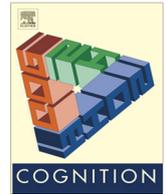




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Why did this happen to me? Religious believers' and non-believers' teleological reasoning about life events

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ABSTRACT

People often believe that significant life events happen for a reason. In three studies, we examined evidence for the view that teleological beliefs reflect a general cognitive bias to view the world in terms of agency, purpose, and design. Consistent with this hypothesis, we found that individual differences in mentalizing ability predicted both the tendency to believe in fate (Study 1) and to infer purposeful causes of one's own life events (Study 2). In addition, people's perception of purpose in life events was correlated with their teleological beliefs about nature, but this relationship was driven primarily by individuals' explicit religious and paranormal beliefs (Study 3). Across all three studies, we found that while people who believe in God hold stronger teleological beliefs than those who do not, there is nonetheless evidence of teleological beliefs among non-believers, confirming that the perception of purpose in life events does not rely on theistic belief. These findings suggest that the tendency to perceive design and purpose in life events—while moderated by theistic belief—is not solely a consequence of culturally transmitted religious ideas. Rather, this teleological bias has its roots in certain more general social propensities.

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1. Introduction

The ancient Greeks believed that human destiny was guided by the hands of the Moirai, the three personified goddesses of fate tasked with overseeing the course and outcome of each individual's life. The goddesses were said to spin a person's thread of life at birth, and then to direct the unfolding of that thread, meting out punishments and rewards throughout the person's life, before ultimately cutting the thread at death. Although belief in the Moirai has gone out of fashion, the perception that human life is guided by unseen intentional forces remains ubiquitous today (e.g., Banerjee & Bloom, *in press*; Bering, 2002, 2003, 2006, 2011; Gray & Wegner, 2010; Heywood, 2010; Heywood & Bering, 2013; Norenzayan & Lee, 2010; Pepitone & Saffiotti, 1997;

Svedholm, Lindeman, & Lipsanen, 2010; Weeks & Lupfer, 2000; Young & Morris, 2004). In their everyday lives, people often perceive design and purpose embedded in significant and anomalous life events. For example, natural disasters are interpreted as divine warnings or admonitions to a sinful society. Personal tragedies, like the death of a loved one, are seen as deliberate punishment for prior wrongdoings. And unexpected good fortune, such as a sudden recovery from serious illness, is viewed as an intended reward for living virtuously.

The belief that life events have a deeper meaning and that they happen for a reason is plainly related to religious belief (e.g., Bering, 2002, 2003, 2006, 2011; Heywood, 2010; Heywood & Bering, 2013; Stephens, Fryberg, Markus, & Hamedani, 2013; Willard & Norenzayan, 2013). People often turn to God to explain significant life events, particularly when those events are difficult to explain in terms of material causes (Gray & Wegner, 2010; Pepitone & Saffiotti, 1997; Weeks & Lupfer, 2000). For example, Gray and Wegner

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(2010) found that people were more likely to believe that God was responsible for a freak flood that killed an entire family when no human cause was mentioned than when a malevolent human perpetrator was explicitly blamed. They apparently had the intuition that an unexpected tragedy of such magnitude could not have occurred by chance alone—it must have been part of God's divine plan.

But even when an event's material cause is obvious, people often explain the same event simultaneously as due to both natural non-teleological processes and supernatural goal-based influences (Legare, Evans, Rosengren, & Harris, 2012; Legare & Gelman, 2008; Legare & Visala, 2011; Lupfer, Brock, & DePaola, 1992; Lupfer, De Paola, Brock, & Clement, 1994; Lupfer, Tolliver, & Jackson, 1996; Weeks & Lupfer, 2000; Woolley, Cornelius, & Lacy, 2011). For example, in a study on beliefs about the causes of AIDS in South Africa, Legare and Gelman (2008) found that both children and adults simultaneously endorsed proximal, natural explanations of disease acquisition (e.g., a biological disease model of virus transmission) as well as distal, supernatural teleological explanations (e.g., AIDS is spread by witchcraft as punishment for one's misdeeds). Thus, the perception of supernatural purpose embedded in a life event need not conflict with naturalistic explanations of that same event, but rather often provides a complementary level of causal explanation (Legare & Gelman, 2008; Legare & Visala, 2011; Legare et al., 2012; Weeks & Lupfer, 2000; Woolley et al., 2011).

1.1. Cultural and cognitive underpinnings of teleological reasoning about life events

Why do people tend to think that things happen for a reason? One possibility is that this tendency is the product of cultural experience. People in societies such as ours come to believe in divine beings who have goals, and come to learn about the more amorphous notions of fate, karma, or destiny. They then interpret certain events in light of this culturally-transmitted knowledge. This learning account is supported by the observation that young children rarely spontaneously generate supernatural teleological explanations of unusual events (e.g., Bering & Parker, 2006; Woolley et al., 2011). For instance, Bering and Parker (2006) found that 7–9-year old children spontaneously attributed an unexpected event to an invisible supernatural being who was trying to send them a message when they were explicitly primed to expect this being to communicate with them in some way—but younger children did not.

An alternative view, which we explore here, is that the tendency to develop teleological beliefs about life events is a byproduct of certain universal social-cognitive biases (Banerjee & Bloom, *in press*; Evans & Wellman, 2006; Willard & Norenzayan, 2013). In general, it has been argued that such biases make people highly receptive to particular cultural religious ideas, including belief in souls, divine creation, and the afterlife. These ideas are hypothesized to be especially seductive because they successfully capitalize on humans' evolved social-cognitive biases (e.g., Banerjee & Bloom, 2013; Bloom, 2004, 2007; Boyer, 2001; Gervais, Willard, Norenzayan, & Henrich, 2011; Waytz, Gray, Epley, & Wegner, 2010; Willard & Norenzayan, 2013).

Along these lines, teleological reasoning about life events might be a cognitive byproduct of humans' natural tendency to view the world in terms of agency, purpose, and design.² As a species, humans are remarkably attuned to the presence of other agents in the environment (Boyer, 2001; Guthrie, 1993), and from infancy, we are uniquely adept at deciphering these agents' goals, intentions, and beliefs (Gergely, Nádasdy, Csibra, & Bíró, 1995; Kovács, Téglás, & Endress, 2010; Wellman & Gelman, 1992; Woodward, 1998). This capacity to infer the mental states of other agents is a core feature of human's intuitive psychology, sometimes known as “mentalizing” or “theory of mind”. While this mentalizing tendency is highly useful for explaining and predicting other agents' behavior, it sometimes leads to error, as when we believe that there are social entities and forces when none, in fact, exist. People are prone to perceive illusory faces—in the clouds and in their food, for instance (Boyer, 2001; Guthrie, 1993; Rieki, Lindeman, Aleneff, Halme, & Nuortimo, 2013), to infer that ambiguous events have agentic causes (Gray & Wegner, 2010; Pepitone & Saffiotti, 1997; Weeks & Lupfer, 2000; Woolley et al., 2011), and to assume that the physical and biological worlds are the product of intended design (Bloom & Weisberg, 2007; Evans, 2000, 2001; Kelemen, 2004).

In addition, children and adults also exhibit a broad, implicit “intentionality bias”—a rapid, default tendency to infer intention in other peoples' behavior (Bègue, Bushman, Giancola, Subra, & Rosset, 2010; Rosset, 2008; Rosset & Rottman, 2014). While the ability to link others' behavior to their underlying intentions is generally useful, this bias also drives an over-reliance on unwarranted intentional explanations. This is particularly true under conditions of cognitive load, when individuals' ability to inhibit automatic judgments of intentionality is impaired (Bègue et al., 2010; Rosset, 2008). As a result, this intentionality bias sometimes causes errors in people's ability to recognize truly non-intentional, accidental behavior. In an analogous way, a fast, implicit cognitive bias to assume intention in the social domain may also promote an under-appreciation of chance and an overreliance on inferences of purpose and intention when reasoning about non-social phenomena—such as the creation of natural kinds, and potentially also life events.

1.2. A domain-general promiscuous teleology?

The manifestation of these social-cognitive biases that is most relevant for the current paper is what Kelemen (1999a, 1999b) has dubbed “promiscuous teleology”: a propensity to believe that entities exist for a purpose. Young children favor teleological explanations for other people's behavior and for manmade artifacts—which is appropriate, since behavior is often motivated by goals, and because artifacts are typically created for a purpose. But they also favor such explanations for the existence of

² This byproduct view is different from the adaptationist position advanced by Bering (2002, 2003, 2006, 2011), who argues that teleological reasoning about personal experiences is the product of a specialized cognitive module, called “existential theory of mind,” evolved specifically for the purpose of deciphering symbolic meaning in the domain of life events.

living species and for naturally occurring objects, believing for example, that tigers and mountains have inherent purposes (Kelemen, 1999a, 1999b, 2004; Kelemen & DiYanni, 2005; but see also Ojalehto, Waxman, & Medin, 2013). Adults also share some of these teleological intuitions, most often in the form of creationist beliefs about species origins (Bloom & Weisberg, 2007; Evans, 2000, 2001).

Recent findings suggest that children's preference for purpose-based explanation also extends to the domain of life events. Although young children are not particularly prone to spontaneously offer supernatural explanations, children as young as five-years-old do prefer teleological explanations of significant life events—that the event happened “to send a sign” or “to teach a lesson”—to explanations that deny purposeful causes when given a choice between the two (Banerjee & Bloom, *in press*). While adults also often invoke teleological explanations for life events, they appear to do so more selectively than children and for a narrower range of life events (Banerjee & Bloom, *in press*).

1.3. Individual differences in mentalizing ability and teleological reasoning

If the propensity to perceive intention and purpose in life events is enabled by cognitive mechanisms for reasoning about other minds, then variation in individuals' teleological beliefs in life events should be expected to track individual differences in their ability to infer and decipher other people's mental states (see also Heywood, 2010; Heywood & Bering, 2013; Willard & Norenzayan, 2013). Such a correlation would parallel findings that suggest a relationship between mentalizing ability and certain theistic views. For example, individuals with autism, who suffer profound deficits in theory of mind, tend to believe in God at lower rates than the general neurotypical population (Caldwell-Harris, Murphy, Velazquez, and McNamara, 2011; Norenzayan, Gervais, & Trzesniewski, 2012), and, within this neurotypical population, mentalizing ability predicts belief in God (Norenzayan et al., 2012). A relationship between mentalizing and religious belief might also partially account for the well-documented gender gap in religiosity (Norenzayan et al., 2012), as men traditionally perform more poorly than women on tests of mentalizing ability (Baron-Cohen & Wheelwright, 2004; Baron-Cohen, Wheelwright, Skinner, Martin, & Clublely, 2001; Wakabayashi et al., 2006), and they also tend to be less religious (Stark, 2002; Walter & Davie, 1998).

Does the same correlation with mentalizing ability exist for teleological interpretations of life events? To explore this, Heywood (2010) interviewed individuals with Asperger's syndrome—a social-cognitive disorder characterized by deficits in mentalizing ability—as well as neurotypical theists and atheists. Participants were asked to discuss the causes of two significant life events: a “learning experience” and a “low point”. Heywood found that, relative to neurotypical theists and atheists, individuals with Asperger's syndrome generally provided fewer explanations of their life events that contained any teleological content—they did not tend to imbue these events with purpose. Such findings suggest that basic theory of mind capacities may underlie people's propensity to infer purpose in life

events, and that deficits in this system may inhibit teleological intuitions (see also Bering, 2002).

The results of a recent study by Willard and Norenzayan (2013) are also consistent with this general proposal. Using undergraduates at a Canadian university and also American adults, Willard and Norenzayan investigated whether certain cognitive tendencies (i.e., mind–body dualism, teleological beliefs about nature, and anthropomorphism), and also cultural exposure to religion, increase individuals' likelihood of believing in God, paranormal phenomena, and deeper purpose in life. They found that dualistic belief (i.e., that idea that minds are separable from physical bodies) was the strongest predictor of this set of supernatural beliefs, but that teleological reasoning about nature (i.e., believing that natural entities exist for a purpose) was also relevant. Specifically, both dualism and teleological beliefs about nature were found to mediate the significant relationship between individuals' mentalizing ability and their supernatural beliefs. In addition, Willard and Norenzayan found that while individuals' teleological beliefs about nature weakly predicted their belief in life's purpose (independently of their belief in God), theistic belief was a much stronger predictor. Taken together, their results suggest that in addition to explicit religious beliefs, individual differences in certain cognitive biases—tentatively including a bias for teleological thought—may encourage belief in intentional supernatural agents, and potentially also the perception of deeper meaning in life events (Willard & Norenzayan, 2013).

1.4. Overview of the present studies

The studies here further investigate how cultural factors and cognitive factors interactively shape individuals' teleological beliefs about life events. In three studies, we explored the view that teleological beliefs about life events are a byproduct of humans' evolved sensitivity to purpose and design in the social world, by investigating the extent to which the propensity to perceive purposes in life events is a reflection of individuals' mentalizing ability. In particular, we tested whether individual differences in mentalizing ability predict people's tendency to believe in fate (Study 1), to represent fate as a type of intentional agent (Study 1), and to reason teleologically about their own autobiographical life events (Study 2). We also explored whether particular types of life events—highly positive or improbable events, for instance—are most likely to elicit teleological intuitions, potentially because they are especially suggestive of intended design (Study 2). Finally, we examined the relationship between people's perception of purpose in life events and their teleological beliefs about natural entities and processes (Study 3).

Our paper is concerned with both universals and variation, then. We argue for the view that teleological reasoning about life events reflects a universal social-cognitive tendency to infer design and purpose in the natural world, one that is itself grounded in mentalizing capacities. But since mentalizing capacities vary across individuals, the extent to which this universal tendency is manifested should vary across individuals. This sort of constrained var-

iation is the norm for psychology. For example, fear of strangers is a likely human universal, but since it is grounded in psychological mechanisms and propensities that vary across individuals (due to differences in genotype, in idiosyncratic personal experience, in cultural norms, and so on), the extent to which any individual is afraid of strangers will vary.

Another source of variation—distinct from mentalizing—is endorsement of religious beliefs. Across all three studies, we investigated whether the belief that life events have purposes depends upon a belief in God. If teleological reasoning about life events reflects a universal cognitive bias to view the world in terms of purpose and design, then we might see evidence of teleological beliefs even among non-religious individuals (see also Heywood, 2010; Heywood & Bering, 2013). But at the same time, we suspected that God-believers would express stronger explicit teleological views than God-non-believers because a belief in God likely reinforces the cognitive intuition that life events have purposeful causes. Thus, although a general cognitive bias to infer purpose in life events may be universal, certain cultural beliefs may enhance underlying teleological intuitions (as in the case of theism) or else suppress them (as in the case of atheism).

In sum, our studies explore the following central hypotheses:

H1. Teleological beliefs about significant life events persist across the full spectrum of religious beliefs and should therefore be observable among both God-believers and God-non-believers. Consequently, both God-believers and God-non-believers should show evidence of belief in fate—the common teleological notion that life events are “meant to be”.

H2. Belief in a purposeful, agentic God likely reinforces and augments the core intuition that life events happen for a reason. Teleological beliefs about significant life events, including a belief in fate, should therefore be stronger among God-believers than among God-non-believers.

H3. Teleological reasoning about significant life events is rooted in certain core social-cognitive capacities, namely, mentalizing ability. Accordingly, individual differences in mentalizing ability should predict people’s tendency to hold teleological beliefs about significant life events, with more active mentalizers more prone to infer purpose and intention embedded in events than less active mentalizers.

