




## Correspondence

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# Looking inside the 'black box' of vaccine hesitancy: unlocking the effect of psychological attitudes and beliefs on COVID-19 vaccine acceptance and implications for public health communication

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Dear Editor,

In a recent article published in *Psychological Medicine*, Salali and Uysal (2020) showed concerning levels of vaccine hesitancy in two samples from the UK and Turkey. Additionally, they identified that beliefs regarding severe acute respiratory syndrome-coronavirus-2 origin (i.e. natural *v.* artificial) are potential determinants of vaccine acceptance. Identifying psychological predictors of vaccine acceptance and hesitancy is fundamental in the current situation, as the effort to immunize a large part of the population could indeed be hampered by groups of citizens refusing or delaying the vaccination. Thus, identifying the psychological roots of vaccine hesitancy in this specific context is an essential precondition to reach and maintain high vaccination rates, as well as to sketch out educational campaigns to boost acceptance. Between 27 November and 3 December 2020, we asked a nation-wide sample of 1005 people, representative of the Italian adult population, to fill an online survey. The survey included a statement regarding the willingness to vaccinate against coronavirus disease 2019 (COVID-19), in which participants were asked to rate between 1 (not likely at all) and 5 (absolutely likely). The survey also included the 5C questionnaire: the scale, developed by Betsch et al. (2018), measures five possible psychological antecedents of vaccine acceptance, namely, confidence (trust in vaccines' safety and effectiveness), complacency (feeling that vaccines are not actually necessary), constraints (perceived barriers to vaccination), calculation (pros and cons balance), and collective responsibility (the sense of the social utility of the vaccine).

In our sample, 58% of the interviewed people stated that it is very or absolutely likely that they are going to vaccinate against COVID-19 as soon as the vaccine is available to them; an additional 26.1% was hesitant, stating that it was neither likely nor unlikely; finally, the remaining 15.9% find unlikely or not likely at all to get vaccinated, which is in line with data from other European countries (Feleszko, Lewulis, Czarnecki, & Waszkiewicz, 2020).

We then ran a multiple linear regression model (with the stepwise method) to assess which of these psychological antecedents are more important in determining the acceptance of the anti-COVID-19 vaccine. Table 1 shows the results of the regression model: indeed, the model shows that only three antecedents are statistically significant, namely, confidence, collective responsibility and, even though only with a marginal importance, calculation. Nevertheless, these variables account for a very good explanation of the variance ( $R^2 = 0.540$ ).

Considering the psychological profiles – in terms of attitudes and beliefs – behind vaccine hesitancy, we reported that having confidence in the safety of vaccines was associated with a significantly increased intention of accepting the vaccine. This is in line with other studies demonstrating that confidence is a major determinant of vaccine uptake (Larson et al., 2018), indicating a need for educational and communication strategies aimed at increasing trust among people with greater levels of vaccine skepticism and coherent with the literature suggesting that a lack of individuals' trust in the effectiveness and safety of vaccines is partly affected by circulating conspiracy theories about the COVID-19 vaccination (Freeman et al., 2020; Salali & Uysal, 2020).

Moreover, our results showed that a lower sense of collective responsibility is associated with a lower intention to get vaccinated against COVID-19. This result is in line with other studies confirming the role of this psychological factor (Parker, Vardavas, Marcum, & Gidengil, 2013; Shim, Chapman, Townsend, & Galvani, 2012). Therefore, promoting altruistic vaccination can be an effective strategy to promote optimal vaccination rates. Given their lack of altruism, messages tailored to vaccine-hesitant or -resistant individuals with this psychological characteristic could emphasize the personal benefits of vaccination against COVID-19 and the benefits to those with whom they most closely identify. Thus, future

**Table 1.** Regression coefficients

Variable name	B (95% confidence interval)	Std B	p value	VIF <sup>a</sup>
<i>Variables included in the model</i>				
Confidence	0.41 (0.37–0.45)	0.49	<0.001	1.49
Collective responsibility	0.28 (0.24–0.33)	0.32	<0.001	1.48
Calculation	−0.09 (−0.12 to −0.05)	−0.09	<0.001	1.02
<i>Variables excluded from the model</i>				
Complacency	−0.01	–	0.594	1.49
Constrains	−0.03	–	0.376	1.76

<sup>a</sup>Variance Inflation Factor.

communication initiatives from public health institutions should highlight the altruistic aspect (herd immunity) of the immunization practice as well as present evidence on the high effectiveness of the vaccination in reducing the risk at both the individual and collective levels of getting infected with COVID-19. If vaccination is viewed as a social responsibility, as well as an act for guaranteeing common goods, then it can be a driver in improving vaccine acceptance. If people in a community consider it a social norm and it becomes a distinctive value to gain social appreciation, then the vaccination rate may improve (Goldstein et al., 2015; Salmon, Dudley, Glanz, & Omer, 2015).

