Communicating risks and evidence in a public health emergency

Dr Alexandra Freeman Dr Gabriel Recchia Christin Ellermann Dr John Kerr

"to inform and not persuade"

Dr Alex Freeman
@alex_freeman

Inform vs Persuade

Inform vs Persuade

Informed consent in medicine
Forensic evidence in court

Marketing
PR

Inform vs Persuade

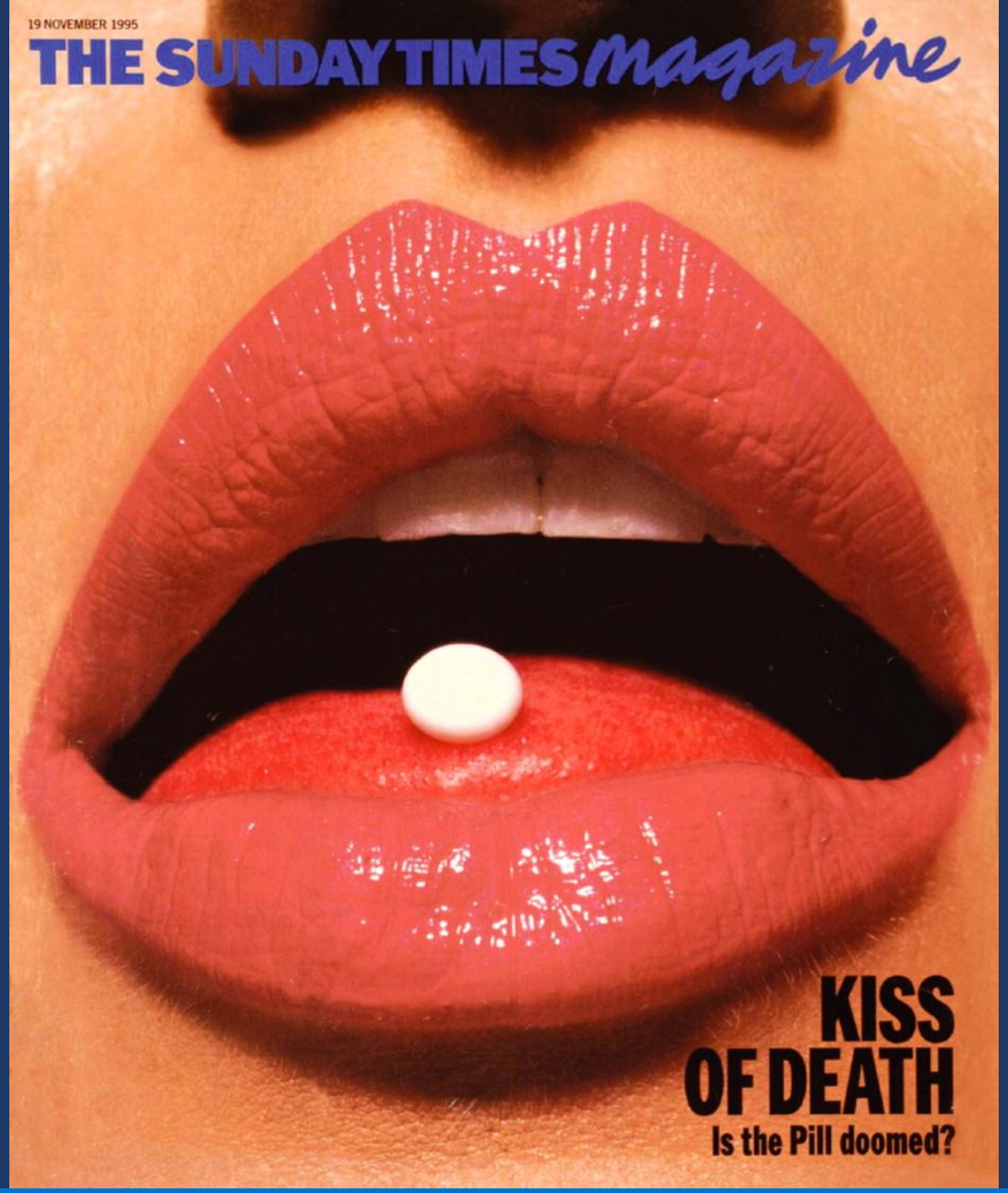
Informed consent

Marketing

Public health?

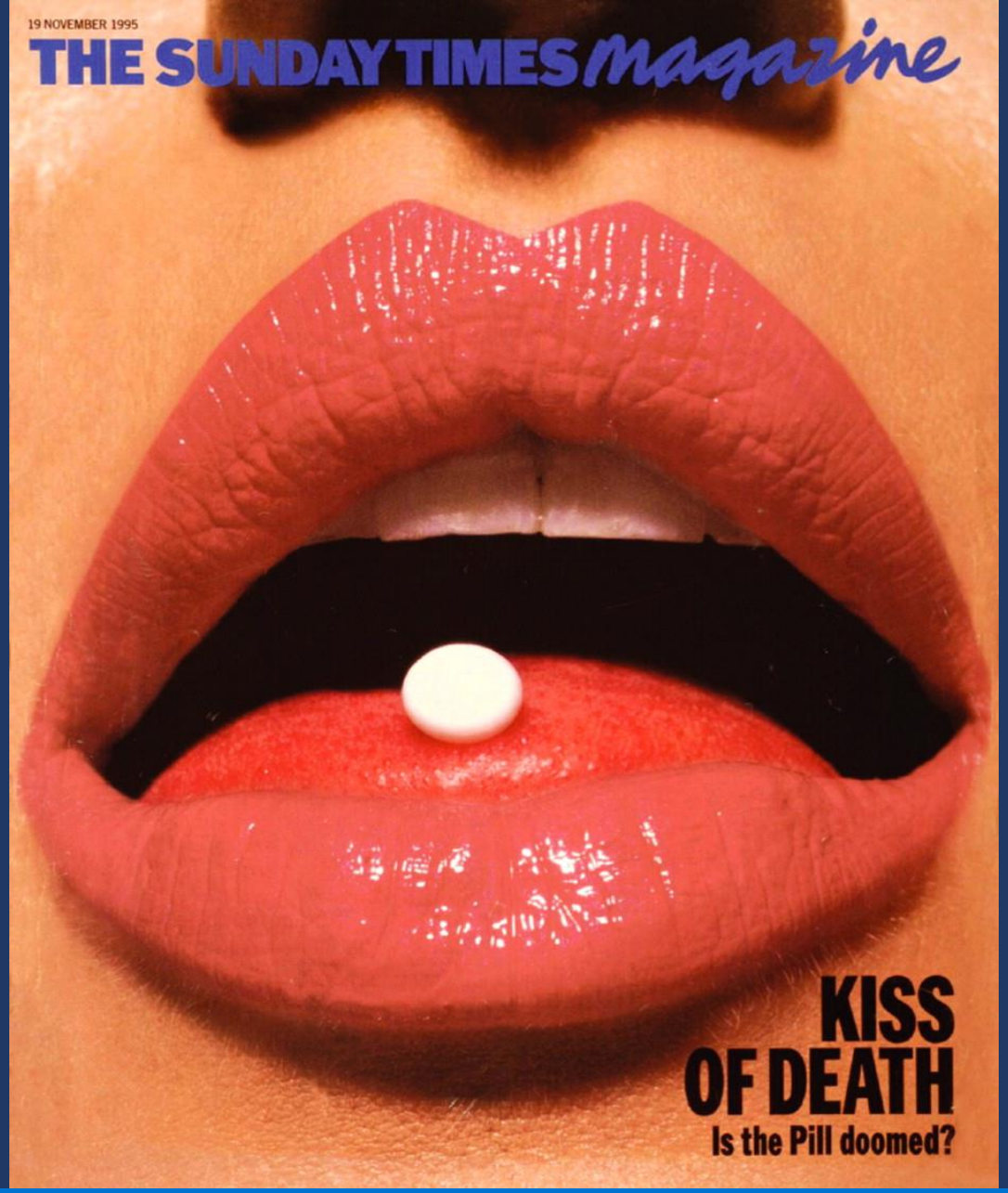
Inform	vs	Persuade
Understand	vs	Believe
Better informed	vs	Changed behaviour
Information	vs	A message
Be trustworthy	vs	Be trusted

The principles of good communication of numbers…



The 3rd generation oral contraceptive pill 'doubles' the rate of potentially fatal venous thrombosis

UK Committee on Safety of Medicines 1995



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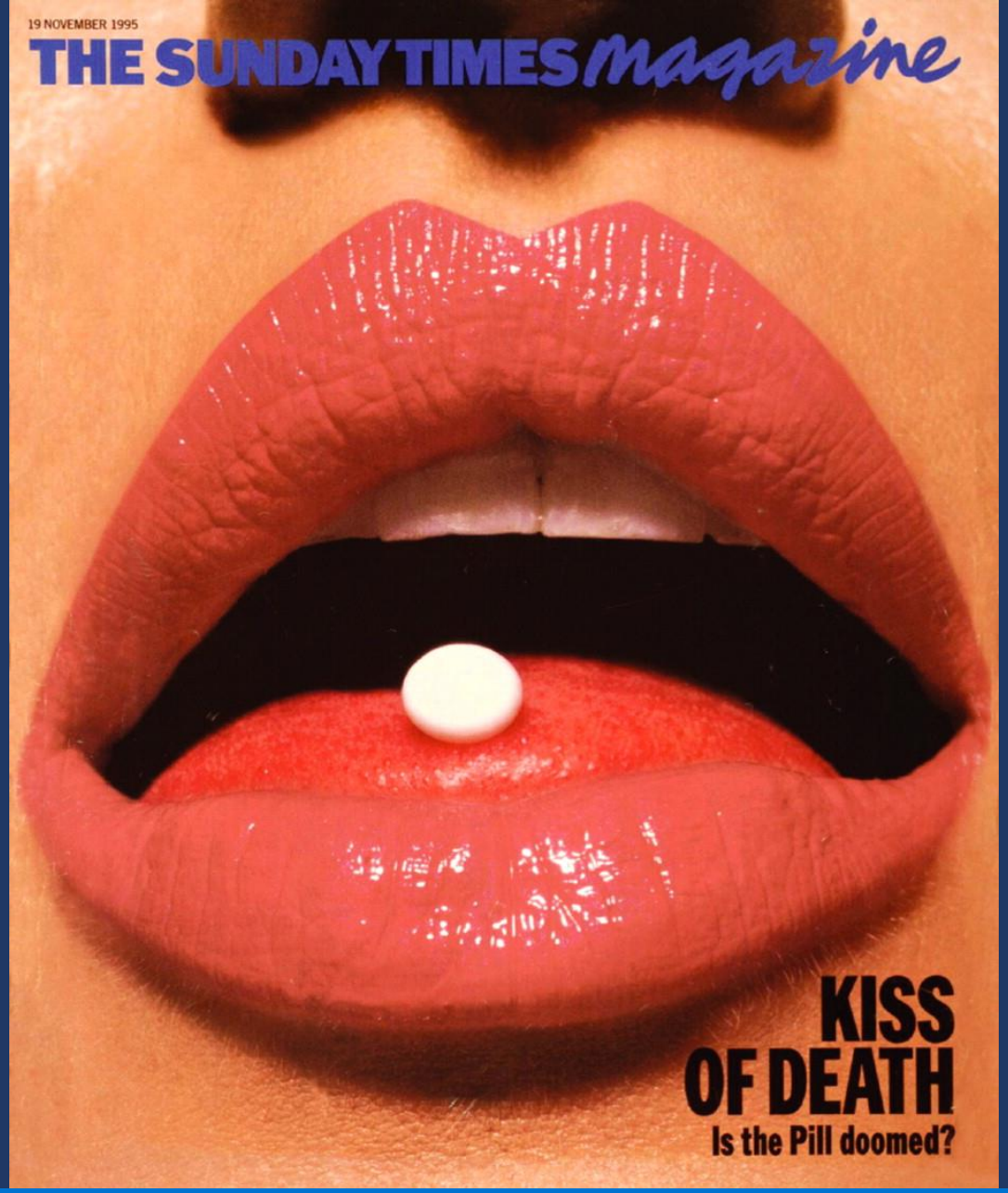
10,000 extra abortions
30,000 extra conceptions



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10,000 extra abortions
30,000 extra conceptions

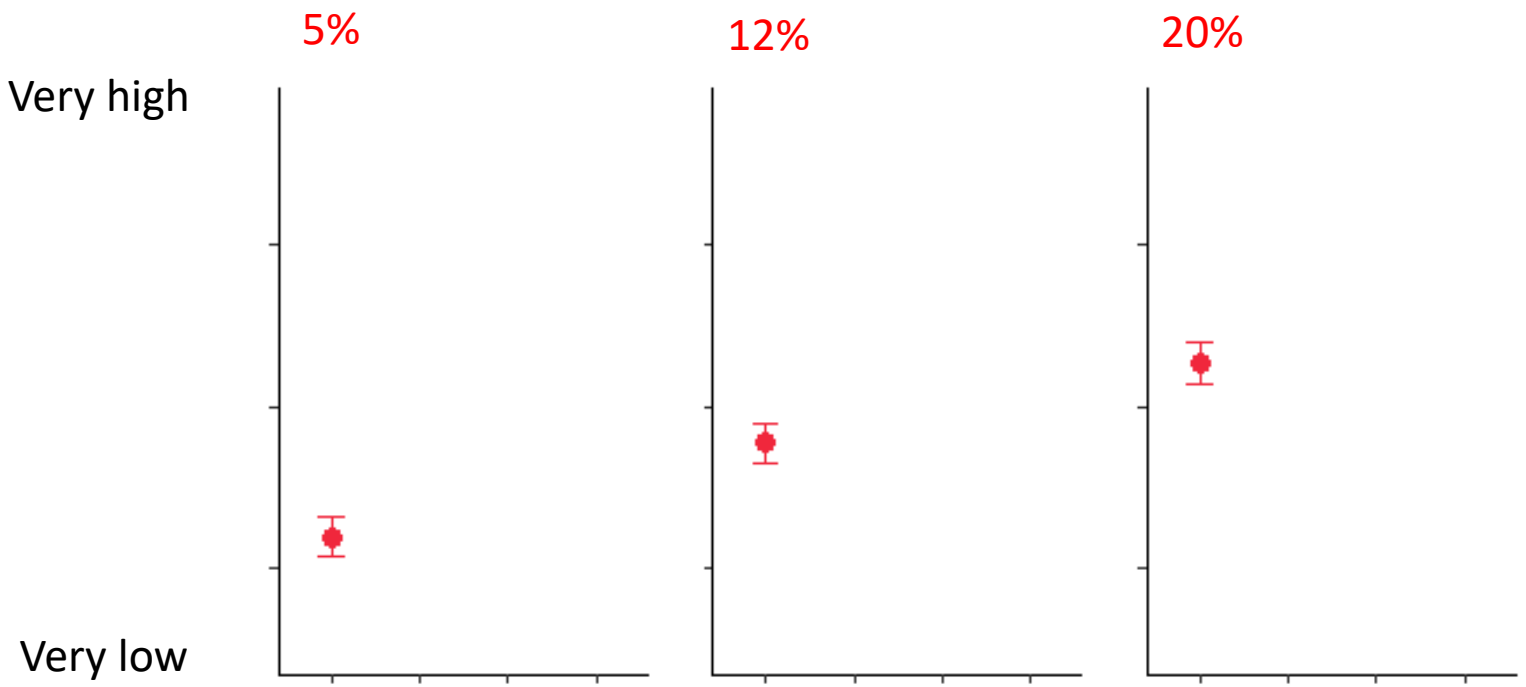
Absolute risks (actual likelihood):
1 in 7000 per year for 2nd generation pill
2 in 7000 per year for 3rd generation pill

(Barnett & Breakwell, 2003)