H4. People may intuitively represent fate as a type of intentional agent (see also Barrett, 2012). Specifically, because fate is often viewed as one source of the order and design that people detect in life events, a cognitive bias to assume that designed entities have intentional agentic causes (Newman, Keil, Kuhlmeier, & Wynn, 2010) may encourage agentic representations of fate. God-believers who conceive of fate as synonymous with God or as an extension of God’s will should be more likely than God-non-believers to represent fate agentially. In addition

and independently, given their particular sensitivity to agency, design, and purpose in the environment, more active mentalizers should also be especially prone to represent fate agentially—as a type of intentional being, rather than as merely a physical fact about the universe, akin to the laws of physics.

H5. A broad domain-general cognitive orientation to purpose may drive teleological intuitions across distinct domains. Therefore, individuals’ teleological beliefs about nature and about significant life events should be systematically related, even independent of their other explicit supernatural beliefs (i.e., paranormal beliefs and belief in God).

Finally, in the course of the paper, we also explore various auxiliary hypotheses. Most notably, in Study 2, we investigate the particular event characteristics that are likely to elicit teleological attributions to fate or to God (e.g., event valence, perceived likelihood, significance, emotionality, and saliency). We expect that certain types of events (e.g., those that are highly significant and anomalous) will be especially likely to evoke the perception of embedded design and purpose, and therefore to encourage teleological interpretations.

1.5. Analytical approach

Across all three studies, we use two parallel analytical approaches to test our hypotheses. First, we examine evidence for teleological beliefs separately among God-believers and God-non-believers in order to determine whether such beliefs persist across the full spectrum of religious belief (H1). We also compare the strength of these teleological beliefs among religious and non-religious individuals to investigate whether theistic belief reinforces and augments the core intuition that significant life events happen for a reason. If so, then teleological beliefs should be stronger among God-believers than God-non-believers (H2).

Second, utilizing our full dataset, we examine whether mentalizing ability predicts individuals’ tendency to reason teleologically about life events, independent of their religious beliefs, and across the full range of responses on these measures (H3). We present the results of regression analyses that simultaneously test the effects of both mentalizing ability and also belief in God as independent predictors of individuals’ teleological reasoning. Using such analyses, we examine whether these variables predict participants’ belief in fate and the nature of their fate representations (H4). These analyses also control for the effects of several other demographic traits (i.e., sex, age, and education) that have previously been shown to covary with mentalizing ability, belief in God, and supernatural belief more generally (e.g., Baron-Cohen & Wheelwright, 2004; Baron-Cohen et al., 2001; Irwin, 1993; Norenzayan et al., 2012; Stark, 2002; Wakabayashi et al., 2006; Walter & Davie, 1998; Willard & Norenzayan, 2013). We also perform correlation and regression analyses using our full dataset to determine whether individuals’ teleological views of nature and of life events are systematically

related, controlling for the same set of demographic traits and also for individuals' other supernatural beliefs (i.e., paranormal beliefs and belief in God) (H5). Overall, this analytical approach best reflects the nature of the continuous and ordered data that we collected and therefore provides the broadest picture of the relationship between participants' religious, cognitive, and demographic traits and their teleological views.

2. Study 1

2.1. Overview

When people say they believe that things happen for a reason, to whom or to what do they attribute that reason? Many believe that significant life events are caused by an all-knowing, all-powerful, and purposeful God. However, many also claim to believe in a different arbiter of life events, namely, fate. A belief in fate typically refers to the conviction that there is an underlying order to universe that determines how events in life turn out—they are “meant to be”.

Previous research has shown that variation in individuals' tendency to attribute life events to fate is related to differences in their religiosity (e.g., Christians endorse belief in fate more than the non-religious) and also their ethnic cultural beliefs about the underlying causal complexity undergirding events (Norenzayan & Lee, 2010). For example, Norenzayan and Lee (2010) examined individuals' devotion to God as well as their culturally mediated belief in “equifinality”—the idea that we live in a “complex, interconnected world where a known outcome is overdetermined by a web of underlying causes” (p. 713). They found that both factors independently predicted participants' tendency to judge fictional events (e.g., finding a diamond on a busy street) as predetermined rather than merely coincidental.

Expanding on these earlier findings, Study 1 directly assessed both religious and non-religious participants' explicit belief in fate to determine whether some individuals who deny the existence of God nevertheless endorse belief in fate. After all, although many people who believe in fate also believe in God, a belief in fate does not by definition require a belief in God. Evidence of teleological fate beliefs among God-non-believers would be consistent with the hypothesis that the perception of purpose in life events is not solely a consequence of religious belief (H1), but rather, may reflect humans' more general social-cognitive propensity to hyperactively detect design and purpose in the natural world. At the same time, in line with prior findings (e.g., Norenzayan & Lee, 2010), we expected that God-believers would be more likely than God-non-believers to believe in fate (H2).

Study 1 also examined whether individual differences in mentalizing ability constitute another source of variation in participants' fate beliefs not previously examined by Norenzayan and Lee (2010). We predicted that if the tendency to infer purpose in life events depends upon theory of mind abilities, then active mentalizers might be particularly prone to perceive order and purpose in life events, and therefore to believe in fate (H3).

In addition, Study 1 investigated the nature of individuals' fate representations. Previous research has shown that while the belief in fate is generally widespread, particular conceptions of fate vary by culture (Norenzayan & Lee, 2010; Young & Morris, 2004; Young, Morris, Burrus, Krishnan, & Regmi, 2011). For example, Young et al. (2011) found that Christians and Hindus generally conceive of fate in different ways; Christians primarily hold an agentic deity-centered worldview while Hindus believe in both a deity-centered worldview and also a non-agentic, destiny-centered conception of fate (see also Young & Morris, 2004). Importantly, these different cultural conceptions of fate have been shown to drive divergent teleological beliefs about the role of fate (and specifically karma) in causing life outcomes. For instance, using fictional vignettes, Young et al. (2011) found that Christians preferentially invoked fate to explain misfortunes that could be linked to a person's known prior misdeeds—presumably reflecting belief in a watchful deity who punishes transgressions committed within one's lifetime (see also Young & Morris, 2004). Hindus, in contrast, invoked fate as the cause of misfortune regardless of whether a person's prior misdeeds were known or unknown. This result is consistent with Hindus' belief that life outcomes may be the product of a destiny determined by one's actions in the current lifetime or in previous lifetimes.

We examined whether individual differences in core social-cognitive biases might also contribute to variation in people's conceptions of fate. Specifically, because fate is often viewed as one source of the order and design that people detect in life events, a cognitive bias to assume that designed entities have agentic causes (Newman et al., 2010) may cause people to intuitively represent fate as a type of intentional agent (H4) (see also Barrett, 2012). Study 1 therefore also examined whether people explicitly represent fate as an agentic force—as a sort of being with the capacity to be intentionally fair, kind, and instructive. Or, alternatively, do they think of fate as a purely non-agentic force, that is, just a property of the universe in the same way that physical forces, such as gravity, are properties of the universe? God-believers who believe that fate is synonymous with God or is an extension of God's will might well be expected to represent fate agentially to a greater extent than God-non-believers. Nonetheless, we hypothesized that individual differences in mentalizing ability would predict whether individuals represent fate agentially or non-agentially, even independent of their belief in God (H4).

2.2. Material and methods

2.2.1. Participants

Participants were 100 adults (61 women; *M* age = 38.8 years) residing in the United States and recruited through the research survey website Amazon Mechanical Turk. All participants successfully passed an attention check question and gave relevant and appropriate answers on a survey question that required a typed response, so no participants were excluded. Participants varied in their level of educational attainment: 3% did not complete high school, 11% completed high school, 36% completed some

college, 35% had a Bachelor's degree, 13% had a Master's degree, and 2% had a Ph.D. Participants identified themselves as White/Caucasian (89%), Black/African-American (5%), Asian (1%), or "Other" (5%). They received 80 cents for completing the experiment, in accordance with standard online payment norms.

2.2.2. Beliefs about fate

Participants answered several questions examining their explicit beliefs about fate. They were first presented with the following definition of fate: "Many people believe that significant life events are meant to be and that they happen for a reason. They believe that there is an underlying order to life that determines how events turn out. These ideas are usually referred to as a belief in fate". Participants then indicated how strongly they believe in fate, using a 1–5 response scale anchored at (1) "not at all" and (5) "a lot".

Next, they indicated whether they believe that fate is generally fair, kind, and instructive, using a 1–7 response scale anchored at (1) "strongly disagree" and (7) "strongly agree" (Table 1). Participants also indicated whether they held an agentic or non-agentic view of fate by reporting either that fate does not exist, that it is simply a fact about the universe, or that it is instead determined by some sort of being (and if so, then precisely who that being is). In addition, they responded to broader measures of teleological belief, including whether they sometimes perceive signs in significant life events, and whether they believe that "everything works out for the best in the end," and that there is "order in the universe".³

2.2.3. Mentalizing ability

Participants completed two measures of mentalizing ability. First, they completed the 20-item Paranoia Scale (Fenigstein & Venable, 1992), a self-report measure of paranoid thoughts such as a concern with being watched and evaluated by other people. Paranoia is often characterized by overactive social threat perception (Green & Phillips, 2004) and reflects hypersensitivity to other people's motives, goals, and mental states. We hypothesized that highly paranoid people who are acutely sensitive to other people's purposes and intentions in the social domain would also be prone to perceiving purpose and intention in life events, and would therefore find the concept of fate both intuitive and compelling (H3).

Next, participants completed the abridged 28-item Autism-Spectrum Quotient-Short (AQ-Short; Hoekstra et al., 2011), a self-report measure of autistic traits. Items on this scale assess personal habits and preferences that are characteristic of individuals with autism, including poor social skills, a desire for routine, difficulty in switching between tasks, and impaired imagination. Because autism is characterized by deficits in theory of mind reasoning, we expected that higher levels of autistic traits would be

associated with lesser intuitive belief in intention and purpose in life events (see also Bering, 2002, 2011; Heywood, 2010), and therefore lower rates of belief in fate (H3). We also expected that people reporting high levels of autistic traits would be more likely to hold non-agentic, as opposed to agentic, representations of fate (H4).

2.2.4. Demographic and religiosity information

Finally, participants provided basic demographic information, including details about their religious beliefs and practices, level of educational attainment, and race. So that we could classify participants as either God-believers or God-non-believers, participants indicated their agreement with the statement, "I believe in God," using a 1–7 response scale anchored at (1) "strongly disagree" and (7) "strongly agree". Participants who gave a rating between 1 and 3 ("strongly disagree," "disagree," or "somewhat disagree") reported various degrees of non-belief in God, and are henceforth referred to as "God-non-believers". Those who gave a rating between 5 and 7 ("somewhat agree," "agree," or "strongly agree") reported various degrees of belief in God, and are henceforth referred to as "God-believers". Participants who gave a rating of 4 ("neither agree nor disagree") were agnostic concerning belief in God and were not included in either the "God-believers" or the "God-non-believers" group.

2.3. Results

2.3.1. Belief in God

Participants included 46 God-believers, 35 God-non-believers, and 19 agnostics, $M = 4.27$, $SD = 2.31$. Women ($M = 4.74$, $SD = 2.23$) believed in God more strongly than men ($M = 3.54$, $SD = 2.27$), $t(98) = 2.61$, $p = .011$, Cohen's $d = .53$.

2.3.2. Teleological beliefs among God-believers and God-non-believers

2.3.2.1. Belief in fate. Belief in fate was assessed using a five point scale with which participants could indicate that they believed in fate (1) "not at all," (2) "a little," (3) that they were "neutral" (i.e., they neither endorsed nor denied belief in fate), or that they believed in fate (4) "moderately," or (5) "a lot". Most participants (69.0%) reported believing in fate to some degree—either a little, moderately, or a lot (overall $M = 2.65$, $SD = 1.23$). The remaining participants were either neutral (12.0%), or else they explicitly denied belief in fate (19.0%).

Because we were interested both in whether a belief in God is a prerequisite for belief in fate (H1) and also whether theism moderates teleological belief (H2), we analyzed participants' responses separately for God-believers and God-non-believers. As predicted, God-believers ($M = 3.26$, $SD = 1.10$) believed in fate more strongly than did God-non-believers ($M = 1.94$, $SD = 1.03$), $t(79) = 5.48$, $p < .001$, Cohen's $d = 1.23$. Among God-believers, 84.8% reported some degree of belief in fate, 13.0% reported they were neutral, and 2.2% denied belief in fate. Among God-non-believers, a smaller majority, 54.3%, also reported some degree of belief in fate, while 5.7% were neutral, and 40.0% denied

³ We also asked participants to judge whether a hypothetical non-believer in fate would be more or less happy, moral, and nice than the average person. We were interested in these questions for reasons that are unrelated to the topic of this paper, and we therefore do not discuss them further here.

Table 1

Belief in agentic fate questions.

1. I believe there is a force in the universe, often called fate, that is generally fair and tends to lead to good acts being rewarded and bad acts being punished.
2. I believe there is a force in the universe, often called fate, that is kind and generally serves my best interests.
3. I believe there is a force in the universe, often called fate, that guides event outcomes in order to teach me important life lessons that I need to learn.

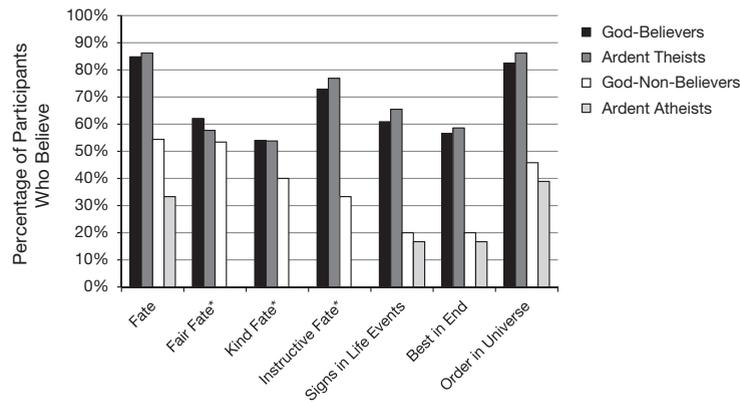


Fig. 1. Teleological beliefs among God-believers and God-non-believers. *Note.* *Bars represent fate-believers only. No values are presented for ardent atheists' belief in fair, kind, and instructive fate due to very small sample size.

belief in fate. Thus, we found support for both H1 and H2. These results are presented in Fig. 1.

2.3.2.2. Agentic vs. non-agentic fate representations. Next, we examined whether participants who believed in fate held an agentic or non-agentic view of fate (H4; Fig. 1). Thirty-six participants who denied belief in fate were excluded from these analyses. Fate-non-believers were those participants who either responded “not at all” on the initial question assessing the strength of one’s belief in fate or else indicated “I don’t believe in fate” on the trichotomous view of fate question (agentic vs. non-agentic vs. non-existent).

Among God-believers ($N = 37$), more participants thought that fate is determined by some sort of being (59.5%) than that it is a fact about the universe (40.5%). Of those God-believers who thought that that fate is determined by a being, all but one identified that being as “God,” “a higher power,” or “the Creator”. In contrast, most God-non-believers ($N = 15$) thought that fate is simply a fact about the universe (93.3%), rather than something determined by some sort of being (6.7%). The one God-non-believer who reported that fate is determined by a being did not identify God as the relevant being, but rather provided a somewhat vague, underspecified response: “I don’t have a name. Just something bigger than myself”.

