PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Public Acceptance of COVID-19 Vaccines: Cross-National Evidence on Levels and Individual-Level Predictors Using Observational Data
AUTHORS	Lindholt, Marie Fly; Jørgensen, Frederik; Bor, Alexander; Petersen, Michael

VERSION 1 – REVIEW

REVIEWER	Dyda, Amalie The University of Queensland
REVIEW RETURNED	04-Jan-2021

GENERAL COMMENTS	This is a very interesting study looking at COVDI vaccine willingness across a number of countries. The methods are very strong and well described. My main concerns with this paper are regarding the introduction and discussion, which seem to be missing some of the more nuanced details and implications regarding vaccine acceptance. Please see my specific comments below for your consideration. Please add in a statement about the appropriate ethical committee approval for conducting this study. Abstract: Conclusion: Our results reveals concerning levels of vaccination willingness and suggest that best communication target is the consequences of infections for the self and close others.- I think you need to be careful how this is worded. There are low levels of willingness so it is correct to state that, but talking about communication is more nuanced as providing people with facts doesn't always change their minds and in some instances can enhance anti-vaccination views. Perhaps you could say, the information can help to guide communication strategies…. Strengths and limitations: "An broad-based"- replace an with a. Background Overall, I think some of the discussion about predictors could be cut down/be made more precise. One common issue with studies on vaccine hesitancy is the use of non-standardised or validated surveys. This makes cross comparisons difficult. It would be good to explain why you didn't use a standardised vaccine hesitancy questionnaire, which I think a strong argument could be made for in this case as this is a new vaccine and situation that will have different factors not covered in previously developed questionnaires. Page 4, line 8- "and will help societies world-wide to return to normal". Pleaser remove or reword this. A vaccine may not enable

	a return to normal and this reference doesn't suggest that. It will help us to manage the pandemic but it may not end it. Page 4 Line 45- "The results demonstrate that for most of the countries in our sample, people are only moderately willing to receive a vaccine. Furthermore, vaccine skepticism is pronounced with more than 10 percent in six out of eight countries saying that they will refuse a future COVID-19 vaccine. The analyses of the individual-level predictors demonstrate that this vaccine skepticism is fueled by three factors: (1) lack of trust in the national health authorities, (2) conspiracy-related concerns about the authorities' handling of the pandemic, and (3) a lack of concern about the personal consequences of the corona pandemic. The role of these factors are remarkably constant across" I would move this to the discussion. Page 5 Line 46- "Lower education among parents is significantly associated with vaccine refusal for child vaccine programs,[13] and lower education is also associated with general vaccine hesitancy," I think you need to clarify this, as education and socio-economic status have been found to be associated with vaccine hesitancy in different directions (i.e. sometimes higher income may be associated) and this is generally country/context specific. Page 5 line 49- "Thus, we include sex, age and education as demographic predictors in our model. As a final background predictor, we also include individual differences in political ideology"- some of this reads like methods. Page 8, line 26 "Denmark, Sweden, the United Kingdom, the United States". How did you decide which countries to include? Methods The methods are well written and thorough. Good analytical method to control for country specific effects Discussion Paragraph 1- I think this could be made stronger by highlighting the main findings, instead of making conclusions. Of particular importance is the finding about the importance of egotropic concerns, as this will have impacts on communication for health authorities. Page 17, line 10- "both across countries and within many of the countries in our sample", I think you can only say across countries not within. It doesn't appear to me that you have looked at patterns based on locations within countries. Page 17 line 22- "First, we found that respondents who trust the national health authorities were most willing to receive a COVID19 vaccine compared to respondents who lack trust in the national health authorities. Second, we found that the people who are the most concerned for the consequences of the corona crisis for themselves and their families had high vaccination willingness"- this is repeating results, not discussion. Please add in a paragraph describing the limitations of the study. Overall the discussion is quite shallow in its interpretation and a lot reads like results instead of an interpretation of the findings and comparison to other literature. I think this needs some work, focusing on what the results mean, instead of simply what they are.

