

Article

**Communication, Social Norms, and
the Intention to Get Vaccinated
Against Covid-19**DOI: 10.47368/ejhc.2023.206
2023, Vol. 4(2) 113-139
CC BY 4.0**A Cross-Country Study in Singapore and
Switzerland****Sarah Geber** 

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Singapore**Abstract**

Social norms are a promising factor for pandemic control, as they motivate people to engage in preventive behaviours. However, little is known about the influence of perceived social norms on the intention to get vaccinated against Covid-19 and the role of communication in shaping such normative perceptions. Moreover, despite the pandemic's global scale, a cross-cultural perspective is scant in research on Covid-19 preventive behaviour. The present study examined the relationships between communication (i.e., attention to mass media and social media), social norms (i.e., perceived norms in the population and personal environment), and people's intention to get vaccinated against Covid-19 using a cross-national survey in Singapore ($N = 998$) and Switzerland ($N = 1,022$). Multigroup structural equation modelling revealed that attention to mass media was positively correlated with perceived norms in both countries, whereas attention to social media was correlated with normative perceptions only in Singapore. Normative perceptions regarding the population and personal environment were positively correlated with vaccination intention in Singapore. However, in Switzerland, only perceived norms in the personal environment were positively related to vaccination intention. The results are discussed against the background of both countries' media systems and cultural values (i.e., individualism/collectivism) and are instructive for norms-based interventions in times of crises.

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Keywords

Social norms, mass media, social media, vaccination, Covid-19, cross-cultural comparison.

The effective rollout of vaccinations against Covid-19 offered the most promising prospect for ending the pandemic. Accordingly, governments and health authorities around the world have implemented vaccination campaigns (Mathieu et al., 2021). The success of vaccination campaigns, however, depends on high vaccination uptake in the population (Aschwanden, 2021). Thus, the understanding of factors that influence the intention to be vaccinated against Covid-19 is crucial for the success of vaccination campaigns.

Though health experts and scholars have called for leveraging the power of social norms to increase vaccination uptake (Chevallier et al., 2021, see also Krenn, 2021), the role of social norms during the Covid-19 pandemic and regarding vaccination is still understudied (Rimal & Storey, 2020). The potential of social norms is rooted primarily in two aspects. First, social norms reduce uncertainty by indicating what relevant others do and approve of (Cialdini et al., 1990). This is crucial in the case with the Covid-19 pandemic in general and the vaccines in particular, as the science behind both is still evolving (Rimal & Storey, 2020). Second, social norms are an insightful concept because they are shaped through communication: It is through communication, such as news media and social media, that people learn about what others do and approve of (Geber & Hefner, 2019; Liao, Ho, & Yang, 2016; Rimal & Storey, 2020). This makes social norms a promising basis for prevention and intervention strategies. Thus, knowledge on the behavioural relevance of social norms and how they are shaped through communication is of vital importance for identifying avenues for effective norms-based interventions (Chevallier et al., 2021).

Both communication (Ball-Rokeach, 2008) and social norms (Edberg & Krieger, 2020) are culture-dependent: The role of media in shaping normative perceptions might be contingent on media system-related factors, and the meaning of social norms towards vaccination intention is likely to depend on cultural values, specifically on collectivism and individualism (Triandis, 2018). Hence, research on communicative and normative influences on Covid-19 vaccination intention needs to contribute to an understanding of these cultural dimensions (Seitz et al., 2020). This is even more important given the global scale of the pandemic, which implies that governments and health authorities around the world must establish effective public health measures.

The present study aims to (1) understand the interrelations between communication, social norms, and Covid-19 vaccination intention and (2) explore the meaning of culture in this regard, encompassing system-related structures as well as collectively shared values. It draws on data from cross-national surveys conducted in Singapore ($N = 998$) and Switzerland ($N = 1,022$) in December 2020, before the vaccine rollout in both countries. Singapore and Switzerland are especially suitable for a cross-cultural approach because they differ in their media systems and cultural orientations: Singapore has a rather authoritarian media system and is a collectivist society; Switzerland has a democratic corporatist media system and is characterised as an individualistic society. We note that culture is a complex construct consisting of various layers (Hofstede, 2001); in this article, we focus on media system-related structures as well as shared values of collectivism and individualism because we expect these differences to be particularly relevant regarding communicative and normative influences (Geber & Ho, 2022).

With this theoretical and methodological set-up, the study contributes to the state of research and thereby informs effective intervention strategies, which “are essential for protecting public health” in the event of a pandemic (Vaughan & Tinker, 2009, p. 324). First, it provides detailed insights on how social norms are correlated with Covid-19 vaccination intention by differentiating between descriptive and injunctive norms as well as multiple reference groups (i.e., the personal environment and the population). Such a nuanced conceptualisation of social norms has not yet been applied to the study of Covid-19 vaccination intention and is meaningful as it would provide valuable insights for developing effective norms-based interventions that encourage people to adopt protective behaviours against the pandemic (Vaughan & Tinker, 2009). Second, the study helps to understand how different types of communication (i.e., news media and social media) are correlated with perceptions of social norms. Though vaccination has been prominent topics in news media (Siegen et al., 2021) and social media (Cotfas et al., 2021; Liew & Lee, 2021), findings on how attention to these media might have affected normative perceptions are missing. Such knowledge is of strategic relevance as it indicates which channels may play a crucial role in the formation of normative perceptions and thus should be part of intervention strategies (Vaughan & Tinker, 2009). Third, the comparative approach allows us to gain initial insights into the extent to which communicative and normative influences are system- and value-sensitive (Esser & Vliegenthart, 2017), which is crucial in a pandemic with global scale and informs about the necessity for culture-specific intervention and communication strategies (Vaughan & Tinker, 2009).

