**Planning for a COVID-19 Vaccination Campaign: The Role of Social Norms, Trust,
Knowledge, and Vaccine Attitudes**

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Abstract

Building public trust and willingness to vaccinate against COVID-19 is as important as developing a safe and effective vaccine to contain the pandemic. Based on the theory of normative social behavior, trust, and the theory of planned behavior, this study tests a comprehensive model for COVID-19 vaccine intentions using a national sample survey of the New Zealand public ($N=1040$). Among the factors assessed in the study, attitudes towards vaccine was most strongly associated with COVID-19 vaccination intentions, followed by trust in mass media, and social norms. While COVID-19 knowledge was associated with COVID-19 vaccine intention, it was not associated with willingness to pay or get on a COVID-19 vaccine list. In contrast, communication competence was not associated with COVID-19 vaccine intention but was significantly associated with willingness to pay or get on a COVID-19 vaccine list. Findings can help inform theory and practice of health campaigns to fight vaccine disinformation and increase COVID-19 vaccine uptake, when available.

Keywords: COVID-19; Vaccine; Social norms; COVID-19 knowledge; Trust; Competency; SARS-CoV-2

Planning for a COVID-19 Vaccination Campaign: The Role of Social Norms, Trust, Knowledge, and Vaccine Attitudes

The coronavirus disease 2019 (COVID-19) has resulted in over 1.27 million deaths and over 50 million cases across 227 countries and territories as of November 2020. The global economic cost of the COVID-19 pandemic is estimated to reach \$9 trillion in next few years (Battersby et al., 2020). Several countries have reported recent surges in infection rates and return of lockdowns, such as Australia, Germany, and France, among others. With 25 deaths, New Zealand has been one of the few countries that has been largely successful in containing the COVID-19 spread so far, due to tough border controls and effective contact tracing (World Health Organization, 2020).

There is an unprecedented scientific endeavor underway to develop a vaccine against the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), the virus that causes COVID-19. Just as important as developing a COVID-19 vaccine is to develop public enthusiasm for vaccination. Public health experts estimate that at least 75% of the population need to vaccinate against COVID-19, when available, if the vaccine efficacy is about 70%; with lower vaccine efficacy, as is currently predicted, the proportion of population that needs to be vaccinated against COVID-19 increases substantially (Bartsch et al., 2020). However, public opinion surveys indicate a significant proportion of the population, about 20-30%, do not intend to get the COVID-19 vaccine when available (Ipsos, 2020; O’Keefe, 2020). In Australia (Rhodes et al., 2020), Italy (Palamenghi et al., 2020), Germany (Deutsche Welle, 2020), for example, there has been a decline in public willingness to get a COVID-19 vaccine.

Public attitudes towards vaccine importance, safety, and effectiveness has remained largely stable in New Zealand (de Figueiredo et al., 2020). While a majority of the New Zealand public say vaccines are important (67% in 2015 and 2019), about half of the public

has consistently remained hesitant towards vaccine safety (45% in 2015 and 40% in 2019) or vaccine effectiveness (58% in 2015 and 2019). In New Zealand, more than 2000 cases of measles outbreak—the most in two decades—was reported in 2019 (Turner, 2019). Of concern, the measles outbreak was exported to the Pacific island nations, which are already vulnerable due to reduced health care access. Historically, New Zealand has never reached the measles vaccination coverage of 95% as recommended by the World Health Organization. It was a timely reminder for the need of health campaigns to address the enduring rates of vaccine hesitancy and refusal.

There is an urgent need to understand factors that shape public attitudes towards COVID-19 vaccine so that public health officials and other stakeholders can provide information that addresses and assuages public concerns and increases COVID-19 vaccination rates, when a vaccine becomes available. Given the novelty of the disease and the uncertainty related to vaccine availability, this study adopts an integrative framework by aligning key theoretical concepts of social norms from the theory of normative social behavior (e.g., Rimal & Lapinski, 2015), trust (e.g., Earle, 2010; Larson et al., 2018; Liu & Yang, 2020), and theory of planned behavior (Ajzen, 1991). An integrative approach is likely to help identify important factors that drive vaccination intentions as “Vaccination represents a set of behaviors in an applied setting and thus is not the domain of any single psychological theory” (Brewer et al., 2017, p. 187).

Specifically, using data from a national sample survey of adults in New Zealand, the current study examines factors associated with intentions to get a COVID-19 vaccine, including perceived impact, descriptive and injunctive norms, trust in informational sources, perceived competency of the government, COVID-19 knowledge, attitudes towards vaccines, and self-reported previous vaccination behavior. The study tests not only a generalized intention for a COVID-19 vaccine, but also individuals’ willingness to pay for the vaccine

and willingness to put their name on a vaccine list, as previous studies indicate individuals make different judgments based on vaccine accessibility (Harapan et al., 2020; Lin et al., 2020). Such a comprehensive model provides a more robust understanding of factors that shape COVID-19 vaccination intentions.

Literature Review

Social Norms and Vaccination Intentions

According to the theory of normative social behavior (Cialdini et al., 1991; Rimal & Lapinski, 2015), individuals' behaviors are shaped by beliefs about how others in their social group are behaving (descriptive norms) and the perceived social pressure to follow such behaviors (injunctive norms). A number of studies show the impact of both descriptive and injunctive social norms on a variety of behaviors, including intentions for screening for diseases (Juon et al., 2017; Smith-McLallen & Fishbein, 2008) as well as intentions to vaccinate against a number of diseases (e.g., Bradshaw et al., 2020; Chen et al., 2020; Xiao, 2019; Xiao & Borah, 2020).

Descriptive norms trigger beliefs that a common behavior is normal, beneficial, and effective (Cialdini et al., 1991). For example, Streefland and colleagues (1999) conducted ethnographic studies in six countries and found that parents have their children vaccinated because everybody is doing it and as it appears the normal thing to do. Injunctive norms activate individuals' motivation for group-affiliation, where their behaviors are shaped by perceptions of social rewards and retribution (Cialdini et al., 1991). A number of experimental and survey-based studies from diverse samples such as college students' (Lee & Su, 2020; Xiao & Borah, 2020), parents (e.g., Bradshaw et al., 2020), and general population (e.g., Juon et al., 2017; Smith-McLallen & Fishbein, 2008; also see Brewer et al., 2017) find a positive association between social norms and health behaviors including vaccination intentions.