REVIEWER	Neumann-Böhme, Sebastian Erasmus Universiteit Rotterdam, Health Economics
REVIEW RETURNED	04-Jan-2021

GENERAL COMMENTS	BMJ The short article provides an interesting overview about the willingness to vaccinate in eight countries. While the results are very interesting and the article is overall well written, it would benefit from some adjustments before publication in the BMJ. Especially the choice of a regression model needs some thought, and the discussion needs to be expanded to discuss the results more in the context of other studies on the same topic and the wider literature on vaccine confidence. Please find my suggestions below: Structure: • Highlight when the study was conducted in the abstract, and early on, the WTV varied over the course of the pandemic (see COSMO or ECOS). • Before you talk about your model to estimate WTV, I would like to know more about the surveys methodology and outcome categories. Potential predictors: 5C / vaccine confidence literature • I would suggest that you look closer into the vaccine confidence literature. The vaccine confidence project (2018) [1] provides a good overview. Betsch et al. provide a good model for vaccine confidence [2]. Trust: • “Government” is in some settings to broad of a definition. In very federalist countries like the US or Germany, a lot of the COVID-19 response was done on a state level. Please check if there are significant differences by region in these settings. Methods: • Make more explicit that you didn’t ask about overall WTV, but framed it in the context of an health authority advising to get vaccinated. Young respondents might have answered differently otherwise. • I would assume that you added category 4&5 together and counted this percentage as WTV, please make this explicit. • Why would you use levels (e.g. WTV or Trust) and then rescale from 0-1, you could have used a scale in the survey. • Why do you use an OLS model when you rescale to a binary outcome? A logit or probit model with odds ratios seems to be a more appropriate choice, you can use the OLS as a sensitivity check. Discussion: • You don’t relate your results to other studies that have investigate a similar question. e.g. the COSMO project in Germany (https://www.psycharchives.org/handle/20.500.12034/2398) or a publication from the ECOS project with similar countries as in the authors study [3]. • Relate your findings to the literature on vaccine confidence outlined above. 1. Larson H, de Figueiredo A, Karafillakis E, Rawal M. State of Vaccine Confidence in the EU 2018. Luxembourg: Publications Office of the European Union. 2018. doi:10.2875/241099 2. Betsch C, Schmid P, Heinemeier D, Korn L, Holtmann C, Böhm R. Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. PLoS ONE. 2018. doi:10.1371/journal.pone.0208601 3. Neumann-Böhme S, Varghese NE, Sabat I, Barros PP, Brouwer W, van Exel J, et al. Once we have it, will we use it? A European

	survey on willingness to be vaccinated against COVID-19. Eur J Heal Econ. 2020. doi:10.1007/s10198-020-01208-6

VERSION 1 – AUTHOR RESPONSE

Reviewer 1

1) *This is a very interesting study looking at COVID vaccine willingness across a number of countries. The methods are very strong and well described. My main concerns with this paper are regarding the introduction and discussion, which seem to be missing some of the more nuanced details and implications regarding vaccine acceptance. Please see my specific comments below for your consideration.*

   Please add in a statement about the appropriate ethical committee approval for conducting this study.

   We thank Reviewer 1 for these encouraging comments. We have included a statement about the ethical guidelines of the Danish National Committee of Health Research Ethics for survey research that do not involve human biological material.

2) *Abstract:*

   Conclusion: Our results reveal concerning levels of vaccination willingness and suggest that the best communication target is the consequences of infections for the self and close others.- I think you need to be careful how this is worded. There are low levels of willingness so it is correct to state that, but talking about communication is more nuanced as providing people with facts doesn't always change their minds and in some instances can enhance anti-vaccination views. Perhaps you could say, the information can help to guide communication strategies….