Covid-19 Vaccination Campaigns and Factors of Vaccination Intention

By mid-December 2020, the first Covid-19 vaccine (i.e., the Pfizer-BioNTech vaccine) had received emergency-use authorisation from the US government and later from the WHO (2020). Since then, Covid-19 vaccines have been administered in more than 170 countries (Mathieu et al., 2021). Singapore (Tan et al., 2022) and Switzerland (Baggio et al., 2021) started their vaccination campaigns as of end December 2020. With the approval and availability of further vaccines, prioritisation was lifted in Spring 2021 in Singapore and Switzerland and the general population was encouraged to get vaccinated. The present study took place shortly before the vaccination campaigns have started in both countries and thus examined the intention to get vaccinated.

The need for high vaccination rates and the accessibility of Covid-19 vaccines have drawn considerable scholarly attention to factors associated with vaccination intention. Specifically, initial reviews on this topic (Al-Amer et al., 2022; AlShurman et al., 2021; Wake, 2021) have revealed that sociodemographic characteristics (i.e., age, sex, and race/ethnicity), being a health professional, and influenza vaccination history were the most prominent factors associated with intention to use Covid-19 vaccines. While there are some experimental studies on exposure to norms-based messages on vaccination intention (Agranov et al., 2021; Palm et al., 2021; Sinclair & Agerström, 2021), knowledge of prevailing perceptions of social norms in the population and their influences on vaccination intention is scarce. Initial surveys from Canada (Ogilvie et al., 2021), the US (Guidry et al., 2021), and China (Zhang et al., 2021) found normative effects on Covid-19 vaccination intention. These studies were based on the theory of planned behaviour (Ajzen, 1991) and applied the concept of subjective norms. The concept of subjective norms refers to perceived social pressure from important others, which is a rather generic understanding of social norms and limits the studies’ insights on normative influences.

This highlights the need for a more nuanced understanding of social norms, how such norms are formed, and how they influence Covid-19 vaccine intentions.

Social Norms

Social norms are “rules and standards that are understood by members of a group, and that guide and/or constrain social behaviour without the force of law” (Cialdini & Trost, 1998, p. 152). To get a nuanced understanding of social norms and their influences, current social norms research differentiates between descriptive and injunctive norms (Shulman et al., 2017), a differentiation that has been established in the focus theory of normative conduct (Cialdini et al., 1990). *Descriptive norms* refer to what is done in a social group; the prevalence of a behaviour provides “social proof” that it is the right thing to do (Chung & Rimal, 2016). *Injunctive norms*, on the other hand, show parallels to subjective norms and pertain to what ought to be done; they convey information about what is socially approved (Cialdini et al., 1990).

Further, social norms can refer to different social groups that might relate to different hierarchical levels (Patrick et al., 2012), including smaller and more proximal social groups (e.g., one’s personal environment) or larger and more distal social groups (e.g., national population). Comparably to the differentiation between descriptive and injunctive norms, there is a call in social norms research to “clearly specify the agents of influence” and not use “generic referents”, such as important others in the operationalisation of subjective norms (Shulman et al., 2017, p. 1209).

Communicative Influences on Social Norms

At the individual level, descriptive and injunctive norms are perceptions, that is, perceptions of the prevalence and social approval of a behaviour (Geber & Sedlander, 2022; Rimal & Lapinski, 2015). Since communication conveys information about what others do and approve of, normative perceptions are likely to be formed through communication (Geber & Hefner, 2019; Ho et al., 2022), or, more specifically, through topics, messages, and features of the media. Indeed, there are several theoretical traditions in the field of media effects research, such as agenda setting (Shaw & MacCombs, 1977) or cultivation theory (Gerbner, 1969), that we can refer to in this regard. While they provide different explanations for media effects and highlight different features of media communication, they share the convention that media can exert influence on the audience’s perceptions of social reality (Ho et al., 2016; Valkenburg et al., 2016). This is especially true during a crisis, when there is a high need for information and sense-making, leading to a more intense media dependency (Ball-Rokeach, 2008). Both traditional mass media and social media have been found to be important media outlets during the pandemic (Friemel et al., 2020; Piltch-Loeb et al., 2021; Wu & Shen, 2022).

Mass Media. The mass media are generally perceived to best satisfy the need for information, as they offer structural connectedness to “expert” sources of information (Lowrey, 2004). Accordingly, mass media, such as newspapers, television, and radio, have also been found to be a dominant source of health information during the Covid-19 pandemic (Friemel et al., 2020; Piltch-Loeb et al., 2021; Wu & Shen, 2022). Content analyses show that the Covid-19 pandemic, in general, but the vaccines, in particular, were key topics in newspapers during the pandemic (e.g., Brandelid & Eklund, 2021; Siegen et al., 2021). The media coverage

of the Covid-19 vaccines provides normative cues, like messages about others' willingness to get vaccinated against Covid-19, such as "50 percent of the Swiss are willing to be vaccinated" (Lüthy, 2021). Our study is based on survey data, and therefore, we did not directly investigate the influence of mass media content on normative perceptions. Instead, we examined the correlations between the attention people have paid to the topic of the Covid-19 vaccination in the mass media and their normative perceptions, according to their self-reports. In light of the state of research, it seems plausible that attention to mass media shapes normative perceptions of people's vaccination intention and approval of getting vaccinated. We posit that:

H1: Attention to mass media is positively correlated with perceived norms toward vaccination.