It’s not just what you say, it’s the way that you say it…

Even the format of the number makes a difference…

How risky does this chance of dying of COVID-19 feel…



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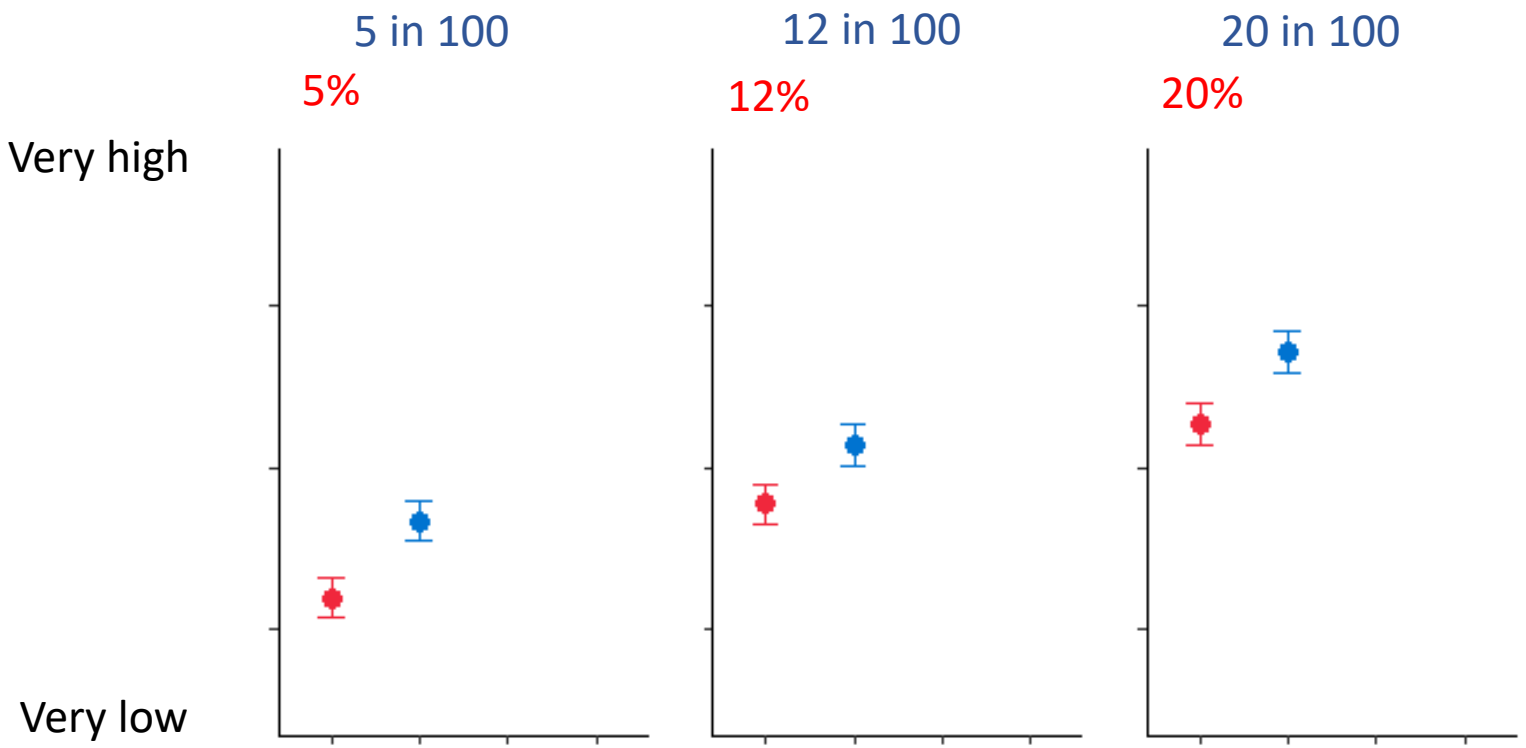

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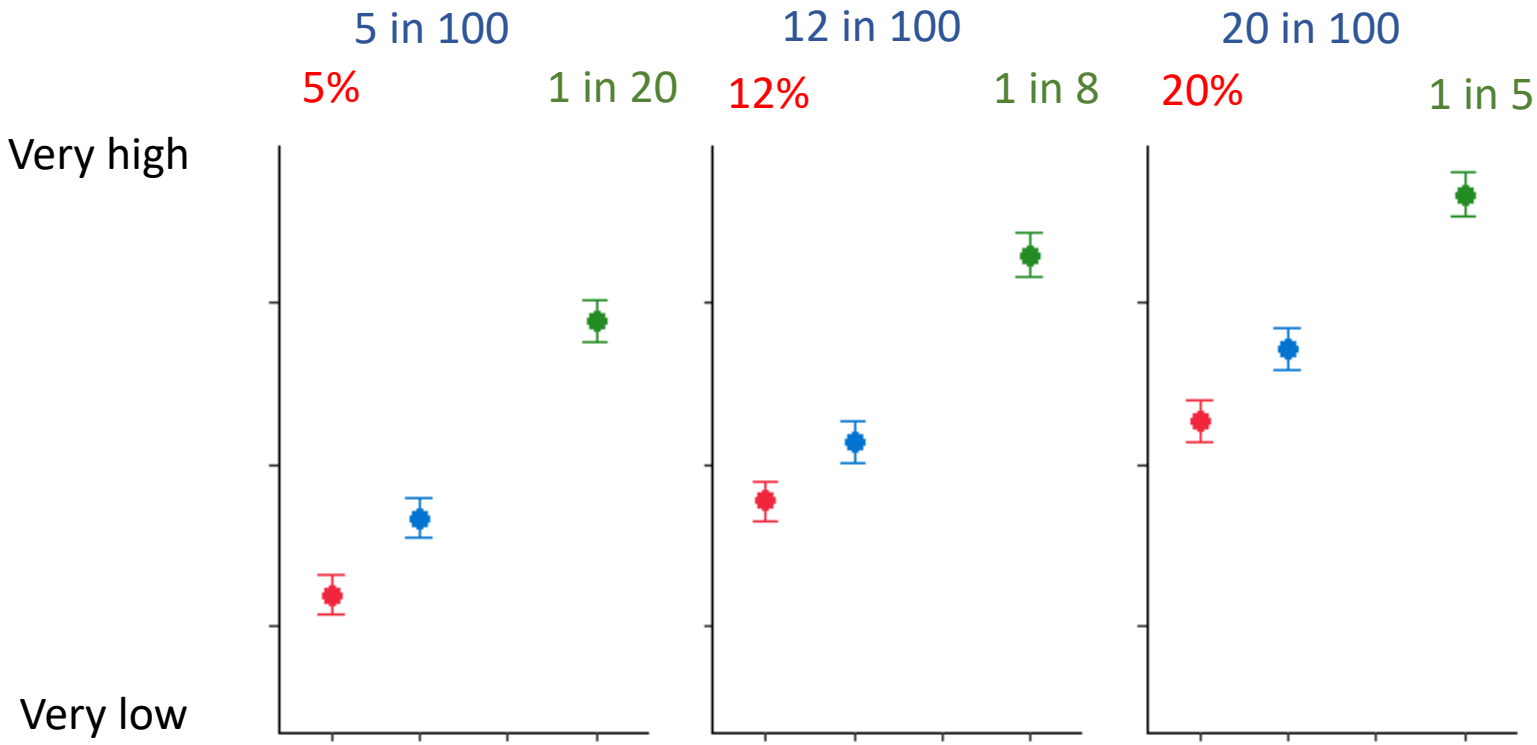

Which scenario do you prefer?

The UK is preparing for the outbreak of ‘flu that is expected to kill 6000 children. Two companies are offering you vaccines, with different claims. Which would you choose?

A. 2000 children will be saved.

B. There is a 1/3 probability that 6000 children will be saved, and a 2/3 probability that none will be saved.

Which scenario do you prefer?

A month later you need to order more vaccine stock. The companies now have different vaccines available. Which do you choose?

A. 4000 children will die.

B. There is a 1/3 probability that no children will die, and a 2/3 probability that 6000 children will die.

Framing affects decisions

Scenario 1 (Gain Frame)

- 2000 children will be saved.

- There is a 1/3 probability that 6000 children will be saved, and a 2/3 probability that none will be saved.

Scenario 2 (Loss Frame)

- 4000 children will die.

- There is a 1/3 probability that no children will die, and a 2/3 probability that 6000 children will die.

Can we use words instead of numbers?

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What do you think is the risk of you getting the following side-effects from your statin?

- Constipation (‘*common*’): ?
- Pancreatitis (‘*rare*’): ?

Can we use words instead of numbers?

What do you think is the risk of you getting the following side-effects from your statin?

- Constipation (‘*common*’): 34% (mean estimate)
- Pancreatitis (‘*rare*’): 18% (mean estimate)

Knapp et al, *Qual Saf Health Care* 2004;13:176–180

Can we use words instead of numbers?

What do you think is the risk of you getting the following side-effects from your statin?

		Actual risk
• Constipation (‘*common*’):	34%	2.5%
• Pancreatitis (‘*rare*’):	18%	0.04%

Knapp et al, *Qual Saf Health Care* 2004;13:176–180

Over to Dr Gabe Recchia….

John Krebs' checklist

1. What you know
2. What you don't know
3. What you are doing to find out
4. What we can all can do in the meantime to be on the safe side
5. That advice will change *(and when/how you will update it)*

Putting numbers into context

Dr. Gabriel Recchia

Winton Centre for Risk and Evidence Communication

- Numbers mean little to people when stripped of context

- What kinds of context did our research find were helpful when communicating COVID-19 risk?

- What were the effects of providing this context?

ROYAL SOCIETY OPEN SCIENCE

Communicating personalized risks from COVID-19: guidelines from an empirical study

Alexandra L. J. Freeman ✉, John Kerr, Gabriel Recchia, Claudia R. Schneider, Alice C. E. Lawrence, Leila Finikarides, Giulia Luoni, Sarah Dryhurst and David Spiegelhalter

The challenge

To present personalised information about an individual's estimated risk of dying from COVID-19 if they caught it

- primary audience: the general public
- aim: to inform

Your estimated risk of dying if you get COVID-19 is 12%

If **100 people** like you got COVID-19, we would expect around **12** of them to die.

For comparison, the average risk for:

- An **85** year old is **19%**
- A **70** year old is **6%**
- A **50** year old is **0.2%**

“If this was your outcome, this number, 12% risk of dying if you catch COVID-19, would this outcome make you do anything differently from what you are currently doing, or not?”

“I don’t think so, because 12%, that’s quite low in my opinion.”

[Later in interview]

"So based on this, what is the likelihood that this person will die if they catch COVID-19?"

"12%."

"And what does that mean in terms of 100 people?"

"Every 12 people out of 100."

"So for you personally, this 12% is a high risk or a low risk?"

"I don't know, because I did say low risk, but if you actually think about it… it's quite high. I'd say yeah, I think it's quite high, but as I said I think I'd just continue as I'm doing."

"You'd changed your mind, at the beginning you thought it was low, but now that you rethink this 12% it doesn't sound that low anymore, you think it's high."

"Yeah, I think it's quite high. Because if you look there as well with the 70-year-old, that's 6%, so that bit's helpful because now I can say, oh ok, 12%, I am actually quite at risk then. I'm obviously stereotyping massively, because in my mind they might have respiratory stuff going on."

"That's interesting, part of the reason that you changed your mind about that 12% is because you saw that the average risk for a 70-year-old is 6%?"

"Exactly."

What's the right context or comparison to provide?

- Risks for healthy or 'average' people of a specified age?
- Risks for a hypothetical person who is 'like you' but differs in some particular way?
- The type of person (in terms of risk factors such as age, health conditions, etc.) who might be at that level of risk?
- The proportion of the population with a lower risk?
- Risk of dying from influenza? Accidents? Other causes?

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- **The type of person (in terms of risk factors such as age, health conditions, etc.) who might be at that level of risk?**
- The proportion of the population with a lower risk?
- **Risk of dying from influenza?** Accidents? Other causes?

What's the effect of providing this context?

Are there effects on…

- Audience evaluation of the message?
- How large the risks are perceived to be?
- How biased the audience is by aspects of the message that 'should' be irrelevant, such as whether the numbers are communicated as frequencies or percentages?

See also: Weinstein, N. D., & Sandman, P. M. (1993). Some criteria for evaluating risk messages. *Risk Analysis, 13*(1), 103-114.

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Your result: 2%

We'd expect **2%** of people with this result to die if they got COVID-19

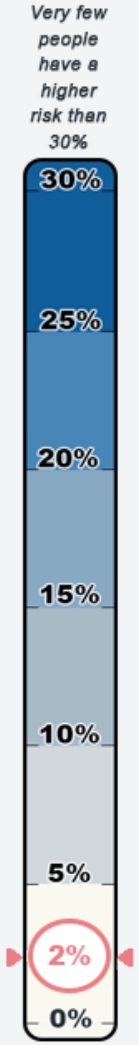
Out of **10,000 people** who entered the same information as you, we would expect around **200** to die if they got COVID-19

Their actual risk of dying could be as low as **1%** or as high as **3%**

This has been calculated based on hospital data and GP records from England.

▶ **What can I do to avoid catching COVID-19?**

▶ **Can I reduce my risk of dying if I catch COVID-19?**



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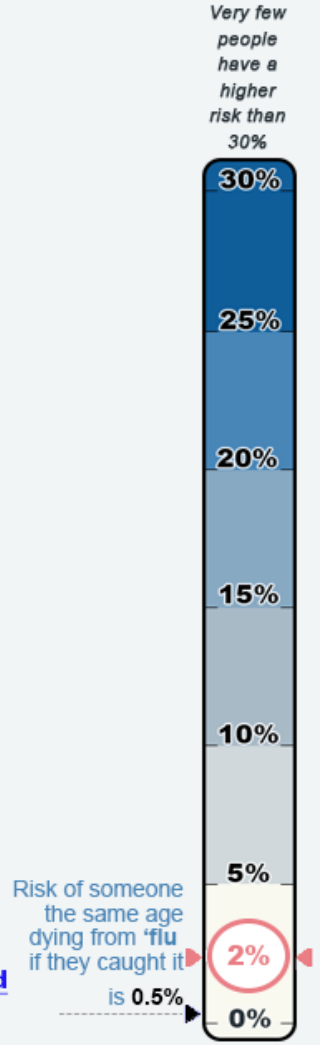

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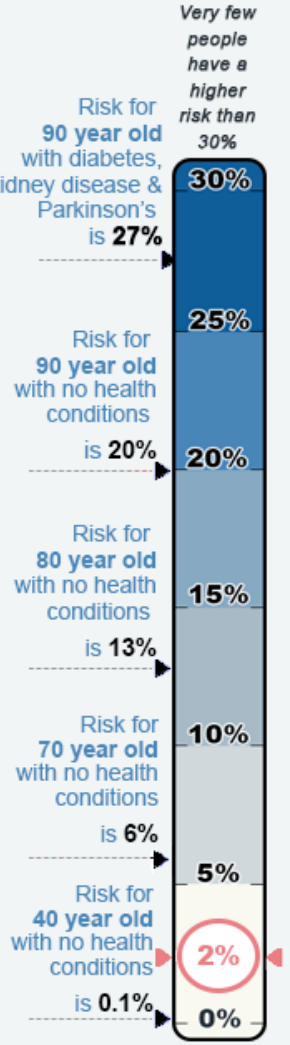
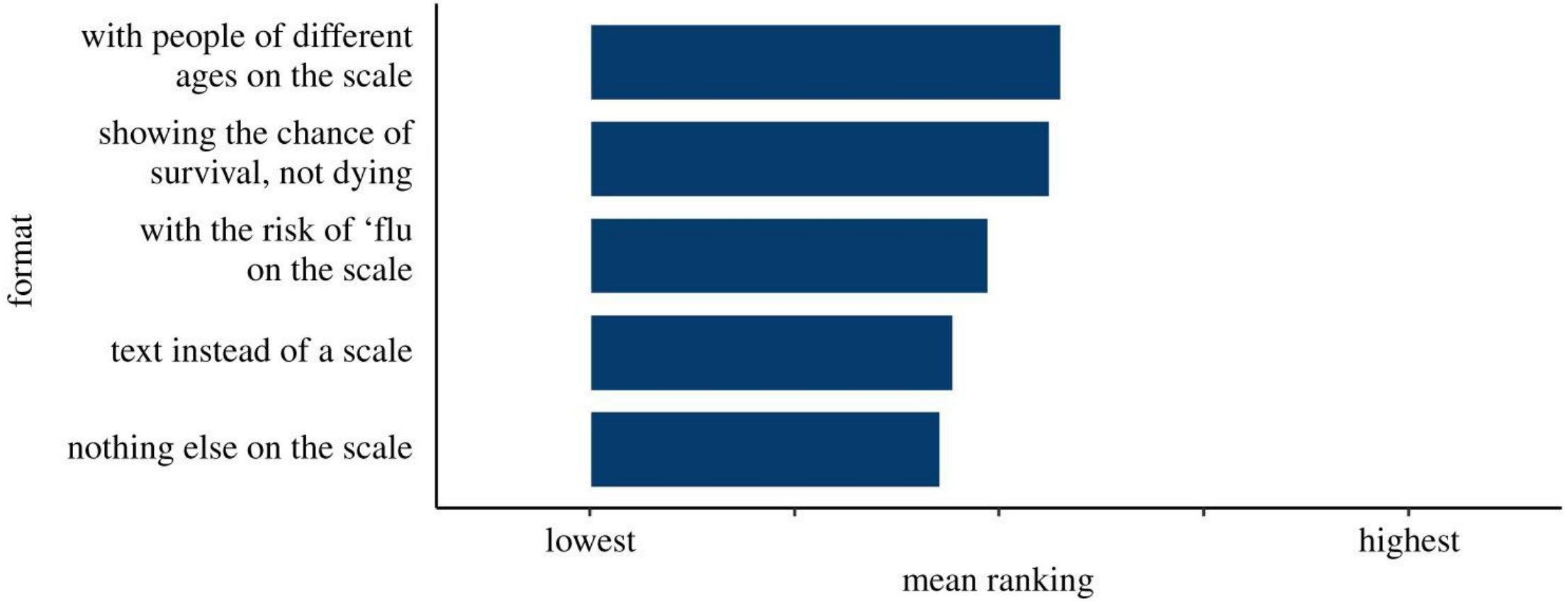


Participants' preferences across the five presentation formats tested in Experiment 4.3 when shown all five and asked to rank them (*n* = 2500).