We also analyzed participants’ beliefs that fate is fair, kind, and instructive, again excluding those participants who did not believe in fate. Among God-believers, most agreed to some degree—reporting either “somewhat agree,” “agree,” or “strongly agree”—that fate is generally fair ($M = 4.68$, $SD = 1.42$, 62.1% agreed), kind ($M = 4.46$, $SD = 1.52$, 54.0% agreed), and instructive ($M = 4.97$, $SD = 1.65$, 72.9% agreed). Relatively fewer God-non-believers

agreed that fate is fair ($M = 4.20$, $SD = 1.21$, 53.4% agreed), kind ($M = 3.27$, $SD = 1.79$, 40.0% agreed), and instructive ($M = 3.53$, $SD = 1.55$, 33.3% agreed). However, the difference between God-believers and God-non-believers was statistically significant only for belief in kind fate, $t(50) = 2.43$, $p = .019$, Cohen’s $d = .69$, and belief in instructive fate, $t(50) = 2.89$, $p = .006$, Cohen’s $d = .82$.

It is unsurprising that participants who equate fate with God would imbue fate with agentic qualities, so we were particularly interested in whether participants who held a non-agentic view of fate (i.e., those who believed that fate is simply a fact about the universe) would also attribute fairness, kindness, and instructiveness to fate. Indeed, even among these participants, God-believers ($N = 15$) often agreed that fate is fair ($M = 4.53$, $SD = 1.55$, 66.7% agreed), kind ($M = 4.13$, $SD = 1.64$, 46.7% agreed), and instructive ($M = 4.40$, $SD = 1.96$, 60.0% agreed). Relatively fewer God-non-believers ($N = 14$) agreed that fate is fair ($M = 4.14$, $SD = 1.23$, 50.0% agreed), kind ($M = 3.14$, $SD = 1.79$, 35.7% agreed), and instructive ($M = 3.57$, $SD = 1.60$, 35.7% agreed). However, the differences between God-believers and God-non-believers did not approach statistical significance, all $ps \geq .13$. Thus, many God-believers, and somewhat fewer God-non-believers, represented fate as a type of agentic being (supporting H4).

2.3.2.3. General teleological beliefs about life events. Next, we examined participants’ broader teleological beliefs about life events to determine whether non-religious participants sometimes held such beliefs (H1), and also whether theistic belief increased this tendency (H2) (Fig. 1). A majority of God-believers agreed that they sometimes see signs in significant life events ($M = 4.80$, $SD = 1.49$; 60.9% agreed), that “everything works out for the best in

the end” ($M = 4.65, SD = 1.46; 56.6\%$ agreed), and that there is “order in the universe” ($M = 5.50, SD = 1.17, 82.5\%$ agreed). Relatively fewer God-non-believers agreed that that they sometimes see signs in significant life events ($M = 3.06, SD = 1.45; 20.0\%$ agreed), that “everything works out for the best in the end” ($M = 2.86, SD = 1.50, 20.0\%$ agreed), and that there is “order in the universe” ($M = 4.11, SD = 1.59, 45.8\%$ agreed). The difference between God-believers and God-non-believers was statistically significant for all three teleological beliefs (signs in life events: $t(79) = 5.29, p < .001, \text{Cohen's } d = 1.19$; “best in end”: $t(79) = 5.41, p < .001, \text{Cohen's } d = 1.22$; “order in the universe”: $t(79) = 4.53, p < .001, \text{Cohen's } d = 1.02$). Thus, we found some evidence of these teleological beliefs among a minority of non-religious participants (weakly supporting H1), but this tendency was indeed greater among God-believers (supporting H2).

2.3.3. Teleological beliefs among “ardent theists” and “ardent atheists”

Evidence of teleological views among participants who scored on the extreme low end of the belief in God scale would provide stronger support for the hypothesis that such beliefs persist across the full range of theistic belief—even among individuals who unwaveringly reject belief in God (H1). Therefore, as the most stringent test of this hypothesis, we examined teleological beliefs among participants who gave a rating of 1 on the belief in God scale (“ardent atheists,” $N = 18$) and compared them to beliefs held by participants who gave a rating of 7 on the scale (“ardent theists,” $N = 29$). We expected that while teleological views would be evident among ardent atheists (H1), they would be stronger among ardent theists since belief in God is likely to reinforce and augment core teleological intuitions (H2).

2.3.3.1. Belief in fate. Ardent theists ($M = 3.31, SD = 1.17$) believed in fate significantly more strongly than did ardent atheists ($M = 1.44, SD = .62, t(44.12) = 7.15, p < .001, \text{Cohen's } d = 2.15$). Levene's test indicated unequal variances ($F = 14.92, p < .001$), so degrees of freedom were adjusted from 45 to 44.12. Among ardent theists, 86.2% reported some degree of belief in fate, 10.3% were neutral, and 3.4% denied belief in fate. Among ardent atheists, 33.3% reported some degree of belief in fate, 5.6% were neutral, and 61.1% denied belief in fate. Results are presented in Fig. 1.

Importantly, ardent atheists' belief in fate was significantly above floor (the lowest possible rating of 1 (“not at all”) on the 1–5 belief in fate scale), $t(17) = 3.06, p = .007$. Thus, consistent with our prediction (H1), even those individuals who denied a belief in God in the strongest possible terms nonetheless reported believing in fate at a rate significantly greater than zero.

Among ardent theists who believed in fate ($N = 26$), most agreed that fate is generally fair ($M = 4.53, SD = 1.48, 57.7\%$ agreed), kind ($M = 4.50, SD = 1.53, 53.8\%$ agreed), and instructive ($M = 5.08, SD = 1.65, 76.9\%$ agreed). It was not possible to examine these same agentic fate attributions among just those ardent atheists who believed in fate (i.e., excluding those who either responded “not at

all” on the initial question assessing the strength of one's belief in fate or else indicated “I don't believe in fate” on the trichotomous view of fate question) due to very small sample size. Therefore, we do not compare ardent atheists to ardent theists on these particular attributions.

2.3.3.2. General teleological beliefs about life events. A majority of ardent theists agreed that they sometimes see signs in significant life events ($M = 5.07, SD = 1.46, 65.5\%$ agreed), that “everything works out for the best in the end” ($M = 4.72, SD = 1.49, 58.6\%$ agreed), and that there is “order in the universe” ($M = 5.69, SD = 1.20, 86.2\%$ agreed). Relatively fewer ardent atheists agreed that that they sometimes see signs in significant life events ($M = 2.39, SD = 1.33, 16.7\%$ agreed), that “everything works out for the best in the end” ($M = 2.78, SD = 1.56, 16.7\%$ agreed), and that there is “order in the universe” ($M = 3.72, SD = 1.74, 38.9\%$ agreed). The difference between ardent theists and ardent atheists was statically significant for all three teleological beliefs (signs in life events: $t(45) = 6.31, p < .001, \text{Cohen's } d = 1.88$; “best in end”: $t(45) = 4.29, p < .001, \text{Cohen's } d = 1.28$; “order in the universe”: $t(45) = 4.59, p < .001, \text{Cohen's } d = 1.37$). Results are presented in Fig. 1.

Once again, supporting H1, ardent atheists' general teleological beliefs were significantly above floor (the lowest possible rating of 1 (“strongly disagree”) on the 1–7 teleological belief scales) (signs in life events: $t(17) = 4.42, p < .001$; “best in the end”: $t(17) = 4.85, p < .001$; “order in the universe”: $t(17) = 6.63, p < .001$). Thus, again consistent with our prediction (H1), even those individuals who denied a belief in God in the strongest possible terms nonetheless reported holding these general teleological beliefs at a rate significantly greater than zero.

In sum, rates of teleological belief in Study 1 were approximately equivalent between God-believers and ardent theists. Ardent atheists believed in fate less than God-non-believers did, but apart from this, rates of teleological thinking across these two groups were also approximately equivalent. Importantly, as expected, ardent atheists sometimes held teleological beliefs and they did so at levels significantly above floor (supporting H1)—but ardent theists held these same teleological beliefs to a greater degree (supporting H2).

2.3.4. Religious, cognitive, and demographic predictors of teleological beliefs

Utilizing our full dataset, we conducted ordinal regressions to test whether participants' religious beliefs, mentalizing tendencies, and demographic traits predicted their fate beliefs across the full range of responses on these measures. We included the following predictors in these analyses: belief in God, scores on the Paranoia Scale and the AQ-Short, sex, age, and education. A multinomial logistic regression was conducted to test whether these same variables also predicted participants' tendency to represent fate either agentially (i.e., as a type of being), non-agentially (i.e., as simply a fact about the universe), or as altogether non-existent.

We also examined whether participants' religious beliefs, mentalizing tendencies, and demographic traits

predicted their broader teleological views about life events. To do so, we first analyzed responses to the three questions assessing participants' tendency to (1) perceive signs in significant life events, (2) believe that "everything works out for the best in the end," and (3) believe that there is "order in the universe". A principal components factor analysis revealed that responses to these questions ($\alpha = .81$) loaded onto a single "general teleological belief" factor (eigenvalue = 2.18) that accounted for 72.5% of the variance in responses. We performed a linear regression to test whether the same set of predictor variables described above also predicted participants' scores on this factor. Doing so was preferable to testing the effects of the predictor variables on each teleological belief question separately, as our approach reduced the overall number of regressions run. The results of the regression analyses are reported in [Table 2](#) and are discussed below.

We focus on interpreting the results of the regression analyses, rather than gross bi-variate correlations among our variables of interest, because several of the hypothesized relationships among these variables are detectable only once we statistically control for the effects of relevant secondary variables. However, we report the Spearman's rank-order correlations among participants' teleological beliefs, belief in God, mentalizing measures, and demographic traits in the [Supplemental materials \(Table S1\)](#).⁴

2.3.4.1. Belief in God. As expected, belief in God was a significant predictor of participants' tendency to believe in fate, to attribute agentic attributes to fate (i.e., to believe that fate is fair, kind, and instructive), and to hold teleological views about life events more broadly (the "general teleological belief" factor). In addition, stronger belief in God predicted a higher likelihood of representing fate as a type of being rather than as a fact about the universe or as non-existent (supporting H4). Stronger belief in God also predicted a higher likelihood of representing fate as a fact about the universe rather than as non-existent. These results provide support for the hypothesis that teleological beliefs about significant life events are moderated by belief in God (H2).

2.3.4.2. Paranoia. Participants' responses to the Paranoia Scale items ($\alpha = .89$) were summed to compute an overall paranoia score with a possible range of 20–100, and with

⁴ We note here that these correlations sometimes revealed surprising associations between our variables of interest. For example, an observed positive correlation between participants' scores on the Paranoia Scale and the AQ-Short ($r(98) = 0.27$) is somewhat surprising given that we expected paranoia to reflect hypermentalizing and autism to reflect deficient mentalizing. In theory, scores on these two measures should therefore be negatively correlated. However, it is possible that the observed positive correlation between these variables reflects shared social deficits that are likely to characterize both highly paranoid and also highly autistic individuals. Importantly, these shared social deficits do not reflect mentalizing ability, per se, but rather individuals' competence in successfully navigating social interactions. Indeed, both the Paranoia Scale and the AQ-Short contained multiple items that directly assess social functioning (e.g., Paranoia Scale: "It is safer to trust no one" and "I tend to be on my guard with people who are somewhat more friendly than I expected."; AQ-Short: "I find it hard to make new friends" and "I prefer to do things with others rather than on my own".)

higher scores indicating greater levels of paranoid thought, $M = 45.16$, $SD = 13.21$. As expected, greater paranoia was a significant predictor of participants' belief in fate. This result is consistent with the hypothesis that individual differences in mentalizing tendencies predict differences in teleological beliefs about significant life events (H3). However, paranoia did not predict participants' belief that fate is kind or instructive, nor their broader teleological views about life events.

2.3.4.3. Autism-spectrum quotient-short. Participants' responses to the AQ-Short items ($\alpha = .83$) were summed to compute an overall AQ-Short score with a possible range of 28–112, and with higher scores indicating possession of more autistic traits, $M = 65.59$, $SD = 10.32$. Contrary to our predictions (H3, H4), participants' AQ-Short scores did not predict their belief in fate, their belief that fate is fair, kind or instructive, nor their general teleological beliefs about life events. Nonetheless, consistent with H4, participants' AQ-Short scores did predict a different measure of participants' tendency to represent fate agentially vs. non-agentially. Specifically, greater endorsement of autistic traits predicted a lower likelihood of conceptualizing fate as a type of being, and a relatively higher likelihood of believing instead that fate is either a fact about the universe or that fate does not exist. AQ scores did not predict differences in participants' tendency to believe that fate is a fact about the universe vs. to believe that fate is non-existent.

2.3.4.4. Sex, age, and education. There were no consistent effects of sex, age, or education on participants' fate beliefs or on their general teleological views of life events. There was only one trending effect of sex on participant's fate beliefs, whereby women ($M = 3.98$, $SD = 1.92$) were somewhat more likely than men ($M = 3.05$, $SD = 1.89$) to believe that fate is instructive, $b = -0.69$, $SE = 0.39$, $p = .078$.

2.4. Discussion

A considerable majority of both God-believers and a slim majority of God-non-believers in Study 1 reported believing in fate. This suggests both that the propensity to see life events as "meant to be" occurs even in the absence of explicitly held theistic views (supporting H1), and that a belief in God increases this tendency (supporting H2) (see also [Heywood, 2010](#); [Heywood & Bering, 2013](#); [Norenzayan & Lee, 2010](#); [Willard & Norenzayan, 2013](#)). This first finding is consistent with the view that belief in fate recruits cognitive support from a general bias to infer intention and purpose in the world, while this second finding suggests that divergent cultural beliefs (e.g., theism vs. atheism) may enhance or suppress the underlying cognitive intuition that life events happen for a reason.

Many God-believers and somewhat fewer God-non-believers also explicitly imbued fate with agentic attributes, agreeing that fate is fair, kind, and instructive (supporting H4). This was true even among those participants who held a non-agentic view of fate (i.e., those who reported that fate is not God, but rather simply a fact about the universe). Thus, even many non-religious people

Table 2

Study 1 unstandardized coefficients from regression analyses of predictors of teleological reasoning.

Predictor	Belief in fate ^a	"Fair" fate ^a	"Kind" fate ^a	"Instructive" fate ^a	General teleological belief ^b	Fate: "being" vs. non-existent ^c	Fate: "being" vs. "fact" ^c	Fate: "fact" vs. non-existent ^c
Belief in God	0.50 (0.10)***	0.34 (0.09)***	0.40 (0.09)***	0.45 (0.09)***	0.24 (0.04)***	1.28 (0.28)***	1.02 (0.27)***	0.26 (0.13)*
Paranoia	0.04 (0.02)*	0.03 (0.02)*	0.00 (0.02)	0.01 (0.02)	0.00 (0.01)	0.04 (0.03)	0.04 (0.03)	0.00 (0.02)
AQ-Short	-0.02 (0.02)	-0.02 (0.02)	-0.01 (0.02)	-0.02 (0.02)	-0.01 (0.01)	-0.10 (0.04)*	-0.10 (0.04)*	0.00 (0.03)
Sex	-0.64 (0.41)	-0.19 (0.38)	-0.51 (0.39)	-0.69† (0.39)	-0.10 (0.18)	-0.21 (0.80)	-0.07 (0.73)	-0.15 (0.52)
Age	0.00 (0.02)	0.01 (0.02)	0.00 (0.02)	-0.01 (0.02)	0.00 (0.01)	0.02 (0.03)	-0.01 (0.03)	0.02 (0.02)
Education	-0.12 (0.19)	-0.05 (0.18)	0.03 (0.18)	0.01 (0.18)	0.07 (0.09)	0.33 (0.37)	0.38 (0.34)	-0.05 (0.25)

Note. Standard errors are given in parentheses.

