Ecker et al. (2022). Combining Refutations and Social Norms Increases Belief Change – Online Supplement

Pilot Study

A total of $N = 29$ undergraduate students at the University of Western Australia (20 females, 9 males; age range 17-23 years, $M = 19.97$, $SD = 1.82$) completed a survey delivered via Qualtrics (Provo, Utah, USA). Participants were presented with four claims that were part of contemporary public debate and could be assumed to align with the views of a majority of participants (A. *Culling sharks will be ineffective in reducing the number of shark attacks at Western Australian beaches*; B. *Accepting a slightly increased uptake of refugees will have a positive impact on the Australian economy within 20 years*; C. *Decreasing rates of incarceration in Australia will decrease the rates of repeat offending*; D. *Raising the legal drinking age in Australia will be ineffective in reducing anti-social behaviour*). Claims were preceded with two sentences of background information on the topics. Participants rated how confidently they agreed with each claim on a scale ranging from confidently disagree (1) to confidently agree (10). Following this, participants were presented with a refutation concerning each of the four topics and asked to re-rate their agreement with the original claim. The full claims and refutations are provided below; results are provided in Table S1.

Claim A. The great debate about shark culling continues in Australia: While the aim is to maximize beach safety, James Williams from the Department of Parks and Wildlife said that there is "no substantial evidence to suggest that culling sharks reduces the number of shark attacks. As a strategy to reduce risk, culling is ineffective".

Refutation A. Later today, Dr Evan Young from the Centre for Marine Futures strongly refuted earlier statements regarding the ineffectiveness of shark culling. He stated that culling was a proven and effective strategy to reduce the risk of fatal shark attacks in Australia. He pointed out that the Queensland culling program has had significant success,

with fatality rates reducing substantially following installation of shark-bait drum lines. He said: “Whether people like it or not, the available evidence is very clear: Culling reduces the risk of shark attacks.”

Claim B. The great debate about how many refugees Australia should take in continues. The main aim is to keep refugees safe, and while there is some immediate cost, Jack Western from the Australian Refugee Resource Centre argued today that within a short period of time, most refugees integrate into society, and a moderate increase in refugees would have a positive impact on the Australian economy within two decades.

Refutation B. Later today, Dr Michael Smith from the Centre for Independent Studies strongly refuted earlier statements regarding an economic benefit associated with asylum seekers. According to Smith, recent modelling by the Centre shows that there is “no economic gain to be expected in the foreseeable future by increasing the intake of asylum seekers in Australia. Evidence also comes from Germany where the intake of asylum seekers over the years has been an economic drain. Unfortunately, the reality is that each additional refugee comes at a certain long-term cost.”

Claim C. The debate on how to best reduce crime in Australia continues. With the need to both punish those who break the law and decrease the chance that they will reoffend, Hannah Jones from the Department of Justice argued today that for non-major crimes there would be greater benefit in giving community-service based punishments rather than a jail sentence, as jail may lead people to “hone their skills.”

Refutation C. Later today, Dr Andrew Miles, a representative from the Australian Institute of Criminology, strongly refuted the earlier suggestion that decreasing rates of incarceration will reduce the likelihood of people repeat offending. He stated that “unfortunately, weaker forms of punishment don’t serve as an adequate deterrent, and as a result Australians who don't receive a jail sentence are significantly more likely to reoffend.”

Research from the United Kingdom and local modelling by the Institute have shown that jail time continues to be the best deterrent to future crime."

Claim D. The debate on the legal drinking age in Australia continues. In many US states, 21 is the legal age, but in Australia 18 has been the standard since 1970. While the aim is to reduce anti-social behaviour in nightlife districts, Tim Jones from the Sydney-based Anti-Violence-League said: "This is a societal issue and no subgroup should be targeted. Raising the legal age to 21 will not fix the problem—there is just no evidence at all that it would."

Refutation D. Later today, Dr Shane Tate, a representative from the Department of Racing, Gaming and Liquor, strongly refuted the earlier suggestion that raising the drinking age will be ineffective. "Unfortunately there is strong evidence that 18-20 year olds are much more likely to cause trouble whilst at bars and clubs than those aged over 21. Research from the United States and modelling by the Department has shown that increasing the drinking age in Australia will lead to an immediate and substantial decrease in anti-social behaviour."

Table S1

Pilot Study Claim Belief Ratings on 1-10 Scale (Claim Selected for Main Study in Bold)

	M	*SD*
Claim A (Shark Culling)		
Pre-Refutation	6.13	2.81
Post-Refutation	5.34	2.73
Claim B (Refugees)		
Pre-Refutation	**6.62**	**2.53**
Post-Refutation	**4.97**	**2.63**
Claim C (Rates of Imprisonment)		
Pre Refutation	5.97	2.67
Post-Refutation	5.07	2.40
Claim D (Drinking Age)		
Pre-Refutation	7.87	2.35
Post-Refutation	7.17	2.29

Authenticity Scale (Wood et al., 2008)

Please respond with how well each statement describes you, on a scale from 1 (does not describe me at all) to 7 (describes me very well); note, (R) indicates reverse-scored items.

1. I think it is better to be yourself, than to be popular.
2. I don't know how I really feel inside. (R)
3. I am strongly influenced by the opinion of others. (R)
4. I usually do what other people tell me to do. (R)
5. I always feel I need to do what others expect me to do. (R)
6. Other people influence me greatly. (R)
7. I feel as if I don't know myself very well. (R)
8. I always stand by what I believe in.
9. I am true to myself in most situations.
10. I feel out of touch with the 'real me'. (R)
11. I live in accordance with my values and beliefs.
12. I feel alienated from myself. (R)

Social Assertiveness Questionnaire

The questionnaire was a modified version of a sub-scale of the college self-expression scale (Galassi et al., 1974). Instructions: Please respond how you generally express yourself in the situation, on the following scale: rarely/never – seldom – sometimes – usually – always/almost always; note, (R) indicates reverse-scored items.

1. Are you overly careful to avoid hurting other people's feelings? (R)
2. Do you keep your opinions to yourself? (R)
3. If you were in a small seminar and the professor made a statement that you considered untrue, would you question it?
4. If someone you respect expresses opinions with which you strongly disagree, would

you venture to state your own point of view?

5. Do you go out of your way to avoid trouble with other people? (R)
6. When a person is blatantly unfair, do you fail to say something about it to him? (R)
7. Do you avoid social contacts for fear of doing or saying the wrong thing? (R)
8. Do you freely volunteer information or opinions in class discussions?
9. Do you find it difficult to stand up for your rights? (R)
10. If a friend unjustifiably criticises you, do you express your resentment there and then?
11. Do you express your feelings to others?
12. Do you avoid asking questions in class for fear of feeling self-conscious? (R)

Experiments 2 and 3: Claims, Refutations, Norms

Refugees.

Claim. The debate about how many refugees Australia should take in continues. The main aim is to keep refugees safe, and while there is some immediate cost, Jack Western from the Australian Refugee Resource Centre argued today that there was no reason to be concerned about economic consequences: "Within a short period of time, most refugees integrate into society, and a moderate increase in refugees will have a positive impact on the Australian economy". Western claimed that within two decades, a slight increase in refugee intake would boost the Australian economy by an estimated 2% [*Experiment 3*: …, or about $1,300 per person (in per-capita GDP terms; per-capita GDP is the Gross Domestic Product—a measure of a country's economic productivity—divided by the number of residents)]. *Accepting a slightly increased uptake of refugees will have a positive impact on the Australian economy within 20 years.*

Refutation. Later today, Dr Michael Smith from the Centre for Independent Studies strongly refuted earlier statements regarding an economic benefit associated with asylum seekers. According to Smith, recent modelling by the Centre shows that "there is absolutely

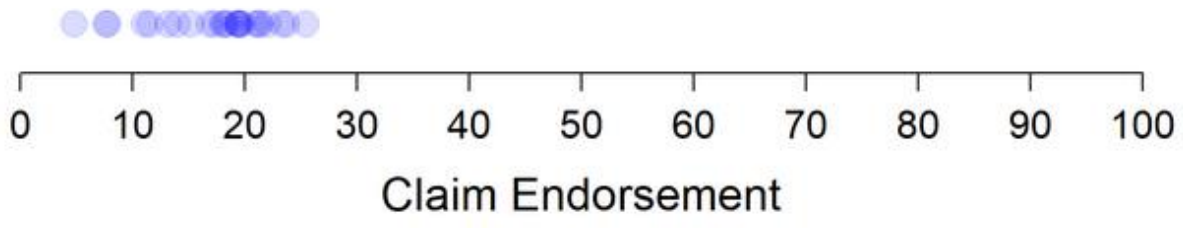
no economic gain to be expected in the foreseeable future by increasing the intake of refugees in Australia. Evidence also comes from Germany, where the intake of asylum seekers over the years has been an economic drain. Unfortunately, the reality is that each additional refugee comes at a certain long-term cost."

