

Would you exchange your soul for immortality? –

Existential Meaning and Afterlife Beliefs Predict Mind Upload Approval

Michael Laakasuo

Jukka Sundvall

Marianna Drosinou

Ivar Hannikainen

Anton Kunnari

Kathryn B. Francis

Jussi Palomäki

Ethics statement: All the local laws and regulations were followed in full.

Data availability: The dataset, analysis scripts, materials and codebook generated for the current study will be available on [Figshare.com](https://figshare.com) upon the publication of this paper.

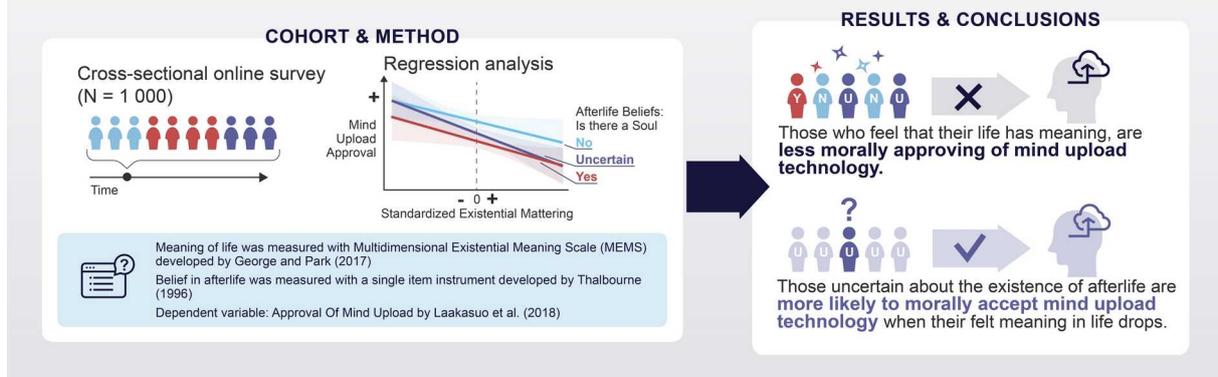
Funding: This work was supported by the Jane & Aatos Erkko Foundation [grant number [170112](#)]; and the Academy of Finland [grant number [323207](#)].

Acknowledgements: ML would like to thank Kaj Sotala for his support for Moralities of Intelligent Machines team and for providing the first version of the Mind Upload vignette. ML would like to thank all of his team members, who make this research possible. Special thanks to Jane and Aatos Erkko Foundation (grant number: 170112) and Academy of Finland (grant number: 323207) for funding this research

Graphical Abstract

Would you exchange your soul for immortality?

– Existential Meaning and Afterlife Beliefs Predict Mind Upload Approval



Abstract

Mind upload, or the digital copying of an individual brain and mind, could theoretically allow one to “live forever”. If such a technology became available, who would be the most likely to approve of it or condemn it? Research has shown that fear of death positively predicts the moral approval of hypothetical mind upload technology, while religiosity may have the opposite effect. We build on these findings, drawing also from work on religiosity and existential mattering as predictors of perceived meaning in one’s life. In a cross-sectional study (N = 1007), we show that existential mattering and afterlife beliefs have a negative association with the moral approval of mind upload technology: people who believe there is a soul or some form of afterlife and who also report a high level of existential mattering, are least likely to approve of mind upload technology. Indeed, mind uploading – if it ever becomes feasible – is a form of technology that would fundamentally redraw the existential boundaries of what it means to be human.

Introduction

Mind upload refers to a speculative future technology that would allow the copying or transfer of an individual's brain into a digital form (Moravec 1988; Kurzweil 2005; Wiley 2014). While the current state of such technology is a "first draft" of a digital version of the connectome of a mouse neocortex (Reimann et al., 2019), some futurists predict that emulated human brains will become possible (e.g., Hanson, 2016). Realistic or not, the ethics and philosophy of mind upload have already been given some serious thought (Andrade, 2018; Capuccio, 2017; Sandberg, 2014). Here, we are interested in laypeople's attitudes towards potential future technologies that could dramatically change humanity: do people find mind upload (im)moral, and why? In terms of moral psychology, mind upload is especially interesting because it carries an implicit promise of immortality through technology, but in doing so, may clash with common intuitions about souls and the afterlife (Bering, 2006; O'Connell, 2017; Geraci, 2010).

