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► **To cite this version:**

Anthony Lantian, Michael Rose. No Evidence That Belief in Conspiracy Theories is Negatively Related to Attitudes Toward Transhumanism. *Scandinavian Journal of Psychology*, inPress, 10.1111/sjop.13003 . hal-04406550

HAL Id: hal-04406550

<https://hal.science/hal-04406550v1>

Submitted on 19 Jan 2024

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**No Evidence That Belief in Conspiracy Theories is Negatively Related to Attitudes
Toward Transhumanism**

(11 January 2024)

Uncorrected proof version: Forthcoming in *Scandinavian Journal of Psychology*

Doi: 10.1111/sjop.13003

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All the data, code, and materials presented in this paper are publicly available and can
be found at: <https://osf.io/s832u/>

No funds, grants, or other support was received.

The authors have no relevant financial or non-financial interests to disclose.

Because our studies were non-interventional and anonymity was assured, in
accordance with our local legislation and institutional requirements, there are no legal

requirements to solicit ethics approval and it is not standard practice to do so. Our studies were carried out in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

All individual participants included in our studies provided their informed consent.

This work was presented in a poster session at the Social Psychology of the Future Virtual Mini-Conference, June 2022.

Acknowledgments: We thank Johan Sintomer and Chloe Sussan-Molson for their assistance in the recruitment of participants for Study 1, and Alexis Akinyemi and Jean-Baptiste Légal for their sound advice on the measurement of attitudes.

WORD COUNT: 9261

Abstract

Introduction.

Transhumanism is a movement that emphasizes the improvement of the human condition by developing technologies and making them widely available. Conspiracy theories regularly refer to the allegedly transhumanist agenda of elites. We hypothesized that belief in conspiracy theories would be related to more unfavorable attitudes toward the transhumanist movement.

Methods.

We examined this association through two pre-registered studies (based on two French samples, total N after exclusion = 550).

Results.

We found no evidence of a negative relationship between belief in conspiracy theories and attitudes toward transhumanism. This null result was further corroborated by Bayesian analysis, an equivalence test, and an internal mini meta-analysis.

Conclusion.

This work plays a precursory role in understanding attitudes toward an international cultural and intellectual movement that continues to grow in popularity and influence.

Keywords: conspiracy beliefs, conspiracy theories, transhumanism, attitudes, cultural movement

No Evidence That Belief in Conspiracy Theories is Negatively Related to Attitudes Toward Transhumanism

According to Humanity+ (previously known as “the World Transhumanist Association”), transhumanism could be defined as “the intellectual and cultural movement that affirms the possibility and desirability of fundamentally improving the human condition through applied reason, especially by developing and making widely available technologies to eliminate aging and to greatly enhance human intellectual, physical, and psychological capacities” (Humanity+, 2023). Actors identified with the transhumanist movement (in the broadest sense) are regularly accused of conspiring using technological means. For example, Alex Jones, an influential figure in the community of conspiracy theory believers, promotes the idea that transhumanism will unveil the “New Dark Age” (Istvan, 2014). On *Infowars*, a website known for spreading conspiracy theories, this topic is frequently discussed. For example, the transhumanists (referred to as ‘globalist eugenicists’) are suspected of poisoning people (Infowars, 2017) and ushering in a post-human era through the COVID-19 pandemic (Infowars, 2020). The connection between conspiracy theories and transhumanism is even explicitly acknowledged (under the term, “go hand-in-hand”), according to *hpluspedia* (“Conspiracy theories and transhumanism,” 2018).

Belief in conspiracy theories is a research topic that has steadily increased in popularity in recent years (Butter & Knight, 2020). This belief is characterized by the preference for an alternative explanation that seeks to account for social or political events as the result of secret planning and involvement of two or more actors (usually perceived as powerful) over more conventional (Butter & Knight, 2020; Douglas et al., 2019; Keeley, 1999) or more probable (Aaronovitch, 2010) explanations. Mistrust is one of the recognized key predictors of belief in conspiracy theories (Pierre, 2020). The robust positive relationship between conspiracy belief and lack of trust has been demonstrated many times, under

different forms, and in many different contexts (e.g., Goertzel, 1994; Green & Douglas, 2018; Imhoff & Lamberty, 2018; Meuer & Imhoff, 2021). This mistrust is accompanied by a high degree of anomie (Abalakina-Paap et al., 1999; Jolley et al., 2019), a feeling of powerlessness (Anthony & Moulding, 2019; van Prooijen, 2017) as well as the belief that the world is dangerous (Anthony & Moulding, 2019), depicting conspiracy belief as the embodiment of a form of social antagonism (Lantian et al., 2020).

On closer examination, this suspicion is not directed toward everyone in an indistinctive manner. In fact, according to some results, conspiracy mentality is to some extent related to the propensity to consider high-power groups (vs. low-power groups) as particularly more threatening and less likable, which could partially explain higher prejudice toward powerful groups (Imhoff & Bruder, 2014; Imhoff & Lamberty, 2018; but see Nera et al., 2021 for a more nuanced approach). Pursuing this idea, Imhoff et al. (2018) carried out four studies from which they concluded that the more people believe in conspiracy theories, the more (less) they perceived powerless (powerful) sources as credible. Thus, it would seem that belief in conspiracy theories would go hand in hand with general distrust of elites.

Transhumanism is generally promoted by scientists and engineers in high-tech companies (e.g., Ray Kurzweil, current Google's executive at the time of writing; Dubarry & Hornung, 2011), and may have political ramifications (e.g., *The United States Transhumanist Party*, Stolyarov II, 2019; see also Benedikter & Siepmann, 2016 for an overview of the existing transhumanist political parties). Because of the position of power of those who seek to pursue a transhumanist agenda, belief in conspiracy theories may well be compatible with negative attitudes with respect to this ideology. After all, transhumanism can sometimes be presented as “an ideology for strong, happy and ambitious people” (Levchuk, 2019), pitting posthumans against bioconservatives (Bostrom, 2005).

