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Our moral values say a lot about our vaccination status: does moral purity play a role?

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Motivation

- In the absence of vaccines that can prevent infection and that lose their effectiveness over time, addressing vaccine hesitancy and refusal is essential to:
  - Protect Public Health
  - Restore Economic Stability
  - Enhance Community Protection
- Hesitancy is a complex phenomenon; we need to identify its drivers to implement effective vaccination policies:
  - fear of the potential side effects (Machingaidze & Wiysonge, 2021)
  - lack of trust in governments & public health bodies (Lazarus et al, (2021)
  - rapid development of the vaccines (Wouters et al., 2021)
  - Moral values ?

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Why do some people decide to get or or not a vaccine?

- The current study evaluates how preferences for vaccination policies might be shaped by moral intuitions.
- Moral Foundations Theory (MFT) was developed to identify the key dimensions of moral judgement and decision-making (for example, approval or disapproval) to particular interpersonal events (Graham et al., 2009).
    - Five foundations:
        1. **Care/harm**: It underlies virtues of kindness, gentleness, and nurturance.
        2. **Fairness/cheating**: It generates ideas of justice, rights, and autonomy.
        3. **Loyalty/betrayal**: It underlies virtues of patriotism and self-sacrifice for the group.
        4. **Authority/subversion**: It underlies virtues of leadership and followership, including deference to legitimate authority and respect for traditions.
        5. **Sanctity/purity**: It underlies the widespread idea that the body is a temple which can be desecrated by immoral activities and contaminants

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        4. **Authority/subversion**: It underlies virtues of leadership and followership, including deference to legitimate authority and respect for traditions.
        5. **Sanctity(Purity)/degradation**: It underlies the widespread idea that the body is a temple which can be desecrated by immoral activities and contaminants
            - *Vaccines are external substances that contaminate our body*

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Previous literature

- High-hesitancy respondents were over twice as likely to endorse strong purity values (US) (Clifford & Wendell, 2016)
- Medium-hesitancy parents were twice as likely as low-hesitancy parents to highly emphasize purity. High-hesitancy respondents were twice as likely to strongly emphasize purity (US) (Amin et al., 2017)
- A quest for purity can partly explain the falling confidence in vaccines (UK) (Larson, 2018)
- Individuals who place greater value on the sanctity (purity) foundation are more hesitant to use vaccine for their children (Australia) (Rossen et al., 2019)
- Purity/degradation has no or only a minor effect on parents' vaccine hesitancy (Netherlands) (Heine & Wolters, 2021)
- Greater need for sanctity (purity) also displayed greater hesitancy towards vaccines in general (UK) (Schmidtke et al., 2022)

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Is there a link between moral purity and preferences for Covid-19 vaccination programs?

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DCE and moral purity

- **Multi-country Discrete Choice Experiment (DCE)** – to understand public preferences for vaccination programs among the general population across 21 countries

- **Moral Foundation Questionnaire (MFQ30)** – to understand the potential link between moral preferences and preferences for Covid-19 vaccination programs
  - 30 statements covering 5 moral foundations– divided in 2 sections
  - **Purity Foundation** – 6 items divided in two parts
  - 2 attention check items

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Attributes and levels

	Levels				
Attributes	**1**	**2**	**3**	**4**	**5**
Effectiveness in reducing the risk of severe symptoms	 40 out of 100 will be protected	 60 out of 100 will be protected	 70 out of 100 will be protected	 90 out of 100 will be protected	
Risk of severe side-effects after the vaccination	Risk of severe side-effects: 1 out of 100,000	Risk of severe side-effects 5 out of 100,000	 Risk of severe side-effects 12 out of 100,000	 Risk of severe side-effects 20 out of 100,000	
Duration of the protection	 Duration of the protection: 3 months	 Duration of the protection: 6 months	 Duration of the protection: 12 months	 Duration of the protection: 24 months	
Time taken from first vaccine trial to market approval	 Time spent in research and development: 6 months	 Time spent in research and development: 12 months	 Time spent in research and development: 24 months		
Origin of the manufacturer	 China	 European Union	 Russia	 UK	 USA
Social/entertainment activities of leisure	 All social activities allowed	Some social activities allowed	 No social activities allowed		
Vaccination requirement to return to formal or informal work activities	 Return to formal and informal work activities allowed only with the vaccine	 Return to formal and informal work activities allowed without the vaccine			

