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How people perceive the minds of the dead: The importance of consciousness at the moment of death

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ABSTRACT

Immortality is thought to be achieved through heroic deeds, reincarnation, and the afterlife. The present studies reveal an alternative path to transcending death: dying while conscious. Seven studies demonstrate that dying while more awake, aware and/or lucid leads people to see a richer postmortem mind—an effect we call *conservation of consciousness*. People see more mind in the deceased when they die with their eyes open (Study 1), and while awake (vs. in a coma), while suffering from ALS (vs. from Alzheimer's), while on hallucinogens (vs. sedatives), and while dreaming (vs. in a deep sleep; Study 2). This effect is robust, holding even in a between-subjects design, and even when participants are explicitly encouraged to interpret the mind perception items literally (Study 3). Perceived conservation of consciousness after death is driven more by general perceived awareness than by fear of death (Study 4) and predicts perceptions of mind beyond having a vivid (vs. dull) life (Study 5). The last wishes of the dying are also given more moral weight if made by those who ultimately die while conscious (Study 6). Perceived conservation of consciousness also occurs in the real-world context of a historic cemetery (Study 7). These results reveal a simple way to increase your influence after death and highlight both the power of endings and the subjective nature of mind.

1. Introduction

The cryogenic storage of severed heads, elaborate religious rituals, and legacy-building investment firms all attest to mankind's desire to transcend death. Despite the many routes to potential immortality—from mythical fountains to advanced technology—there may be a relatively simple way for your mind to survive death, at least in the eyes of others. Those who die while lucid and aware may enjoy greater perceived immortality. We investigate whether the minds of deceased individuals seem to persist more if they die while conscious rather than unconscious. This perceived "conservation of consciousness" would not only highlight the malleability of mind perception but would also extend research on an important but relatively understudied topic in social psychology: immortality.

1.1. Immortality

In a world of cultural and individual differences, the quest for immortality is universal (Boyer, 2001). Researchers often divide immortality into two different forms: literal and symbolic immortality (Dechesne et al., 2003). Literal immortality is the continued survival of the self after death, whether in the afterlife or through reincarnation (Dechesne et al., 2003), or as spirits that linger on Earth (Gray et al., 2018). In America, beliefs in literal immortality are often tied to religiosity (Dechesne et al., 2003) as Christianity expressly advocates for the continued survival of the soul after bodily death. Literal immortality is also implicated in near-death experiences, in which people describe the sensation of floating freely, and moving through a tunnel toward their deceased loved ones (Moody, 2001; Siegel, 1980; van Lommel, 2011).

If literal immortality is grounded in concrete survival, symbolic immortality is much more abstract, involving the conservation of important cultural symbols or institutions after one's death (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989). Although this form of immortality may be less personally comforting, it need not hinge on notions of eternal souls or benevolent gods. When soldiers die for the conservation of freedom, or for the glory of America, they are demonstrating symbolic immortality. The same is true when civil rights activists die for equality, or when journalists die in their quest to expose the truth. Of course, lines between literal and symbolic immortality can be blurred, such as when suicide bombers die both for a cause and for the promise of everlasting life in Heaven. Adding even more nuance to the ideas of surviving death, we suggest a third form[1] of immortality that lies between symbolic and literal immortality—continued perceptions of the mind of the deceased.

Postmortem mind perception is the continuation of one's mind, but

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[1] Although literal and symbolic immortality are certainly the most commonly discussed forms, there is work describing up to five different types of immortality (Lifton, 1979).

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not necessarily in the literal and supernatural sense, nor in the vague cultural and institutional sense. Instead, it involves the continued *perception* of the minds of the deceased by others. Postmortem mind perception sits somewhere between literal and symbolic immortality because it can incorporate elements of both. For instance, postmortem mind perception incorporates literal immorality because the minds of the deceased are perceived to transcend physical death, and it incorporates symbolic immortality because the perceived presence of mind after death may have moral implications for the legacies of the deceased. This kind of immortality is exemplified when we think that a deceased friend or relative still possesses some form of personality, emotion or thoughts. In addition, someone believed to be living in Heaven would certainly be perceived to have a conscious mind, and someone who died for America could still possess enough feeling to be harmed when someone burns an American flag (Gray, Schein, & Ward, 2014). In this paper, we examine postmortem mind perception, a phenomenon informed by research on general perceptions of mind.

1.2. Mind perception

It may be obvious that you have a mind, because you can directly experience your own thoughts and feelings. However, the minds of others are ultimately inaccessible, making their existence uncertain. In philosophy, this has been called the "problem of other minds" (Harnad, 1991; Leudar & Costall, 2004; Morick, 1967). This problem is relatively inconsequential in everyday social interaction, because of clear cues to others' minds such as language, expressions and purposeful actions. Nevertheless, it is more problematic when minds are ambiguous, such as with animals and machines. In these cases, minds are more a matter of perception than of fact, even in the face of objective evidence (Waytz, Gray, Epley, & Wegner, 2010; Wegner & Gray, 2016). Computers may be good at chess and Jeopardy (Markoff, 2011), but are they "truly" intelligent? Animals may help their conspecifics, but do they "truly" have empathy or morality (de Waal, 2009)?

That minds are matters of perception is especially true for the dead, because they lack objective mental qualities. Nonetheless, this does not stop people from ascribing them mind. Certainly people see less mind in the dead than in normal functioning humans, but the dead are seen to have more mind than inanimate objects, and sometimes even more mind than patients living in vegetative states (Gray, Knickman, & Wegner, 2011). Even young children perceive mind in the dead. In one study, children ranging from 4 to 12 years old listened to a story about a baby mouse who lost its way home and was then eaten by an alligator. While the older children acknowledged that the mouse was dead and had ceased to function biologically, they still believed that the mouse had thoughts and emotions (Bering & Bjorklund, 2004).

The idea that mental qualities can extend beyond physical death is consistent with dualism, the psychological tendency to see the mind and body as separate entities (Demertzi et al., 2009). Dualism is an idea with long philosophical roots dating back to Descartes, (1641). Dualism appears to be innate (Bloom, 2004), as infants believe that the rules of matter do not apply to human minds (Kuhlmeier, Bloom, & Wynn, 2004). Dualistic beliefs continue into adulthood, and enable people to perceive minds in the dead even after their bodies (and brains) have stopped functioning (Demertzi et al., 2009).

Research has clearly shown that people do perceive the minds of the dead (e.g., Bering, 2002; Bering & Bjorklund, 2004). However, it remains unclear whether the degree of mental capacity at the time of death leads to relative differences in perceptions of mind postmortem. In the present report, we specifically test whether deceased individuals are ascribed more mind when conscious or aware at the time of their death. This hypothesized effect is called the *conservation of consciousness* because qualities of mind immediately before death would be—at least somewhat—conserved in perceptions after death. Conservation of consciousness may be facilitated by dualism, but we suggest that it is powered by the importance of endings.

1.3. The importance of endings

Human experiences (e.g., vacations, jobs) progress continuously, but perceptions of those experiences are relatively discrete, and segmented based on salient events or schemas (e.g., beginning, middle, end; Kurby & Zacks, 2008). These segments exert different influences upon memories and judgments, with endings being particularly important. For example, one study showed that a medical procedure (e.g., a colonoscopy) with a less painful ending—but more pain overall—was remembered as more enjoyable than one with less overall pain but a worse ending (Kahneman, Fredrickson, Schreiber, & Redelmeier, 1993). Endings exert an oversized influence in many domains, including moral evaluations of others (Newman, Lockhart, & Keil, 2010), perceptions of life quality (Diener, Wirtz, & Oishi, 2001), and even understandings of death.

Similar to individual experiences, people divide human lives into discrete segments (i.e., childhood, adolescence, adulthood, senescence; Erikson, 1963), and events at the end powerfully shape perceptions of an entire life (Newman et al., 2010). It is for this reason that people speak of what matters on their "deathbed," and why older adults focus upon themes of generativity, redemption, and family (McAdams, 2006). Each of us wants to believe that actions near the end of life can make amends for previous mistakes, and there is some truth to this idea. Studies reveal that perceptions of moral character are especially dependent on a person's last acts (Newman et al., 2010), and that death serves to "freeze" this moral character, making it resistant to information revealed postmortem (Eylon & Allison, 2005).

The persistence of moral character at the time of death and the link between morality and mind perception (Gray, Young, & Waytz, 2012) suggests that mind perception at the time of death may also matter. Perhaps those who are aware and awake at the time of death will conserve their consciousness, such that they will have more perceived mind after death. One could argue that—unlike the weight of moral character (Pizarro & Tannenbaum, 2011)—someone's mental capacities are transient and fleeting and are directly impacted by death (i.e., ostensibly terminated). Indeed, while many obituaries reference the character, traits, and past deeds of the deceased, few seem to mention their consciousness at the time of death. Nevertheless, we suggest that even transient mental states (i.e., consciousness and awareness) may be somewhat conserved after death.

1.4. Perceived conservation of consciousness

This research has several potential implications for psychological science. First, if confirmed, the hypothesized conservation of consciousness effect would reveal a greater significance of the power of endings (e.g., state of mind during final moments of life) than previously uncovered. Second, it would also demonstrate how perceptions are crystallized after death, even when those perceptions directly conflict with our scientific understanding of death's impact on mental states. Third, conservation of consciousness would be a novel illustration of the tenacity of mind perception. Research reveals that people have a hair-trigger when it comes to initiating mind perception, often seeing the behavior of inanimate objects as mind perception (Heider & Simmel, 1944). Conservation of consciousness would suggest a complementary process of the persistence of mind perception, such that once a mind is initially perceived, people continue to perceive it—even after death.

Conservation of consciousness would also dovetail with various religious, moral and real-world phenomena. For example, some Buddhist traditions attach special importance to the clarity of mind at the time of death, so adherents will often refuse pain medication and palliative care as they die (Fosarelli, 2008). Similarly, it was traditionally recommended that adherents of Catholicism receive Extreme Unction (now called the sacrament of anointing of the sick) while awake and conscious in order to receive the full benefits of the

sacrament (see Ariès, 1981) When someone dies while fully conscious, we may not only perceive more mind, but we might also attach more weight to their moral agenda—ideas that we also test in the present studies.

1.5. Pilot data

As an initial test of the conservation of consciousness effect, we presented 225 MTurk participants (M_{age} = 34.18, SD_{age} = 11.58, 52% female) with vignettes about a person who died in a car accident (see Supplementary Materials for the full vignettes). Importantly, the mental state of the person at the time of their death was left ambiguous. Participants rated both the level of conscious awareness at the time of death, as well as the target's mental capacities after death (as in Gray et al., 2011; see specific items used in the present studies below). As predicted, ratings of consciousness at the time of death were positively correlated with the target's perceived mind after death, $r(223) = 0.23$, $p < .001$, 95% CI [0.10, 0.35]. This relationship between perceived consciousness at time of death and postmortem mind perception inspired us to conduct a series of studies investigating the *conservation of consciousness*.