In a systematic review of vaccine uptake during the 2009 H1N1 influenza pandemic, Bish et al., (2011) found that beliefs that family and friends have been vaccinated, or descriptive norms, and that others would want you to be vaccinated, or injunctive norms, were associated with both intention as well as actual uptake of vaccination. As Rimal and Storey (2020) reminded, “Because COVID-19 is a new pandemic and the science behind it is evolving, many behavioral decisions are made with uncertainty, which elevates the prominence of normative influence” (p. 1). Based on these previous studies on the association between social norms and vaccination intentions, this study tests the following:

H1: Descriptive norms will be positively associated with COVID-19 vaccine intentions.

H2: Injunctive norms will be positively associated with COVID-19 vaccine intentions.

Trust in Informational Sources

While trust has been a central component in several health and science communication studies, there is a “conceptual confusion” (Lewis & Weigert, 1985, p. 975) about the definition of trust (see Schäfer, 2016; Hendriks et al., 2015). Here, the definition of trust as commonly accepted is used (Earle, 2010; Poortinga & Pidgeon, 2003), as “a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another” (Rousseau et al., 1998, p. 395). In line with recent conceptualization and measurement of trust (Hendriks et al., 2015), it is inferred as comprising competence, integrity, and benevolence.

Particularly, media as trust intermediary between scientists and public deserves our attention as public primarily comes to know about scientific breakthroughs through media. As Schäfer (2016) argued, trust in science and trust in media as a source of information has to

be distinguished to “enable researchers to assess the relative importance of both factors in the production of mediated trust in science” (p. 3).

A large and substantial body of research elucidates that for individuals, information from a trusted source helps reduce cognitive effort and provides a short-cut to make judgements about an issue (e.g., Hmielowski et al., 2013; Malka et al., 2009; Poortinga & Pidgeon, 2003; Siegrist et al., 2005; Slovic, 1993). Individuals are cognitive misers (Fiske & Taylor, 1991) and they may not have either the required time or cognitive ability to understand any one particular issue comprehensively, especially for a complex and emerging pandemic such as the coronavirus that continues to challenge scientists.

A number of studies show that trust in scientists, government, mass media are important determinants of vaccination intentions and behavior (Bradshaw et al., 2020; Cadeddu et al., 2020; de Figueiredo et al., 2020). Liu and Yang (2020) found that trust was positively associated with vaccination intention and was one of the strongly associated factors with intention for a domestic vaccine (compared to imported vaccine, where trust was not significantly associated). However, their study only tested trust in government. Krishna (2018) found that trust in Centers for Disease Control and trust in healthcare professionals was associated with less negative attitudes towards vaccines, which in turn, was associated with intention to vaccinate. However, trust in government and in pharmaceutical companies was not associated with attitudes about vaccines. Further, a key limitation of these studies is lack of measurement of trust in different agencies, particularly trust in mass media (Freimuth et al., 2017; Larson et al., 2018), trust in family and friends (de Figueiredo et al., 2020) as well as measurement of the competence dimension of trust (Larson et al., 2018). Further, this study also tests trust in Jacinda Ardern, the Prime Minister of New Zealand, who was globally acknowledged as leading a successful plan to contain COVID-19 community transmission (Farrer, 2020). That is, we test if trust and competency of government officials

in particular and in government in general factor in public attitudes and intentions for COVID-19 vaccination.

H3: Trust in mass media will be positively associated with COVID-19 vaccine intentions.

H4: Trust in family and friends will be negatively associated with COVID-19 vaccine intentions.

H5: Trust in Jacinda Ardern will be negatively associated with COVID-19 vaccine intentions.

H6: Perceived communication competence will be positively associated with COVID-19 vaccine intentions.

Knowledge

Knowledge about health issues is a central component of health literacy and is considered a prerequisite for health decision-making process, including vaccination intentions (Chen et al., 2020; World Health Organization, 2019). A number of studies show a positive association between knowledge about a disease as well as knowledge about vaccines as positively associated with vaccine intentions. For example, Schulz and Hartung (2020) found that general vaccination knowledge has the most consistent impact on vaccination behavior across six different vaccines such as tetanus, measles, influenza and others, as well as willingness to recommend these vaccines to others. Krishna (2017) found that lack of scientifically accurate knowledge influenced negative attitudes toward vaccine, which in turn impacted vaccination behavioral intention. Chen et al., (2020) found that knowledge moderated the negative association between exposure to conspiracy theories and vaccine intentions. Liu and Yang (2020) found that vaccine knowledge was one of the strongest factors associated with vaccination intention in China even if one had to pay for the vaccines. However, they reported no significant association between either HPV (Human

papillomavirus) knowledge or vaccine knowledge on intentions for HPV vaccine, with or without costs in the US sample. Lin et al., (2020) found that while HPV related knowledge was associated with intentions for HPV vaccination, knowledge was not associated with willingness to pay for a vaccine. In contrast, Harapan et al., (2020) found that knowledge about Zika was associated with willingness to pay for a hypothetical Zika vaccine in Indonesia. Based on the mixed findings between knowledge and different motivations for vaccination, this study tests the following:

H7: COVID-19 knowledge will be positively associated with COVID-19 vaccine intentions.

Attitudes towards Vaccines

According to theory of planed behavior (Ajzen, 1991), attitudes and norms lead to behavioral intentions, which in turn, serve as a proximal predictor of behaviors. Attitudes can be defined as a “disposition to respond positively or negatively toward a particular object, for example, a person, issue, or organization” (Binder et al., 2009, p. 316; also see Fazio, 1986). Vaccination attitudes can be defined as expression of support or hesitancy across different vaccines (e.g., Yaqub et al., 2014). Attitudes towards vaccines is comprised of both affective (e.g., getting vaccine is desirable) and cognitive dimensions (e.g., getting vaccine is effective) (e.g., Xiao, 2019). A number of studies show a positive association between attitudes and intentions for vaccination (Brewer et al., 2017; Krishna, 2018; Xiao, 2019). For example, Krishna (2018) found that negative attitudes towards vaccines was associated with lower intentions for vaccination. Lin et al., (2020) found that while HPV related attitudes was associated with intentions for a HPV vaccination, these attitudes were not associated with willingness to pay for a vaccine.