Previous research has found both cultural and individual-level factors influencing people's moral judgments about transhuman technologies (Koverola et al., 2020; Laakasuo et al., 2018; 2021). For example, exposure to science fiction increases acceptance of both cognition-enhancing brain implants and mind upload technology (Koverola et al., 2021; Laakasuo et al., 2018). Religiosity reduces approval of mind upload, though this was only observed in a sample from the US but not in a sample from the more secular Finland (Laakasuo et al., 2018). Moral purity and sexual disgust sensitivity are associated with lower levels of acceptance, while utilitarianism and Machiavellianism are associated with higher levels of acceptance towards mind upload (Koverola et al., 2020; Laakasuo et al., 2018; 2021). Death anxiety is associated with more positive moral judgments about mind upload (Laakasuo et al., 2018), suggesting that a fear of death may motivate acceptance, as mind upload seemingly allows one to live forever.

Here, we expand on what kinds of existential beliefs and attitudes motivate differing moral judgments about mind upload. Our research stemmed from the idea that mind upload can be argued to represent a secular version of immortality (Geraci, 2010), and from the aforementioned findings linking religiosity and death anxiety with lower and higher moral approval of mind upload, respectively. The present study focused on how beliefs about what happens after a person dies and what kind of value or meaning people feel in their own lives affects their approval of a “technological afterlife”.

Studies in the psychology of religion have long argued in favor of a relationship between death anxiety and religious belief, with death anxiety motivating belief, and belief in turn reducing death anxiety (see, e.g., Vail et al., 2010; Greenberg et al., 2020). However, the exact nature of this relationship is far from clear (Ellis & Wahab, 2012), and a recent review found evidence for the association to be weak or nonexistent (Jong, 2021). Van Tongeren (2019) argued that death anxiety and religiosity are linked, but the connection depends on the specific contents as well as the strength of religious belief, and the mediating role of meaning in life. Meaning in life (MIL) or existential meaning (Georg & Park, 2017) refers, in general, to the felt meaningfulness (being understandable, purposeful, consequential) of an individual’s lives. Previous research suggests that more dogmatic religious beliefs are associated with stronger beliefs in an afterlife, which in turn are associated with stronger felt meaning in life (van Tongeren et al., 2013). Furthermore, religiosity in general seems to reduce anxiety concerning what happens after death, but this effect is mediated via felt meaning in life (van Tongeren et al., 2017). Moreover, this mediating effect only affected those for whom religion was central to their identity. In sum, individual differences in afterlife beliefs and life’s felt meaningfulness seem to be important to the connection between

religiosity and death anxiety, and thus, may also affect moral judgments about immortality technologies¹.

MIL has been historically divided into several different sub-dimensions with differing terminology, but recently a three-facet view has gained popularity (Costin & Vignoles, 2020; George & Park, 2016; Martela & Steger, 2016). Here, MIL is conceptualized as consisting of the distinct sub-constructs of comprehension, purpose, and mattering. Comprehension refers to a feeling of one's life making sense, of things happening as they should; purpose refers to a feeling of one's life having a direction and clear goals to move towards; and mattering refers to a feeling of one's life, in its entirety, having significance and being consequential. Recently, Costin and Vignoles (2020) showed that individuals' experienced existential mattering predicted their felt meaning in life, purpose, and comprehension². The effect of existential mattering on felt meaning in life was not mediated by religion (whether participants identified as religious or not). Thus, while MIL is associated with religiosity, the most consistent predictor of MIL predicts it for atheists and religious people alike.

In the present study, we investigated whether views on the existence of souls, along with MIL, predict moral judgments of mind upload. Given previous findings linking death anxiety and religiosity to judgments about mind upload (Laakasuo et al., 2018), and the associations between religiosity and MIL (see van Tongeren, 2017), we expected that lower MIL and not believing in an afterlife would be associated with higher approval of mind upload.

Method

Participants & Design

¹ It may be that inconsistent results regarding the relationship between religiosity and a fear of death are due to measures of religiosity not tapping into the aspects of religiosity that are the most important to this link.

² George & Park (2014), define existential mattering "as the degree to which individuals feel that their existence is of significance and value; to feel a sense of EM is to feel that one's existence is important and relevant."

We recruited One-thousand-and-Fourty (1040) participants on Prolific.io to participate in a correlational study. Post exclusions the final sample size was 1007 (46% male; Age_M = 37.55, SD = 13.32; about 60% had at least a Bachelor's degree or higher). We excluded participants, who failed attention checks, stated that English was not their first tongue, or completed the study suspiciously fast. The survey took approx. 40 minutes, and those who participated received 4€s in compensation. The data collection was completed for a previously published and preregistered study (Laakasuo et al., 2021; <https://osf.io/2v3fj>). However, the current analyses were not part of this preregistration, and should be considered exploratory.