1.6. Measures

1.6.1. Postmortem mind perception

In the present research, we indexed postmortem mind perception using ratings of agency (e.g., self-control and planning) and experience (e.g., emotions and sensitivity to pain). Many of these items have been used in prior work investigating mind perception of the dead and those in a persistent vegetative state (Gray et al., 2011). Ratings of mind perception were collected on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). As with past work (Gray et al., 2011), we added the clause "in some way" to the beginning of each item to avoid potential floor effects (except for Study 3, in which we removed this clause to ensure that participants did not interpret the mind perception items non-literally).

The mind perception items used in the present study were 1) "In some way, [the target] still has a personality," 2) "In some way, [the target] lives on," 3) "In some way, [the target] is still capable of influencing events," 4) "In some way, [the target] is still capable of planning," 5) "In some way, a part of [the target] knows right from wrong." 6) "In some way, [the target] is still aware of his or her environment," 7) "In some way, [the target] is still capable of feeling pain," 8) "In some way, [the target] is still capable of feeling desire," 9) "In some way, [the target] still has emotions and feelings," and 10) "In some way, a part of [the target] can remember the events of his or her life." These mind perception capacities spanned both "agency" (the ability to think and do) and "experience" (the ability to sense and feel) to capture a full understanding of mind perception of the deceased. Although past work on moral typecasting examines agency and experience separately (Gray & Wegner, 2010; Yam, Fehr, Burch, Zhang, & Gray, 2019), there is little reason why the two dimensions of mind perception should diverge here. Consistent with this idea, reliability across the 10 items in the postmortem mind perception scale was high (α = 0.91).

1.6.2. Dualism

In addition to measuring mind perception, we measured endorsement of dualistic views using an abridged version of the Stanovich Dualism Scale (Stanovich, 1989). We measured dualism because it allows people to view the mind as separate from the body, facilitating mind perception of the deceased. Selected items were 1) "The mind is not part of the brain but it affects the brain," 2) "The mind is a special form of energy (currently unknown to man) that is in contact with the brain and affects it," 3) "Minds are in principle independent of bodies, to which they are only temporarily attached," 4) "The mind is a nonmaterial substance that interacts with the brain to determine behavior," 5) "My consciousness will survive the disintegration of my physical body," 6) "The mind and the brain are two totally separate things." Reliability for the 6 dualism items used in the present study was also high (α = 0.89).

1.6.3. Religion

We also collected information about participants' religious affiliations. This enabled us to ensure that our participants came from a broad range of religious backgrounds, and that our findings did not merely reflect any particular religious beliefs. Religion was assessed by having participants first choose which religion (if any) they most closely identified with. We report religious affiliations for participants in each study in Table S1 of Supplementary Materials. Next, participants indicated to what extent they believe in God or a universal spirit on a 6-point scale from "No" (1) to "Yes, I'm absolutely certain" (6). Then, participants reported, "How important is religion to you?" using a 3-point scale from "Not at all important" (1) to "Very important" (3). Cronbach's alpha was not computed for religiosity measures because we only assessed two items that are scaled differently. Other religiosity measures collected in this study were not of interest in the present report and are included in Supplementary Materials.

2. The present research

We tested the conservation of consciousness effect in seven studies. In Study 1, we tested whether depictions of pre-death consciousness (photographs with eyes open vs. closed) predicted ratings of postmortem mind. In Studies 2a-f, we investigated whether various manipulations of pre-death consciousness (e.g., coma vs. awake, dementia vs. aware, on sedatives vs. on hallucinogens, deep sleep vs. dreaming), influenced ratings of postmortem mind. In Study 3, we replicated this effect in a between-subjects design with more stringent experimental control. In Study 4, we tested the alternative explanation that perceptions of postmortem minds were driven by perceived fear rather than perceived overall consciousness. In Study 5, we tested whether conservation of consciousness depended upon the initial level of perceived mind using a novel target (i.e., a robot). In Study 6, we examined an implication of conservation of consciousness, testing whether those who die while conscious have increased moral rights in terms of their last wishes being honored, as compared to those who die while unconscious. Finally, in Study 7, we tested conservation of consciousness in a more naturalistic field setting by assessing perceptions of mind while participants stood next to graves in a two-hundred-year-old cemetery.

In all studies except for Study 7, participants were recruited through Amazon Mechanical Turk (MTurk). Across Studies 1–6, participants earned $0.15 to $1.00, depending on the length of the study. Internet samples are frequently used in psychological research (Skitka & Sargis, 2006), and recruitment from MTurk provides more diversity than lab-based samples (Buhrmester, Kwang, & Gosling, 2011). However, MTurk samples are more likely than lab-based samples to yield technological problems and/or inattentive participants (Goodman, Cryder, & Cheema, 2012). Thus, participants were excluded from analyses if they failed attention checks (Kapelner & Chandler, 2010; Oppenheimer, Meyvis, & Davidenko, 2009) or failed to follow instructions. To provide additional diversity, the MTurk participants were augmented with a student sample in Study 7.

We made an effort to maximize power by using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) to estimate a priori sample sizes. We approximately doubled the recommended sample sizes to ensure sufficient power. For our field study (Study 7) we created a detailed protocol that research assistants followed throughout the experiment. Thus, we are confident that the study was executed in exactly the same manner across all participants. The detailed protocol is included in Supplementary Materials. All studies were conducted in a manner approved by

the Institutional Review Board at the University of North Carolina at Chapel Hill.

3. Study 1: Ratings of photographs

In Study 1, we investigated whether depictions of individuals' consciousness shortly before death influenced ratings of mind after death. As in our pilot study, participants were not explicitly told whether the targets were conscious or unconscious at the time of death. Rather, consciousness at time of death was manipulated with photographs.

3.1. Method

3.1.1. Participants

Sample size was determined a priori using G*Power (Faul et al., 2007) assuming a medium effect size. G*Power recommends a sample size of 54 participants for a paired samples *t*-test. Because we did not have an estimate of the true effect size, we more than doubled the recommended sample size. One hundred and twenty-nine participants completed the study. Eighteen participants failed an attention check and were consequently removed from analyses (final $N = 111$, $M_{age} = 32.27$, $SD_{age} = 9.57$, 53% female).

3.1.2. Procedure

In a within-subjects design, participants viewed images of two individuals who were lying in a hospital bed. We manipulated whether the target appeared to have a more vivid or more dull mental state by showing them with their eyes open ("vivid mind" condition) or closed ("dull mind" condition). Photographs were presented on the screen one at a time. While the photograph was on the screen, participants read brief descriptions of why the target was hospitalized. The descriptions also stated that the target had died immediately after the photograph was taken. Presentation order of the photographs was counterbalanced such that if a given participant first saw a target with his eyes open, they next saw a different target with his eyes closed (see Fig. 1 for the "vivid mind" and "dull mind" versions of photographs of one of the targets). The descriptions used in Study 1 were as follows: "[*The target*] *was brought to the emergency room last week and he was diagnosed with* [*hypothyroidism/diabetic ketoacidosis*]. *This picture of* [*target*] *was taken seconds before he died.*" After viewing each photograph, participants were asked to make mind perception judgments about the target after his death. We reiterated to participants that the mind perception items referred to the target's mind after he was dead.

3.2. Results

We conducted a paired-samples *t*-test to determine whether participants perceived more mind in the target that had been photographed with his eyes open compared to closed shortly before his death. We found that, as predicted, participants ascribed more postmortem mind to targets who were photographed with their eyes open ($M = 4.32$, $SD = 1.97$) compared to closed ($M = 3.74$, $SD = 1.84$) moments before their deaths, $t(110) = 4.93$, $p < .001$, 95% CI [0.35, 0.81], $d = 0.30$.

3.2.1. Correlations with dualism and religiosity

Dualism was positively correlated with postmortem mind perception of targets who were photographed with their eyes open, as well as with their eyes closed. Interestingly, dualism was more strongly correlated with ratings of postmortem mind perception of targets who were photographed with their eyes closed. Ratings of postmortem mind perception were also correlated with our religiosity items. Specifically, belief in God or a universal spirit was positively correlated with postmortem mind perception of the target who was photographed with his eyes open as well as the target who was photographed with his eyes closed. Similarly, the item assessing the importance of religion was positively correlated with postmortem mind perception of both targets (see Fig. 2).

3.3. Discussion

As hypothesized, participants perceived more mind in individuals who had been photographed with their eyes open moments before death. These findings provide the first experimental evidence that a lucid death confers more postmortem mind perception. Further, these findings show that ratings of postmortem mind perception are related to dualistic beliefs and religiosity, especially for targets who are perceived to die while unconscious. A limitation of Study 1 is that we did not explicitly manipulate whether the target was conscious or unconscious at the time of his death. The purpose of Study 2 is to address this limitation and build on the findings of Study 1 to show that various types of lucid mental states at the time of death confer more postmortem mind perception.

4. Study 2: State of mind at the time of death

Study 2 consists of six within-subjects experiments in which we manipulated targets' mental states at the time of their death. Participants read brief vignettes describing the targets' deaths, rated the targets' perceived mind after death, and then answered dualism and religiosity items as in Study 1. In each study, participants read vignettes

Fig. 1. Examples of images used in Study 1. Participants viewed images of individuals with their eyes open ("vivid mind") or closed ("dull mind"), and then rated the degree to which they perceived their minds postmortem.

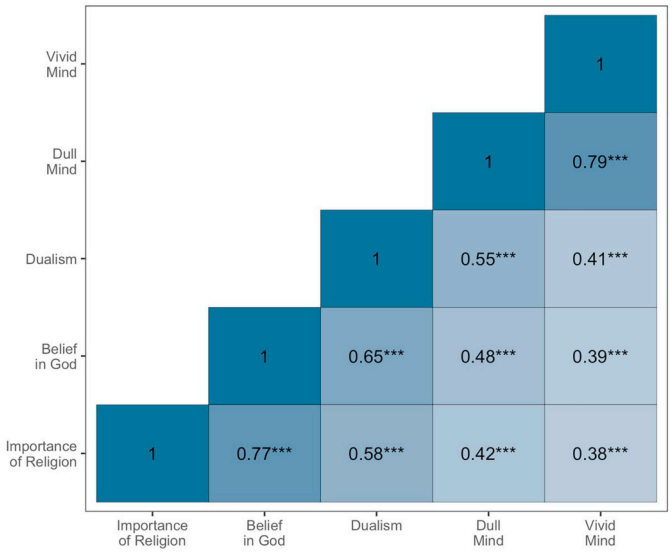

Fig. 2. Correlations between ratings of postmortem mind perception, dualism, and religiosity for Study 1.

in which targets died in vivid and dull mental states. We counterbalanced situational factors surrounding the targets' death and their state of mind at the time of death (i.e., who they were, how they died, and whether they were in a dull or vivid mental state). See Table 1 for a description of the conditions used in each experiment, the rationale behind that experiment, and means and standard deviations across conditions.