Design

- D-efficient experimental design (Ngene) with informative priors (Rose, Bliemer, 2013)
  - 36 hypothetical choice tasks
  - 3 block
  - 12 tasks per respondents

- Virtual think-aloud interviews
  - Experts – n =12 (from: NSW governments, Hunter regional Health, CIFAL Newcastle, University of Bologna, Oxford University)
  - Participants recruited via **Facebook** advertisement (n=20 in Australia; n=8 in Italy)

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MFQ30 – Sanctity/Purity Foundation

Part 1 – How much is relevant…?

- DECENCY - Whether or not someone violated standards of purity and decency
- DISGUSTING - Whether or not someone did something disgusting
- GOD - Whether or not someone acted in a way that God would approve of
- MATH - Whether or not someone was good at math

5 points Likert Scale*: not at all relevant , not very relevant, slightly relevant, somewhat relevant, very relevant, extremely relevant*

Part 2 – How much do you agree…?

- HARMLESSDG - People should not do things that are disgusting, even if no one is harmed.
- UNNATURAL - I would call some acts wrong on the grounds that they are unnatural.
- CHASTITY - Chastity is an important and valuable virtue.
- GOOD – It is better to do good than to do bad.

5 points Likert Scale: *strongly disagree, moderately disagree, slightly disagree, slightly agree, moderately agree, strongly agree*

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$$Purity = \frac{Decency + Disgusting + God + HarmlessDG + Unnatural + Chastity}{6}$$

Econometric analysis

- **Hybrid choice model** (Ben-Akiva et al., 2002)
  - Discrete choice component
  - Measurement component
  - Structural equation component

- **WTAR space – we directly estimate the willingness to accept risk**
  - how much risk (the proportion of individuals with risk of serious side effects) individuals would accept for an improvement in attribute *k*

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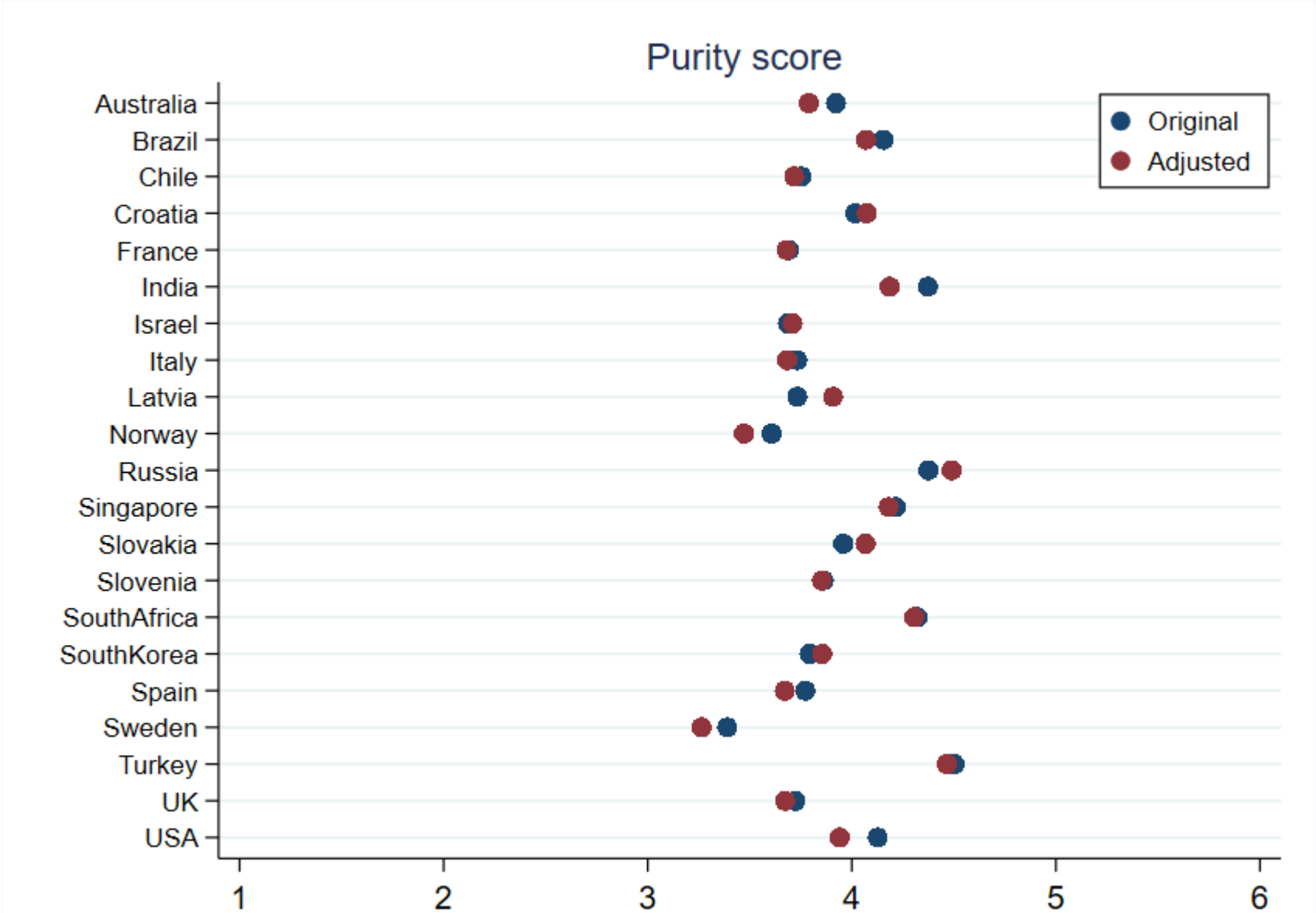
Results