Materials

Multidimensional Existential Meaning Scale (MEMS)

This scale was developed by George and Park (2017), based upon reviewing decades of previous work on meaning in life studies. The scale has three sub-factors with five items each. The purpose sub-factor measures the extent of perceiving direction in one's life and motivation towards achieving personally valued goals (e.g. "I have aims in my life that are worth striving for"). High purpose scores indicate a clear sense of goals or ends which one is striving towards. The comprehension sub-factor measures the extent of feeling a sense of coherence and understanding in one's life (e.g., "I know what my life is about"). High comprehension scores indicate that one's life makes sense, and that life's components are clear and fit well together. The mattering sub-factor measures the extent of feeling that one's personal existence is significant, valuable and important for the rest of the world (e.g., "Even considering how big the universe is, I can say that my life matters"). High mattering scores indicate that one's life feels consequential and of profound value. In our sample, Cronbach's alphas were .91, .92 and .86, respectively.

Belief in an Afterlife

This is a single item instrument developed by Thalbourne (1996), where one option (out of six) is chosen : 1) “What we think of as the "soul", or conscious personality of a person, ceases permanently when the body dies” [extinctionist]; 2) “After death, the "conscious personality" continues for a while on a different plane and then is reincarnated into a new body on Earth elsewhere; this reincarnation process occurs over and over again, and may culminate in the individual being absorbed into a Universal Consciousness” [reincarnationist]; 3) “The "conscious personality" survives the death of the body; it does not reincarnate into another body, but continues to exist forever; there may (or may not) be a day when the dead rise again from the grave” [immortalist]; 4) “The "conscious personality" survives the death of the body and is indeed immortal; it may be reincarnated into another body, this process occurring over and over again; there may (or may not) be a "Resurrection of the Dead”” [eclectic]; 5) “The "conscious personality" survives death of the body, but I'm completely unsure as to what happens to it after that” [other believer]; 6) “I am completely uncertain as to what happens to the "conscious personality" at the death of the physical body” [agnostic]. We collapsed categories 2–5, since they were all related to some form of belief in the soul or conscious personality surviving the death of the body, and treated categories 1 and 6 as separate categories. With this categorization, we ended up with three roughly equally sized categories, which we henceforth label as no afterlife beliefs (category 1; N = 298); uncertain about afterlife (category 6; N = 369); and believers in afterlife (categories 2–5; N = 340).

Mind Upload Vignette

The vignette consisted of a science fiction story describing a researcher engaging in uploading of his mind. In the story, the researcher injects himself with very tiny nano-robots. The nano-robots then enter his brain through the blood stream substituting his nerve cells one by one. After the neurons have been replaced, the the brains functions are uploaded (copied)

on a computer. After every single brain cell has been uploaded, the nano-machines shut down and the researcher's body collapses to the floor. He then wakes up inside the computer. This procedure has been labelled as Moravec transfer procedure (Moravec,1988). However, our version is based on Eliezer Yudkowsky's work³ (see Appendix for a full version of the vignette). We intentionally decided to focus on a scenario that describes the death of the corporeal body to avoid creating a situation where participants could consider that there are two copies of the same mind.

Dependent Variable: Approval Of Mind Upload

The DV had nine items;— such as: (e.g., “How acceptable was the scientist's decision?”), four of which were reversed (e.g., “The Scientist's decision was appalling.”). Higher scores indicate more approval of the scientist's decision to upload his mind. The items were averaged together. See Appendix for items.

Procedure

After consenting to participate, participants first filled in measures reported elsewhere (Laakasuo et al., 2021), along with the Multidimensional Existential Meaning Scale. Then, they proceeded to read the vignette describing a scientist successfully uploading his mind (see Appendix). After reading the vignette, participants gave their responses to a battery of Likert questions measuring their moral approval of the scientist's actions. After this, participants filled in the Afterlife Beliefs scale and gave their responses on demographic questions. Finally, participants were debriefed and redirected back to Prolific Academic.

Results

The zero-order correlations between variables are presented in Table 1. Mind upload approval was negatively correlated with each of the MEMS sub-scales; higher comprehension, purpose

³ <http://yudkowsky.net/obsolete/singularity.html>

and mattering were all associated with lower mind upload approval. Also, as expected, each of the MEMS sub-scales correlated with the other two.