Furthermore, in the broader sense, there is a whole cluster of themes that revolve around transhumanism that can feed a large number of conspiracy theories. To mention only a few examples, nanotechnology, genetic engineering, biotechnology, neural implants, and artificial intelligence can fuel conspiracy theories because they can easily be seen as an almost infinite toolbox of sources of abuse and unlimited control (e.g., generalized surveillance). Due to their anti-surveillance attitude (Furnham & Swami, 2019), their post-apocalyptic beliefs (Fetterman et al., 2019), their anti-science attitudes (Lewandowsky et al., 2013), and their rejection of scientific innovations (Marques et al., 2021), believers in conspiracy theories are likely to be particularly sensitive to these issues contributing to negative attitudes toward transhumanism. These fears can be sustained and amplified through narratives from various forms of fiction featuring dystopian worlds in which the misuse of biotechnology and superintelligences constitute an existential threat. The existence of misinformation regarding transhumanism (Vita-More, 2019), as well as recurrent objections against posthumanity (Bostrom, 2009; Dubarry & Hornung, 2011), can facilitate the hypothetical disapproval of this cultural movement by believers in conspiracy theories. These considerations led us to formulate the hypothesis of more negative attitudes toward transhumanism among people who subscribe more to conspiracy belief.

We may speculate that the hypothetical link between belief in conspiracy theories and negative attitudes toward transhumanism could be partly, if not fully explained by anomie. As underlined by Klein (2018), the term anomie is a hybrid concept that can cover different meanings depending on the authors, but we can define it simply as “[...] a perception that a particular society has become disintegrated and disregulated” (Teymoori et al., 2016, p. 3). Anomie (via its two components: breakdown of social fabric and breakdown of leadership, Teymoori et al., 2016) could be relevant in predicting negative attitudes toward transhumanism. Considering breakdown of social fabric, its component of lack of trust and

moral decline are difficult to reconcile with the faith on humanity underpinning the transhumanist project. Regarding breakdown of leadership, a lack of legitimacy and effectiveness of leadership has made the implementation of the transhumanist project pointless if not counterproductive. As anomie has in the past been widely established as a predictor of belief in conspiracy theories (e.g., Imhoff et al., 2018; Moulding et al., 2016), we can expect a set of common mechanisms (e.g., distrust, perceived illegitimacy of leadership) to lead to the prediction of a negative attitude toward transhumanism. For these reasons, we will include anomie in our analyses to control for the role of this potential confounding variable. Furthermore, given the robust relationship between belief in conspiracy theories and anomie, this measure would serve as a positive control of the procedure (i.e., it will make it possible to verify the quality of the data; if they are of good quality, one should be able to find this significant positive relationship).

Study 1

Method

Preregistration

We preregistered our hypotheses, planned sample size, exclusion rules, and general analytic strategy on *Aspredicted* (<https://aspredicted.org/sk5cq.pdf>). We planned to recruit about 250 participants. This number was based on the sample size at which correlations stabilize (Schönbrodt & Perugini, 2013). This sample size gave us an 80% chance of detecting an existing correlation of $r = .18$ (value obtained by using the ‘pwr’ package [v.1.2-2; Champely, 2018] in R [v. 3.6.1]), with α set to .05. The materials of this study, the preregistration planning and deviation documentation (specifying that there is no preregistration deviations), as well as the data and the corresponding statistical code are publicly available and can be found at (<https://osf.io/s832u/>). In this study, in line with

reporting standards suggested by Simmons et al. (2012, p. 4), “we report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study.”

Participants

We recruited 250 participants ($M_{\text{age}} = 31.06$, $SD_{\text{age}} = 14.22$, 156 women, 93 men, 1 missing), 144 of whom were recruited on the Internet.

Materials and Procedure

The study, introduced as a survey on worldviews, was available both in a paper and pencil version ($n = 106$) and online ($n = 144$). We opted for the simultaneous use of these two modes of data collection to diversify our sample (for example, one can imagine that the way people relate to technology can vary between those who complete the study on the Internet and those who complete the study via the paper and pencil version). For the paper and pencil version, participants were recruited at different locations (e.g., university campus, shopping mall) and completed the questionnaire under the supervision of research assistants. For the online version, the link to the study was distributed via social media posts, emails, and forums. The participants were not remunerated. They completed the different scales presented below one after another. We deliberately decided to present the scales in a fixed order (i.e., attitudes toward transhumanism then belief in conspiracy theories) to avoid possible contamination of the measure of attitudes toward transhumanism through having completed a scale related to conspiracy theories immediately beforehand.

Anomie was measured with the validated French version of the Perception of Anomie Scale (PAS, Teymoori et al., 2016). This scale consists of 12 items (including 5 reverse-coded items) from 1 = *Strongly disagree* to 7 = *Strongly agree* (e.g., “Politicians don’t care about the problems of average person.”). This scale originally covered two dimensions of anomie (i.e., breakdown of social fabric and breakdown of leadership), but as originally intended in our pre-registration, we treated this as a unitary construct because we were only interested in a

more general version of the anomie construct. Cronbach's alpha was .71. A Confirmatory Factor Analysis (CFA) was performed and the detailed results can be found in Appendix A.

