman who has sex with her father." The Cronbach's alpha in our sample was 0.75 for the first part and 0.87 for the second part. The two parts highly correlated with each other, indicating that they shared common variance and, thus, may be best represented as a single trait. The combined Cronbach's alpha for all 32-items was 0.89, indicating high internal reliability for overall disgust sensitivity, including moral disgust sensitivity. We, therefore, combined the two subscales from the disgust sensitivity subscale into an average *Disgust* factor

scale. We, therefore, averaged the two standardized scores into a single disgust sensitivity score. The unstandardized mean score in our sample was .96 (SD = .69).

*Ethics of Autonomy, Community, and Divinity* (adapted from ROZIN et al. 1999) (25-items) contains three subscales that measure the perceived badness of violations of the ethic of autonomy (9-items), community (11-items), and divinity (5-items) respectively. The scales, which range from 0 (Not Bad at all) to 4 (Extremely Bad), contains items such as “You hear about a man that comes home drunk and beats his wife” (autonomy), “You hear a 10-year-old child say dirty words to his/her parents” (community), and “You hear about a 70-year-old male who has sex with a 17-year-old female” (divinity). These scales were adapted to read in the second person rather than the third person. The Cronbach’s alphas in our sample were 0.81 (autonomy), 0.75 (community), 0.68 (divinity). The three subscales were correlated with each other, indicating that they shared common variance and, thus, may be best represented as a single trait. Further, the Cronbach’s alpha for all three subscales combined was 0.86, indicating higher internal consistency for the aggregated scale than for any of the three disaggregated scale alone. We, therefore, combined the autonomy, community, and divinity subscales into a single aggregated scale by taking the average of the three disaggregated scales. We combined the ethics of autonomy, divinity, and community into an average factor scale that we labeled the *Ethics* factor. The unstandardized mean score in our sample was 2.60 (SD = .53).

### Statistical Analyses

We used SAS version 9.1 to conduct the statistical analyses. We used PROC CORR to calculate Cronbach’s alpha for each scale and to compute the bivariate correlations among all of the scales. An Exploratory Factor Analysis was performed to determine the latent variables underlying the correlations among the various measures of life history, religiosity, and moral intuitions used. We used PROC FACTOR to perform the Exploratory Factor Analysis; principle axis estimation used squared multiple correlations as initial communality estimates. Cumulative and incremental proportions of variance accounted for and screen tests were used to determine the optimal number of factors to be retained. Promax rotation was used to obtain an oblique factor solution. We took the average of the salient indicators for each latent common factor identified to estimate factor scales. This is equivalent to unit-weighted factor scoring (GORSUCH 1983). Finally, we performed path analyses among the latent common factors identified to evaluate three alternative structural equation models for the relationships among the major constructs. We used the PROC CALIS procedure to test and compare alternative path models.

## RESULTS

We conducted an Exploratory Factor Analysis (EFA) on *Dumbfounding*, *Ethics*, *Disgust*, the Mini-K, High-K strategy scale, Religiosity, and Spiritual Perspective scales. The EFA revealed that a 3-factor solution was optimal, explaining 99.7% of the reliable variance. The first factor was composed of the Religiosity and Spiritual Perspective scales and labeled the *Religiosity* factor. The second factor was composed of *Dumbfounding*, *Ethics*, and *Disgust* and was labeled the *Moral Intuitions* factor. The third factor was composed of the Mini-K and High-K Strategy scale and was labeled the *Life History* factor. The *Religiosity*, *Moral Intuitions*, and *Life History* factors were positively correlated with one another. The factor loadings are presented in *Table 1* and the factor intercorrelations are presented in *Table 2*.