Norm (Experiment 2). The original claim was: "*A slightly increased uptake of refugees will have a positive impact on the Australian economy. The estimated effect of a moderate increase in refugee intake on the Australian economy will be +2%.*" The true effect on the Australian economy was estimated by the last four participants as: -0.2% / -0.1% / +0.3% / +0.4% [narrow] or -1.2% / -0.6% / +0.8% / +1.4% [wide]

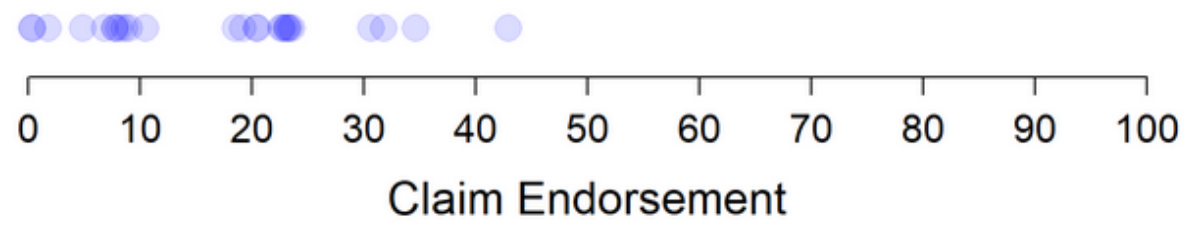
Norms (Experiment 3).

Claim-endorsement norm. "Before you re-rate your belief in the original claim, let's first have a look at what your peers said. We surveyed a representative sample of 25 UWA students, asking them how they rated their belief in the claim. The original claim was: *"Accepting a slightly increased uptake of refugees will have a positive impact on the Australian economy."* This is how your peers rated their belief in the claim. The below graph shows their claim endorsement on a scale from 0 (confidently disagree with claim) to 100 (confidently agree with claim):

[narrow:]

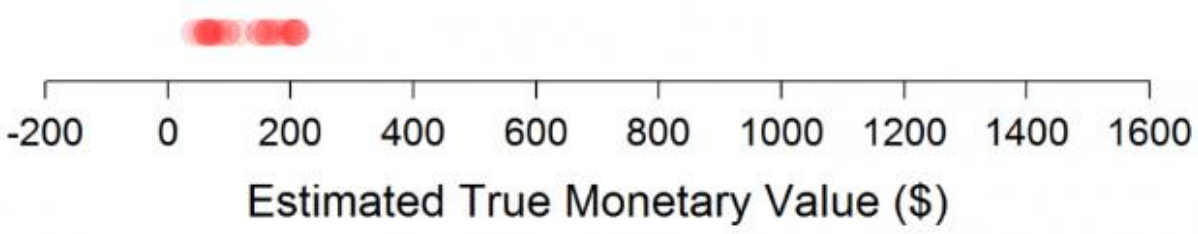


[wide:]



Predictive-estimate norm. We will now ask you to estimate what you think the true effect of a slight increase in refugee intake would have on the Australian economy. But first, let us have a look at what the representative sample of your peers thought. The original claim was: "*Within two decades, a slight increase in refugee intake would boost the Australian economy by an estimated 2%, or about $1,300 per Australian resident (i.e. per-capita GDP)*". The true effect on the Australian economy – expressed as $-per-resident (i.e. per-capita GDP) – was estimated by your peers as: (Note: a negative number would indicate a negative effect on the economy.)

[narrow:]



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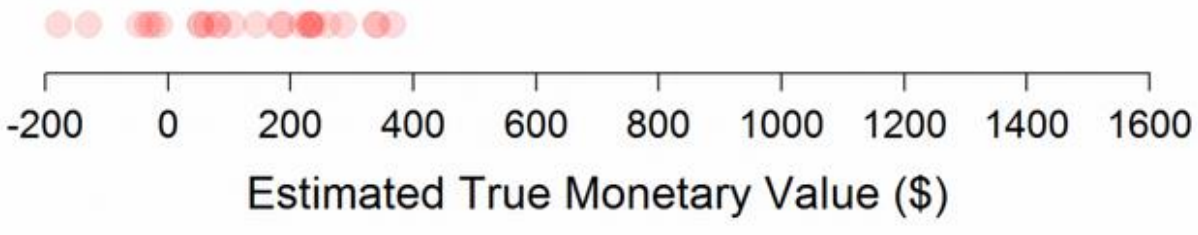


Renewable energy.

Claim. Australia's conversion to renewable energy continues to be a hotly debated topic. Today, Danielle Sayers from the Institute for Sustainable Futures explained that "a

reasonably rapid transition to a renewable-energy system is both technically possible and economically viable. While there would be job losses in certain areas, these would be more than offset by the creation of many new clean-energy jobs in engineering, construction, and operation. Thus, a move to a clean-energy economy would have a positive impact on the job market even in the short term. Australia should stop looking at this as a challenge, and instead embrace the opportunities." Sayers explained that a near-total transition to renewables had the potential to reduce the Australian unemployment rate by about 1% over the next 20 years [*Experiment 3*: …, which is equivalent to a net creation of approx. 7,300 new jobs]. *A switch to renewable energy will have a positive impact on the Australian job market.*

Refutation. In a statement today, Martina Fields from the independent Australian Energy Market Operator objected to claims that a radical switch to renewables would benefit the job market. She called these claims "wishful thinking", explaining that "based on the available projections, it is clear that a move towards renewables will not create enough jobs to compensate the losses in mining, energy production, and associated industries. As we know from the UK and Europe, many 'renewable' jobs are not actually created locally but abroad, so it is clear that employment is not a reason to move to renewables. On the contrary, if we are not careful with the transition, it could have a negative impact on the job market."

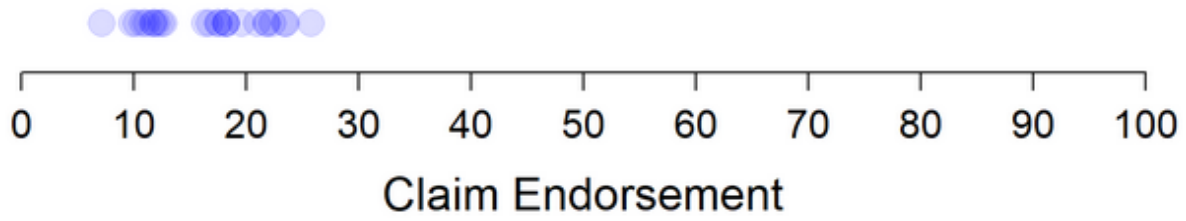
Norm (Experiment 2). The original claim was: "*A switch to renewable energy will have a positive impact on the Australian job market. The estimated effect of a switch to renewable energy on the Australian unemployment rate will be -1%.*" The true effect on the unemployment rate was estimated by the last four participants as: -0.2% / -0.05% / +0.1% / +0.15% [narrow] or -0.7% / -0.4% / +0.3% / +0.6% [wide]

Norms (Experiment 3).

Claim-endorsement norm. Before you re-rate your belief in the original claim, let's first have a look at what your peers said. We surveyed a representative sample of 25 UWA

students, asking them how they rated their belief in the claim. The original claim was: "*A switch to renewable energy will reduce the unemployment rate in Australia."* This is how your peers rated their belief in the claim. The below graph shows their claim endorsement on a scale from 0 (confidently disagree with claim) to 100 (confidently agree with claim):

[narrow:]