Social Media. On social media, such as Twitter, Facebook, and Instagram, users can get actively involved in the process of content production (Flanagin, 2017), implying that they select, filter, annotate, and frame content in line with their personal views (Thorson & Wells, 2016). A content analysis of Twitter data conducted in the UK during Covid-19 vaccine rollouts found most of the tweets have a neutral stance, while the number of in favour tweets overpasses the number of against tweets (Cotfas et al., 2021). A study in the U.S. identified various topics, with administration and access to vaccines being the major concerns, and found fear to be the leading emotion in the tweets, followed by joy (Monselise et al., 2021). These initial studies indicate that there is a huge variance in the vaccination discourse on social media, ranging from support for Covid-19 vaccination campaigns to vaccine hesitancy promoted by antivaccine activists (Muric et al., 2021). In either case, it seems highly plausible that such content shapes normative perceptions as people explicitly present what they do (e. g., vaccine selfies; Bresge, 2021) and what they approve or do not approve of, for instance, through popularity cues or in comments (Geber & Hefner, 2019). Because the initial evidence shows some inconsistencies and has been generated in different national contexts, it remains unclear whether vaccine-related content on social media was predominantly positive or negative and to which content people were exposed to it at the time of vaccine rollout. Thus, we posit an undirected hypothesis on the correlation between the attention paid to the topic of Covid-19 vaccination and normative perceptions:

H2: Attention to social media is correlated with perceived norms toward vaccination.

Normative Influences on Vaccination Intention

Social norms are linked to specific groups and have their effects because the group is relevant in the behavioural context (Terry et al., 2000). Generally, social norm research focuses on proximal referent groups, such as people from one's personal environment (Ho et al., 2014; Shulman et al., 2017). Members of the personal environment are assumed to influence personal vaccination uptake because they are people with whom individuals identify and trust (Rimal & Real, 2005). In the special case of the Covid-19 vaccination campaign, however, we expect the population to be a relevant reference group that exerts normative influences in addition to the personal environment. This is because getting vaccinated is a cooperative behaviour, meaning that people need to cooperate to reach the best possible outcome (Diekmann, 2020). The more people get vaccinated, the better. The importance of cooperation in the Covid-19 vaccination has been highlighted in the discussion of the concept of herd immunity and the related idea that there is a way back to normality if enough people get vaccinated (Aschwanden, 2021). Thus,

it seems plausible that perceived social norms (i.e., descriptive and injunctive) toward vaccination in the population and personal environment would be related to Covid-19 vaccination intention. We posit that:

H3: Perceived social norms toward vaccination in the population and personal environment are positively correlated with vaccination intention.

Indirect Communicative Influences on Vaccination Intention

Based on the above- hypothesising that communication is a correlate of perceived norms, and perceived norms, in turn, are associated with vaccination intention, we expect communication to be indirectly correlated with vaccination intention (through perceived norms). This assumption can be theoretically substantiated by the social norms approach (Berkowitz, 2004), which is based on the idea that norms-based communication interventions affect normative perceptions, which then influence behaviour. Research in this tradition provide evidence that exposure to normative messages affect health-related behaviours through changing normative perceptions. This has been found for mass media and social media campaigns (Dempsey et al., 2018). We thus posit the following hypotheses for attention to mass and social media.

H4: Attention to mass media is positively correlated with vaccination intention through perceived norms toward vaccination.

H5: Attention to social media is correlated with vaccination intention through perceived norms toward vaccination.

Differences Between Singapore and Switzerland

As communication (Ball-Rokeach, 2008) and social norms (Edberg & Krieger, 2020) are culture-dependent, this study examined the interrelations between communication, social norms, and vaccination intention in different cultural contexts. Singapore and Switzerland are particularly suitable for cross-cultural comparison (Geber & Ho, 2022). They are both among the wealthiest countries (International Monetary Fund, 2022) and have efficient professional health systems (Okma et al., 2010). At the same time, they systematically differ in their media systems and cultural values, which helps to assess the extent to which the findings on communicative and normative influences are culture-dependent.

In Singapore, the media is primarily state-owned, implicating that the state tightly controls the media, and freedom of the press is largely subordinate to the primacy of the government. Thus, debates over controversial issues in mass media are often restricted (George, 2012). In such environments, social media might provide alternative spaces for a more critical public debate (Goh & Pang, 2016). Conversely, in Switzerland, the media system has a democratic corporatist model (Hallin & Mancini, 2006) and questioning and criticising the government are encouraged (Bonfadelli, 2008). Hence, given these variations in both countries' media systems, media presentations of vaccination against Covid-19 and their influences on normative perceptions toward Covid-19 vaccination may differ between Singapore and Switzerland.

Besides media system-related variations, some notable differences between Singapore and Switzerland concern the individualism/collectivism dimension. According to the work of Hofstede and colleagues (Hofstede Insights, 2020), Singapore can be regarded as a collectivist society (individualism score: 20) and Switzerland as a rather individualistic society (individualism score: 68). In collectivistic cultures, individuals identify themselves in social terms, stress participation in social norms, and thus, feel social belonging to the collective. In

contrast, in individualistic cultures, people perceive themselves as independent individuals, with personal goals being more important than group goals (Triandis, 2018).