*Table 1.* Factor loadings of scales for Religiosity, Moral Intuitions, and Life History factors (oblique promax rotation)

	Religiosity	Moral Intuitions	Life History
Religiosity	0.86	.27	.25
Spiritual Perspective Scale	0.84	.18	.31
Dumbfounding	.24	0.62	.31
Ethics	.06	0.66	.34
Disgust	.24	0.74	.19
Mini-K	.30	.46	0.59
High-K Strategy Scale	.20	.21	0.66

*Table 2.* EFA inter-factor correlations

	Life History	Religiosity	Moral Intuitions
Life History	1.00	.31	.39
Religiosity	.31	1.00	.27
Moral Intuitions	.39	.27	1.00

Next, in order to test multiple path-analytic structural models aimed at examining what causal relationships exist among the three correlated factors, we created an averaged factor scale for each of the three common factors derived from the EFA. We used the unweighted means of the standardized indicators of each factor (see GORSUCH 1983).

We tested three structural path models. Based on LH theory, we reasoned that the *Life History* factor should logically be included first in the causal sequence because LH strategy is thought to be an overall reproductive strategy that is a highly heritable ( $h^2 = .65$ ; FIGUEREDO et al. 2004) and multifaceted latent trait composed of multiple tactics (FIGUEREDO et al. 2007). According to LH theory, LH strategies are adaptations that are developmentally contingent on local population density and

mortality rates. In this view, religiosity and moral intuitions may be cognitive and affective products of LH strategy, but it would make little sense for these traits to cause an overall LH strategy.

The first alternative path model tested whether *Religiosity* mediated the relationship between the *Life History* factor and *Moral Intuitions*, indicating that religiosity would constitute a necessary link to strong moral intuitions. The model was statistically rejectable ( $X^2(1) = 13.22, p < .001$ ) and unacceptable by various parsimonious and practical indices of fit ( $CFI = .55, NFI = .57, RMSEA = 0.31$ ).

The second alternative path model tested whether the *Moral Intuitions* factor mediated the relationship between the *Life History* factor and *Religiosity*. In other words, a slow LH strategy might cause strong moral intuitions and religiosity might be manifested as a result of these strong emotion-laden responses. In this view, religiosity would result from deeply felt feelings that human actions carry universal moral significance. This model was also statistically rejectable ( $X^2(1) = 7.42, p < .01$ ) and was unacceptable by various parsimonious and practical indices of fit ( $CFI = .77, NFI = .76, RMSEA = .22$ ).

The third alternative path model tested whether the observed association between *Religiosity* and *Moral Intuitions* was a spurious correlation resulting from a shared common cause, the *Life History* factor. This model was statistically acceptable ( $X^2(1) = 1.90, p = .17$ ) and was also acceptable by various parsimonious and practical indices of fit ( $CFI = .97, NFI = .94, RMSEA = .08$ ). The third model positing a spurious association between *Religiosity* and *Moral Intuitions* was therefore superior to the two alternative path models positing direct causal links between them. Therefore, we concluded that the *Life History* factor is best conceived of as the common cause of both *Moral Intuitions* and *Religiosity*. The indices of fit and pathway beta weights for the three alternative structural models are presented in *Table 3*.

Table 3. Alternative structural models

ALTERNATIVE MODELS: Causal Pathways (Beta Weight)	$X^2$	DF	p(Ho)	NFI	CFI	RMSEA
Life History→Religiosity (.29) Religiosity→Moral Intuitions (.21)	13.22	1	<.001	.57	.55	.31
Life History→Moral Intuitions (.35) Moral Intuitions→Religiosity (.21)	7.42	1	<.01	.76	.77	.22
Life History→Religiosity (.29) Life History→Moral Intuitions (.35)	1.90	1	.17	.94	.97	.08

## DISCUSSION

As expected, the Mini-K and the High-K Strategy scales loaded on a single latent *Life History* factor. The Religiosity and Spiritual Perspective scales composed a second latent *Religiosity* factor. Morally *Dumbfounding* intuitions, the *Ethics* of

autonomy, community, and divinity, and *Disgust* sensitivity clustered into a third latent *Moral Intuitions* factor. The three common factors identified (*Life History*, *Religiosity*, and *Moral Intuitions*) were positively correlated with each other. This is consistent with previous findings that religiosity is an indicator of a slow LH strategy (FIGUEREDO et al. 2006, 2007) and supports the idea that religiosity is associated with aspects of moral intuitions such as the ethic of divinity, community, and moral disgust (HAIDT and JOSEPH 2004; HAIDT and GRAHAM 2007). More importantly, it suggests that there is a general tendency for slow LH individuals to moralize each of the “Big-Three” moral domains of morality more than other individuals.