To measure attitudes toward transhumanism, we first created a new scale because, to the best of our knowledge, no such scale existed at the time we designed the studies. Hence, we created a measure of Attitude Toward Transhumanism (ATT). To ensure that the participants would not respond to the items with their idiosyncratic conception of transhumanism but start from a common basis, we asked them to read an extract of Wikipedia entries on "transhumanism." More explicitly, after a brief introduction to the transhumanist movement, we provided a French version (translated by Yann Minh; iatranshumanisme, 2017) of the 2012 version of *The Transhumanist Declaration* (More & Vita-More, 2013). To verify that the participants had correctly read and understood the content, we included 4 comprehension check questions, in the form of Multiple Choice Questions (MCQ) with 3 response options for each question¹. We informed participants that there was only one correct answer per question. Following this, we presented different items related to their attitudes toward the transhumanist movement, as described in the text they read. This measure was based on a 9-point differential semantic scale (Crites et al., 1994; Osgood et al., 1957): In Disfavor/In Favor; Good/Bad; Negative/Positive; Harmful/Beneficial; For/Against. We calculated a unique score of positive attitudes toward transhumanism by averaging the items while recoding the two reverse-coded items. This new scale proved reliable at $\alpha = .94$ and was subjected to an Exploratory Factor Analysis (EFA). The Bartlett's test of sphericity, $\chi^2(10) = 1093.143$, $p < .001$ and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (.88) ensured adequate common variance for factor analysis. The observed eigenvalues (based on $\lambda \geq 1.0$ criterion) suggested a one-factor structure with ($\lambda = 3.74$), which was corroborated by a

¹ Four participants made more than two errors in our MCQ. As specified in our pre-registration document, as their exclusion did not change the results, we kept them in our final sample.

parallel analysis. Thus, we ran a maximum-likelihood EFA with forced one-factor solution (accounting for 75% of the total variance). The factor loadings were above .40 for all items of the scale.

To measure conspiracy belief, we included the *Generic Conspiracist Beliefs scale* (GCB; Brotherton et al., 2013; for the French version, see Lantian et al., 2016), a 15-item scale (from 1 = *Definitely not true* to 5 = *Definitely true*) assessing the general tendency to believe in conspiracy theories (an example item is: “Technology with mind-control capacities is used on people without their knowledge”). The reliability of the scale was good ($\alpha = .91$). In line with the recommendations of researchers who wish to see more details regarding the psychometric properties of scales measuring conspiracy belief (Atari et al., 2019; Goreis & Voracek, 2019; Swami et al., 2017), a CFA was conducted, the detailed results of which can be found in Appendix A. The expected unidimensionality of the scale was not empirically supported. Instead, in a similar way to what has been found in French (Lantian et al., 2021) and U.S. samples (Castanho Silva et al., 2017), the EFA suggested a two-factor solution; the first with the items related to the existence of aliens (i.e., “extraterrestrial cover-up” factor), and the second with all other items of the scale. However, given the monological nature of belief in conspiracy theories (Goertzel, 1994) and as a common practice in this research field, in accordance with our preregistration, we report here the results based only on the average of all the items present in the GCB. Results with GCB items forming two or five factors are reported in Appendix A.

Finally, we included a measure of religious stance (*atheist, agnostic, believer*), degree of religiosity (from 1 = *Not at all religious* to 9 = *Extremely religious*), political orientation (from 1 = *Far left* to 9 = *Far right*; with other choices of response in the case of refusal to answer), awareness of the existence of transhumanism prior to the study (*Had you ever heard of transhumanism before completing this study? Yes-no answer*), estimation of the level of

interest in transhumanism prior to the study (*Before participating in this study, what level of interest in transhumanism did you consider yourself to have on this subject?*; from 1 = *Absolutely no interest* to 9 = *A very strong interest*), estimation of the level of knowledge of transhumanism prior to the study (*Before participating in this study, what level of knowledge about transhumanism did you consider yourself to have on this subject?*; from 1 = *No knowledge at all* to 9 = *Very good knowledge*), identification with the “transhumanists” group (*I identify with the group of people who share the transhumanist ideology, as defined in this study*: from 1 = *Strongly disagree* to 9 = *Strongly agree*), gender, and age. Participants were then thanked and debriefed.

Results

Confirmatory Analysis

Our pre-registered main analysis consisted of testing the bivariate correlation between belief in conspiracy theories and attitudes toward transhumanism. The bivariate correlation between belief in conspiracy theories ($M = 2.57$, $SD = 0.83$) and attitudes toward transhumanism ($M = 4.81$, $SD = 1.81$) was inconclusive and descriptively in a direction opposite to the hypothesis, $r(243) = .06$, $p = .322^2$. Afterwards, as part of a pre-registered secondary analysis, we ran a multiple regression analysis with conspiracy belief (mean-centered), anomie (mean-centered), and their interaction term, as predictors, and attitude toward transhumanism as the criterion. As the interaction term was not significant, $t(241) = -1.45$, $p = .147$, $\eta^2_p = .008$, we ran a new multiple regression analysis without this interaction term. We then found that, after controlling for anomie, belief in conspiracy theories approached significance in predicting the attitude toward transhumanism but in a direction opposite to the hypothesis, $t(242) = 1.84$, $p = .067$, $\eta^2_p = .014$, while after controlling for

² The sample size was 245 and not 250 because five participants did not fully complete the scale of conspiracy belief (missing data). This reduced sample therefore concerns only the analyses involving conspiracy belief measure.

conspiracy belief, a higher level of anomie predicted more negative attitudes toward transhumanism, $t(241) = -2.95, p = .003, \eta^2_p = .035$.

Exploratory Analyses

In our sample, almost half (46.6%) of the participants told us they were unaware of the existence of transhumanism before they participated in the study, suggesting that the movement is far from widely known, at least in our specific sample. Bivariate correlations between all the variables measured in our study are presented in Table 1. The replication of a classic finding in the literature served as a test of data reliability: indeed, we found a positive correlation between conspiracy belief and anomie, $r(243) = .30, p < .001$. Moreover, we observed that attitudes toward transhumanism could be predicted by the degree of anomie ($M = 4.60, SD = 0.76$), $r(248) = -.15, p = .017$. In other words, a higher degree of anomie was associated with more negative attitudes toward transhumanism. Beyond the role of anomie, we discovered that an estimation of the level of interest in transhumanism and knowledge of transhumanism prior to the study, as well as identification with transhumanists, predicted positive attitudes toward transhumanism. More anecdotally, men expressed more positive attitudes toward transhumanism than women ($p = .006$).

Discussion

Study 1 provides no support for the predictive role of belief in conspiracy theories in attitudes toward transhumanism. As expected, we replicated the positive association between anomie and conspiracy belief. We also obtained a more original result corresponding to a higher level of anomie among people with less favorable attitudes toward transhumanism. Exploratory analyses revealed that attitudes toward transhumanism were positively related to the level of interest in transhumanism and knowledge of transhumanism prior to the study, as well as identification with transhumanists. Given the exploratory nature of these latter results, replication will be necessary in order to strengthen these conclusions.

