Determinants of adherence to COVID-19 vaccine | Fact-sheets collection from the Portuguese COVID-19 pandemic Task Force on Behavioral Sciences

Ricardo R. Santos[1], Osvaldo Santos[1,2], Margarida Gaspar de Matos[3,4], on behalf of the Portuguese Task Force on Behavioral Sciences[5] for supporting health policies in the context of the COVID-19 pandemic

[1] Laboratório de Comportamentos de Saúde Ambiental (EnviHeB Lab), Instituto de Saúde Ambiental da Faculdade de Medicina da Universidade de Lisboa, Portugal
[2] Unbreakable Idea Research, Painho, Portugal
[3] Supportive Environments for Individuals' Lifespan Development Research Group (RG2), Instituto de Saúde Ambiental da Faculdade de Medicina da Universidade de Lisboa, Portugal
[4] Aventura Social, Lisboa, Portugal
[5] Mandated by the Portuguese Health Minister from March 19th to December 31st 2021

Corresponding author: Osvaldo Santos | osantos@medicina.ulisboa.pt

Abstract

Adherence to COVID-19 vaccine is determined by several cognitive and emotional determinants. Portuguese population has remarkable trust level on vaccines, also explained by a highly favorable public perception of the quality of healthcare public services. However, the process of development, testing and implementation of COVID-19 vaccines (some of them involving new applied health technology) raises concern in important segments of the population. Effective programs for promotion of adherence to COVID-19 vaccine requires communicating easy-to-understand, solid and credible evidence about the effectiveness of COVID-19 vaccines (at individual and collective levels) and about the safety of these vaccines (at short and long terms). Reducing the number of steps and procedure complexity for accessing the vaccine is also crucial for the adherence to this form of severe COVID-19 prevention.

Keywords: COVID-19 vaccine, Adherence, Evidence-based policies, Policy brief.

Introduction

The Portuguese National Immunization Programme (NIP) was created in 1965 with the goal of protecting individuals and the community against diseases that can pose a wide threat to public health. NIP's basic principles are the universality, the gratuitousness, the accessibility, the equity, and the vaccination in every possible opportunity.

The latest NIP's assessment shows a national immunization coverage of 95% for all vaccines that are included in the national program of vaccination (PNV). Even during COVID-19 pandemics, no significant decrease in vaccination coverage was observed related to the previously vaccines included in the PNV. In fact, Portugal has had an exemplary trajectory in this public health area. This success is linked to the performance of the National Health Service itself, which provides its users an ample access to high-quality maternal and

child healthcare, benefiting from high-level confidence in vaccines by the Portuguese population, in terms of safety and effectiveness of vaccines, in general.

These facts may explain the high adherence of the Portuguese population to the vaccination against COVID-19. However, there are five special specific circumstances about this vaccine that make the high level of adherence so remarkable: (1) SARS-CoV-2 suddenly emerged as a new and not well-known infectious agent; (2) The disease (COVID-19) that SARS-CoV-2 provoke in humans is new and still poorly understood; (3) The vaccines against COVID-19 were offered in exceptional conditions, both in terms of their formulation and on how they have been developed, tested, and approved; (4) The pandemic was (and is) still currently active at the moment of starting the general public inoculation initiatives; (5) Unlike the vaccines recommended by the PNV, for which the vaccination scheme starts under the age of one year old – i.e., the subject does not decide if they want or not to be vaccinated – the COVID-19 vaccines were mainly (at early stages of the vaccination implementation) directed to adults, having more autonomy in deciding to be voluntarily vaccinated or not (although with some social pressure for doing so – e.g., for travelling or accessing specific public spaces).

The above-mentioned circumstances brought new challenges, not only to the health management of the pandemic, but also in societal, political, and ethical terms. In a time of recognition of individual rights, calling for vaccination as a civic duty (as an obligation in favour of a greater, collective good) is a challenge for health authorities, because it calls for the realisation of values that conflict with others, equally valid.