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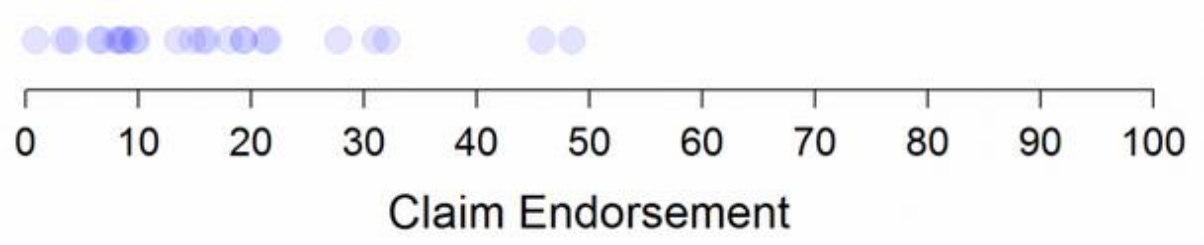
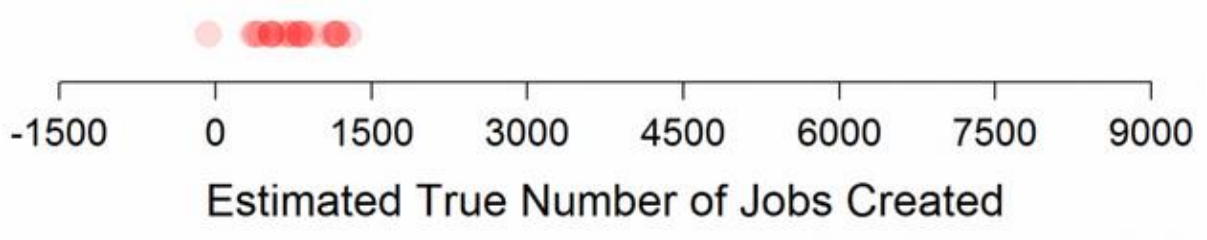
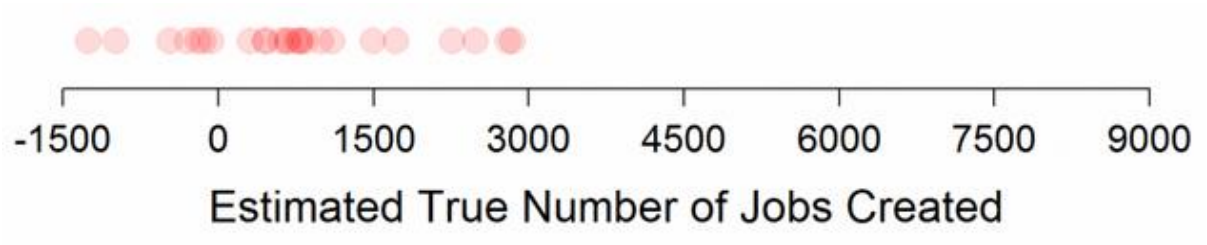


Predictive-estimate norm: We will now ask you to estimate what you think the true effect of a rapid switch to renewables would be on unemployment rates. But first, let us have a look at what the representative sample of your peers thought. The original claim was "*A rapid switch to renewable energy will have a positive impact on the Australian job market. Over the next 20 years, it would reduce the unemployment rate by 1%, which is equivalent to a net creation of approx. 7,300 new jobs*". The true effect on unemployment rates – expressed as the number of jobs created – was estimated by your peers as: (Note: a negative number would indicate job losses.)

[narrow:]



[wide:]



Medicinal cannabis.

Claim. Following changes to federal legislation, discussions about the roll-out of medicinal cannabis and its impact continue. At a Sydney symposium, Anthony Coffey from advocacy group United Compassion argued that more needed to be done to make medicinal cannabis available around Australia: "Medicinal cannabis has proven safe, and there is simply no reason to delay its roll-out any longer. It will help many Australians with various conditions from epilepsy to multiple sclerosis. Also, it just makes economic sense: Medicinal cannabis is a much more cost-effective option compared to traditional pharmaceuticals, and will save the health-care system approx. $10 million annually." *When made readily available, medicinal cannabis will benefit the Australian health-care system.*

Refutation. Later this week, Rebecca Clarke from the Menzies Institute for Medical Research refuted claims that medicinal cannabis would reduce health-care costs. She explained that medicinal cannabis should not be seen as a panacea: "Recent clinical trials have failed to support the use of medicinal cannabis for a number of conditions. In most cases, the same or greater benefits can be achieved by medication that is already readily available in Australia. Furthermore, we know little about its long-term effects. Preliminary

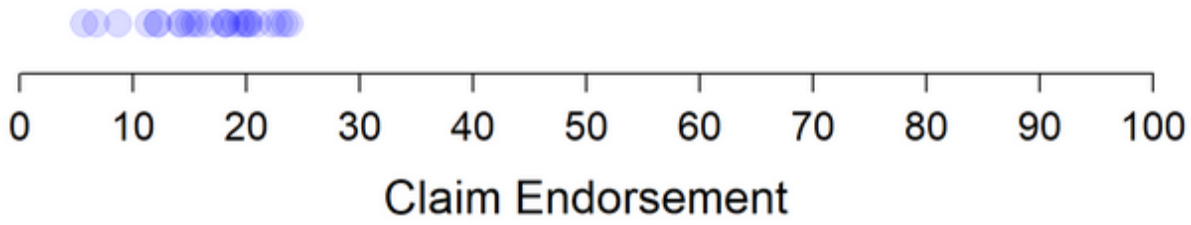
studies from the U.S. have suggested adverse health consequences with prolonged use, which would almost certainly result in additional costs to the health-care system. The truth is, medicinal cannabis will not save the Australian health-care system any money, in fact it may incur a cost."

Norm (Experiment 2). The original claim was: "*Medicinal cannabis will benefit the Australian health-care system and reduce costs. The estimated effect of medicinal cannabis on annual health-care costs will be -$10 million.*" The true number was estimated by the last four participants as: -$2.2 million / -$1.3 million / +$0.3 million / +$1.2 million [narrow] or -$7.2 million / -$3.8 million / +$2.8 million / +$6.2 million [wide]

Norms (Experiment 3).

Claim-endorsement norm. Before you re-rate your belief in the original claim, let's first have a look at what your peers said. We surveyed a representative sample of 25 UWA students, asking them how they rated their belief in the claim. The original claim was: "*Medicinal cannabis will benefit the Australian health-care system and reduce costs. The estimated effect of medicinal cannabis on annual health-care costs will be -$10 million.*" This is how your peers rated their belief in the claim. The below graph shows their claim endorsement on a scale from 0 (confidently disagree with claim) to 100 (confidently agree with claim):

[narrow:]



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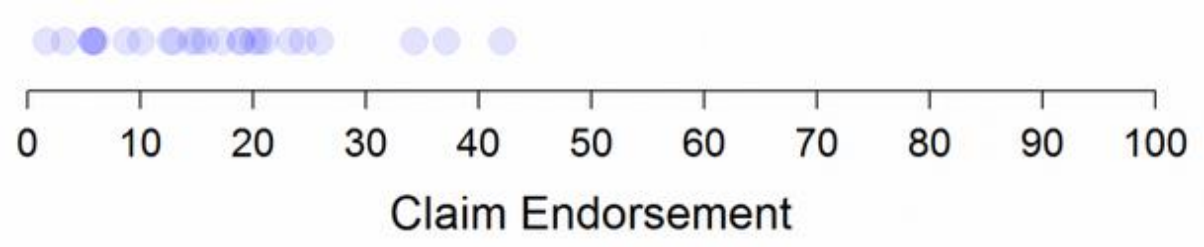
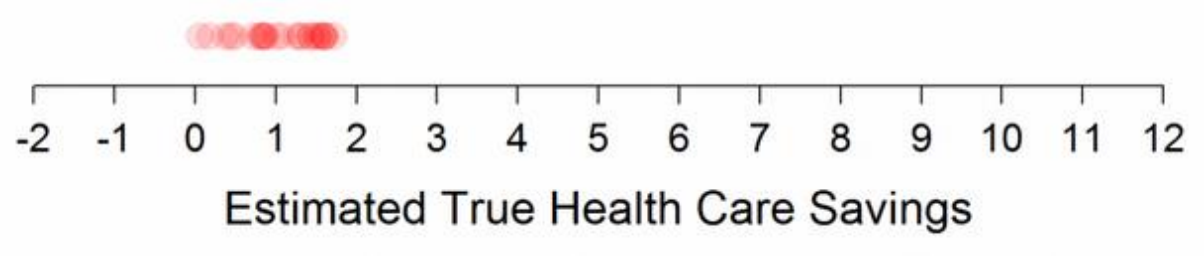


Predictive-estimate norm. We will now ask you to estimate what you think the true effect of better access to medicinal cannabis would be on health-care costs. But first, let us have a look at what the representative sample of your peers thought. The original claim was: "*When made readily available, medicinal cannabis will benefit the Australian health-care system. It could reduce annual health-care costs by $10 million*". The true effect on annual health-care costs – expressed as a cost reduction (i.e. savings) in $ million – was estimated by your peers to be: (Note: negative numbers would indicate additional costs to the health-care system.)

[narrow:]



[wide:]

Homelessness (filler).