4.1. Method

4.1.1. Participants

As in Study 1, we conducted a paired samples *t*-test for each of the 6 within-subjects experiments in Study 2. We again approximately doubled G*Power's recommended sample size of 54 participants for each experiment in Study 2. The key manipulation in each of the following studies is whether the target was conscious and fully aware at the time of death versus unconscious and unaware. Vignettes for each of the six experiments are presented below. Vignettes were counterbalanced in terms of order and details of death.

4.1.2. Procedure

4.1.2.1. Study 2a: Conscious vs. coma. In Study 2a, participants (N = 121) read about targets who died while in a coma versus fully conscious. Twenty participants failed an attention check and were removed from analyses (final N = 101, M_{age} = 35.36, SD_{age} = 12.50, 58% female). The vignettes for Experiment 2a were as follows:

> "[*Target 1/Target2*] *recently passed away. He was brought to the emergency room last Tuesday after he experienced a* [*heart attack/stroke*] *and* [*fell into a coma* - (unconscious condition only)]. *His doctor admitted him and monitored his condition. On Thursday, he had another* [*heart attack/stroke*] *and passed away that evening.* [*Target1/Target2*] *was* [*conscious/still in a coma*] *at the time of his death and* [*was fully aware of/never knew*] *what happened.*"

4.1.2.2. Study 2b: Lucid vs. dementia. In Study 2b, participants (N = 107) read about experimental targets that were either in a normal state of mind or showing signs of dementia at the time of their death. Sixteen participants failed the attention check and were removed from analyses (final N = 91, M_{age} = 36.66, SD_{age} = 12.58, 68% female). The vignettes for Experiment 2b were as follows:

> "[*Target 1/Target2*] *recently passed away. He was an elderly man who was* [*not showing any signs of cognitive aging/showing signs of dementia*]. *He was brought to the hospital last week because he was experiencing* [*excessive fatigue/difficulty breathing*]. *He died in the hospital as a result of natural causes. Because he* [*was not experiencing any changes in cognitive functioning/had dementia*] *he was* [*fully aware/not aware*] *of what was happening at the time of his death.*"

4.1.2.3. Study 2c: ALS vs. PVS. Study 2c tested whether consciousness, rather than perceptions of ability versus affliction at the time of death, facilitates postmortem mind perception. We compared individuals who died while in a persistent vegetative state (PVS) to those who died with amyotrophic lateral sclerosis (ALS). Individuals in a PVS have severe deficits in conscious awareness in the absence of specific physical disabilities, whereas individuals with ALS have severe physical disabilities in the absence of impaired consciousness. Participants (N = 123) read about experimental targets that either had ALS or were in a PVS at the time of their death. Thirteen participants failed an attention check and were removed from analyses (final N = 110, M_{age} = 37.96, SD_{age} = 12.55, 62% female). The vignettes for Experiment 2c were as follows:

> "[*Target 1/Target2*] *went to the doctor because he* [*felt his muscles getting progressively weaker/was experiencing persistent cramping and trouble swallowing*], *and was diagnosed with* [*ALS/Reye syndrome*]. *His symptoms got progressively worse, and he eventually* [*lost his ability to walk/lost consciousness*]. *He died in the hospital due to respiratory failure after* [*battling ALS for four years/spending several months in a Persistent Vegetative State*]. [*Target1/Target2*] *was* [*conscious/unconscious*] *at the time of his death and* [*was fully aware of/never knew*] *what happened.*"

4.1.2.4. Study 2d: Painful vs. painless. In Study 2d, participants (N = 126) read about experimental targets that were either experiencing pain or no pain at the time of their death. We reasoned that the psychological power of pain (Scarry, 1985) would increase postmortem mind perception. Twenty-three participants failed an attention check and were removed from analyses (final N = 103, M_{age} = 35.57, SD_{age} = 11.83, 61% female). The vignettes for

Table 1
Summary of the conditions, rationale, and findings from the six experiments in Study 2.

Study	Conditions		Rationale	Postmortem mind perception	
	Vivid	Dull		Vivid	Dull
2a	Conscious	Coma	Initial proof of concept	4.20 (1.79)	3.47 (1.53)
2b	Lucid	Dementia	Examine permanent dulled state	5.03 (1.92)	4.21 (1.54)
2c	ALS	PVS	Ensure effect is not simply due to perceptions of affliction	4.44 (1.89)	3.34 (1.51)
2d	Painful	Painless	Test the momentary conscious vividness provided by pain	3.49 (1.88)	2.79 (1.39)
2e	Hallucinogen	Sedative	Compare states caused by pharmaceutical intervention	3.70 (1.65)	3.24 (1.52)
2f	Dreaming	Deep sleep	Test whether effect holds even within a less conscious vivid state	3.38 (1.53)	3.05 (1.50)

Note: Mean differences in ratings of postmortem mind perception are significant for all six experiments (*ps* < .001).

Experiment 2d were as follows:

> "[*Target 1/Target2*] *recently passed away. Last year, he went hiking in an isolated area of the Appalachian Mountains. He was* [*hiking up a trail/sleeping in his tent*] *when a large tree fell on him.* [*Target1/Target2*] *was* [*struck in the spine and paralyzed by the tree/struck in the head and killed instantly and painlessly*]. *He was* [*conscious/unconscious*] *at the time of his death and* [*filled with pain and fear/never knew what happened*]."

4.1.2.5. Study 2e: Hallucinogens vs. sedatives. In Study 2e, participants (N = 120) read about targets that died while under the influence of drugs described as having either hallucinogenic or sedative effects. As hallucinogens cause more vivid psychological experiences, we reasoned that those who were on them at the time of death would have greater postmortem mind perception than those on sedatives, which dull conscious experience. Fifteen participants failed the attention check and were removed from analyses (final N = 105, M_{age} = 35.01, SD_{age} = 11.46, 69% female). The vignettes for experiment 2e were as follows:

> "[*Target 1/Target2*] *recently passed away. He* [*died in a car accident/drowned in a lake*] *after taking a* [*hallucinogenic/tranquilizing*] *drug. He began* [*hallucinating/feeling strong tranquilizing effects*]. [*Target1/Target2*] *was* [*seeing and hearing things that were not real/heavily sedated by the drug and could not sense anything around him*]. *He was struggling to* [*stay on the road/stay afloat*] *and* [*swerved off the road and hit a tree/drowned before anybody could help him*]. [*Target 1/Target2*] *was* [*conscious/unconscious*] *at the time of his death, and* [*still experiencing vivid hallucinations/never knew what happened*]."

4.1.2.6. Study 2f: Dreaming vs. deep sleep. In Experiment 2f, participants (N = 117) read about experimental targets that died in their sleep while either experiencing a vivid dream or while in a stage of sleep in which dreams do not occur. We reasoned that dreaming involves more conscious experience than a deep dreamless sleep. Twenty-five participants failed the attention check and were removed from analyses (final N = 92, M_{age} = 37.50, SD_{age} = 12.90, 66% female). The vignettes for experiment 2f were as follows:

> "[*Target 1/Target2*] *recently passed away. He died in his sleep due to* [*heart failure/a pulmonary embolism*]. *He fell asleep in his bed as he always did, without any symptoms of distress. While he was in* [*REM sleep/Stage 4 sleep*], *the stage in which dreams* [*do/do not*] *occur, he* [*went into cardiac arrest/had a pulmonary embolism*] *and died.* [*Target1/Target2*] *was still* [*dreaming vividly/in a dreamless sleep*] *at the time of his death.*"

4.2. Results

4.2.1. Postmortem mind perception

Across all six experiments, the target who died in a relatively more vivid state of mind was ascribed more postmortem mind perception. All condition means (and standard deviations) are presented in Table 1, with more detailed results presented below.

4.2.1.1. Study 2a: Conscious vs. coma. As predicted, a paired-samples t-test revealed that individuals who died while conscious were perceived as having more mind postmortem (M = 4.20, SD = 1.79) than those who died while in a coma (M = 3.47, SD = 1.53), $t(100)$ = 5.44, p < .001, 95% CI [0.47, 1.00], d = 0.44.

4.2.1.2. Study 2b: Lucid vs. dementia. As predicted, a paired-samples t-test revealed that individuals who died while lucid were perceived as having more mind postmortem (M = 5.03, SD = 1.92) than those who died while in a state of dementia (M = 4.21, SD = 1.54), $t(90)$ = 6.86, p < .001, 95% CI [0.59, 1.07], d = 0.47.

4.2.1.3. Study 2c: ALS vs. PVS. As predicted, a paired-samples t-test revealed that individuals who died while suffering from ALS were perceived as having more mind postmortem (M = 4.44, SD = 1.89) than those who died while in a PVS (M = 3.34, SD = 1.51), $t(109)$ = 7.36, p < .001, 95% CI [0.80, 1.40], d = 0.64.

4.2.1.4. Study 2d: Painful vs. painless. As predicted, a paired-samples t-test revealed that individuals who died while in pain were perceived as having more mind postmortem (M = 3.49, SD = 1.88), than those who died painlessly (M = 2.79, SD = 1.39), $t(102)$ = 5.09, p < .001, 95% CI [0.43, 97], d = 0.42.

4.2.1.5. Study 2e: Hallucinogens vs. sedatives. As predicted, a paired-samples t-test revealed that individuals who died while on hallucinogens were perceived as having more mind postmortem (M = 3.70, SD = 1.65), than those who died while on sedatives (M = 3.24, SD = 1.52), $t(104)$ = 4.23, p < .001, 95% CI [0.24, 0.67], d = 0.29.

4.2.1.6. Study 2f: Dreaming vs. deep sleep. As predicted, a paired-samples t-test revealed that individuals who died while vividly dreaming were perceived as having more mind postmortem (M = 3.38, SD = 1.53) than those who died while in a deep dreamless sleep (M = 3.05, SD = 1.50), $t(91)$ = 4.04, p < .001, 95% CI [0.17, 0.49], d = 0.22.

4.2.1.7. Non-parametric analyses of studies 2a-f. We assessed whether our outcome variables for Studies 2a-f (i.e., the difference between perceptions of vivid and dull minds) satisfied the assumption of normality for paired samples t-tests. The distributions of difference scores for the items in our postmortem mind perception scale were relatively normal across all six experiments. However, we opted to also conduct non-parametric analyses to ensure that the effect remains when we are certain that no assumptions have been violated. Results of related-samples Wilcoxon Signed Rank tests revealed that the conservation of consciousness effect holds across all six experiments (ps < 0.01). Thus, we present only parametric analyses throughout the remainder of this report.

4.2.2. Correlations with dualism and religiosity

In all six experiments, ratings of postmortem mind perception were positively correlated with dualistic beliefs, as measured by an abridged version of the Stanovich Dualism Scale (Stanovich, 1989). Perhaps not surprisingly, the more people endorse items that are designed to measure the extent to which people believe the human mind is separate from the body, the more likely they are to believe that individuals' minds continue on after death. In addition, ratings of the targets' postmortem mind perception were also positively correlated with participants' responses to at least one of our religiosity items (most often the importance of religion) for Studies 2a-e. Interestingly, in Study 2f, there was no relationship between either of our religiosity items and participants' perceptions of mind of the target who died while dreaming as well as the target who died while not dreaming. Perhaps people have a distinct set of intuitions about dreaming, or perhaps this null effect is due to a chance finding across multiple comparisons over six studies. See Fig. 3a for correlations of mind perception with dualism and religiosity for Studies 2a-f, and Fig. 3b for a meta-analysis of correlations across Studies 2a-f.