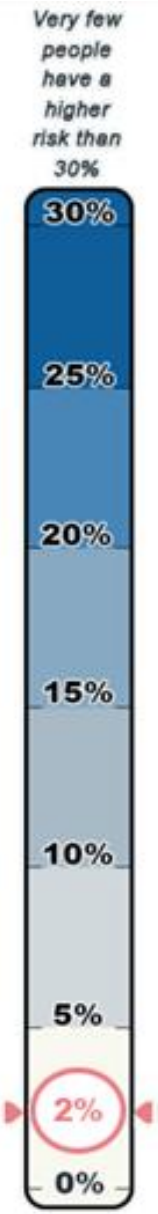
What about…

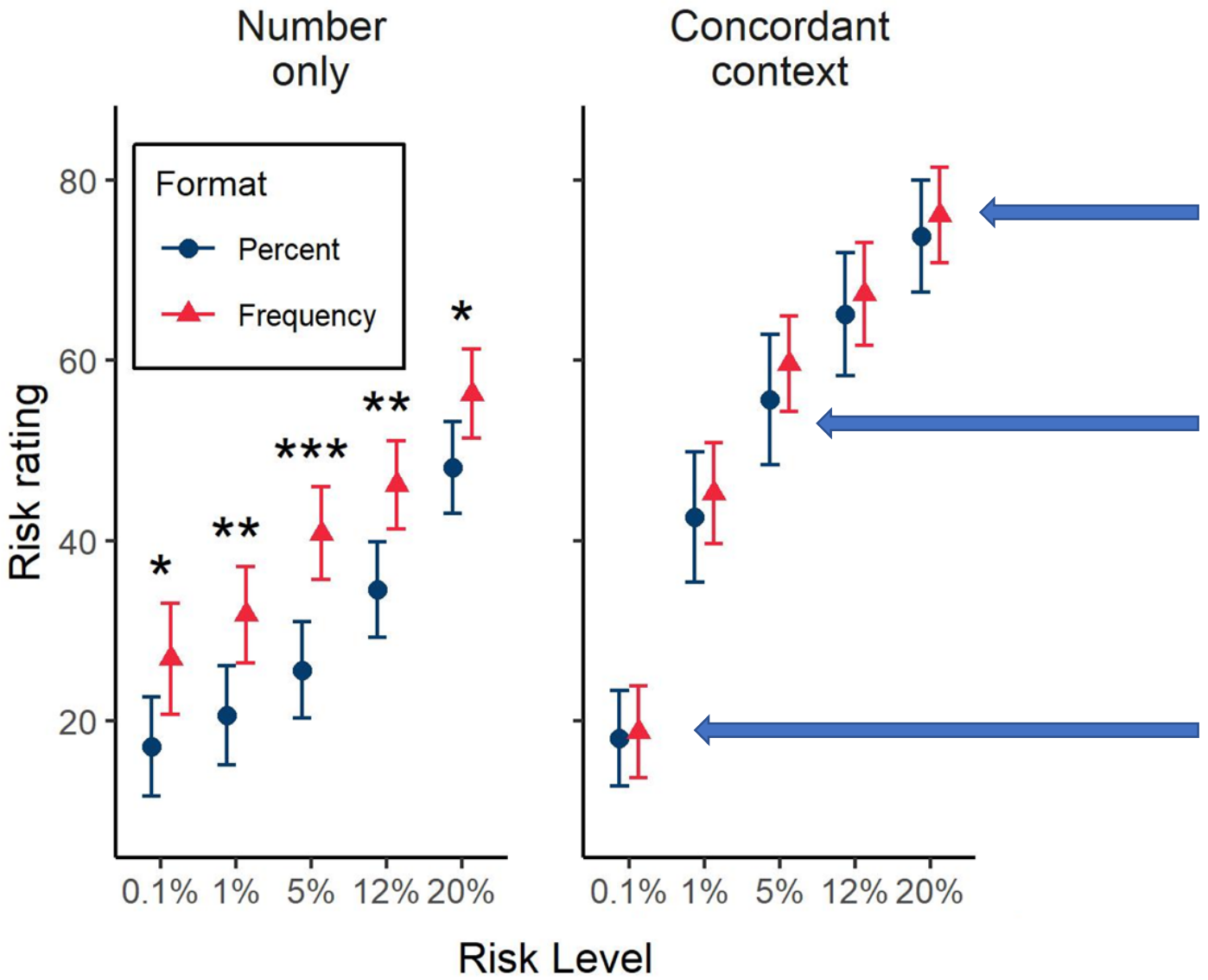
- How large the risks are perceived to be?
  - Perceived likelihood of death? How worried people said they would be about catching COVID-19 if this was their result? The degree to which people said they would like to see this information? The degree to which people said they would change their behaviour? The degree to which people were more concerned with catching COVID-19 vs. seasonal flu?
- Trust in the information? In the producers of the information?
- Perception in the certainty of the information?

- Audience preferred version with risk ladder to text-only version

- No significant differences on measures of behavioural intentions – except when viewing % surviving rather than % dying (survival framing made people less cautious)

- Caveat: Those viewing a text-only version did appear to perceive the risks as greater than those viewing the risk ladder visualisation





"If Sam catches COVID-19, Sam's risk of dying is **20%**. For context: They are an Asian man aged 85 with a heart condition and diabetes"

"If Jo catches COVID-19, Jo's risk of dying is **5%**. For context: They are a white woman aged 40 with a high BMI and undergoing cancer treatment"

"If Mel catches COVID-19, Mel's risk of dying is **0.1%**. For context: They are a white man aged 30 with no underlying health conditions"

Conclusions

- No easy shortcuts: important to find out what kind of context your audience would find useful

- If you can, you may be able both to improve how your audience evaluates the message, and ground their interpretation in something that means more to them than a raw probability

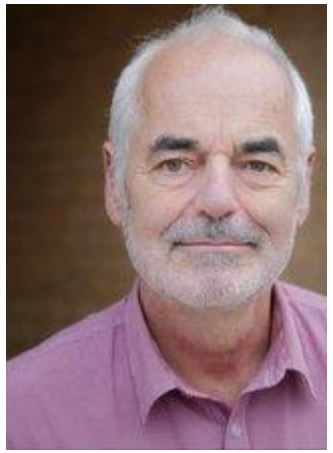
Freeman, A. L., Kerr, J., Recchia, G., Schneider, C. R., Lawrence, A. C., Finikarides, L., ... & Spiegelhalter, D. (2021). Communicating personalized risks from COVID-19: guidelines from an empirical study. *Royal Society Open Science, 8*(4), 201721.

Contributors to the research presented here


Alexandra Freeman


Alice Lawrence


Claudia Schneider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INFORMED COVID-19 MRNA VACCINATION DECISIONS WITH FACT BOXES

Christin Ellermann, M.Sc. PH

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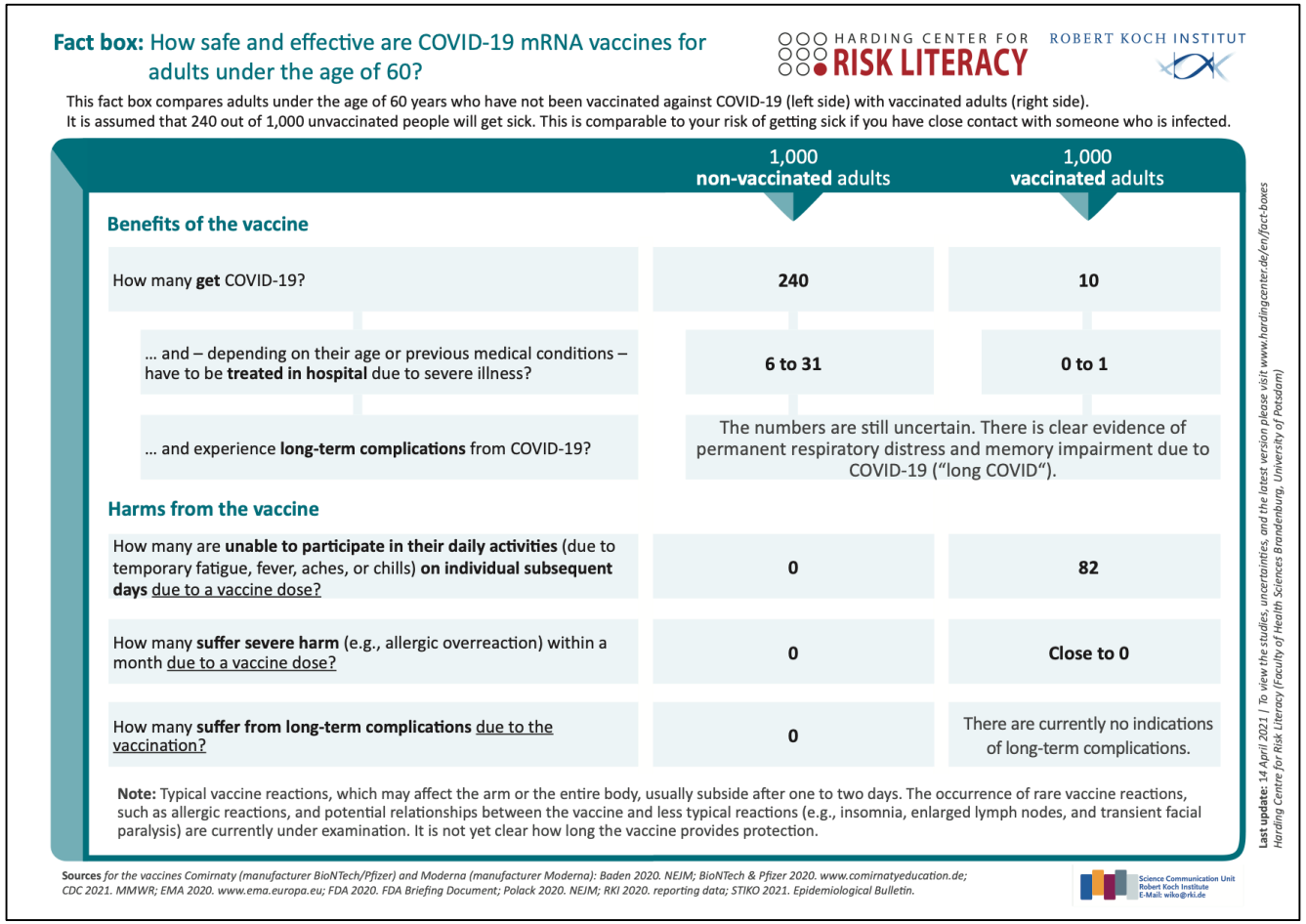

Fact box: How safe and effective are COVID-19 mRNA vaccines for adults under the age of 60?

HARDING CENTER FOR RISK LITERACY — ROBERT KOCH INSTITUT

This fact box compares adults under the age of 60 years who have not been vaccinated against COVID-19 (left side) with vaccinated adults (right side).
It is assumed that 240 out of 1,000 unvaccinated people will get sick. This is comparable to your risk of getting sick if you have close contact with someone who is infected.

	1,000 **non-vaccinated** adults	1,000 **vaccinated** adults
Benefits of the vaccine		
How many **get** COVID-19?	**240**	**10**
… and – depending on their age or previous medical conditions – have to be **treated in hospital** due to severe illness?	**6 to 31**	**0 to 1**
… and experience **long-term complications** from COVID-19?	The numbers are still uncertain. There is clear evidence of permanent respiratory distress and memory impairment due to COVID-19 ("long COVID").	
Harms from the vaccine		
How many are **unable to participate in their daily activities** (due to temporary fatigue, fever, aches, or chills) **on individual subsequent days** due to a vaccine dose?	**0**	**82**
How many **suffer severe harm** (e.g., allergic overreaction) within a month due to a vaccine dose?	**0**	**Close to 0**
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Note: Typical vaccine reactions, which may affect the arm or the entire body, usually subside after one to two days. The occurrence of rare vaccine reactions, such as allergic reactions, and potential relationships between the vaccine and less typical reactions (e.g., insomnia, enlarged lymph nodes, and transient facial paralysis) are currently under examination. It is not yet clear how long the vaccine provides protection.

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Science Communication Unit Robert Koch Institute E-Mail: wiko@rki.de

Last update: *14 April 2021 | To view the studies, uncertainties, and the latest version please visit www.hardingcenter.de/en/fact-boxes*
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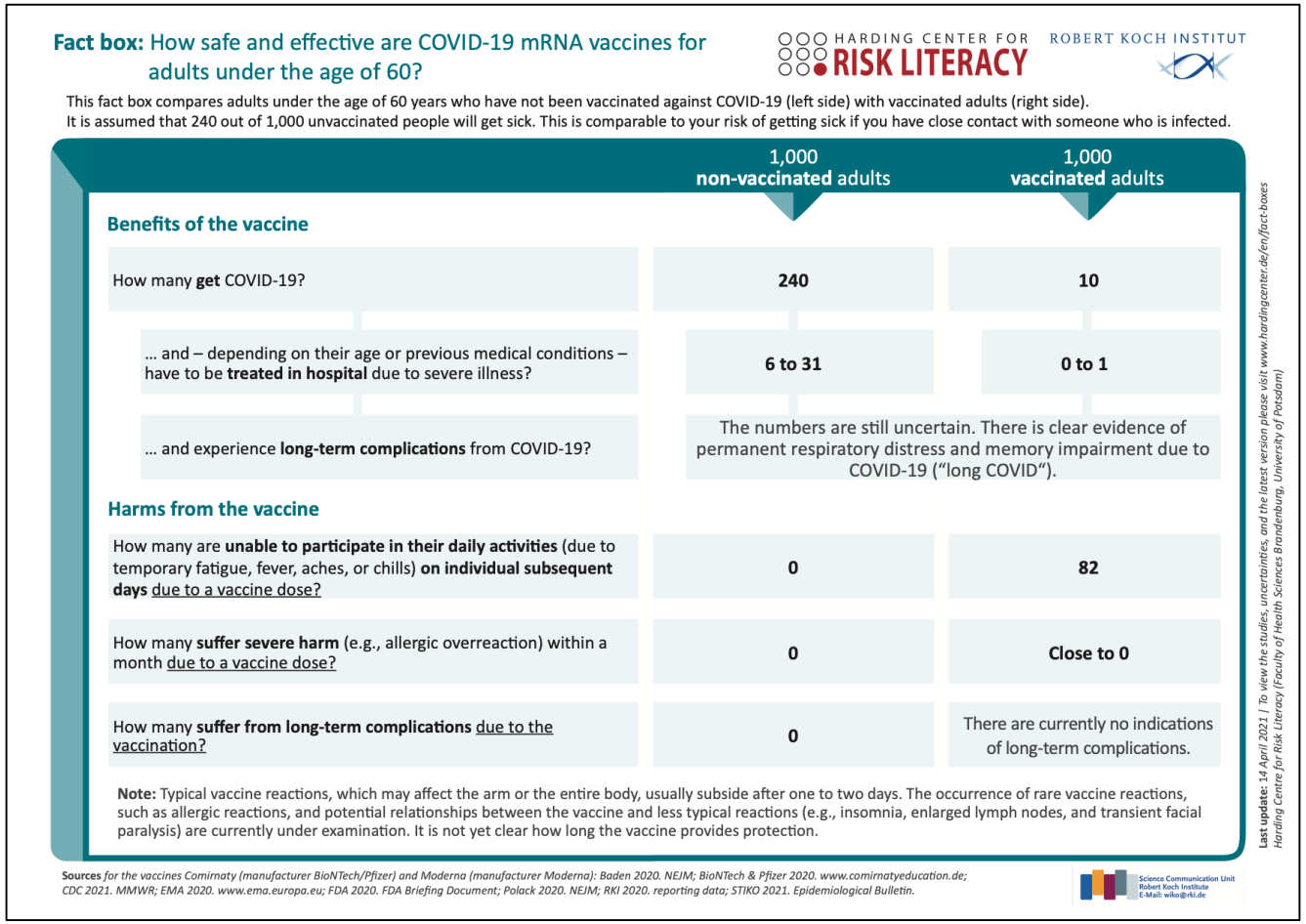
INFORMED COVID-19 MRNA VACCINATION DECISIONS WITH FACT BOXES

What is a fact box?