Claim. Across Australian cities, discussions about how best to address the issue of homelessness have drawn increasing attention. Kate Wilson from Homelessness Australia argued yesterday that providing the homeless with government-provided housing for a fixed period of time should be a priority: "The provision of temporary free shelter is a crucial first step to helping homeless people rebuild their lives. In the long term, it will reduce people's reliance on government support and increase employment. Just using existing housing, this would drastically reduce homelessness and get many people off the streets permanently. Potentially, providing homeless people with free temporary housing could reduce homelessness in Australian cities by two thirds [*Experiment 3*: …, which equates to about 75,000 people of the streets)." *Providing temporary free shelter will reduce homelessness in Australia.*

Neutral statement. Today, David Atkins from the Australian Housing and Urban Research Institute also addressed the issue. He said that the number of homeless people in Australian cities was problematic, and that government needed to consider all suggestions. "It's obviously a complex issue, and it will require concerted efforts by all levels of government to address the problem. Homeless people need help with addiction and mental health, they need help with reconnecting to their social networks, they obviously need shelter. We need to start somewhere and then work through those multi-layered problems one by one on an individual basis, because each person is different, and they all have different reasons for living on the streets. We won't be able to help everyone, but now is the time to start acting."

Experiments 2 and 3: Predictive Estimates, Inference Questions

Refugees.

Predictive estimates (Experiment 2). If Australia were to slightly increase its refugee uptake, what do you estimate the true effect to be on the Australian economy over the next 20 years (in percentage terms)? [-3% to +3%, in 0.3% increments]

Predictive estimates (Experiment 3). If Australia were to slightly increase its refugee uptake, what do you estimate the true effect to be on the Australian economy over the next 20 years, in $-per-resident (i.e. per-capita GDP) terms? (Note: A negative number would indicate a negative effect on the economy). [-$200 to $1600]

Inference questions.

1. In 20 years, the Australian economy will be better off if refugee intake is slightly increased now. [Confidently Disagree (1) – Confidently Agree (10)]
2. Within a few decades, refugees contribute more to the economy than they take out. [Confidently Disagree (1) – Confidently Agree (10)]
3. Australia is facing many costly issues and record-level debt; therefore we simply cannot afford the additional cost of taking on more refugees. (Reverse-coded) [Confidently Disagree (10) – Confidently Agree (1)]
4. How would you change the rate of refugee intake? [-50% to +50%, in 10% increments]

Renewable energy.

Predictive estimates (Experiment 2). If Australia were to rapidly switch to renewable energy, what do you estimate the true effect to be on the unemployment rate over the next 20 years (in percentage terms)? [-1.5% to +1.5%, in 0.2% increments]

Predictive estimates (Experiment 3). If Australia were to rapidly switch to renewable energy, what do you estimate the true effect to be on the unemployment rate over the next 20

years, expressed as the net number of jobs created? (Note: a negative number would indicate job losses).

Inference questions.

1. In 20 years, the Australian job market will be better off if Australia switched to renewable energy. [Confidently Disagree (1) – Confidently Agree (10)]
2. Within a few decades, renewable energy will create more jobs than will be lost. [Confidently Disagree (1) – Confidently Agree (10)]
3. The Australian job market remains weak; therefore, we simply cannot afford the impact of a switch to renewable energy on the job market. (Reverse-coded) [Confidently Disagree (10) – Confidently Agree (1)]
4. Australia currently produces about 15% of its electricity through renewable resources. What percentage of renewable energy should Australia aim for? [0-10% to 91-100%, in 10% increments]

Medicinal cannabis.

Predictive estimates (Experiment 2). If medicinal cannabis was made readily available, what do you estimate the true effect to be on annual Australian health-care costs (in million dollars)? [-$15m to +$15m, in $2 million increments]

Predictive estimates (Experiment 3). If medicinal cannabis was made readily available, what do you estimate the true effect to be on annual Australian health-care costs, expressed as a saving in $ million? (Note: a negative number would indicate additional health care costs). [-$2m to +$12m]

Inference questions.

1. The Australian health-care system will benefit from readily available medicinal cannabis. [Confidently Disagree (1) – Confidently Agree (10)]

2. Medicinal cannabis will help many Australian patients because it is safe and effective. [Confidently Disagree (1) – Confidently Agree (10)]
3. The Australian health-care system is already struggling; therefore, we cannot afford to implement medicinal cannabis on a larger scale. (Reverse-coded) [Confidently Disagree (10) – Confidently Agree (1)]
4. How much do you support the provision of medicinal cannabis to patients in Australia? [Do not support at all (1) – Support very much (10)]

Homelessness.

Predictive estimates (Experiment 2). If government-funded temporary shelter was made readily available, what do you estimate the true effect to be on homelessness in Australia long-term (in percentage terms)? [-100% to +100%, in 10% increments]

Predictive estimates (Experiment 3). If government-funded temporary shelter was made readily available, what do you estimate the true effect to be on homelessness in Australia long-term, expressed as the number of homeless people that would no longer be sleeping rough? (Note: a negative number would indicate an increase in the number of homeless people) [-10,000 to 90,000]

Inference questions.

1. Providing free temporary shelter will reduce homelessness in Australia. [Confidently Disagree (1) – Confidently Agree (10)]
2. In the long-term, providing shelter will reduce homeless people's reliance on government support and increase opportunities for employment. [Confidently Disagree (1) – Confidently Agree (10)]
3. Australia is already struggling with debt; we cannot afford to provide free shelter for the homeless. (Reverse-coded) [Confidently Disagree (10) – Confidently Agree (1)]

4. What should happen to government funding spent on shelter for the homeless? [-50% to +50%, in 10% increments]

Experiment 3: Graph Interpretation Instructions

Prior to commencing the task, participants were provided detailed explanations of how to interpret the graphical representations of norms, using neutral examples. The examples demonstrated what a graph would look like with 1, 5, 10, and 25 participant responses for claim endorsements. Example graphs included narrow and wide norm examples, reflecting either low or high claim endorsement, as well as "very wide" and "no norm" examples reflecting a weak consensus or no consensus at all. Instructions and examples were additionally provided for narrow and wide predictive-estimate norms.

Experiment 2 Results from Analyses Including Covariates

Belief Change. In Experiment 2A, a repeated measures ANCOVA on belief-change scores yielded a significant main effect of condition, $F(2, 136) = 20.89$, $MSE = 2.00$, $p < .001$, $\eta_p^2 = .24$. All effects involving the covariates were nonsignificant, $F(1, 68) < 1$; $F(2, 136) \leq 2.81$, $p \geq .064$. Planned contrasts confirmed significant differences between the refutation condition and both the narrow-norm, $F(1, 68) = 26.10$, $MSE = 2.08$, $p < .001$, $\eta_p^2 = .28$, and the wide-norm condition, $F(1, 68) = 29.47$, $MSE = 2.38$, $p < .001$, $\eta_p^2 = .30$. The effect of norm width was nonsignificant, $F < 1$. The analogous ANCOVA in Experiment 2B showed no significant effect of condition, $F(2, 136) = 1.91$, $MSE = 3.32$, $p = .152$, $\eta_p^2 = .03$, and no significant effects including the covariates, all $F(1, 68) < 1$; $F(2, 136) \leq 1.90$, $p \geq .154$.

Across experiments, a 2 (norm width: narrow vs. wide; within-subjects) × 2 (refutation: absent vs. present [i.e., Experiment: A vs. B]; between-subjects) ANCOVA on belief change scores yielded a significant main effect of refutation, $F(1, 136) = 29.08$, $MSE = 2.57$, $p < .001$, $\eta_p^2 = .18$, confirming that a refutation reduced belief. There was no

significant main effect of norm width, $F(1, 136) = 2.16$, $MSE = 2.61$, $p = .144$, $\eta_p^2 = .02$, nor an interaction between norm width and refutation, $F < 1$. All effects involving the covariates were nonsignificant, $F(1, 136) \leq 3.41$, $p \geq .067$.

Predictive Estimate Scores. In Experiment 2A, the ANCOVA yielded a statistically significant effect of condition, $F(2, 136) = 15.81$, $MSE = 0.21$, $p < .001$, $\eta_p^2 = .19$. Effects involving the covariates were all nonsignificant, all $F(1, 68) \leq 1.85$, $p \geq .179$; $F(2, 136) \leq 1.11$, $p \geq .332$. Planned contrasts revealed significant differences between the refutation condition and both the narrow-norm, $F(1, 68) = 10.72$, $MSE = 0.21$, $p = .002$, $\eta_p^2 = .14$, and the wide-norm condition, $F(1, 68) = 25.11$, $MSE = 0.26$, $p < .001$, $\eta_p^2 = .27$. There was also a significant difference between narrow and wide-norm conditions, $F(1, 68) = 7.12$, $MSE = 0.15$, $p = .010$, $\eta_p^2 = .09$.