^a Ordinal regression.

^b Linear regression.

^c Multinomial logistic regression (second category is the reference category).

† $p \leq .10$.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

(between 33% and 53%), most of whom claimed that fate is just a fact about the universe, nonetheless personified fate as a type of goal-directed intentional force—a plainly teleological view. As noted above, we suspect that the inclination to personify fate may be a consequence of early-emerging tendencies to link perceptions of order in the environment to intentional, agentic causes (Newman et al., 2010). If people view fate as the source of the non-random design that they detect in significant life events, then they may intuitively imbue fate with intentional agentic qualities, including benevolence, fairness, and instructiveness. Participants' tendency to personify fate in Study 1 is analogous to the frequent (misconceived) personification of natural selection as a benevolent, progressive, intentional force (Greene, 1990; Shtulman, 2006). That is, the personification of fate and the personification of natural selection may both occur because these forces are seen as sources of complex order and design in the natural world (see Barrett, 2012 for a similar point). We also find, however, that many participants in Study 1 (around 27% of God-believers and 47% of God-non-believers) do not explicitly conceive of fate as having the properties of an intentional agent.

Study 1 also explored whether individual differences in mentalizing tendencies predict people's fate beliefs (H3). As expected, participants' paranoia predicted their tendency to believe in fate. Paranoia is characterized by unwarranted overattribution of mental states to other people. Individuals with paranoid tendencies are prone to inferring that others have malicious motives, to perceiving conspiracies against them, and to feeling as though they are constantly being watched and evaluated. Study 1's results suggest that a tendency to hyperactively perceive purposes and intentions at play in the social environment may also bias individuals to detect intentions and purpose behind life events. It may be that a belief in fate serves as a useful explanatory device for making sense of the intentionality and purpose that paranoid people regularly perceive in the world.

Contrary to our expectations, participants' AQ-Short scores did not predict whether or not they believed in fate, nor did they predict their tendency to imbue fate with

fairness, kindness, and instructiveness. They did, however, predict a more subtle difference in whether participants represented fate as an agent or as a non-agent (supporting H4). Specifically, participants who reported having more autistic traits were more likely to endorse a non-agentic view of fate—seeing fate as similar to a natural law of physics, such as gravity—, or else to deny the existence of fate altogether, than they were to represent fate as a type of intentional being. These findings suggest that some people may intuitively represent fate agentially and that, as with a belief in God (Norenzayan et al., 2012), doing so may recruit theory of mind capacities. Deficits in theory of mind may therefore encourage viewing fate as a non-agentic force in the universe.

Such a finding meshes well with Bering's (2002) proposal that mentalizing deficits may encourage a non-agentic view of God. Bering argues that individuals with autism are likely to be uninterested in "spiritual matters" (p. 16), but when they do believe in God, they tend to believe in a type of impersonal, non-agentic God who lacks the kind of mental life typical of ordinary agents. For these individuals, God is less a rich psychological being with goals and emotions, and more an abstract principle or force that organizes the cosmos (Bering, 2002).⁵ The notion that the social-cognitive deficits that are characteristic of autism serve to inhibit mind perception, and therefore drive non-agentic representations of fate and God, is also consistent with the recent empirical finding that greater possession of autistic traits is associated with reduced ascriptions of agency to human adults (Gray, Jenkins, Heberlein, & Wegner, 2011).

Note, however, that while participants' paranoia and AQ-Short scores predicted certain beliefs about fate, neither measure of mentalizing ability predicted their more general teleological views about life events, as measured

⁵ As an example of how individuals with autism make sense of God, Bering (2002, p. 200) cites the scientist and activist Temple Grandin: "In nature, particles are entangled with millions of other particles, all interacting with each other. One could speculate that entanglement of these particles could cause a kind of consciousness for the universe. This is my current concept of God".

in three questions assessing the tendency to see signs in significant life events, to believe that “everything works out for the best in the end”, and that there is “order in the universe”. One possible explanation for this lack of relationship is that these statements were vaguely worded and open to various interpretations. For example, one interpretation of this statement is “I believe life events happen *in order* to send me a sign”—a teleological belief. However, participants may also have interpreted it to mean something like, “I often extract signs from significant life events,” for example, by analyzing an event’s significance for my life after it has occurred. This ambiguity in meaning may have introduced noise into participants’ responses and is resolved in Study 2. The latter two questions were also somewhat vague and could possibly have been interpreted as supernatural claims about non-human agency and order operating in the universe, or else as natural claims about human agency and physical order (e.g., physical laws) that structure the world. This ambiguity makes it somewhat difficult to draw firm conclusions from the results of these particular questions.

In sum, Study 1 found support for some of our hypotheses. Specifically, we found that that one common form of teleological belief, a belief in fate, is not dependent on belief in God (H1). We found as well that it is predicted, to some extent, by individual differences in mentalizing ability (H3). Moreover, many individuals appear to construe fate as a type of intentional being (though more God-believers than God-non-believers do so), and this tendency is predicted to some extent by underlying mentalizing tendencies (H4). These results support the hypothesis that teleological reasoning about life events is not solely the consequence of culturally transmitted religious views, but rather reflects a general cognitive bias to perceive purpose in the social and natural worlds. At the same time, individuals’ tendency to outwardly express teleological views about the causes of life events appears to be moderated, at least in part, by their explicit religious beliefs (H2).

One limitation of Study 1, however, was that it explored only participants’ abstract self-reported beliefs about fate, without examining when people actually engage in teleological reasoning when making sense of their own personal life experiences. Study 2 therefore expanded on Study 1’s findings by asking whether religiosity and mentalizing predict individuals’ tendency to reason teleologically, not only in the abstract, but also in the context of specific autobiographical life events.

3. Study 2

3.1. Overview

Beyond simply endorsing a belief in fate, do both God-believers and God-non-believers actively engage in teleological reasoning about their own personal experiences? And does the tendency to do so depend on an individual’s propensity to infer purposes and intentions in the social domain? To address these questions, we employed a more naturalistic methodology in Study 2 by asking participants to discuss a significant past autobiographical life event and

to judge the likelihood that various natural and purposeful supernatural factors (e.g., God or fate) caused that event to occur.

Using a similar method, [Heywood and Bering \(2013\)](#) found that theists were more likely than atheists to use teleological language when discussing both a past “learning experience” and “a low point” in their life during a semi-structured interview. Atheists were also more likely than theists to give “anti-teleological” responses by explicitly denying that a past life experience happened for a reason. Nonetheless, a majority of atheists either occasionally used teleological language to explain their life event or else expressed feeling conflicted between their teleological beliefs and their desire to provide only rational, naturalistic explanations of their life experiences. Given such findings, and also the results from Study 1, we expected that both God-believers and God-non-believers in Study 2 might reason teleologically about their own past life event (H1), but that God-believers would be more likely to do so (H2) (see also [Heywood, 2010](#)).

Study 2 extends earlier findings by examining a broad range of predictors of participants’ teleological beliefs, including characteristics of the events themselves, individuals’ demographic traits, and of primary interest, their mentalizing tendencies. In a study similar to [Heywood and Bering’s \(2013\)](#) described above, [Heywood \(2010\)](#) found that individuals who had a clinical diagnosis of Asperger’s syndrome—a disorder characterized by deficits in social-cognitive reasoning (e.g., mentalizing)—generally engaged in less teleological reasoning about their life experiences than did either neurotypical theists or atheists.⁶ Our study builds on this finding by using a diverse sample of the general population that is likely to exhibit broader variation in mentalizing. We predicted that superior mentalizers would be most likely to perceive design and purpose in their own personal experiences, and therefore, to attribute them to purposeful supernatural causes (H3). To test our predictions, we measured participants’ mentalizing ability using the Paranoia Scale from Study 1 as well as the Empathy Quotient, a measure of a person’s ability to decipher and respond to other people’s mental states ([Wakabayashi et al., 2006](#)).

Study 2 also extended previous research by systematically examining a range of event characteristics that may encourage teleological inferences of design and purpose in participants’ everyday reasoning about their own life experiences. Asking participants to report on these characteristics allowed us to investigate whether certain types of events are especially likely to elicit attributions to

⁶ [Heywood \(2010\)](#) found that individuals with Asperger’s syndrome provided significantly fewer teleological explanations of their life events compared to theists, and also compared to atheists, although this latter comparison did not reach statistical significance. Nonetheless, atheists were more likely than those with Asperger’s syndrome to provide “anti-teleological” explanations that explicitly denied the possibility that their life events happened for a reason. [Heywood \(2010\)](#) explained this result by proposing that individuals with Asperger’s generally avoid teleological thinking of any sort—whether confirming or actively denying that their life events happen for a reason. Thus, overall, individuals with Asperger’s syndrome tend to engage in less teleological reasoning than either neurotypical theists or atheists.

purposeful supernatural causes such as God and fate. Past research has primarily examined the effects of event valence, significance, and unexpectedness on supernatural attributions, and has typically done so in the context of fictional, experimenter-constructed vignettes (e.g., DeRidder, Hendricks, Zani, Pepitone, & Saffiotti, 1999; Gray & Wegner, 2010; Lupfer et al., 1992, 1994, 1996; Pepitone & Saffiotti, 1997; Spilka & Schmidt, 1983; Woolley et al., 2011; but see Heywood, 2010; Heywood & Bering, 2013; Stephens et al., 2013 for exceptions to this approach and Spilka, Shaver, & Kirkpatrick, 1985 for further discussion). In general, these studies have found that events that are highly positive, significant, and surprising are most likely to elicit attributions to God, perhaps because such events are especially suggestive of non-random, benevolent design (but see Gray & Wegner, 2010 for a discussion of why negative events may preferentially elicit God attributions). In Study 2, we examined whether these same event characteristics, and others, would similarly be associated with teleological reasoning in the context of individuals' own personal life experiences.

3.2. Material and methods

3.2.1. Participants

Participants were 100 adults (68 women; *M* age = 39.2) residing in the United States and recruited through the research survey website Amazon Mechanical Turk. Twelve participants who did not follow the life event writing instructions (see below) were excluded and replaced. Participants varied in their level of educational attainment: 3% did not complete high school, 10% completed high school, 33% completed some college, 31% had a Bachelor's degree, 12% completed some graduate school, 7% had a Master's degree, and 4% had a Ph.D. Race information was not collected for Study 2. Participants received \$1.00 as compensation for completing the study, in accordance with standard online payment norms.

3.2.2. Life event analysis

Participants were first instructed to write about the most significant past life event that had happened to them in the past five years and then to discuss why they believe that event occurred. They were required to write a minimum of six sentences. Participants who did not follow these instructions were excluded and replaced. Participants then rated the likelihood that several natural and supernatural factors caused the event to occur, using a 1–7 response scale anchored at (1) “very unlikely” and (7) “very likely”. These factors were: God, fate, good/bad luck, random chance, yourself, and other people. Participants were told that these factors were not mutually exclusive, and that they could indicate that multiple factors caused their event. They also selected which one of these potential causes best explained why their event occurred.

Next, participants rated their agreement with several statements assessing their teleological beliefs about their life event. These included, “I believe this event was meant to be,” “I believe this event happened for a reason,” and “I believe this event happened to send me a message”. Unlike in Study 1, this third statement probing participants'

perception of signs embedded in life events was phrased to encourage a teleological interpretation. Participants responded using a 1–7 response scale anchored at (1) “strongly disagree” and (7) “strongly agree”. We expected that both God-believers and God-non-believers would sometimes reason teleologically about their own life event (H1), but that the tendency to do so would be greater among God-non-believers (H2).

Finally, participants provided additional information about their life event, including their perception of how likely the event was to occur, how significant they felt the event was in the context of their life as a whole, the event's valence, how much the event affected them emotionally, and how much time they spent thinking about the event.

3.2.3. General teleological beliefs

In addition to probing participants' teleological beliefs about a specific past autobiographical life event, we also examined their tendency to reason teleologically about life events in general, so as to replicate and extend the results of Study 1. Consequently, we asked participants to rate their agreement with the following statements: (1) “I sometimes see signs and messages embedded in life events,” (2) “I believe in fate: that significant life events are predestined to occur”, and (3) “I believe that in the long-run, good things will happen to good people and bad things will happen to bad people” (i.e., a belief in karma). Participants responded using a 1–7 response scale anchored at (1) “strongly disagree” and (7) “strongly agree”. Once again, we expected to find evidence of these general teleological beliefs among both God-believers and God-non-believers (H1), but that God-believers would endorse them to a greater degree (H2).

3.2.4. Mentalizing ability

Participants completed the same Paranoia Scale used in Study 1 as a measure of hyperactive mentalizing. They also completed the abridged 22-item Empathy Quotient (Wakabayashi et al., 2006), a different test of mentalizing ability that measures an individual's ability to discern other people's feelings and also feel concern for them. We included both measures of mentalizing ability for two reasons. First, we sought to replicate Study 1's finding that paranoia predicts teleological reasoning about life events. Second, we included the Empathy Quotient because it captures a slightly different aspect of mentalizing ability than the Paranoia Scale. Specifically, paranoia reflects “hypermentalizing”—the tendency to make unwarranted, superfluous inferences about purpose and intention in the social environment. The Empathy Quotient, on the other hand, is more sensitive to peoples' accuracy in deciphering others' mental states and also their motivation to respond to them appropriately. Substituting the AQ-Short scale from Study 1 with the Empathy Quotient scale allowed us to conceptually replicate Study 1's finding that mentalizing ability predicts teleological beliefs, using a slightly different measure of mentalizing (the same one used by Norenzayan et al., 2012 and by Willard & Norenzayan, 2013 in their studies of the relationship among mentalizing ability, belief in God, and other supernatural beliefs). We did not also

include the AQ-Short in Study 2 as a third measure of mentalizing ability because doing so would have made the study unduly long. We predicted that participants who scored high on both the Paranoia Scale and the Empathy Quotient would be most likely to perceive design and purpose in their own life experiences (H3).

3.2.5. Religiosity and demographic information

Finally, participants provided basic demographic information, including details about their religious beliefs and practices and level of educational attainment. They answered the same belief in God question from Study 1, for the purpose of categorizing God-believers and God-non-believers.

3.3. Results

3.3.1. Belief in God

Participants included 64 God-believers, 25 God-non-believers, and 11 agnostics, $M = 5.00$, $SD = 2.37$. Unlike in Study 1, women ($M = 5.10$, $SD = 2.25$) and men ($M = 4.78$, $SD = 2.63$) did not differ in their belief in God, $p = .53$.

3.3.2. Teleological beliefs among God-believers and God-non-believers

3.3.2.1. Life event analyses. Participants discussed a wide variety of life events including graduations, the birth of children, falling in love, marriage, career changes, the death of loved ones, abuse, and illness. Most events, 63.0%, were described as positive; 32.0% were negative; and 5.0% were neutrally valenced. Some of the participants spontaneously attributed their event to God or to fate or else used teleological or intentional language—defined by reference to intended purpose or design—in their initial open-ended description of their event. Sample excerpts are presented in [Table 3](#).