4.3. Discussion

In six experiments, we found that vivid, lucid mental states at the time of death confer more postmortem mind perception than dull, less aware mental states. In Study 2a, we showed that targets who die while

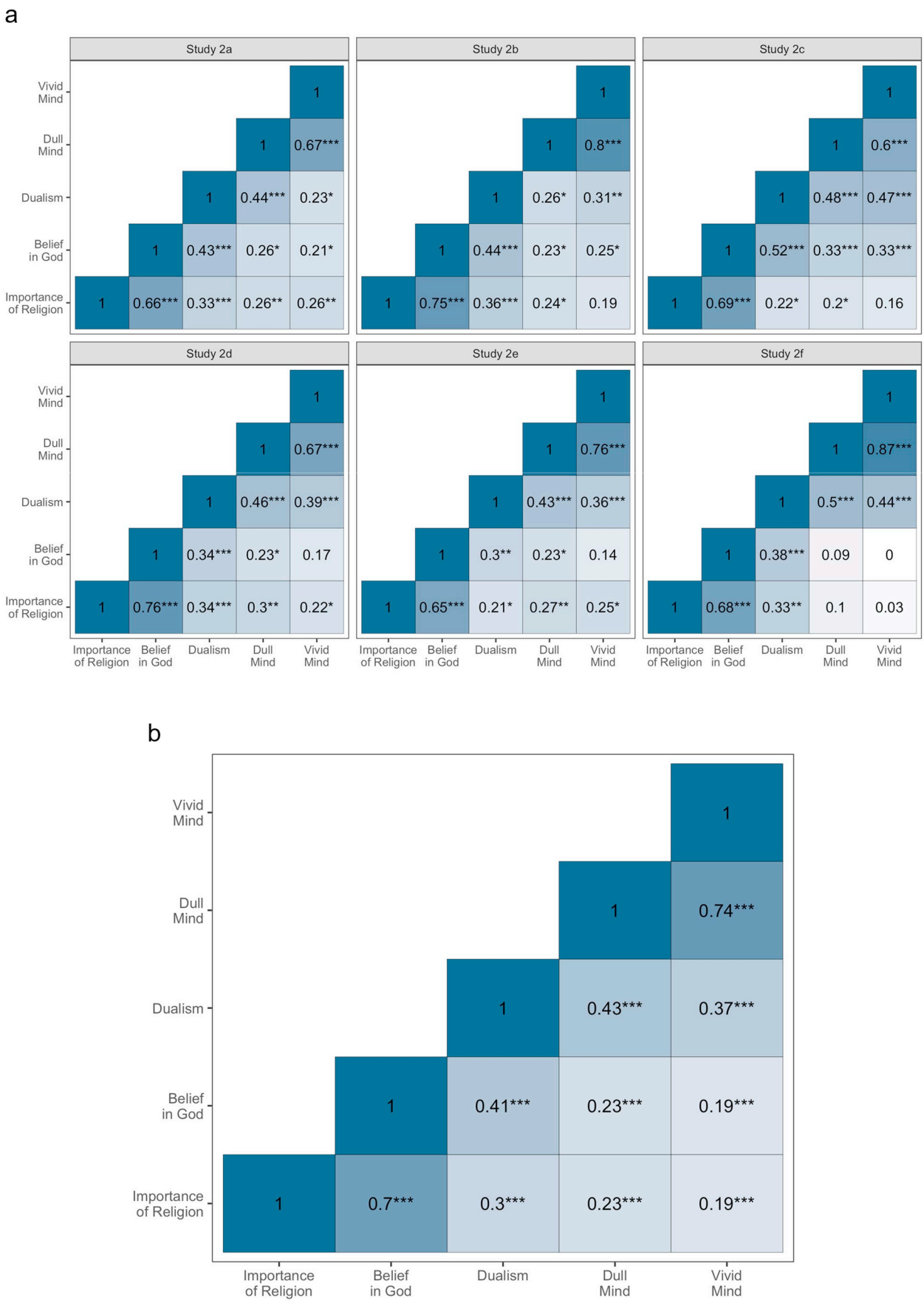

Fig. 3. a. Correlations between ratings of postmortem mind perception, dualism, and religiosity for each of the six experiments in Study 2.
b. Meta-analysis of correlations between ratings of postmortem mind perception, dualism, and religiosity across the six experiments in Study 2.

aware are perceived to have more mind after death than those who die while in a coma. Study 2b extends this effect by demonstrating that dying while aware confers more postmortem mind perception than dying with dementia. Study 2c shows that in spite of severe illness, patients who die with ALS are perceived to have more mind after death than those in a PVS, which we suggest stems from the clarity of their state of mind at the time of death. In Study 2d, we demonstrate that dying a painful death confers more postmortem mind perception that dying painlessly. Study 2e shows that the conservation of consciousness effect holds even when both targets have altered mental states at the time of death. Specifically, targets who were experiencing vivid hallucinations at the time of death were perceived to have more mind postmortem than those who died while in a dull mental state. Finally, in Study 2f, we showed that even if a target is asleep at the time of death, vivid mental activity in the form of dreams confers more postmortem mind perception than dying while in a dreamless sleep. Together, these results provide converging evidence that the level of consciousness at the time of death carries over to perceptions of mind after death.

5. Study 3: Conscious vs. coma replication

Studies 2a-f suggest that consciousness at time of death confers postmortem mind perception. However, there are several caveats to these studies that should be addressed. First, all six studies employed a within-subjects design. While the presentation order of vignettes was counterbalanced, there is still the possibility that this design created task demand, such that participants were able to intuit our hypotheses and respond accordingly. Second, the mind perception items may have invited non-literal reasoning. For example, use of the clause "in some way" (e.g., "in some way, [the target] is still capable of influencing events") and the potential lack of clarity that the items refer to a deceased individual may have inflated our effects. Finally, the conscious-at-time-of-death vignettes may have primed theory of mind by generating greater perspective taking on the part of participants. In Study 3, we aimed to address these issues by 1) employing a between-subjects design, 2) removing the "in some way" caveat from the mind perception items and reiterating that the target is deceased, and 3) altering the language in the vignettes in order to minimize potential for priming theory of mind in the conscious condition.

5.1. Method

5.1.1. Participants

We again computed our a priori sample size in G*Power assuming a medium effect size. The recommended sample size for a between-subjects design was 210, which we nearly doubled as in previous studies. We posted 400 HITs to MTurk for Study 3. Given concerns that data quality suffers when respondents use mobile devices (Struminskaya, Weyandt, & Bosnjak, 2015), participants who indicated that they were completing the survey on a mobile device were excluded from participation. Thus, fewer than 400 participants actually completed Study 3.

5.1.2. Procedure

5.1.2.1. Study 3: conscious vs. coma replication. In Study 3, participants (N = 360) read about a target who either died while in a coma versus fully conscious. Twenty-four participants were removed from analyses because they failed a manipulation check asking whether the target was indeed deceased and/or an attention check embedded in the dualism questionnaire (final N = 336, M_{age} = 36.80, SD_{age} = 11.10, 46% female). Participants were randomly assigned to read either the conscious or unconscious version of the vignette below. Importantly, the vignettes included the same number of mental state references, thus reducing the potential for greater perspective-taking in the conscious condition.

Conscious vignette: "*John Bennett recently passed away. John was brought to the emergency room last Tuesday after he experienced a heart attack. His doctor admitted him and monitored his condition. On Thursday, he experienced another heart attack and passed away that evening. John had been in a coma but regained consciousness shortly before his death. So although John had previously been unconscious and unaware, he was very much conscious and aware at the time of his death.*"

Unconscious vignette: "*John Bennett recently passed away. John was brought to the emergency room last Tuesday after he experienced a heart attack. His doctor admitted him and monitored his condition. On Thursday, he experienced another heart attack and passed away that evening. John had been conscious but fell into a coma shortly before his death. So although John had previously been conscious and aware, he was very much unconscious and unaware at the time of his death.*"

5.2. Results

We conducted an independent samples t-test to investigate differences in postmortem mind perception based on whether targets died while conscious versus unconscious. As in Studies 2a-2f, we again found that the target who was conscious at the time of death was perceived as possessing more mind postmortem (M = 2.64, SD = 1.66) than the target who died while unconscious, (M = 2.17, SD = 1.41), t (334) = −2.79, p = .006, 95% CI [−0.80, −0.14], d = 0.30.

5.2.1. Correlations with dualism and religiosity

As in Studies 1 and 2, we observed positive relationships between dualism and postmortem mind perception of the target who died while conscious (Vivid), as well as the target who died while unconscious (Dull). We also observed a positive relationship between belief in God or a universal spirit and postmortem mind perception of the individual who died while conscious and the individual who died while unconscious. Finally, there was a positive relationship between the importance of religion and postmortem mind perception of the individual who died while conscious, as well as the individual who died while unconscious (see Fig. 4).

5.3. Discussion

Study 3, we ruled out the possibility that the conservation of consciousness effect found in Studies 1 and 2 was due to task demand, non-literal reasoning, or increased perspective-taking on the part of participants during the conscious condition. As predicted, the target who died while conscious was perceived as possessing more mind postmortem than the target who died while unconscious.

6. Study 4: Fear of dying?

Are individuals perceived to live on because they are conscious at the time of death, or because of their perceived fear of death? We have suggested that consciousness itself confers some kind of immortality, but it may also be that the conscious live on in the minds of others simply because people are inferring that they did not want to die. In Study 4, we sought to rule out this possibility, by pitting together awareness versus feelings of fear at the time of death.

6.1. Method

6.1.1. Participants

We again more than doubled G*Power's recommended sample size of 54 participants. One hundred and twenty M-Turk participants completed the study. Twelve participants failed an attention check and were consequently removed from analyses (final N = 108, M_{age} = 36.52, SD_{age} = 13.46, 40% female).