   We thank the Reviewer for raising this point. We now distinguish between (1) the long-term importance of building trust in health authorities in preparations for health emergencies, and (2) the importance of focusing on personal risk-perceptions and debunking myths in the health communication during the pandemic. Furthermore, we emphasize that this information can help to guide communication strategies.

3) *Strengths and limitations:*

   "An broad-based"- replace an with a.

   We thank the Reviewer for catching this. We have now corrected it.

4) *Background*

   Overall, I think some of the discussion about predictors could be cut down/be made more precise.

Following the suggestion of Reviewer 2, we have addressed this concern by restructuring the discussion of predictors using the framework of the 5C model from Betsch et al. (2018). This restructuring made it possible to increase theoretical precision and reduce the length of this part of the manuscript.

5) *One common issue with studies on vaccine hesitancy is the use of non-standardised or validated surveys. This makes cross comparisons difficult. It would be good to explain why you didn't use a standardised vaccine hesitancy questionnaire, which I think a strong argument could be made for in this case as this is a new vaccine and situation that will have different factors not covered in previously developed questionnaires.*

   In the discussion of the measurement of our outcome, vaccine acceptance, we now specify that we do not use a previously validated measure, which makes it more difficult to compare our results with prior studies of vaccine acceptance. However, this choice reflects that (1) we focus on COVID-19 vaccines specifically, 2) in the context of a global health crisis, where (3) health authorities are emergency approving and very actively encouraging people to take up new vaccines. Some of these important factors are overlooked by previous validated vaccine acceptance measures developed pre-pandemic for measuring attitudes towards vaccines in general (see p. 8).

6) *Page 4, line 8- "and will help societies world-wide to return to normal". Pleaser remove or reword this. A vaccine may not enable a return to normal and this reference doesn't suggest that. It will help us to manage the pandemic but it may not end it.*

   We acknowledge this important point and we adjusted the text accordingly. It now reads that a vaccine is a vital tool in the management of the pandemic, as suggested by the reference.

7) *Page 4 Line 45- "The results demonstrate that for most of the countries in our sample, people are only moderately willing to receive a vaccine. Furthermore, vaccine skepticism is pronounced with more than 10 percent in six out of eight countries saying that they will refuse a future COVID-19 vaccine. The analyses of the individual-level predictors demonstrate that this vaccine skepticism is fueled by three factors: (1) lack of trust in the national health authorities, (2) conspiracy-related concerns about the authorities' handling of the pandemic, and (3) a lack of concern about the personal consequences of the corona pandemic. The role of these factors are remarkably constant across" I would move this to the discussion.*

   Following the suggestion, we have removed this paragraph from the "Background"-section and implemented it in the discussion instead.

8) *Page 5 Line 46- "Lower education among parents is significantly associated with vaccine refusal for child vaccine programs,[13] and lower education is also associated with general vaccine hesitancy," I think you need to clarify this, as education and socio-economic status have been found to be associated with vaccine hesitancy in different directions (i.e. sometimes higher income may be associated) and this is generally country/context specific.*

   This is a good point. We have now emphasized that prior studies focusing on vaccine acceptance and education reveals mixed findings, indicating that the association is context specific. To illustrate this, we include Guay et al. (2019) who find that lower education is associated with general vaccine

hesitancy in Canada, and Wagner et al. (2019) who find that educational level is not associated with general vaccine hesitancy across five low-middle and middle-income countries. Similarly, we include the findings of Bertoncello et al. (2020) who find that while low parent education is significantly associated with general vaccine hesitancy, it is *not* associated with hesitancy in the context of child vaccine programs in Italy. Furthermore, we include findings specifically related to vaccine acceptance of a COVID-19 vaccine. These studies have found that higher education is associated with higher levels of vaccine acceptance (see p. 6).

9) *Page 5 line 49- "Thus, we include sex, age and education as demographic predictors in our model. As a final background predictor, we also include individual differences in political ideology"- some of this reads like methods.*

Thank you. This has been implemented in the "Methods"-section instead.