Table 1. Zero-order correlations between independent and dependent variable

	MEMS Purpose	MEMS Mattering	Mind Upload Approval
MEMS Comprehension	.62	.57	-.09
MEMS Purpose		.53	-.08
MEMS Mattering			-.19

Notes

To test for an association between attitudes towards “immortalizing” technology and beliefs about souls, we ran a regression model analysis, where the three-category afterlife belief measure was entered as three dummy coded variables, with mind upload approval as the dependent variable. In this analysis, all contrasts between the categories were significantly different from each other. Those with no afterlife beliefs had the highest approval of mind upload ($B = 4.58$; 95% CI [4.41, 4.74]), followed by those uncertain about the afterlife ($B = 4.21$; 95% CI [4.07, 4.36]), and those with some form of afterlife beliefs had the lowest endorsement of mind upload technology ($B = 3.91$; 95% CI [3.75, 4.06]; all pairwise comparisons $p < .012$).

Since each of the MEMS sub-scales was associated with each other sub-scale and with mind upload approval (see Table 1), we wanted to disentangle potential mediation effects between the variables. We therefore ran a multiple regression analysis on mind upload approval by entering the MEMS sub-scales as predictors. Mattering fully mediated the effects of both comprehension and purpose on mind upload approval ($B_{\text{mattering}} = 0.20$; $t(1003) = -5.62$, $p < .001$). Thus, mattering seemed to be the primary driver of any effects of felt existential meaning on moral judgments about mind upload. This result aligned conceptually with Costin and Vignoles’ (2021) finding that of the MEMS sub-scales, mattering was the most consistent predictor of other measures of meaning in life. Thus, the result may be interpreted in a simplified way as the effect of felt meaning in life on moral judgments.

Since religiosity and MIL – which in our analyses collapsed to only the mattering sub-scale – are correlated, we wanted to disentangle their independent effects on moral judgments in our results. We progressed to a moderation analysis between afterlife beliefs (yes, no, uncertain) and standardized mattering sub-scale scores, with mind upload approval as the dependent variable (see Figure 1 for results). In addition to a clear main effect of mattering in the moderation analysis, there were differences in slopes in different categories (see Figure 1). The slope for those who were uncertain about the existence of an afterlife was the steepest ($B = -0.28$; 95% CI $[-0.43, -0.12]$), followed by those who were certain that there is an afterlife ($B = -0.20$) or certain that there is no afterlife ($B = -.18$). We further explored these differences by examining the different belief groups at low and high levels of mattering. At -1 SD of mattering, there was no difference between those who were certain there is no afterlife and those uncertain ($B = 0.18$, 95% CI $[-0.09, 0.46]$, $p = n.s.$). At +1 SD of mattering, the uncertain group was significantly different from those who did not believe in afterlife ($B = 0.39$, 95% CI $[0.01, 0.78]$, $p = .04$), but not different from those who did (see Figure 1).

To summarize, beliefs about the afterlife predicted moral approval of mind upload in a linear fashion, with those who were certain that there is an afterlife having the lowest approval, those who were certain that there is no afterlife having the highest approval, and the uncertain placing in the middle. Additionally, existential mattering negatively predicted moral approval of mind upload, while comprehension and purpose had only an indirect effect through mattering. Regardless of what the participants believed about what happens to a person after they die, an increase in mattering predicted a decrease in moral approval toward mind upload. Interestingly, the slope for those who were uncertain about afterlife was the steepest, and statistically significantly different from those who did not believe in an afterlife.

