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# **Anticipating pride or regret? Effects of anticipated affect focused persuasive messages on intention to get vaccinated against COVID-19**

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## **Abstract**

Understanding the factors that increase intention to receive COVID-19 vaccines is essential to maximise the vaccination campaign effectiveness. The present experimental study evaluated the effect of exposure to messages targeting cognitive attitude plus anticipated positive (pride) or negative (regret) affective reactions on intention to get vaccinated. Participants included 484 Italian adults randomly allocated to one of four conditions: 1) cognitive attitude message; 2) cognitive attitude plus positive anticipated affect message; 3) cognitive attitude plus negative anticipated affect message; 4) no message. Results showed that participants in the second condition reported greater intention to get vaccinated against COVID-19 compared with those in the control condition. Parallel mediation analysis indicated that the effect of the second condition on intention was fully mediated by cognitive attitude and anticipated positive affect. These findings suggest that future campaigns aimed at promoting COVID-19 vaccination intention could usefully target both cognitive attitude and anticipated positive affect.

*Keywords:* COVID-19, COVID-19 vaccination, intention, attitude, anticipated affective reactions

## 1. Introduction

December 2020 marked, in much of the world, the start of the vaccination campaign against COVID-19. Mass vaccination represents an essential weapon to control the pandemic. However, its success depends not only on how safe and effective the approved vaccines are but also on the intention to vaccinate and their actual uptake among the general population.

To date (31 August 2021), in Italy, 60.8% of the population (36.7 million people) have completed the vaccination course (2nd dose / single dose), in line with data of other EU countries (for example, at the time of writing, in France the percentage of fully vaccinated people is 59.7%, in Germany 60.7%, in Spain 70.3%, in the UK 64.2%; Our World in Data, 2021). However, based on the *Strategic Plan* approved by the Italian Parliament in December 2020, vaccines are expected to reach most of the population (about 80%) in the last quarter of 2021 (Italian Ministry of Health, 2021a).

Among the population not yet vaccinated, a recent survey found the majority of Italians (79%) willing to get vaccinated against COVID-19 (Ipsos, 2021). Several studies conducted before the approval of any vaccine against COVID-19 showed similar results. For example, Caserotti et al. (2021) reported that Italians had strong intentions to get vaccinated in the early stages of the pandemic (February-June 2020), particularly during the lockdown phase, with 86% of the participants saying they were willing to pay to receive the vaccine when available. However, in another study (Graffigna et al., 2020) conducted during the early days of the reopening after the first lockdown, only 59% of the respondents declared that they would accept the vaccine, whereas 15% said that they would refuse it, and the remaining 26% were hesitant. Later in the pandemic, with the approval of the first COVID vaccines (i.e., Pfizer – BioNTech and Moderna vaccines), the percentage of people who reported being uncertain about the vaccine appears to have increased. For example, in a study on a representative sample of one Italian region (Emilia Romagna), 31% of participants declared themselves COVID vaccine hesitant (Reno et al., 2021).

Overall, these data can be considered moderately encouraging in relation to likely vaccination rates against COVID-19. Despite this, it should be noted that even a small proportion of the population with poor vaccination rates could compromise the goal of achieving herd immunity for SARS-CoV2, for which around 80% of the population is required to be vaccinated (Italian Ministry of Health, 2021a).

Therefore, there is an urgent need to understand which psychological factors can increase vaccination uptake. The current research focuses on testing the effectiveness of interventions to promote the intention to get vaccinated against COVID-19. In this regard, the literature has demonstrated the efficacy of targeting cognitive and affective responses to promote changes in health intentions and behaviours (Lawton et al., 2009; Portnoy et al., 2014; Xu & Guo, 2019). Nevertheless, no studies to date have tested such processes in the context of COVID-19 vaccination. This study aims to fill this gap by exploring the effectiveness of persuasive messages targeting jointly cognitive attitude and anticipated affective reactions (positive or negative) in increasing intention to get vaccinated.

### *1.1 The predictive role of anticipated affective reactions on vaccination intention*

Among the numerous psychological variables that influence the intention to receive the COVID-19 vaccine, several studies (Graffigna et al., 2020; Paul et al., 2021; Sherman et al., 2020) have identified attitude (i.e., overall evaluation of the behaviour) as a key factor. This is in line with previous literature demonstrating that attitude is the strongest predictor of intention to get vaccinated (e.g., Britt & Englebert, 2018; Cha & Kim, 2019; Hofman et al., 2013; Lehmann et al., 2014; Ratanasiripong et al., 2018). In particular, cognitive evaluations about the efficacy and safety of the vaccine in question represent important determinants of vaccination intention and behaviour (Xiao, 2019). The role of attitude has been widely emphasised in the context of social cognitive models of health behaviour, such as Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) and Theory of Planned Behaviour (TPB; Ajzen, 1991). Although these models have proved effective in predicting several health behaviours, including vaccination (e.g., Caso et al., 2019), they

are predominantly cognitive theories that ignore the role of affective processes that may affect intention and behaviour (Williams et al., 2018). Nevertheless, in recent years, a growing literature has explored and demonstrated the usefulness of including an affective component, especially in the TPB model (e.g., Conner et al., 2013; Stevens et al., 2019). In particular, it has been widely shown that adding the component of anticipated affective reactions (e.g., anticipated regret) to the TPB increases the proportion of the explained variance in intention and behaviour (Sandberg & Conner, 2008).

Anticipated affective reactions refer to people's expectations about the possible affective response they will experience after performing a given behaviour (e.g., "If I got the COVID-19 vaccine, I would feel proud"), and are centred on self-conscious emotions, such as pride and regret, rather than hedonic emotions (e.g., pleasure; Conner et al., 2013; Conner et al., 2015). In the context of research that has focused on understanding affective processes related to vaccination intention and behaviour, studies that only explored the impact of the affective component of attitude produced inconsistent results (e.g., Xiao, 2019). In contrast, the literature that shifted the focus to anticipated affective reactions yielded very promising findings (Caso et al., 2019; Christy et al., 2016; Cox et al., 2014; Pența et al., 2020; Weinstein et al., 2007; Ziarnowski et al., 2009).