10) *Page 8, line 26 "Denmark, Sweden, the United Kingdom, the United States". How did you decide which countries to include?*

These countries were chosen to represent a diversity of national responses to the COVID-19 pandemic as well as a diversity in the severity of the local epidemic. We have now clarified this in the manuscript (see p. 7).

11) *Methods*

The methods are well written and thorough. Good analytical method to control for country specific effects

Thank you, we very much appreciate this!

12) *Discussion*

Paragraph 1- I think this could be made stronger by highlighting the main findings, instead of making conclusions. Of particular importance is the finding about the importance of egotropic concerns, as this will have impacts on communication for health authorities.

We have highlighted the main findings, being that a *lack of confidence* and *complacency* are the most important predictors of vaccine skepticism. Furthermore, we now use Betsch et al. (2015) to understand how a *lack of confidenc*e and *complacency* should be addressed to increase vaccine uptake. Following Betsch et al. (2015) complacency should be addressed by motivating the complacent. This can be done through information interventions to explain disease risks and stress the social benefits of vaccination. However, individuals with a lack of confidence usually possess a considerable amount of incorrect knowledge that undermines trust in vaccination. Therefore, debunking myths is key to increase vaccine uptake among those who lack confidence. However, as emphasized by WHO (2017) it is important to build trust prior the onset of crises. Therefore, we distinguish between (1) the long-term importance of building trust in health authorities in

preparations for health emergencies, and (2) the importance of focusing on personal risk-perceptions and debunking myths in the health communication during the pandemic (see p. 14-15).

13) *Page 17, line 10- "both across countries and within many of the countries in our sample", I think you can only say across countries not within. It doesn't appear to me that you have looked at patterns based on locations within countries.*

The reviewer is absolutely correct and we have accordingly removed "within"from the sentence.

14) *Page 17 line 22- "First, we found that respondents who trust the national health authorities were most willing to receive a COVID19 vaccine compared to respondents who lack trust in the national health authorities. Second, we found that the people who are the most concerned for the consequences of the corona crisis for themselves and their families had high vaccination willingness"- this is repeating results, not discussion.*

This is a good point. We have in general sought to streamline the manuscript to remove redundancies of this kind and the specific paragraph has been removed.

15) *Please add in a paragraph describing the limitations of the study.*

We have added a paragraph in the discussion describing the limitations of the study. Specifically, the limitations we address are the following: (1) the results are based on observational data which limits causal traction, (2) we investigate self-reported vaccine acceptance, and thus, not actual vaccination behavior. Since self-reported vaccine acceptance can be subject to social desirability bias, we cannot be sure that acceptance of the vaccine translates into actual vaccination rates (see p. 15)

16) *Overall the discussion is quite shallow in its interpretation and a lot reads like results instead of an interpretation of the findings and comparison to other literature. I think this needs some work, focusing on what the results mean, instead of simply what they are.*

Following the Reviewer's concern, we have rewritten the discussion emphasizing the implications of our findings and compared it to the existing literature and removing repetition regarding the results. We discuss that our findings are consistent with several other studies that found trust in experts and scientists and personal risk perceptions to be important predictors of vaccine acceptance. Thus, our results show that especially *confidence* and *complacency* predictors are important. Following Betsch et al. (2015) the implications of these results is that health communication should focus on debunking myths and informational interventions that explain the disease risks and stress the social benefit of vaccination (see p. 14). Furthermore, an important contribution compared to existing studies is the fact that we compare predictors before and after the vaccines have been approved and rolled out. Even though we find that the levels of vaccine acceptance varied over the course of the pandemic, the individual-level predictors of vaccine acceptance are essentially the same when comparing results before and after vaccination roll-out (see Figure A9 in the OA).