Here we identify the main determinants of willingness to be or not to be vaccinated (i.e., vaccine adherence),

and briefly characterise attitudes of the Portuguese people towards vaccination against COVID-19.

Relevant pieces of knowledge for public health action

- Several quick-surveys conducted throughout 2021 (after the beginning of COVID-19's vaccination program) revealed that the percentage of Portuguese population expressing the willingness not to be vaccinated with COVID-19 vaccine ranged from 4% to 9% (European Commission, 2021; ENSP, 2021; Soares et al., 2021).

- Portugal was soon recognized as the EU country in which the highest percentage of the population considering that the benefits of the COVID-19 vaccine outweigh the risks (87%) and that the vaccines authorized to be used in the EU are safe (86%); considering that vaccines can have unknown long-term side effects (77%); agreeing less with the idea that serious illnesses (in general) have disappeared thanks to vaccines (58%); and not agreeing with the idea that the vaccine is the only way to end a pandemic (81%); saying to be afraid of being infected (70%); and agreeing with the statement that vaccines are safe (95%) and effective (95%) (European Commission, 2021).

- Those surveys also revealed that the willingness to be vaccinated, as well as the percentage of undecided, varied according to age group. The resistance to be vaccinated was greater among Portuguese males, in different ages (26-45 years and 46-65 years), and with higher education (Table 1; ENSP, 2021).

- Eight major determinants of COVID-19 vaccine acceptance were evidenced by the literature (Table 2).

Table 1. Declared intentions/willingness to be vaccinated, by age group (ENSP, 2021).

Age class (years)	Willingness to be vaccinated	Willingness not to be vaccinated	Undecided
16-25	85,7%	No data	14,3%
26-45	87,1%	5,6%	7,3%
46-65	86,6%	9,2%	4,2%
+65	85,2%	3,7%	11,1%

Table 2. Determinants of COVID-19 vaccination acceptability, according to the COM-B model (Michie, Van Stralen & West, 2011).

Capability

Psychological capability (knowledge)

Factors associated to a low COVID-19 vaccination acceptance

- Lack of information about the disease and/or about the vaccine

Factors associated to a high COVID-19 vaccination acceptance

- Access to information about the vaccine safety

Opportunity

Physical opportunities (environment and resources)

Factors associated to a low COVID-19 vaccination acceptance

- Access to the vaccine: waiting time, access convenience (distance to vaccine administration centres), and costs (travelling, indirect costs such as salary cuts due to out-of-working hours)

Factors associated to a high COVID-19 vaccination acceptance

- Exposure to information about the vaccine and vaccine access through traditional and social medias.

Social opportunity

Factors associated to a low COVID-19 vaccination acceptance

- Mistrust on the Government and/or health authorities, and/or belief in conspiracy theories
- Advice from health professionals not to be vaccinated
- Delaying the vaccine-taking, while waiting for more people to be vaccinated in first place (for altruistic reasons, or waiting to see if it works without no major side-effects)

Factors associated to a high COVID-19 vaccination acceptance

- Trust on the Government and health authorities
- Advice from health professionals to be vaccinated
- Endorsement by prominent public figures
- Example of relatives/friends/co-workers taking the vaccine (social norms)

Motivation

Beliefs about vaccine effects

Factors associated to a low COVID-19 vaccination acceptance

- The accelerated way vaccines were developed and implemented (doubts about the quality of the effectiveness evaluation process)
- Concerns about the vaccine safety and efficacy
- Perception of (no) need to take the vaccine: beliefs related to natural resistance, to be already immunized, to be healthy, not vulnerable to severe forms of COVID-19

Factors associated to a high COVID-19 vaccination acceptance

- Positive beliefs about vaccine safety and efficacy
- Perception of need to take the vaccine: to prevent the risk of infection, to reduce the disease severity in case of infection, to reduce the risk of virus' transmission, to contribute to the end the pandemics and return to a normal life

Social/professional role and identity

Factors associated to a low COVID-19 vaccination acceptance

- Not found

Factors associated to a high COVID-19 vaccination acceptance
- Political preferences
- Having responsibilities at work
- Personal norms/responsibility/duty