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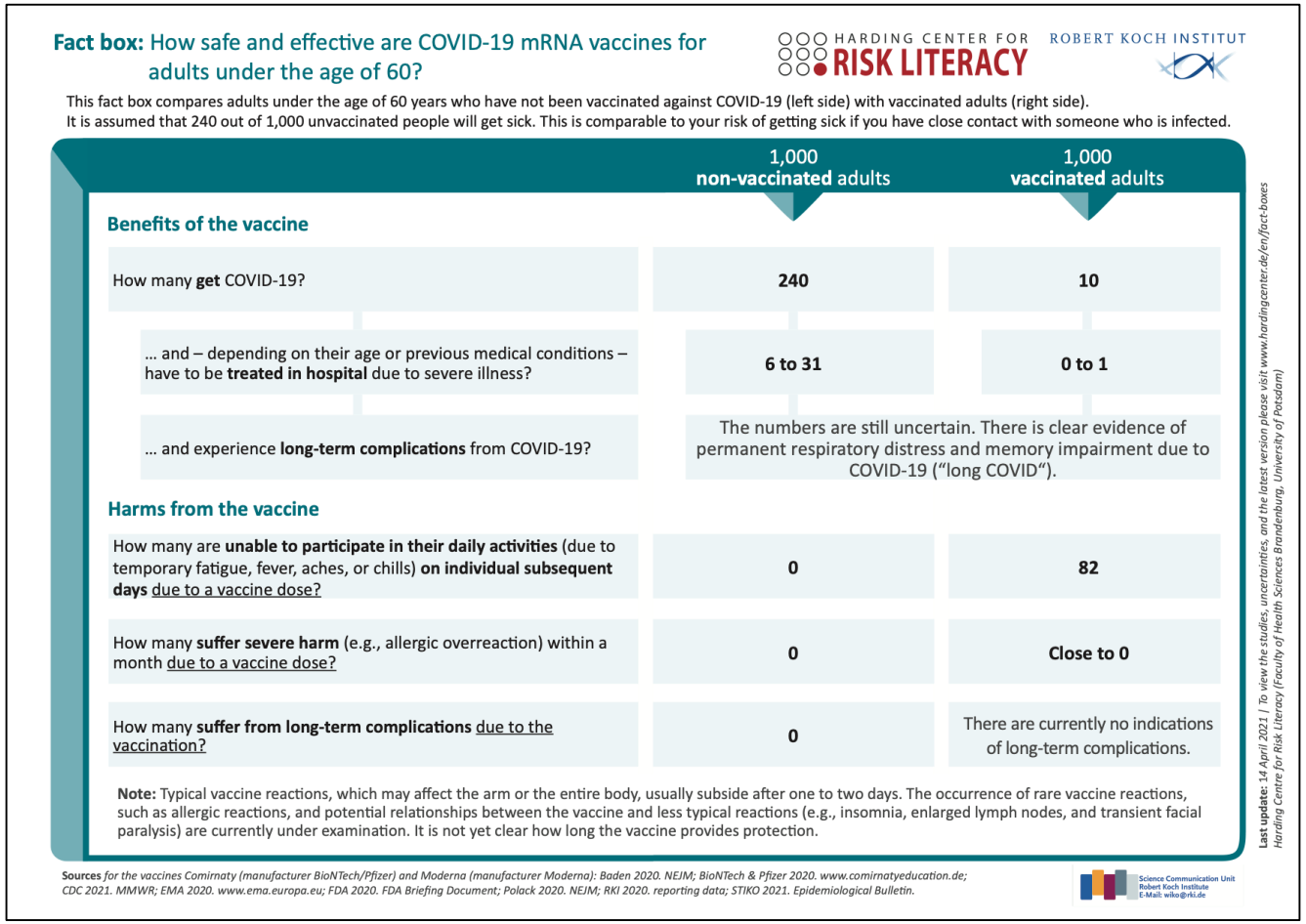
INFORMED COVID-19 MRNA VACCINATION DECISIONS WITH FACT BOXES

- Evidence based summary
- Balanced overview of benefits and harms
- Not designed to enforce directed behavioral change

Aim

- Support informed decisions
  - Comprehensive knowledge
  - Decision is congruent with needs and preferences
- Maybe boost of vaccination uptake for people who lack information



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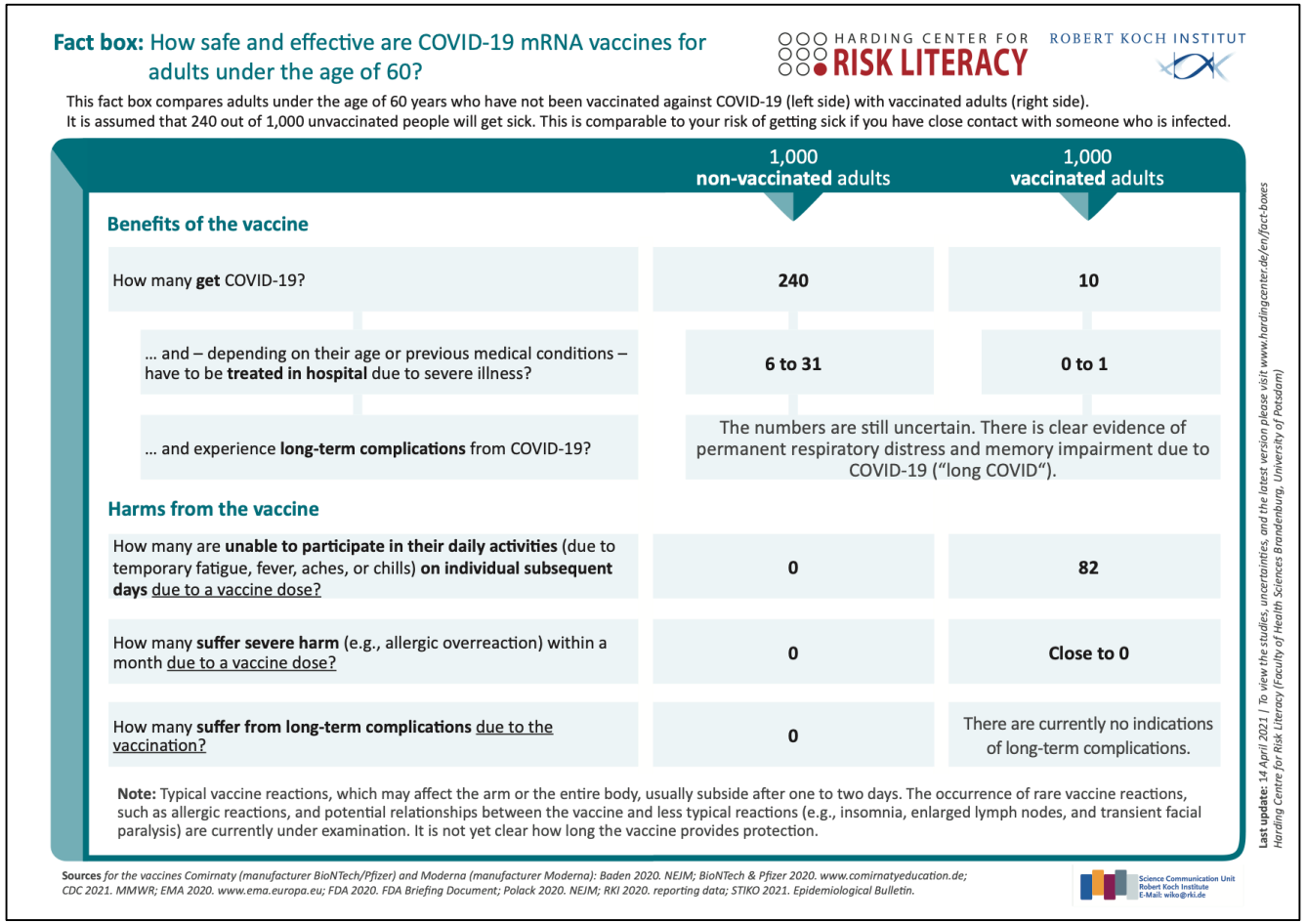
Fact box on COVID-19 mRNA vaccines – Key elements

What are the key elements of a fact box?



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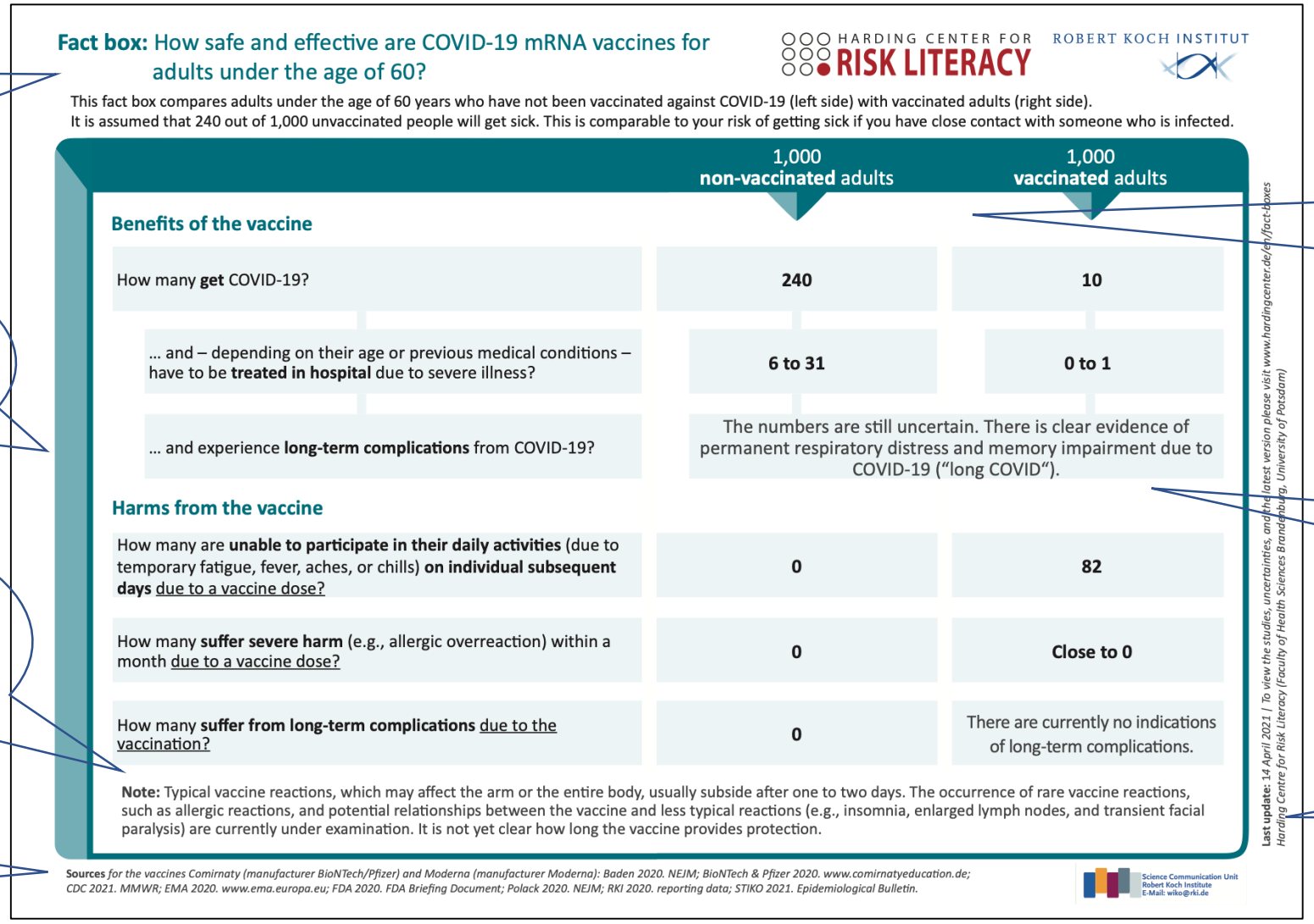
Fact box on COVID-19 mRNA vaccines – Key elements



Fact box: How safe and effective are COVID-19 mRNA vaccines for adults under the age of 60?

HARDING CENTER FOR RISK LITERACY — ROBERT KOCH INSTITUT

This fact box compares adults under the age of 60 years who have not been vaccinated against COVID-19 (left side) with vaccinated adults (right side).
It is assumed that 240 out of 1,000 unvaccinated people will get sick. This is comparable to your risk of getting sick if you have close contact with someone who is infected.

	1,000 **non-vaccinated** adults	1,000 **vaccinated** adults
Benefits of the vaccine		
How many **get** COVID-19?	**240**	**10**
… and – depending on their age or previous medical conditions – have to be **treated in hospital** due to severe illness?	**6 to 31**	**0 to 1**
… and experience **long-term complications** from COVID-19?	The numbers are still uncertain. There is clear evidence of permanent respiratory distress and memory impairment due to COVID-19 ("long COVID").	
Harms from the vaccine		
How many are **unable to participate in their daily activities** (due to temporary fatigue, fever, aches, or chills) **on individual subsequent days** due to a vaccine dose?	**0**	**82**
How many **suffer severe harm** (e.g., allergic overreaction) within a month due to a vaccine dose?	**0**	**Close to 0**
How many **suffer from long-term complications** due to the vaccination?	**0**	There are currently no indications of long-term complications.

Note: Typical vaccine reactions, which may affect the arm or the entire body, usually subside after one to two days. The occurrence of rare vaccine reactions, such as allergic reactions, and potential relationships between the vaccine and less typical reactions (e.g., insomnia, enlarged lymph nodes, and transient facial paralysis) are currently under examination. It is not yet clear how long the vaccine provides protection.

Sources *for the vaccines Comirnaty (manufacturer BioNTech/Pfizer) and Moderna (manufacturer Moderna): Baden 2020. NEJM; BioNTech & Pfizer 2020. www.comirnatyeducation.de; CDC 2021. MMWR; EMA 2020. www.ema.europa.eu; FDA 2020. FDA Briefing Document; Polack 2020. NEJM; RKI 2020. reporting data; STIKO 2021. Epidemiological Bulletin.*

Science Communication Unit Robert Koch Institute E-Mail: wiko@rki.de

Last update: 14 April 2021 | To view the studies, uncertainties, and the latest version please visit www.hardingcenter.de/en/fact-boxes
Harding Centre for Risk Literacy (Faculty of Health Sciences Brandenburg, University of Potsdam)

Description of the reference class

Most relevant endpoints for benefits and harms

Short summary/ additional note about typical and rare side effects

Sources

2 groups of the same denominator with the same reference group

Numbers as absolute risks or statement

Last update

McDowell et al. 2016

FACT BOX ON COVID-19 MRNA VACCINES - IMPLEMENTATION

How has the fact box been implemented?

