

## DOES VACCINE SCARCITY INFLUENCE THE EFFECT OF CONSPIRACY BELIEFS ON INTENTION TO VACCINATE AGAINST COVID-19?

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### Abstract

Vaccination against Covid-19, a major public health issue, comes up against many fears that fuel strong vaccine hesitancy, when it is not rejected. The main explanation that is used to explain it is the adherence to conspiracy theories (ACT) (Keeley, 1999). However, the literature provides contradictory results about the ACT effects on compliance with health recommendations (e.g., Allington et al., 2020; D iaz and Cova, 2020; Imhoff & Lamberty, 2020). Furthermore, psychological reactance (PR) (Brehm, 1966) moderates the relationship between ACT and vaccine intentions (Bordarie & Plichon, 2021). In other words, the more individuals adhere to conspiracy theories, the less they have the intention to get vaccinated; and this effect is even stronger when they also are reactant, i.e., they feel their freedom of choice threatened. This study tries to supply a more global model by integrating the perceived scarcity of vaccines as a moderator of the relationship between PR and/or ACT and vaccine intentions.

The sample consisted of 715 participants (59.6% female and 40.4% male) with a mean age of 45.17 years (SD = 18.7). The questionnaire included 3 standardised scales, measuring respectively PR (14 items), ACT (5 items), perceived scarcity (4 items) and 2 items measuring vaccine intention.

The results confirmed the tools internal consistency. Linear regression analyses confirmed the role of both PR and ACT on vaccine intention. The scarcity does not influence the relationship between PR and intentions, neither the one between ACT and intentions. However, scarcity moderates the link between PR and ACT ( $p=.02$ ) confirming the highly complex relationship that individuals can have with conspiracy beliefs.

The intention to get vaccinated against Covid-19 is under influence of both PR and ACT and we also know that PR moderates the relationship between ACT and intention. The moderating effect of scarcity between PR and ACT testify that the ACT depends on other external variables and could be the consequence of the context, more than a disposition to ACT. Thus, in general we can say that the more reactant people are, the more they adhere to conspiracy theories; but this positive effect is less important when people perceived a higher vaccine scarcity. These results open perspectives for vaccinal strategies and information or awareness campaigns in order to convince the most hesitant participants.

**Keywords:** Covid-19, psychological reactance, conspiracy theories adherence, vaccine hesitancy, vaccine scarcity.

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### 1. Introduction

While the vaccination campaign had just begun, at the end of December 2020, France was the country in the world with the most vaccine resistant. Only 40% of French people were ready to be vaccinated (Ipsos, 2020). From the fear of side effects to the antivax posture, the explanations of the rejection of vaccination have been studied by many researchers. One of the main explanations that is used to explain it is the adherence to conspiracy theories (ACT) (Keeley, 1999). Conspiracy theories are an explanation of a historical event (or events) based on the significant causal role of a relatively small group of individuals - the conspirators - acting in secret' (Keeley, 1999). They are more generally defined as 'an effort to explain an event or practice by referring to the machinations of powerful people, who attempt to conceal their role' (Sunstein & Vermeule, 2009, p. 205). The difficulty in explaining certain events leads to the credibility of conspiracy theories in the sense, we might say, that thought abhors a vacuum. Faced with the uncertainty and incomprehension generated by the crisis and/or certain decisions, conspiracy theories allow us to fill in the blanks and the gaps, especially in terms of evidence regarding its origin (Craft et al., 2017; Sunstein, 2014). By providing a causal explanation for the origins and making sense of the decisions and choices made in the face of the crisis, these theories also make it possible to identify

those responsible (Van Prooijen, 2017) and to fulfil several functions, such as regaining a form of control through explanation in the face of the feeling of powerlessness generated by uncertainty and incomprehension, or contesting a dominant political discourse (Valsecchi, 2021). The question of challenging the dominant discourse is found in the effects of adherence to conspiracy theories (ACT), which we see generally leads to less compliance with health recommendations. This is the case in general in health behaviours with a questioning of vaccination in general (Quinn et al., 2017) or of vaccination intentions (Jolley & Douglas, 2014). The Covid-19 crisis also confirms this trend (e.g., Allington et al., 2020), or sometimes leads to a simple lack of correlation between adherence to conspiracy theories and adherence to preventive measures (e.g., Díaz & Cova, 2020). However, some studies sometimes seem to contradict these results and results reveal a better compliance with government decisions (Imhoff & Lamberty, 2020), leading us to question the reasons for such variations.

Some authors then look for explanations in the very dispositions of individuals, notably through the study of certain temperamental traits, such as Bordarie and Plichon (2021, 2022) who study the role of psychological reactance (PR) (Brehm, 1966) in vaccination intentions against Covid-19. PR is then described as the tendency of individuals to react when they feel their freedom of choice threatened by a situation or a person. While PR is usually associated with a transient, situation-related state, Hong and Page (1989) have successfully demonstrated that it can also be a temperamental trait. Like ACT, PR-trait has negative consequences when looking at health behaviours (Miller & Quick, 2010), adherence to prescribed or recommended treatments (Fogarty & Youngs, 2000), particularly in the context of the Covid-19 health crisis, and adherence to health recommendations (Jordan et al, 2020) or with regard to vaccination both in terms of attitudes (Hornsey et al., 2018). This resistant reaction to the perceived pressure constitutes an unpleasant motivational arousal, generating negative cognitions and emotions, which pushes individuals to regain their freedom, the degree of which depends both on the importance of the threatened freedom and the perceived magnitude of the threat (Steindl et al., 2015).