Reinforcement (past learnings)

Factors associated to a low COVID-19 vaccination acceptance
- Previous experience of severe infection by SARS-CoV-2
- Negative vaccination experience against influenza
- Experience of allergic reaction following vaccination, or previous experience of vaccines (other than COVID-19's vaccine) refusal

Factors associated to a high COVID-19 vaccination acceptance
- Positive vaccination record/experience against influenza
- Personal experience with COVID-19 or having close persons who died from COVID-19
- To have adopted other personal protection behaviors or mitigation strategies

Emotion / psychological suffering

Factors associated to a low COVID-19 vaccination acceptance
- Not found

Factors associated to a high COVID-19 vaccination acceptance
- High score of anxiety due to COVID-19
- Symptoms of depression
- Feeling agitated, sad, or anxious due to physical distancing measures

Goals

Factors associated to a low COVID-19 vaccination acceptance
- Being forced to take the vaccine certificate for getting access to places/activities (perception of lack of autonomy)

Factors associated to a high COVID-19 vaccination acceptance
- To be vaccinated with the intended vaccine brand
- To have adopted other personal protection behaviors / mitigation strategies
- To be able to access places/activities if having the vaccination certificate

- In Portugal, four sets of determinants of COVID-19 vaccine adherence have been identified (Soares et al., 2021): (1) social influence (normative determinants), (2) positive beliefs about the consequences of taking the vaccine, (3) previous personal experiences and learning regarding other vaccines or living with COVID-19, and (4) emotions or psychological suffering (the vaccine as a way of minimising or avoiding these affective states).

- In a specific sample, with chronic patients (with multiple sclerosis), two sets of cognitive determinants of adherence to the COVID-19 vaccine were also identified: beliefs about vaccine efficacy and safety, and beliefs about possible negative consequences of COVID-19 in the context of multiple sclerosis (Serrazina et al., 2021).

- Factors associated with greater hesitancy towards COVID-19 vaccine among Portuguese were (Soares et al., 2021): (a) younger ages, (b) low income, (c) perception of inadequacy of government

measures to deal with the pandemic, (d) inconsistency of information as communicated by the authorities, (e) lack of confidence about the capacity of response from health authorities to cope with the current pandemic, (f) perception of low risk (about severity) of COVID-19, (g) low confidence in the way in which the COVID-19 vaccine was developed, and (h) lack of information about the safety and efficacy of the vaccines.

- Specific factors associated to delaying the COVID-19 vaccine administration were (a) being women and (b) having low risk perception of developing severe forms of COVID-19 (Soares et al., 2021).

- Specific factors associated to refusal to get the COVID-19 vaccine were (a) low educational level, (b) having school aged children, (c) low risk perception of developing severe forms of COVID-19 (Soares et al., 2021).

- Portuguese trust more, as a reliable source of information about COVID-19 vaccines, on health professionals (e.g., doctors, nurses, and pharmacists; 71%), followed by health authorities (62%), the European Union (39%), the Government of Portugal (30%), the local or regional authorities (20%) and, finally, the media, including television, newspapers, and radio (13%) (European Commission, 2021).

- Regarding satisfaction with how the vaccination strategy was handled by the Government of Portugal, 12% of Portuguese reported they were very satisfied; and 61% reported to be reasonably satisfied (European Commission, 2021).

- The main motive for Portuguese to be vaccinated was controlling the pandemic; on the other hand, the main reason for not being vaccinated related to potential secondary effects (Table 3; European Commission, 2021).

Table 3. Reasons to be or not vaccinated (the average value for the European Union is indicated in parentheses; European Commission, 2021).