Among the possible range of anticipated affects, great space has been dedicated to the role of anticipated regret, i.e., the anticipated negative feeling experienced in relation to the possibility of implementing or not a given behaviour, with most studies focused on inaction anticipated regret (Sandberg & Conner, 2008). Anticipated regret has proven to be a key factor both in influencing the decision to get personally vaccinated (Christy et al., 2016; Weinstein et al., 2007) and vaccinate someone else (e.g., in the case of mandatory or recommended vaccinations for children and adolescents; Caso et al., 2019; 2021a; Ziarnowski et al., 2009). For example, in a recent study on the HPV and influenza vaccinations, Pența et al. (2020) found that inaction anticipated regret was the strongest predictor of intention for both types of vaccinations, over and above cognitive variables (knowledge, perceived susceptibility and severity in relation to the disease, perceived

vaccine effectiveness and safety). A very similar result was also found in a study by Christy et al. (2016), who reported that inaction anticipated regret was associated with intention to receive the HPV vaccine, beyond a series of cognitive variables (e.g., perceived risk of developing genital warts or cancer), but only among male participants. Generally, inaction anticipated regret appears to be more relevant than action anticipated regret in the context of vaccination (Brewer et al., 2016).

If the predictive role of anticipated negative affective reactions on intention to or actual vaccination has been extensively explored, less attention has been paid to the possible impact of anticipated *positive* affective reactions, such as pride and satisfaction for being vaccinated. For example, Stevens et al. (2019) tested the effect of both anticipated positive and negative positive affects on intentions to perform health-promoting and health-risk behaviours; results showed that anticipated positive affects (i.e., pride), differently from anticipated regret, did not predict intention to engage in the analysed health behaviours, including influenza vaccination. On the other hand, Radic et al. (2021) examined the factors influencing intention to get vaccinated against COVID-19 as a precondition to travel abroad. Although the study investigated a particular type of intention, the results highlighted that anticipated feelings of pride influenced the personal norm concerning vaccination (i.e., the sense of moral obligation to get vaccinated), which in turn affected intention. It must be noted that the results of these studies are insufficient to draw strong conclusions regarding the possible impact of anticipated positive affects on the intention to get vaccinated against COVID-19. That is why, in the present study, we decided to explore the role of both anticipated positive (pride) and negative (regret) affects on intention, implementing an experimental design based on the creation of persuasive messages targeting such affective responses (Conner et al., 2020).

### *1.2 Anticipated affect based interventions to change vaccination intention*

Persuasive communication has shown to be effective in modifying a wide variety of health behaviours (e.g., Caso et al., 2021b; Hood et al., 2020; Lindsey, 2017), including vaccination (e.g., Abhyankar et al., 2008; Liu et al., 2019; Nan, 2012). In particular, numerous intervention and experimental studies successfully targeted anticipated affects to promote different health behaviours

(see Conner et al., 2020). For example, Martinez (2014) found that persuasive messages focused on attitude plus anticipated regret, compared with messages focused on attitude only, significantly increased participants' intention to consume folic acid. Similarly, manipulating anticipated negative affects proved effective in increasing intention to drink at least 2L of water a day (Carfora et al., 2018), willingness to become an organ donor (O'Carroll et al., 2011), and cancer screening attendance (O'Carroll et al., 2015; Sandberg & Conner, 2009). Regarding vaccination behaviour, Kim (2020) demonstrated that the effect of health promotion messages on attitude and intention to receive the HPV vaccine was fully mediated by changes in inaction anticipated regret. In addition, another relevant result emerged from the study conducted by Cox et al. (2014). These authors demonstrated that simply asking anticipated regret questions increased mothers' intention to vaccinate their daughters against human papillomavirus (HPV). Despite the fact that, in this study, the effect of the anticipated regret questions only worked in mothers who had been exposed to a graphic message about the possible consequences of HPV vaccination (compared with those exposed to a text-only message), such results emphasise the potential of targeting anticipated affects in promoting vaccination intention.

In sum, the studies described so far suggest that both cognitive (e.g., efficacy and safety evaluations) and affective processes (anticipation of the affective consequences) can influence intention to get vaccinated. However, to date, no studies have tried to promote vaccination intention by targeting jointly cognitive attitude and anticipated affects. In addition, we found no studies that experimentally manipulated anticipated positive affects (e.g., pride) to change vaccination intentions or behaviour.

## **2. The present study**

In light of the above theoretical premises, the current study aimed to test whether persuasive messages focused on cognitive attitude plus anticipated affective reactions (both positive and negative) can increase intention to get vaccinated against COVID-19.

Specifically, we focused on the following two research questions:

RQ1: Do participants exposed to messages focused on cognitive attitude with or without anticipated affective reactions (positive or negative) report higher intention to get vaccinated against COVID-19 compared to those receiving no message?

RQ2: Do cognitive attitude and anticipated affective reactions (positive or negative) mediate any effect of the experimental conditions on intention to get vaccinated against COVID-19?

### **3. Methods**

#### *3.1 Participants*

We powered our study to detect differences between the control and each experimental condition. Using a small sized effect ( $\eta^2 = .04$ ),  $\alpha = .05$  and power = .80, G\*Power indicated a minimum sample size of 100 per condition with four conditions. Based on a 20% dropout due to ineligibility and minor variation in numbers per condition due to randomisation, we therefore aimed to recruit 600 into the study in order to ensure a minimum of 100 per condition.

Between November and December 2020, before the official approval of any vaccine against COVID-19, 600 Italian adults were invited to participate in a study on the factors influencing the intention to receive the future COVID-19 vaccine. The inclusion criteria for the study were to be aged between 18 and 75 years and not to suffer from medical conditions that increase the risk of developing severe illness from the virus that causes COVID-19 (Center for Disease Control and Prevention, 2021).

As shown in the Participant flow chart (Figure 1), from 600 recruited, a total of 484 adults met the eligibility criteria, signed the informed consent form and fully completed the questionnaire (Appendix A, Section 1), which was shared online through social networks (e.g., generic Facebook groups. No-vax groups were excluded). The study was implemented following receipt of ethical approval by the Ethical Committee of Psychological Research of the Department of Humanities of the University of Naples “Federico II”.

#### *3.2 Study design and procedure*

In the present study, we implemented a between-subjects design. Specifically, participants were randomly allocated to one of four conditions using the online redirecting tool “allocate monster”:

- 1) Cognitive attitude message: participants in this condition were exposed to a message focused on cognitive attitude only;
- 2) Cognitive attitude plus *positive* affect message: participants in this condition were exposed to a message focused on cognitive attitude plus anticipated positive affective reactions (pride);
- 3) Cognitive attitude plus *negative* affect message: participants in this condition were exposed to a message focused on cognitive attitude plus anticipated negative affective reactions (regret);
- 4) Control: participants in the control condition were not exposed to any message.