Table 1
Descriptive Statistics and Bivariate Correlations (With 95% Confidence Intervals) for Study Variables (Study 1)

	1. Positive attitude toward transhumanism	2. Belief in conspiracy theories	3. Anomie	4. Awareness of the existence of transhumanism ^a	5. Interest in transhumanism	6. Knowledge of transhumanism	7. Identification with transhumanists	8. Political orientation ^b	9. Religiosity	10. Gender ^c	11. Age
1.	-										
2.	.06 [-.06, .19]	-									
3.	-.15* [-.27, -.03]	.30*** [.18, .41]	-								
4.	.09 [-.04, .21]	-.18** [-.30, -.05]	-.04 [-.17, .08]	-							
5.	.28*** [.16, .39]	-.02 [-.14, .11]	-.07 [-.19, .05]	.49*** [.39, .58]	-						
6.	.17** [.05, .29]	-.09 [-.21, .04]	-.04 [-.17, .08]	.65*** [.57, .72]	.67*** [.60, .74]	-				-	
7.	.67*** [.59, .73]	.05 [-.08, .17]	-.14* [-.26, -.02]	.11 [-.01, .23]	.34*** [.23, .45]	.25*** [.13, .36]	-				
8.	.11 [-.04, .25]	.18* [.03, .32]	-.09 [-.24, .05]	-.16* [-.30, -.01]	-.03 [-.17, .12]	-.07 [-.22, .07]	.10 [-.05, .24]	-			
9.	-.04 [-.16, .09]	.12 [-.00, .25]	.03 [-.10, .15]	-.13* [-.25, -.00]	-.14* [-.26, -.01]	-.08 [-.20, .05]	.02 [-.11, .14]	.19* [.04, .33]	-		
10.	.17** [.05, .29]	.00 [-.12, .13]	.02 [-.10, .15]	.18** [.05, .29]	.22*** [.10, .34]	.26*** [.14, .38]	.16** [.04, .28]	.14 [-.01, .28]	-.00 [-.13, .12]	-	
11.	.00 [-.12, .13]	-.04 [-.16, .09]	-.10 [-.22, .02]	-.01 [-.13, .11]	-.03 [-.15, .10]	.02 [-.11, .14]	.00 [-.12, .12]	.28*** [.14, .41]	-.02 [-.14, .11]	.12 [-.00, .24]	-
<i>M</i>	4.81	2.57	4.60		3.13	2.96	2.99	3.66	2.58		31.06
<i>SD</i>	1.81	0.83	0.76		2.28	2.06	1.99	1.89	2.14		14.22
<i>n</i>	250	245 ^d	250	249 ^d	249 ^d	250	249 ^d	180 ^d	248 ^d	249 ^d	250

Notes.
^a Awareness of the existence of transhumanism is coded -0.5 for 'no' (*n* = 116) and 0.5 for 'yes' (*n* = 133). Values represent point-biserial correlations.
^b Higher values on political orientation indicate a conservative political ideology.
^c Gender is coded -0.5 for women (*n* = 156) and 0.5 for men (*n* = 93). Values represent point-biserial correlations.
^d Variation in sample size is due to missing values.
^{*}*p* < .05. ^{**}*p* < .01. ^{***}*p* < .001.

More crucially, collecting more data through a new study would be necessary to allow us to conclude whether there is evidence of a negative link between attitudes toward transhumanism and belief in conspiracy theories. In the following study, we decided to supplement the classic frequentist statistical analyses with Bayesian analyses (Kruschke & Liddell, 2018; Świątkowski & Carrier, 2020; Wagenmakers et al., 2018) as well as equivalence testing (Lakens et al., 2018). These decisions were based on the known limitations of null hypothesis statistical testing regarding the possibility of evaluating evidence for the null hypothesis over an alternative hypothesis (Nickerson, 2000; Wagenmakers, 2007), and the epistemic importance of doing so (Fidler et al., 2018).

Study 2

Method

Preregistration

We preregistered our hypotheses, planned sample size, exclusion rules, and general analytic strategy on *Aspredicted* (<https://aspredicted.org/2am9w.pdf>). We planned to recruit about 300 participants. This targeted sample size was based on $r = .16$ (in absolute value), the smallest effect size of interest (SESOI) given our resources (Brysbaert, 2019; Lakens & Evers, 2014), with power = .80 and α set to 5%. Materials, preregistration planning and deviation documentation (the only minor deviation concerned the number of participants recruited), data, and script are publicly available at (<https://osf.io/s832u/>). In this study, in line with reporting standards suggested by Simmons et al. (2012, p. 4), “we report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study.”

Participants

We recruited 309 undergraduate psychology students from a French university ($M_{\text{age}} = 19.52$, $SD_{\text{age}} = 4.99$, 280 women, 27 men, 2 “other”) who participated in exchange for course

credits. After removing the data of 2 minors, following the exclusion criteria set in our pre-registration, we discarded the data from participants who made more than two errors in our MCQs ($n = 6$), and from participants whose answers were too repetitive ($n = 1$), or too fast ($n = 2$; the latter having already been identified on an exclusion criterion listed earlier). The final sample was composed of 300 participants ($M_{\text{age}} = 19.53$, $SD_{\text{age}} = 5.02$, 271 women, 27 men, 2 “other”).

Materials and Procedure

The materials and procedure of Study 2 were the same as Study 1 with three exceptions: all the participants completed the study online, we restricted the study to a more homogenous sample (only undergraduate psychology students), and we removed questions about religiosity. The reliability of the three main scales was comparable to Study 1 ($\alpha = .70$ for the PAS³, $\alpha = .91$ for the ATT, and $\alpha = .89$ for the GCB), as well as the factor structure (see Appendix B for more details, including the results with GCB items forming two or five factors).⁴ As in Study 1, again to avoid possible contamination, participants began by completing the measure of attitudes toward transhumanism before completing the measure of conspiracy belief.