These cultural differences likely imply variations in the extent to which people align their behaviours with normative perceptions. Interestingly, a recent meta-analysis of studies across various Covid-19 preventive behaviours (including getting vaccinated) found that subjective norms influence behavioural intention more strongly in collective than in individualistic societies (Fischer & Karl, 2022). However, it is unclear whether and how this applies to the more nuanced differentiation of social norms into descriptive and injunctive norms as well as norms referring to the overall population and the personal environment. Thus, against these differences between Singapore and Switzerland in their media systems and cultural values, we pose the following research question:

RQ: Are there differences between Singapore and Switzerland in the correlations between attention to media, perceived social norms, and vaccination intention?

Methods

Design

We collected data in 2020 via online surveys in collaboration with research institutes in both countries: Qualtrics in Singapore and Intervista in Switzerland. The data collection for this study was part of a larger project on cross-cultural differences in communicative and normative influences on Covid-19 prevention behaviours (Geber & Ho, 2022). The data collection started on December 1 and ended on December 15 in Switzerland and December 21 in Singapore. Thus, it took place shortly before the vaccination campaigns in both countries has started. This timing of data collection has the advantage that the factors and their associations with vaccination intention are largely independent of the national vaccination campaigns. The data collection procedure and survey were approved by the Institutional Review Board of the Nanyang Technology University (IRB-2020-11-008).

Sample

We set quotas for age, gender, and education in both samples to increase the variance in these variables. The total sample sizes were 998 for Singapore and 1,022 for Switzerland. In the Singaporean sample, 49% of respondents were female and their ages ranged from 21 to 84 years ($M = 39.2$, $SD = 12.7$). In the Swiss sample, 51% of respondents were female and their ages ranged from 18 to 85 years ($M = 47.6$, $SD = 17.5$). In the Singaporean sample, 42% of respondents held a university degree; in the Swiss sample, 31% of respondents had a university degree. All measures were assessed using an English survey in Singapore and a German survey in Switzerland.

Measures

At the time of data collection, vaccinations were not yet available in both countries. Vaccination-related questions were, therefore, introduced with the following note describing the necessary requirements for approval of the vaccine: “Please imagine that there is a vaccine against Covid-19 available. The efficacy and safety of the vaccine have been tested and proven

in clinical trials. The Singaporean [Swiss] regulatory authorities have reviewed the study results and approved the vaccine.”

Vaccination Intention. To measure vaccination intention, we asked how likely it would be that respondents would decide to get a Covid-19 vaccine next week if they could on a 5-point scale ranging from 1 = *not likely at all* to 5 = *very likely* (Singapore: $M = 3.26$, $SD = 1.27$; Switzerland: $M = 2.83$, $SD = 1.52$).

Media Attention was measured by asking respondents how much attention they paid to messages about Covid-19 vaccine development in newspapers, news telecasts, and radio news. All items were assessed on a 5-point scale ranging from 1 = *no attention at all* to 5 = *a lot of attention* (for the items' wording, means, and standard deviations, see Table 1). Comparably, attention to social media was operationalised by a question about attention to such messages on social media (e.g., Facebook, Twitter, and Instagram; Singapore: $M = 3.48$, $SD = 1.33$; Switzerland: $M = 1.91$, $SD = 1.28$). Comparable measures of media attention were used in previous studies (e.g., Chaffee & Schleuder, 1986; Ho et al., 2020).

Social Norms. The perceived descriptive norm in the population was measured as the perceived willingness to get vaccinated in the population. Respondents were asked to answer the following question using a percentage slider ranging from 0 to 100%: “In your opinion, how large is the proportion of the Singaporean [Swiss] population that is willing to be vaccinated?” (Singapore: $M = 67.2$, $SD = 21.6$; Switzerland: $M = 50.4$, $SD = 18.2$). The perceived injunctive norm in the population was assessed by perceived social approval using three items on a 5-point scale ranging from 1 = *do not agree at all* to 5 = *fully agree*; for example: “The Singaporean [Swiss] population thinks it is important to get vaccinated against Covid-19.” See Table 1 for the wording of all items and descriptive statistics.

Perceptions of the norm in the personal environment were measured in parallel to the population norms. Thus, for the perceived descriptive norm in the personal environment, respondents were asked to assess the percentage of people in their personal environment who were willing to get vaccinated (Singapore: $M = 62.1$, $SD = 25.3$; Switzerland: $M = 47.4$, $SD = 25.1$). Further, for the injunctive norm, the above-mentioned social approval statements were applied to the personal environment (see Table 1). Comparable norms measures were used in previous studies (e.g., Geber & Friemel, 2022). For an overview of descriptive statistics of all key variables, see Table A1 in the appendix.