Reviewer 2

The short article provides an interesting overview about the willingness to vaccinate in eight countries. While the results are very interesting and the article is overall well written, it would benefit from some adjustments before publication in the BMJ. Especially the choice of a regression model needs some thought, and the discussion needs to be expanded to discuss the results more in the context of other studies on the same topic and the wider literature on vaccine confidence.

Please find my suggestions below:

1) *Structure:*

Highlight when the study was conducted in the abstract, and early on, the WTV varied over the course of the pandemic (see COSMO or ECOS).

This is a good point. In the original version, we included data from September - November 2020, i.e. before the vaccines were approved and rolled out. However, since then, we have collected more data making it possible to extend the period of analysis. In particular we now observe vaccine acceptance and our predictors until February 16, 2021, allowing us to assess changes in acceptance and predictors as COVID-19 vaccine programs were rolled out. Even though the levels of vaccine acceptance changed over the course of the pandemic, we show that the results before and after COVID-19 vaccines were approved are essentially identical (please see Figure A9 in the appendix). We now emphasize the context of the study in the abstract and the Background section).

2) *Before you talk about your model to estimate WTV, I would like to know more about the surveys methodology and outcome categories.*

In the original version of the manuscript, we mentioned our model already in the discussion of predictors. This has now been changed such that we don't mention our statistical models, before the survey methodology and measurement of our outcome and predictors have been described. Thus, in the methods section of the revised manuscript, we first discuss our data, including data collection and survey methodology. Second, in a designated measurement subsection, we discuss the specific operationalizations of our outcome and predictors, respectively. Third and finally, we present the statistical models that we use for analyses (see p. 7-10).

3) *Potential predictors: 5C / vaccine confidence literature:*

I would suggest that you look closer into the vaccine confidence literature. The vaccine confidence project (2018) [1] provides a good overview. Betsch et al. provide a good model for vaccine confidence [2].

We thank the Reviewer for this very helpful and important comment, which has had major consequences for the structure of the manuscript. Specifically, we have implemented Betsch et al. (2018) as a framework for the manuscript and, hence, our derived predictions follow this model, it

is used to structure the Results section and we reflect upon the findings in light of this model in the Discussion.

4) *Trust:*
"Government" is in some settings to broad of a definition. In very federalist countries like the US or Germany, a lot of the COVID-19 response was done on a state level. Please check if there are significant differences by region in these settings.

This is a good point. For the federalist countries in our sample (the US and Germany), we conduct robustness analyses where we shift from country to region dummies, implying that we control away region specific heterogeneity in the outcome. These analyses show that the main results replicate, i.e., that the correlations on the individual-level factors do not fundamentally change. Moreover, we see that there is relatively little geographic heterogeneity in vaccine acceptance, i.e., the differences between the region dummies are most statistically insignificant. Note that while our data is reflective of the national populations, the data is relatively thin when dummying out e.g., American States. This means that conclusions about state heterogeneity should be taken with caution.

5) *Methods:*

Make more explicit that you didn't ask about overall WTV, but framed it in the context of an health authority advising to get vaccinated. Young respondents might have answered differently otherwise.

Thank you. We have now made it explicit that our measure of Vaccine Acceptance is not a general measure because it is framed in the context of the health authorities advising to get vaccinated. We agree that this may increase Vaccine Acceptance but, at the same time, we believe that this way of asking is indeed ecologically valid and reflects how individuals in most Western democracies will receive the offer to get vaccinated. In the discussion of the measurement of our outcome, vaccine acceptance, we now specify that our choice reflects that (1) we focus on COVID-19 vaccines specifically, 2) in the context of a global health crisis, where (3) health authorities are emergency approving and very actively encouraging people to take up new vaccines. Some of these important factors are overlooked by previous validated vaccine acceptance measures developed pre-pandemic for measuring attitudes towards vaccines in general (see p. 8).