6.1.2. Procedure

As in Studies 1 and 2, participants read two vignettes about targets who had recently died. One vignette was about an individual who was

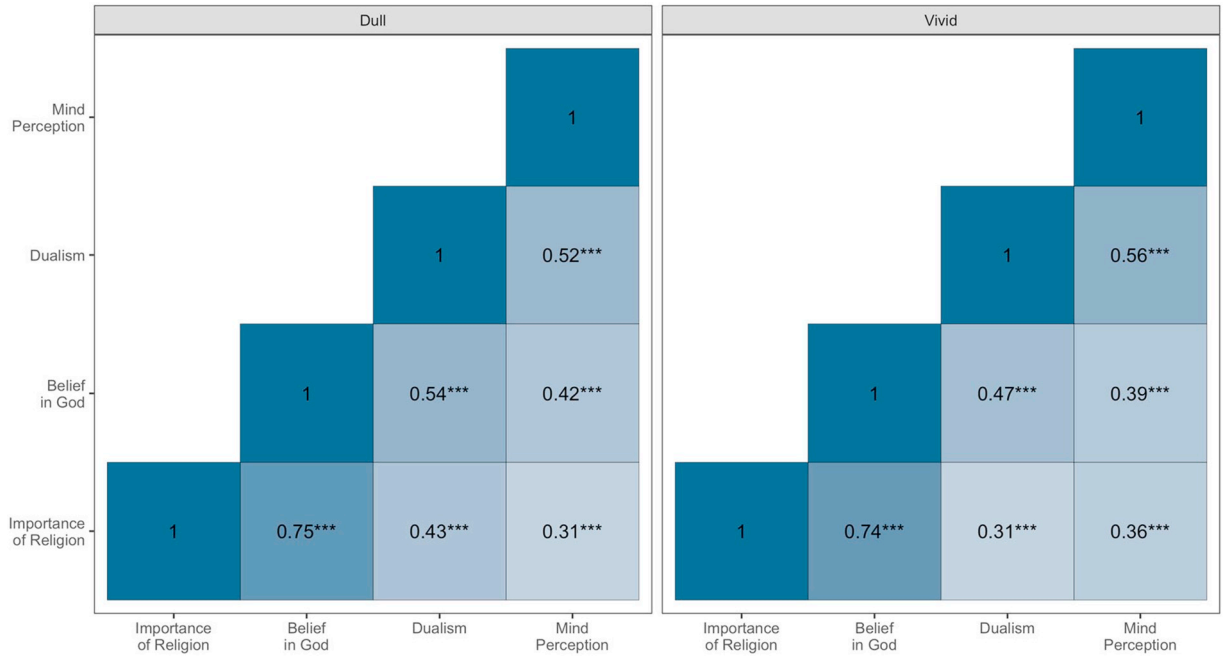

Fig. 4. Correlations between ratings of postmortem mind perception, dualism, and religiosity for Study 3.

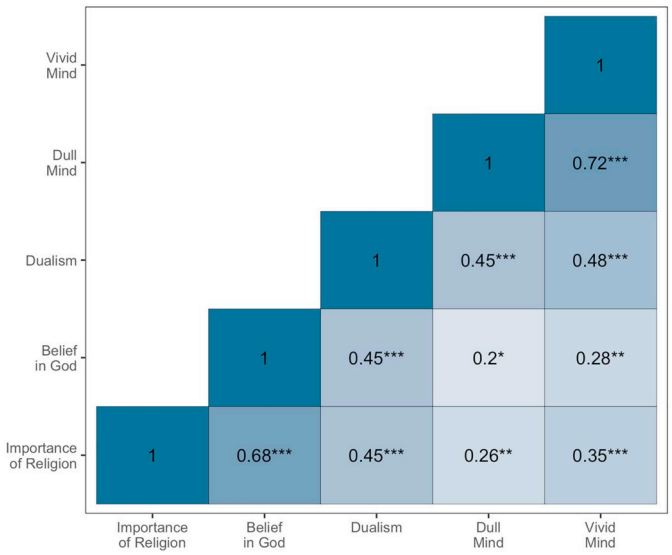

Fig. 5. Correlations between ratings of postmortem mind perception, dualism, and religiosity for Study 4.

not afraid of death and died while conscious, and the other vignette was about an individual who was afraid of death and died while unconscious. Presentation of the two vignettes was counterbalanced across participants to control for order effects. The vignettes used in Study 4 were as follows:

> [*Target 1/Target2*] *recently passed away. He was brought to the emergency room last Tuesday after he experienced a* [*heart attack/stroke and fell into a coma*]. *His doctor admitted him and monitored his condition.* [*Target 1/Target2*] *had known for a few months that he was in bad health, and that there was a chance he might die. He was* [*not at all afraid/very afraid*] *of the possibility that he would soon be dead. A couple days after being admitted to the hospital,* [*Target 1/Target2*] *experienced another* [*heart attack/stroke*] *and passed away that evening.* [*Target 1/Target2*] *was* [*conscious (but feeling no pain)/still in a coma*] *at the time of his death and* [*was fully aware of/never knew*] *what happened.*

6.2. Results

We conducted a paired samples *t*-test to investigate differences in postmortem mind perception based on whether targets were afraid to die. We found that consciousness at time of death, rather than fear of dying, is driving the conservation of consciousness effect. A target who was conscious at the time of death and not afraid of dying was perceived as possessing more mind postmortem ($M = 3.53$, $SD = 1.72$) than a target who was afraid of dying and died while unconscious, ($M = 2.87$, $SD = 1.45$), $t(107) = 5.64$, $p < .001$, 95% CI [0.42, 0.88], $d = 0.42$.

6.2.1. Correlations with dualism and religiosity

We observed positive relationships between dualism and postmortem mind perception of the target who died while conscious and unafraid of death, as well as the target who died while unconscious and afraid of death. We also observed a positive relationship between belief in God or a universal spirit and postmortem mind perception of the individual who died while conscious and unafraid, but there was no relationship between belief in God or a universal spirit and postmortem mind perception of the individual who died while unconscious and afraid. Finally, there was a positive relationship between the importance of religion and postmortem mind perception of the individual who died while conscious and unafraid, as well as the individual who died while unconscious and afraid (see Fig. 5).

6.3. Discussion

In this study, we ruled out the possibility that the conservation of consciousness effect seen in Studies 1–3 was being driven by perceptions of fear of dying. The target who died while conscious and unafraid of death was perceived as possessing more mind postmortem than the target who died while unconscious and afraid of death.

7. Study 5: Robots and the separation of capacity and last moments

In Study 5, we sought to generalize the conservation of consciousness effect by investigating perceptions of an ambiguous mind—a robot. We created four vignettes about a mechanical robot that was "disassembled." The robot's disassembly is a proxy for its death because participants were told that the robot would no longer be functional after it was disassembled. We manipulated the presence of mind by describing the robot as either having sophisticated mental capacities or not. We also manipulated the robot's perceived consciousness at time of "death" by describing it as being either powered on or powered off during the disassembly. We predicted that the robot would have more mind "after death" when it both had mind before death and was powered on.

This experiment also helped address two potential concerns from previous studies. First, it could be that lucid-at-death targets were ascribed more mind after death because their descriptions were somehow more "extreme," evoking more intense reactions in participants. Second, it could be that people infer that the person who dies while lucid has more general psychological capacity. For example, participants might have inferred that the target with dementia always had little mental capacity (or at least less than the person without dementia), and these perceptions of general capacity could have influenced judgments of mind after death. By independently manipulating capacity and time-of-death state, we can better test for the importance of last moments. That is, while the general capacity for mind is important, it should also be necessary to have that mind lucid at the time of death.

7.1. Method

7.1.1. Participants

Because we found medium to large effect sizes in the previous studies, we conducted an a priori power analysis assuming a medium to large effect size. G*Power recommends a sample size ranging from 112 to 280 participants for a factorial ANOVA. To ensure adequate power, we targeted the higher end of the sample size estimate. Two-hundred and sixty-seven participants started the survey, but twenty-five failed to complete it. Of the two hundred and forty-two participants who completed the study, seventeen failed an attention check and were consequently removed from analyses (final N = 225, M_{age} = 34.14, SD_{age} = 10.98, 44% female).

7.1.2. Procedure

In a 2 (state at time-of-death: *on*, *off*) x 2 (mental capacity: *sophisticated*, *simple*) between-subjects experiment, we varied the descriptions of the robot based on mental capacity and whether it was powered *on* or *off* at the time of disassembly. The robot with mental capacity was described as having a "sophisticated mind," whereas the robot with no mental capacity was described as being a simple working machine. Participants each read one vignette about the robot's disassembly, and rated the robot's mind after the disassembly as in previous studies. The Study 5 vignettes were as follows:

> "*Sonny was a* [*sophisticated/simple*] *robot that was recently disassembled. He* [*seemed to have a mind/was a simple work device*]. *He* [*could feel emotions, and had intentions and hopes for the future/was wirelessly operated from a control panel*]. *When Sonny was powered on, he* [*was fully conscious/worked efficiently*]. *Sonny was used to replace reactors in chemical plants, but new reactors no longer need to be replaced. Therefore, Sonny was disassembled for spare parts. Sonny* [*had been working up until the day he was disassembled/hadn't worked for years and was collecting dust*]. *At the time he was disassembled, Sonny* [*had a full battery and was powered on/did not have his battery in and was powered off*]. [*He remained completely inanimate and unconscious during his disassembly* (unconscious condition only)]."

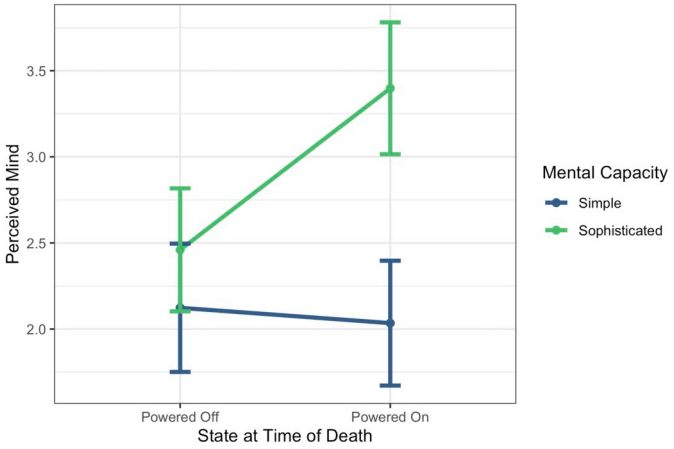

Fig. 6. Means and 95% confidence intervals reveal greater postmortem mind perception for a robot with a sophisticated mind who is powered on at the time of death.

7.2. Results

A 2 (state at time-of-death: *on*, *off*) x 2 (mental capacity: *sophisticated*, *simple*) ANOVA revealed a main effect of mental capacity, such that robots who had a sophisticated mind were perceived as having more mind postmortem than those who had a simple mind, $F(1, 221) = 20.61$, $p < .001$, $\eta_p^2 = 0.09$. There was also a main effect of state at time-of-death, such that robots who were disassembled while powered on were perceived as having more mind postmortem than those who were powered off, $F(1, 221) = 5.14$, $p = .024$, $\eta_p^2 = 0.02$. The main effects were qualified by the predicted interaction between mental capacity and state at time-of-death, such that if the robot had a sophisticated mind and was powered on at the time of disassembly, it was perceived as having more mind postmortem (M = 3.40, SD = 1.65, 95% CI [3.02, 3.78]) than if it had a sophisticated mind and was powered off (M = 2.46, SD = 1.44, 95% CI [2.10, 2.82]), as well as those who had a simple mind and were powered on (M = 2.03, SD = 1.24, 95% CI [1.67, 2.40]) or off (M = 2.12, SD = 1.20, 95% CI [1.75, 2.50]), $F(1, 221) = 7.53$, $p = .007$, $\eta_p^2 = 0.03$ (see Fig. 6).