H8: Vaccine attitudes will be positively associated with COVID-19 vaccine intentions.

Apart from attitudes, previous vaccination behavior has also been found to shape vaccine intention. For example, Liu and Yang (2020) found that previous vaccination was the strongest factors associated with vaccination intention compared with other factors considered in their study. Recently, Southwell et al., (2020) also found that past behavior concerning influenza preventive action predicts COVID-19 vaccination, even though influenza and COVID-19 stem from distinct viruses, suggesting that future prevention behavior may be rooted in part in preexisting prevention behaviors. As Southwell et al., (2020) was the only recent study to test this, the following hypothesis is proposed:

H9: Previous vaccination behavior will be positively associated with COVID-19 vaccine intention.

Method

A nationally representative sample survey ($N=1040$) of the New Zealand adults was conducted in July 2020, after the country was briefly at the Alert Level 1, with fewer restrictions. The web-based survey was fielded by Qualtrics, using their representative online panel. The average time to complete the survey was 22 minutes. Ethics approval was filed at the human research review board at (anonymized for peer review) university and the study was determined to be exempt from a full review. Participants provided informed consent after reading brief aims of the survey. The data was weighted based on age, sex, education, and ethnicity, post-survey, to account for slight difference between the sample and the census estimates. The Table 1 provides the descriptive statistics of the sample along with the Census estimates. *[Table 1 near here]*.

Measures

COVID-19 Vaccination Intentions

Following previous studies (e.g., Liu & Yang, 2020) and recent surveys (O'Keefe, 2020; Reiter et al., 2020), COVID-19 vaccination intention was measured using three items.

The three questions started with a prompt, “How much do you agree or disagree with the following statements,” and was measured on a 5-point scale from “*strongly agree*,” to “*strongly disagree*,” with “*neither agree nor disagree*” as the mid-point of the scale. The scales were reverse coded so that higher scores indicate more willingness to get a COVID-19 vaccine. The three measures were: (1) “I intend to get vaccinated against the coronavirus,” ($M = 3.84$, $SD = 1.24$) (2) “I will get vaccinated against the coronavirus even if I must pay for the vaccine,” ($M = 3.45$, $SD = 1.37$) and (3) “I am willing to put my name on the list to get vaccinated against the coronavirus” ($M = 3.59$, $SD = 1.33$). The three measures were tested independently to identify unique factors predicting each of them as paying for a vaccine in contrast to a free vaccine may factor a different psychological mechanism, as mentioned above.

Social Norms

Similar to previous studies, descriptive norms were measured as perceived prevalence of protective behaviors on a 5-point scale, *strongly disagree* to *strongly agree*, “Most of my family and friends took action to limit the spread of the coronavirus” ($M = 4.51$, $SD = .84$) and “Most people in my neighborhood took action to limit the spread of the coronavirus” ($M = 4.18$, $SD = .94$). The mean of two items was used for a descriptive norms measure ($M = 4.34$, $SD = .81$, $r = .64$). Injunctive norms were measured as perceived peer approval, “My family and friends would disapprove of me if I did not take action to limit the spread of the coronavirus” ($M = 4.11$, $SD = 1.09$) and “People in my neighborhood would disapprove of me if I did not take action to limit the spread of the coronavirus” ($M = 3.99$, $SD = 1.07$). The average of the two items was used as a measure of injunctive norms ($M = 4.04$, $SD = .99$, $r = .71$).

Knowledge about COVID-19

Knowledge about COVID-19 was assessed using eleven questions, measured dichotomously (*True* or *False*). All scientifically accurate statements were coded 1. These statements referred to scientifically accurate information relating to symptoms (dry cough (*True*, 1, 87%), fever (93%)), spread of the disease without showing symptoms (93%), protection (frequent hand washing (97%), avoiding large gatherings (92%), keep 6-feet distance (74%)), and cure (“there is currently no cure for the coronavirus,” 81%). Five statements were scientifically inaccurate, including on impact on elderly (“only elderly people get infected,” *False*, coded as 1, 94%), and protection (“Hydroxychloroquine can prevent or kill coronavirus,” *False*, 1, 84%; “antibiotics can prevent or kill the coronavirus,” *False*, 1, 84%; “exposure to sun or extreme heat can prevent or kill the coronavirus,” *False*, 1, 76%). Similarly, the respondents who correctly identified conspiracy theories as false were coded as 1 (“5G towers are spreading coronavirus,” *False*, 1, 93%; “Bill Gates may have created the coronavirus to profit,” *False*, 1, 90%; “coronavirus was created in a lab,” *False*, 1, 66%). The scientifically accurate answers were summed to create an index of knowledge about COVID-19 ($M = 9.58$, $SD = 1.56$; KR-20 (Kuder-Richardson Formula 20) = .58).

Previous Vaccination Refusal

Based on a five-point scale, from “*strongly disagree*,” to “*strongly agree*,” participants were asked to respond to (1) “I have previously refused vaccination” ($M = 1.97$, $SD = 1.33$) and “I have previously refused to get my child vaccinated” ($M = 1.84$, $SD = 1.18$). The two items were strongly correlated ($r = .73$, $p < .001$) and their average was used as a measure of previous vaccination refusal ($M = 1.90$, $SD = 1.17$).

Attitudes Towards Vaccines

Attitudes towards vaccines were assessed by a measure adapted from previous studies (e.g., Xiao, 2019). Respondents rated, “Generally speaking, how do you feel about vaccines?” on a scale consisting of six 1-7 semantic differential items (bad/good,

unpleasant/pleasant, undesirable/desirable, useless/useful, worthless/valuable, ineffective/effective) (Cronbach's $\alpha = .94$, $M = 5.39$, $SD = 1.59$). Higher scores indicate more favorable attitudes.