Reasons to be vaccinated	
Vaccine will help to end the pandemics	98% (EU: 95%)
Vaccine will allow to visit again friends and family	98% (EU: 94%)
Vaccine will protect me against COVID-19	96% (EU: 91%)
Vaccine will protect my family and others against COVID-19	97% (EU: 94%)
Vaccine will allow me to go to restaurants, cinemas, and sports	90% (EU: 86%)
Vaccine will allow me to have a normal professional life	89% (EU: 81%)
Vaccine will allow me to travel	86% (EU: 83%)
Reasons to not be vaccinated	
Concerns about the vaccine's side-effects	91% (EU:82%)
Vaccines are not yet sufficiently tested	88% (EU: 85%)
Vaccines are not effective	66% (EU: 60%)
Pandemics will end soon	61% (EU: 49%)
Very low or no personal risk of being infected with SARS-CoV-2	59% (EU: 52%)
COVID-19 risk is overestimated	52% (EU: 57%)

- For individuals who are hesitating about taking or not the vaccine, determinants of adherence would be: (a) better clarification of how vaccines were developed, tested, and approved (36%), (b) percentage of people having been vaccinated (without negative health events associated), (c) providing solid evidence that the vaccine works (effectiveness) and that there are no major side effects (29%), (d) and having the vaccine recommended by a medical doctor (26%) (European Commission, 2021).

Content analysis of spontaneous reactions/comments to two Portuguese health authorities Facebook-posts related to COVID-19 vaccine

A content analysis of 2.453 comments to COVID-19 vaccination messages posted in the Facebook page of

the Directorate-General for Health was performed according to the open line-by-line coding principles (Charmaz, 2006) and is more detailed in the supplementary material of this paper (presented in Portuguese language). Some of the most relevant insights resulting from this content analysis are the following:

- Four segments were identified: *Adherence*, *Willing*, *Refusal* and *Militants* (Figure 1).
- Reasons stated by the *Refusal* segment – i.e., those who have rejected the COVID-19 vaccine – are essentially related to the perceived uncertainty on the safety and efficacy of vaccines (a **Capacity** determinant of behavior, according to the COM-B model; knowledge/beliefs).
- Among the *Willing* segment (which includes people who express their intention to be vaccinated, to not be vaccinated, and who haven't decided yet), it was highlighted the lack of information related to the procedures that citizens without a national healthcare system number (e.g., migrants) must follow to be able to be vaccinated or complete the vaccination schedule. The constraints associated with self-scheduling also contributed to a perception of disorganization and perceived difficulty to access the vaccine (**Capacity and Opportunity** determinant, according to the COM-B model; knowledge and environmental and access/resources).
- In the *Adherence* segment, vaccine centers' organization and speed of the process (i.e., the convenience and accessibility conditions) were highly valued (**Opportunity** determinant, according to the COM-B model; environmental context and resources).
- A wide range of factors influencing positively or negatively the decision to be vaccinated were identified, including: (1) level of trust in the Portuguese government and health authorities, (2) level of trust in health professionals, (3) theories of conspiracy (i.e., that the origin and/or management of the pandemic serves ideological, economic or politicians purposes), (4) level of confidence in safety and efficacy, as well as in how vaccines were developed, tested and approved, with particular emphasis on vaccines that use

mRNA technology (**Capacity and Opportunity** determinants, according to the COM-B model; knowledge/beliefs and social Influence).

- A specific concern regards the technology behind and processes of authorization to administer the COVID-19 vaccine in humans. Namely, there is wide uncertainty about the long-term security of vaccines (**Motivation** determinants, according to the COM-B model; beliefs about consequences of the behavior).
- To be vaccinated is also perceived by several citizens who commented on the posts as a civic duty. This becomes more evident in the criticism that is made to those who have not get the COVID-19 vaccine (**Motivation** determinant, according to the COM-B model; social/professional role and identity).