7.2.1. Correlations with dualism and religiosity

Perhaps because people have less developed intuitions about the minds of robots and dualism, there was no relationship between dualism and postmortem mind perception of the robot that had a sophisticated mind and was powered on during disassembly, nor the robot that had no mind and was powered off during disassembly. There was a positive relationship between dualism and postmortem mind perception of the robot that had a sophisticated mind and was powered off at the time of disassembly, as well as the robot that had no mind and was powered on during disassembly. In terms of religiosity items, we did not observe any relationships between postmortem mind perception of the robot and belief in God or in the importance of religion (see Fig. 7).

7.3. Discussion

This study further demonstrates that perceived consciousness at time of death confers postmortem mind perception. If a robot has an aware mind at the time of death, then it is granted more mind after death, just as with humans. However, even a robot who led a rich, vivid life was not granted postmortem mind when he was "unconscious" during his final moments. This finding not only demonstrates the domain-generality of the conservation of consciousness, but also affirms that it is precisely the ending of life that determines the conservation of

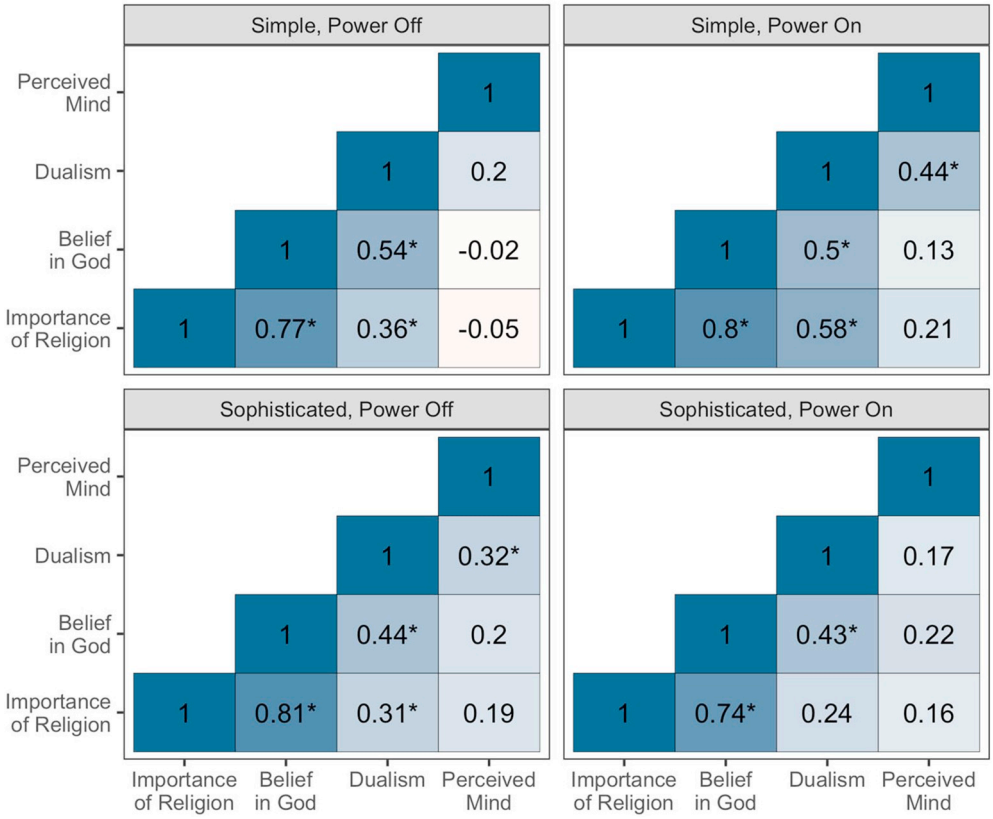

Fig. 7. Correlations between postmortem mind perception, dualism, and religiosity for each of the conditions in Study 5.

consciousness. Next, we test an implication of perceived conservation of consciousness—the moral rights of the dead.

8. Study 6: Moral rights of the dead

The previous studies demonstrate that dying while conscious confers greater postmortem mind perception. However, they do not speak to any downstream implications of the conservation of consciousness effect. As mind is tied to morality (Gray, Young, & Waytz, 2012), it may be that those who die while conscious also enjoy more moral rights. We hypothesized that neglecting the dying wishes of the dead would be seen as more immoral when people die while conscious.

8.1. Method

8.1.1. Participants

As in previous studies using a within-subjects design, we approximately doubled G*Power's recommended sample size of 54 participants. One hundred and twenty-one participants completed the study. Nine participants failed an attention check and were consequently removed from analyses (final N = 112, M_{age} = 34.77, SD_{age} = 11.67, 46% female).

8.1.2. Procedure

Participants read vignettes about individuals who died while either conscious or in a coma, and had their last wishes violated after their death. Violated wishes involved the targets' small businesses not being run as they had envisioned. Vignettes were presented in counterbalanced order to avoid potential order effects or demand characteristics. The vignettes for Study 6 were as follows:

> "[*Target 1/Target 2*] *recently passed away. He was brought to the emergency room last Tuesday after he experienced a* [*heart attack/stroke*] [*and fell into a coma* (unconscious condition only)]. *His doctor admitted him and monitored his condition. On Thursday, he had another* [*heart attack/stroke*] *and passed away that evening.* [*Target1/Target 2*] *was* [*conscious/still in a coma*] *at the time of his death and* [*was fully aware of/never knew*] *what happened. He owned a traditional* [*Italian/Mediterranean*] *restaurant that he wanted to keep classic and pass down to his oldest son. Instead of having it remain a traditional* [*Italian/Mediterranean*] *restaurant like* [*Target 1/Target 2*] *wanted, his son modernized the menu to keep up with the trends.*"

We assessed perceptions of moral wrongdoing using six items designed to measure the extent to which the target was harmed by his son's actions after his death. The items were as follows: 1) "It was wrong to modernize [the target]'s menu," 2) "It was immoral to modernize [the target]'s menu," 3) "It was permissible to modernize [the target]'s menu (reverse coded)," 4) "[The target] was victimized by the decision to modernize his menu," 5) "[The target] was harmed by the decision to modernize his menu," and 6) "The decision to modernize [the target]'s menu caused him suffering." Ratings of these violations of targets' wishes were collected on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Reliability for the six items in the Violation of Wishes Scale was high (α = 0.92).

8.2. Results

We conducted a paired samples t-test to investigate whether participants perceived more postmortem mind in the target who died while conscious. As expected, the conscious target was ascribed more postmortem mind (M = 3.01, SD = 1.58) than the unconscious target (M = 2.85, SD = 1.50), $t(111)$ = 2.22, p = .03, 95% CI [0.02, 0.29], d = 0.10. We also sought to test whether the conscious target was perceived as having been more "wronged" when his wishes were violated after his death. As predicted, participants considered this violation of wishes to be more immoral if the individual died while conscious (M = 2.87, SD = 1.30) compared to unconscious (M = 2.53,

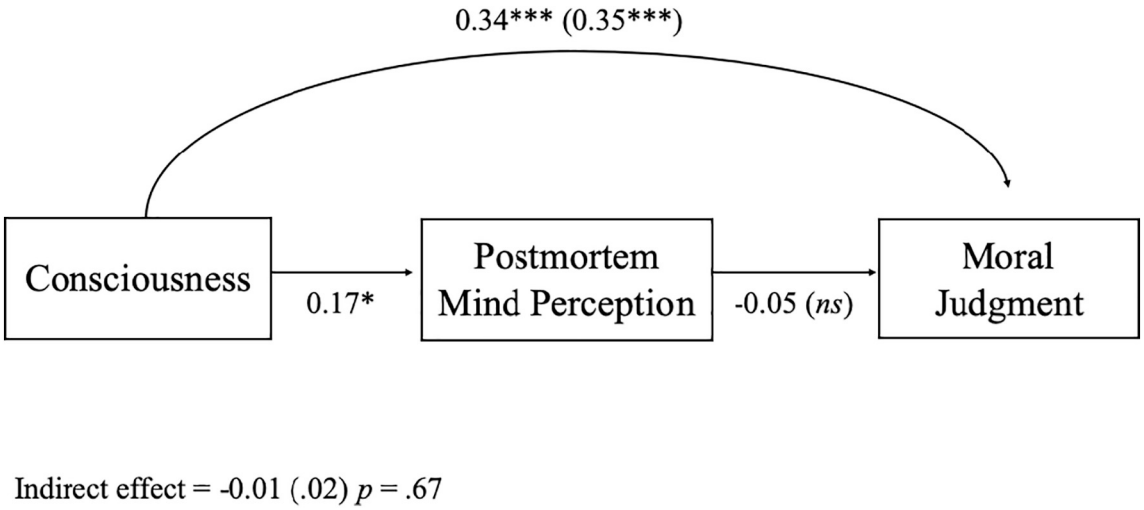

Fig. 8. A multilevel mediation model revealed that postmortem mind perception does not mediate the link between targets' consciousness at time of death and moral judgments of wrongs committed against the targets after death.

$SD = 1.20$), $t(111) = 4.23$, $p < .001$, 95% CI [0.18, 0.50], $d = 0.27$. In addition to comparing mean values of postmortem mind perception and judgments of immorality, we conducted a mediation analysis to assess whether postmortem mind perception mediated judgments of morality. Despite general links between mind perception and morality (Gray, Young, & Waytz, 2012), postmortem mind perception did not mediate judgments of morality, $b = -0.01$, $p > .05$ (see Fig. 8). This null finding suggests that there may be two independent effects of living on in terms of mind and in terms of morality. Consciousness at the time of death confers both consciousness after death and enduring moral concern.

8.2.1. Correlations with dualism and religiosity

Dualism was correlated with participants' postmortem mind perception ratings, as well as their moral judgments of violating targets' wishes after death. Specifically, dualism was positively correlated with postmortem mind perception of the target who died while conscious, with participants' judgments of violations of the conscious target's wishes after death, with postmortem mind perception of the target who died while unconscious, and with judgments of violations of the unconscious target's wishes after death. As in previous studies, postmortem mind perception of the target who died while conscious was positively correlated with participants' belief in God or a universal spirit and the importance of religion. However, neither belief in God nor the importance of religion were correlated with judgments of the violation of the conscious target's wishes after death. The same pattern of results emerged for the target who died while unconscious. Specifically, postmortem mind perception of the target who died while unconscious was positively correlated with belief in God or a universal spirit, as well as with the importance of religion. As with the conscious target, neither belief in God nor the importance of religion were correlated with judgments of the violation of the unconscious target's wishes after death (see Fig. 9).

8.3. Discussion

Study 6 reveals that consciousness at the time of death not only confers more perceived mind postmortem, but also more respect for your living wishes. Targets who were conscious when they died were seen as more victimized and more wronged when their wishes were violated after death. These findings suggest that consciousness at time of death leads to tangible benefits beyond death—a greater respect for the legacy of the dead.