Trust

Similar to the above measure, trust in mass media was measured using 5 items on a five-point scale, *strongly distrust* to *strongly trust*: (1) national newspapers such as *New Zealand Herald* ($M = 3.39$, $SD = 1.17$), (2) online news such as *Stuff.co.nz* (a popular national news website in New Zealand) ($M = 3.31$, $SD = 1.20$), (3) radio such as *RNZ* (Radio New Zealand, a national radio similar to *BBC*) ($M = 3.54$, $SD = 1.05$), (4) international newspapers such as *The Guardian* and *New York Times* ($M = 3.06$, $SD = 1.18$), and (5) TV news ($M = 3.66$, $SD = 1.17$). The 5 items were added to create an index of trust in mass media (Cronbach's $\alpha = .84$, $M = 3.39$, $SD = 0.91$).

Trust in family and friends as a source of accurate information was measured using a single item on a 5-point scale, *strongly distrust* to *strongly trust* ($M = 3.82$, $SD = 0.91$). Similarly, trust in the Prime Minister Jacinda Ardern was measured using a single item on a 5-point scale ($M = 3.97$, $SD = 1.23$).

Communication Competence. Respondents assessed government's competence following the prompt, "On a scale of 0 -10, where 0 refers to poor performance and 10 to best performance, how would you rate the government's response to the coronavirus?" The items included (1) "communication about the rules of the lockdown," ($M = 8.13$, $SD = 2.08$), (2) "communication about different levels of the lockdown," ($M = 8.25$, $SD = 2.04$), (3) "communication about government support for individuals," ($M = 7.61$, $SD = 2.27$), (4) "communication about government support for businesses," ($M = 7.71$, $SD = 2.19$), (5) "Jacinda Ardern's communication during the lockdown," ($M = 8.44$, $SD = 2.25$), and (6) "Ashley Bloomfield's communication during the lockdown," ($M = 8.19$, $SD = 2.40$) (Ashley

Bloomfield is the Director-General of Health, a role similar to Dr. Anthony Fauci in the US).

The six items were added to compute an index of competence ($M = 8.06$, $SD = 1.91$; r 's ranged from .57 to .84, $p < .001$; Cronbach's $\alpha = .93$, Kaiser-Meyer-Olkin measure = .90, Bartlett's test of sphericity ($\chi^2 (15) = 5157.16$, $p < .001$)).

Covariates

A range of demographic variables were tested in the model, including gender (Female, 51%, Male, 49%), age ($M = 3.59$, $SD = 1.69$), education (no education (19%), post-school certification (54%), and graduate degree and above (27%), $M = 2.07$, $SD = .67$), income ($M = 2.76$, $SD = 1.69$), parental status (1, 60%), currently employed (1, 49%), and marital status (1, married or currently in some form of civil or legal partnership, 56%). Ethnicity was measured using the New Zealand Census and was dummy coded comparing Asians with other ethnicities. Impact of COVID-19 was measured as average of two dichotomous items, lost a job (*Yes*, 1, 14%) and lost income from a job or business (*Yes*, 1, 33%).

Results

The correlations between key variables are presented in Table 2 [Table 2 near here]. The multivariate results are presented in Table 3. H1 was not supported but the association between descriptive norms and the three measures of COVID-19 vaccine intentions were significant but negative. H2 was supported; there is a significant positive association between injunctive norms with COVID-19 vaccine intention ($\beta = .09$, $p < .01$), including willingness to pay for the COVID-19 vaccine ($\beta = .06$, $p = .05$) and to put their name on a list to get the vaccine ($\beta = .11$, $p < .001$). H3, which suggested a positive association between trust in mass media and COVID-19 vaccine intentions, was supported. There was no significant association between trust in family and friends and the three COVID-19 vaccine intention measures; H4 was not supported. H5 was supported as there was a positive association

between trust in Jacinda Ardern and COVID-19 vaccine intentions. H6 was partly supported; while there was no significant association between perceived communication competence and intention for COVID-19 vaccine ($\beta = .05, p = .13$), a significant positive association was found between competence and willingness to pay for the vaccine ($\beta = .07, p < .05$) and put their name on a list for the vaccine ($\beta = .08, p < .05$). [Table 3 near here].

H7 was partly supported as knowledge was positively associated with COVID-19 vaccine intention ($\beta = .06, p < .05$) but not with either willingness to pay ($\beta = .05, p = .08$) or with putting name on a list for a vaccine ($\beta = .03, p = .28$). Vaccine attitudes was one of the strongest correlates of the three measures of COVID-19 vaccine intentions, supporting H8. No support was found for H9 as there was no significant association detected between previous vaccination behavior and intentions for get a COVID-19 vaccine.

Discussion

The central finding of this study is that while factors associated with COVID-19 vaccine intentions were largely similar, there are important differences between a general acceptance for a COVID-19 vaccine and willingness to pay or put their name on a list to get a vaccine when available. This finding highlights the need to test different measures for vaccination intentions and identify how key factors shape these differences in intentions.

Contrary to expectations, there was a consistent negative and significant association between descriptive norms and the three measures of COVID-19 vaccine intentions. In contrast, there was a consistent positive association between injunctive norms and COVID-19 vaccine intentions, including willingness to pay and put their name on a list to get a COVID-19 vaccine. While these findings are in contrast to our expectations, they are consistent with few prior studies. For example, Smith-McLallen and Fishbein (2008) found that while descriptive norms were not associated with cancer screening intention, injunctive norms were positively associated with cancer screening intention, including mammography, colonoscopy,

and PSA testing. A recent experimental study showed that compared to a basic information control, exposure to information about positive and negatively worded descriptive norms were not associated with HPV vaccine intention. Exposure to injunctive norm messages, in contrast, increased intention to seek further information about HPV vaccination, which in turn enhanced intention to get the vaccine (Xiao & Borah, 2020).