Control Variables. Informed by the state of research on vaccination intention (Al-Amer et al., 2022; AlShurman et al., 2021; Wake, 2021), we included control variables that we expected to be linked to vaccination intention. The first set of control variables covered personal experiences of Covid-19. We asked whether respondents were or had been infected with Covid-19 (personal infection; 1 = *yes*, 0 = *no*), whether they belonged to the risk group (risk group; 1 = *yes*, 0 = *no*), whether they knew people in their immediate personal environment who were or had been infected with Covid-19 (personal environment infection; 1 = *yes*, 0 = *no*), and whether they had people in the risk group in their everyday environment (personal environment risk group; 1 = *yes*, 0 = *no*). Second, respondents were asked if they were health professionals (health professionals; 1 = *yes*, 0 = *no*), and we collected data on whether they rule out flu vaccination in principle (1 = *yes*, 0 = *no*). Third, we collected sociodemographic information on age (open question), gender (1 = *female*; 0 = *male*), and education level. For

education level we asked for respondents' highest level of school completed; categories were recoded into 1 = *university degree*, 0 = *less than university degree*.

Data Analysis

We used multigroup structural equation modelling (SEM) to test the relationships hypothesised in H1 to H5 and to examine differences between Singapore and Switzerland (RQ). The SEM was conducted in R with the package lavaan (Rosseel, 2012).

First, we performed a confirmatory factor analysis (CFA) to test our multi-item measures for attention to mass media and perceived injunctive norms. The fit indices revealed a good fit for the CFA in the Singaporean and Swiss samples (Hu & Bentler, 1999; model SG_{CFA} and

Table 1. Measures of Latent Variables

Latent Variables and Items	Singapore		Switzerland	
	α / Std. loading	<i>M</i> (<i>SD</i>)	α / Std. loading	<i>M</i> (<i>SD</i>)
Attention to mass media	$\alpha = .69$	3.47 (1.19)	$\alpha = .74$	2.97 (1.16)
Attention to messages about Covid-19 vaccine development in newspapers	.73	3.74 (1.25)	.77	3.18 (1.38)
Attention to messages about Covid-19 vaccine development on news telecasts	.77	3.64 (1.40)	.80	3.11 (1.45)
Attention to messages about Covid-19 vaccine development in radio news	.55	3.04 (1.83)	.54	2.60 (1.48)
Injunctive norms, population	$\alpha = .90$	3.77 (0.82)	$\alpha = .91$	3.25 (0.84)
The Singaporean [Swiss] population thinks it is important to get vaccinated against Covid-19.	.86	3.81 (0.89)	.88	3.28 (0.89)
The Singaporean [Swiss] population is in favor of getting vaccinated against Covid-19.	.87	3.74 (0.91)	.88	3.32 (0.92)
The Singaporean [Swiss] population is generally positive about vaccination against Covid-19.	.86	3.77 (0.88)	.87	3.15 (0.93)
Injunctive norms, personal environment	$\alpha = .92$	3.71 (0.88)	$\alpha = .96$	3.15 (1.09)
My social environment thinks it is important to get vaccinated against Covid-19.	.89	3.75 (0.95)	.94	3.14 (1.13)
My social environment is in favor of getting vaccinated against Covid-19.	.88	3.66 (0.96)	.94	3.16 (1.13)
My social environment is generally positive about vaccination against Covid-19.	.89	3.72 (0.93)	.93	3.14 (1.13)

Note. $N_{SG} = 998$, $N_{CH} = 1,022$; α = Cronbach's alpha, measurement model of the structural equation model with robust maximum likelihood estimator (MLM); $\chi^2(48) = 90.56$, $p < .001$; $\chi^2/df = 1.89$; CFI = .997; RMSEA = .030; SRMR = .011; std. loadings = standardised factor loadings.

CH_{CFA}, Table 2); in both country samples, the measurements also showed good internal consistencies (Table 1). Factor loading invariance—a prerequisite for comparing path coefficients (Chen, 2007)—was tested by constraining loadings to be equal among both groups (model MULTI-CONST_{CFA}) and comparing this constrained model to the original (i.e., unconstrained) multigroup model (MULTI_{CFA}). This comparison indicated weak invariance as the difference between both models in CFI was less than |0.01| and the difference in RMSEA was less than .015 (Chen, 2007).

Second, we tested the relations between communication, social norms, and vaccination intention in a SEM (Figure 1). We evaluated multivariate normality with Mardia's test using the R package MVN (Korkmaz et al., 2014); because the test indicated that the presumption of multivariate normality was not met in both samples, we used a robust maximum likelihood estimator, that is, the maximum likelihood estimator with robust standard errors and a Satorra-Bentler scaled test statistic as estimator (MLM, Rosseel, 2012).

Besides communication, social norms, and vaccination intention, the model included the aforementioned control variables.¹ In addition, to check for the robustness of the results, we run a model without control variables that is presented in Figure A1 in the appendix. Indirect correlations between communication and vaccination intention through social norms were estimated by bootstrapping (Table 3). The residuals of the norm constructs were allowed to covary to avoid biases in standard errors, and the direct correlations between media attention and vaccination intention were estimated to avoid inflated indirect effects estimates (Preacher & Hayes, 2008). The fit of the multigroup model was good (MULTI_{SEM}, Table 2). To test for differences between the Singaporean and Swiss sample, we compared the (unconstrained) multigroup model (MULTI_{SEM}) with a constrained model in which the regression coefficients were held equal across the two countries (MULTI-CONST_{SEM}). The difference in goodness of fit between both models ($\Delta\chi^2 = 104.41$, $\Delta df = 23$, $p < .001$) indicated significant differences in some of the paths of the Singaporean and Swiss models. To answer RQ, we identified the paths that caused the difference by constraining the regression paths (one at a time) and testing for differences in the goodness of fit (Table 4). For all tests reported in this study, we followed the convention and set the significance level to 5%, meaning that we considered a p-value less than .05 to be statistically significant.