We analyzed participants' ratings of the likelihood that various natural and supernatural factors caused their life event. We compared God-believers to God-non-believers in order to test the hypothesis that some non-religious participants would show evidence of teleological beliefs (H1), but that God-believers would do so to a greater degree (H2). We found strong support for H2, but only weak support for H1; God-believers were indeed more like God-non-believers to endorse teleological, supernatural explanations of their life event, and only a minority of God-non-believers did so. Specifically, 43% of all participants attributed their event to fate, including 53.1% of God-believers ($M = 3.95$, $SD = 2.11$) and 24.0% of God-non-believers ($M = 2.64$, $SD = 1.91$). In addition, 40.0% of participants attributed their event to God, including 59.4% of God-believers ($M = 4.72$, $SD = 2.23$) and, unsurprisingly, none of the God-non-believers ($M = 1.16$, $SD = .47$). Across all participants, the single best explanation of their life event's cause was rated as follows: you (35.0%), other people (20.0%), God (21.0%), fate (13.0%), random chance (7.0%), and good/bad luck (4.0%). Both God-believers (15.6%) and God-non-believers (4.0%) sometimes selected fate as the best explanation of their life event's cause, but only God-believers (32.8%) selected God as the best explanation.

Forty-nine percent of all participants, including 59.4% of God-believers and 24.0% of God-non-believers, attributed their event simultaneously to at least one supernatural cause (God or fate) as well as at least one natural cause (e.g., themselves, other people, random chance)⁷ when rating the likelihood of their event's various potential causes. Some participants also explicitly distinguished between their event's proximal (natural) and its distal (supernatural) cause on the open-ended writing task. For example, discussing the birth of her daughter, one participant wrote,

“I think that this event occurred because it was the will of God that she be born. I believe that everything that happens, happens because it is the will of God. The way this happens also involves cause and effect relationships in a worldly sense. In that worldly sense, the birth of my daughter happened because my husband and I procreated, I carried the baby for the pregnancy, and then I went into labor. The C-section occurred because of the complications.”

One surprising finding was that all but one of the participants who attributed their event to God or to fate engaged in active “benefit-finding” (Kray et al., 2010), regardless of whether the initial event was positive or negative. In other words, they identified positive downstream consequences of the event, even when the initial event itself was highly negative. For example, one participant who was at first unhappy that her son decided that he wanted to be home-schooled wrote, “At the time, it was like God or fate had intervened, making him chose the option I found least desirable. As I researched, joined groups, and found curriculum, I encountered many positive things about being homeschooled, I realize now that God or fate intervened for the right reasons”.

3.3.3. Teleological beliefs among “ardent theists” and “ardent atheists”

As in Study 1, we also examined evidence of teleological views among participants who scored on the extremes of the belief in God scale as the most stringent test of the hypothesis that such beliefs persist even among deeply non-religious individuals (H1). To do so, we restricted analyses to participants who gave a rating of 1 on the belief in God scale (“ardent atheists,” $N = 19$) and compared them to beliefs held by participants who gave a rating of 7 on the scale (“ardent theists,” $N = 45$). Once again, we expected to find evidence of teleological reasoning among ardent atheists (H1). At the same time, we predicted that teleological reasoning would be stronger among ardent theists, for whom belief in God is likely to reinforce and augment core teleological intuitions (H2).

The overall pattern of results was unchanged when we analyzed the data in this way. Rates of teleological reasoning were approximately equivalent between God-believers and ardent theists and also between God-non-believers and ardent atheists. Specifically, 55.6% of ardent theists

⁷ We did not include “good/bad luck” as a natural cause in this analysis due to ambiguity over whether to classify luck as either a natural or supernatural force. However, classifying luck as either a natural or a supernatural cause does not substantially alter the pattern of results.

($M = 4.00$, $SD = 2.14$) and 21.1% of ardent atheists ($M = 2.63$, $SD = 1.98$) attributed their life event to fate. Importantly, ardent atheists' average fate attribution were significantly above floor (the lowest possible rating of 1 "strongly disagree" on the 1–7 scale assessing participants' belief that fate caused their life event to occur), $t(18) = 3.60$, $p = .002$. Thus, consistent with our prediction (H1), even those individuals who denied a belief in God in the strongest possible terms sometimes reasoned teleologically, and they did so at levels significantly above floor—but ardent theists did so to a greater degree (supporting H2).

In addition, 64.4% of ardent theists ($M = 4.84$, $SD = 2.29$), but no ardent atheists ($M = 1.00$, $SD = 0.00$), attributed their life event to God. Both ardent theists (11.1%) and ardent atheists (5.3%) sometimes selected fate as the best explanation of their life event's cause, but only God-believers (37.8%) selected God as the best explanation. Further, both ardent theists (66.7%) and ardent atheists (21.1%) sometimes attributed their event simultaneously to at least one supernatural cause (God or fate) as well as at least one natural cause (e.g., themselves, other people, random chance) when rating the likelihood of their event's various potential causes.

3.3.4. Correlations among event characteristics and teleological attributions

Using Spearman's rank-order correlations, we analyzed whether particular life event characteristics were correlated with participants' tendency to attribute that event to teleological supernatural causes (i.e., God and fate). God attributions were significantly correlated with participants' perceived likelihood of the life event occurring, $r(98) = .24$, $p = .015$, with event significance, $r(98) = .28$, $p = .004$, and also with positive event valence, $r(98) = .26$, $p = .011$. However, God attributions were not correlated with event emotionality or with time spent thinking about the event. Fate attributions were correlated only with event significance, $r(98) = .21$, $p = .035$, and not with any of the other event characteristics. A full correlation matrix reporting the correlations among each of the measured life event characteristics and participants' attributions to God and to fate is presented in the [Supplemental materials \(Table S2\)](#).

3.3.5. Cognitive and demographic predictors of teleological beliefs

Finally, utilizing our full dataset, we conducted ordinal regressions to test whether participants' religious beliefs, mentalizing tendencies, and demographic traits predicted their tendency to attribute their life event to fate or to God. We included the following predictors in these analyses: belief in God, scores on the Paranoia Scale and the Empathy Quotient, sex, age, and education.

We also examined whether these same predictor variables predicted participants' teleological beliefs specifically about their own life event and also their tendency to hold teleological views of life events in general. To do so, we first analyzed responses to the three questions assessing participants' belief that their life event was "meant to be," "happened for a reason," and "happened to send a message". A principal components factor analysis revealed

that responses to these questions ($\alpha = .84$) loaded onto a single "event-specific teleological belief" factor (eigenvalue = 2.30) that accounted for 76.7% of the variance in responses. We therefore conducted a linear regression to test the influence of the full set of predictor variables on participants' scores on this factor. We did not combine responses to the three questions probing participants' broader non-event-specific teleological beliefs (i.e., their general belief in fate, karma, and that signs or messages are embedded in significant life events), because these questions did not form a reliable scale ($\alpha = .67$). Instead, we conducted separate ordinal regressions to examine whether participants' religious beliefs, mentalizing tendencies, and demographic traits predicted each of these general teleological beliefs. The results of the regression analyses are presented in [Table 4](#) and are discussed below.

As in Study 1, we focus on interpreting the results of the regression analyses, rather than the gross bi-variate correlations among our variables of interest, because several of the hypothesized relationships among these variables are detectable only once we statistically control for the effects of relevant secondary variables. However, we report the Spearman's rank-order correlations among participants' teleological beliefs, belief in God, mentalizing measures, and demographic traits in the [Supplemental materials \(Table S3\)](#).⁸

3.3.5.1. Belief in God. As expected, belief in God significantly predicted all of the measures of participants' teleological reasoning about their own life event and also their general teleological beliefs: attribution of the life event to fate and to God, general teleological beliefs about the life event, the general tendency to see signs and messages in life events, and the general belief in fate and in karma. These results support the hypothesis (H2) that belief in God moderates teleological belief, with stronger

⁸ We note that, as in Study 1, these correlations sometimes revealed surprising associations between our variables of interest. For example, an observed negative correlation between participants' scores on the Paranoia Scale and the Empathy Quotient ($r(98) = -0.32$) may initially seem surprising given that we expected higher scores on both measures to reflect more active mentalizing. We might have predicted, therefore, that these scores would be positively correlated. However, we suspect that the reason for the observed negative correlation is the following: highly paranoid individuals who are deeply distrusting of others are likely to suffer social deficits. Highly empathetic individuals, on the other hand, are likely to be fairly successful in navigating social relationships, due both to their skill in deciphering others' cognitive and emotional states and also their motivation to respond to them. This would explain a negative correlation between these two measures. Indeed, both the Paranoia Scale and the Empathy Quotient contain items that directly assess social functioning (e.g., Paranoia scale: "It is safer to trust no one" and "I tend to be on my guard with people who are somewhat more friendly than I expected."; Empathy Quotient: "I really enjoy caring for other people" and "I find it hard to know what to do in a social situation." (reverse coded)). This point is consistent with the discussion in the Study 1,⁴ which noted that a positive correlation between participants' scores on the Paranoia Scale and the AQ-Short was likely due to shared social deficits characteristic of both highly paranoid and also highly autistic individuals. The observed relationships among these three measures of mentalizing ability (the Paranoia Scale, AQ-Short, and Empathy Quotient) may therefore reflect not only individuals' mind-reading capacities, but also positive or negative consequences for social functioning.

Table 3

Sample teleological and intentional event descriptions.

1. "In the long run, I think the initial event of the fire occurred by fate in order for me to have the precious time with my dad and to already have my mom settled down in a new location where I can continue with her care and make her feel secure."
2. "I think this occurred as a way for the universe to show me that no matter what I thought my mission in life was, I was meant to be a person who lived my life for others and strives to make everything around me a little better and more kind and loving."
3. "I think I had that experience, that horrendous marriage . . . to make me stronger. It is the only reason I can think of. I think that Luna came into my life to save me. I KNOW she did. She was my reason to live. I met her so I would find a will to live."
4. "I definitely think that the universe set up for me to be fired so that I could truly make a difference in the lives of my children and others around me."
5. "I truly believe god brought us together at just the right time."

Table 4

Study 2 unstandardized coefficients from regression analyses of predictors of teleological reasoning.

Predictor	Teleological beliefs (event)			Teleological beliefs (general)		
	Fate attribution ^a	God attribution ^a	Teleological belief factor ^b	See signs/messages in events ^a	Belief in fate ^a	Belief in karma ^a
Belief in God	0.27 (0.09)**	0.90 (0.14)***	0.17 (0.04)**	0.55 (0.10)***	0.25 (0.09)**	0.29 (0.09)***
Paranoia	0.05 (0.02)**	0.02 (0.02)	0.02 (0.01) [†]	0.07 (0.02)***	0.04 (0.02)**	0.01 (0.01)
Empathy Quotient	0.04 (0.02) [†]	0.03 (0.02)	0.01 (0.01)	0.07 (0.02)**	0.04 (0.02) [†]	0.02 (0.02)
Sex	-0.65 (0.41)	0.17 (0.45)	0.01 (0.21)	-0.37 (0.41)	-0.77 (0.41) [†]	1.17 (0.41)**
Age	-0.04 (0.02) [†]	-0.04 (0.02) [†]	-0.01 (0.01)	0.00 (0.02)	-0.02 (0.02)	-0.01 (0.02)
Education	-0.45 (0.16)**	0.01 (0.16)	-0.05 (0.07)	0.03 (0.15)	-0.47 (0.15)**	-0.30 (0.15) [†]

Note. Standard errors are given in parentheses.

^a Ordinal regression.

^b Linear regression.

[†] $p \leq .10$.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

theistic belief associated with greater teleological reasoning.

3.3.5.2. Paranoia. Participants' responses to the Paranoia Scale items ($\alpha = .91$) were summed to compute an overall paranoia score, $M = 47.23$, $SD = 14.59$. Greater paranoia was a significant predictor of all but two of the measures of participants' teleological reasoning about their own life event and also their general teleological beliefs: attribution of the life event to fate, general teleological beliefs about the life event, the general tendency to see signs and messages in life events, and the general belief in fate. Paranoia did not predict participants' attribution of the life event to God nor their belief in karma. In general, these results support, for the most part, the hypothesis (H3) that individual differences in mentalizing predict differences in individuals' teleological beliefs, with hyperactive mentalizing associated with greater teleological reasoning.

3.3.5.3. Empathy Quotient. Participants' responses to each item on the Empathy Quotient (EQ) ($\alpha = .92$) were scored as follows: 2 points for definitely agreeing with an empathetic response, 1 point for slightly agreeing, and 0 points for slightly or definitely disagreeing. Six items were reversed coded. Participants' scores were then summed to compute an overall EQ score with a possible range of 0–44, and with higher scores indicating greater empathy and superior mentalizing ability, $M = 24.16$, $SD = 9.50$. Higher

EQ scores were a significant predictor of several measures of participants' teleological reasoning about their own life event and also their general teleological beliefs: attribution of the life event to fate, the general tendency to see signs and messages in life events, and, marginally, the general belief in fate ($p = .067$). However, participants' EQ scores did not predict attribution of the life event to God, general teleological beliefs about the life event, or the belief in karma. These results offer some support for the hypothesis (H3) that mentalizing ability predicts individual differences in teleological reasoning about significant life events.

3.3.5.4. Sex, age, and education. Sex did not predict participants' teleological reasoning about the specific life event they discussed. However, it did predict participants' more general teleological beliefs. Men ($M = 3.91$, $SD = 1.94$) were marginally less likely than women ($M = 4.10$, $SD = 1.80$) to believe in fate, $b = -0.77$, $SE = 0.41$, $p = .061$. Men ($M = 4.88$, $SD = 1.70$) were also significantly more likely than women ($M = 3.59$, $SD = 1.90$) to believe in karma, $b = 1.17$, $SE = 0.41$, $p = .004$.

Age did not predict participants' general teleological beliefs about life events. However, younger participants were significantly more likely than older participants to attribute their specific life event to fate, $b = -0.04$, $SE = 0.02$, $p = .024$, and to God, $b = -0.04$, $SE = 0.02$, $p = .038$.

Finally, educational attainment predicted several measures of teleological reasoning. Compared to participants

with lower educational attainment, more educated participants were less likely to believe in fate, $b = -0.47$, $SE = 0.15$, $p = .002$, to attribute their life event to fate, $b = -0.45$, $SE = 0.16$, $p = .004$, and to believe in karma, $b = -0.30$, $SE = 0.15$, $p = .041$.

3.4. Discussion

A majority of God-believers and a minority of God-non-believers reasoned teleologically about a past autobiographical life event, either by attributing the event to God or to fate or by acknowledging that the event happened for a reason, was “meant to be,” or happened to send them a message. Questions assessing the belief that one’s life event “happened for a reason” and was “meant to be” are inherently vague, and could possibly have been interpreted as referring either to supernatural teleological purpose (e.g., God’s will) or simply to natural purpose (e.g., a person intentionally caused the event). Nonetheless, combined with responses to other unambiguous measures of teleological reasoning—such as the belief that one’s life event was caused by fate and that it happened in order to send a message—Study 2 finds that even God-non-believers sometimes infer purpose and design in life events, providing weak support for H1. Also consistent with Study 1, we find that God-believers are more likely than God-non-believers to have an explicit belief in fate, consistent with H2.

Furthermore, in line with recent findings that people commonly use both natural and supernatural explanatory frameworks to explain the same event (Legare & Gelman, 2008; Legare & Visala, 2011; Legare et al., 2012; Lupfer et al., 1992, 1994, 1996; Weeks & Lupfer, 2000; Woolley et al., 2011), participants in Study 2 often reported believing that God or fate was responsible for their life event in addition to at least one natural cause (e.g., themselves, other people, random chance). This result confirms that natural and supernatural explanations of personal life experiences need not conflict with one another, but rather, often co-exist.