Before being exposed to the messages, the participants completed a series of pre-manipulation measures to verify that the groups did not differ in relation to important variables that the literature has shown to influence the general attitude toward vaccination, i.e., trust in science (Lehmann et al. 2014), religiosity (Rutjens et al., 2018) and past vaccination behaviour (Caso et al., 2019) - in addition to socio-demographic characteristics. Indeed, past vaccination behaviour and high trust in science have been associated with a positive attitude toward vaccines and vaccinations (Caso et al., 2021a), whereas hesitant attitudes toward vaccines have been related to a strong religious morality (Rutjens et al., 2018).

After completing the pre-manipulation measures, the experimental groups' participants were exposed to a specific persuasive message according to the assigned condition. The messages are presented in Appendix A (Section 4).

It is worth noting that all the messages were presented in the form of graphic posters that took up the format of the images usually shared on the official Facebook page of the Italian Ministry of Health. In addition, all posters featured the logo of the Italian Ministry of Health in

order to strengthen the persuasive impact of the message through the use of an expert source (Hopfer, 2012). Finally, since past research showed that prosocial motives could reinforce the decision to get vaccinated (Betsch et al., 2013; Quadri-Sheriff et al., 2012), we also included a prosocial component in the messages (i.e., “... protect yourself and others”).

After being exposed to the posters, participants in all conditions completed the post-manipulation measures (intention to get vaccinated against COVID-19, cognitive attitude toward COVID-19 vaccination, anticipated positive and negative affective reactions). At the end of the questionnaire, the participants were informed that the poster was not real but built for research purposes only. Therefore, they were asked again for informed consent, in line with the ethical code of the Italian Association of Psychology (AIP, 2015) on the use of deception in psychological research.

INSERT FIGURE 1 HERE

#### **4. Measures**

##### *Pre-manipulation measures*

*Demographic Information.* The first section of the questionnaire included questions about the sample’s socio-demographic characteristics, i.e., age, gender, education (response scale: compulsory education, high school diploma, degree, post-degree training), socioeconomic status (response scale: extremely low, low, middle, high, extremely high), marital status (response scale: single, married, in a romantic relationship, separated, divorced, widow/widower, cohabitant), political orientation (response scale: left-wing, right-wing, centre, apolitical, other orientation) and religious orientation (response scale: practising Catholic, non-practising Catholic, atheist, other orientation). Participants were also asked if they knew someone infected with COVID-19 and if they ever tested positive for the virus.

*Past behaviour about vaccination.* In order to understand participants’ past choices regarding vaccinations, they were asked to indicate (“yes”, “no”, or “I do not remember”) whether they received the mandatory vaccinations, influenza vaccine in the last year, and the past influenza

seasons, and other vaccinations recommended by the Italian Ministry of Health (e.g., HPV, hepatitis A, pneumococcus).

*Religiosity* was assessed using the *Duke University Religion Index* (DUREL; Koenig & Büssing, 2010). The DUREL is a 5-item measure considering three aspects of religiosity: organisational religious activity (1 item: “*How often do you attend church or other religious meetings?*”, evaluated on a 6-point scale from “*never*” to “*more than once/week*”), non-organisational religious activity (1 item: “*How often do you spend time in private religious activities, such as prayer, meditation or Bible study?*”, measured on a 6-point scale from “*rarely or never*” to “*more than once a day*”) and intrinsic religiosity (3 items, e.g., “*My religious beliefs are what really lie behind my whole approach to life*”, evaluated on a 5-point scale from “*definitely not true*” to “*definitely true*”). Intrinsic religiosity subscale Cronbach’s  $\alpha = .92$ .

*Trust in science* was assessed with the 10-item *Belief in science scale* (Farias et al., 2013). The scale was developed to measure a general belief in science and acceptance of the scientific method. Participants were asked to indicate their degree of agreement with the items on a Likert scale from “*strongly disagree*” (1) to “*strongly agree*” (6). A sample item is “*The only real kind of knowledge we can have is scientific knowledge*”. Cronbach’s  $\alpha = .91$ .

#### *Post-manipulation measures*

*Intention to get vaccinated against COVID-19* was measured by 3 items on a Likert scale from “*completely disagree*” (1) to “*completely agree*” (5) (e.g., “*I intend to get vaccinated against COVID-19*”; adapted from Askelson et al., 2010). Cronbach’s  $\alpha = .98$ .

*Cognitive attitude toward vaccinating against COVID-19* was assessed with 9 items on a semantic differential scale ranging from 1 to 5 (“*Getting the COVID-19 vaccine will be... harmful-beneficial, disadvantageous-advantageous, useless-useful, dangerous-safe, bad-good, worthless-worthwhile, unhealthy-healthy, irresponsible-responsible, not important-important*”). Cronbach’s  $\alpha = .97$ .

*Anticipated positive affective reactions* were assessed with 3 items on a Likert scale from “completely disagree” (1) to “completely agree” (5) (e.g., “If I got the COVID-19 vaccine, I would be proud of myself”; adapted from Conner et al., 2013). Cronbach’s  $\alpha = .91$ .

*Anticipated negative affective reactions* were assessed with 3 items on a Likert scale from “completely disagree” (1) to “completely agree” (5) (e.g., “If I did not get the COVID-19 vaccine, I would regret it”; adapted from Conner et al., 2013). Cronbach’s  $\alpha = .92$ .

The questionnaire required a mandatory answer to each item, so no respondents had missing values.

## **5. Analyses**

Statistical analyses were conducted using SPSS 26. Descriptive statistics were examined for all study variables. In preliminary analyses, we conducted a multivariate analysis of variance (MANOVA) and a Chi-squared test on pre-manipulation measures in order to verify the success of the randomisation. In the main analyses, we used univariate analyses of variance (ANOVA) to examine the differences between conditions in relation to intention (our primary outcome), plus cognitive attitude, anticipated positive and negative affective reactions (our secondary outcomes). These were followed up by post-hoc comparisons (Bonferroni) between each experimental condition and the control condition in order to test RQ1. Where differences between an experimental and control condition were significant, we used parallel mediation analyses to test RQ2. This was performed using the PROCESS macro for SPSS (Hayes, 2012) and tested the mediating effect of cognitive attitude and anticipated affective reactions (positive or negative as appropriate to the experimental condition examined) in the relationship between condition and intention. Bootstrapping was used for coefficient and indirect estimation. Indirect effects were considered statistically significant if the 95% confidence intervals (CIs) did not include zero.