Purity foundation



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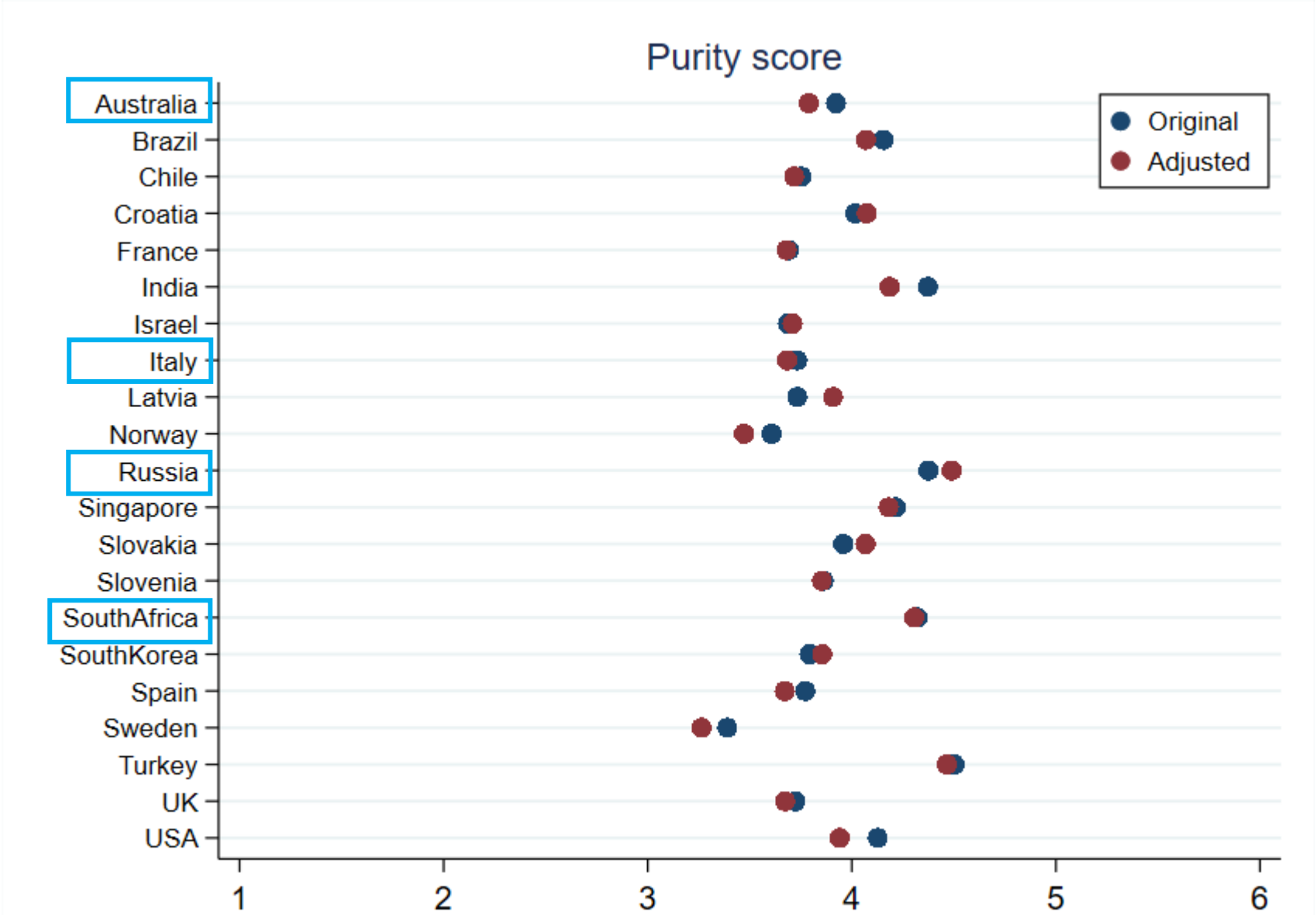
Purity foundation