Afterlife Beliefs and Existential Mattering

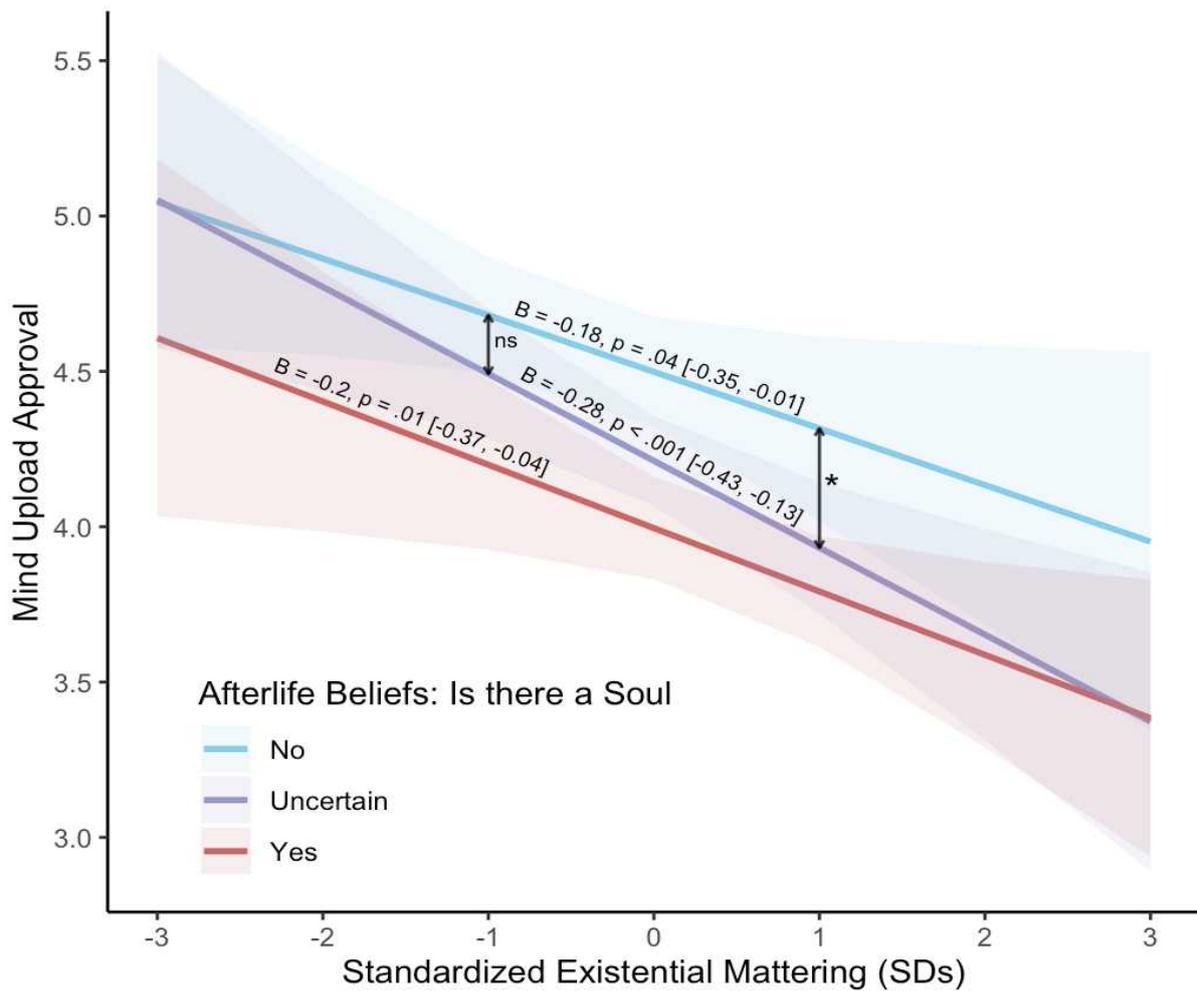


Figure 1: Moderation analysis between afterlife beliefs and the matterin sub-scale of the MEMS, predicting mind upload approval. There is a clear main effect for all three different types of afterlife beliefs, where increase in felt mattering predicts lower levels of mind upload approval. Interestingly, the slope for those who are uncertain is steepest and it is statistically significantly different from those who have no belief in the existence of the soul.

Discussion

We investigated the associations between moral judgments about mind upload, afterlife beliefs, and existential meaning. Our results can be summarized as follows: First, individuals who did not believe in any form of afterlife approved of mind upload more than those who were certain that there is some form of afterlife; Second, individuals who were uncertain

about whether there is an afterlife approved of mind upload more than those who were certain that there is an afterlife; Third, higher existential mattering – the belief that one’s life is in some way important in the grand scheme of the universe – was associated with lower approval of mind upload; this effect was pronounced for those who were uncertain about the afterlife. These findings complement previous work where mind upload approval was positively linked with death anxiety, suicide acceptance, science fiction hobbyism, utilitarianism and Machiavellianism, and negatively with sexual disgust, religiosity and moral purity (Laakasuo et al., 2021; 2018).

Why are afterlife beliefs predictive of mind upload judgments? On first glance, it seems that people align their morality with their metaphysical worldviews. It makes sense that individuals who do not believe in existence after death are more approving of mind upload: a technological solution seemingly offering eternal life should appear positive to those who believe there is nothing after death. Correspondingly, if someone believes that life goes on after death, they have no reason to endorse a digital extension of biological life. An individual’s disapproval of mind upload can even be seen as *rational*, given their beliefs (see Stark, 1999 for rational choice theory of religious beliefs).

However, judging an act as wrong or unacceptable is different from feeling that the act is unnecessary. That is, believers in an afterlife may feel no need for a technology that would “side-step” death, but such feelings do not necessarily imply less moral approval. Most people do not need to wear glasses, but moral condemnation of people wearing glasses is not common; indeed, such condemnation would seem strange to most people. It makes sense that non-believers in afterlife would find it desirable to have a technology that could make afterlife possible. This individual-level desire could be one of the factors that increases moral approval. However, this line of reasoning does not necessarily work symmetrically for those

who do believe in an afterlife: they may not feel any desire to have access to mind upload technology, but a lack of desire is not equivalent to aversion.