In Experiment 2B, the ANCOVA returned a statistically significant main effect of condition, $F(2, 136) = 3.89$, $MSE = 0.25$, $p = .023$, $\eta_p^2 = .05$. There was also a significant interaction between need for authenticity and social assertiveness, $F(1, 68) = 4.57$, $MSE = 0.25$, $p = .036$, $\eta_p^2 = .06$. All other effects involving the covariates were nonsignificant, all $F(1, 68) \leq 1$; $F(2, 136) \leq 1.22$, $p \geq .300$. Planned contrasts revealed statistically significant differences between the refutation condition and the narrow-norm condition, $F(1, 68) = 6.59$, $MSE = 0.15$, $p = .012$, $\eta_p^2 = .09$. There was no difference between refutation and wide-norm conditions, $F < 1$. There was, however, a significant difference between narrow and wide-norm conditions, $F(1, 68) = 6.45$, $MSE = 0.19$, $p = .013$, $\eta_p^2 = .09$.

In the across-experiments ANCOVA, there was no significant main effect of norm width, $F < 1$. There was a significant main effect of refutation, $F(1, 136) = 17.87$, $MSE = 0.23$, $p < .001$, $\eta_p^2 = .12$, as well as a significant interaction, $F(1, 136) = 12.95$, $MSE = 0.17$, $p < .001$, $\eta_p^2 = .09$. Effects involving the covariates were all nonsignificant, all

$F(1, 136) \leq 2.88$, $p \geq .092$. A post-hoc comparison confirmed a significant effect of a refutation in the wide-norm condition, $F(1, 136) = 25.94$, $MSE = 0.24$, $p < .001$, $\eta_p^2 = .16$.

Inference Scores. In Experiment 2A, the ANCOVA returned a statistically significant main effect of condition, $F(2, 136) = 10.38$, $MSE = 0.02$, $p < .001$, $\eta_p^2 = .13$. Effects involving the covariates were all nonsignificant, all $F(1, 68) \leq 2.11$, $p \geq .151$; $F(2, 136) \leq 1.95$, $p \geq .146$. Planned contrasts revealed significant differences between the refutation condition and both the narrow-norm, $F(1, 68) = 9.35$, $MSE = 0.02$, $p = .003$, $\eta_p^2 = .12$, and the wide-norm conditions, $F(1, 68) = 19.62$, $MSE = 0.02$, $p < .001$, $\eta_p^2 = .22$. There was no significant difference between narrow-norm and wide-norm conditions, $F(1, 68) = 1.83$, $MSE = 0.02$, $p = .181$, $\eta_p^2 = .03$.

In Experiment 2B, there was no significant main effect of condition, $F(2, 136) = 1.12$, $MSE = 0.02$, $p = .330$, $\eta_p^2 = .02$. Effects involving the covariates were all nonsignificant, all $F(1/2, 68/136) \leq 2.31$, $p \geq .103$. All planned contrasts were also nonsignificant, all $F(1, 68) \leq 2.02$, $p \geq .160$.

A 2 (norm width; within-subjects) × 2 (refutation; between-subjects) ANCOVA across-experiments showed a nonsignificant main effect of norm width, $F < 1$. However, the main effect of refutation was significant, $F(1, 136) = 4.32$, $MSE = 0.04$, $p = .039$, $\eta_p^2 = .03$, and this main effect was qualified by a marginal interaction, $F(1, 136) = 3.96$, $MSE = 0.02$, $p = .049$, $\eta_p^2 = .03$, indicating that the refutation effect was stronger with a wide norm than a narrow norm. Effects involving the covariates were all nonsignificant, all $F(1, 136) \leq 3.89$, $p \geq .051$. A post-hoc comparison confirmed a significant effect of a refutation in the wide-norm condition, $F(1, 136) = 7.45$, $MSE = 0.03$, $p = .007$, $\eta_p^2 = .05$.

Experiment 3 Results from Analyses Including Covariates

Belief Change. In Experiment 3A, a repeated measures ANCOVA on belief-change scores yielded no significant main effect of condition, $F < 1$, suggesting comparable effects

of the refutation and the norms. All effects involving the covariates were also nonsignificant, all $F(1/2, 72/144) \leq 3.14$, $p \geq .081$.

In Experiment 3B, the ANCOVA returned a main effect of condition, $F(2, 148) = 7.61$, $MSE = 206.82$, $p < .001$, $\eta_p^2 = .09$. All effects involving the covariates were nonsignificant, all $F(1/2, 74/148) \leq 2.76$, $p \geq .101$. Planned comparisons showed that the refutation-plus-narrow-norm condition was associated with greater belief change than both the refutation condition, $F(1, 74) = 13.15$, $MSE = 238.45$, $p < .001$, $\eta_p^2 = .15$, and the refutation-plus-wide-norm condition, $F(1, 74) = 5.73$, $MSE = 168.30$, $p = .019$, $\eta_p^2 = .07$, which in turn did not differ significantly from the refutation condition, $F(1, 74) = 2.91$, $MSE = 213.72$, $p = .092$, $\eta_p^2 = .04$. This provides some evidence that addition of a narrow norm can boost the impact of a refutation.

A between-experiment 2 × 2 within-between ANCOVA with the within-subjects factor of norm width (narrow, wide) and the between-subjects factor of refutation (no refutation [Exp. A], refutation [Exp. B]) returned a significant main effect of norm width, $F(1, 146) = 5.99$, $MSE = 137.04$, $p = .016$, $\eta_p^2 = .04$, and a significant main effect of refutation, $F(1, 146) = 21.45$, $MSE = 209.23$, $p < .001$, $\eta_p^2 = .13$. These effects demonstrate that the addition of a refutation boosted the belief change associated with a norm, and that narrow norms tended to be more effective than wide norms. There was also a significant effect of need for authenticity, $F(1, 146) = 5.33$, $p = .022$, $\eta_p^2 = .04$, indicating that belief change was generally larger for participants with low authenticity need (a median split suggested that belief change was approx. 5.5 points larger in the group with below-average authenticity need). All other effects were nonsignificant, $F(1, 146) \leq 2.89$, $p \geq .091$. An additional contrast showed no difference between the (identical) refutation conditions, $F < 1$.

Predictive Estimate Scores. In Experiment 3A, a repeated measures ANCOVA returned no significant main effect of condition, $F(2, 144) = 2.17$, $MSE = 0.07$, $p = .118$,

η_p^2 = .03, but a significant condition × need for authenticity interaction, $F(2, 144) = 3.30$, $p = .040$, $\eta_p^2 = .04$, which suggested that the narrow norm was associated with lower estimates (i.e., stronger belief reduction) in participants with low (vs. high) need for authenticity. All other effects were nonsignificant, $F(1/2, 72/144) \leq 2.07$, $p \geq .130$.

In Experiment 3B, the ANCOVA returned a significant main effect of condition, $F(2, 148) = 4.20$, $MSE = 0.07$, $p = .017$, $\eta_p^2 = .05$. There was also a significant condition × need for authenticity interaction, $F(2, 148) = 4.27$, $p = .016$, $\eta_p^2 = .05$, which suggested that the wide norm was associated with lower estimates (i.e., greater belief reduction) in participants with high (vs. low) need for authenticity. All other effects were nonsignificant, $F(1/2, 74/148) \leq 2.48$, $p \geq .088$. Planned comparisons showed that the refutation-plus-narrow-norm condition was associated with lower estimates (i.e., greater belief reduction) than the refutation condition, $F(1, 74) = 7.10$, $MSE = 0.08$, $p = .009$, $\eta_p^2 = .09$. The contrast of refutation and refutation-plus-wide-norm conditions was nonsignificant, $F(1, 74) = 3.23$, $MSE = 0.07$, $p = .077$, $\eta_p^2 = .04$, and so was the contrast of the two norm conditions, $F(1, 74) = 1.29$, $MSE = 0.05$, $p = .260$, $\eta_p^2 = .02$.

An across-experiment 2 × 2 within-between ANCOVA was conducted on estimate scores with factors norm width (narrow, wide) and refutation (no refutation, refutation). There were no significant main effects of width, $F < 1$, or refutation, $F(1, 146) = 1.78$, $MSE = 0.09$, $p = .184$, $\eta_p^2 = .01$, but a significant interaction between norm width and refutation, $F(1, 146) = 5.66$, $MSE = 0.06$, $p = .019$, $\eta_p^2 = .04$. This indicated that the effect of a narrow norm on estimates was weakened by the absence of a refutation, unlike the effect of a wide norm. There was also an interaction of refutation and need for authenticity, $F(1, 146) = 4.96$, $p = .028$, $\eta_p^2 = .03$, suggesting that adding a refutation to a norm was associated with a benefit only for participants with high need for authenticity. All other effects were nonsignificant, $F(1, 146) \leq 3.28$, $p \geq .072$.