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Descriptive statistics (%)

Part 1

Country	not all relevant	not very relevant	slightly relevant	somewhat relevant	very relevant	extremely relevant
Whether or not someone violated standards of purity and decency						
Australia	7	7	16	27	27	**17**
Italy	5	6	17	39	23	11
Russia	6	5	11	37	31	11
South Africa	8	8	14	23	27	**19**
Whether or not someone was good at math						
Australia	37	20	11	14	10	8
Italy	36	13	28	15	6	3
Russia	21	11	27	25	12	4
South Africa	31	19	14	15	14	8
Whether or not someone did something disgusting						
Australia	9	10	19	26	21	15
Italy	3	3	9	35	32	**19**
Russia	6	5	12	34	31	12
South Africa	11	13	18	20	22	16
Whether or not someone acted in a way that God would approve of						
Australia	28	16	15	17	13	11
Italy	27	12	24	23	9	5
Russia	12	6	13	32	24	13
South Africa	13	11	14	18	21	24

Part 2

Country	strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree
People should not do things that are disgusting, even if no one is harmed.						
Australia	5	4	9	24	23	34
Italy	2	4	7	16	42	29
Russia	2	2	4	28	10	53
South Africa	5	3	6	15	15	56
It is better to do good than to do bad						
Australia	1	1	4	13	19	60
Italy	0	0	2	8	30	59
Russia	1	1	3	17	9	69
South Africa	1	1	2	6	11	79
I would call some acts wrong on the grounds that they are unnatural						
Australia	6	5	14	29	23	22
Italy	9	16	17	23	24	10
Russia	3	3	13	34	23	24
South Africa	5	5	10	22	25	33
Chastity is an important and valuable virtue						
Australia	15	10	15	27	16	17
Italy	32	24	16	15	10	4
Russia	3	4	10	32	17	34
South Africa	4	4	9	27	23	32

Descriptive statistics (%)

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Country	not all relevant	not very relevant	slightly relevant	somewhat relevant	very relevant	extremely relevant
Whether or not someone violated standards of purity and decency						
Australia	7	7	16	27	27	**17**
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Russia	6	5	11	37	31	11
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Whether or not someone acted in a way that God would approve of						
Australia	28	16	15	17	13	11
Italy	27	12	24	23	9	5
Russia	12	6	13	32	24	13
South Africa	13	11	14	18	21	24

31	7
24	3
41	5
37	4

Part 2

Country	strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree
People should not do things that are disgusting, even if no one is harmed.						
Australia	5	4	9	24	23	34
Italy	2	4	7	16	42	29
Russia	2	2	4	28	10	53
South Africa	5	3	6	15	15	56
It is better to do good than to do bad						
Australia	1	1	4	13	19	60
Italy	0	0	2	8	30	59
Russia	1	1	3	17	9	69
South Africa	1	1	2	6	11	79
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MXL model (WTAR-space, risk of severe side effects)

