Supplemental Online Material

Scale Construction

Below, we document the development of our Multi-dimensional Science Beliefs measure. Data from Study 1 and 2 was used to develop the measure from an initial pool of 20-items from three separate measures of science beliefs. The 12 items used in the final measure are available in Table 1 in the main text. The details on the datasets from Study 1 and 2 are also available in the main text.

We originally planned to use the three scientific beliefs measures as predictors in our primary analyses. We pre-registered the analyses with the individual measures on the OSF (https://tinyurl.com/5xueuhnm (Study 1) and https://tinyurl.com/3uyfw5nu (Study 2)). We initially believed these scales were measuring very similar constructs, and we were treating each scale as a unidimensional measure of science beliefs. However, after receiving reviewer feedback on that project and re-evaluating the content of each scale, we determined that there was considerable conceptual fuzziness among the three measures. They appeared to have significant item content in common, but there were also items in each scale that appeared to be measuring separate aspects of science beliefs. We were unsure whether each of these three measures was measuring an identical construct (i.e., a 1-factor model for the full 20-items), or whether the scales were tapping into more than one construct (i.e., a multi-factor model for the full 20-items). Moreover, the items from two of these measures had not actually undergone confirmatory factor analyses during their validation procedure (i.e., the faith in science scale, and the science attitudes scale), bringing the factor structure of the measures further into question.

To deal with the conceptual fuzziness of the three measures, we explored the factor structure of the full set of 20 items from the three scales, with goal of reducing the item set to a well-fitting and interpretable factor structure.

Study 1 – Scale construction

Initial item pool

Our initial item pool consisted of 20-items from previously three previously utilized measures (see Table S1). It is worth noting that the science beliefs scale (Carey, 2012) used a five-item response scale (1 = "Strongly disagree" to 5 = "Strongly agree"), while the other two measures used a six item response scale (1 = "Strongly disagree" to 6 = "Strongly agree"). In addition, all participants completed the faith in science scale first, the science attitudes scale second, and the science beliefs scale third. However, the items within each scale were in a randomized order for each participant.

Table S1. *Original 20-items and their means, standard deviation, and loadings in initial EFA in Study 1.*

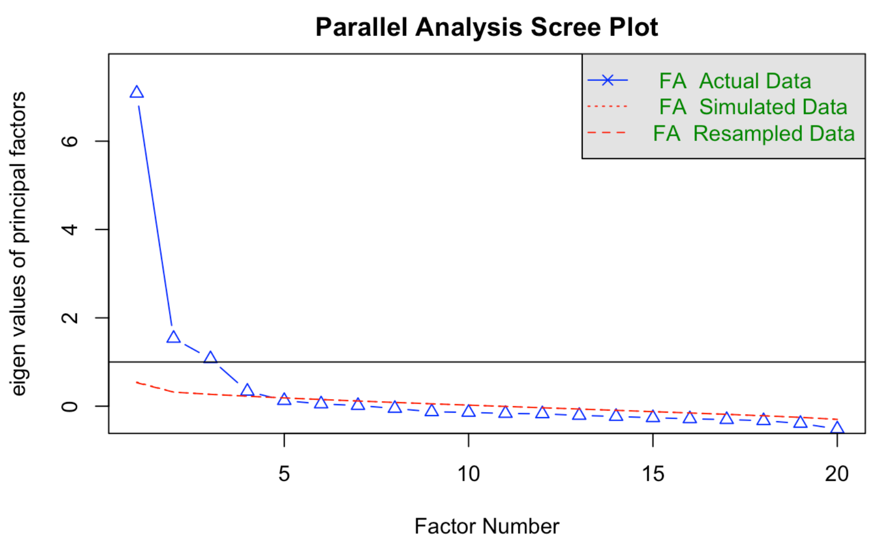
Item	*M* (SD)	F1 loading	F2 loading	F3 loading
Science attitudes scale (Mcphetres & Zuckerman, 2018)				
Because of science and technology, there will be more opportunities for the next generation.	4.94 (1.00)	0.00	**0.81**	-0.01
Science makes our way of life change too fast. (R)	4.14 (1.38)	-0.20	0.30	0.38
Even if it brings no immediate benefits, scientific research that advances the frontiers of knowledge is necessary and should be supported by the federal government.	4.95 (0.99)	-0.01	**0.58**	0.29
Science and technology are making our lives healthier and easier.	4.80 (1.01)	0.14	**0.74**	0.00
Most scientists want to work on things that make life better for the average person.	4.72 (0.96)	0.13	**0.67**	-0.11
It is not important to know about science in every day life. (R)	4.76 (1.25)	-0.19	0.38	0.23
Faith in science (Farias et al., 2013; Rutjens et al., 2018)				
We believe too often in science, and not enough in feelings and faith. (R)	4.17 (1.45)	0.12	0.10	**0.63**
Science tells us everything there is to know about what reality consists of.	3.47 (1.46)	**0.86**	0.05	-0.08
The scientific method is the only reliable path to knowledge.	3.60 (1.43)	**0.84**	0.04	0.07
The only real kind of knowledge we can have is scientific knowledge.	3.35 (1.44)	**0.85**	-0.04	0.07
Science is the most efficient means of attaining truth.	4.18 (1.44)	**0.64**	0.21	0.16
Science beliefs (Carey, 2012)				
There are some things that humans should not try to understand. (R)	3.40 (1.15)	-0.08	0.08	**0.63**
There are things in this world too complicated to happen on their own. (R)	2.72 (1.17)	0.04	-0.11	**0.72**
Reports of so-called "near-death experiences" don't prove there is an afterlife.	3.30 (1.16)	0.08	-0.11	**0.65**
I prefer spiritual explanations for things rather than scientific ones. (R)	3.81 (1.03)	0.02	0.17	**0.72**
If someone told me they had a spiritual vision I would doubt it.	3.09 (1.18)	0.14	-0.11	**0.57**
I believe there is something beyond this material universe. (R)	2.39 (1.19)	0.24	-0.15	**0.62**