Inference Scores. In Experiment 3A, an ANCOVA yielded a significant main effect of condition, $F(2, 144) = 4.72$, $MSE = 0.02$, $p = .010$, $\eta_p^2 = .06$. Additionally, there was a significant condition × need for authenticity interaction, $F(2, 144) = 6.42$, $p = .002$, $\eta_p^2 = .08$. All other effects were nonsignificant, all $F(1/2, 72/144) \leq 3.03$, $p \geq .062$. Planned contrasts revealed significant differences between the narrow-norm condition and both the refutation condition, $F(1, 72) = 4.54$, $MSE = 0.02$, $p = .036$, $\eta_p^2 = .06$, and the wide-norm condition, $F(1, 72) = 8.51$, $MSE = 0.02$, $p = .005$, $\eta_p^2 = .11$. There was no significant difference between refutation and wide-norm conditions, $F < 1$. The pattern suggested that a refutation or a wide norm led to lower inference scores and thus less reliance on the disputed claim compared to a narrow norm; this narrow-norm disadvantage was present primarily in participants with high need for authenticity.

In Experiment 3B, there was no significant main effect of condition, $F(2, 148) = 1.68$, $MSE = 0.02$, $p = .190$, $\eta_p^2 = .02$. All other effects were nonsignificant, all $F(1/2, 74/148) \leq 2.88$, $p \geq .059$, except the main effect of social assertiveness, $F(1, 74) = 5.96$, $MSE = 0.05$, $p = .017$, $\eta_p^2 = .07$, suggesting that inference scores were generally lower in participants low in social assertiveness.

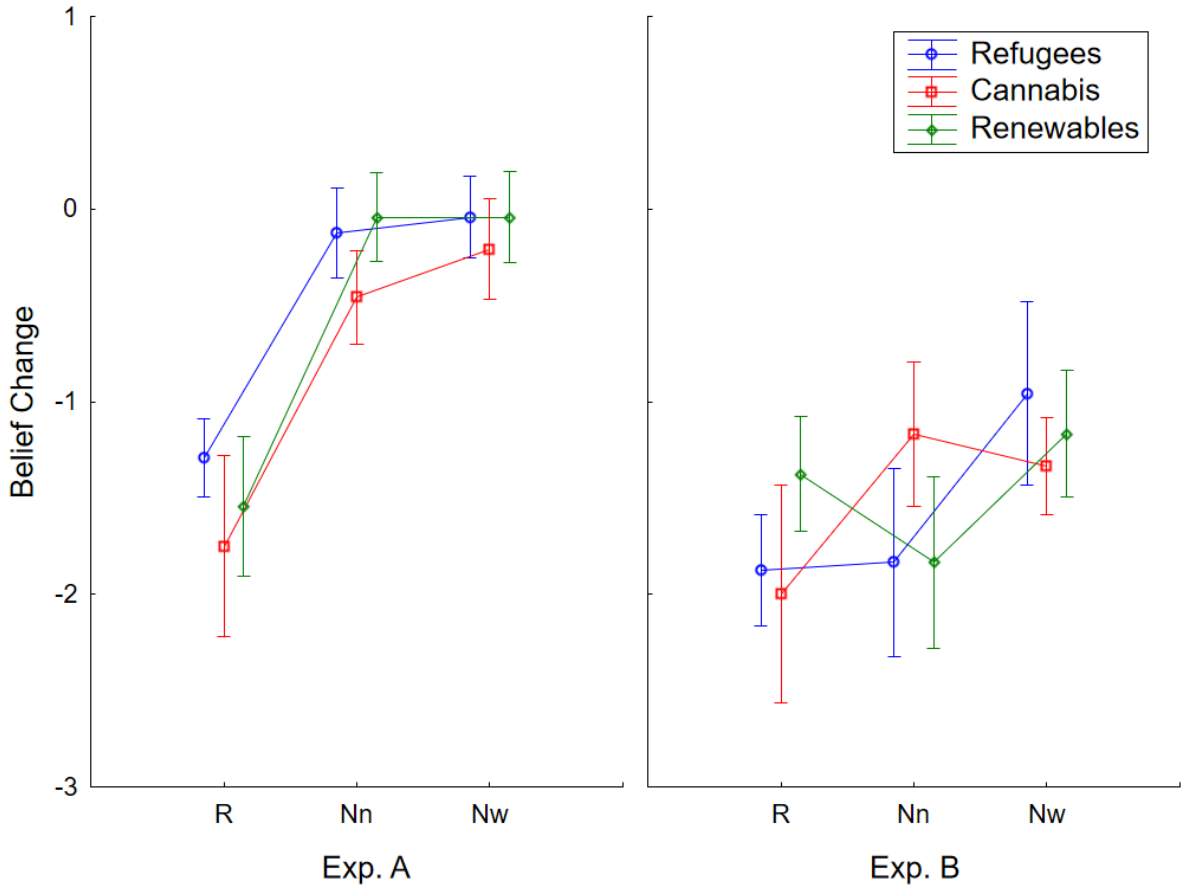
A 2 (norm width; within-subjects) × 2 (refutation; between-subjects) ANCOVA across experiments showed a marginally significant main effect of norm width, $F(1, 146) = 4.19$, $MSE = 0.02$, $p = .042$, $\eta_p^2 = .03$. All other effects were nonsignificant, all $F(1, 146) \leq 3.83$, $p \geq .052$, except again the main effect of social assertiveness, $F(1, 146) = 4.71$, $MSE = 0.04$, $p = .032$, $\eta_p^2 = .03$.

Experiments 2 and 3: Dependent Measures by Topics

Additional figures showing dependent measures across conditions by topic (refugees, cannabis, renewables) are presented below. The graphs show reasonable convergence across topics but readers should keep in mind that each data point reflects the data of only a subset of participants.

Figure S1

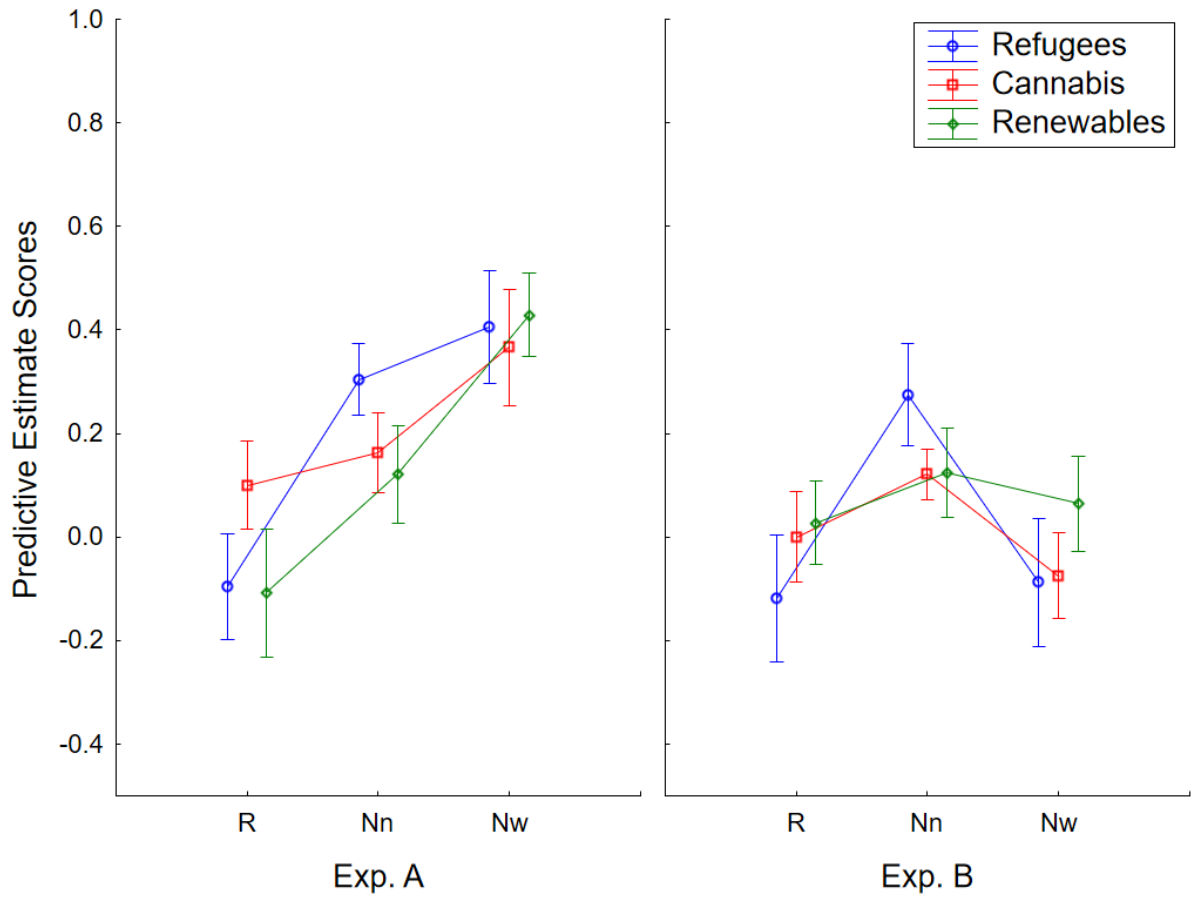
Belief Change by Topic in Experiment 2



Note. R, refutation condition. Nn, narrow norm condition. Nw, wide norm condition. Norm information was only provided in narrow and wide norm conditions, either by itself (Experiment 2A) or together with the refutation (Experiment 2B). The two refutation conditions were identical. Claim beliefs were measured on 0-10 scales. Error bars show standard error of the mean.