Results

Vaccination intention was slightly higher in the Singaporean sample ($M = 3.26$, $SD = 1.27$) than in the Swiss sample ($M = 2.83$, $SD = 1.52$; $F(1, 2018) = 46.69$, $p < .001$, $\eta^2 = .02$). Figure 1 presents all estimated paths and shows that social norms and communication explained more than 40% of vaccination intention in both countries (also after excluding the control variables). In what follows, we will present the tests of the hypotheses (H1 to H5, Figure 1) and, at the same time, point to significant differences between both countries as inquired in RQ (Table 4).

Attention to mass media was positively correlated with perceived social norms toward vaccination in Singapore and Switzerland: The more attention respondents paid to messages about the Covid-19 vaccine, the more vaccination willingness and social approval of vaccination they perceived in the population and their personal environment, supporting H1. While the hypothesis found support in both countries, the positive correlations between

attention to mass media and perceived norms in the environment were significantly stronger in Switzerland than in Singapore (Table 4).

Table 2. Measurement and Structural Equation Models

Model	χ^2	df	p	χ^2/df	CFI	RMSEA	SRMR
Measurement models							
SG _{CFA}	31.96	24	.128	1.33	.998	.021	.013
CH _{CFA}	39.87	24	.022	1.66	.997	.028	.011
MULTI _{CFA}	71.63	48	.015	1.49	.998	.025	.011
MULTI-CONST _{CFA}	85.96	54	.004	1.59	.997	.024	.019
Structural equation models							
SG _{SEM}	394.21	156	<.001	2.53	.966	.041	.070
CH _{SEM}	586.23	156	<.001	3.76	.951	.054	.083
MULTI _{SEM}	978.58	312	<.001	3.13	.957	.048	.073
MULTI-CONST _{SEM}	1,081.55	335	<.001	3.23	.953	.049	.075

Note. $N_{SG} = 998$, $N_{CH} = 1,022$; CFA = confirmatory factor analysis; SEM = structural equation model; robust maximum likelihood estimator (MLM); SG = Singapore; CH = Switzerland; MULTI = multigroup model; MULTI-CONST = constraint model (factor loadings (CFA)/regression coefficients (SEM) are constrained to be equal across groups).

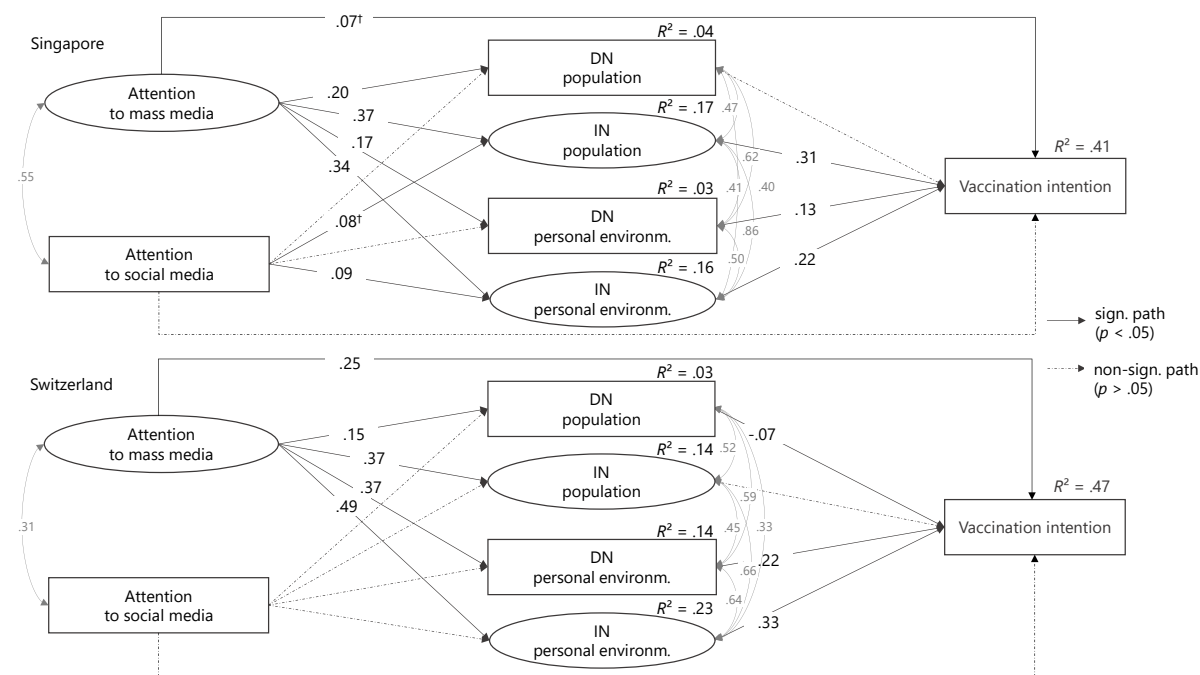


Figure 1. Structural Equation Model in Singapore and Switzerland

Note. $N_{SG} = 998$, $N_{CH} = 1,022$; structural equation model with robust maximum likelihood estimator (MLM); $\chi^2(312) = 978.58$, $p < .001$; $\chi^2/df = 3.13$; CFI = .957; RMSEA = .048; SRMR = .073; ellipses represent latent measures; the measurement model is documented in Table 1; correlations between norm variables represent covariances of residuals; direct and indirect paths between media attention and vaccination intention are documented in Table 3; control variables were included in the analyses but not displayed for clarity, their coefficients are documented in Table A2 in the appendix; only significant paths are displayed (at the 5% level, $p < .05$); scores report standardised coefficients; † $p = .05$ -.06; $R^2 = r$ square; DN = descriptive norms, IN = injunctive norms.