I am comfortable with the idea that the world is just atoms and molecules.	3.24 (1.23)	0.31	-0.01	**0.40**
I trust my intuition more than scientific evidence. (R)	3.47 (1.02)	-0.03	0.23	**0.64**
I follow my instincts, even if I don't understand them. (R)	2.63 (0.85)	-0.06	-0.08	**0.49**

Exploratory factor analysis

We examined the factor structure of the 20-items using EFA with an oblimin rotation and maximum likelihood estimation. The scree-plot (Figure S1) suggested we could retain up to three factors. When we used the psych package in *R* to conduct a parallel analysis using 1000 simulations, the results suggested we should retain 4 factors. However, the minimum average partial (MAP) suggested a three-factor solution. Finally, inspecting the very simple structure (VSS) suggested we retain only 1 factor. Following the suggestions of the MAP and the scree-plot, we examined a three-factor solution, which resulted in three interpretable factors.

Figure S1. *Scree plot for 20-item EFA*

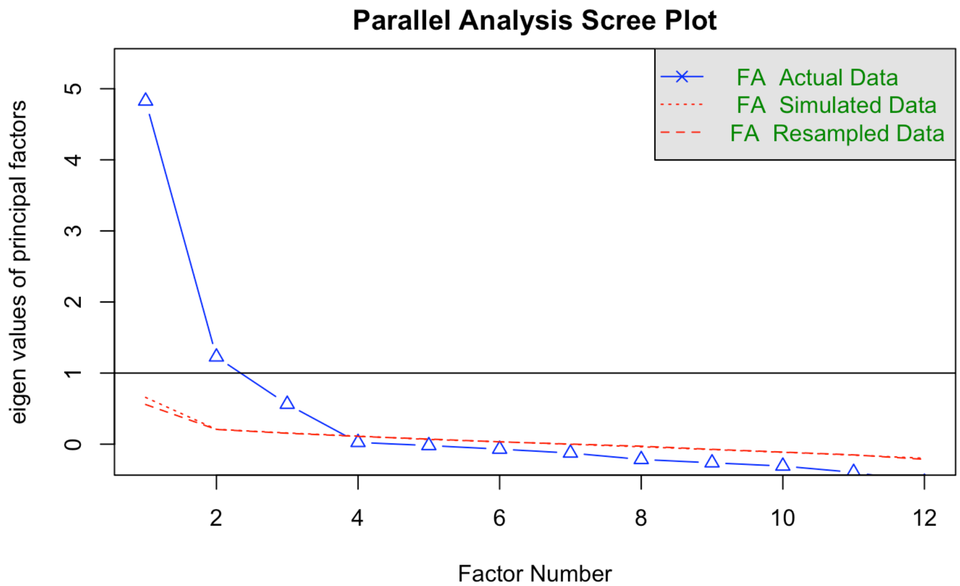


The first two factors seemed to be tapping into dogmatic belief in the power of the scientific method (i.e., scientism; Factor 1) and optimism towards the benefits of science (i.e., scientific optimism; Factor 2). The third factor was harder to interpret but included several items that seemed to be tapping into a tendency for scientific reductionism or the belief that naturalistic explanations for phenomena are the most plausible (i.e., scientific reductionism; Factor 3). We wanted to narrow the item pool down such that we had fewer items per factor. The scientism factor (F1 in Table S1) and the scientific optimism factor (F2 in Table S1) each had four items that clearly stood out as representative of the underlying constructs (e.g., factor loadings > .40). For the third factor, we wanted to avoid including items that were too explicitly related to religion, because we did not want to simply measure religiosity. We thus chose four items with strong factor loadings (i.e., < .40) that appeared to measure some aspect of scientific reductionism, while not being too closely related to religiosity. Altogether, this process resulted in four potential items from each of the scientism factor, scientific optimism factor, and the reductionism factors (12-items total; see Table 1 in the main text for the 12 items).