Figure S2

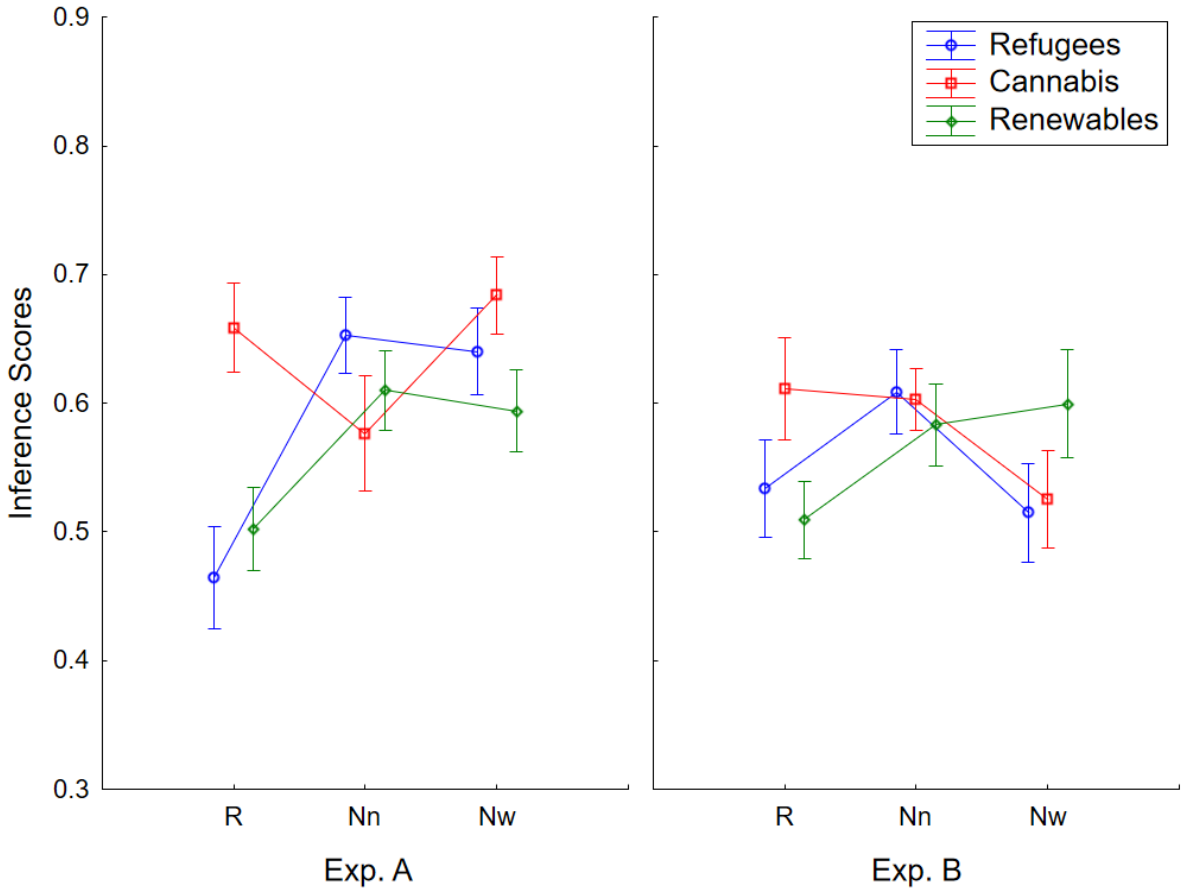
Predictive Estimate Scores by Topic in Experiment 2



Note. R, refutation condition. Nn, narrow norm condition. Nw, wide norm condition. Norm information was only provided in narrow and wide norm conditions, either by itself (Experiment 2A) or together with the refutation (Experiment 2B). The two refutation conditions were identical. Predictive estimate scores of 1 indicate full claim endorsement; scores of 0 reflect fully-effective intervention; scores < 0 indicate hypercorrection. Error bars show standard error of the mean.

Figure S3

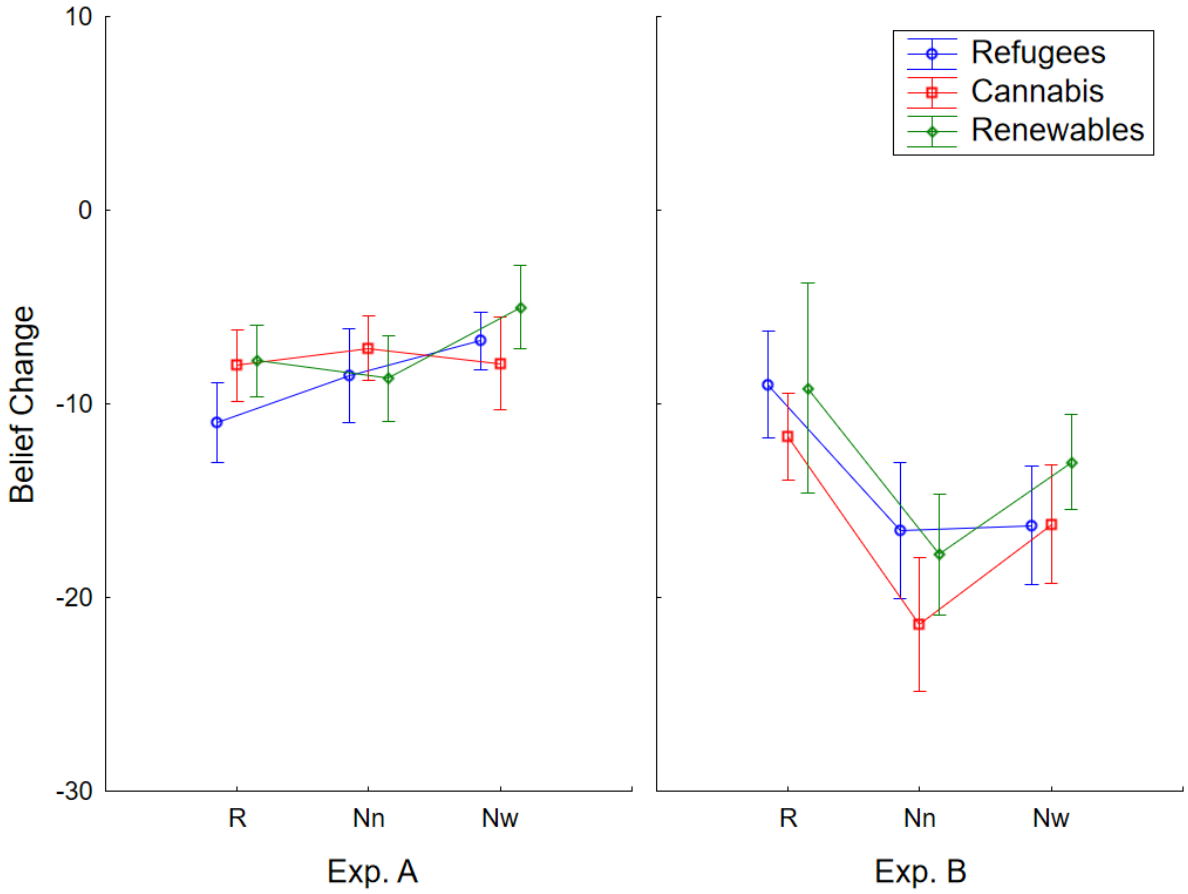
Inference Scores by Topic in Experiment 2



Note. R, refutation condition. Nn, narrow norm condition. Nw, wide norm condition. Norm information was only provided in narrow and wide norm conditions, either by itself (Experiment 2A) or together with the refutation (Experiment 2B). The two refutation conditions were identical. Greater inference scores indicate greater claim endorsement. Error bars show standard error of the mean.