Fact box: How safe and effective are COVID-19 mRNA vaccines for adults under the age of 60?

HARDING CENTER FOR RISK LITERACY

ROBERT KOCH INSTITUT

This fact box compares adults under the age of 60 years who have not been vaccinated against COVID-19 (left side) with vaccinated adults (right side).
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	1,000 **non-vaccinated** adults	1,000 **vaccinated** adults
Benefits of the vaccine		
How many **get** COVID-19?	**240**	**10**
… and – depending on their age or previous medical conditions – have to be **treated in hospital** due to severe illness?	**6 to 31**	**0 to 1**
… and experience **long-term complications** from COVID-19?	The numbers are still uncertain. There is clear evidence of permanent respiratory distress and memory impairment due to COVID-19 (“long COVID”).	
Harms from the vaccine		
How many are **unable to participate in their daily activities** (due to temporary fatigue, fever, aches, or chills) **on individual subsequent days** due to a vaccine dose?	**0**	**82**
How many **suffer severe harm** (e.g., allergic overreaction) within a month due to a vaccine dose?	**0**	**Close to 0**
How many **suffer from long-term complications** due to the vaccination?	**0**	There are currently no indications of long-term complications.

Note: Typical vaccine reactions, which may affect the arm or the entire body, usually subside after one to two days. The occurrence of rare vaccine reactions, such as allergic reactions, and potential relationships between the vaccine and less typical reactions (e.g., insomnia, enlarged lymph nodes, and transient facial paralysis) are currently under examination. It is not yet clear how long the vaccine provides protection.

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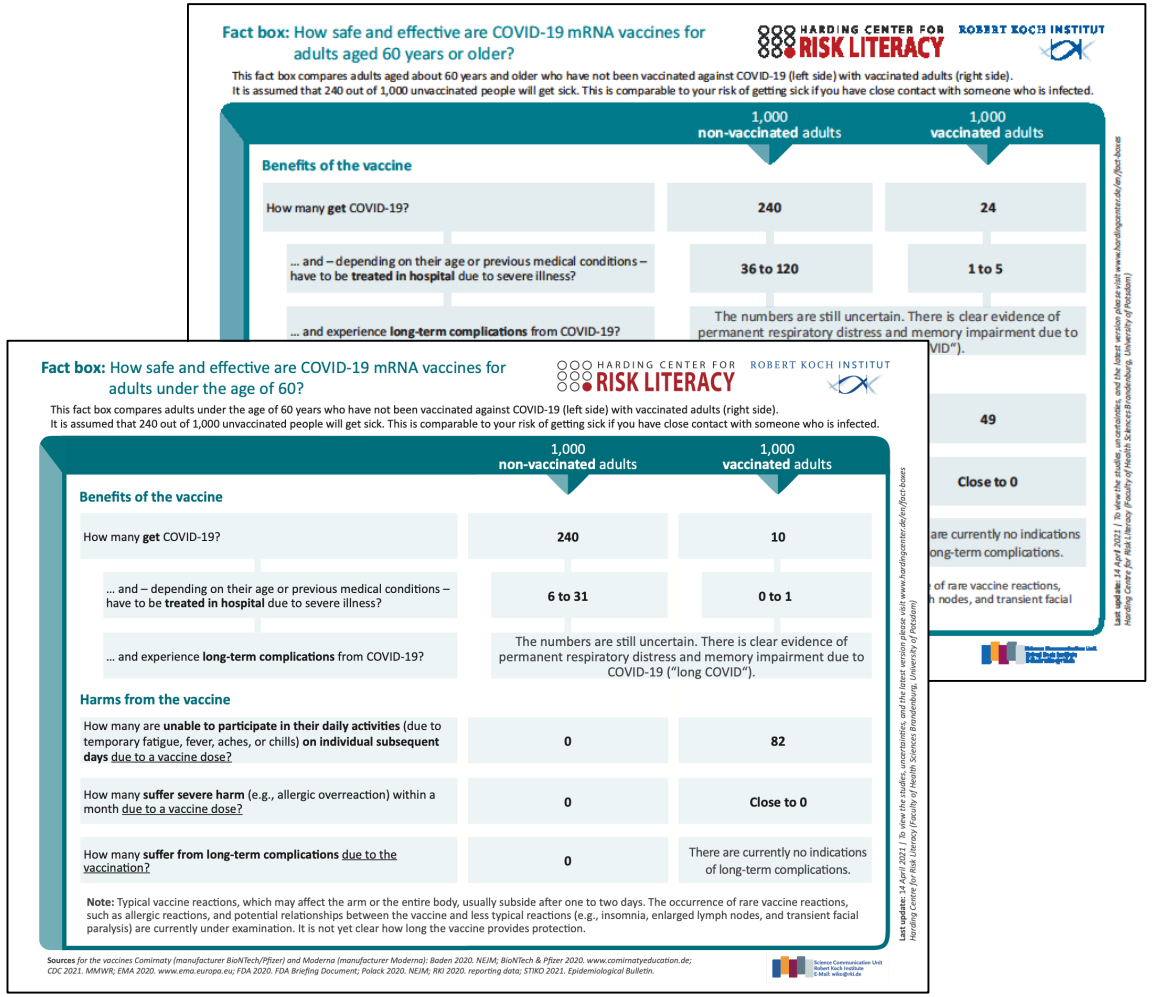
FACT BOX ON COVID-19 MRNA VACCINES - IMPLEMENTATION

- Fact boxes are embedded in an accompanying text
- Available for two risk groups: people aged 18-59 and from 60 years
- Complex version has been revised and replaced by a simple fact box
- Update and version for youth and young adults in progress



Fact box: How safe and effective are COVID-19 mRNA vaccines for adults aged 60 years or older?

HARDING CENTER FOR RISK LITERACY — ROBERT KOCH INSTITUT

This fact box compares adults aged about 60 years and older who have not been vaccinated against COVID-19 (left side) with vaccinated adults (right side).
It is assumed that 240 out of 1,000 unvaccinated people will get sick. This is comparable to your risk of getting sick if you have close contact with someone who is infected.

	1,000 non-vaccinated adults	1,000 vaccinated adults
Benefits of the vaccine		
How many **get** COVID-19?	240	24
... and – depending on their age or previous medical conditions – have to be **treated in hospital** due to severe illness?	36 to 120	1 to 5
... and experience **long-term complications** from COVID-19?	The numbers are still uncertain. There is clear evidence of permanent respiratory distress and memory impairment due to COVID-19 ("long COVID").	
		49
		Close to 0
		are currently no indications ong-term complications.
		of rare vaccine reactions, h nodes, and transient facial

Fact box: How safe and effective are COVID-19 mRNA vaccines for adults under the age of 60?

HARDING CENTER FOR RISK LITERACY — ROBERT KOCH INSTITUT

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Benefits of the vaccine		
How many **get** COVID-19?	240	10
... and – depending on their age or previous medical conditions – have to be **treated in hospital** due to severe illness?	6 to 31	0 to 1
... and experience **long-term complications** from COVID-19?	The numbers are still uncertain. There is clear evidence of permanent respiratory distress and memory impairment due to COVID-19 ("long COVID").	
Harms from the vaccine		
How many are **unable to participate in their daily activities** (due to temporary fatigue, fever, aches, or chills) **on individual subsequent days** due to a vaccine dose?	0	82
How many **suffer severe harm** (e.g., allergic overreaction) within a month due to a vaccine dose?	0	Close to 0
How many **suffer from long-term complications** due to the vaccination?	0	There are currently no indications of long-term complications.

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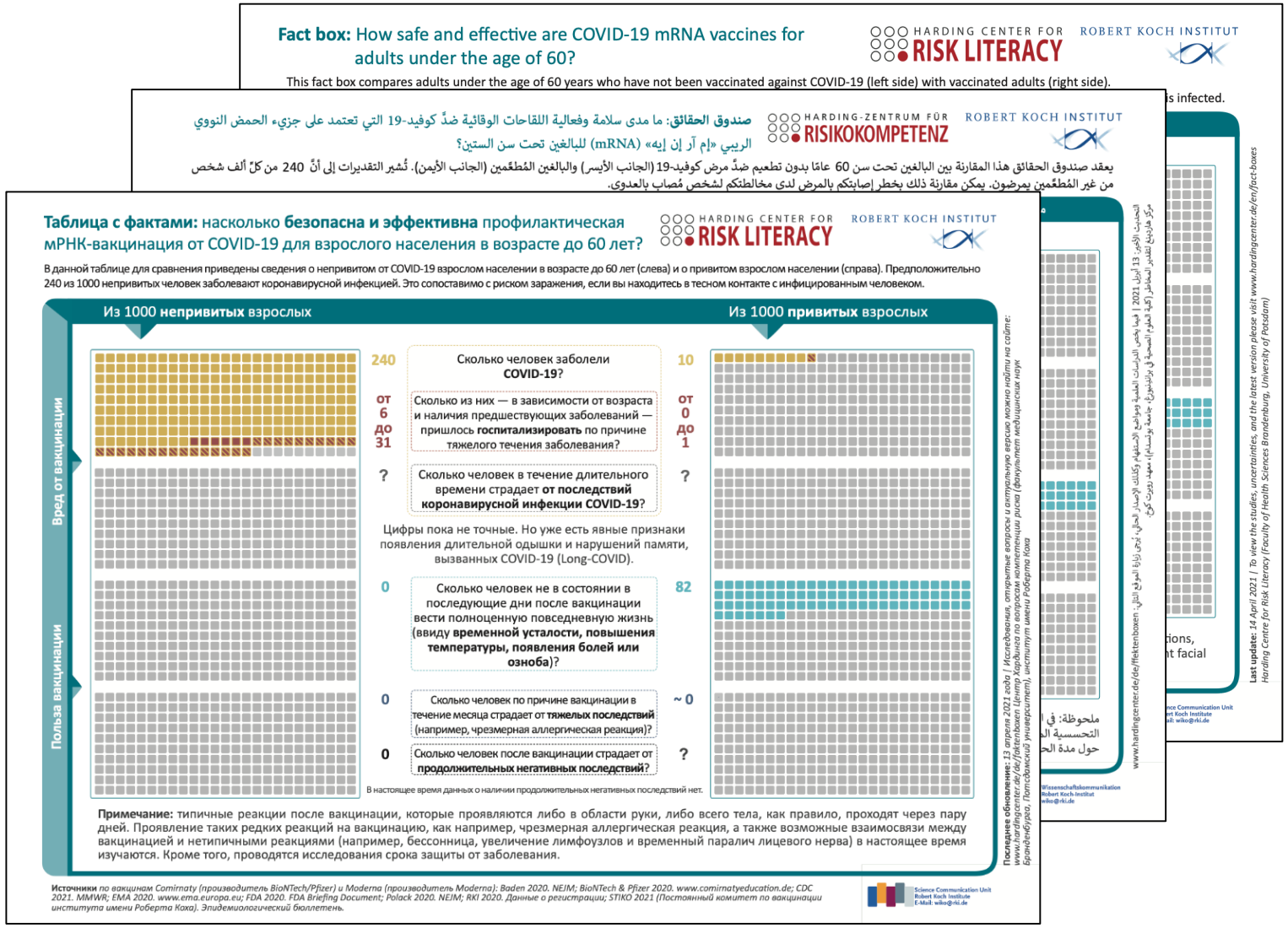
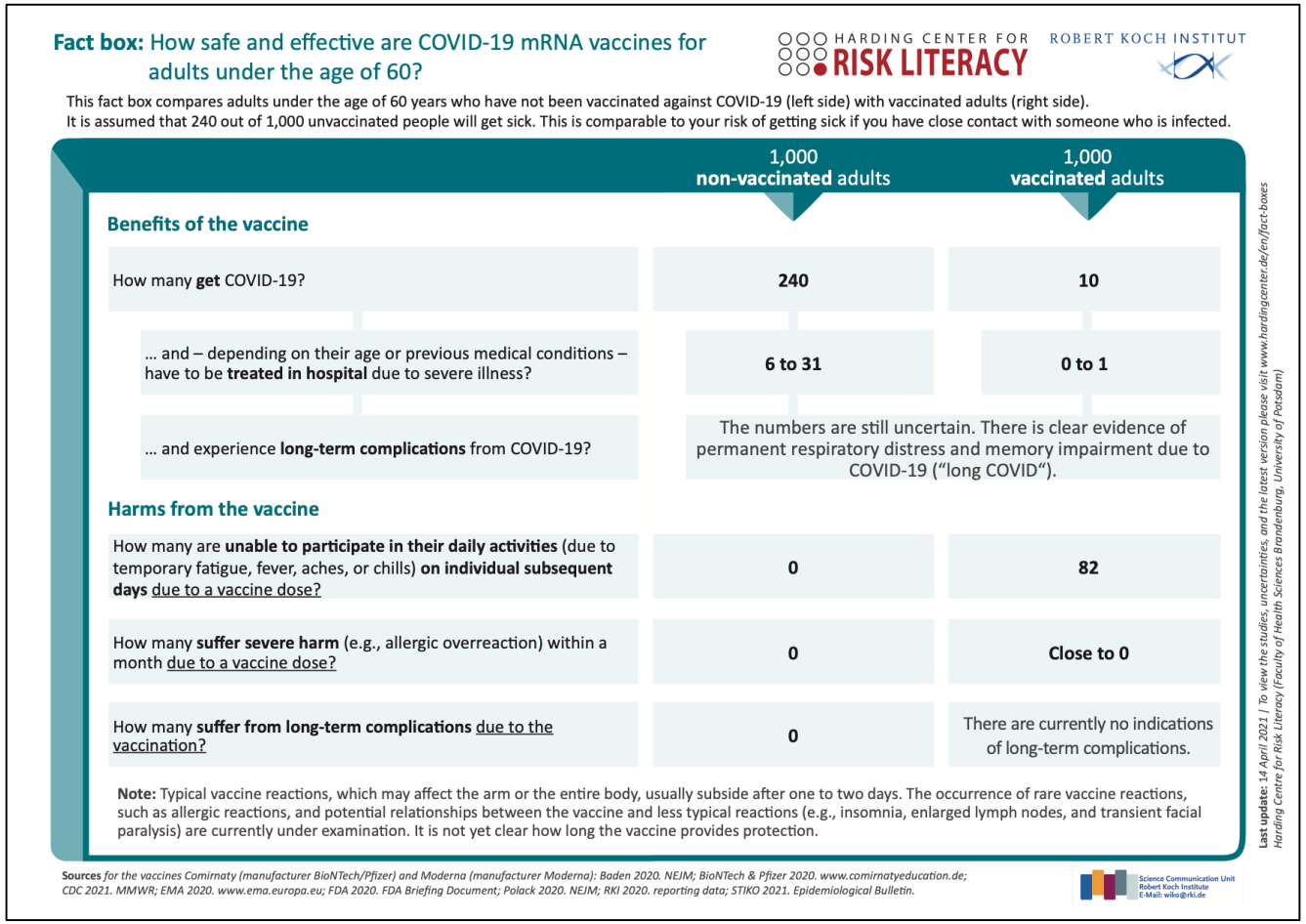
Fact box on COVID-19 mRNA vaccines - Implementation

- Visualization is intended to help low-numerate people or people with poor reading skills compare benefits and harms
- Available in nine other languages besides English and German



FACT BOX ON COVID-19 MRNA VACCINES - EVALUATION

Can fact boxes support informed COVID-19 vaccination decisions?