It is possible that for health behaviors such as vaccination against infectious diseases, where actions of other members in a group or neighborhood can safeguard public health, the higher the perceived prevalence of a healthy behavior, the lower the motivation for an individual to repeat that behavior. That is, if an individual believes that others will follow protective behaviors such as getting vaccinated, they may free ride on the effort of others, particularly when the efficacy, safety, and importance of a vaccine is unknown. Many of the perceived norms about COVID-19 safety behaviors, such as handwashing and vaccination (when that occurs) are private and likely imagined. Such imagined norms may be considered less trustworthy and may carry less force in shaping behavior. In alignment with Rimal and Storey (2020) recommendation, future research should test how more information about COVID-19 vaccine in media and through social media shapes perceived norms about vaccine acceptance. The influence of social norms on COVID-19 vaccination intentions is particularly important to study given the need to achieve “herd immunity.” Herd immunity refers to the concept that a population can be protected from infectious diseases if a threshold of vaccination is reached (Bartsch et al., 2020).

Trust in mass media, Prime Minister Jacinda Ardern, and in perceived communication competence of the government were positively associated with COVID-19 vaccine intentions, as expected. Importantly, while there was no significant association between perceived communication competence and intention for COVID-19 vaccine, there was a significant positive association between competence and willingness to pay for the vaccine

and to get on a list for the vaccine. It is possible that the issue of competence surfaces when individuals need to take a more motivated action and may reflect a cognitive effort. This is probably a warning sign to governments that have largely failed to contain the virus transmission, such as the U.S., India, several European countries, among others. Perceived competence is associated with heightened commitment to get a COVID-19 vaccine.

The role of knowledge was in contrast to the pattern of association between competence and the three COVID-19 vaccine intentions. While knowledge was positively associated with a general COVID-19 vaccine intention, its association was insignificant with willingness to pay or put name on a list for a vaccine. This finding is similar to another study in the US that found a moderate association between COVID-19 knowledge and intention to vaccinate against COVID-19 (Reiter et al., 2020). Previous studies show a positive association between vaccine knowledge and vaccine intention (Krishna, 2018; Schulz & Hartung, 2020). Chen et al., (2020) found that for individuals who were not knowledgeable enough were more susceptible to health misinformation in the media. Experimental studies show potential to correct health misinformation (Walter et al., 2020). This study provides a more nuanced finding on the role of knowledge in affecting vaccination intentions such that while knowledge is important but probably not a strong motivator for vaccination intention when individuals are asked to take on additional roles.

Positive attitudes towards vaccines was one of the most strongly associated factors of COVID-19 vaccine intention, similar to several studies (Krishna, 2018; Larson et al., 2016). It appears that public attitudes to specific vaccines, including a potential COVID-19 vaccine, are driven by a generalized attitude towards vaccines (Southwell et al., 2020). According to the World Health Organization (WHO) (2019), vaccine hesitancy is one of the 10 most important health threats to the world. Vaccination rates have seen a decline across the world and as a result, the WHO established the Vaccine Confidence Project (VCP) to develop

systematic approaches to monitor public attitudes towards vaccine and help increase vaccination rates (e.g., Larson 2015; 2016). A recent study of 149 countries, including 284,381 respondents, shows that public confidence has slightly increased in some European countries while declining in other countries (de Figueiredo et al., 2020). It is possible that vaccine attitudes account for a large variance in previous vaccination behavior, which was not significantly associated with intentions for get a COVID-19 vaccine. It is important for continuous and more comprehensive assessment to monitor public attitudes towards vaccines.

Limitations

The findings of this cross-section survey need to be replicated in other countries as well as tested longitudinally to identify how changing information about a potential COVID-19 vaccine shapes public behavioral intention to get the vaccine, even public willingness to pay for the vaccine. It cannot be ruled out that the mixed findings about social norms in the study could be due to the measure of social norms used in the study—perceived norms about actions to limit the spread of the coronavirus—which was not aligned with the specific behavior being tested—vaccine intention. Future research should test imagined social norms about COVID-19 vaccine uptake among significant others (Rimal & Storey, 2020). While the study measured a generalized trust in accuracy of information from sources as well as competence, yet another dimension of trust refers to fairness (Hendriks et al., 2015). Future research should test a more comprehensive measure of trust and its interactions with social norms in shaping behavioral intentions (Rimal & Storey, 2020). In addition to knowledge about COVID-19 tested in this study, future research should also include both perceived and objective knowledge about COVID-19 vaccine. Only two items were used to measure perceived impact in this study and a better measure of perceived susceptibility and severity would align with the health belief model.

Conclusion

Public health scholars predict that unless a substantial proportion of the population gets vaccinated against COVID-19, when available, community outbreaks of the disease are likely to continue, limiting our ability to return to “normal.” This study shows that injunctive norms, trust, competence are important correlates of intentions to vaccinate against COVID-19. The persisting influence of general vaccine attitudes on COVID-19 vaccination intentions indicates a need for a more comprehensive public health communication campaign that seeks to not only address public concerns about COVID-19 vaccine in particular but also vaccine hesitancy in general. Strengthening social norms, building public trust, and continuing government competency in handling the pandemic are key to increasing vaccination intentions. A public health adage states that it is not vaccines that save lives but vaccination.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Bartsch, S. M., O'Shea, K. J., Ferguson, M. C., Bottazzi, M. E., Wedlock, P. T., Strych, U., McKinnell, J. A., Siegmund, S. S., Cox, S. N., Hotez, P. J., & Lee, B. Y. (2020). Vaccine efficacy needed for a COVID-19 coronavirus vaccine to prevent or stop an epidemic as the sole intervention. *American Journal of Preventive Medicine*, 59(4), 493–503. <https://doi.org/10.1016/j.amepre.2020.06.011>
- Battersby, B., Lam, W. R., & Ture, E. (2020, May 20). Tracking the \$9 Trillion Global Fiscal Support to Fight COVID-19. *IMF Blog*. <https://blogs.imf.org/2020/05/20/tracking-the-9-trillion-global-fiscal-support-to-fight-covid-19/>
- Binder, A. R., Dalrymple, K. E., Brossard, D., & Scheufele, D. A. (2009). The soul of a polarized democracy: Testing theoretical linkages between talk and attitude extremity during the 2004 presidential election. *Communication Research*, 36(3), 315–340. <https://doi.org/10.1177/0093650209333023>
- Bish, A., Yardley, L., Nicoll, A., & Michie, S. (2011). Factors associated with uptake of vaccination against pandemic influenza: A systematic review. *Vaccine*, 29(38), 6472–6484. <https://doi.org/10.1016/j.vaccine.2011.06.107>
- Bradshaw, A. S., Shelton, S. S., Wollney, E., Treise, D., & Auguste, K. (2020). Pro-vaxxers get out: Anti-vaccination advocates influence undecided first-time, pregnant, and new mothers on Facebook. *Health Communication*, 0(0), 1–10. <https://doi.org/10.1080/10410236.2020.1712037>
- Brewer, N. T., Chapman, G. B., Rothman, A. J., Leask, J., & Kempe, A. (2017). Increasing vaccination: Putting psychological science into action. *Psychological Science in the Public Interest*, 18(3), 149–207. <https://doi.org/10.1177/1529100618760521>