## **6. Results**

### *6.1 Sample characteristics*

Respondents (60.3% women) were aged between 18 and 71 years ( $M = 36.4$ ,  $SD = 13.9$ ). Most reported having middle socioeconomic status (71.5%) and being married or in a romantic relationship (59.7%). Regarding education, 43% had a high school diploma, 36.6% had a degree, while 8.7% only completed compulsory education. Concerning the political orientation, 35.3% declared themselves to be left-wing, 34.5% apolitical, 12.8% right-wing, while the remaining 17.4% declared a different orientation from the previous ones. With regard to religious orientation, the majority of participants (66.3%) defined themselves as Catholic (46.1% not practising and 20.2% practising). As for the experience with Covid-19, 89.5% declared to know someone infected with the virus, whereas only 5.8% reported having been personally tested positive.

Regarding participants' past behaviour about vaccination, most participants (95%) remembered having received all mandatory vaccinations; 19.4% had the influenza vaccine in the past year and 29.1% in past seasons, whereas 34.7% received recommended vaccinations. Full Profile of Respondents is reported in Appendix A, Section 2.

Descriptive statistics for the total sample (Table 1) showed that participants reported very high levels of intention to get vaccinated, cognitive attitude and anticipated affective reactions (both positive and negative), high trust in science, moderate levels of intrinsic religiosity, and low levels of organisational and non-organisational religious activities.

INSERT TABLE 1 HERE

## 6.2 Preliminary analyses

Preliminary analyses were conducted to verify the success of the randomisation. First, a multivariate analysis of variance (MANOVA) was carried out on all psychological pre-manipulation variables (organisational religious activity, non-organisational religious activity, intrinsic religiosity, and trust in science) plus age, showing no significant effect of the condition on such variables ( $F_{(15,1434)} = 1.47$ ;  $p = .11$ ,  $\eta p^2 = .02$ ). In addition, the Chi-square test showed no significant differences among the conditions in relation to socio-demographic characteristics,

experience with COVID-19, and past behaviour about vaccination (all  $p$ s > .12). This supports the success of randomisation.

### 6.3 Main analyses

Analysing differences in intention (primary outcome variable), ANOVA pointed to a small but significant sized effect of condition on intention to get vaccinated ( $F_{(3,480)} = 3.73$ ;  $p < .05$ ,  $\eta p^2 = .02$ ). Post-hoc comparisons between message conditions (cognitive attitude message, cognitive attitude plus positive affect message, cognitive attitude plus negative affect message) and the control group showed that intention was significantly higher ( $p < .01$ ,  $\eta p^2 = .04$ ) in the cognitive attitude plus positive affect message condition ( $M = 4.06$ ;  $SD = 1.12$ ) compared to the control group ( $M = 3.56$ ;  $SD = 1.33$ ). In contrast, no significant differences were found between cognitive attitude message ( $p = .20$ ,  $\eta p^2 = .02$ ) or cognitive attitude plus negative affect message ( $p = .11$ ,  $\eta p^2 = .02$ ) and control conditions.

Considering differences in other post-manipulation variables (secondary outcome variables), ANOVAs showed that condition significantly affected cognitive attitude ( $F_{(3,480)} = 2.94$ ;  $p < .05$ ,  $\eta p^2 = .02$ ), but not anticipated positive affective reactions ( $F_{(3,480)} = 1.76$ ;  $p = .15$ ,  $\eta p^2 = .01$ ) or anticipated negative affective reactions ( $F_{(3,480)} = 2.54$ ;  $p = .06$ ,  $\eta p^2 = .02$ ). Post-hoc comparisons between message conditions and control group in relation to cognitive attitude showed that cognitive attitude was significantly higher ( $p < .05$ ,  $\eta p^2 = .03$ ) in the cognitive attitude plus positive affect message condition ( $M = 4.24$ ;  $SD = .92$ ) compared to the control group ( $M = 3.87$ ;  $SD = 1.10$ ), whereas no significant differences were found between cognitive attitude message ( $p = .74$ ,  $\eta p^2 = .01$ ) or cognitive attitude plus negative affect message ( $p = .31$ ,  $\eta p^2 = .01$ ) and control conditions.

For the sake of brevity and coherently with RQ1, we report only comparisons between experimental conditions and the control group. However, complete post-hoc comparisons on all post-manipulation measures are presented in Appendix A (Section 3).

### 6.4 Mediation analysis

The results of the analysis described above showed that participants in the cognitive attitude plus positive affect message condition (condition 2) reported higher intention to get vaccinated against COVID-19 compared with those in the control group. Accordingly, we evaluated whether the effect of condition 2 versus control on intention was mediated by changes in cognitive attitude and anticipated positive affective reactions. Results of the parallel mediation analysis indicated that the effect of condition 2 versus control on intention (*Direct effect* = .10; 95% CI [-.04, .25]; *Total effect* = .51; 95% CI [.19, .82]) was totally mediated by cognitive attitude (*Indirect effect* = .26; 95% bootstrapped CI [.07, .50]) and anticipated positive affective reactions (*Indirect effect* = .14; 95% bootstrapped CI [.02, .29]). In addition, indirect effect contrasts showed no significant difference between the indirect effects of cognitive attitude and anticipated positive affective reactions (*Effect* = .12; 95% bootstrapped CI [-.08, .37]). Unstandardised path coefficients are displayed in Figure 2. Additional mediation analyses contrasting conditions 1 or 3 and the control condition are reported in Appendix A (Section 3).

INSERT FIGURE 2 HERE

## **7. Discussion and conclusion**

Since the outbreak of the COVID-19 pandemic, the development of a safe and effective vaccine has represented the key weapon on which all the great world powers have invested to finally put an end to the global health and economic emergency. Unfortunately, although in Italy the majority of unvaccinated people intend to get vaccinated, this percentage dropped by 6 points from February to May (from 85% to 79%), according to the last data by the Ipsos company (2021). For this reason, it is important to identify the most effective strategies for promoting intention and actual uptake of the COVID-19 vaccine.