Results

Confirmatory Analysis

As in Study 1, we did not find a significant correlation between belief in conspiracy theories ($M = 2.90$, $SD = 0.78$) and attitudes toward transhumanism ($M = 4.66$, $SD = 1.53$), $r(298) = -.06$, 95% IC[-.17, .05], $p = .287$. The sign of the correlation (i.e., negative) differed from the previous study at a descriptive level. According to the framework of LeBel et al.

³ After the study was started, we were warned of a possible error with the anomie scale. We discovered a coding error regarding the anchors that were inverted and we corrected it immediately. To verify whether this error affected the participants' responses, we compared the values on the scale before and after the correction and found no significant differences, $t(298) < 1$. Therefore, we did not take further action to address this error.

⁴ At the end of the study, four additional scales were included to test hypotheses related to an unrelated research project described here: <https://osf.io/mrkdy>.

(2018), in Study 2, no signal was detected and the replication effect size was inconsistent with the original effect size point estimate (i.e., the confidence interval calculated in Study 2 did not include the effect size point estimate calculated in Study 1).

As specified in the pre-registration document, we ran the two one-sided tests (TOST) procedure (Lakens et al., 2018) to assess whether this effect was at least as extreme as the SESOI. A SESOI of $r = \pm.16$ was preregistered: the size below which we considered the effect to be negligible (i.e., statistically equivalent to 0). The TOST procedure indicated that the observed effect size was significantly within the equivalence bounds, $p = .043$, thus, r values at least as extreme as $\pm.16$ could be rejected (with $\alpha = .05$).

Next, we conducted a Bayesian analysis using JASP (v. 0.14.4; Quintana & Williams, 2018; Wagenmakers et al., 2018), with the default prior (a stretched beta prior width of 1). The negative correlation, $r = -.06$, 95% credible interval $[-.18, -.01]$, was accompanied by a Bayes factor $BF_{01} = 4.59$, which indicated that the null model was 4.59 more likely than a directional alternative hypothesis model (i.e., a negative correlation between our two key variables), given the data. This could be described as moderate evidence in favor of the null hypothesis (Wagenmakers et al., 2018). A robustness check (see Appendix C) showed that with the exception of small prior widths (approximately < 0.5), the Bayes factors were relatively stable, although only demonstrating at best moderate evidence in favor of H_0 .

Finally, to get a more accurate effect size of the association between belief in conspiracy theories and attitudes toward transhumanism, we ran an internal mini meta-analysis (see Goh et al., 2016) of Studies 1 and 2 (using the package ‘meta’ [v. 4.18-0; Schwarzer, 2007] in R [v. 3.6.1]). The Pearson’s correlations were first transformed to z-scores (Fisher’s z-transformation, see Borenstein et al., 2009) and converted back to Pearson’s correlations. We performed a random-effects model using the inverse variance method. The overall effect size for the association between attitudes toward transhumanism and belief in

conspiracy theories was negative and still non-significant, $r = -.002$, 95% CI $[-.12, .12]$, $z = -0.03$, $p = .972$. The effect was not significantly heterogeneous, although the degree of inconsistency across studies was moderate, $Q(1) = 2.10$, $p = .148$, $I^2 = 52.3\%$.

Then, we ran a multiple regression analysis with conspiracy belief (mean-centered), anomie (mean-centered), and their interaction term, as predictors, and attitude toward transhumanism as the criterion. As the interaction term was not significant, $t(296) < 1$, $\eta^2_p = .003$, we ran a new multiple regression analysis without this interaction term. Neither variable significantly predicted attitudes toward transhumanism, $ps > .226$.

Regarding the bivariate correlation between anomie ($M = 4.45$, $SD = 0.70$) and attitude toward transhumanism, we did not replicate the results obtained in Study 1, $r(298) = .021$, 95% IC $[-.09, .13]$, $p = .718$ (note that the sign of this correlation was not the same as in the previous study). According to the framework of LeBel et al. (2018), no signal was detected, and the replication effect size was inconsistent with the original effect size point estimate (i.e., the confidence interval calculated in Study 2 did not include the effect size point estimate calculated in Study 1). This observed effect size was significantly within the equivalence bounds of $r = -.16$ and $r = .16$, $p = .008$. Thus, r values at least as extreme as $\pm .16$ could be rejected (with $\alpha = .05$). The correlation between anomie and attitude toward transhumanism, $r = .02$, 95% credible interval $[-.12, -.00]$, was accompanied by a Bayes factor $BF_{01} = 18.03$, which indicated that the null model was 18.03 more likely than a directional alternative hypothesis model (i.e., a negative correlation between anomie and positive attitudes toward transhumanism); given the data, strong evidence in favor of the null hypothesis. A robustness check (see Appendix C) showed that except for very small prior widths, the Bayes factors were relatively stable, demonstrating moderate or strong evidence in favor of H_0 .

We ran an internal mini meta-analysis with the same procedure as those presented earlier. The overall effect size for the association between anomie and attitudes toward

transhumanism was negative and still non-significant, $r = -.06$, 95% CI $[-.23, .11]$, $z = -0.73$, $p = .463$. This estimate was significantly heterogeneous, and accompanied by a high degree of inconsistency across studies, $Q(1) = 4.01$, $p = .045$, $I^2 = 75.1\%$.

Exploratory Analyses

Table 2 displays the bivariate correlations between all the variables measured in this study. We again found the well-established positive correlation between conspiracy belief and anomie, $r(298) = .28$, $p < .001$.

In this sample, nearly one third (29.3%) of the participants responded that they were unaware of the existence of transhumanism before they participated in the study, which was a lower rate of unawareness of transhumanism than in our previous study (46.4%), $X^2(1) = 18.69$, $p < .001$, $\Phi = 0.18$. We replicated the predictive role of interest in transhumanism (signal - consistent) and identification with transhumanists (signal - inconsistent, larger) on positive attitudes toward transhumanism. However, we did not replicate the predictive role of knowledge of transhumanism prior to the study (no signal - inconsistent) nor gender (no signal - consistent) on enthusiasm for transhumanism. This lack of replication could come from differences between our two samples (e.g., distribution difference on gender and knowledge of transhumanism prior to the study) and/or simple sampling error.