	Australia		Italy		Russia		South Africa	
Model parameter	Mean Coeff (St.err)	SD Coeff (St.err)	Mean Coeff (St.err)	SD Coeff (St.err)	Mean Coeff (St.err)	SD Coeff (St.err)	Mean Coeff (St.err)	SD Coeff (St.err)
ASC 1	5.21 (0.4) ***	-	-0.69 (0.2) ***	-	-0.41 (-0.2) *	-	1.24 (-0.3) ***	-
Effectiveness 90% (ref: 40%)	**23.23 (1.2) *** **	**28.26 (1.3) *** **	**18.03 (0.7) *** **	**11.06 (0.6) *** **	**14.57 (-0.6) *** **	**14.41 (-0.6) *** **	**21.08 (-0.9) *** **	**21.71 (-0.9) *** **
Duration 24 months (ref: 3 months)	11.58 (0.8) ***	13.96 (0.8) ***	10.09 (0.5) ***	9.32 (0.4) ***	9.31 (-0.5) ***	11.02 (-0.5) ***	7.91 (-0.7) ***	12.21 (-0.7) ***
Market. 24 months (ref: 6 months)	4.48 (0.8) ***	15.41 (0.9) ***	2.28 (0.6) ***	9.43 (0.4) ***	3.46 (-0.6) ***	13.4 (-0.5) ***	5.27 (-0.8) ***	15.1 (-0.8) ***
European Union (ref: China)	18.69 (1.4) ***	23.47 (1.2) ***	16.39 (0.9) ***	15.13 (0.6) ***	-1.13 (-0.7)	20.27 (-0.6) ***	7.49 (-0.9) ***	16.74 (-1) ***
United Kingdom (ref: China)	24.05 (1.5) ***	29.2 (1.2) ***	10.68 (0.7) ***	10.17 (0.6) ***	-7.3 (-0.7) ***	23.24 (-0.7) ***	8.82 (-1) ***	19.95 (-0.9) ***
United States (ref: China)	22.3 (1.5) ***	31.66 (1.4) ***	10.82 (0.7) ***	13.16 (0.7) ***	-6.6 (-0.7) ***	24.61 (-0.7) ***	8.37 (-1) ***	22.37 (-1) ***
Russia (ref: China)	4.63 (1.1) ***	20.22 (1.1) ***	-0.11 (0.7)	8.94 (0.6) ***	13.09 (-0.8) ***	15.38 (-0.6) ***	1.29 (-0.9)	14.93 (-0.8) ***
Full lockdown (ref: None)	-11.92 (1.0) ***	24.74 (0.9) ***	-12.52 (0.6) ***	16.28 (0.4) ***	-6.73 (-0.5) ***	13.56 (-0.4) ***	-11.92 (-0.9) ***	20.63 (-0.7) ***
Mandate (ref: no mandate)	**0.85 (0.7)**	**16.4 (0.6) *** **	**1.79 (0.4) *** **	**7.79 (0.2) *** **	**-1.98 (-0.4)*** **	**11.7(-0.3)*** **	**3.02(-0.7)*** **	**18.27(-0.5)*** **
LL at convergence	-20926.20		-19859.87		-20593.4		-21700.7	
BIC	1.21		1.15		1.19		1.25	
Number of respondents	3004		3001		3010		3002	

HMXL model (WTAR-space, risk of severe side effects) – Australia

Discrete choice component

	Means Coeff. (st.err.)	SD	LV1 (positive attitude to purity)
ASC 1	5.59 (0.4) ***	-	2.57 (0.4) ***
effect 90	**24.74 (1) *** **	25.29***	**-8.39 (0.8) *** **
duration 24	10.59 (0.6) ***	12.6***	-4.35 (0.6) ***
time24	4.91 (0.7) ***	17.56***	-3.81 (0.6) ***
eu	20.71 (1.2) ***	22.91***	-4.95 (0.8) ***
uk	24.43 (1.2) ***	31.34***	-4.84 (0.8) ***
us	23.86 (1.3) ***	32.53***	-3.58 (0.8) ***
russia	6.32 (0.9) ***	21.26***	-1.38 (0.6) **
full restriction	**-11.42 (0.9) *** **	26.62***	**4.31 (0.6) *** **
mandate	0.21 (0.6)	17.57***	0.49 (0.4)