While this research on ACT and PR is certainly interesting and explains the vaccine hesitancy at the beginning of 2021, it forgets to introduce a contextual element which, to our knowledge, has never been studied: the shortage of vaccines. Indeed, at the end of January 2021, at the European level, France was hit by a vaccine shortage, with an average of 1.89 doses injected per 100 inhabitants, compared to 3.82 for Denmark or 2.90 for Spain. The headlines were alarmist and questioned the government's strategic choices. Should a single injection be offered to the greatest number of people, as was proposed in Great Britain, or should we restrict vaccination to certain people who could then receive a complete vaccination schedule with two injections, thereby making it inaccessible to the majority? The vaccine would thus become a rare good and only a chosen few would be able to benefit from it. Researchers define scarcity as the presence of limited resources and competition on the demand side (i.e., not enough for two people) (Mittone et Savadori, 2009). It was repeatedly found that scarcity impacts the consumer's perception of products by enhancing desirability (Lynn, 1991) and attractiveness (Szybillo, 1975). The attraction for a good is increased by the merefact that this good is presented as scarce. It can act as a direct positive attractor on the consumers' preference structure, without necessarily being mediated by any social or cultural factor: the Scarcity Bias explained by Mittone and Savadori, 2009. In other words, scarcity is an attractor even when it is detached from any status symbol effect. The aim of our paper is to examine the attraction effect produced by perceived scarcity on our model.

## 2. Hypotheses

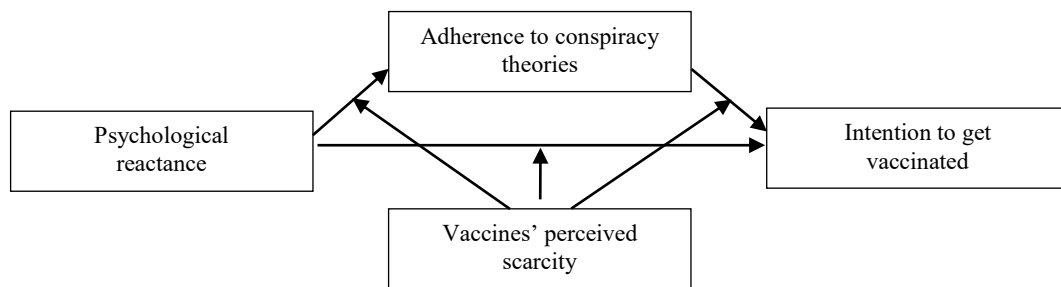
This study tries to supply a more global model by integrating the perceived scarcity of vaccines as a moderator of the relationship between psychological reactance and vaccine intentions. Previous results stated:

1. PR influences negatively the intention to get vaccinated against Covid-19.
2. ACT influences negatively the intention to get vaccinated against Covid-19.
3. ACT mediates totally the relationship between PR and the intention to get vaccinated.

However, the perceived scarcity of vaccines should moderate negatively the influence of both PR and ACT on vaccine intentions. In other words, the hypotheses are the following:

1. A higher psychological reactance should generate a lower intention to get vaccinated; but this influence should be reduced for the ones who perceived a high vaccines scarcity.
2. A higher adherence to conspiracy theories should generate a lower intention to get vaccinated; but this influence should be reduced for the ones who perceived a high vaccines scarcity.
3. A higher psychological reactance should generate a higher adherence to conspiracy theories; but this influence should be reduced for the ones who perceived a high vaccines scarcity.

Figure 1. Tested model.



### 3. Method

#### 3.1. Sample and measures

The sample consisted of 714 participants, divided into 59.7% women and 40.3% men. The mean age was 45.16 (SD=18.75), ranging from 18 to 88 years. The only two criteria for inclusion were those of being French and being at least 18 years old. The questionnaire was posted on Facebook and made available via publication on the walls of users with a Facebook account, between 13th February 2021 and 14th April 2021. Three publicity campaigns were conducted.

The questionnaire consisted of 25 items with the aim of testing the model (Figure 1). It included three standardised scales, measuring respectively PR (Hong & Faedda, 1996; 14 items) ( $\alpha=.87$ ), ACT (Bruder et al., 2013; 5 items) ( $\alpha=.94$ ), perceived scarcity (adapted from Park et al., 2017; 4 items) ( $\alpha=.79$ ) and 2 items measuring vaccine intentions:

- I personally intend to get vaccinated against COVID-19
- I will get vaccinated against COVID-19 as soon as the government allows me to

#### 3.2. Statistical analysis

The analyses were performed using SPSS version 28. The results confirmed the tools internal consistency. The means and Pearson correlation coefficients were calculated. Linear regressions were used to measure the predictive dimension of the independent variables (PR on the one hand and ACT on the other) on the dependent variable (intention to be vaccinated against COVID-19). Complementary analyses were conducted to measure the moderating effect of vaccines' perceived scarcity on the relationships between PR and ACT on the one hand and between ACT and the intention to be vaccinated against COVID-19 on the other hand.