Study 2 also examined whether particular event characteristics are associated with the tendency to infer purpose in life events. We found that event significance was correlated with participants’ tendency to attribute their life event to fate and to God. This finding is consistent with previous research suggesting that individuals are especially likely to attribute important, life-altering outcomes to supernatural causes (e.g., Lupfer et al., 1996; Pepitone & Saffiotti, 1997; Spilka & Schmidt, 1983).

No other event characteristics assessed in Study 2 were related to participants’ fate attributions. However, both positive event valence and perceived event probability were also correlated with participants’ God attributions. Previous studies that have examined explanatory reasoning about artificial vignettes have found that people are more likely to attribute positive events to God than negative events (Lupfer et al., 1992, 1994, 1996; Spilka & Schmidt, 1983; Woolley et al., 2011). We replicated this finding of a positivity bias in individuals’ God attributions, but this time in the context of reasoning about their own autobiographical life events. We suspect that this positivity

bias is a consequence of a pervasive cultural emphasis on God’s benevolence, which makes people quick to attribute positive events to God but hesitant to blame him for negative ones (see Woolley et al., 2011 for a similar point).

Surprisingly, there was no relationship between event valence and fate. Participants were equally likely to invoke fate to explain events that they described as positive and those they described as negative. This may be because popular cultural conceptions of fate do not emphasize benevolence to nearly the same degree as for God. However, nearly all participants who spontaneously attributed either positive or negative events to fate engaged in benefit-finding (Kray et al., 2010); they identified positive downstream consequences of the event, even for highly negative events. To put it differently, people tended to construe virtually all of the events as being, at least to some extent, positive. This result appears to be consistent with Study 1’s finding that many people believe that fate is a fair, kind, and instructive force. It might be, then, that people tend to explain all significant events—negative and positive—in terms of fate, but once they do so, their belief in the nature of fate, causes them to view the events as at least partially positive.

The finding that greater perceived event probability was correlated with God attributions was also somewhat surprising in light of previous research suggesting that *unexpected* events, in particular, initiate searches for external intentional explanations (Morewedge, 2009; Subbotsky, 2001; but see Bohner, Bless, Schwarz, & Strack, 1988). However, it is possible that we obtained this result because our participants often discussed positive life events that they expected to occur—such as graduations, planned pregnancies, and earned job promotions.

Finally, as predicted, two measures of mentalizing ability, the Paranoia Scale and the Empathy Quotient, independently predicted several measures of participants’ teleological reasoning about a specific past life event and also in general (supporting H3). The more paranoid participants were, the more likely they were to attribute their life event to fate and to reason teleologically about that event (i.e., to believe that it happened for a reason, was meant to be, and occurred in order to send them a message). More paranoid participants were also more likely, in general, to see signs and messages in life events and to believe in fate. Participants with higher EQ scores were also more likely to attribute their life event to fate, and in general, to see signs and messages in life event and (marginally) to believe in fate. Overall, paranoia was a better predictor of participants’ teleological beliefs than EQ scores, but both measures of mentalizing ability predicted multiple measures of teleological reasoning, providing additional evidence that mentalizing ability moderates individuals’ tendency to infer purpose and design in life events.

Interestingly, paranoia and EQ scores accounted for non-overlapping proportions of the variance in participants’ teleological reasoning. One possible explanation for this result is that the Paranoia Scale and the Empathy Quotient measure slightly different aspects of mentalizing ability—hypersensitivity to purpose and intention on the one hand, and motivation to respond to the purpose and intention that people detect in their environment on the other hand. Future research should investigate in greater

detail how distinct facets of mentalizing ability independently contribute to teleological beliefs about life events.

In sum, Study 2 builds upon Study 1 by providing additional evidence that people occasionally infer design and purpose in their own autobiographical life events both in the presence and absence of theistic beliefs (supporting H1), although belief in God increases the tendency to do so (supporting H2). Furthermore, this tendency is moderated by the extent to which they perceive and respond to intentions and purpose in the social world (supporting H3). These findings support the view that sensitivity to purpose in the social domain may make people similarly sensitive to purpose in the non-social domain. In Study 3, we further explored this hypothesis that an individual's cognitive orientation to purpose may influence their teleological explanatory reasoning across distinct domains.

4. Study 3

4.1. Overview

Previous research has found that people often perceive design and purpose in nature, for example, in the form of creationist beliefs about species origins (Bloom & Weisberg, 2007; Evans, 2000, 2001), but that individuals differ in the extent to which they do so (e.g., Casler & Kelemen, 2008; Kelemen, Rottman, & Seston, 2013). It is possible that the perception of purpose in nature and in life events are not unrelated psychological phenomena, but rather, that they share a common cognitive source: a domain-general orientation to purpose and intention. We therefore hypothesized that people who are prone to perceive purpose in the one domain would be similarly prone to perceive purpose in the other, even independent of their other explicit supernatural beliefs (H5). To test this prediction, Study 3 examined whether people's unwarranted teleological inferences about purpose in natural phenomena are systematically related to their inferences about purpose in life events.

Both the logic of this study and its methods overlap considerably with those of Svedholm et al. (2010). Testing Finnish subjects, Svedholm et al. (2010) investigated the relationship between certain fallacies in psychological, biological, and physical reasoning, the possession of paranormal beliefs, and the belief in purpose in life events. They found that confusions of core knowledge in these domains (i.e., mistakenly attributing psychological properties to non-psychological entities, biological properties to non-biological entities, or physical properties to non-physical entities) predicted individuals' belief in paranormal phenomena as well as their belief in purposeful life events. For example, participants who believed in the literal truth of statements such as "old furniture knows things about the past," "an evil thought is contaminated," or "an unstable human mind is disintegrating," were especially likely to hold paranormal beliefs and to perceive purpose in fictional life events. Based on these findings, Svedholm et al. (2010) concluded that the perception of purpose in life events is a type of supernatural thinking that results from drawing faulty analogies from intuitive psychology, biology, and physics.

Study 3 presented an opportunity to corroborate these findings using a different participant population and also different testing materials. Our method differed from that of Svedholm et al. (2010) in certain other important regards. First, whereas Svedholm et al. (2010) broadly examined the relationship between core knowledge confusions of psychology, biology, and physics and the belief in purpose in life events using diverse and varied stimuli, our focus was exclusively on the hypothesized relationship between perceptions of purpose in nature and in life events. Accordingly, we examined participants' beliefs about purpose in nature by measuring their agreement with scientifically unwarranted teleological statements about biological and non-biological natural processes and entities (e.g., the earth has an ozone layer to protect it from UV light; Kelemen & Rosset, 2009). Unlike many of Svedholm et al. (2010)'s stimuli (e.g., some stones are benevolent), the statements we used had no overt supernatural characteristics, but instead appeared to be potentially reasonable naturalistic explanations of natural phenomena. This allowed us to test whether a potential correlation between participants' teleological beliefs about nature and life events truly reflects a domain-general cognitive orientation to purpose, and not simply a general appetite for supernatural ideas.

Second, like Svedholm et al. (2010), we also measured participants' belief in paranormal phenomena in order to test whether individuals' teleological beliefs about nature and life events are correlated with their paranormal beliefs. However, unlike Svedholm et al. (2010), we measured only paranormal beliefs that are unlikely to engage theory of mind reasoning. For example, while Svedholm et al. (2010) measured participants' belief in immortal souls, God, precognition, and mind-reading, we did not. We excluded items like these from our paranormal belief scale to avoid the possibility that potential correlations among participants' paranormal beliefs and their teleological beliefs about nature and life events might simply reflect shared recruitment of cognitive systems dedicated for reasoning about purpose and intention (i.e., theory of mind), rather than a general affinity for supernatural ideas.

Study 3 also shares similarities with a recent study by Willard and Norenzayan (2013). In their study, the researchers investigated whether several distinct cognitive biases (e.g., mind-body dualism, teleological intuitions, and anthropomorphism) increase individuals' likelihood of believing in God, in paranormal phenomena, and in deeper purpose in life (see the general Introduction above for additional discussion of this study). They found that participants' teleological beliefs about nature⁹ predicted their tendency to hold each of these supernatural beliefs. For example, teleological reasoning about nature was found to predict individuals' belief in life's purpose, above and beyond the influence of belief in God (but theistic belief

⁹ Like us, Willard and Norenzayan (2013) assessed participants' teleological reasoning about nature using items from Kelemen and Rosset (2009). Specifically, they measured participants' acceptance of a series of scientifically unwarranted explanations of various natural entities and processes. We describe these items in greater detail in the Study 3 methods section below.

was found to be a much stronger predictor). However, these were weak effects; not all of the paths in their path model linking teleological reasoning to supernatural beliefs were significant (although all were necessary for the overall model fit). Moreover, their measure of belief in life's purpose consisted of three questions that had not been previously validated as a reliable individual differences measure. For these reasons, Willard and Norenzayan (2013) caution that, "no hard conclusions can be made on the role of teleology other than that our measure does appear to be capturing at least some of the variance in religious and paranormal belief" (pp. 388–389).

Given this, Study 3 offers an opportunity to conceptually replicate their finding of a relationship between teleological reasoning about nature and about life events, using a different measure of teleological belief in the latter domain. Specifically, we assessed individuals' teleological reasoning about life events using a series of fictional life events intended to evoke the perception of embedded purpose or design. We measured participants' willingness to attribute these events to fate. This approach has previously been shown to successfully elicit meaningful individual and group differences in teleological fate beliefs and the perception that life events are "meant to be" (e.g., Norenzayan & Lee, 2010).

Finally, while Willard and Norenzayan (2013) were primarily interested in whether a suite of cognitive biases—including teleological thought—predicts individuals' tendency to hold certain supernatural beliefs, our focus in Study 3 was somewhat different. Specifically, we were interested in whether individuals' teleological beliefs about nature and life events are systematically related to each other, even after controlling for the influence of their other explicit supernatural beliefs (i.e., belief in God and paranormal belief). Evidence of such a relationship would suggest that a domain-general cognitive sensitivity to purpose in the environment—and not just people's culturally acquired supernatural beliefs—may drive a teleological view of various aspects of the natural world.

4.2. Materials and methods

4.2.1. Participants

Participants were 100 adults (45 women; *M* age = 31.6 years) residing in the United States and recruited through the research survey website Amazon Mechanical Turk. All participants successfully passed two check attention questions, so no participants were excluded. Participants varied in their level of educational attainment: 2% did not

complete high school, 22% completed high school, 42% completed some college, 26% had a Bachelor's degree, and 8% had a Master's degree. Participants identified themselves as White/Caucasian (84%), Black/African-American (5%), Asian (6%), Middle Eastern/North African (1%), American Indian/Alaska Native (1%), or "Other" (3%). They received 60 cents as compensation for completing the study, in accordance with standard online payment norms.

4.2.2. Teleological reasoning about nature

Participants first completed a questionnaire assessing their endorsement of unwarranted teleological explanations of natural phenomena. Items in this questionnaire were a sample selected from Kelemen and Rosset (2009; Table 1)'s study of individuals' acceptance of teleological explanations of nature. The questionnaire included 24 trials that described either correct or incorrect explanations for a variety of social, psychological, and biological phenomena. Following Kelemen and Rosset (2009), participants were instructed to judge whether the explanation provided on each trial was "good" (correct) or "bad" (incorrect).

Participants received 12 test trials, each of which described a subtle scientifically unwarranted ("bad") teleological explanation for either a biological or non-biological natural phenomenon. For example, these included, "The sun makes light so that plants can photosynthesize" and "Water condenses to moisten the air". In addition, participants received 12 filler control trials, also from Kelemen and Rosset (2009), which included a mix of unambiguously correct and incorrect explanations for various psychological, biological, and physical phenomena. A subset of these control explanations were teleological (i.e., purpose-based) in nature. Control trials included, for example, "Zebras have black stripes because they eat coal" and "Teapots whistle to signal the water is boiling". Test trials and control trials were presented in random order.

4.2.3. Teleological reasoning about life events

Next, participants read six fictional scenarios describing significant life events intended to evoke the perception of embedded purpose or design (Table 5). Half of the events were positively valenced and the other half were negatively valenced. For each vignette, participants were instructed to imagine themselves experiencing the event described, and then to indicate the extent to which they believed fate was responsible for causing the event, using a 1–7 response scale anchored at (1) "strongly disagree" and (7) "strongly agree".

Table 5

Study 3 sample life event scenarios.

-
1. "Imagine that you are planning on traveling across the country for a very important business meeting. On the morning of your trip, you accidentally sleep through your alarm clock and miss your flight. Later that day, you learn that the plane you were scheduled to be on crashed just after take-off and left no survivors."
 2. "Imagine that you have a vivid dream that your investments in the stock market are at risk because the market is about to collapse. The next morning, you decide to take all of your money out of the stock market. That evening, the market crashes, but all of your life savings are safe in your bank account."
 3. "Imagine that for several years you have driven to work every day. One morning, your car battery dies and you are forced to take the bus to work. While on the bus, you strike up a conversation with the person sitting next to you. You discover that this person has the same mother as you, and that you are long-lost siblings, separated at birth."
-

4.2.4. Paranormal belief scale

Participants also completed a 9-item paranormal belief scale. Scale items were a subset selected from the 26-item Revised Paranormal Belief Scale (Tobacyk, 2004), a self-report measure of belief in paranormal phenomena. We selected nine paranormal beliefs from the full scale that were least likely to engage theory of mind reasoning. Items in the 9-item scale included, for example, “The abominable Snowman of Tibet exists” and “The number 13 is unlucky”. Participants were asked to rate their agreement with each paranormal belief, using a 1–7 response scale anchored at (1) “strongly disagree” and (7) “strongly agree”.

4.2.5. Religiosity and demographic information

Finally, participants provided basic demographic information, including details about their religious beliefs and practices, level of educational attainment, and race. They answered the same belief in God question from Studies 1 and 2, for the purpose of categorizing God-believers and God-non-believers.

4.3. Results

4.3.1. Belief in God

Participants included 48 God-believers, 44 God-non-believers, and 8 agnostics, $M = 4.06$, $SD = 2.44$. Women ($M = 4.71$, $SD = 2.39$) believed in God significantly more strongly than men ($M = 3.53$, $SD = 2.36$), $t(98) = 2.48$, $p = .015$, Cohen's $d = .50$.

4.3.2. Paranormal belief

Participants' responses to each item on the paranormal belief scale ($\alpha = .83$) were summed to compute an overall measure of paranormal belief,¹⁰ with possible scores ranging from 9 to 63, and with higher scores indicating greater paranormal belief, $M = 22.19$, $SD = 9.76$. God-believers ($M = 27.00$, $SD = 8.36$) had significantly higher paranormal belief scores than did God-non-believers, ($M = 17.23$, $SD = 8.78$), $t(90) = 5.47$, $p < .001$, Cohen's $d = 1.15$.

4.3.3. Teleological reasoning among God-believers and God-non-believers

4.3.3.1. *Teleological reasoning about nature.* Participants' responses to the test trials on the nature questionnaire were assigned a score of 0 if they correctly rejected an unwarranted teleological explanation of a natural phenomenon and a score of 1 if they accepted it. Scores for all twelve test trials were then summed to compute an overall teleological reasoning score with a possible range of 0–12, and with higher scores indicating more teleological beliefs about nature, $M = 8.32$, $SD = 2.54$. God-believers ($M = 8.92$, $SD = 2.32$) had significantly higher teleological

reasoning scores than did God-non-believers ($M = 7.77$, $SD = 2.62$), $t(90) = 2.22$, $p = .029$, Cohen's $d = .47$.