This study aimed to test the effect of persuasive messages focused on both cognitive attitude and anticipated (positive or negative) affective reactions in order to provide new insights into the psychological variables to be targeted in future campaigns aimed at promoting vaccination against COVID-19. In response to RQ1, the results showed that only participants in the cognitive attitude

plus positive affect message condition reported significantly higher intentions to get vaccinated against COVID-19 compared with participants in the control group. This highlights that cognitive attitude and anticipated pride could play a crucial role in the decision-making process related to COVID-19 vaccination. On the other hand, in contrast with studies (e.g., Cox et al., 2014; Ziarnowski et al., 2009) that showed the effectiveness of manipulating anticipated regret to increase vaccination intention, participants exposed to the message focused on cognitive attitude plus anticipated negative affect (regret) did not report higher levels of intention compared with those in the control condition. These findings can have more than one explanation. As Chou and Budenz (2020) suggested, on the one hand, negative emotional appeals tend to be effective in piquing the interest of people who are emotionally disengaged about the promoted behaviour, whereas, on the other hand, they could even be counterproductive when negative emotions are already pervasive in the target population (which may be likely during a global pandemic). In such a context, activating positive affects in relation to the possibility of being vaccinated could be a good strategy to increase intention and counterbalance the possible negative affects aroused by the pandemic and fear of vaccines. Another possible explanation for this result is that anticipated positive affects can represent a drive for action to the extent they are experienced immediately after putting in place the behaviour (Stevens et al., 2019). In the case of COVID-19 vaccination, targeting regret about a future negative outcome (e.g., getting sick or infecting loved ones) that is not necessarily going to occur may not be enough to increase the intention to get vaccinated. Conversely, emphasising pride that one might experience immediately after engaging in the recommended behaviour may be a more salient factor in influencing vaccination-related decision-making.

Moreover, in response to RQ2, our results showed that both cognitive attitude and anticipated positive affective reactions fully mediated the effect of the experimental condition (targeting cognitive attitude and anticipated positive affect) on intention to get vaccinated. Although the messages targeting only cognitive attitude did not prove sufficient in modifying intention, these findings instead show the usefulness of working jointly on cognitive and positive affective aspects

in promoting vaccination intention. Of course, enormous efforts must be devoted to improving people's attitudes toward the vaccine, with particular emphasis on its safety and efficacy aspects, and appealing to affects could represent that extra step that makes the persuasive message really effective. Promoting a more positive approach with respect to vaccination behaviour should take into consideration the process that leads to the intention to vaccinate in its complexity, which includes, without doubt, the role of affective variables.

This study is not without limitations. First of all, data collection started about a month before any COVID-19 vaccine was officially approved, that is, in a period in which accurate information was not available on the characteristics of the candidate vaccines, in particular about its efficacy, safety and the possible side effects. With the start of the vaccination campaign, the intention to get vaccinated may likely have changed in light of the clearer information about the vaccines, the experiences of people who have already received them, and, not less importantly, government decisions and the daily news broadcast by the media. As specified above, the data on the time course of the vaccination campaign in Italy is in line with those of the neighbouring countries of the EU (around 60% of fully vaccinated people). However, the percentage of people still hesitant about the vaccine should not be underestimated, particularly in the older age groups (e.g., over 60s and 70s), where there is currently the lowest adhesion to vaccines (Italian Ministry of Health, 2021b). For this reason, further studies are needed to verify whether the type of persuasive messages that we have identified as the most effective in promoting intention to receive the *future* COVID-19 vaccine also works in increasing intention to get the *currently approved* vaccines and the consequent behaviour and their impact on different socio-demographic groups. Secondly, since we used a convenience sample recruited by advertising the study through various online channels (e.g., Facebook groups), we cannot conclude that our results are generalisable to the general population and, above all, participants that did not already have high levels of vaccination intention. However, the heterogeneity of participants in terms of socio-demographic characteristics may have partially reduced this bias. Thirdly, although in the literature there is no convincing evidence that affective

attitude – unlike anticipated affective reactions – can predict vaccination intention, future studies with larger samples could simultaneously manipulate both components of the attitude (cognitive vs affective) plus anticipated affective reactions to clarify better if and how these processes are mutually exclusive in the context of the decision-making process related to COVID-19 vaccination. In addition, it should be noted that we have not focused on all the variables of the TPB model but only on attitude and intention. Future studies should also consider, for example, the possible effect of subjective norms on the intention to get vaccinated against COVID, since the literature shows that subjective norms, after attitude, are the strongest predictors of vaccination intentions (e.g., Askelson et al., 2010). Injunctive norms, i.e. what significant others (family, friends) think the person should do (to get vaccinated or not), and descriptive norms, i.e. what they do themselves (they intend to get vaccinated or not), are both aspects that could have a substantial impact on the decision-making process that leads to vaccination, especially in consideration of the context uncertainty (e.g., doubts about the safety and efficacy of the vaccines) in which this decision is taken. Furthermore, considering that many countries are starting to vaccinate or consider vaccinating children and young people, studying the impact of social influences appears even more relevant. Indeed, younger people's attitudes towards vaccines appear to be heavily influenced by social norms (Rambout et al., 2014); in this perspective, learning that most people significant to them (e.g., parents or friends) get vaccinated can represent, for the youngest, an important motivational factor.

Finally, we are aware that our results should be interpreted with caution as they indicate a small sized effect. Since changing vaccination intentions presumably requires more than exposure to a single message, it would be unrealistic to expect larger effects. Nevertheless, as Funder and Ozer (2019) highlighted, small effects can matter in the long run, particularly when analysing psychological processes that influence the behaviour of many individuals simultaneously. This is especially true when it comes to vaccination, since increasing the intentions to get vaccinated of even a few people can have huge practical consequences, as vaccinated people protect not

only themselves but also people around them. Also, the result that the exposure to a *single* persuasive message has produced a small but significant effect on intentions appears to us somewhat encouraging, as it suggests that a more structured intervention (e.g., daily exposure to persuasive messages) in larger populations could have a stronger effect.

Despite these limitations, the results of this study demonstrate that persuasive messages targeting cognitive attitude plus anticipated affective reactions could be an effective strategy in increasing the intention to get vaccinated against COVID-19. Surprisingly, most studies that have tested the effectiveness of persuasive messages in the context of vaccination behaviour focused only on the classic distinction between gain-framed and loss-framed messages (e.g., Abhyankar et al., 2008), leaving aside the possible role of the affective components. As far as we know, our is the first study in which the combined effect of affective and cognitive variables is examined. Even though further studies are needed to confirm the efficacy of persuasive messages targeting cognitive attitude plus anticipated positive affective reactions, our results emphasise the need for future COVID-19 (and not only) vaccination promotion campaigns to take into account the role of affective processes in the design and implementation of more effective communication strategies to promote vaccination intention and behaviour. More generally, interventions to increase trust in vaccines, while not directly increasing vaccine uptake, could act indirectly by strengthening the effectiveness of public health policies on vaccination (Brewer et al., 2017). These efforts need to be even more focused when planning to increase COVID-19 vaccination rates, as the development of a new vaccine is always accompanied by fear, indecision, and misinformation, all of which could jeopardise the success of the vaccination campaign and, consequently, the battle against the pandemic.