Structural equation component

Variables	LV 1 (positive attitude to purity)
	coef. (st.err.)
Age (>45 years)	<0.01 (0.02)
Male	**0.1 (0.02) *** **
Less than college	-0.04 (0.02) **
Urban area	-0.03 (0.02)
Children (yes)	0.06 (0.02) ***
High income	0.15 (0.02) ***
Death closed Network	0.24 (0.02) ***

Measurement component

Purity Items	LV1 (positive attitude to purity)
	coef. (st.err.)
Decency	0.85 (0.03) ***
Disgusting	0.84 (0.03) ***
God	1.2 (0.04) ***
HarmlessDg	0.77 (0.03) ***
Unnatural	0.9 (0.03) ***
Chastity	1.04 (0.04) ***

Respondent are willing to accept **24.74** out of 100,000 (risk of severe side-effects) for a vaccine that has 90% effectiveness

Those who place a general positive attitude to purity (LV1) are willing to accept …

24.74 – 8.39 = **16.32** out of 100,000 risk of severe side-effects for a vaccine that has 90% effectiveness

Men are more likely to display positive attitudes to purity…

Compared to women, men would accept lower risk of severe side-effects for a vaccine that has 90% effectiveness

HMXL model (WTAR-space, risk of severe side effects) - Italy

Discrete choice component

	Means Coeff. (st.err.)	SD	LV1 (positive attitude to purity)
ASC 1	-0.41 (0.2) **	-	0.27 (0.2)
Effect. 90	**15.47 (0.5) *** **	2.47 ***	**-2.22 (0.4)** ***
Duration 24	9.51 (0.4) ***	7.11 ***	-1.1 (0.3) ***
Market. 24	2.46 (0.5) ***	10.09 ***	0.47 (0.3)
EU	16.43 (0.7) ***	7.36 ***	1.83 (0.4) ***
UK	11.59 (0.6) ***	9.73 ***	0.82 (0.4) *
US	11.13 (0.6) ***	5.86 ***	1.89 (0.4) ***
Russia	1.73 (0.5) ***	3.23 ***	0.96 (0.4) **
Full restrictions	**-11.87 (0.5) *** **	10.08 ***	**2.72 (0.3)** ***
Mandate	1.07 (0.3) ***	16.39 ***	-0.31 (0.2)

Structural equation component

Variables	LV 1 (positive attitude to purity)
	coef. (st.err.)
Age (>45 years)	0.08 (0.02) ***
Male	0.01 (0.02)
Less than college	**0.09 (0.02) *** **
urban area	0.04 (0.02) *
Children (yes)	0.17 (0.02) ***
High income	-0.08 (0.02) ***
Death closed Network	0.03 (0.02)

Measurement component

Purity Items	LV1 (positive attitude to purity)
	coef. (st.err.)
Decency	0.6 (0.03) ***
Disgusting	0.39 (0.03) ***
God	1.29 (0.05) ***
HarmlessDg	0.55 (0.03) ***
Unnatural	0.97 (0.03) ***
Chastity	0.91 (0.03) ***

Respondent should be compensated with **11.87** out of 100,000 reduction in the risk of severe side-effects to accept a new lockdown

Those who place a general positive attitude to purity (LV1) are willing to be compensated …
-11.87 + 2.72 = **-9.15** out of 100,000 risk of severe side-effects to accept a new lockdown

Those with less than college education are more likely to display positive attitudes to purity…
They would be willing to be compensated with lower risk of severe side effects to accept a new lockdown

Summary of main findings

- Findings provide insights to trade-offs general public are willing to make
- Preference heterogeneity in the trade-offs people are willing to make
- Part of the heterogeneity could be explained by people's latent moral purity
- Depending on the country, positive attitude towards purity seem to explain some of the heterogeneity in terms of WTAR (e.g., for the most effective vaccine or the lockdown)
- When designing vaccination and health literacy campaigns governments should be aware of the role of pre-conceived moral attitudes in people's behavioural response

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V. h. e. P.

Next steps

- Remove inattentive respondents and check robustness of the results
- There is all literature about moral purity and vaccine hesitancy
    - From the stated choice data we can identify vaccine hesitancy (dichotomous variable 0/1)
    - Run regressions of vaccine hesitancy on purity score controlling for other characteristics (e.g., sociodemographic) and test the hypothesis that purity leads to hesitancy
- Run the analysis for other countries

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THANK YOU!

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