Next, we conducted a second EFA using these 12-items with an oblimin rotation and maximum likelihood estimation. Examining the scree-plot suggested we could retain up to 2 factors. However, parallel analysis suggested we should retain 3 factors. The MAP additionally suggested we retain 3 factors, while VSS suggested we retain only 2. We ultimately retained a three-factor structure, because there was also evidence of a three-factor structure using the original 20-item pool. The factors had eigenvalues of 4.83, 1.23, and 0.56 (see figure S2 for Parallel Analysis Plot). Fit statistics indicated the three-factor model had exceptional fit (TLI = 0.95, RMSEA = 0.02).

Overall, we had strong initial evidence that our set of 12-items was tapping into three distinct factors, with one factor representing "Scientism" beliefs, another representing "Scientific optimism", and the final factor indicating "Scientific reductionism". The scientism factor was correlated $r = .42$ and $r = .61$ with scientific optimism and scientific reductionism, respectively. Scientific optimism and scientific reductionism were more weakly correlated, $r = .28$.

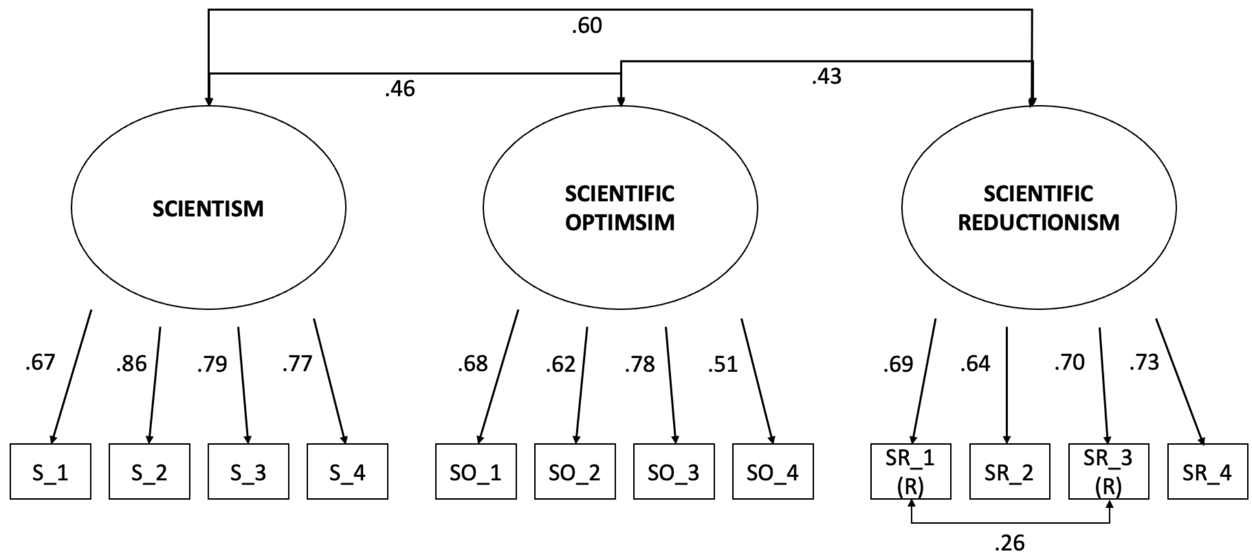
Figure S2. Scree plot of 12-item EFA



Study 2 – Confirmatory factor analysis

Using the Study 2 dataset described in the main text, we conducted a confirmatory factor to test the 12-item three-factor model uncovered in Study 1. However, it is worth noting that the full initial pool of 20-items was also included in this survey. The model fit to the data is presented in Figure S3. We allowed the residuals of the two reverse coded items on the Scientific reductionism factor to correlate, given that methodological factors such as reverse-worded items can create "method variance" independent of the latent construct. We used the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA) to assess the fit of our model, with RMSEA values below .08 (Brown & Cudeck, 1993) and CFI values above .90 (Hu & Bentler, 1999) representing acceptable fit. Using these guidelines, our model fit the data well, RMSEA = .074 and CFI = .94. In addition, the Standardized Root Mean Residual (SRMR) was .058. As expected, given the relatively large sample size (e.g., Byrne, 2005), the chi-square test was significant, $\chi^2(50) = 185.46$, $p < .001$.