### **LH Strategy and Moral Rule Following**

This was the first demonstration that slow LH strategies predict strength of moral intuitions. Slow LH strategies were related to the general factor of moral intuitions, rather than just one specific moral domain (LH strategy also predicted each individual domain). These moral intuitions are thought to be automatic responses that manifest in awareness as anger (in response to violations of the ethic of autonomy), contempt (in response to violations of the ethic of community), and disgust (in response to violations of the ethic of divinity) (HAIDT 2001; ROZIN et al. 1999). These emotions drive (or actually *are* the) moral judgment and sometimes result in “moral dumbfounding”. In other words, the emotional response results in adherence to a moral judgment despite the lack of rational reasons to support the judgment. Our results suggest that slow LH individuals are more deontological in their moral judgments (i.e., they appear to make moral judgments at least partially based on moral rules rather than on immediately harmful consequences exclusively) and that they have a broad domain of morality (i.e., they make judgments across three domains of morality). This is consistent with predictions that following social and moral rules is an important aspect of slow LH strategy (RUSHTON 1985). Increased strength of moral judgment would have encouraged social rule-following in others, resulting in increased social stability and order. Social stability would have enhanced long-term survival prospects for slow LH individuals and facilitated cooperation in groups.

Increased strength of moral emotions (e.g., anger, contempt, and disgust) could have motivated behaviors that would have been especially important for slow LH strategists. First, moralistic anger likely motivates the punishment of cheaters that violate social contracts (BUSS 2008). This suggests that slow LH individuals may be more likely to be “altruistic punishers” by incurring the cost of punishment to facilitate social cohesiveness. This is consistent with the fact that slow LH individuals are characterized by increased altruism towards kin, friends, and community (altruism is part the Arizona Life History Battery; FIGUEREDO 2007). Second, moralistic contempt likely motivates ostracism of individuals that show disrespect towards the community (duty) or do not conform to the existing social order (e.g., hierarchy) of

the group or do not honor their duties to the group. Third, (core) disgust likely motivates the avoidance of dangerous activities or surroundings that could lead to contact with disease-producing agents (e.g., pathogens, or parasites; HAIDT et al. 1997; NAVARETTE and FESSLER 2006). This “purity module” has been coadapted to function in moral disgust and likely in moral rule following. The finding that slow LH individuals exhibit increased disgust sensitivity supports the prediction that slow LH strategies are characterized by increased somatic effort (investment in continued survival of the individual) because maintaining physical health is a form of somatic effort (FIGUEREDO et al. 2004, 2007). This finding is also consistent with the recently reported findings of THORNHILL and FINCHER (2007) that both the number of infectious diseases and parasite severity predict collectivist attitudes, because slow LH strategies are partly characterized by altruism toward the community. To summarize, these moral emotions could serve as a “watchdogs of the moral world” (HAIDT and BJORKLUND 2008) by motivating the exclusion or punishment of individuals who violate social rules, by facilitating in-group cohesiveness, and by motivating disease-avoidance.

### MORALITY AND RELIGION AS SPURIOUSLY CORRELATED LH TRAITS

Tests of three path-analytic structural models suggested that the association between *Religiosity* and *Moral Intuitions* is best explained as a spurious correlation caused by slow *Life History* strategy, and not as a direct causal relationship.

The model positing that moral intuitions mediate the relationship between LH and religiosity was an unacceptably fitting model. This suggests that experiencing strong moral intuitions that some human actions violate universal moral rules does not lead to post-hoc religious sentiments. In other words, increased religiosity is not a post-hoc rationalization for the “experienced realism” of the moral emotion. It could have been the case that experiencing strong moral intuitions leads to increased religiosity as a means to justify the moral reality of those intuitions. This view was not supported.