6) *I would assume that you added category 4&5 together and counted this percentage as WTV, please make this explicit.*

We have now made it explicit that we added category 4 & 5 for the descriptive analyses, and refer to this as the percentage who accept the vaccines. However, we kept our outcome, vaccine acceptance, as a continuous variable in the statistical models, and report logit models with a dichotomous outcome measure in the OA. This has now been emphasized in the manuscript (see point 8 below for further explanation).

7) *Why would you use levels (e.g. WTV or Trust) and then rescale from 0-1, you could have used a scale in the survey.*

We apologize for this confusion and now make it clear in the manuscript that both our outcome (vaccine acceptance) and all predictors (except demographics) are continuous variables. We also make it clear that we simply rescale the variables to range from 0-1 in order to ease interpretation. To be sure, the variables are not dichotomous measures, but we acknowledge that this was not clear in the previous version.

8) Why do you use an OLS model when you rescale to a binary outcome?

A logit or probit model with odds ratios seems to be a more appropriate choice, you can use the OLS as a sensitivity check.

Again, we apologize that it was not clear from the initial manuscript that our outcome is not a binary variable but rather a continuous variable and treated as such. We now hope that it is clear, that vaccine acceptance is a continuous variable, simply rescaled from 1-5 to 0-1. This is why OLS, and not a logit model, has been used. However, we acknowledge that one could have argued for dichotomizing the outcome. Therefore, as a robustness test, we recode the outcome into a binary indicator with the categories 4 & 5 taking the value 1 (indicating vaccine acceptance) and the remaining categories taking the value 0. We replicate the main results using this outcome - rather than the continuous one - modeled using logistic regression. All results are similar to those of the main text (please see Figure A8 in the appendix).

9) Discussion:

You don't relate your results to other studies that have investigate a similar question. e.g. the COSMO project in Germany (https://www.psycharchives.org/handle/20.500.12034/2398) or a publication from the ECOS project with similar countries as in the authors study [3]. Relate your findings to the literature on vaccine confidence outlined above.

1. Larson H, de Figueiredo A, Karafillakis E, Rawal M. State of Vaccine Confidence in the EU 2018. Luxembourg: Publications Office of the European Union. 2018. doi:10.2875/241099

2. Betsch C, Schmid P, Heinemeier D, Korn L, Holtmann C, Böhm R. Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. PLoS ONE. 2018. doi:10.1371/journal.pone.0208601

3. Neumann-Böhme S, Varghese NE, Sabat I, Barros PP, Brouwer W, van Exel J, et al. Once we have it, will we use it? A European survey on willingness to be vaccinated against COVID-19. Eur J Heal Econ. 2020. doi:10.1007/s10198-020-01208-6

Thank you for these very useful suggestions. We have now related our findings to other studies investigating a similar question, and used the framework of Betsch et al. to interpret the implications of our findings and how this can be used to guide health communication.

VERSION 2 – REVIEW

REVIEWER	Dyda, Amalie

	The University of Queensland
REVIEW RETURNED	09-Apr-2021

GENERAL COMMENTS	The authors have done a very good job of responding to previous reviewer comments. A few small suggested changes below for your consideration. Abstract- please add self-reported to outcome measure Introduction, table 1- Demographics seem to be described in the complacency section of table 1, move these to a section on their own or explain why these are related to complacency Vaccine acceptance- "This choice reflects that (1) we focus on COVID-19 vaccines specifically, (2) in the context of a global health crisis". I'm not sure what you mean by (2) in this context. This section could be better worded. Could say something like we asked about vaccine acceptance in the following way '…' which reflects… Statistical analysis- "control away" reword to "control for". Results: "The results indicate that vaccine skepticism is present in most of the countries in our sample. These results underscore two important points. First, the presence of vaccine skepticism demonstrates the importance of understanding the individual-level variation of vaccine acceptance in order to understand the targets of health communication. Second, the large variation across countries emphasizes the need of a more thorough understanding of the importance of national context. In the Discussion section, we therefore move beyond the individual-level focus to also exploring macro-level correlations of vaccine acceptance" this reads like discussion not results Discussion: "As a final explorative analysis, we therefore assess whether the highlighted factors also help explain the cross-national variation in vaccine acceptance…" I think this should be in results Limitations: could add in a reference to previous study comparing self-report to actual vaccine rates.