- Cadeddu, C., Daugbjerg, S., Ricciardi, W., & Rosano, A. (2020). Beliefs towards vaccination and trust in the scientific community in Italy. *Vaccine*, 38(42), 6609–6617.
<https://doi.org/10.1016/j.vaccine.2020.07.076>
- Chen, L., Zhang, Y., Young, R., Wu, X., & Zhu, G. (2020). Effects of vaccine-related conspiracy theories on Chinese young adults' perceptions of the HPV vaccine: An experimental study. *Health Communication*, 0(0), 1–11.
<https://doi.org/10.1080/10410236.2020.1751384>
- Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 24, pp. 201–234). Academic Press. [https://doi.org/10.1016/S0065-2601\(08\)60330-5](https://doi.org/10.1016/S0065-2601(08)60330-5)
- de Figueiredo, A., Simas, C., Karafillakis, E., Paterson, P., & Larson, H. J. (2020). Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: A large-scale retrospective temporal modelling study. *The Lancet*, 396(10255), 898–908. [https://doi.org/10.1016/S0140-6736\(20\)31558-0](https://doi.org/10.1016/S0140-6736(20)31558-0)
- Deutsche Welle. (2020, July 12). *Fewer Germans willing to get coronavirus vaccine, survey shows*. DW.COM. <https://www.dw.com/en/coronavirus-vaccine-germany/a-54146673>
- Earle, T. C. (2010). Trust in risk management: A model-based review of empirical research. *Risk Analysis*, 30(4), 541–574. <https://doi.org/10.1111/j.1539-6924.2010.01398.x>
- Farrer, M. (2020, October 8). New Zealand's Covid-19 response the best in the world, say global business leaders. *The Guardian*.
<https://www.theguardian.com/world/2020/oct/08/new-zealands-covid-19-response-the-best-in-the-world-say-global-business-leaders>
- Fiske, S. T., & Taylor, S. E. (1991). *Social cognition*, 2nd ed (pp. xviii, 717). McGraw-Hill Book Company.

Freimuth, V. S., Jamison, A. M., An, J., Hancock, G. R., & Quinn, S. C. (2017).

Determinants of trust in the flu vaccine for African Americans and Whites. *Social Science & Medicine*, 193, 70–79. <https://doi.org/10.1016/j.socscimed.2017.10.001>

Harapan, H., Wagner, A. L., Yufika, A., Winardi, W., Anwar, S., Gan, A. K., Setiawan, A.

M., Rajamoorthy, Y., Sofyan, H., & Mudatsir, M. (2020). Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia. *Frontiers in Public Health*, 8. <https://doi.org/10.3389/fpubh.2020.00381>

Hendriks, F., Kienhues, D., & Bromme, R. (2015). Measuring laypeople's trust in experts in a digital age: The Muenster Epistemic Trustworthiness Inventory (METI). *PLOS ONE*, 10(10), e0139309. <https://doi.org/10.1371/journal.pone.0139309>

Hmielowski, J. D., Feldman, L., Myers, T. A., Leiserowitz, A., & Maibach, E. (2013). An attack on science? Media use, trust in scientists, and perceptions of global warming. *Public Understanding of Science*. <https://doi.org/10.1177/0963662513480091>

Ipsos. (2020, September 1). *Three in four adults globally say they would get a vaccine for COVID-19*. Ipsos. <https://www.ipsos.com/en-us/news-polls/WEF-covid-vaccine-global>

Juon, H.-S., Rimal, R. N., Klassen, A., & Lee, S. (2017). Social norm, family communication, and HBV screening among Asian Americans. *Journal of Health Communication*, 22(12), 981–989. <https://doi.org/10.1080/10810730.2017.1388454>

Krishna, A. (2018). Poison or prevention? Understanding the linkages between vaccine-negative individuals' knowledge deficiency, motivations, and active communication behaviors. *Health Communication*, 33(9), 1088–1096. <https://doi.org/10.1080/10410236.2017.1331307>

Larson, H. J., Clarke, R. M., Jarrett, C., Eckersberger, E., Levine, Z., Schulz, W. S., & Paterson, P. (2018). Measuring trust in vaccination: A systematic review. *Human*

Vaccines & Immunotherapeutics, 14(7), 1599–1609.

<https://doi.org/10.1080/21645515.2018.1459252>

Larson, H. J., de Figueiredo, A., Xiaohong, Z., Schulz, W. S., Verger, P., Johnston, I. G., Cook, A. R., & Jones, N. S. (2016). The state of vaccine confidence 2016: Global insights through a 67-country survey. *EBioMedicine*, 12, 295–301.

<https://doi.org/10.1016/j.ebiom.2016.08.042>

Lee, T. K., & Su, L. Y.-F. (2020). When a Personal HPV Story on a Blog Influences Perceived Social Norms: The Roles of Personal Experience, Framing, Perceived Similarity, and Social Media Metrics. *Health Communication*, 35(4), 438–446.

<https://doi.org/10.1080/10410236.2019.1567440>

Lewis, J. D., & Weigert, A. (1985). Trust as a social reality. *Social Forces*, 63(4), 967–985.