For control trials, participants' responses were assigned a score of 0 for every correct judgment (i.e., when they accepted unambiguously good explanations or rejected unambiguously bad ones) and a score of 1 for every incorrect judgment. Scores for all twelve control trials were then summed to compute an overall measure of judgment error with a possible range of 0–12, and with higher scores indicating greater error, $M = .77$, $SD = 1.22$. There were very few errors on control trials, and these did not distinguish between God-believers ($M = .60$, $SD = 1.09$) and God-non-believers ($M = .86$, $SD = 1.34$), $p = .31$.

4.3.3.2. *Teleological reasoning about life events.* On average, God-believers ($M = 4.23$, $SD = 1.62$) attributed the fictional life events to fate significantly more than did God-non-believers ($M = 2.40$, $SD = 1.54$), $t(90) = 5.52$, $p < .001$, Cohen's $d = 1.16$. God-believers' average fate attribution scores, which had a possible range of 1–7, fell between 3.31 ($SD = 1.89$) and 5.25 ($SD = 1.92$) for the six life events. God-non-believers' average fate attribution scores ranged from 1.98 ($SD = 1.34$) to 3.02 ($SD = 2.22$) across the six events. Most God-believers (75.0%) and fewer God-non-believers (31.8%) attributed at least one of the life events to fate—indicating that they either “agree,” “somewhat agree,” or “strongly agree” that fate was responsible. The percentage of God-believers who attributed the fictional life events to fate ranged from 29.2% to 75.0% across the six events. The percentage of God-non-believers who attributed the life events to fate ranged from 6.8% to 31.8% across the six events. Thus, we again found weak support for the hypothesis that God-non-believers individuals sometimes hold teleological views of significant life events (H1), but the tendency to do so is relatively greater among God-believers (supporting H2).

4.3.4. Teleological beliefs among “ardent theists” and “ardent atheists”

As in Studies 1 and 2, we again examined evidence of teleological views only among participants who scored on the extremes of the belief in God scale as the most stringent test of the hypothesis that such beliefs persist across the full range of theistic belief—even among deeply non-religious individuals (H1). We restricted analyses to participants who gave a rating of 1 on the belief in God scale (“ardent atheists,” $N = 26$) and compared them to beliefs held by participants who gave a rating of 7 on the scale (“ardent theists,” $N = 27$). We expected that while ardent atheists would sometimes make teleological fate attributions, ardent theists would do so to a greater extent (H2). The overall pattern of results was unchanged when we analyzed the data in this way. Rates of teleological reasoning (about both nature and life events) were approximately equivalent between God-believers and ardent theists and also between God-non-believers and ardent atheists.

4.3.4.1. *Teleological reasoning about nature.* There was a trend for ardent theists ($M = 8.93$, $SD = 2.37$) to have higher scores on the teleological reasoning about nature task than ardent atheists ($M = 7.62$, $SD = 2.73$), $t(51) = 1.87$, $p = .067$,

¹⁰ We included an item measuring participants' belief in psychokinesis (the movement of objects through psychic powers) in our paranormal belief scale because we initially conceptualized this as a violation of intuitive physics rather than a violation of intuitive psychology. However, since reasoning about psychokinesis could conceivably involve representing mental states, we also performed analyses excluding this item from the paranormal belief scale. Doing so did not alter the pattern of results.

Cohen's $d = .52$. Error on control trials on this task did not distinguish between ardent theists ($M = .74$, $SD = 1.35$) and ardent atheists ($M = .88$, $SD = 1.28$), $p = .69$.

4.3.4.2. Teleological reasoning about life events. On average, ardent theists ($M = 4.61$, $SD = 1.75$) attributed the fictional life events to fate significantly more than ardent atheists ($M = 2.25$, $SD = 1.59$), $t(51) = 5.13$, $p < .001$, Cohen's $d = 1.44$. Ardent theists' average fate attribution scores, which had a possible range of 1–7, fell between 3.59 ($SD = 2.02$) and 5.56 ($SD = 1.97$) for the six life events. Ardent atheists' average fate attribution scores ranged from 1.77 ($SD = 1.42$) to 2.85 ($SD = 2.33$) across the six events.

Importantly, ardent atheists attributed the fictional events to fate significantly above floor (the lowest possible rating of 1 (“strongly disagree”) on the 1–7 scale assessing participants' belief that fate caused the life events to occur), $t(25) = 4.02$, $p < .001$. Thus, once again consistent with our prediction (H1), even those individuals who denied a belief in God in the strongest possible terms sometimes made teleological attributions of life events to fate, and they did so at levels significantly above floor—but ardent theists did so to a greater degree (supporting H2).

In addition, a majority of ardent theists (76.9%) and fewer ardent atheists (31.6%) attributed at least one of the life events to fate—indicating that they either “agree,” “somewhat agree,” or “strongly agree” that fate was responsible. The percentage of ardent theists who attributed the fictional life events to fate ranged from 44.4% to 77.8% across the six events. The percentage of ardent atheists who attributed the life events to fate ranged from 7.7% to 34.6% across the six events.

4.3.5. Correlations among participants' religious beliefs, paranormal beliefs, demographic traits, and teleological beliefs

Table 6 presents the bi-variate Spearman's rank-order correlations among participants' belief in God, paranormal beliefs, demographic traits, and their teleological beliefs about both nature and life events. We predicted that individuals' teleological beliefs about nature and about life events would be correlated because both types of beliefs are driven in part by the same broad, underlying cognitive

orientation to purpose in the environment—our hypothesis H5. As initial support for this hypothesis, participants' endorsement of unwarranted teleological explanations of natural phenomena was significantly correlated with their average attribution of the fictional life events to fate, $r(98) = .28$, $p = .006$. Both measures of teleological reasoning were also significantly correlated with participants' belief in God and their paranormal beliefs (see Table 6).

However, we were primarily interested in the pure relationship between participants' teleological beliefs about nature and about life events, controlling for the effects of these other supernatural beliefs as well as participants' demographic traits. We therefore turn our focus next to interpreting the results of the regression analyses, which tested precisely this relationship.

4.3.6. Cognitive and demographic predictors of teleological beliefs

Utilizing our full dataset, we conducted linear regressions to further investigate whether participants' endorsement of the unwarranted teleological explanations of nature was related to their tendency to attribute the fictional life events to fate. In these regressions, we controlled for participants' religious beliefs, paranormal beliefs, and demographic traits. We did not expect that teleological beliefs in one domain (e.g., nature) would necessarily drive teleological beliefs in the other domain (e.g., life events). In other words, although we expected teleological beliefs in both domains to be related, this was a non-directional prediction. We therefore ran two separate linear regression models. In the first model, endorsement of teleological explanations of nature was the predictor variable and average fate attribution was the dependent variable. This was reversed in the second model. In both regression models, we also included the following additional predictors: belief in God, scores on the Paranormal Belief Scale, sex, age, and education. The results of the regression analyses are presented in Table 7 and are discussed below.

4.3.6.1. Teleological beliefs about nature and life events. Neither regression model found a statistically significant relationship between participants' endorsements of teleological explanations of nature and their average fate attribution when considering the full set of predictor variables. Thus, we failed to find support for the hypothesis

Table 6
Study 3 correlations among participants' religious beliefs, paranormal beliefs, teleological beliefs, and demographic traits.

	Belief in God	Paranormal belief	Teleological reasoning – nature	Average fate attribution	Sex	Age	Education
Belief in God	–						
Paranormal belief	0.53 ^{***}	–					
Teleological reasoning – nature	0.18 [†]	0.26 ^{**}	–				
Average fate attribution	0.54 ^{***}	0.54 ^{***}	0.28 ^{**}	–			
Sex	–0.25 [†]	–0.36 ^{***}	–0.10	–0.40 ^{***}	–		
Age	0.20 [†]	0.21 [*]	0.04	0.02	–0.09	–	
Education	–0.05	–0.08	–0.10	–0.23 [*]	0.11	0.06	–

[†] $p \leq .10$.

^{*} $p \leq .05$.

^{**} $p \leq .01$.

^{***} $p \leq .001$.

Table 7

Study 3 unstandardized coefficients from regression analyses of predictors of teleological reasoning.

Predictor	Model 1 Average fate attribution	Model 2 Teleological reasoning-nature
Teleological reasoning-nature	0.07 (0.06)	n/a
Average fate attribution	n/a	0.24 (0.19)
Belief in God	0.25 (0.07)***	0.04 (0.13)
Paranormal belief	0.05 (0.02)*	0.04 (0.03)
Sex	−0.84 (0.30)**	0.15 (0.56)
Age	−0.02 (0.01)	0.01 (0.02)
Education	−0.27 (0.15)†	−0.23 (0.28)

Note. Standard errors are given in parentheses. Model 1: dependent variable = average fate attribution; Model 2: dependent variable = teleological reasoning about nature.

† $p \leq .10$.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

(H5) that a domain-general cognitive orientation to purpose drives teleological beliefs across distinct domains, independent of individuals' explicit religious and paranormal beliefs.

4.3.6.2. Belief in God. Belief in God was a significant predictor of participants' average fate attribution (Model 1). This result supports the hypothesis (H2) that belief in God moderates teleological reasoning about significant life events, with stronger theistic belief associated with stronger teleological views (i.e., fate beliefs). However, belief in God did not predict participants' endorsement of the teleological explanations of nature (Model 2).

4.3.6.3. Paranormal belief. Paranormal belief was a significant predictor of participants' average fate attribution (Model 1), but did not predict their endorsement of the teleological explanations of nature (Model 2).

4.3.6.4. Sex, age, and education. Sex did not predict participants' endorsement of the teleological statements about nature. However, it did predict participants' average fate attribution for the fictional life events. Women ($M = 4.13$, $SD = 1.49$) attributed these events to fate significantly more than did men ($M = 2.65$, $SD = 1.78$), $b = -0.84$, $SE = 0.30$, $p = .006$. There were no statistically significant effects of age or education on either type of teleological belief, although there was a trend for more educated participants to attribute the fictional life events to fate less than did participants with lower educational attainment ($p = .079$).

4.3.7. Mediation analysis

As noted above, although participants' teleological beliefs about nature and about life events were significantly correlated, we were unable to establish any relationship between these beliefs after conducting regressions that statistically controlled for participants' religious and paranormal beliefs and demographic traits. One possible explanation for this discrepancy between the correlational finding and the regression results is that the apparent bi-variate correlation between participants' teleological beliefs about nature and about life events reflects, in fact, one or more other variables that causally affect both. Given that both types of teleological beliefs

were also correlated with belief in God and paranormal belief, we hypothesized that these were the most likely candidates.

To investigate this possibility, we conducted a bootstrapped multiple mediation analysis (Preacher & Hayes, 2008) to test whether the relationship between participants' teleological views of nature and of life events was mediated by belief in God, by paranormal beliefs, or by both. Participants' endorsement of teleological explanations of nature was entered as the independent variable, belief in God and paranormal belief as the mediators, and average fate attribution for the fictional life events as the dependent variable. We also simultaneously controlled for sex, age, and education. The 95% bias corrected confidence interval for the indirect effect through belief in God ranged from .0008 to .10, and for paranormal belief, the bias corrected 95% confidence interval ranged from .003 to .10. As neither range included zero, this analysis suggests that the relationship between teleological beliefs about nature and about life events was significantly mediated by both belief in God and paranormal belief (see Fig. 2). Moreover, belief in God and paranormal belief fully mediated the relationship between teleological beliefs about nature and about life events. The relationship between participants' teleological reasoning about nature and their fate attributions decreased from a total effect of .15, $p = .021$, to a direct effect of .07, $p = .20$, once the mediators were included.

We also conducted a second bootstrapped multiple mediation analysis to test the opposite directional causal pathway; this time, we tested whether average fate attribution significantly predicted participants' teleological beliefs about nature, with belief in God and paranormal belief mediating this relationship. Once again, we also simultaneously controlled for sex, age, and education. In this case, individuals' average fate attribution had a significant effect on both belief in God (.70, $p < .001$) and paranormal belief (2.45, $p < .001$). In addition, there was also a significant total effect of average fate attribution on teleological beliefs about nature (.36, $p = .021$). However, neither mediator was significantly related to teleological reasoning about nature (direct effects: $ps \geq .24$), and thus the indirect effect of fate attributions through either mediator was also not significant (indirect effects: $ps > .05$).

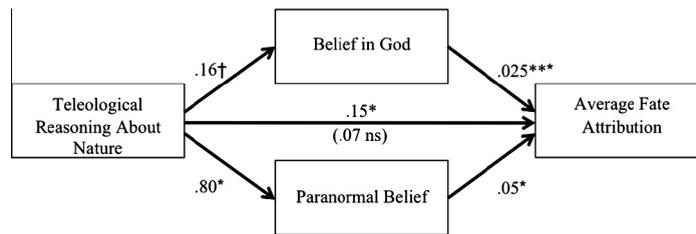


Fig. 2. Study 3 mediation analysis. † $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Thus, although we found a significant predictive relationship between participants' average fate attribution and their teleological beliefs about nature, this relationship did not appear to be mediated by either belief in God or by paranormal belief.

4.4. Discussion

On average, both God-believers and God-non-believers endorsed a majority of the unwarranted teleological explanations of natural phenomena. In addition, both God-believers and God-non-believers sometimes attributed the fictional life events to a teleological cause—fate—(support for H1) although God-non-believers did so more strongly and more often than God-non-believers (support for H2). We suspect that relatively low levels of fate attribution in Study 3 were a consequence of using fictional experimenter-constructed life events, which may appear less realistic and less compelling than genuine autobiographical life events, of the sort explored in Study 2.

Consistent with the results of Svedholm et al. (2010) and Willard and Norenzayan (2013), participants' acceptance of unwarranted teleological explanations of natural phenomena was significantly correlated with their tendency to attribute life events to fate. However, this relationship became non-significant after controlling for participants' belief in God, paranormal belief, and demographic traits. Moreover, belief in God and paranormal belief were found to fully mediate the relationship between teleological beliefs in both domains. Thus, it appears that while individuals who tend to see purpose in nature may also be prone to see purpose embedded in significant life events, this relationship is largely driven by individuals' explicit religious and paranormal beliefs. This proposal is consistent with Willard and Norenzayan's (2013) finding that belief in God is a much more powerful predictor of individuals' belief in life's purpose than is a general cognitive bias to interpret natural phenomena in terms of purpose. In sum, Study 3 failed to find support for the hypothesis (H5) that a wholly independent cognitive orientation to purpose drives teleological beliefs across different domains.

The results of our mediation analyses further clarify the nature of the relationship among participants' teleological, religious, and paranormal beliefs. We found that greater teleological beliefs about nature predicted both stronger belief in God (marginally) and also greater paranormal belief. These religious and paranormal beliefs, in turn, predicted higher average fate attribution for the fictional life events. However, we found no support for the opposite

casual pathway; although participants' fate attributions predicted their religious and paranormal beliefs, these beliefs did not, in turn, predict participants' teleological beliefs about nature.