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Table 1. Descriptive statistics.

	Condition 1	Condition 2	Condition 3	Control condition	Total sample
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
<i>Pre-manipulation measures</i>					
Organisational religious activity	2.42 (1.34)	2.55 (1.50)	2.29 (1.18)	2.63 (1.35)	2.47 (1.35)
Non-organisational religious activity	1.91 (1.43)	2.01 (1.53)	1.81 (1.38)	2.37 (1.76)	2.01 (1.54)
Intrinsic religiosity	2.54 (1.33)	2.63 (1.38)	2.28 (1.26)	2.74 (1.33)	2.54 (1.33)
Trust in science	4.33 (.98)	4.04 (1.08)	4.31 (.98)	3.98 (1.13)	4.17 (1.05)
<i>Post-manipulation measures</i>					
Intention	3.89 (1.14)	4.06 (1.12)	3.92 (1.19)	3.56 (1.33)	3.87 (1.20)
Cognitive attitude	4.06 (.89)	4.24 (.92)	4.11 (.97)	3.87 (1.10)	4.07 (.98)
Anticipated positive affective reactions	3.55 (1.15)	3.77 (1.05)	3.61 (1.13)	3.43 (1.24)	3.59 (1.15)
Anticipated negative affective reactions	3.58 (1.12)	3.83 (1.04)	3.58 (1.13)	3.43 (1.20)	3.61 (1.13)

*Note.* Condition 1 = cognitive attitude message; Condition 2 = cognitive attitude plus positive affect message; Condition 3 = cognitive attitude plus negative affect message.

Figure 1. Participant flow chart.

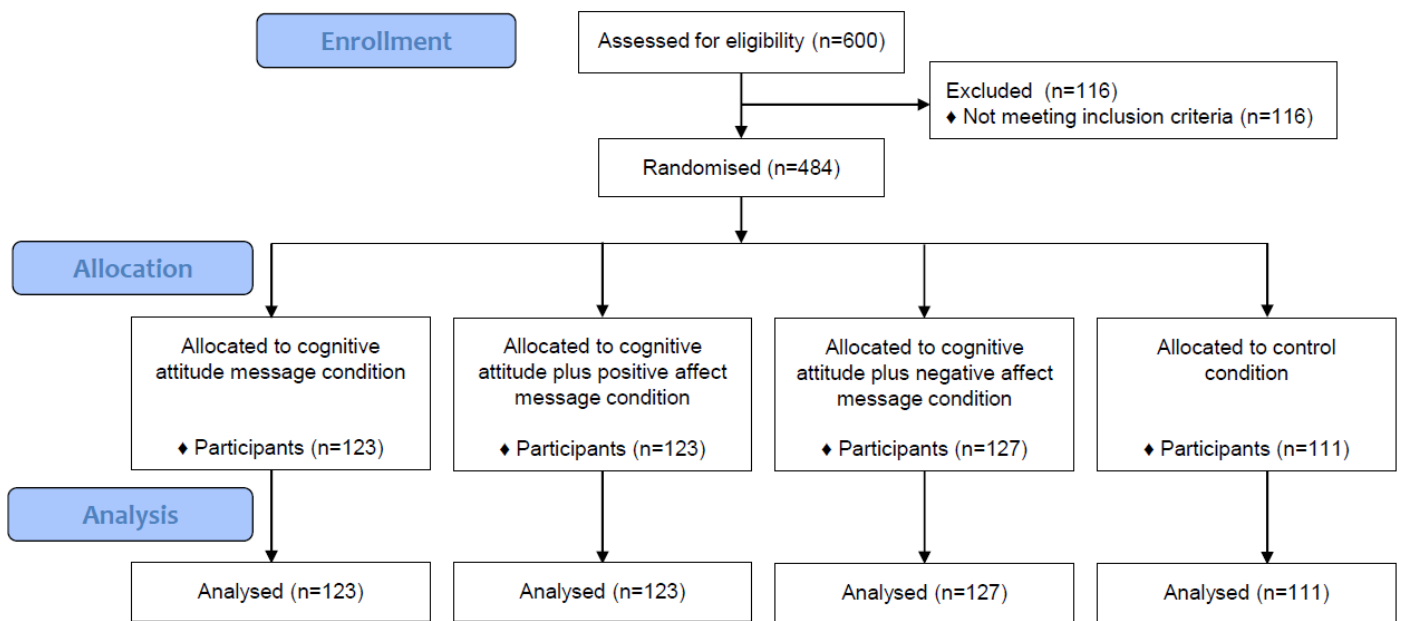
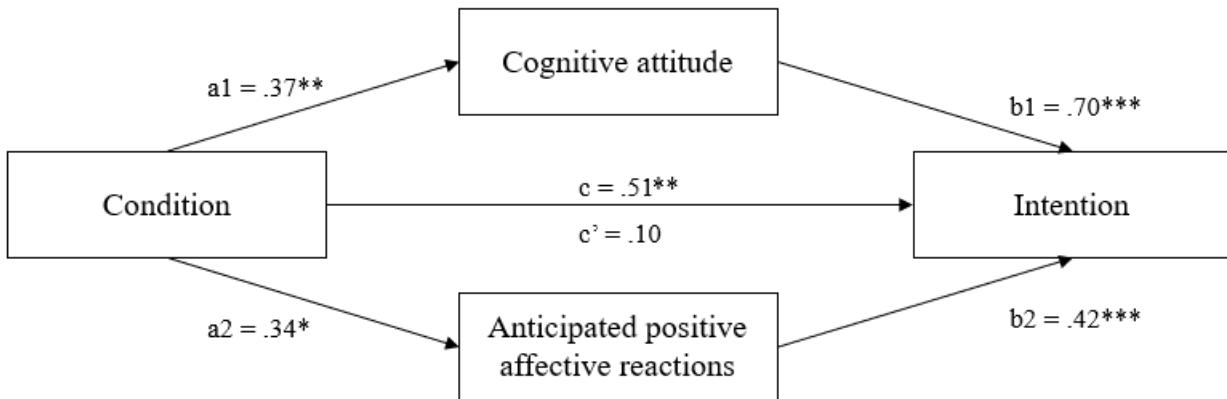


Figure 2. Parallel mediation model via cognitive attitude and anticipated positive affective reactions. Condition indicate difference between cognitive attitude plus positive anticipated affect (condition 2) and control (condition 4).



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

**Anticipating pride or regret? Effects of anticipated affect focused persuasive messages on intention to get vaccinated against COVID-19**

Supplemental Materials

## Section 1. Questionnaire

### *Pre-manipulation measures*

#### **1. Demographic Information**

What is your age?: \_\_\_\_\_

What is your gender?