<https://doi.org/10.1093/sf/63.4.967>

Lin, Y., Lin, Z., He, F., Chen, H., Lin, X., Zimet, G. D., Alias, H., He, S., Hu, Z., & Wong, L. P. (2020). HPV vaccination intent and willingness to pay for 2-, 4-, and 9-valent HPV vaccines: A study of adult women aged 27–45 years in China. *Vaccine*, 38(14), 3021–3030. <https://doi.org/10.1016/j.vaccine.2020.02.042>

Liu, Z., & Yang, J. Z. (2020). In the wake of scandals: How media use and social trust influence risk perception and vaccination intention among Chinese parents. *Health Communication*, 0(0), 1–12. <https://doi.org/10.1080/10410236.2020.1748834>

Malka, A., Krosnick, J. A., & Langer, G. (2009). The association of knowledge with concern about global warming: Trusted information sources shape public thinking. *Risk Analysis*, 29(5), 633–647.

O’Keefe, S. M. (2020, August 7). *One in three Americans would not get COVID-19 vaccine*. Gallup.Com. <https://news.gallup.com/poll/317018/one-three-americans-not-covid-vaccine.aspx>

- Palamenghi, L., Barelo, S., Boccia, S., & Graffigna, G. (2020). Mistrust in biomedical research and vaccine hesitancy: The forefront challenge in the battle against COVID-19 in Italy. *European Journal of Epidemiology*, 35(8), 785–788.
<https://doi.org/10.1007/s10654-020-00675-8>
- Poortinga, W., & Pidgeon, N. F. (2003). Exploring the dimensionality of trust in risk regulation. *Risk Analysis*, 23(5), 961–972.
- Reiter, P. L., Pennell, M. L., & Katz, M. L. (2020). Acceptability of a COVID-19 vaccine among adults in the United States: How many people would get vaccinated? *Vaccine*, 38(42), 6500–6507. <https://doi.org/10.1016/j.vaccine.2020.08.043>
- Rhodes, A., Hoq, M., Measey, M.-A., & Danchin, M. (2020). Intention to vaccinate against COVID-19 in Australia. *The Lancet Infectious Diseases*, 0(0).
[https://doi.org/10.1016/S1473-3099\(20\)30724-6](https://doi.org/10.1016/S1473-3099(20)30724-6)
- Rimal, R. N., & Lapinski, M. K. (2015). A re-explication of social norms, ten years later. *Communication Theory*, 25(4), 393–409. <https://doi.org/10.1111/comt.12080>
- Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, 23(3), 393–404.
<https://doi.org/10.5465/amr.1998.926617>
- Schäfer, M. S. (2016). Mediated trust in science: Concept, measurement and perspectives for the ‘science of science communication’. *Journal of Science Communication*, 15(5), C02. <https://doi.org/10.22323/2.15050302>
- Schulz, P. J., & Hartung, U. (2020). Unsusceptible to social communication? The fixture of the factors predicting decisions on different vaccinations. *Health Communication*, 0(0), 1–9. <https://doi.org/10.1080/10410236.2020.1771119>
- Siegrist, M., Gutscher, H., & Earle, T. (2005). Perception of risk: The influence of general trust, and general confidence. *Journal of Risk Research*, 8(2), 145–156.

- Slovic, P. (1993). Perceived risk, trust, and democracy. *Risk Analysis*, 13(6), 675–682.
- Smith-McLallen, A., & Fishbein, M. (2008). Predictors of intentions to perform six cancer-related behaviours: Roles for injunctive and descriptive norms. *Psychology, Health & Medicine*, 13(4), 389–401. <https://doi.org/10.1080/13548500701842933>
- Southwell, B. G., Kelly, B. J., Bann, C. M., Squiers, L. B., Ray, S. E., & McCormack, L. A. (2020). Mental models of infectious diseases and public understanding of COVID-19 prevention. *Health Communication*, 0(0), 1–4. <https://doi.org/10.1080/10410236.2020.1837462>
- Streefland, P. H., Chowdhury, A. M., & Ramos-Jimenez, P. (1999). Quality of vaccination services and social demand for vaccinations in Africa and Asia. *Bulletin of the World Health Organization*, 77(9), 722–730.
- Turner, N. (2019). A measles epidemic in New Zealand: Why did this occur and how can we prevent it occurring again? *The New Zealand Medical Journal*, 132(1504). <https://www.nzma.org.nz/journal-articles/a-measles-epidemic-in-new-zealand-why-did-this-occur-and-how-can-we-prevent-it-occurring-again>
- Walter, N., Brooks, J. J., Saucier, C. J., & Suresh, S. (2020). Evaluating the impact of attempts to correct health misinformation on social media: A meta-analysis. *Health Communication*, 0(0), 1–9. <https://doi.org/10.1080/10410236.2020.1794553>
- World Health Organization. (2019). *Ten health issues WHO will tackle this year*. <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>
- World Health Organization. (2020, July 15). *New Zealand takes early and hard action to tackle COVID-19*. <https://www.who.int/westernpacific/news/feature-stories/detail/new-zealand-takes-early-and-hard-action-to-tackle-covid-19>

Xiao, X. (2019). Follow the heart or the mind? Examining cognitive and affective attitude on HPV vaccination intention. *Atlantic Journal of Communication*, 0(0), 1–13.

<https://doi.org/10.1080/15456870.2019.1708743>

Xiao, X., & Borah, P. (2020). Do norms matter? Examining norm-based messages in HPV vaccination promotion. *Health Communication*, 0(0), 1–9.

<https://doi.org/10.1080/10410236.2020.1770506>

Yaqub, O., Castle-Clarke, S., Sevdalis, N., & Chataway, J. (2014). Attitudes to vaccination: A critical review. *Social Science & Medicine*, 112, 1–11.