Overall, our results suggest that it is critically important to consider specific psychological determinants, and in particular individuals' unique beliefs and attitudes related to the vaccine – in understanding individuals' motivations behind their hesitancy. Understanding these underlying psychological roots may offer evidence-based strategies to promote more effective health communication campaigns to support people's decisions to engage in such health behaviors. Furthermore, dedicated psychological measurements related to the specific COVID-19 vaccine of interest will ultimately provide greater guidance to health care providers and public health agencies seeking to promote and strengthen vaccine uptake through effective education and communication initiatives. If such campaigns are to be core components of efforts to improve perceptions of the value of COVID-19 vaccination, it is essential that immunization advocates and programs: (1) avoid 'top-down' approaches and privilege efforts to address psycho-attitudinal barriers toward vaccination and make clear which groups and specific populations will be the focus; (2) articulate messages/contents targeting cluster-specific underlying attitudes and beliefs behind vaccine hesitancy; and (3) ground communication and education strategies in health communication considerations and insights that start from the deep understanding of the psychological experience of citizens toward vaccination.

**Author contributions.** All authors equally contributed to conceptualization and methodology; L.P. was in charge of data curation and formal analysis; L.P. and S.B. equally contributed to original draft preparation and editing; project supervision, administration, and funding acquisition were under the care of G.G.; all authors have read and agreed to the published version of the manuscript.

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**Conflict of interest.** None.

**Ethical standards.** The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

## References

- Betsch, C., Schmid, P., Heinemeier, D., Korn, L., Holtmann, C., & Böhm, R. (2018). Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. *PLoS One*, *13*(12), e0208601. doi: 10.1371/journal.pone.0208601.
- Feleszko, W., Lewulis, P., Czarnecki, A., & Waszkiewicz, P. (2020). Flattening the curve of COVID-19 vaccine rejection—A global overview. *SSRN Electronic Journal*. doi: 10.2139/ssrn.3631972.
- Freeman, D., Waite, F., Rosebrock, L., Petit, A., Causier, C., East, A., ... Lambe, S. (2020). Coronavirus conspiracy beliefs, mistrust, and compliance with government guidelines in England. *Psychological Medicine*, *1*–13. doi: 10.1017/S0033291720001890.
- Goldstein, S., MacDonald, N. E., Guirguis, S., Eskola, J., Liang, X., Chaudhuri, M., ... Schuster, M. (2015). Health communication and vaccine hesitancy. *Vaccine*, *33*(34), 4212–4214. doi: 10.1016/j.vaccine.2015.04.042.
- Larson, H. J., Clarke, R. M., Jarrett, C., Eckersberger, E., Levine, Z., Schulz, W. S., ... Paterson, P. (2018). Measuring trust in vaccination: A systematic review. *Human vaccines and immunotherapeutics*, *14*(7), 1599–1609. doi: 10.1080/21645515.2018.1459252.
- Parker, A. M., Vardavas, R., Marcum, C. S., & Gidengil, C. A. (2013). Conscious consideration of herd immunity in influenza vaccination decisions. *American Journal of Preventive Medicine*, *45*(1), 118–121. doi: 10.1016/j.amepre.2013.02.016.
- Salali, G. D., & Uysal, M. S. (2020). COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel coronavirus in the UK and Turkey. *Psychological Medicine*, *1*–3. doi: 10.1017/S0033291720004067.
- Salmon, D. A., Dudley, M. Z., Glanz, J. M., & Omer, S. B. (2015). Vaccine hesitancy: Causes, consequences, and a call to action. *Vaccine*, *33*, D66–D71. doi: 10.1016/j.vaccine.2015.09.035.
- Shim, E., Chapman, G. B., Townsend, J. P., & Galvani, A. P. (2012). The influence of altruism on influenza vaccination decisions. *Journal of the Royal Society Interface*, *9*(74), 2234–2243. doi: 10.1098/rsif.2012.0115.