- Man
- Woman
- I prefer not to specify
- Other (specify): \_\_\_\_\_

What is your level of education?

- Compulsory education
- High school diploma
- Degree
- Post-degree training

How would you define your socio-economic status?

- Extremely low
- Low
- Middle
- High
- Extremely high

Marital status:

- Single
- Married
- In a romantic relationship
- Separated
- Divorced
- Widow/Widower
- Cohabitant

Political orientation:

- Left-wing
- Right-wing

- Centre
- Apolitical
- Other (specify): \_\_\_\_\_

Religious orientation:

- Practising Catholic
- Non-practising Catholic
- Atheist
- Other (specify): \_\_\_\_\_

Do you personally know someone who has been infected with COVID-19?

- Yes
- No

Have you ever been tested positive for COVID-19?

- Yes
- No

## **2. Past behaviour about vaccination**

Did you get the mandatory vaccinations?

- Yes
- No
- I do not remember

Did you get the flu vaccine in the past year?

- Yes
- No

Did you ever get the flu vaccine in past flu seasons?

- Yes
- No

Did you ever get other vaccinations recommended by the Italian Ministry of Health (e.g., HPV, hepatitis A, pneumococcus)?

- Yes
- No
- I do not remember

## **3. Organizational religious activity**

How often do you attend church or other religious meetings?

- Never

- Once a year or less
- A few times a year
- A few times a month
- Once a week
- More than once/week

**4. Non-organizational religious activity**

How often do you spend time in private religious activities, such as prayer, meditation or Bible study?

- Rarely or never
- A few times a month
- Once a week
- Two or more times/week
- Daily
- More than once a day

**5. Intrinsic religiosity**

①	②	③	④	⑤
Definitely not true	Tends not to be true	Unsure	Tends to be true	Definitely true

1. In my life, I experience the presence of the Divine (i.e., God)	①	②	③	④	⑤
2. My religious beliefs are what really lie behind my whole approach to life	①	②	③	④	⑤
3. I try hard to carry my religion over into all other dealings in life	①	②	③	④	⑤

**6. Trust in science**

①	②	③	④	⑤	⑥
Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree

1. Science provides us with a better understanding of the universe than does religion	①	②	③	④	⑤	⑥
2. "In a demon-haunted world, science is a candle in the dark." (Carl Sagan)	①	②	③	④	⑤	⑥
3. We can only rationally believe in what is scientifically provable	①	②	③	④	⑤	⑥
4. Science tells us everything there is to know about what reality consists of	①	②	③	④	⑤	⑥

5. All the tasks human beings face are soluble by science	①	②	③	④	⑤	⑥
6. The scientific method is the only reliable path to knowledge	①	②	③	④	⑤	⑥
7. The only real kind of knowledge we can have is scientific knowledge	①	②	③	④	⑤	⑥
8. Science is the most valuable part of human culture	①	②	③	④	⑤	⑥
9. Science is the most efficient means of attaining truth	①	②	③	④	⑤	⑥
10. Scientists and science should be given more respect in modern society	①	②	③	④	⑤	⑥

*Post-manipulation measures*

**1. Intention to get vaccinated against COVID-19**

①	②	③	④	⑤
Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree

1. I intend to get vaccinated against COVID-19	①	②	③	④	⑤
2. I plan to get vaccinated against COVID-19	①	②	③	④	⑤
3. I will get vaccinated against COVID-19	①	②	③	④	⑤

**2. Cognitive attitude toward vaccinating against COVID-19**

Getting vaccinated against COVID-19 will be...

Harmful				Beneficial
1	2	3	4	5

Disadvantageous				Advantageous
1	2	3	4	5

Useless				Useful
1	2	3	4	5

Dangerous				Safe
1	2	3	4	5

Bad				Good
1	2	3	4	5

Worthless				Worthwhile
1	2	3	4	5

Unhealthy				Healthy
1	2	3	4	5

Irresponsible				Responsible
1	2	3	4	5

Not important				Important
1	2	3	4	5

**3. Anticipated positive affective reactions**

①	②	③	④	⑤
Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree

1. If I got the COVID-19 vaccine, I would be proud of myself	①	②	③	④	⑤
2. If I got the COVID-19 vaccine, I would be satisfied	①	②	③	④	⑤
3. If I got the COVID-19 vaccine, I would feel calm	①	②	③	④	⑤

**4. Anticipated negative affective reactions**

①	②	③	④	⑤
Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree

1. If I did not get the COVID-19 vaccine, I would regret it	①	②	③	④	⑤
2. If I did not get the COVID-19 vaccine, I would worry	①	②	③	④	⑤
3. If I did not get the COVID-19 vaccine, I would feel guilty	①	②	③	④	⑤

## Section 2. Profile of Respondents

### *Socio-demographic characteristics*

Variable	Frequency	%
<b>Age</b>		
18-29	217	44.8
30-39	68	14
40-49	75	15.5
50-59	108	22.3
>59	16	3.3
<b>Gender</b>		
Man	192	39.7
Woman	292	60.3
<b>Education</b>		
Compulsory education	42	8.7
High school diploma	208	43
Degree	177	36.6
Post-degree training	57	11.8
<b>Socio-economic status</b>		
Extremely low	7	1.4
Low	59	12.2
Middle	346	71.5
High	70	14.5
Extremely high	2	.4
<b>Marital status</b>		
Single	142	29.3
Married	177	36.6
In a romantic relationship	112	23.1
Separated	12	2.5
Divorced	6	1.2
Widow/Widower	4	.8
Cohabitant	31	6.4
<b>Political orientation</b>		
Left-wing	171	35.3
Right-wing	62	12.8
Center	62	12.8
Apolitical	167	34.5
Other	22	4.6

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<b>Religious orientation</b>		
Practicing Catholic	98	20.2
Non-practicing Catholic	223	46.1
Atheist	124	25.6
Other	39	8.1

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*Past behaviour about vaccination*

Variable	Frequency	%
<b>Mandatory vaccinations</b>		
Yes	460	95
No	5	1.1
I do not remember	19	3.9
<b>Flu vaccination (past year)</b>		
Yes	94	19.4
No	390	80.6
<b>Flu vaccination (past flu seasons)</b>		
Yes	141	29.1
No	343	70.9
<b>Recommended vaccinations</b>		
Yes	168	34.7
No	181	37.4
I do not remember	135	27.9