The model positing that religiosity mediates the relationship between slow *Life History* strategy and *Moral Intuitions* was also an unacceptably fitting model. This suggests that religiosity does not directly affect strength of moral intuitions. This result is consistent with the view that religious traditions may have formally codified existing moral intuitions, but how strongly someone experiences moral intuitions is not influenced by their degree of religiosity. Instead, both moral intuitions and religiosity are influenced by a slow LH strategy.

The present results are inconsistent with the predictions of the “costly-signaling” theory of religion. According to this view, religiosity (e.g., religious ritual and emotional displays) functions as a costly, “hard to fake” signal used by religious individuals to identify “true-believers” that are likely to be trustworthy coop-

erators (BULBULIA 2007). BULBULIA (2007) argues that religiosity facilitates within-group cooperation by allowing religious cooperators to identify individuals who are committed to beliefs in gods that will enforce social contracts. Individuals that truly believe that there are god-given social and moral rules may be less likely to violate those rules. Thus, this theory predicts that religiosity will lead to increased moral rule-following. Our results did not support this prediction. Our admittedly preliminary results instead suggest that slow LH individuals are both more likely to exhibit religious behavior and more likely to follow and enforce social rules, but not because religiosity leads to such rule-following behavior. In this view, moral intuitions motivate slow LH individuals to encourage social and moral rule following within the group, while religiosity is a mere indicator of a likely moral rule follower. Because both are important features of a slow LH, LH strategies may explain why moral intuitions and religiosity are associated. Religious institutions may be set up by slow LH strategists to formalize social and moral rules that must be followed to be considered a true altruist.

To summarize, we found that measures of slow LH strategy predict both general strength of moral intuitions and religiosity. Moral intuitions are thought to promote social and moral rule following in others and, perhaps, health-maintenance behaviors in oneself, both of which are predicted to be important components of a slow LH strategy (RUSHTON 1985; FIGUEREDO et al. 2006). Comparisons of three structural models revealed only one acceptably fitting model: LH strategy directly influencing both moral intuitions *and* religiosity with only a spurious link between religiosity and moral intuitions. This structure suggests that religiosity does not produce moral intuitions nor do moral intuitions produce religiosity in an attempt to justify those intuitions. Instead, both moral intuitions and justifications of those intuitions result from a slow LH strategy. In this view, moral rules codified by religions reflect the moral intuitions of slow LH individuals.

## LIMITATIONS AND FUTURE DIRECTIONS

The present results are preliminary; they await independent replication with a larger sample and additional measures. For example, the use of the full Arizona Life History Battery (ALHB; FIGUEREDO 2007) could greatly improve our measurement of LH strategy. Further, the use of the ALHB would be well suited for a fully latent-variable structural equations model.

Reliance on a correlational method, a relatively homogenous college student sample (e.g., age, SES, religious background), and a single measure, self-report questionnaires, limits our ability to generalize the model with any confidence. It is, however, possible to put that model to critical tests using a variety of behavioral, physiological, and imaging methods. For example, the model predicts that slow LH individuals will be more likely to use 'morally' based punishment than fast LH individuals in response to the violation of moral rules. Further, the model predicts that

slow LH individual will show stronger emotional reactions to the violation of moral rules than fast LH individuals will. Moreover, the model predicts that, when permitted to punish individuals who violate moral rules, slow LH individuals will show greater activity in neural areas associated with reward and reinforcement than fast LH individuals will. In addition, the model predicts that slow LH individuals will exhibit greater in-group favoritism mediated by disgust reactions than fast LH individuals. Each of these predictions are trivially easy to examine using correlational, quasi- or true-experimental designs – each of which puts the model at risk of disconfirmation. Finally, it is important to test if disgust-based health-maintenance behaviors overlap with the anger-based punishment predicted by the present model. It will be important to examine relations among reactions to ethical violations involving autonomy, divinity, and community. Doing so will permit us to distinguish the unique and overlapping variance contained by each of these ethical domains.

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