Figure S4

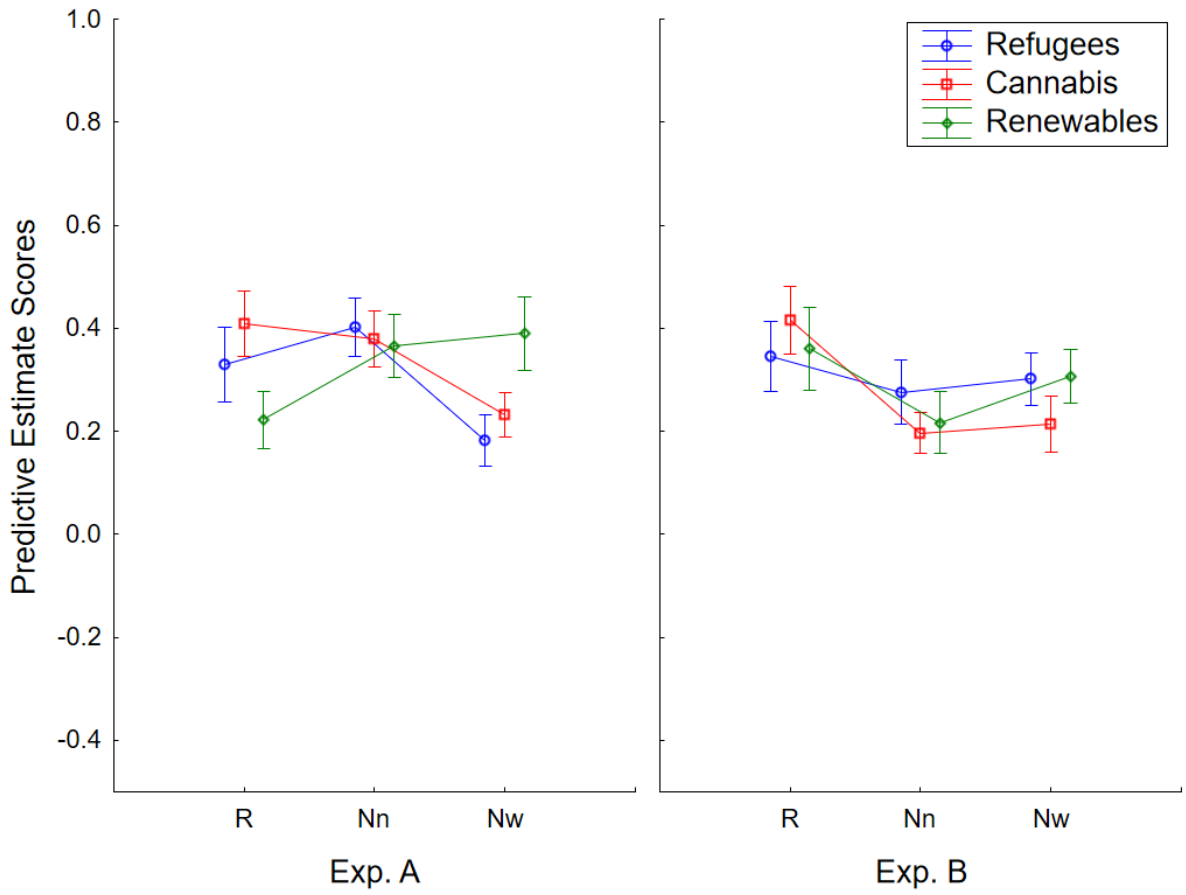
Belief Change by Topic in Experiment 3



Note. R, refutation condition. Nn, narrow norm condition. Nw, wide norm condition. Norm information was only provided in narrow and wide norm conditions, either by itself (Experiment 3A) or together with the refutation (Experiment 3B). The two refutation conditions were identical. Claim beliefs were measured on 0-10 scales. Error bars show standard error of the mean.

Figure S5

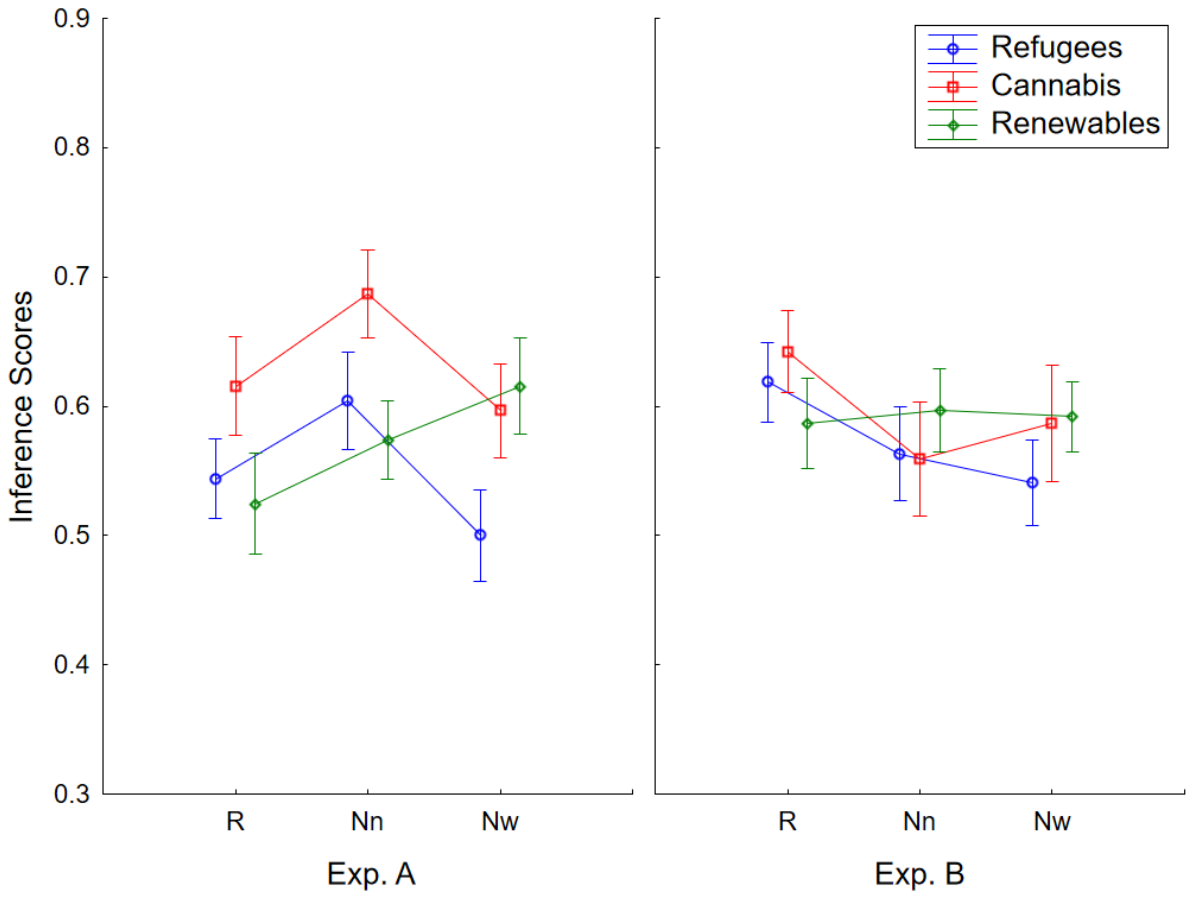
Predictive Estimate Scores by Topic in Experiment 3



Note. R, refutation condition. Nn, narrow norm condition. Nw, wide norm condition. Norm information was only provided in narrow and wide norm conditions, either by itself (Experiment 3A) or together with the refutation (Experiment 3B). The two refutation conditions were identical. Predictive estimate scores of 1 indicate full claim endorsement; scores of 0 reflect fully-effective intervention; scores < 0 indicate hypercorrection. Error bars show standard error of the mean.

Figure S6

Inference Scores by Topic in Experiment 3



Note. R, refutation condition. Nn, narrow norm condition. Nw, wide norm condition. Norm information was only provided in narrow and wide norm conditions, either by itself (Experiment 3A) or together with the refutation (Experiment 3B). The two refutation conditions were identical. Greater inference scores indicate greater claim endorsement. Error bars show standard error of the mean.

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Wood, A. M., Linley, P. A., Maltby, J., Baliousis, M., & Joseph, S. (2008). The authentic personality: A theoretical and empirical conceptualization and the development of the Authenticity Scale. *Journal of Counseling Psychology*, *55*(3), 385-399.