Calls for action

- It is crucial to reduce the number of steps and requirements for citizens to access the vaccine: small barriers can have a disproportionately negative impact on adherence to vaccination.
- Considering that Portuguese population has a high level of trust on health professionals (European Commission, 2021), the strategy of communication must take advantage of this relationship of trust.
- Actions to promote adherence to vaccination among population segments considered as a priority must be based on (and adapted to) the best available scientific evidence (and with cultural adaptation), both on the content to be used (in promotion actions) and on the means through which those contents should be communicated. The effectiveness of the promotion actions depends, to a large extent, on the communication strategy adopted. This, in turn, will depends on a clear definition of the purpose of communication and, above all, of adjustment, clarity and transparency of the content and adequacy of channels of communication to the profile of the audience (considering the needs of information of different population groups).
- In the design of communication campaigns, it is recommended a special attention to generational,

- cultural, ethnic, and literary backgrounds (particularly in terms of access to information technologies and communication) of target audiences.

- It is highly recommended to provide information aimed at specific groups (with particular importance for migrant communities living in Portugal), namely those who do not have SNS number and who want to get the COVID-19 vaccine.

- The use of images must consider the heterogeneity of the audience, specifically the audience's generational, cultural, ethnic, and religious diversity, as well as the diversity of personal characteristics (gender, height, age, physical condition, etc.).

- It is highly recommended the use of images that illustrate realistic and credible scenarios with which audience can identify.

- The main determinants of willingness for COVID-19 vaccine are (a) individual perception of severity and vulnerability to the disease, (b) confidence in the way the vaccines were developed, tested, and approved, (c) confidence about short- and long-term safety (perceived low costs associated with the vaccine) and about vaccines efficacy against COVID-19, (d) credibility of information sources. These determinants must be the base of the communication strategy from health authorities, which should have as a main guideline the coherent and consistent transmission of information, cultivating trust in decision makers (political and health).

- Audience segmentation of public intentions to get COVID-19 vaccine is very useful for message targeting (Smith et al., 2021; Thaker, Richardson, & Holmes, 2022). Therefore, communication strategy must be tailored to the specific attitudinal and information-seeking characteristics of the different audience segments, taking into account (a) the way each of these groups perceives COVID-19 (in terms of vulnerability and severity), (b) the security (at short and long terms) and effectiveness (i.e., pros and cons) of vaccines, and (c) the viability of the plan of vaccination as an adequate measure of response to the COVID-19 pandemic;

vaccine campaign strategy should also take into account these population segments information needs, the way they process the information and preferences regarding information sources.

- In the case of the *Adherence* segment, because they are already vaccinated, it is recommended a strategy focused mainly on providing information about the safety and efficacy of the vaccine (e.g., the estimated durability of immunity against reinfection).

- In the case of people who express the willingness to be vaccinated, the priority of the communication strategy is to preserve this motivation and facilitate access to the vaccine. On the other hand, in the case of those who express the willingness to not be vaccinated, along with the ambivalent ones, the communication strategy must consider (a) the group age and socio-economic contexts of these population segment, (b) the perception of low vulnerability to COVID-19 and/or perception of low severity of the disease, (c) low confidence in the way vaccines were developed, tested and approved, and/or (d) low confidence about security and/or effectiveness of the vaccines, in particular those using mRNA technology (new technology, with limited evidence of security at long term).

- In the *Refusal* segment, as well as in the *Militants*, if there is a denial of the disease, or about the severity of the disease, there is obvious distrust regarding safety and effectiveness of existing vaccines. That is, even when the risk associated with disease is not denied, the vaccines are refused, especially those that use the mRNA technology. This segment needs to be better studied to be possible to design effective communication strategies.