Rather, it seems more likely that believers in an afterlife have other moral views associated with their worldview. One possible candidate is the condemnation of suicide, since religious individuals are less accepting of it (Stack, 2013). People may view mind upload as a kind of suicide: the person in the vignette is acting alone, engaging in an act that leaves their physical body showing no signs of life. More generally, both committing suicide and artificially extending one's life may be seen by religious people as acts that violate a perceived natural order or God's will. Based on findings that link suicide condemnation to specific beliefs about one's life belonging to God (Ross & Kaplan, 1994; Worthen & Yeatts, 2001), Bering (2006, pp. 459) argued that the religious condemnation of suicide is essentially a judgment about "cheating" God; meaning, it goes against a supreme being's right to decide about the lives of humans. This line of reasoning could be applied to life extension as well. Even if mind upload is not seen as suicide but as extending one's lifespan, it seems clear that it conflicts with a worldview where the authority to decide about life does not belong to humans.⁴

Why do stronger feelings of existential mattering – but not purpose or comprehension – predict lower approval of mind upload? Notably, in our study, when participants were both uncertain about what happens after death and had low levels of felt mattering, they were not different in their approval of mind upload from those who did not believe in an afterlife. However, when uncertain individuals reported higher felt mattering, their approval of mind upload resembled that of participants who did believe in an afterlife. In other words, mattering seems to reduce the effect of afterlife uncertainty. One possible explanation for mattering

⁴ Other potential religious or spiritual reasons for being less morally approving of mind upload include the idea that mortality gives humans perspective; worries about what happens to the soul, often differentiated from the mind, in the mind upload scenario; and seeing a technological version of the afterlife as a threat to faith or something that undermines reasons to be religious.

uniquely predicting moral judgments is that the mattering sub-scale measures another kind of certainty. Whereas the purpose and comprehension sub-scales concern one's feelings about their life in the current moment, the mattering sub-scale also concerns the future. The mattering sub-scale contains items such as "[w]hether my life ever existed matters even in the grand scheme of the universe", which seem to measure certainty about a symbolic immortality. That is, high mattering implies that a person is more likely to think that their life will have a legacy regardless of what happens after their death, making techno-immortality irrelevant. However, again, a lack of necessity or felt desire towards something does not automatically imply more negative moral judgment about that thing.

According to Park and George (2016, 2017), mattering is linked with spiritual beliefs and, at times, traditional religiosity. While we did not collect a general spirituality measure, we did measure afterlife beliefs, and found that mattering had a similar effect on moral judgment among people *with* and *without* beliefs in afterlife. Thus, any unobserved mediation effects of spirituality would have to be aspects spirituality that are not related to afterlife beliefs. One potential candidate is the belief that one's body has divine qualities ("body sanctification"), which is associated with mattering (Park & George, 2017). The effect of mattering on moral judgments of mind upload could stem from perceiving mind upload as a violation of the natural order of the human body and mind. This aligns with findings from previous studies showing that moral purity (Graham et al., 2011) is associated with disapproval of mind upload (Laakasuo et al., 2018). Perhaps mattering is also associated with suicide acceptance separately from religious beliefs; or maybe mattering partially stems from an acceptance of mortality, and immortality technologies threaten it?

Recent studies on the moral psychology of transhumanistic technology have been primarily descriptive: they have revealed associations between variables but have not explained why these associations exist (Koverola et al., 2021; Laakasuo et al., 2021; 2018).

Likewise, despite our current novel findings, we cannot fully explain the associations we observed and further work is still needed.

Conclusions

Our results contribute to the ongoing discussion on the moral implications of transhumanist technologies, which have the potential to shape our thoughts on what it is to be human. In our study, those most hesitant towards mind upload were also the most “spiritual”, not only having afterlife beliefs, but also the highest reported levels of feeling that they matter as individuals in the grand scheme of the universe. For individuals who were uncertain about whether there is an afterlife, the feeling of existential mattering decreased the moral acceptance of mind upload more sharply than for those who were certain about their beliefs. In sum, people who have less reason to worry about dying, whether due to believing in an afterlife or due to being certain of their life being consequential, are more likely to morally condemn mind upload. However, the specific reasons for these associations are not clear. Future work should attempt to shed light on the specific beliefs or patterns of thought behind condemning technological immortality.