<https://doi.org/10.1016/j.socscimed.2014.04.018>

Tables

Table 1*Demographic characteristics of the sample*

	<i>N</i> (unweighted)	% (unweighted)	% (weighted)	% Census Estimate
Total	1040	100	100	100
Female	609	58.6	51	50.6
Male	431	41.4	49	49.3
<i>Age</i>				
18-25	189	18.2	14	14
26-35	220	21.2	18	18
36-45	175	16.8	16	16
46-55	163	15.7	18	18
56-65	127	12.2	15	15
66 and above	166	16	19	19
<i>Education</i>				
No qualification	96	9.2	19	18.19
Level 1 to Level 6 diploma	577	55.5	54	51.10
Bachelor's degree or higher	367	35.3	27	24.82*
<i>Ethnicity</i>				
European New Zealander	648	62.3	61.5	64
Māori	139	13.4	16.3	17
Pasifika	50	4.8	7.7	8
Asian or other	203	19.5	14.4	15.1
<i>Annual personal income</i>				
Less than \$19,999	280	26.9	27.5	
\$20,000 to \$39,999	254	24.4	26.2	
\$40,000 to \$59,999	182	17.5	18	
\$60,000 to \$79,999	138	13.3	12.5	
\$80,000 to \$99,999	68	6.5	5.6	
\$100,000 to \$119,999	64	6.2	5.3	
\$120,000 or above	50	4.8	4.4	

Note: *N*=1040. The census estimates according to 2018 census(<https://www.stats.govt.nz/2018-census/>). * Percentages do not add to 100% as some responses were unidentifiable or not stated in the Census.

Table 2*Correlations between COVID-19 vaccination intentions and key variables*

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Vaccination intention	1												
2 Pay for vaccine	.81**	1											
3 Name on vaccine list	.83**	.77**	1										
4 Impact	-.03	-.02	-.05	1									
5 Descriptive norms	.08**	.07*	.10**	-.06*	1								
6 Injunctive norms	.11**	.09**	.14**	-.01	.55**	1							
7 Trust mass media	.25**	.26**	.25**	-.01	.18**	.12**	1						
8 Trust family & friends	.01	.04	.02	.01	.16**	.05	.26**	1					
9 Trust Jacinda Ardern	.23**	.23**	.26**	-.10**	.15**	.13**	.38**	.16**	1				
10 Communication competence	.24**	.23**	.27**	-.09**	.27**	.23**	.27**	.05	.56**	1			
11 Knowledge about COVID-19	.24**	.21**	.22**	-.13**	.11**	.13**	.02	-.08**	.13**	.24**	1		
12 Attitudes towards vaccines	.58**	.49**	.55**	-.06	.16**	.07*	.23**	0.01	.17**	.22**	.30**	1	
13 Previous vaccination refusal	-.28**	-.20**	-.27**	.10**	-.15**	-.14**	-.04	-.03	-.08*	-.16**	-.32**	-.50**	1

Note. $n = 1032$, list-wise deletion of missing values. ** $p < .01$, * $p < .05$

Table 3*Results of Multiple Regression Analysis Predicting COVID-19 Vaccine Intentions*

	COVID-19 vaccine intention			Willingness to pay for COVID-19 vaccine			Willingness to put name on COVID-19 vaccine list		
	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β	<i>B</i>	<i>SE</i>	β
(Constant)	0.50	0.35		-0.31	0.41		-0.12	0.38	
Female	-0.14	0.06	-0.06*	-0.11	0.08	-0.04	-0.12	0.07	-0.05
Age	-0.03	0.02	-0.04	-0.02	0.03	-0.02	-0.04	0.03	-0.05
Education	0.03	0.05	0.02	0.07	0.06	0.04	0.02	0.06	0.01
European New Zealander	-0.14	0.10	-0.05	-0.10	0.11	-0.04	0.06	0.11	0.02
Māori	-0.17	0.12	-0.05	-0.21	0.14	-0.06	-0.15	0.13	-0.04
Pasifika	-0.12	0.14	-0.03	-0.30	0.16	-0.06	-0.11	0.15	-0.02
Annual income	0.07	0.02	0.10**	0.06	0.03	0.08*	0.07	0.02	0.09**
Employed	-0.05	0.07	-0.02	0.02	0.08	0.01	-0.03	0.08	-0.01
Parental status	-0.15	0.07	-0.06*	-0.18	0.09	-0.07*	-0.07	0.08	-0.03
Married/Union	0.09	0.07	0.04	0.08	0.08	0.03	0.08	0.08	0.03
Smoking status	0.11	0.07	0.04	0.00	0.08	0.00	0.04	0.08	0.01
Impact of COVID-19	-0.01	0.09	0.00	0.04	0.11	0.01	-0.04	0.10	-0.01
Descriptive Norms	-0.13	0.05	-0.08**	-0.13	0.06	-0.08*	-0.15	0.05	-0.09**
Injunctive norms	0.11	0.04	0.09**	0.08	0.04	0.06*	0.15	0.04	0.11***
Trust mass media	0.12	0.04	0.09**	0.17	0.05	0.12***	0.12	0.04	0.08**
Trust family & friends	-0.02	0.03	-0.01	0.03	0.04	0.02	0.00	0.03	0.01
Trust Jacinda Ardern	0.09	0.03	0.09**	0.10	0.04	0.09**	0.12	0.04	0.12***
Communication competence	0.03	0.02	0.05	0.05	0.02	0.07*	0.06	0.02	0.08*
Knowledge about COVID-19	0.05	0.02	0.06*	0.05	0.03	0.05	0.03	0.02	0.03
Attitudes towards vaccines	0.39	0.02	0.51***	0.36	0.03	0.43***	0.39	0.03	0.48***
Previous vaccination refusal	0.01	0.03	0.01	0.06	0.04	0.05	0.01	0.04	0.01
ΔR^2	.39			.30			.36		

Note. $n = 1030$. Female (1) compared to male (1). Ethnicity was dummy coded comparing Asians to other categories as

mentioned above. Current employed (1) compared to others (retired, student, 0). Parental status (with children, 1) compared to others (0). Married/union/live-in (1) compared to others (0). Smoking status was coded as currently smoke/vape/roll own cigarettes (1) compared to others (0). B = unstandardized coefficient, SE = standard error, β = standardized coefficient. *** $p < .001$, ** $p < .01$, * $p < .05$.