Table 3. Indirect Paths Between Communication and Vaccination Intention in Singapore and Switzerland

	Singapore		Switzerland	
	<i>b</i> *	<i>p</i>	<i>b</i> *	<i>p</i>
Attention to mass media → vaccination intention				
via DN population	-0.00	.841	-0.01	.084
via IN population	0.16	.004	0.01	.673
via DN environment	0.03	.027	0.11	<.001
via IN environment	0.10	.026	0.22	<.001
Attention to social media → vaccination intention				
via DN population	-0.00	.946	-0.00	.294
via IN population	0.02	.111	-0.00	.965
via DN environment	0.00	.700	0.00	.942
via IN environment	0.02	.146	-0.01	.401

Note. $N_{SG} = 998$, $N_{CH} = 1,022$; direct and indirect paths between communication and vaccination intention tested within the structural equation model displayed in Figure 1; correlations were estimated via bootstrapping; *b** = standardised path coefficients; DN = descriptive norms, IN = injunctive norms.

We found no correlations between attention to social media and normative perceptions toward vaccination in Switzerland, however, small positive correlations between attention to social media and perceived injunctive norms in Singapore (but none between social media and descriptive norms). The correlation with the injunctive norm in the population differed significantly from the respective path in Switzerland (Table 4). Thus, H4 found only limited support, that is, in Singapore and only regarding injunctive norms toward vaccination.

Turning to the correlations between perceived norms and vaccination intention (H3), we found crucial differences between Singapore and Switzerland. First, in Singapore, the perceived descriptive norm in the population was not correlated with vaccination intention, whereas, in Switzerland, the population's perceived willingness to get vaccinated was weakly negatively correlated with vaccination intention (contrary to the hypothesis). Second, perceptions of injunctive norms in the population were positively associated with vaccination intention in Singapore but not in Switzerland, which was a significant difference between both countries (Table 4). With regard to perceived norms in the personal environment, we found support for normative influences in both countries. The perception of vaccination willingness in the personal environment (i.e., descriptive norm) and social approval of getting vaccinated (i.e., injunctive norm) were linked with increased vaccination intention in both countries. Notably, however, the descriptive norm-intention correlation was significantly stronger in Switzerland than in Singapore (Table 4).

Ultimately, and in line with H4, some indirect correlations between mass media attention and vaccination were found in Singapore and Switzerland (Table 3). In both countries, mass media attention was indirectly correlated with vaccination intention through perceived norms in the personal environment. Additionally, in Singapore, attention to mass media was positively correlated with vaccination intention through perceived injunctive norms in the population. Regarding social media, no indirect correlations were found. Thus, H5 was not supported.

Last, we note that we found no substantial differences between the model with all variables (i.e., including the control variables) and the model without control variables (Figure A1), indicating the robustness of the results.

Table 4. Differences in Paths Between Singapore and Switzerland

Path	$\Delta\chi^2$	p
Attention to mass media		
→ DN population	3.09	.079
→ IN population	0.51	.476
→ DN environment	5.57	.018
→ IN environment	24.54	<.001
Attention to social media		
→ DN population	0.21	.643
→ IN population	2.16	.142
→ DN environment	0.07	.794
→ IN environment	4.02	.045
→ Vaccination intention		
DN population	2.19	.139
IN population	7.42	.006
DN environment	6.02	.014
IN environment	0.64	.424

Note. $N_{SG} = 998$, $N_{CH} = 1,022$; test for differences in paths within the structural model displayed in Figure 1 by constraining the regression paths (one at a time) and testing for differences in the goodness of fit between the constrained and unconstrained model; DN = descriptive norms, IN = injunctive norms.

Discussion

The study revealed some cross-national differences in Covid-19 vaccination intention and its associations with attention to media and social norms. In line with previous research on the cultural dependence of vaccination intention (Betsch et al., 2017; Böhm et al., 2016; Leonhardt & Pezzuti, 2022), we found that vaccination intention is higher in Singapore than in Switzerland. We will discuss these differences in light of the vaccination intention's associations with communication and norms and against the backdrop of both countries' cultural values and media systems.

The Role of Media Attention

In both countries, attention to mass media (i.e., newspaper, news telecasts, and radio news) was positively correlated with normative perceptions and thereby indirectly associated with vaccination intention. The more people paid attention to messages about Covid-19 vaccine development in the mass media, the higher the perceived vaccination willingness and perceived social approval in the population and in the personal environment, and the higher the willingness to get vaccinated. Interestingly, for perceptions related to the personal environment, the positive correlation between mass media attention and normative perceptions was significantly stronger in Switzerland than in Singapore. Thus, these results suggest that in both countries, reports in mass media included some messages or features based on which media users formed perceptions of the prevalence and acceptance of the measures (Geber & Hefner, 2019; Rimal & Storey, 2020). Further, they suggest that this process of normative perception formation was more pronounced in Switzerland than in Singapore for personal environment norms. This might point to some differences in the media reporting, such as a

stronger framing of the social environment in the Swiss media as the relevant reference group. However, this interpretation is rather speculative and points to the need for comparative content analyses.