Table 2
 Descriptive Statistics and Bivariate Correlations (With 95% Confidence Intervals) for Study Variables (Study 2)

	1. Positive attitude toward transhumanism	2. Belief in conspiracy theories	3. Anomie	4. Awareness of the existence of transhumanism ^a	5. Interest in transhumanism	6. Knowledge of transhumanism	7. Identification with transhumanists	8. Political orientation ^b	9. Gender ^c	10. Age
1.	-									
2.	-.06 [-.17, .05]	-								
3.	.02 [-.09, .13]	.28*** [.17, .38]	-							
4.	-.11 [-.22, .00]	-.25*** [-.35, -.14]	-.12* [-.23, -.01]	-						
5.	.21*** [.10, .32]	-.03 [-.14, .09]	-.11 [-.22, .01]	.28*** [.17, .38]	-					
6.	-.02 [-.13, .10]	-.13* [-.24, -.01]	-.15** [-.26, -.04]	.40*** [.30, .49]	.59*** [.51, .66]	-			-	
7.	.57*** [.49, .64]	.01 [-.10, .13]	.02 [-.10, .13]	-.04 [-.15, .07]	.39*** [.29, .49]	.16** [.05, .27]	-			
8.	.12 [-.02, .25]	-.04 [-.18, .09]	-.22** [-.35, -.09]	-.09 [-.23, .04]	.11 [-.02, .24]	.07 [-.06, .21]	.14* [.00, .27]	-		
9.	.10 [-.02, .21]	-.15* [-.26, -.03]	.07 [-.05, .18]	.02 [-.09, .14]	.15** [.04, .26]	.09 [-.02, .20]	.14* [.03, .25]	.12 [-.01, .25]	-	
10.	.02 [-.09, .14]	.04 [-.07, .15]	.02 [-.10, .13]	-.03 [-.14, .08]	.01 [-.10, .12]	-.00 [-.12, .11]	-.02 [-.14, .09]	-.01 [-.14, .13]	-.03 [-.14, .09]	-
<i>M</i>	4.66	2.90	4.45		3.36	3.16	3.13	4.29		19.53
<i>SD</i>	1.53	0.78	0.70		1.97	1.99	1.86	1.45		5.02
<i>n</i>	300	300	300	300	300	300	300	212 ^d	298 ^d	300

Notes.

^a Awareness of the existence of transhumanism is coded -0.5 for 'no' ($n = 88$) and 0.5 for 'yes' ($n = 212$). Values represent point-biserial correlations.

^b Higher values on political orientation indicate a conservative political ideology.

^c Gender is coded -0.5 for women ($n = 271$) and 0.5 for men ($n = 27$). Values represent point-biserial correlations.

^d Variation in sample size is due to missing values.

* $p < .05$. ** $p < .01$. *** $p < .001$.

General Discussion

Given the current popularity of conspiracy theories around COVID-19 and their societal consequences (Pummerer et al., 2021) as well as the growth of anti-science movements and science skepticism (Rutjens et al., 2018, 2021), it is important to better understand factors that foster conspiracy theories, taking care not to discard any line of investigation. The purpose of the present research was to test the predictive role of belief in conspiracy theories in attitudes toward transhumanism, a line of investigation that had never been investigated until now. This hypothesis is based on the lack of trust, feelings of vulnerability, distrust of new technology, and anti-surveillance attitudes that characterize people who believe in conspiracy theories. In promoting advanced technologies, transhumanism can threaten believers in conspiracy theories by confronting them with sensitive issues (for instance, doubts about the reliability and safety of genetic modification of food, Rutjens & van der Lee, 2020). The so-called transhumanist agenda of the Illuminati (Aupers, 2020) illustrates this connection made between transhumanism and conspiracy theories.

However, the results we obtained do not support the hypothesis that inspired this work. The data we collected are more compatible with a lack of relationship between belief in conspiracy and negative attitudes toward transhumanism (i.e., H₀) rather than our initial hypothesis (i.e., H₁). Even more fine-grained analyses focused on the facets of conspiracy beliefs related to science and technology (i.e., “personal wellbeing” and “control of information”) did not change the main conclusions (see the Appendices A and B). In a similar vein, in a recent work based on a Dutch sample recruited subsequently to the studies we have reported here (Većkalov et al., 2023, Study 2), the author did not find any evidence of associations between conspiracy belief and skepticism either (toward scientific innovations,

artificial intelligence, and human gene editing: three domains that can be related to transhumanism).

Nevertheless, attitudes toward transhumanism do not seem to be completely disconnected from other psychological variables. In effect, we found that participants with high levels of interest in transhumanism and identification with this movement predict more favorable attitudes toward transhumanism. The role of anomie is less clear and merits clarification in future studies.

One might ask whether our measurement faithfully probes the way in which people view transhumanism or if it only reflects a distorted conception of transhumanism. In fact, the design of this measuring instrument is far from being eccentric compared to the classic standards of attitude measurement scales. In this respect, we relied on the way transhumanists present themselves, although this does not rule out the possibility of a gap between how ordinary people perceive and understand transhumanism and how it is conceived and presented by its promoters. Moreover, we based our measurement of attitudes on a classic differential semantic scale (Crites et al., 1994; Osgood et al., 1957) widely used in the theoretical field of attitudes. Finally, in view of the classic correlation between belief in conspiracy theories and anomie, we can rule out the alternative explanation that our sample was insufficiently reliable.