References

- Andrade, G. (2018). Philosophical Difficulties of Mind Uploading as a Medical Technology. *APA Newsletter*, 18(1), 14-19.
- Bering, J. M. (2006). The folk psychology of souls. *Behavioral and brain sciences*, 29(5), 453-462.
- Bostrom, N. (2014). *Superintelligence: Paths, Dangers & Strategies*. Oxford: Oxford University Press.
- Cappuccio ML (2017) Mind-upload. The ultimate challenge to the embodied mind theory. *Phenomenol Cogn Sci* 16(3):1–24
- Costin, V., & Vignoles, V. L. (2020). Meaning is about mattering: Evaluating coherence, purpose, and existential mattering as precursors of meaning in life judgments. *Journal of Personality and Social Psychology*, 118(4), 864.
- Ellis, L., & Wahab, E.A. (2013). Religiosity and Fear of Death: A Theory-Oriented Review of the Empirical Literature. *Review of Religious Research*, 55, 149-189.
- George, L. S., & Park, C. L. (2016). Meaning in life as comprehension, purpose, and mattering: Toward integration and new research questions. *Review of General Psychology*, 20(3), 205-220.
- George, L. S., & Park, C. L. (2017). The multidimensional existential meaning scale: A tripartite approach to measuring meaning in life. *The Journal of Positive Psychology*, 12(6), 613-627.
- Geraci, R. M. (2010). The popular appeal of apocalyptic AI. *Zygon®*, 45(4), 1003-1020.
- Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of personality and social psychology*, 101(2), 366.

Greenberg, J., Helm, P. J., Landau, M. J., & Solomon, S. (2020). Dwelling forever in the house of the lord: On the terror management function of religion. In K. E. Vail & C. Routledge (Eds.), *The Science of Religion, Spirituality, and Existentialism* (pp. 3–20). Academic Press.

Hanson, R. (2016). *The Age of Em: Work, Love and Life When Robots Rule the Earth*. Oxford: Oxford University Press

Helm, P.J., Lifshin, U., Greenberg, J. (2021). Will Life Extension Affect Our Social Judgments? Evidence That the Possibility of Indefinite Life Extension Increases Harshness Towards Social Transgressors. *Psychological Reports*. 0033294121988997

Jong, J. (2021). Death anxiety and religion. *Current Opinion in Psychology*, 40, 40-44.

Jones, D. N., & Paulhus, D. L. (2014). Introducing the short dark triad (SD3) a brief measure of dark personality traits. *Assessment*, 21(1), 28–41.

<https://doi.org/10.1177/1073191113514105>

Kurzweil, R. (2005). *The singularity is near: When humans transcend biology*. New York, NY: Penguin Press.

Koverola, M., Kunnari, A., Drosinou, M., Palomäki, J., Hannikainen, I. R., Jirout Košová, M., ... Laakasuo, M. (2021). Non-human Superhumans - Understanding Moral Disapproval of Neurotechnological Enhancement. <https://doi.org/10.31234/osf.io/qgz9c>

Koverola, M., Drosinou, M., Palomäki, J., Halonen, J., Kunnari, A., Repo, M., ... & Laakasuo, M. (2020). Moral psychology of sex robots: An experimental study– how pathogen disgust is associated with interhuman sex but not interandroid sex. *Paladyn, Journal of Behavioral Robotics*, 11(1), 233-249.

Laakasuo, M., Drosinou, M., Koverola, M., Kunnari, A., Halonen, J., Lehtonen, N., & Palomäki, J. (2018). What makes people approve or condemn mind upload

- technology? Untangling the effects of sexual disgust, purity and science fiction familiarity. *Palgrave Communications*, 4(1), 1-14.
- Laakasuo, M., Repo, M., Drosinou, M., Berg, A., Kunnari, A., Koverola, M., Saikkonen, T., Hannikainen, I. R., Visala, A. & Sundvall, J. (2021). Dark Path to Eternal Life: Machiavellianism Predicts Approval of Mind Upload Technology. *Personality and Individual Differences*, 177, 110731.
- Martela, F., & Steger, M. F. (2016). The three meanings of meaning in life: Distinguishing coherence, purpose, and significance. *The Journal of Positive Psychology*, 11(5), 531-545.
- Moravec H. (1988). *Mind children: the future of robot and human intelligence*. Harvard University Press: Harvard
- O'Connell, M. (2018). *To be a machine: Adventures among cyborgs, utopians, hackers, and the futurists solving the modest problem of death*. Anchor.
- Reimann, M. W., Gevaert, M., Shi, Y., Lu, H., Markram, H., & Muller, E. (2019). A null model of the mouse whole-neocortex micro-connectome. *Nature communications*, 10(1), 1-16.
- Ross, L. T., & Kaplan, K. J. (1994). Life ownership orientation and attitudes toward abortion, suicide, doctor-assisted suicide, and capital punishment. *OMEGA-Journal of death and dying*, 28(1), 17-30.
- Sandberg, A. (2014). Ethics of brain emulations. *Journal of Experimental & Theoretical Artificial Intelligence*, 26(3), 439-457.
- Smith, K., & Hatemi, P. K. (2020). Are Moral Intuitions Heritable?. *Human Nature*, 31(4), 406-420.
- Stack, S. (2013). Religion and suicide acceptability: A review and extension. *Suicidologi*, 18(1).