Figure S3. *CFA model with loadings*



Although our model fit the data well, to rule out alternative model specification we tested the three-factor model vs. more parsimonious factor structures. In service of this, we created a two factor CFA model with Scientific Optimism factor intact and the Scientism and Scientific reductionism factors combined into a single factor. We combined the Scientism and Scientific reductionism into one factor in the more constrained model because these were the two factors that were the most highly correlated in our three factor CFA (see Figure S3). We also created a single factor CFA model with all the items loading onto a single factor. Because the one and two factor models are *nested* within the three-factor model, we compared the fit of the three-factor model to the one and two factor models using the chi-square difference test (Steiger, et al., 1985). The chi-square difference test tests the null-hypothesis that the additional restrictions in the nested model are also correct. As such, a *non-significant* chi-square difference test suggests that the additional restrictions in the nested model (in our case, the move from a three-factor model to a one or two factor model) should be accepted. In contrast, a significant chi-square difference test suggests the additional constraints in the nested model *should* be rejected. The result of the chi-square difference test between our three-factor model and the two-factor model was significant, $\chi^2(2) = 205.15$, $p < .001$. Likewise, the chi-square difference test between the three factor and one factor models was also significant, $\chi^2(3) = 282.18$, $p < .001$. As such, we can reject the two factor and one factor models as being a stronger fit to our data. See Table S2 for the final items included in our scale.

Given that the scientific optimism factor may simply be tapping into general optimism, we assessed whether scores on our scientific optimism items were highly correlated with a measure of general optimism (Scheier et al., 1994). To do this, we created a composite scientific optimism score by averaging the four items on that factor. Scientific optimism scores were essentially uncorrelated with general optimism, $r = .08$, suggesting they are two distinct constructs. A composite score of scientific reductionism, however, was highly negatively correlated with a 3-item measure of religious belief, $r = -.78$, suggesting that this factor is highly negatively related to people's general religious beliefs. The composite scores for scientism (r -.45) and scientific optimism ($r = -.25$) were less correlated with religiosity, however, suggesting they represent more distinct constructs.

Table S2. *The final items in the Multi-Dimensional Science Beliefs Scale.*

Item
Scientism subscale
Science tells us everything there is to know about what reality consists of.
The scientific method is the only reliable path to knowledge.
The only real kind of knowledge we can have is scientific knowledge.
Science is the most efficient means of attaining truth.
Scientific Optimism subscale
Because of science and technology, there will be more opportunities for the next generation.
Even if it brings no immediate benefits, scientific research that advances the frontiers of knowledge is necessary and should be supported by the federal government.
Science and technology are making our lives healthier and easier.
Most scientists want to work on things that make life better for the average person.
Scientific Reductionism subscale
There are things in this world too complicated to happen on their own. (R)
Reports of so-called "near-death experiences" don't prove there is an afterlife.
I believe there is something beyond this material universe. (R)
I am comfortable with the idea that the world is just atoms and molecules.

Supplemental Regression Analyses – Study 1

Additional Measures

Religious faith. As described in the main text, we included three additional measures of religious faith aside from the three-item measure included in the main text. Along with the three item measure, participants completed a single-item measure, a two-item measure of spiritual and religious faith, and a 10-item intrinsic religiosity measure (Gervais & Norenzayan, 2012; Kaur et al., 2017; see the full list of measures at https://tinyurl.com/2p8uucdb). To cover the full breadth of the religiosity construct, we created a 16-item composite measure of the religiosity measures by averaging the z-scores for each of the individual items on all four measures (including the three-item measure used in the main text; $\alpha = .94$). We then used this 16-item composite as the religious faith variable in the same regression analyses reported in the main text.

Regression results

See Table S3 for the results of the regression analyses with scientism, scientific optimism, and scientific reductionism, predicting our existential variables, controlling for conservatism and religious faith (using the full 16-item composite). The results are essentially identical to those in the main text, albeit scientism only marginally negatively predicts significance now (p = .059). It is worth noting, there is extreme multicollinearity in this model, with the high variance inflation factor of the predictors being 48.27.