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How many are **unable to participate in their daily activities** (due to temporary fatigue, fever, aches, or chills) **on individual subsequent days** due to a vaccine dose?	**0**	**82**
How many **suffer severe harm** (e.g., allergic overreaction) within a month due to a vaccine dose?	**0**	**Close to 0**
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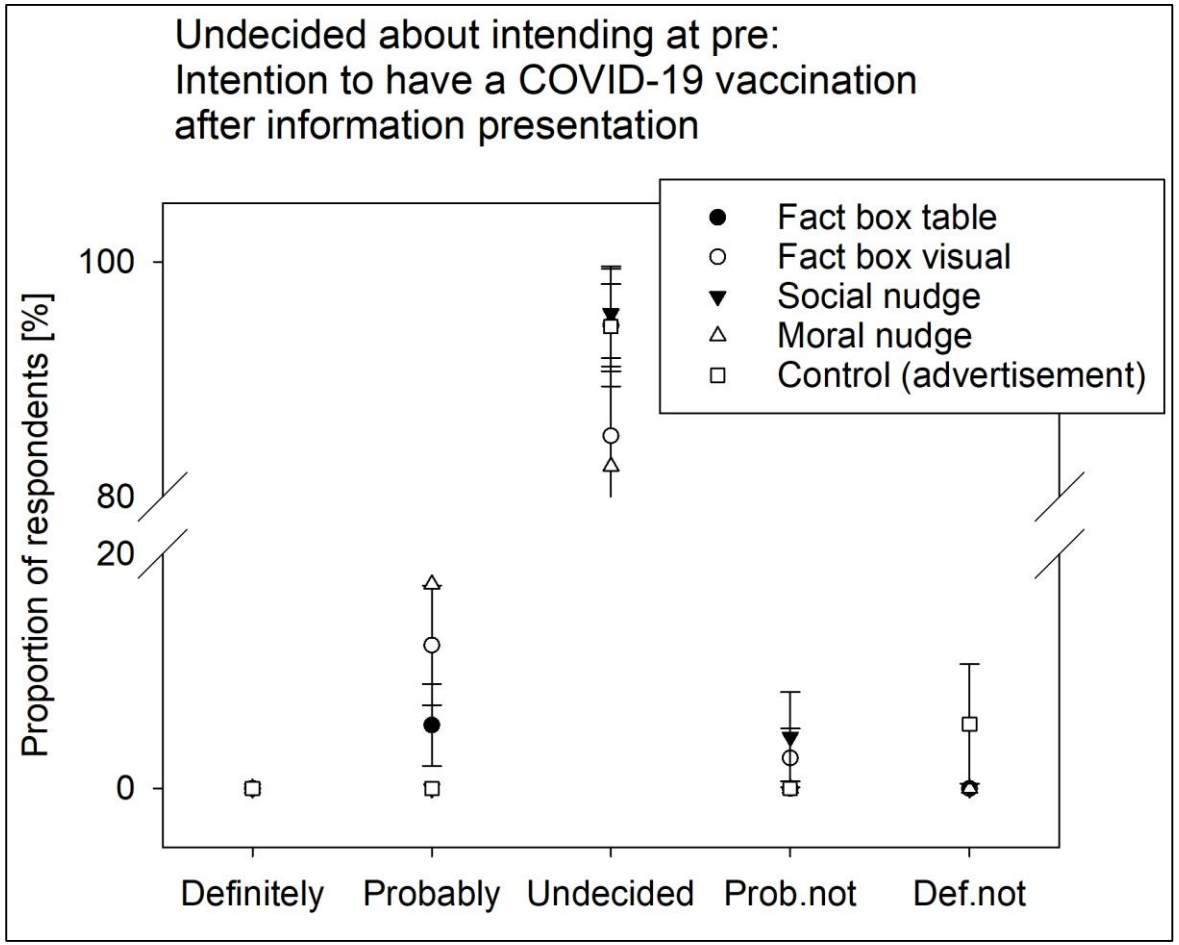
Fact box on COVID-19 mRNA vaccines - Evaluation

- **Knowledge improvement** (McDowell et al. 2016, 2019; Brick et al., 2020; Rebitschek et al., under review)
- Representative online survey in Germany with 14,000 invited panelists
- Preregistered study:

  https://aspredicted.org/DDI_WHT
- **More likely vaccination intention** in people who were undecided before

Conclusion

- Informed decisions can also lead to vaccination decisions
- Further research on vulnerable groups



Rebitschek et al. (in prep). Evidence-based information against vaccine hesitancy before nudging.

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COVID-19 vaccines: Examining the impact of evidence communication guidelines

John R. Kerr

Comment

Consider what information — in what format — would best support your audiences' decisions.

Five rules for evidence communication

Michael Blastland, Alexandra L. J. Freeman, Sander van der Linden, Theresa M. Marteau & David Spiegelhalter

Avoid unwarranted certainty, neat narratives and partisan presentation; strive to inform, not persuade.

"Be persuasive", "be engaging", "tell stories with your science". Most researchers have heard such exhortations many times, and for good reason. Such rhetorical devices often help to land the message, whether that message is designed to sell a product or win a grant. These are the traditional techniques of communications applied to science.

This approach often works, but it comes with danger.

There are myriad examples from the current pandemic of which we might ask: have experts always been explicit in acknowledging unknowns? Complexity? Conflicts of interest? Inconvenient data? And, importantly, their own values? Rather than re-examine those cases, we offer ideas to encourage reflection, based on our own research.

Our small, interdisciplinary group at the University of Cambridge, UK, collects empirical data on issues such as how to communicate uncertainty, how audiences decide

Blastland et al., 2020; *https://doi.org/10.1038/d41586-020-03189-1*

Setting the agenda in research

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" Our aim is to design communications that do not lead people to a particular decision but help them to understand what is known about a topic and to make up their own minds on the basis of that evidence."

"We worry that the urge to persuade or to tell a simple story can damage credibility and trustworthiness."

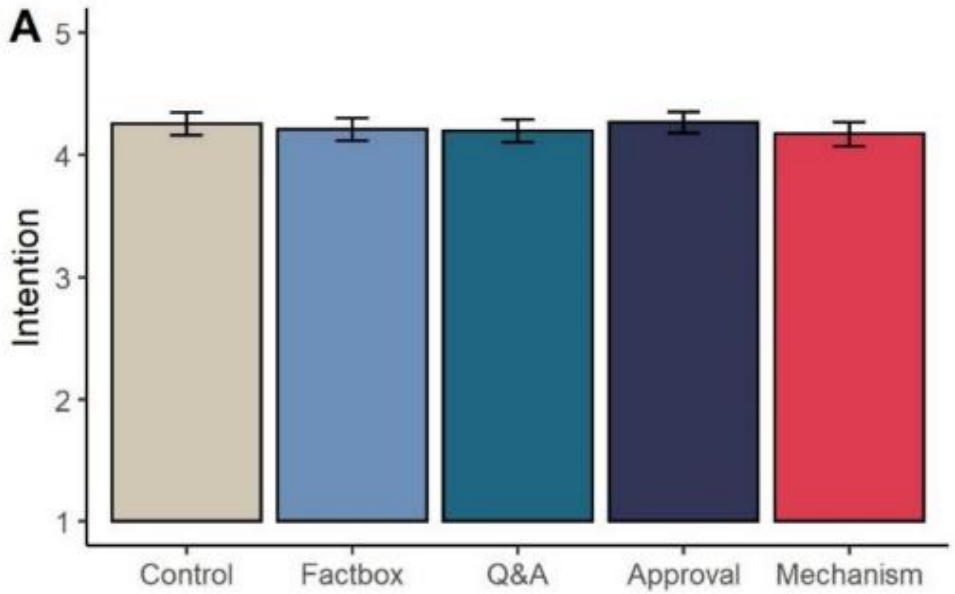
"In our view, it is important to be clear about motivations, present data fully and clearly, and share sources."

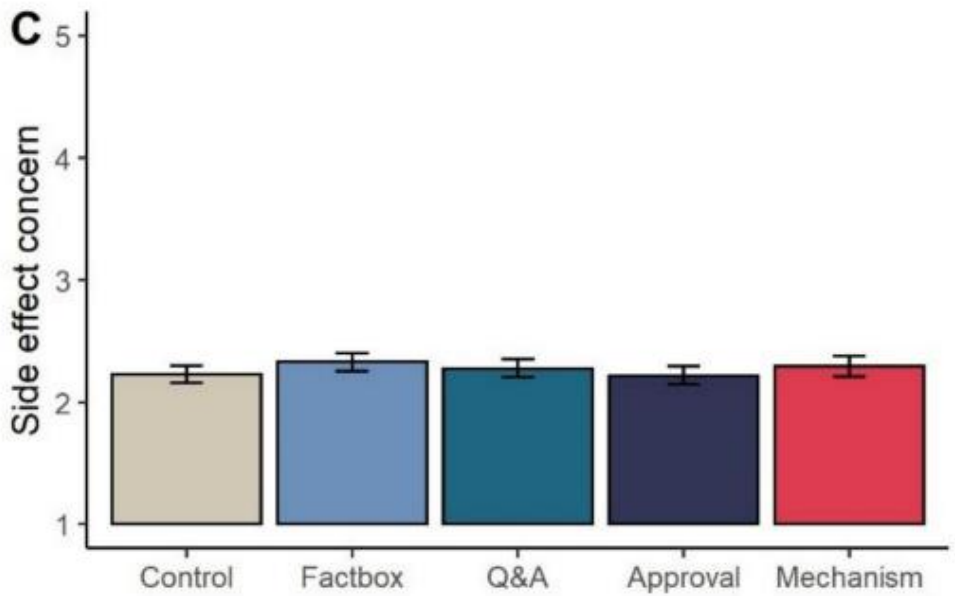
Blastland et al., 2020; *https://doi.org/10.1038/d41586-020-03189-1*

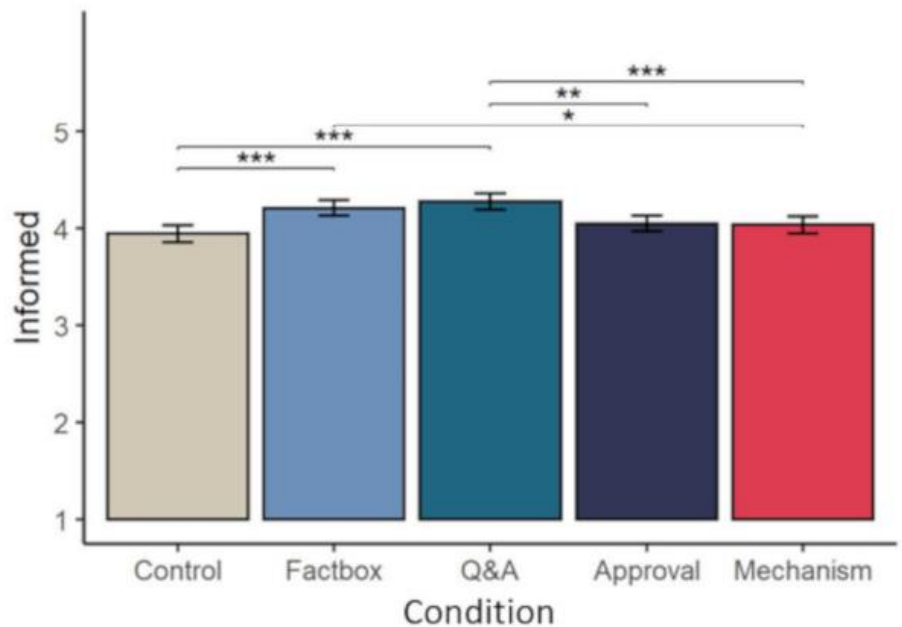
For 18-64 year old:

POTENTIAL BENEFITS **From 2 weeks after 2nd dose**			
	Dummy injection (10,521 people)	**Vaccine injection (10,551 people)**	**What difference did the vaccine make?**
Number who developed symptoms confirmed to be COVID-19	156 (1.5%)	7 (less than 0.1%)	149 fewer cases (95.5% reduction in COVID-19 cases)

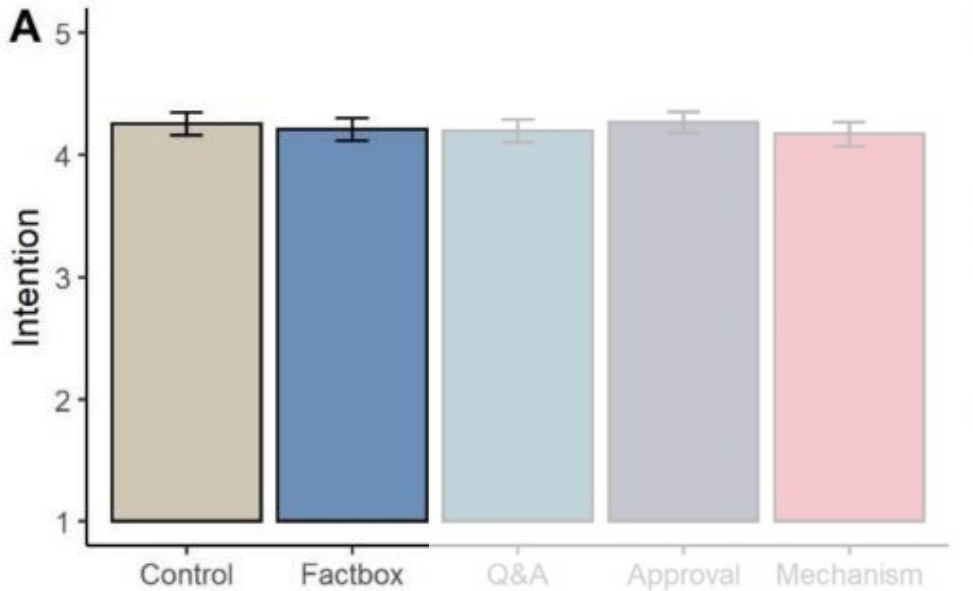
POTENTIAL HARMS* **(usually lasting 2-3 days)**		
Number who reported:	**Dummy injection (10,315 people)**	**Vaccine injection (10,357 people)**
Pain at the injection site (some also reported redness and swelling)	1,942 (18.8%)	9,335 (90.1%)
Swollen/sore armpit glands	444 (4.3%)	1,654 (16%)
Fever	38 (0.4%)	1,806 (17.4%)
Headache (a similar number reported other 'flu-like symptoms such as fatigue, aching joints, chills)	2,617 (25.4%)	6,500 (62.8%)
Nausea/Vomiting	754 (7.3%)	2,209 (21.3%)

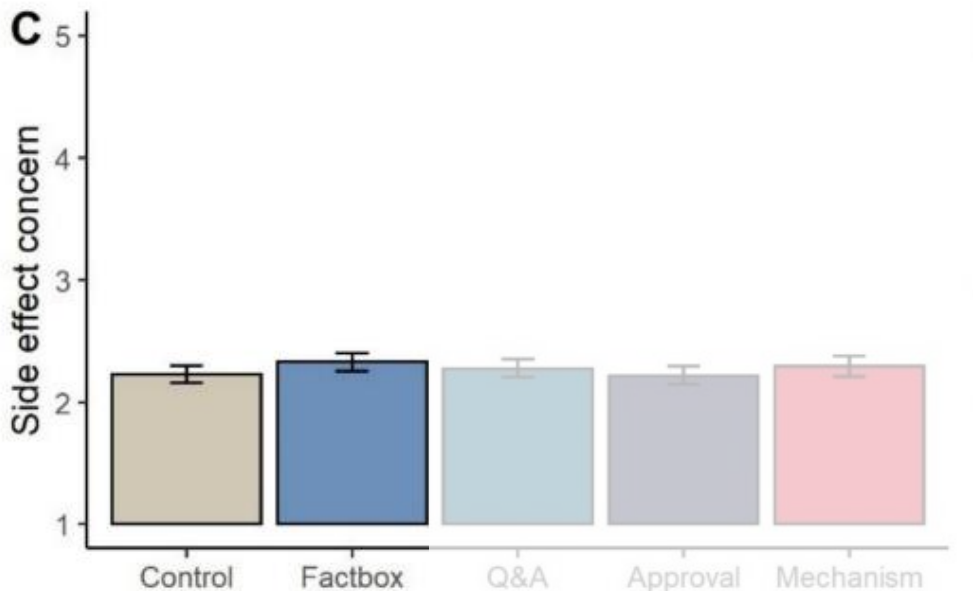


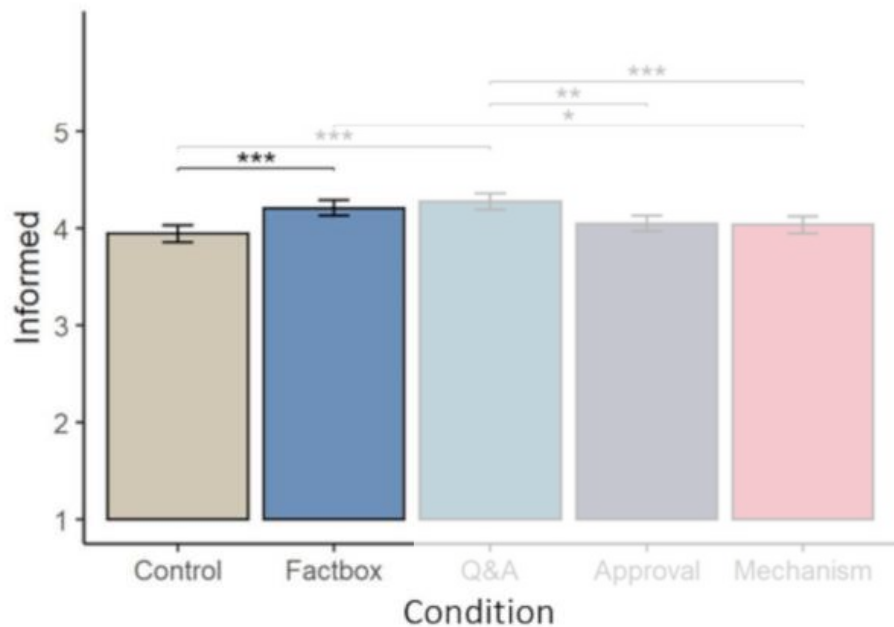




Kerr et al., 2020; *https://doi.org/10.3390/vaccines9040379*







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Comment

SCOTTISH HEALTH ACTION ON ALCOHOL

Consider what information — in what format — would best support your audiences' decisions.