9. Study 7: Cemetery study

In Study 7, we sought to replicate the perceived conservation of consciousness in a real-world setting, involving real dead people. We brought participants to the Old Chapel Hill Cemetery, a two-hundred-year-old historic cemetery on the campus of the University of North Carolina at Chapel Hill. Participants were escorted through the cemetery as experimenters read short—and true—biographical vignettes about notable alumni and other individuals that are buried there. We manipulated the ending of the vignettes, describing that the individuals were either conscious or unconscious at the time of their deaths, and then asked participants to rate the individuals on postmortem mind perception.

9.1. Method

9.1.1. Participants

Unlike other studies, which used MTurk participants, this study employed undergraduate students, who participated in the experiment in exchange for credit toward a course requirement. As in most of our previous studies, we approximately doubled G*Power's recommended sample size of 54 participants. Ninety-three participants ($M_{age} = 19.34$, $SD_{age} = 3.33$, 59% female) completed the study. We had no reason to suspect that participants would be inattentive during this experiment. This rationale is based on the fact that participants completed the task in the presence of an experimenter rather than in a closed room in the lab (or the privacy of their own homes, as in online studies). Thus, we did not exclude participants based on an attention check as in our previous studies. We also collected standard demographics information from Study 7 participants. In terms of racial identity, 70.8% of participants reported that they identify as “White,” 13.5% identify as “Asian,” 8.3% identify as “Black,” 3.1% identify as “more than one race,” and 4.2% chose not to respond.

9.1.2. Procedure

Participants entered the laboratory individually and were attached to physiological sensors to measure skin conductance, electrocardiography, and cardiac impedance using an ambulatory monitor (Mindware Technologies; Gahanna, OH). We hypothesized that learning about individuals who died while conscious would lead to increased autonomic nervous system activity (e.g., galvanic skin response), which is an indirect measure of attention, emotion, and cognitive arousal (e.g., Critchley, Elliott, Mathias, & Dolan, 2000). However, due to extensive technical issues with the ambulatory device (i.e.,

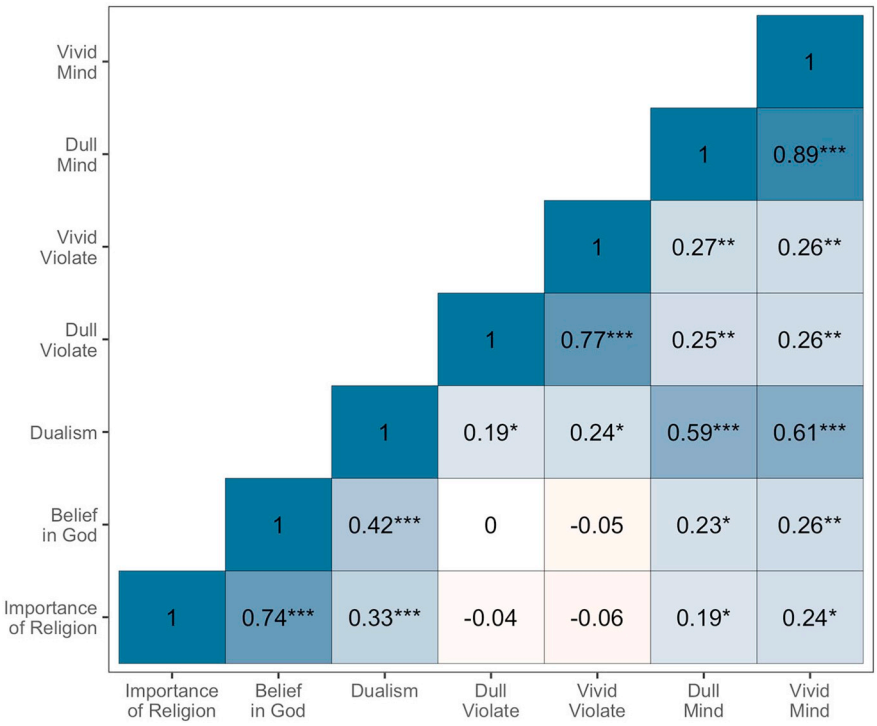

Fig. 9. Correlations between ratings of postmortem mind perception, violation of wishes, dualism, and religiosity for Study 6.

Fig. 10. Research assistants demonstrate how participants were led around the cemetery, learning about the lives of the deceased and whether they died while conscious or unconscious. Participants rated the continued mental capacity of the deceased on an iPad.

poor connection, failure to record, lost sensors due to sweating in the North Carolina humidity), the psychophysiological data were unanalyzable and will thus not be discussed in the results section. After being attached to the ambulatory physiological device, the participant was escorted by a research assistant to the Old Chapel Hill Cemetery on UNC's campus (about a five-minute walk from the Department of Psychology and Neuroscience). On the way to the cemetery, the participant was told: "*We are going to take a short walk to the cemetery on campus, where you'll learn about notable UNC alumni. The things you'll learn are designed to help you engage in the University's rich cultural history. When we get to the cemetery, I'll have you fill out some questionnaires and then I am going to tell you about some notable alumni and other individuals who made an impact here at Carolina.*" See Fig. 10 for a sense of what participants experienced during the task, as reenacted by two research assistants who were instrumental in conducting this experiment.

Once in the cemetery, participants completed demographics questionnaires on an iPad. The purpose of collecting demographics data in the cemetery before the experiment was to provide adequate time for participants' physiological activity to return to baseline after walking from the lab. After participants completed the questionnaires, they

were told "*We are now going to visit the gravesites of several individuals that attended Carolina or were otherwise affiliated with the University*." At each of six gravesites, the iPad was used to present participants with vignettes about the individuals buried there. We included biographical information about the lives and deaths of real individuals, but we manipulated whether the targets were conscious or unconscious at the time of their deaths. Vignettes were counterbalanced for order of presentation and targets' consciousness at the time of death (see Supplementary Materials for the full vignettes).

After learning the biographies of each individual, participants completed an abridged version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) while still at the gravesite. We added two additional items to the PANAS because we felt that they were particularly relevant to the graveyard setting (i.e., *creeped out* and *unnerved*). Participants also completed our 10-item postmortem mind perception scale at each gravesite.

9.2. Results

Prior to conducting our analyses, we took each participant's average postmortem mind perception rating across each of the graves in which the target purportedly died while conscious, as well as the average rating of postmortem mind perception at each of the graves in which the target purportedly died while unconscious. We followed the same procedure for self-reported positive and negative affect at the gravesites. We then conducted inferential statistics on those mean values. Replicating the results of our previous studies, we found that individuals who died while conscious were perceived as having more postmortem mind perception (M = 3.31, SD = 1.29) than individuals who died while unconscious (M = 3.20, SD = 1.29), $t(92) = 2.47$, $p = .02$, 95% CI [0.02, 0.21], $d = 0.09$. Further, we found that participants felt more positive affect at the gravesites of individuals who died while conscious (M = 1.36, SD = 0.50) compared to individuals who died while unconscious (M = 1.30, SD = 0.49), $t(92) = 3.00$, $p = .004$, 95% CI [0.02, 0.10], $d = 0.12$. Finally, participants also felt more negative affect at the gravesites of individuals who died while conscious (M = 1.45, SD = 0.50) compared to those who died while unconscious (M = 1.39, SD = 0.34), $t(92) = 2.84$, $p = .006$, 95% CI [0.02, 0.11], $d = 0.17$. That both positive and negative affect was elevated at the gravesites of those who died conscious may be perhaps a bit surprising, but we suggest that participants were likely experiencing more general affective arousal at their gravesites. It makes sense that the increased psychological presence of a notable person may be both exciting and unnerving.

In addition to assessing mean differences, we also conducted regression analyses using our measures of positive and negative affect as predictors of postmortem mind perception. We first assessed whether positive and negative affect at the gravesites of individuals who died while conscious predicted postmortem mind perception of those individuals. We found that the two predictors (i.e., positive and negative affect) together explained about 11% of the variance in postmortem mind perception of the targets who died while conscious, $R^2 = 0.11$, $F(2,90) = 5.55$, $p = .005$. Negative affect was a significant predictor of postmortem mind perception of individuals who died while conscious ($\beta = 0.87$, $p = .02$). However, positive affect did not significantly predict postmortem mind perception of individuals who died while conscious ($\beta = 0.42$, $p = .12$). We then assessed whether positive and negative affect at the gravesites of individuals who died while unconscious predicted their postmortem mind perception. Positive and negative affect together explained about 15% of the variance in postmortem mind perception of the targets who died while unconscious, $R^2 = 0.15$, $F(2,90) = 8.09$, $p = .001$. In the case of targets who died while unconscious, both positive affect ($\beta = 0.58$, $p = .03$) and negative affect ($\beta = 1.04$, $p = .01$.) emerged as significant predictors of postmortem mind perception.

9.2.1. Correlations with dualism and religiosity

Dualism was positively correlated with postmortem mind perception of the targets who died while conscious, but not with self-reported positive and negative affect at the gravesites of individuals who died while conscious. Dualism was also positively correlated with participants' ratings of postmortem mind perception of targets who died while unconscious, as well as participants' negative affect at the gravesites of individuals who died while unconscious. However, dualism was not correlated with positive affect at those same gravesites. In terms of religiosity, belief in God or a universal spirit was positively correlated with postmortem mind perception of the targets who died while conscious, as well as with negative affect at the gravesites of individuals who died while conscious. However, it was not correlated with participants' positive affect at those gravesites. The importance of religion was correlated with postmortem mind perception of the target who died while conscious, but not with participants' self-reported positive or negative affect at those gravesites. For unconscious targets, belief in God or a universal spirit was positively correlated with postmortem mind perception, but not with participants' positive or negative affect at the gravesites of those individuals. The same pattern emerged for the importance of religion. Specifically, it was positively correlated with postmortem mind perception of the target who died while unconscious, but not with participants' self-reported positive or negative affect at those individuals' gravesites (see Fig. 11).

9.3. Discussion

In Study 7, we replicated and extended our previous findings by demonstrating the conservation of consciousness effect in a more naturalistic setting. Undergraduate participants perceived more postmortem mind perception in targets who had died while conscious as compared to targets who had died while unconscious. Further, participants experienced more positive and negative emotions at the gravesites of individuals who had died while conscious, suggesting that the continued presence of mind impacts more than just explicit ratings—it also impacts emotional experience.

10. General discussion

Despite the perennial focus on death and the afterlife in human cultures, relatively little research has examined psychological processes surrounding this important transition. The current research sought to examine how people might achieve some degree of continued presence of mind after death. Seven studies revealed support for the phenomenon of "conservation of consciousness," such that people perceive more mind in the deceased when they died while aware, awake, or otherwise conscious. In Study 1, participants saw more mind in the deceased when they died with their eyes open versus with their eyes closed. In Study 2, participants saw more mind in the deceased when they died with more lucidity and consciousness across six manipulations including dying while awake (vs. while in a coma), dying of ALS (vs. of Alzheimer's), dying on hallucinogens (vs. on sedatives), dying while dreaming (vs. while in a deep sleep). In Study 3, we replicated the effect in a between-subjects design with additional experimental control. Study 4 revealed that the conservation of consciousness is driven by general consciousness more than the specific fear of death, and Study 5 extended this effect to a novel target—robots—while also independently manipulating general mental capacity with state at the time-of-death. Study 6 examined an extension of conservation of conscious, revealing that someone's last wishes carried more moral weight if they died while awake and aware versus unconscious. Finally, Study 7 generalized the conservation of consciousness effect to a more real-world setting, a historic cemetery. Participants perceived more mind in the deceased—and had a more powerful affective experience—if they learned that they died while conscious versus unconscious.