- Stark, R. (1999). Micro foundations of religion: A revised theory. *Sociological theory*, 17(3), 264-289.
- Thalbourne, M. A. (1996). Belief in life after death: Psychological origins and influences. *Personality and Individual Differences*, 21(6), 1043-1045.
- Van Tongeren, D. R., Pennington, A. R., McIntosh, D. N., Newton, T., Green, J. D., Davis, D. E., & Hook, J. N. (2017). Where, O death, is thy sting? The meaning-providing function of beliefs in literal immortality. *Mental Health, Religion & Culture*, 20(5), 413-427.
- Van Tongeren, D. R. (2019). The importance of meaning in the relationship between religion and death. *Religion, Brain & Behavior*, 9(2), 194-200.
- Vail, K. E., Rothschild, Z. K., Weise, D. R., Solomon, S., Pyszczynski, T., & Greenberg, J. (2010). A terror management analysis of the psychological functions of religion. *Personality and Social Psychology Review*, 14(1), 84-94.
- Wiley, K. B. (2014). *A taxonomy and metaphysics of mind-uploading*. Los Angeles: Humanity+ Press and Alautun Press.
- Worthen, L. T., & Yeatts, D. E. (2001). Assisted suicide: Factors affecting public attitudes. *OMEGA-Journal of Death and Dying*, 42(2), 115-135.

Appendix A. The Vignette

On the next page is a story set in the future. Read the story through and try to immerse yourself in the story as well as possible - even if it is not relevant to your life. After reading the story, please answer the questions about the story.

By the year 2050, research into both computing technology and the human brain has taken huge steps forward. One of the researchers in the field is Henry Willington. 42 years old, he used to be a professor at the neuroscience department of a major university before deciding to pursue more independent research. He has been fascinated by the brain ever since seeing a colorful illustration of it in a picture book he had as a child, and has spent most of his life learning more about it. Besides neuroscience, he also has a passion for computers, and spends much of his free time programming.

A particular idea that combines these two passions is the notion of transferring a human mind to run on a computer. Many people have speculated with the idea and done preliminary research into it, but so far nobody has managed to carry it out, or even seriously attempted it. However, as a result of his long studies and some unpublished research he conducted at the university, Henry believes he has managed to put all the necessary pieces together. He intends to be the first one to carry out such a transfer. Because it would take a long time to acquire the necessary permits for human experimentation, and because he is confident in the safety of his technique, he decides to demonstrate it by transferring his own mind.

After setting everything up, Henry sits down in his office chair, inserts an IV needle into his arm, and activates the program. The needle injects into his blood a swarm of tiny machines the size of a cell, which find their way into Henry's brain. The machines start by studying one of Henry's brain cells, and send a copy of their observations into the large computer in Henry's office. The computer uses this information to create a simulated copy of the brain cell in its memory. Once the simulation is perfect, one of the machines replaces the original cell, using the information from the simulation to completely imitate the cell's behavior and functions. The actual activity of the cell is now being calculated in the computer: the machine is just a transmitter, sending the computer information about the cell's environment and receiving in return instructions for how to behave and what kinds of messages to send to the other cells.

The machines then slowly repeat this process for each cell, until the computer contains a complete simulation of Henry's brain. Although the activity inside Henry's skull might look like the real thing to an outside observer, the machines are just acting on the basis of instructions received from the computer, and all of the actual thinking has been transferred to the simulation running in the computer's memory. Once this point is reached, the computer runs a series of final checks to verify that everything happened correctly, and then disconnects the machines. Henry's body collapses to the floor, and he awakens inside the computer, the transfer is complete.

Appendix B. DV scale

1. How moral do you find the scientist's decision?
2. How acceptable was the scientist's decision?
3. How appealing was the scientist's decision?
4. The Scientist's decision was appalling.
5. Thinking about the scientist's decision makes me angry.
6. The Scientist should be punished for what he did.
7. The Scientist acted in a morally correct way.
8. The Scientist's action should not be allowed by the law.
9. There was nothing wrong with the scientist's action.