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'PROVE' Framework

• Pre-empt misinformation & misunderstandings	Pre-bunk
• Inform not persuade	Reliably Inform
• Offer balance, not false balance	Offer balance
• State evidence quality	Verify quality
• Disclose uncertainties	Explain uncertainty

Blastland et al., 2020; *https://doi.org/10.1038/d41586-020-03189-1*

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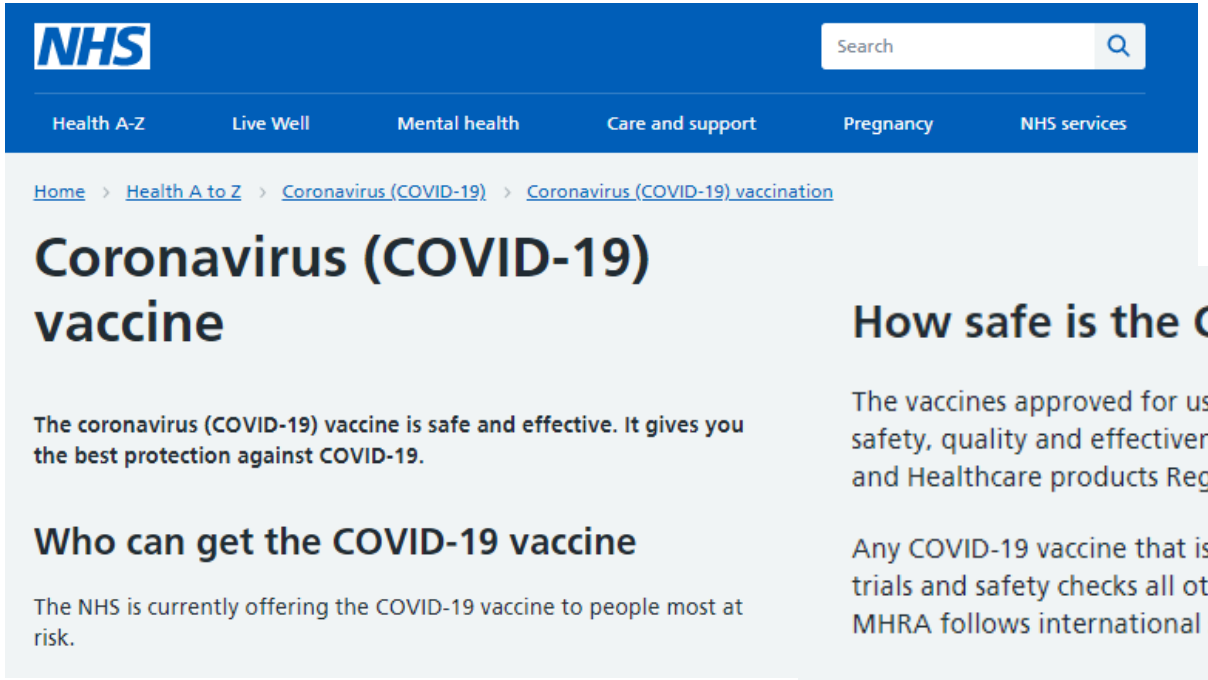
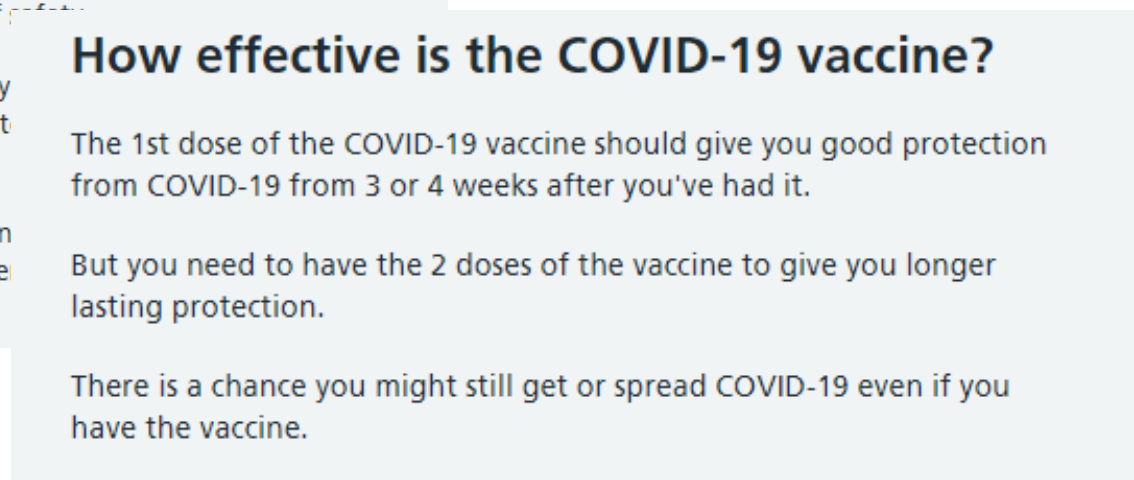
COVID-19 Vaccines – a test case for applying PROVE guidelines





Comparison of COVID-19 information and version adapted using PROVE criteria (see *Nature* article: Five rules for evidence communication)

CURRENT: Coronavirus (COVID-19) vaccine	PROVE: Coronavirus (COVID-19) vaccination: making your decision	PROVE Criteria notes
The coronavirus (COVID-19) vaccine is safe and effective. It gives you the best protection against coronavirus.	**The coronavirus (COVID-19) vaccine is now being offered in the UK. This information is designed to help you make ~~your~~ an informed decision about vaccination. ~~whether to accept the offer or not.~~**	**Inform not persuade**
	All medical treatments have potential benefits and potential side effects. You should weigh these up when making your decision.	
How safe is the COVID-19 vaccine? The vaccines approved for use in the UK have met strict standards of safety, quality and effectiveness set out by the independent Medicines and Healthcare products Regulatory Agency (MHRA). Any coronavirus vaccine that is approved must go through all the clinical trials and safety checks all other licensed medicines go through. The MHRA follows international standards of safety. Other vaccines are being developed. They will only be available on the NHS once they have been thoroughly tested to make sure they are safe and effective. So far, millions of people have been given a COVID-19 vaccine and reports of serious side effects, such as allergic reactions, have been very rare. No long-term complications have been reported.	~~**How safe is the COVID-19 vaccine?**~~ **Rapid approvals process** ~~The vaccines approved for use in the UK have met strict standards of safety, quality and effectiveness set out by the independent Medicines and Healthcare products Regulatory Agency (MHRA).~~ Any coronavirus vaccine that is approved must go through all the clinical trials and safety checks all other licensed medicines go through. However, the medicines regulators have provided 'rolling review' which means that they have been able to assess the data at it has come in and speed up the authorisation application assessment. The MHRA follows international standards of safety. ~~Other vaccines are being developed. They will only be available on the NHS once they have been thoroughly tested to make sure they are safe and effective.~~ So far, millions of people have been given a COVID-19 vaccine and reports of serious side effects, such as allergic reactions, have been very rare. No long-term complications have been reported.	Prebunking "Prebunking requires anticipating potential misunderstandings or disinformation attacks"
How effective is the COVID-19 vaccine? The 1st dose of the COVID-19 vaccine should give you good protection from coronavirus. But you need to have the 2 doses of the vaccine to give you longer lasting protection.	**Potential benefits of the COVID-19 vaccine** The vaccines are designed to protect you against becoming ill with COVID-19. The vaccine available in the UK at the moment has been tested in over 10,500 volunteers aged 18-64 and over 3,500 over 65s, including many ethnicities and people with underlying health conditions. These volunteers were compared with the same number of people who got a	State evidence quality – use numbers "Audiences also judge the credibility of information based on the quality of the underlying evidence, more than its clarity, the usual priority for a communications department."

Dr. S.L. van der... I think this kind of wording ma
Dr. S.L. van der... inform not persuade
Dr. S.L. van der... Formatted
Alexandra Free... I worry about having this as the
Alexandra Free... Since the safety information
Alexandra Free... This is unsubstantiated,
Dr. S.L. van der... or is this simply a factual
Theresa Marteau Formatted
Alexandra Free... This is again written in a
Dr. S.L. van der... I'm not sure, is there
Alexandra Free... This should be under the 'side
Theresa Marteau Terminology: side-effects vs
Dr. S.L. van der... benefits and risk with numerical
John Kerr Punctuation added for
Dr. S.L. van der... Quality of evidence

Current

The COVID-19 vaccine is safe and effective. It gives you the best protection against COVID-19.

PROVE

The COVID-19 vaccine is now being offered in the UK. This information is designed to help you make an informed decision about vaccination.

Current

Most side effects of the COVID-19 vaccine are mild and should not last longer than a week, such as:

- a sore arm where the needle went in,
- feeling tired,
- a headache,
- feeling achy,
- feeling or being sick

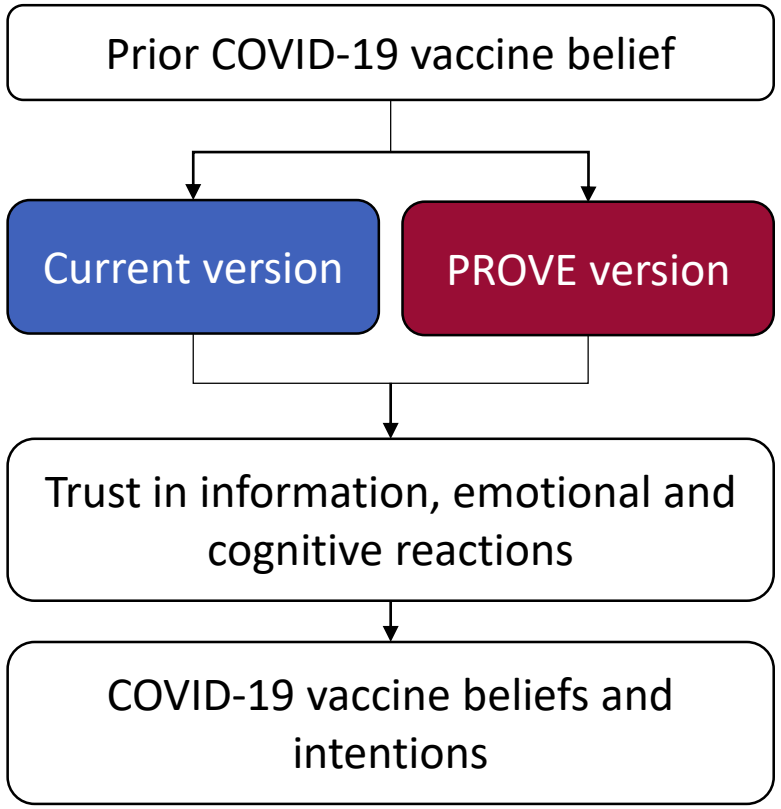
PROVE

Most side effects of the COVID-19 vaccine are mild and should not last longer than a week. In clinical trials, certain side effects were more common for people who received the vaccine compared to those who received a dummy (placebo) injection:

Side effect	**Percent of people reporting side effect in clinical trial**	
	Received a vaccine	**Received a dummy injection**
a sore arm where the needle went in	90%	19%
feeling tired	68%	36%
a headache	63%	36%
feeling achy	60%	20%
feeling or being sick	21%	7%

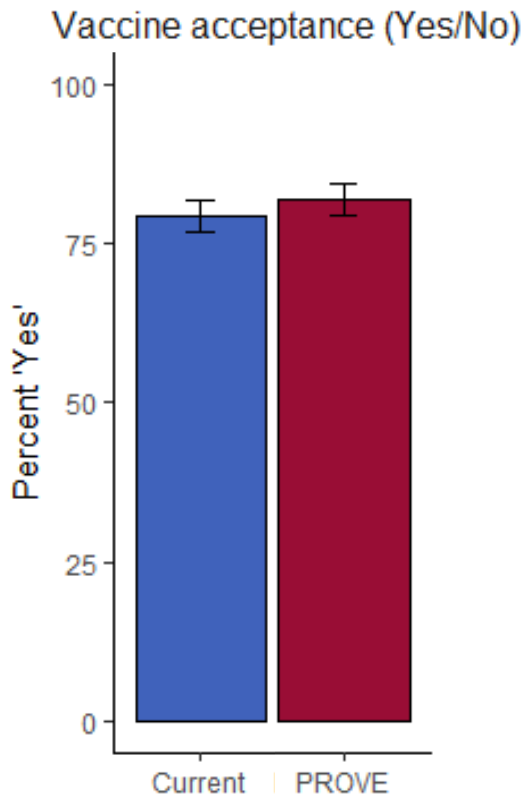
Online experiment

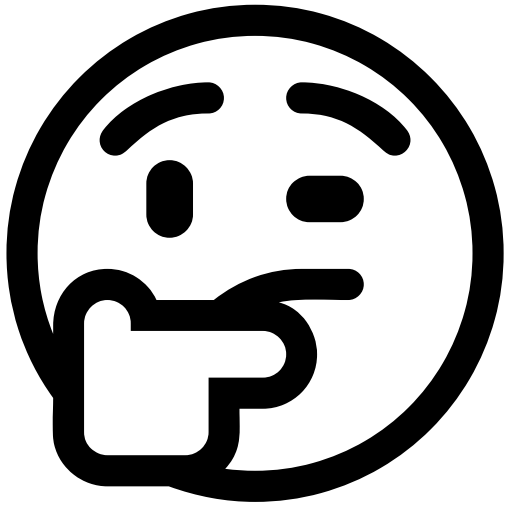
- ~2,000 unvaccinated UK residents aged 18-50 (pre-registered)