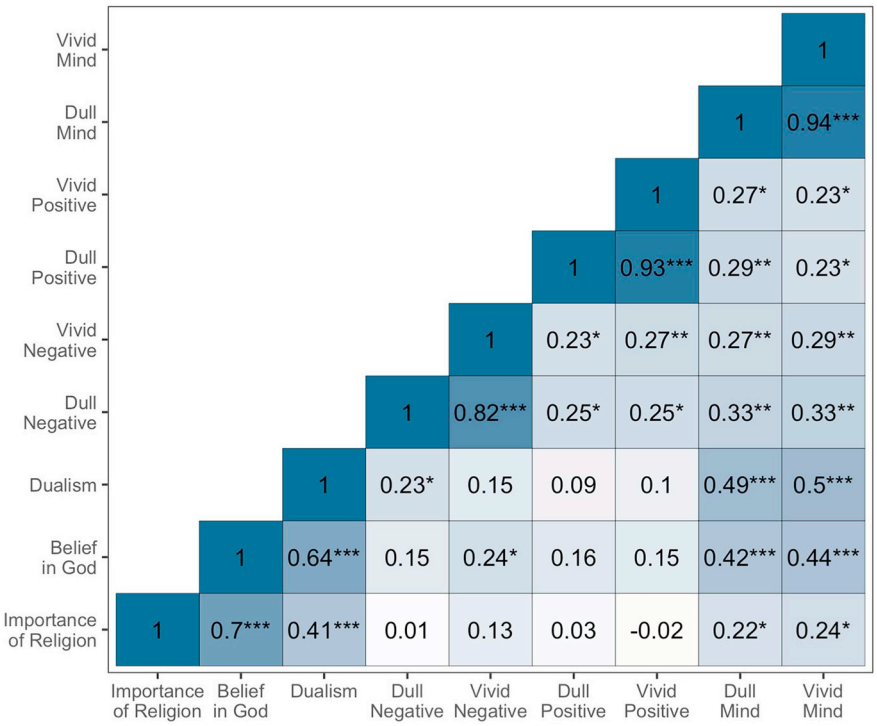

Fig. 11. Correlations between ratings of mind perception, positive and negative affect, dualism, and religiosity for Study 7.

10.1. Implications

Together, these results extend theory in three ways: shedding light on the psychology of death, event endings, and mind perception. First, these studies reveal how people's lives—and their termination—can be understood via domain general processes. Research in judgment and decision-making finds that people rely upon the "peak" and the "end" of events when making summary judgments about those events (Kahneman et al., 1993), and these studies add to results suggesting the perceived importance of endings (e.g., Eylon & Allison, 2005) concerning the lives of others.

Second, these findings also inform a basic understanding of event endings, revealing an even greater influence of endings than previously thought. Past work on endings has revealed that people often prefer an objectively worse experience (e.g., a longer colonoscopy) if it has a more positive ending (Kahneman et al., 1993). While this preference is irrational, it attests to the powerful impact of endings on overall perceptions of psychological experience. These studies build on this work to reveal that endings also shape perceptions of minds after death.

Third, these results reveal an important property of mind perception, and perhaps social cognition more generally: continuity. Previous studies have demonstrated the ease with which we initiate mind perception, seeing mind in animals (Epley, Waytz, & Cacioppo, 2007), supernatural agents (Gervais, 2013), animate motion (Looser & Wheatley, 2010) and machines (Gray & Wegner, 2012). These studies illustrate the difficulty of dispelling mind perception even in the face of scientific evidence regarding death. People may explicitly understand that consciousness ends with death, but the internal trace left in our own mind by another's consciousness is hard to dispel. In some small way, our minds may treat other minds like the physical laws regarding energy or momentum. The mental energy or momentum of others may be conserved in our perceptions.

These results also have a practical implication. Many people seem to want to die in their sleep, to go painlessly and unaware into the darkest of nights. However, such an easy death is not without its tradeoffs, at least in terms of one's legacy. To the extent that people want their minds to live on after they pass away, they may strive to stay awake leading up to their final moments. Of course, we can seldom choose when exactly we die, but we can often determine our mental state leading up to death. For example, using consciousness-dulling pain killers (e.g., morphine) can make death less difficult, but it also makes it less likely that others will perceive your mind after death. Likewise, as people grapple with diagnoses of dementia and Alzheimer's, they must also recognize that the longer the disease progresses before death, the less that loved ones may perceive their minds after death. Although these studies only examine a relatively circumscribed phenomena, they point to the importance of having broader discussions (and more empirical investigations) about death. Despite its looming inevitability and absolute universality, there is relatively little work examining how people's understanding of death intersects with basic socio-cognitive processes.

10.2. Caveats and future directions

As with any set of studies, the current research has a variety of limitations. First, we acknowledge that we examine only Western participants, who may have a different conception of death than other cultures (e.g., Nichols, Strohminger, Rai, & Garfield, 2018). Despite this limitation, our samples were relatively diverse in terms of religious affiliation (see Table S1 of Supplementary Materials).[2] While we recognize the importance of cross-cultural research, we also suggest that it is important to examine perceptions of death within Western culture across a range of religious beliefs. Despite the vast amounts of research on social cognition completed with Western participants, relatively little examines perceptions of the dying. The research that does investigate death and dying typically focuses on how people cope with the threat of their own death, or how people cope with the loss of a loved one (e.g., Buckley et al., 2012; Fried et al., 2015; Schut & Stroebe,

[2] Although Lewis, Djupe, Mockabee, & Wu, (2015) argue that non-religious individuals are overrepresented in MTurk samples, we found our samples to be relatively diverse in terms of religious affiliation. In fact, some of our samples had more Catholics and Evangelicals than Atheist and Agnostic individuals.

1999). This work focuses on more basic socio-cognitive processes tied to the transition out of life.

Although the participants used here were Western, it is worth noting that other cultures appear to emphasize the importance of one's mental state in the last moments of life. In the Hindu holy text, the *Bhagavad-gita*, it is written:

> "Whatever state of being one remembers when he quits his body, O son of Kunti, that state he will attain without fail." (8.6) "And whoever, at the end of his life, quits his body remembering Me alone at once attains My nature. Of this there is no doubt." (8.5).

Put differently, it is those who are thinking of God at the last moment of their lives who become one with God. This quote suggests a specific flavor of conservation of consciousness: divine-oriented consciousness. Although the power of an omnipotent God may help with the persistence of mind, it seems like religious belief may not be necessary to enable conservation of consciousness. We suggest that ethnographic accounts might further reveal the perceived importance of mental states at the time of dying.

Another limitation is that the effects reported here are relatively small, revealed mostly through within-subject studies (although Studies 3 and 5 used between-subjects manipulations). Clearly whether someone dies while awake or asleep matters less to mind perception than the general fact of whether they are dead or alive. Even in perceptions of death, people have dispositional differences in mind perception, such as those we revealed: individuals higher in dualism and religiosity perceive more mind in the dead. However, while overall perceptions of mind are largely determined by objective facts about others and people's enduring beliefs, substantial research reveals how perceptions of mind are sensitive to relatively subjective social factors. For example, people ascribe lower mind to outgroups (Hackel, Looser, & Van Bavel, 2014) and to disliked others (Kozak, Marsh, & Wegner, 2006), which in turn dictates how we treat them. This is because people tend to deny mind perception to members of outgroups, effectively seeing those individuals as less human than themselves (Kteily, Bruneau, Waytz, & Cotterill, 2015). Consequences of such dehumanization range from medical professionals providing deindividuated medical care to outgroups (Haque & Waytz, 2012) to average Americans explicitly endorsing physical harm to suspected terrorists (Waytz & Epley, 2012). Therefore, we suggest that even relatively small effects can be important in determining how we treat others.

We also acknowledge that the idea of conservation of consciousness was tested in a relatively controlled fashion, with each study comparing similar targets who were more or less lucid. We suggest that future research should examine perceived conservation of conscious across a number of more diverse settings. However, we note that we did examine a large array of ways in which consciousness naturalistically varies (especially as death approaches), including being awake or asleep, being in a coma or being lucid, having dementia or not, and being on different kinds of medication. In all these cases, results were consistent: more lucidity at the time of death conferred more perceived mind after death. We also extended these effects to an entirely novel target—a robot—revealing the generalizability of the persistence of mind across fundamental transitions. Finally, we note that we revealed conservation of consciousness in a historic cemetery, providing some naturalistic validity and methodological diversity.

The present studies demonstrate a robust effect of consciousness at time of death on perceptions of mind after death. Two recent reviews suggest another potential driver of perceptions of mind after death: perceptions of social relationships at the time of death (Harris, 2018; Hodge, 2018). These accounts suggest that people are perceived to exist after death relative to their apparent social ties with the living—a perspective consistent with the sentiment that the deceased "live on" through their friends and loved ones. The current work may help support this perspective because a person's perceived mind is likely correlated with a person's social ties. It is certainly more difficult to have rich social connections in a coma than when fully lucid. However, perceptions of mind likely matter above and beyond social ties; it is unlikely that inferences of social ties explain why someone dying while on hallucinogens is conferred more postmortem mind than someone dying while on sedatives. Future research should more closely tease apart mind and social connections, especially because many have argued that minds themselves are webs constructed by our social world (Hofstadter, 2007; Wegner & Gray, 2016).

Finally, it is important to note that the present studies emphasized the basic social cognitive processes involved in perceiving the minds of the deceased. With the exception of the moral implications revealed in Study 6, the present research did not examine the downstream effects of consciousness at time of death, including its impact on surviving loved ones. Future research should investigate this important question. For example, if our loved ones die while conscious, does that positively or negatively impact the process of bereavement?

11. Conclusion

With an aging population, there is a renewed focus on death in popular culture. Books such as *Mortality* (Hitchens, 2012) and *Gratitude* (Sacks, 2015) examine poignant accounts of dying. We suggest that social psychology might also want to focus basic research on this important life transition, by questioning how people understand the minds of those who are dying—or have recently died. This work suggests that social cognition is somewhat conserved across death, such that people's base perceptions of mind after death depend upon those moments at the very end of life. Practically speaking, this suggests that if you want to live on more in the thoughts of others—and if you want others to follow your dying wishes—it might make sense to die while others think you are lucid. We often say how we want to die in our sleep, but we may live on more in the eyes of others if we die while awake.

CRediT authorship contribution statement

Cameron M. Doyle: Methodology, Formal analysis, Writing - original draft. **Kurt Gray:** Conceptualization, Methodology, Writing - original draft, Funding acquisition.

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