Given the data obtained, one might be tempted to conclude that there is merely no noteworthy negative or positive association between belief in conspiracy theories and attitudes toward transhumanism. However, that might be a somewhat premature conclusion. Some possible explanations for the failure to detect this link can be considered. Beyond the lack of representativeness of our samples and the heterogeneity of results across studies, there may be subtleties that could potentially explain in part this lack of conclusive results. Although transhumanism has been presented as a unitary block for the purposes of the study,

reality is more complex. In effect, this philosophical movement offers a diversity of sub-branches which are less well known, unifying different ideologies that may at first look incompatible or unrelated. For example, just as Christian transhumanists exist (Mercer & Trothen, 2021; Redding, 2019), there are transhumanists ranging on a spectrum from techno-progressivism to techno-libertarianism (Mazarakis, 2016). More importantly, transhumanism has historically flourished in a specific cultural context, in this case, in the United States. The possibility of a link being detected in a cultural context in which transhumanism is better known than in France cannot be excluded. At the time of our study, our data show that this topic was not widely familiar to our participants. That said, on a local level, in our samples, awareness of the existence, level of interest, and prior knowledge of transhumanism did not interact significantly with the relationship between belief in conspiracy theories and attitude toward transhumanism ($ps > .396$). A cross-cultural comparison therefore constitutes a research avenue that emerges naturally as a result of our work.

One possible explanation for these null results could be the way transhumanism has been presented in our studies. The transhumanist manifesto presents the ideology at a high level of abstraction and defuses potential fears by emphasizing its benevolent goals. This way of presenting this ideology may have been enough to remove the potential association between conspiracy belief and attitudes toward transhumanism. Perhaps the alleged conspiracy believers' rejection of transhumanism is not a rejection of the ideology in itself, but rather a rejection of the powerful organizations that promote it.

To conclude, our research plays a precursory role in understanding the attitudes one may have about a cultural movement that continues to grow in popularity and influence. To date, there are only a few empirical studies on this topic (e.g., Bainbridge, 2005), and to our knowledge, this is the first time that a scale measuring the attitudes toward transhumanism has been designed and administered in the context of research in psychology. It is very surprising

that, to date, the psychological correlates of the attitudes toward transhumanism have not attracted more research attention. Although we have not been able to establish that belief in conspiracy theories predicts negative attitudes toward transhumanism, one could perhaps suggest that the preoccupation with transhumanism is predominantly found among ardent supporters of conspiracy theories and/or those who propagate them.

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Appendices

Appendix A: Study 1 - Additional analyses

Confirmatory Factor Analysis of the GCB

We conducted two CFAs (using the maximum likelihood estimator) of the GCB. The two-factor model (general propensity to believe in conspiracy theories and extraterrestrial cover-up sub-factors) provided an acceptable fit to the data ($\chi^2 [89, N = 245] = 245.39$, normed chi-square (χ^2/df) = 2.76, comparative fit index [CFI] = .91, mean square error of approximation [RMSEA] = .085 [90% CI = .072, .097], standardized root mean square residual [SRMR] = .06. The test of a single-factor model (including all the items onto a single factor) fit the data poorly ($\chi^2 [90, N = 245] = 479.12$, normed chi-square (χ^2/df) = 5.32, CFI = .77, RMSEA = .133 [90% CI = .121, .145], SRMR = .09). Consistently, the two-factor model fit the data significantly better than the single-factor model, $\chi^2(1) = 233.73, p < .001$.

Confirmatory Factor Analysis of the PAS

We ran a CFA (using the maximum likelihood estimator) of the PAS's original two-factor model (i.e., breakdown of social fabric and breakdown of leadership; Teymoori et al., 2016). This model fit the data poorly ($\chi^2 [53, N = 250] = 185.23$, normed chi-square (χ^2/df) = 3.49, CFI = .78, RMSEA = .100 [90% CI = .084, .116], SRMR = .09).

Facets of belief in conspiracy theories and their links to attitudes toward transhumanism

As a reminder, we found a specific factor structure for the GCB (general propensity to believe in conspiracy theories vs. extraterrestrial cover-up). We can also consider the original facets identified by the authors of the latter scale (Brotherton et al., 2013)⁵. To check whether the lack of significant correlation observed at global level (i.e., between conspiracy belief and attitudes toward transhumanism) does not conceal more local relationships, it might be instructive to test the correlations between these facets and attitudes toward transhumanism. It

⁵ Note that the facet "Extraterrestrial cover-up" corresponds exactly to the second sub-factor we presented above, so we only present it once.

turned out that our initial conclusions did not change: all the correlations had a positive sign, but none was significant ($ps > .061$, see Table A1).

Table A1
Bivariate correlations between attitudes toward transhumanism and facets of beliefs in conspiracy theories (With 95% Confidence Intervals) in Study 1.

	1. Positive attitude toward transhumanism	2. GPBCT	3. GM	4. MG	5. ET	6. PW	7. CI
1.	-	.08	.08	.01	.01	.12 [†]	.04
		[-.04, .20]	[-.05, .20]	[-.11, .14]	[-.11, .13]	[-.01, .24]	[-.08, .16]
<i>M</i>	4.81	2.66	2.85	2.53	1.74	2.33	3.39
<i>SD</i>	1.81	0.87	1.09	1.13	0.97	1.02	1.01
<i>n</i>	250	248 ^a	249 ^a	248 ^a	249 ^a	249 ^a	246 ^a

Note.

Abbreviations. GPBCT = General Propensity to Believe in Conspiracy Theories; GM = Government Malfeasance; MG = Malevolent Global Conspiracy; ET = Extraterrestrial cover-up; PW = Personal Wellbeing; CI = Control of Information.

^a Variation in sample size is due to missing values.

[†] $p = .061$.

Testing the effect of the mode of administration

The following analysis was carried out in response to a question raised by an anonymous reviewer during the review process about whether the results were similar in the two modes of administration (paper and pencil vs. online). To answer this question, we ran a multiple regression analysis with conspiracy belief (mean-centered), the mode of administration (contrast-coded), and their interaction term as predictors, and attitude toward transhumanism as the dependent variable. The interaction term was not significant, $t(241) = 1.61$, $p = .108$, $\eta^2_p = .011$. Thus, the mode of administration does not seem to play a significant role in the effect corresponding to our main hypothesis, namely, the relationship between belief in conspiracy theories and attitudes toward transhumanism.