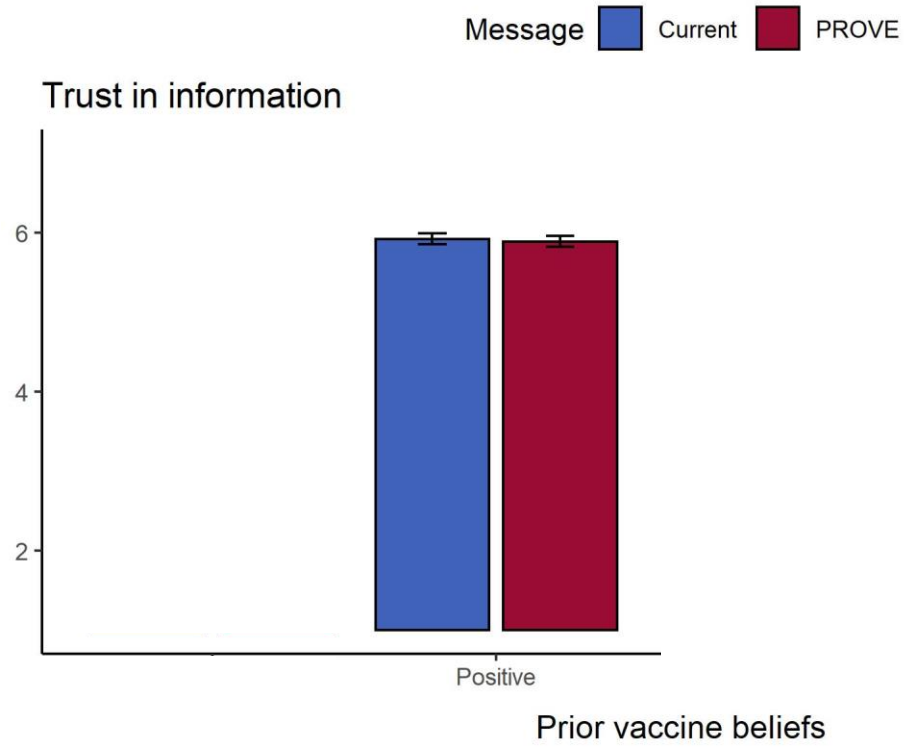
Key results

- No overall effect on vaccine decision (consistent with prior research)



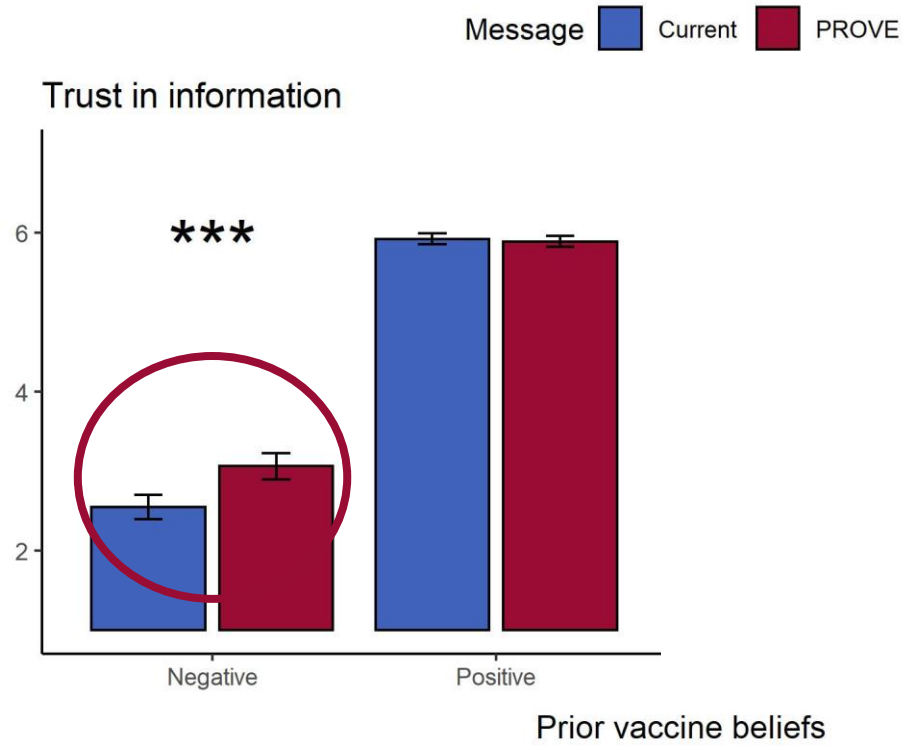


Key results


Message
Current
PROVE
Trust in information
6
4
2
Positive
Prior vaccine beliefs

Key results

- PROVE message (compared to Current) was considered more trustworthy by those with a negative view of COVID-19 vaccines.



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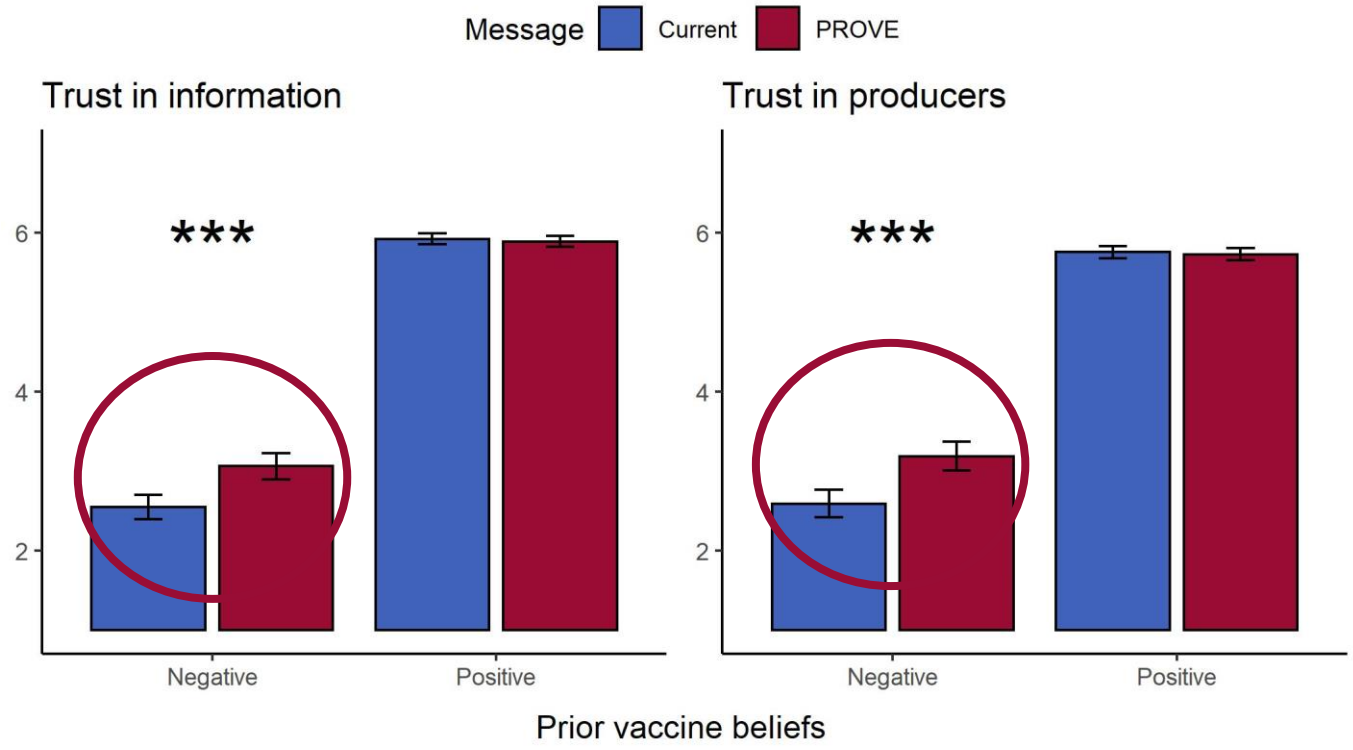

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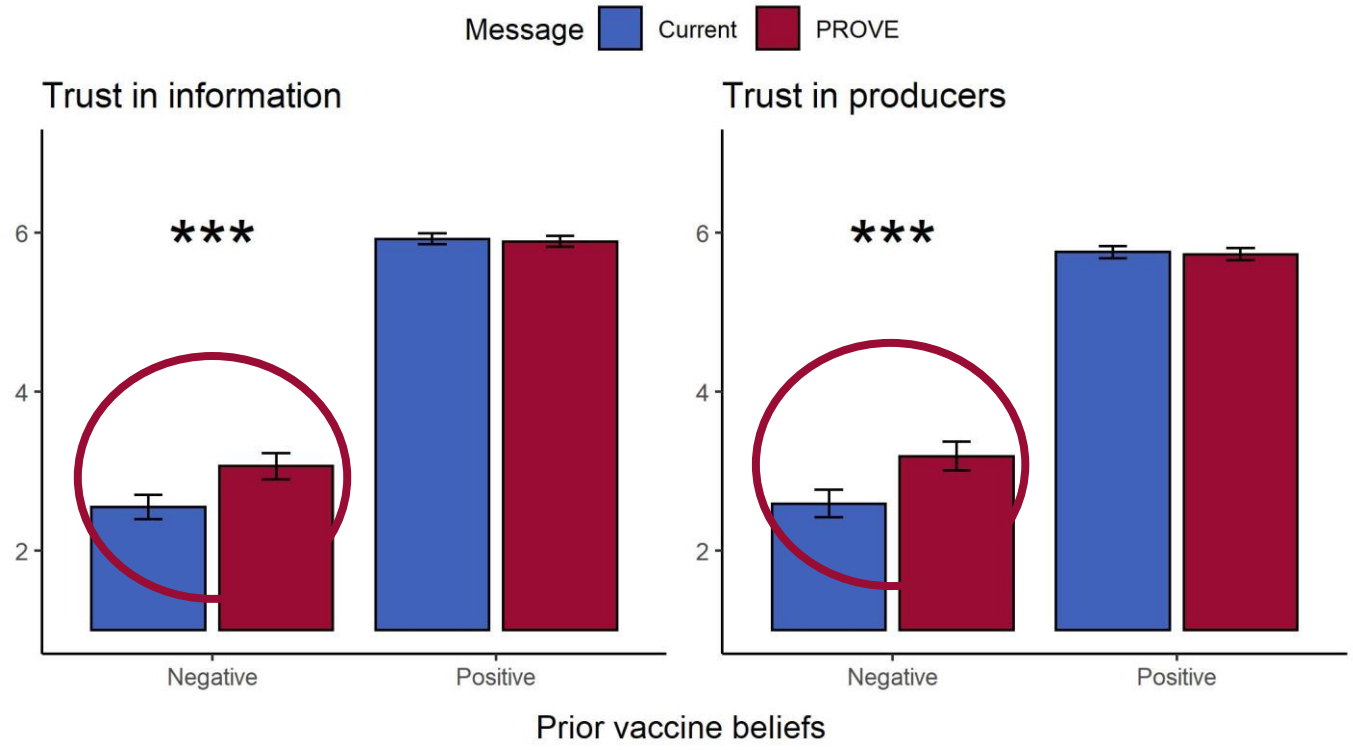
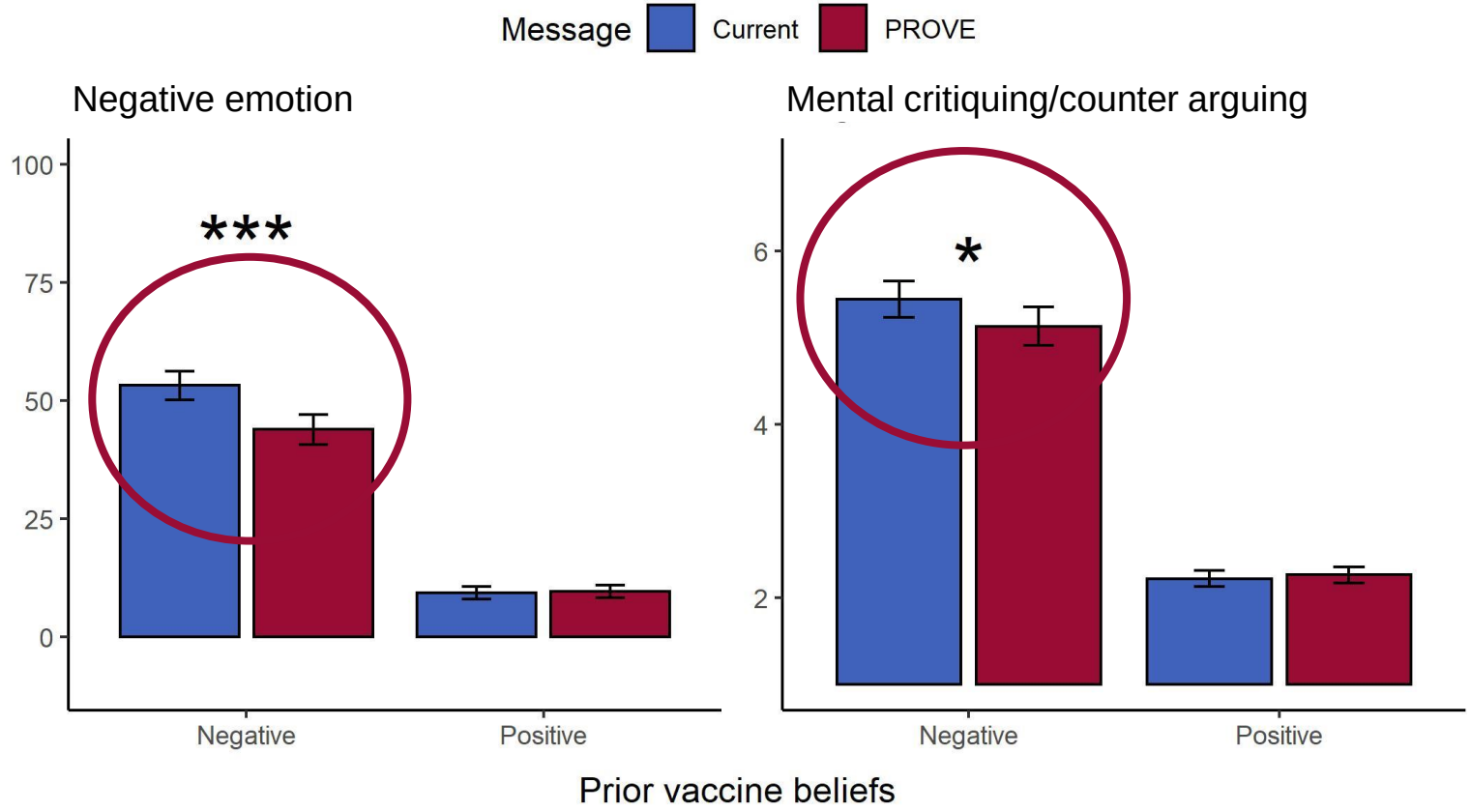


Key results

- PROVE messages elicited less negative cognitive and emotional responses among those with a negative view of COVID-19 vaccines.



Conclusions

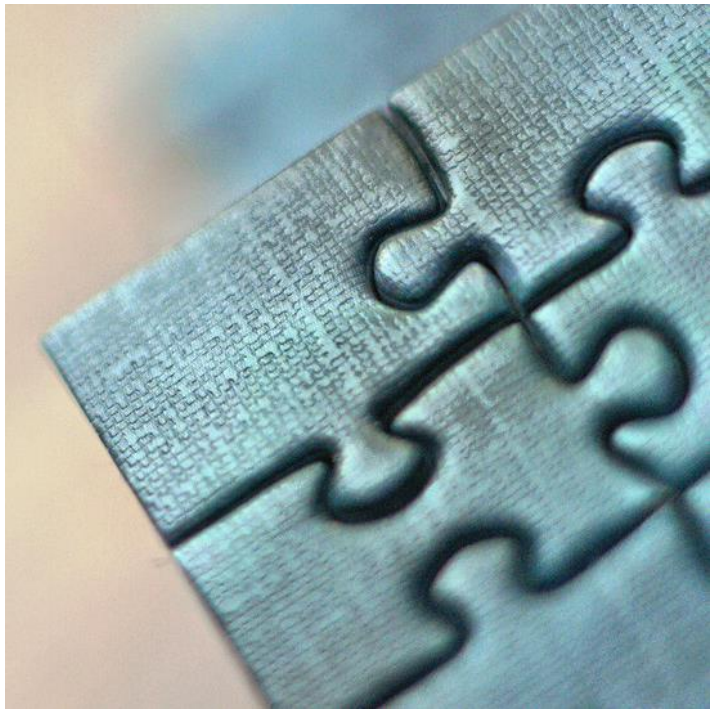
Transparent and balanced communication of COVID-19 vaccine evidence:

- Does not negatively impact vaccine attitudes and intentions.
- Is considered more trustworthy and elicits less negative reactions among those those with negative prior vaccine beliefs.

Future research

Do these findings generalize to other domains?

Which PROVE elements have greatest impact?



Thank you
Merci

jk802@cam.ac.uk

Blastland, M., Freeman, A. L., van der Linden, S., Marteau, T. M., & Spiegelhalter, D. (2020). Five rules for evidence communication. *Nature*, 587, pp. 362-364. https://doi.org/10.1038/d41586-020-03189-1