Table S3. *Regression results with composite measure of all religious measures included in original survey (Study 1)*

	Meaning in Life				**Significance**				**Purpose**				**Coherence**			
Predictors	*B*	*95% CI*	*t*	*p*	*B*	*95% CI*	*t*	*p*	*B*	*95% CI*	*t*	*p*	*B*	*95% CI*	*t*	*p*
Scientism	-0.23	-0.34 – -0.12	-4.10	**<.001**	-0.10	-0.21 – 0.00	-1.89	.059	-0.20	-0.31 – -0.08	-3.37	**.001**	-0.16	-0.27 – -0.04	-2.70	**.007**
Scientific Optimism	0.28	0.18 – 0.37	5.78	**<.001**	0.16	0.07 – 0.25	3.61	**<.001**	0.29	0.19 – 0.39	5.94	**<.001**	0.26	0.16 – 0.35	5.24	**<.001**
Scientific reductionism	0.03	-0.10 – 0.15	0.44	.662	-0.21	-0.33 – -0.09	-3.37	**.001**	0.14	0.01 – 0.27	2.13	**.034**	0.22	0.09 – 0.35	3.34	**.001**
Religious faith (composite of all items)	0.18	0.06 – 0.31	2.81	**.005**	0.22	0.09 – 0.34	3.48	**.001**	0.16	0.03 – 0.29	2.37	**.018**	0.21	0.08 – 0.34	3.12	**.002**
Conservatism	0.07	-0.03 – 0.17	1.38	.167	0.10	0.00 – 0.19	2.04	**.042**	0.10	0.00 – 0.20	1.98	**.048**	0.12	0.02 – 0.22	2.29	**.023**
Observations	497				497				497				497			
R^2 / R^2 adjusted	0.135 / 0.126				0.227 / 0.220				0.097 / 0.088				0.093 / 0.084			

Relationship Between Meaning Of Life and Other Constructs

As discussed in the main text, we included a measure assessing people's perceptions of the meaning *of* life more generally. This involved removing any reference to the participants personal life in the wording of the four meaning *in* life items. For example, participants indicated their agreement with the question "Life as a whole as meaning" instead of the item "My life as a whole has meaning." In Study 1, our meaning of life measure was correlated $r = .67$ with the standard meaning in life measure. The correlation between the two measures was $r = .60$ in Study 2. Table S4 and S5 contain the correlations between the meaning of life measure with the other measures in the studies. In general, the correlations between the meaning of life variable and the science beliefs subscales were nominally stronger than the relationships between the meaning in life variable and the science beliefs subscales.

Table S4. *Correlations between meaning of life variable and other variables in Study 1*

	1	2	3	4	5	**6**	7	8	9
1. Scientism	1								
2. Scientific Optimism	0.42	1							
3. Scientific Reductionism	0.61	0.29	1						
4. Religious faith	-0.54	-0.27	-0.76	1					
5. Conservatism	-0.33	-0.35	-0.35	0.44	1				
6. Meaning OF life	-0.28	0.13	-0.35	0.35	0.11	1			
7. Significance	-0.31	-0.03	-0.40	0.42	0.25	0.64	1		
8. Coherence	-0.07	0.15	0.01	0.07	0.11	0.42	0.53	1	
9. Purpose	-0.10	0.17	-0.04	0.09	0.10	0.47	0.56	0.74	1
10. Search for meaning	-0.07	0.00	-0.25	0.20	0.02	0.11	0.00	-0.21	-0.09

Table S5. *Correlations between meaning of life variable and other variables in Study 1*

	1	2	3	4	5	**6**	7	8	9	10
1. Scientism	1									
2. Scientific Optimism	0.38	1								
3. Scientific Reductionism	0.47	0.31	1							
4. Religious faith	-0.45	-0.24	-0.78	1						
5. Conservatism	-0.19	-0.26	-0.41	0.41	1					
6. Meaning OF life	-0.18	0.06	-0.32	0.36	0.16	1				
7. Significance	-0.24	-0.11	-0.43	0.44	0.22	0.61	1			
8. Coherence	0	0.12	0	0.09	0.1	0.36	0.34	1		
9. Purpose	0.04	0.14	-0.04	0.15	0.14	0.37	0.43	0.61	1	
10. Search for meaning	-0.05	0.04	-0.22	0.16	-0.07	0.05	0.09	-0.16	-0.09	1