REVIEWER	Neumann-Böhme, Sebastian Erasmus Universiteit Rotterdam, Health Economics
REVIEW RETURNED	18-Mar-2021

GENERAL COMMENTS	Congratulations to this much improved version of the manuscript. It really benefitted from the work and effort you put into the revision.

VERSION 2 – AUTHOR RESPONSE

Reviewer: 1

Dr. Amalie Dyda, The University of Queensland Comments to the Author:

2) The authors have done a very good job of responding to previous reviewer comments. A few small suggested changes below for your consideration.

Thank you. We really appreciate this comment from the reviewer.

Abstract

3) Please add self-reported to outcome measure

We have added “self-reported” to the description of our outcome measure in the abstract.

Introduction

4) Table 1- Demographics seem to be described in the complacency section of table 1, move these to a section on their own or explain why these are related to complacency

In the discussion of potential predictors, we explain why the demographic variables are related to complacency (see p. 5-6). We have now added a footnote to complacency in table 1, to emphasize that this relationship is discussed in the text.

Vaccine acceptance

5) “This choice reflects that (1) we focus on COVID-19 vaccines specifically, (2) in the context of a global health crisis”. I’m not sure what you mean by (2) in this context. This section could be better worded. Could say something like we asked about vaccine acceptance in the following way ‘…’ which reflects…

Thank you. We agree that this section could be better worded. We have now included the question wording of our outcome measure, vaccine acceptance, in the beginning of this section. After that, we emphasize that this measure is framed as an approved vaccine that is recommended by the national health authorities. Finally, we argue that this choice of our outcome measure reflects that (1) we focus on COVID-19 vaccines specifically, (2) during a global health crisis, where health authorities are emergency approving and very actively encouraging people to take up new vaccines.

Statistical analysis

6) “control away” reword to “control for”.

This has been changed to “control for” instead of “control away”.

Results:

7) “The results indicate that vaccine skepticism is present in most of the countries in our sample. These results underscore two important points. First, the presence of vaccine skepticism demonstrates the importance of understanding the individual-level variation of vaccine acceptance in order to understand the targets of health communication. Second, the large variation across countries emphasizes the need of a more thorough understanding of the importance of national context. In the Discussion section, we therefore move beyond the individual-level focus to also exploring macro-level correlations of vaccine acceptance” this reads like discussion not results

Thank you for the suggestions. However, we have decided to keep this paragraph in the results section to improve the readability of the manuscript. The paragraph summarizes the

main findings of Figure 1 and uses this to motivate the rest of the analyses in the results section (see point 8 regarding the Discussion section; this has been moved to the results section instead as suggested by reviewer 1). We will therefore prefer the current placement of the paragraph. However, if the Editor insists we will move this paragraph to the Discussion section instead as suggested.

Discussion:

8) "As a final explorative analysis, we therefore assess whether the highlighted factors also help explain the cross-national variation in vaccine acceptance…" I think this should be in results

We have now moved this to the results section.

Limitations:

9) Could add in a reference to previous study comparing self-report to actual vaccine rates.

We have now added some references comparing self-reported vaccine acceptance and actual vaccine rates. These studies find a high level of consistency between self-reported vaccine acceptance and actual vaccination rates.

Reviewer: 2

Dr. Sebastian Neumann-Böhme, Erasmus Universiteit Rotterdam Comments to the Author:

1) Congratulations to this much improved version of the manuscript. It really benefitted from the work and effort you put into the revision.

Thank you. We really appreciate these encouraging comments from the reviewer.