One hypothesis that is consistent with our findings is that individuals' sensitivity to purpose in nature, specifically, may initially attract them to certain theistic and paranormal ideas that match up with their perception of design in the natural world (e.g., belief in God or in paranormal phenomena like luck, magic, and witchcraft). Once in place, these supernatural beliefs may then further encourage and strengthen teleological views of life events (e.g., a belief in fate) that cohere with a belief in purposeful deities and in paranormal phenomena more generally (see Willard & Norenzayan, 2013; see also Zusne & Jones, 1989 for a related discussion of adults' intercorrelated supernatural beliefs; and see Bressan, 2002 for a relevant discussion of how paranormal belief may promote more frequent experiences of meaningful everyday coincidences). Note that we are not proposing that religious and paranormal beliefs are a necessary prerequisite for holding teleological beliefs about life events; the results of Studies 1 and 2 suggest that this is not the case, at least regarding religious belief in God. Rather, we suspect that religious and paranormal beliefs encourage and reinforce core teleological intuitions, and for that reason, they are likely to be predictive of the strength of one's teleological beliefs about life events.

Interestingly, while belief in God and paranormal belief predicted participants' fate attributions, they did not predict their endorsement of the unwarranted teleological explanations of nature. This is, perhaps, unsurprising given that the teleological explanations of nature that participants judged in Study 3 lacked any overt supernatural characteristics. Rather, they appeared to be potentially reasonable naturalistic explanations of natural phenomena. For this reason, they presented an extremely subtle test of scientifically unwarranted teleological reasoning. In fact, even scientifically educated adults who had completed multiple college-level science courses frequently endorsed these unwarranted teleological explanations in Kelemen and Rosset (2009)'s original experiment. Thus, it is unlikely that explicit theistic or paranormal beliefs—or even a more general attraction to supernatural ideas—drove teleological beliefs about nature in Study 3. Instead, it may be that variation in a general underlying cognitive sensitivity to purpose in the natural world can explain individual differences in participants' acceptance of the teleological explanations of nature. Alternatively, it may be these differences were driven primarily by variation in participants'

skepticism and distaste for non-scientific, non-naturalistic explanations, which might have led them to reject teleological explanations of nature—and also to reject belief in God, paranormal phenomena, and fate.

It is also possible that more general individual differences in cognitive style may have contributed to the relationship among participants' teleological reasoning about nature and life events and their religious and paranormal beliefs. People who have an "intuitive cognitive style" tend to follow salient initial intuitions when problem-solving, while people who have an "analytic cognitive style" are more likely to forgo initial intuitions in favor of further reflective analysis (Frederick, 2005). Perhaps people who have an intuitive cognitive style are particularly prone to accept intuitive teleological beliefs about nature and life events and also to adopt religious and paranormal beliefs. Recent findings that intuitive cognitive style and weak cognitive inhibition predict individuals' belief in God, in purpose in nature, in paranormal phenomena, and in supernatural signs in visual stimuli offer some evidence in support of this view (Gervais & Norenzayan, 2012; Kelemen & Rosset, 2009; Lindeman, Riekkki, & Hood, 2011; Lindeman, Svedholm, Riekkki, Raij, & Hari, 2012; Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012; Shenhav, Rand, & Greene, 2012; Svedholm & Lindeman, 2013). A relationship between intuitive cognitive style, weak cognitive inhibition, and teleological beliefs is consistent with the hypothesis that teleological reasoning reflects a universal cognitive bias to detect design and purpose in the natural world. Although teleological beliefs about life events and nature may be highly intuitive and automatically generated, they can be explicitly overridden by engaging in reflective thought and by inhibiting default causal intuitions.

In sum, Study 3 found that participants who accepted unwarranted teleological explanations of nature were likely to be the same people who found fate to be an intuitive and useful explanation of the design they detected in the fictional life events. In other words, people who tended to perceive purpose in nature also tended to perceive purpose in life events. However, we did not find support for the hypothesis (H5) that this relationship is driven by a domain-general cognitive orientation to purpose that operates independently of participants' other supernatural beliefs. Instead, it appears that this relationship is largely a consequence of people's explicit religious and paranormal beliefs, which themselves may be encouraged by an underlying sensitivity to purpose in the natural world.

5. General discussion

In three studies, we explored the cognitive basis of individuals' tendency to infer design and purpose embedded in significant life events. We found support for some, but not all, of our hypotheses.

First, we found that teleological reasoning occurs not only among God-believers, but among God-non-believers as well—including among the most ardent atheists who rejected a belief in God in the strongest possible terms. This supports the hypothesis that teleological views persist

across the full spectrum of theistic belief (H1) (see also Heywood, 2010; Heywood & Bering, 2013; Norenzayan & Lee, 2010). Explicit theistic views are therefore not the sole source of teleological beliefs about life events—even the non-religious sometimes intuit the presence of unseen intentional forces directing their lives. This finding may help to explain the results of a recent [Pew Forum on Religion and Public Life \(2012\)](#), which found that even 38% of self-identified atheists and agnostics report believing in God or a "universal spirit".

In sum, many God-non-believers endorse teleological views of life events. We suspect that a belief in some sort of guiding intentional agency or cosmic order in life is pervasive even among the non-religious due to a deeply-rooted social-cognitive bias to imbue the world with agency, intention, and purpose. While the precise rate of God-non-believers' teleological belief may vary depending on the particular experimental methods and measures used to assess teleological belief, we predict that such beliefs should be present to a non-trivial degree among atheists, and indeed, in all neurotypical populations. Specifically, we expect that across diverse experimental contexts, atheists will exhibit teleological beliefs about life events at an intermediate level that is significantly greater than zero, but also significantly less than that observed among theists.

This deeply rooted teleological bias may also explain other common supernatural and quasi-magical beliefs, including (a) a belief in a just world (Lerner, 1980; Piaget, 1932/1965); (b) certain superstitious rituals, such as blowing on dice for luck, that are sometimes performed as appeals to supernatural powers (Hutson, 2012; Young & Morris, 2004); (c) worries about provoking cosmic punishment by "tempting fate" (Risen & Gilovich, 2008; Young & Morris, 2004); and (d) karmic bargaining with the universe, as when individuals perform good acts with the belief that this will help them secure a desired, but unrelated, outcome (Converse, Risen, & Carter, 2012). Each of these phenomena assumes a sort of agentic order underlying life events and may derive from a teleological view of the natural world.

An alternative view is that God-non-believers' teleological thinking is caused by their exposure to high levels of ambient cultural religiosity in American society ([Pew Forum on Religion and Public Life, 2012](#)). That is, living in a society in which belief in God is widely prevalent might encourage a teleological view of life events, even among people who explicitly deny God's existence.

One way to address this would be to determine whether God-non-believers in countries with far lower levels of ambient cultural religiosity (e.g., Western Europe, China) show similar rates of teleological belief compared to American non-believers. Heywood and Bering (2013) conducted just such an analysis by comparing teleological views of life events held by atheists and theists from the United States and from the United Kingdom. This is a particularly useful comparison because although both countries share deep cultural similarities, the United States is far more religious (Heywood & Bering, 2013; Kelemen, 2003; Office for National Statistics, 2011; [Pew Forum on Religion and Public Life, 2012](#)). Despite this, however, the researchers

found no differences in teleological beliefs held by theists from the United States vs. the United Kingdom, nor between atheists from both countries. This finding suggests that teleological intuitions might reliably emerge even in highly secular societies, and at a rate roughly equivalent to that seen in far more religious societies. However, future cross-cultural research would benefit from expanding the study of teleological thinking about life events to other countries, and especially to non-Western societies, to further explore how universally these intuitions are expressed across diverse cultural contexts.

We note, as well, that the proposal that teleological thinking simply results from exposure to ambient cultural religious ideas (e.g., about God or fate) would not predict our finding, discussed in more detail below, that individual differences in mentalizing ability systematically track variation in people's teleological beliefs. In other words, our findings seriously challenge the view that teleological belief among God-non-believers straightforwardly derives from exposure to cultural religious beliefs. Instead, we propose that the tendency to perceive design and purpose in life events may be moderated to some extent by cultural ideas, but a teleological bias fundamentally has its roots in certain more general social-cognitive propensities.

Second, across all three of our studies, we found support for the hypothesis that God-believers hold stronger teleological beliefs about life events than God-non-believers (H2). Specifically, God-believers were more likely than God-non-believers to believe in fate and to attribute both their own personal experiences and also fictional life events to fate. This is not a surprising finding. While an underlying bias to perceive design and purpose in life events may be cognitively universal, it makes sense that an explicit belief in divine agents who intervene in human affairs will reinforce and augment core teleological intuitions (see also Willard & Norenzayan, 2013), and may also make purposeful explanations of life events highly accessible. In a parallel manner, an explicit rejection of supernatural beliefs among religious non-believers may suppress the underlying intuition that life events have purposeful causes. In fact, this likely explains our finding that across all three studies, and using a wide range of methods and measures, God-non-believers consistently expressed an intermediate level of teleological thinking that was significantly greater than zero, but also significantly below that of God-believers.

Third, the current studies confirmed a second predicted source of individual differences in the tendency to infer purpose and design in life events—mentalizing ability (H3). People who are prone to hypermentalize within the social domain are similarly prone to infer illusory intention and purpose in the non-social domain. We found that they were more likely to believe in fate and to attribute their own life events to purposeful cases. These findings are consistent with the view that a bias for teleological explanations may have evolved in the “proper domain” of social behavior, but has come to operate within a broader “actual domain” that encompasses natural kinds, natural objects, and also life events.

Fourth, we found support for the hypothesis that many people intuitively represent fate as a type of intentional

being, and that both belief in God and mentalizing ability increase this tendency (H4). Many God-believers, but relatively fewer God-non-believers, conceived of fate as a type of intentional being, rather than as merely a physical fact about the universe. Further, they also often attributed certain agentic attributes to fate, including fairness, kindness, and instructiveness. These findings support the proposal that a cognitive bias to associate agents with the creation of order and design (Newman et al., 2010) may underlie the intuition that human life is guided by some sort of intentional agency.

Finally, we failed to find evidence in Study 3 that individuals' teleological beliefs about nature and about life events are systematically related, independent of their other supernatural beliefs (H5). Instead, we found that the relationship between individuals' teleological beliefs in both of these domains is fully mediated by their belief in God and in paranormal phenomena. This result is surprising in light of the findings from Studies 1 and 2. In both of these studies, individuals' proclivity for teleological reasoning about life events was predicted by their mentalizing tendencies, even after controlling for belief in God. The results of these first two studies suggest that certain core social-cognitive capacities that drive sensitivity to agency, purpose, and design in the environment also undergird the perception that life events happen for a reason, above and beyond the influence of explicit theistic belief. Moreover, using the same measure of mentalizing that we used in Study 2 (i.e., the Empathy Quotient), Willard and Norenzayan (2013) found that mentalizing tendencies also predict individuals' teleological beliefs about nature—suggesting that similar social-cognitive mechanisms may underlie teleological intuitions in both the domain of nature and that of life events. Lastly, Study 3's results are also inconsistent with Willard and Norenzayan's (2013) finding that individuals' teleological beliefs about nature predicted their beliefs about life's deeper purpose, independently of belief in God (although belief in God was a much stronger predictor). Study 4 therefore warrants replication—potentially using larger sample sizes and different methods for measuring individuals' teleological beliefs—before firm conclusions can be drawn.

5.1. Additional future directions

The results of the studies reported here advance our understanding of the cognitive underpinnings of teleological reasoning about life events, but they also raise certain questions. One of these concerns the finding that while many God-non-believers in our studies claimed to believe in fate and to believe that life events happen in order to send them messages, many others did not. This might suggest that some people do not believe in fate or hold teleological beliefs about life events. Alternatively, however, we may have underestimated non-religious individuals' teleological beliefs due to our use of self-report survey measures—perhaps those participants who explicitly deny believing in fate would reveal underlying teleological beliefs when more sensitive measures are used. Similarly, those people who deny that fate has agentic qualities may be shown to hold implicit agentic intuitions under

more sensitive testing conditions. An analogous divergence between people's professed supernatural beliefs and their non-reflective everyday intuitions has been documented for other common supernatural concepts (e.g., God's omnipresence; see Barrett & Keil, 1996; Bering, 2010; Slone, 2004).

Consider also that Kelemen et al. (2013) found that although professional physical scientists explicitly reject teleological explanations of natural phenomena, they reveal evidence of implicit teleological beliefs when placed under cognitive load. Specifically, these scientists were more likely to endorse unwarranted teleological explanations of nature (similar to those used in Study 3) when forced to make judgments under speeded conditions. Moreover, scientists' errors in accepting the teleological explanations of nature were correlated with their belief in agentic sources of order in the natural world (e.g., belief in "Mother Nature"). Future research on individuals' teleological views of life events would benefit from using similar methods capable of detecting differences in explicit and implicit teleological beliefs, and also the extent to which these beliefs are rooted in agent representations (see also Kelemen & Rosset, 2009).

Another question concerns the heterogeneity of atheists. It has recently been argued that there exist several different strains of atheism, each characterized by a unique psychological profile (Gervais et al., 2011; Norenzayan & Gervais, 2013). This raises the possibility that certain types of atheists may be more compelled than others to believe in fate or to perceive purpose in life events, depending on the cognitive or cultural basis of their atheism. For example, our findings and others' (Heywood, 2010; Willard & Norenzayan, 2013) suggest that individuals whose atheism is the product of mentalizing deficits that block intuitive cognitive support for belief in God (e.g., autism) should be least likely to believe in fate or to hold teleological beliefs, while those whose atheism results from a lack of ambient cultural exposure to belief in God may be relatively more likely to believe in fate or to perceive purpose in life events. Although the present studies were not designed to distinguish teleological beliefs held by different types of God-non-believers, future research could pursue this issue.

Finally, there is the question of the psychological consequences of perceiving design and purpose in life events. A large body of research suggests that a belief in a benevolent, purposeful God satisfies humans' fundamental psychological need for control—particularly in circumstances where people lack personal control—and that it promotes healthy coping with illnesses or tragedies that are believed to be part of a benevolent God's will (e.g., Inzlicht, Tullett, & Good, 2011; Kay, Gaucher, McGregor, & Nash, 2010; Kay, Gaucher, Napier, Callan, & Laurin, 2008; Kay, Moscovitch, & Laurin, 2010; Laurin, Kay, & Moscovitch, 2008; Pargament et al., 1990). A belief in God thus has certain palliative effects by mitigating anxiety associated with the aversive psychological experience of perceived randomness and lack of control. Does the perception of purpose in life events, divorced from a belief in God, serve these same psychological functions, even for religious non-believers? Some recent evidence suggests that this may be the case;

Kray et al. (2010) found that individuals' belief that life events were "meant to be" enhanced their ability to derive meaning from those events, although the researchers did not examine whether religious belief interacts with this process. Future research might therefore explore how the perception of purpose in life events influences individuals' cognitive construal of these events, independently of their religious beliefs, and how teleological beliefs may shape their construction of meaningful autobiographical life narratives.

6. Conclusion

The studies presented here reveal that the tendency to infer design and purpose in life events is a feature of both religious believers' and, to a lesser extent, non-believers' explanatory reasoning. We find as well that individual differences in mentalizing ability predict both the tendency to believe in fate and to infer purposeful causes of one's own life events. Moreover, although individuals' perception of purpose in life events is related to their teleological beliefs about natural phenomena, this relationship may be driven by other supernatural beliefs, such as belief in God and paranormal belief.

Taken together, our findings suggest that teleological reasoning about life events is not solely the product of cultural learning, although it may be moderated to some extent by certain cultural religious beliefs. Rather, adages such as "it was meant to be" and "everything happens for a reason" are expressions of the way people naturally view the world—as imbued with agency, intention, and meaning.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.cognition.2014.06.017>.

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