### 4. Results

Intention to get vaccinated against COVID-19 is significantly and negatively correlated to PR and ACT ( $p < .001$ ) and positively correlated to vaccines' perceived scarcity ( $p < .001$ ). The three latter variables are positively correlated the one with the other ( $p < .001$ ). The intention to get vaccinated is influenced by both PR ( $\beta = -.169$ ;  $p < .001$ ) and ACT ( $\beta = -.388$ ;  $p < .001$ ) (Bordarie, 2021, 2022). Here, perceived scarcity of vaccines does not influence the relationship between PR and intentions, neither the one between ACT and intentions. However, perceived scarcity moderates the relationship between PR and ACT ( $p = .02$ ). Indeed, we can see that perceived scarcity moderated the relationship between PR and ACT. This effect was assessed using the interaction term devised by multiplying the PR predictor variable with the perceived scarcity score. Results obtained with the PROCESS macro for SPSS (Hayes, 2018) are reported in Table 1. The interaction term PR  $\times$  perceived scarcity was significantly related to the degree of adherence to conspiracy theories, indicating that perceived scarcity moderated the effect of PR on ACT. More precisely, the positive association between PR and ACT was stronger for individuals who reported low levels of perceived scarcity ( $b = 1.80$ ,  $p < .001$ ), compared to those who reported high levels of perceived scarcity ( $b = 1.37$ ,  $p < .001$ ).

Table 1. Summary data for the mediation model with vaccines' perceived scarcity as moderator between PR and ACT.

Models	Output
<b>Model 1: PR → ACT</b>	
Psychological reactance	2.29***
Vaccines' perceived scarcity	.61**
Psychological reactance × Vaccines' perceived scarcity	-.15*
Effect for low vaccines' perceived scarcity (3.31)	1.80***
Effect for moderate vaccines' perceived scarcity (4.77)	1.59***
Effect for high vaccines' perceived scarcity (6.23)	1.37***

Note: Unstandardized coefficients are reported.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

Effects are evaluated for different levels of vaccines' perceived scarcity that correspond to the mean  $\pm 1$  SD.

## 5. Discussion

The literature already attested that vaccine intentions were influenced by both the adherence to conspiracy theories (Jolley & Douglas, 2014) and the psychological reactance (Hornsey et al., 2018). The case of COVID-19 is no exception and it has been demonstrated that both ACT and PR played a role in vaccine intentions (Bordarie & Plichon, 2021, 2022). In this study, results showed that perceived scarcity also influenced vaccine intention, but it did not moderate the influence of neither of both variables on intention; except by considering the indirect effect of perceived scarcity on the relationship between PR and intention through ACT, which is not exploited here. We thus only confirm our third hypothesis. However, perceived scarcity moderated negatively the influence of PR on ACT; that is to say that the more reactant people generally have higher scores on ACT but this influence of PR is reduced when people perceive a high vaccines scarcity. This result confirms the highly complex relationship that individuals can have with conspiracy beliefs. Indeed, our results testify that the ACT depends on other variables that can be internal or external. On the one hand, the influence of a temperament trait like psychological reactance showed the role of internal and dispositional variables. On the other hand, the perceived scarcity testified that degrees of ACT can also be the consequence of the context. Thus, in general we can say that the more reactant people are, the more they adhere to conspiracy theories; but this positive effect is less important when people perceived a higher vaccine scarcity.

These results open perspectives for vaccinal strategies and information or awareness campaigns in order to convince the most hesitant participants. Indeed, this study seems to provide an interesting perspective on how communication about the absence of vaccines may have ultimately been an opportunity in that it may have limited the effect of reactance on adherence to conspiracy theories and their joint effect on intention to vaccinate against COVID-19. This study raises questions about the most relevant information and communication strategies when it comes to a major public health issue such as vaccination in the context of the current health crisis. However, this is not without raising serious ethical questions. Indeed, our results show the positive effects of communication messages highlighting the lack of vaccines to limit the effects of reactance and adherence to conspiracy theories on vaccination intentions. And spontaneously, this could be seen as a good strategy in that it could enable States to meet their vaccination targets. Indeed, some companies have understood the value of communicating through perceived scarcity as a marketing strategy, and it is one of the most widely used strategies (Wu and Lee, 2016). By targeting emotions to influence decision-making and guide behaviours, scarcity strategies, found in particular in Hunger Marketing, lead individuals to make emotional rather than rational determinations in situations of potential scarcity; generating intentions or decision-making that are primarily driven by emotions (Skarmeas et al., 2019; Szablewska & Kubacki, 2019).

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