- Figure 2 proposes a positioning of the *Adherence*, *Willing*, and *Refusal* segments, according to the Extended Parallel Process Model (Witte, 1994) (Figure 2). This positioning can be useful to understand the way the message is processed by each of the segments, and which message components can be strategically tailored to promote the decision-making for vaccination.
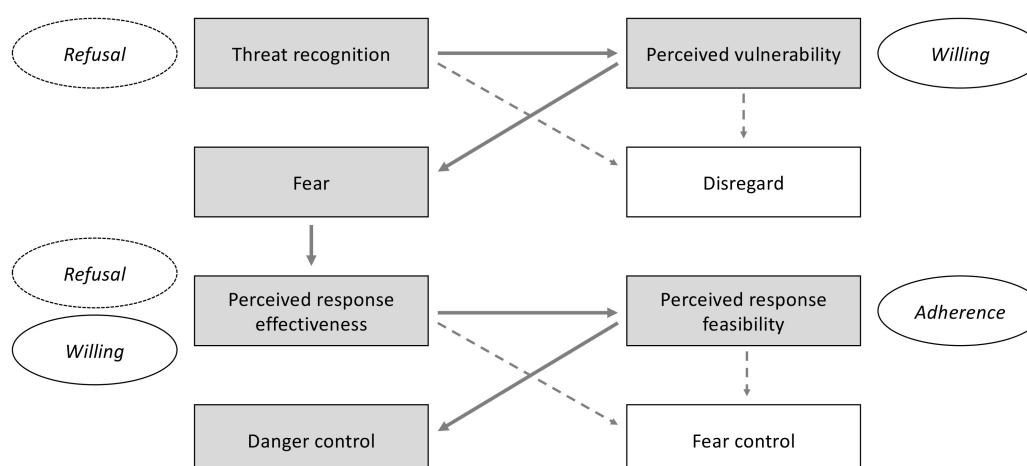
Figure 1. Positioning of the three population segments identified in the content analysis, according to the Extended Parallel Process Model (Witte, 1994).

Disclosure

This work has been adapted from the original policy brief document, developed by the Work Package 3 of the Portuguese Task Force on Behavioral Sciences for supporting health policies in the context of the COVID-19 pandemic, delivered to the Cabinet of the Prime Minister in July, 2021.

References

Charmaz, K. (2006). *Constructing Grounded Theory*. SAGE Publications.

DGS (2021). [COVID-19 vaccination report no. 21 (week 26). Available at https://covid19.min-saude.pt/wp-content/uploads/2022/02/Relatorio_Vacinacao_27122020_04072021_pdf-1909kb.pdf (Accessed July 18, 2021)

ENSP (2021). [Vaccination hesitancy in Portugal] COVID-19 Barometer. Available at https://barometro-covid-19.ensp.unl.pt/hesitacao-na-vacinacao-em-portugal/ (Accessed July 18, 2021)

European Commission (2021). Flash Eurobarometer Attitudes on vaccination against COVID-19 – May 2021. Available at https://europa.eu/eurobarometer/surveys/detail/2512 (Accessed July 18, 2021)

Michie, S., Van Stralen, M.M., West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implement Sci*. 6: 42. https://doi.org/10.1186/1748-5908-6-42

Serrazina, F., Pinho, A. S., Cabral, G., Salavisa, M., & Correia, A. S. (2021). Willingness to be vaccinated against COVID-19: An exploratory online survey in a Portuguese cohort of multiple sclerosis patients. *Multiple Sclerosis and Related Disorders*, *51*, 102880. https://doi.org/10.1016/j.msard.2021.102880

Smith, R. A., Myrick, J. G., Lennon, R. P., Martin, M.A., Small, M. L., Van Scoy, L. J., The Data Action Research Group (2021). Exploring Behavioral Typologies to Inform COVID-19 Health Campaigns: A Person-Centered Approach. *J Health Commun*, *26*(6), 402–12. https://doi.org/10.1080/10810730.2021.1946218

Soares, P., Rocha, J.V., Moniz, M., Gama, A., Laires, P.A., Pedro, A.R., Dias, S., Leite, A., Nunes, C. (2021). Factors Associated with COVID-19 Vaccine Hesitancy. *Vaccines* 9(3), 300; https://doi.org/10.3390/vaccines9030300

Thaker, J., Richardson, L. M., & Holmes, D. C. (2022). Audience segmentation analysis of public intentions to get a COVID-19 vaccine in Australia. *Public Understanding of Science*, 1–9. https://doi.org/10.1177/09636625221138494

Witte, K. (1994). Fear control and danger control: A test of the extended parallel process model (EPPM). *Communication Monographs*, 61(2), 113–134. https://doi.org/10.1080/03637759409376328