Appendix B: Study 2 - Additional analyses

Confirmatory Factor Analysis of the ATT

We ran a CFA (using the maximum likelihood estimator) of the ATT original single-factor model. This model fit the data very well ($\chi^2 [5, N = 300] = 8.16$, normed chi-square (χ^2/df) = 1.63, CFI = .997, RMSEA = .046 [90% CI = .000, .101], SRMR = .02).

Confirmatory Factor Analysis of the GCB

We conducted two CFAs (using the maximum likelihood estimator) of the GCB. The two-factor model (general propensity to believe in conspiracy theories and extraterrestrial cover-up sub-factors) provided an acceptable fit to the data (χ^2 [89, $N = 300$] = 304.84, normed chi-square (χ^2/df) = 3.43, CFI = .89, RMSEA = .090 [90% CI = .079, .101], SRMR = .06. The test of a single-factor model (including all the items onto a single factor) fit the data poorly (χ^2 [90, $N = 300$] = 638.96, normed chi-square (χ^2/df) = 7.10, CFI = .72, RMSEA = .143 [90% CI = .132, .153], SRMR = .10). Consistently, the two-factor model fit the data significantly better than the single-factor model, $\chi^2(1) = 334.12, p < .001$.

Confirmatory Factor Analysis of the PAS

We ran a CFA (using the maximum likelihood estimator) of the PAS’s original two-factor model (i.e., breakdown of social fabric and breakdown of leadership; Teymoori et al., 2016). This model fit the data poorly (χ^2 [53, $N = 300$] = 173.73, normed chi-square (χ^2/df) = 3.28, CFI = .81, RMSEA = .087 [90% CI = .073, .102], SRMR = .08).

Facets of belief in conspiracy theories and their links to attitudes toward transhumanism

As in Study 1, we wanted to test the correlations between these facets and the attitudes toward transhumanism. Again, none of our conclusions changed: none was significant ($ps > .072$, see Table B1).

Table B1
Bivariate correlations between attitudes toward transhumanism and facets of beliefs in conspiracy theories (With 95% Confidence Intervals) in Study 2.

	1. Positive attitude toward transhumanism	2. GPBCT	3. GM	4. MG	5. ET	6. PW	7. CI
1.	-	-.06 [-.17, .06]	-.10 [-.21, .02]	.00 [-.11, .12]	-.01 [-.12, .10]	-.04 [-.15, .07]	-.10 [†] [-.21, .01]
<i>M</i>	4.66	3.00	3.04	2.87	2.03	2.76	3.78
<i>SD</i>	1.53	0.80	1.11	1.05	1.06	0.94	0.86
<i>n</i>	300	300	300	300	300	300	300

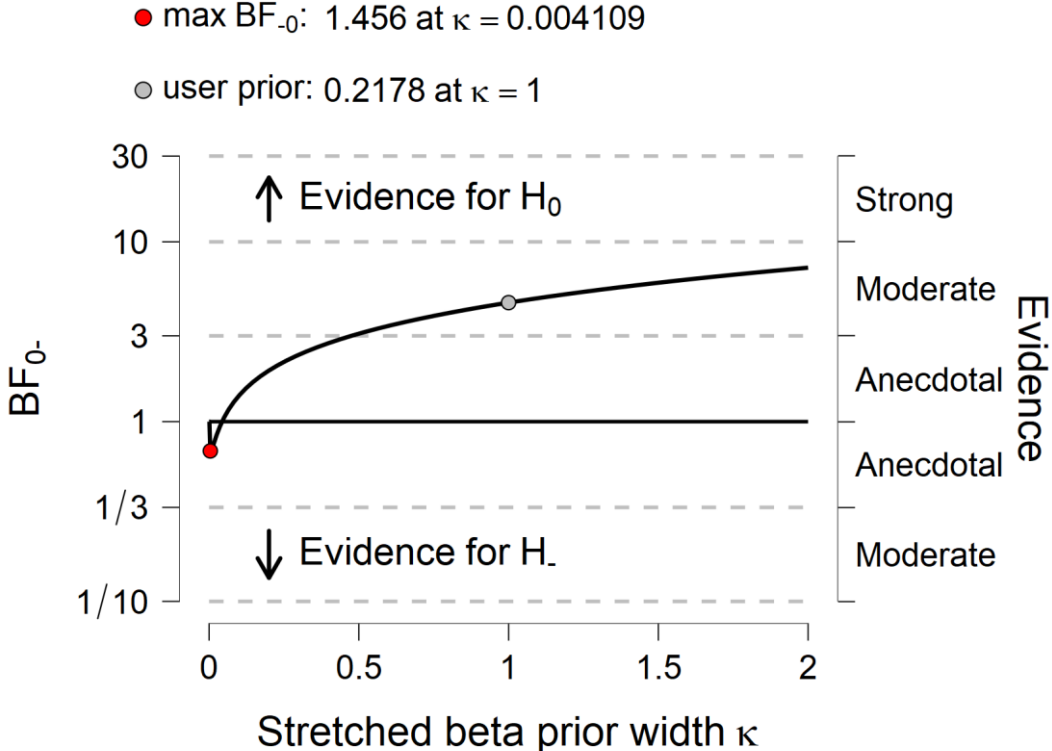
Note.

Abbreviations. GPBCT = General Propensity to Believe in Conspiracy Theories; GM = Government Malfeasance; MG = Malevolent Global Conspiracy; ET = Extraterrestrial cover-up; PW = Personal Wellbeing; CI = Control of Information.

[†] $p = .072$.

Appendix C: Study 2 - Bayes Factor Robustness Check

Bayes Factor Robustness Check of the association between belief in conspiracy theories and attitudes toward transhumanism in Study 2



Bayes Factor Robustness Check of the association between anomie and attitudes toward transhumanism in Study 2

Bayes Factor Robustness Check

● max BF_{-0} : 1 at $\kappa = 0.0001028$

○ user prior: 0.05545 at $\kappa = 1$