### Section 3. Additional outputs

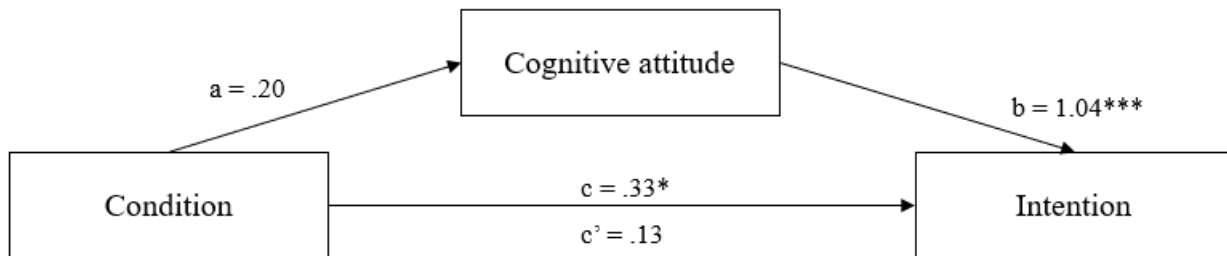
*Complete post-hoc comparisons on all post-manipulation measures*

Dependent Variable	(I) CONDITION	(J) CONDITION	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intention	1	2	-.173	.152	1.000	-.577	.223
		3	-.035	.151	1.000	-.435	.365
		4	.333	.156	.200	-.08	.747
	2	3	.138	.151	1.000	-.261	.538
		4	.507*	.156	.008	.093	.921
	3	4	.368	.155	.107	-.042	.779
Cognitive attitude	1	2	-.176	.124	.930	-.504	.152
		3	-.050	.123	1.000	-.375	.275
		4	.196	.127	.745	-.141	.532
	2	3	.126	.123	1.000	-.199	.456
		4	.371*	.127	.021	.035	.708
	3	4	.245	.126	.313	-.089	.579
Anticipated positive affective reactions	1	2	-.214	.146	.855	-.600	.172
		3	-.053	.144	1.000	-.437	.330
		4	.123	.150	1.000	-.273	.520
	2	3	.160	.145	1.000	-.223	.544
		4	.338	.150	.147	-.059	.734
	3	4	.177	.149	1.000	-.217	.570
Anticipated negative affective reactions	1	2	-.247	.143	.515	-.626	.133
		3	0	.142	1.000	-.377	.377
		4	.151	.147	1.000	-.239	.540
	2	3	.247	.142	.501	-.130	.623
		4	.397*	.147	.043	.007	.787
	3	4	.151	.146	1.000	-.236	.538

*Note.* The mean difference is significant at the 0.05 level. Condition 1 = cognitive attitude message; Condition 2 = cognitive attitude plus positive affect message; Condition 3 = cognitive attitude plus negative affect message. Condition 4 = Control condition.

*Additional mediation analyses*

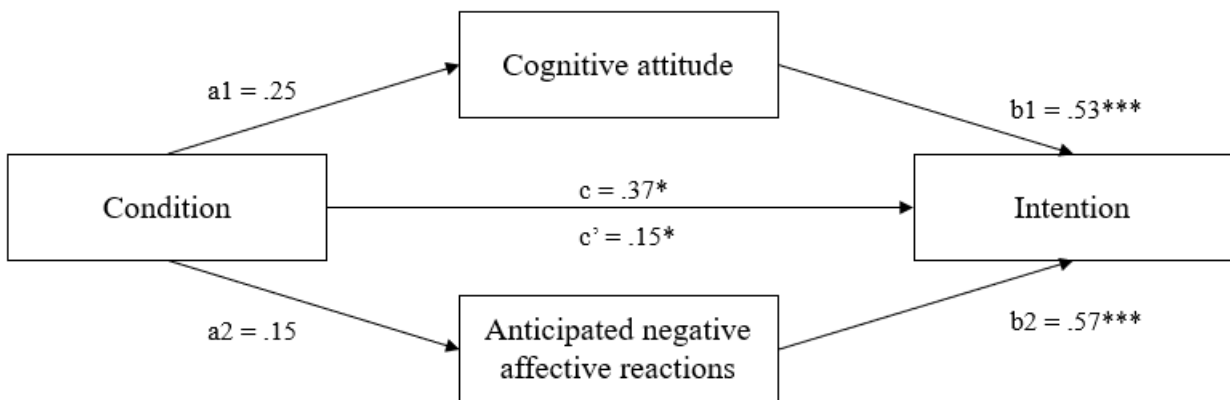
*1. Simple mediation analysis via cognitive attitude – Condition 1 vs Control Condition*



\* $p < .05$ ; \*\*\* $p < .001$ . Unstandardised path coefficients.

Results of the simple mediation analysis indicated that the effect of condition 1 versus control on intention (*Direct effect* = .13; 95% CI [-.04, .30]; *Total effect* = .33; 95% CI [.02, .65]) was not significantly mediated by cognitive attitude (*Indirect effect* = .20; 95% bootstrapped CI [-.07, .47]).

*2. Parallel mediation analysis via cognitive attitude and anticipated negative affective reactions – Condition 3 vs Control Condition*



\* $p < .05$ ; \*\*\* $p < .001$ . Unstandardised path coefficients.

Results of the parallel mediation analysis indicated that the effect of condition 3 versus control on intention (*Direct effect* = .15; 95% CI [.02, .29]; *Total effect* = .37; 95% CI [.05, .69]) was not significant mediated neither by cognitive attitude (*Indirect effect* = .13; 95% bootstrapped CI [-.01, .28]) nor anticipated negative affective reactions (*Indirect effect* = .09; 95% bootstrapped CI [-.08, .26]).

## Section 4. Messages

Condition 1: cognitive attitude message



Ministero della Salute



[www.salute.gov.it/nuovocoronavirus](http://www.salute.gov.it/nuovocoronavirus)

**The COVID-19 vaccine  
will be available soon**

**The vaccine will be  
the **safest** and **most effective** means  
of preventing COVID-19**

**Choose to get vaccinated  
Protect yourself and others!**

Condition 2: cognitive attitude plus positive affect message



Ministero della Salute



[www.salute.gov.it/nuovocoronavirus](http://www.salute.gov.it/nuovocoronavirus)

**The COVID-19 vaccine  
will be available soon**

**The vaccine will be  
the **safest** and **most effective** means  
of preventing COVID-19**

**Choose to get vaccinated  
Feel proud about taking the opportunity  
to protect yourself and others!**

Condition 3: cognitive attitude plus negative affect message



Note. All the messages have been translated into English for the report.