Contrary to mass media, social media did not appear to have played an important role in the formation of normative perceptions. It is only in Singapore that attention to social media was positively but very weakly correlated with perceived injunctive norms. As social media has been shown to be a crucial factor in the context of other preventive measures, such as the use of the tracing app (Geber & Ho, 2022), it might be that the time point of data collection (December 2020, before the vaccine rollout) was too early to find substantial effects. Though the topic of vaccination was already being discussed on social media (e.g., Cotfas et al., 2021; Monselise et al., 2021), this discussion might not yet have reached the majority. In line with this interpretation, the mean score of attention to social media in our study indicates that people had not yet devoted significant attention to messages about the Covid-19 vaccine on social media.

Further, given the huge variance in topics and sentiments in the discussion of Covid-19 vaccination on social media (Cotfas et al., 2021; Monselise et al., 2021), it might be that the extent to which users were exposed to more negative or positive vaccination-content was highly personalised. This idea connects to the work of Thorson and Wells (2016) on media exposure in the digital age and the notion of “the power of the individual to design her own information environment” (p. 309). Thus, while some people might have been exposed to social media content completely supporting vaccines, others might have been exposed to social media against vaccines, and, thus, potential positive and negative influences might have cancelled each other out in aggregate. This explanation has methodological implications, suggesting that a more nuanced approach to measuring attention to social media is needed.

Generally, the study did not identify huge differences between Singapore and Switzerland in the effects of media attention that systematically relate to variations in the countries' media systems. The comparable positive correlations between mass media attention and normative perceptions indicate that in such an unprecedented crisis as the Covid-19 pandemic, differences between media systems may diminish and mass media may discuss the crisis and measures comparably in terms of frequency, extent, and valence.

The Role of Social Norms

In both countries, social norms were important correlates of vaccination intention. Notably, however, our results showed that differences between countries regarding the meaning of social norms were related to the question of whether they refer to the population or the social environment. In Singapore, the perceived injunctive norm in the population was the strongest correlate of vaccination intention, indicating the motivating role of perceived high vaccination approval in the population. This result reflects the collectivistic culture in Singapore, where high importance is placed on belonging to the collective and loyalty is an important behavioural-guiding value (Hofstede Insights, 2020). However, we did not find the same vaccination-supporting effect of perceived population norms in Switzerland; quite the opposite—the perceived descriptive norm in the population was weakly negatively correlated with vaccination intention, indicating that the higher the perceived vaccination intention in the population, the lower their vaccination intention. This contradicts the basic idea of social normative influences (Cialdini et al., 1990; Rimal & Real, 2005). A possible explanation might

be free-riding—that is, benefitting from the indirect effects of vaccination while avoiding individual costs (e.g., inconvenience, time; Agranov et al., 2021; Betsch et al., 2013; Galizzi et al., 2022). Because the effect was very small, the underlying free-riding mentality might not be widespread but apply only to a subgroup of the Swiss sample. This, however, is speculative and further research is needed to study the relationship between norms, freeriding, and vaccination intention.

While the perceived population norm toward vaccination may play no role or even a negative role in Switzerland, our results provide a different picture of the role of the personal environment norm. We found significant positive correlations between perceived norms in the personal environment and vaccination intention in both countries. Path comparisons showed that perceived descriptive norms relating to the personal environment were even stronger correlates of vaccination intention in Switzerland than in Singapore. Thus, our results indicate that in rather individualistic countries, social norms do play a role, but in contrast to collectivistic countries, it is not the population-related but the personal environment-related norm that is behaviourally relevant.

Further, beyond the differentiation between population- and environment-related norms and cross-national differences, the results indicate that in both Singapore and Switzerland, injunctive norms toward vaccination were more behaviourally relevant than descriptive norms. People may perceive that getting vaccinated is primarily a moral behaviour, which makes others' expectations (i.e., injunctive norms) more important, and less a cooperative behaviour, which depends on widespread willingness in the population (i.e., descriptive norm). In line with this interpretation, a recent meta-analysis by Rhodes et al. (2020) across various behaviours shows that “injunctive norms, though underutilised, may be more effective in changing behaviour than previously considered” (p. 161).

Theoretical and Practical Implications

The discussion of our results points to three main implications. First, mass media play an important role in the process of normative perception formation during a public health crisis (Friemel & Geber, 2023), which seems to apply to the media systems both in Singapore and Switzerland (Geber & Ho, 2022). The importance of mass media is contrasted by the limited effects of social media. As noted, however, this should not be overstated and could also be partly due to the timing of the data collection or an insufficient nuanced measurement. These findings not only provide some interesting insights regarding the question of where normative perceptions come from (Geber et al., 2019) but also suggest the potential for health authorities' communication efforts.

Second, our results highlight the need to consider and differentiate between social norms in the population and the personal environment. While in collectivistic cultures, perceived norms in the population and the social environment are linked to behaviour, it is primarily norms in the personal environment that seem to motivate preventive behaviour in more individualistic cultures. The differentiation of population and personal environment norms has almost been neglected in social norms research thus far (Shulman et al., 2017) and should be considered in future research. Further, cross-cultural variations in the significance of different norms must be considered in norms-based intervention strategies aimed at increasing the rate of compliance with preventive measures.

Third, our findings reveal a possible downside of a perceived high population norm for cooperation measures—that is, measures whose effectiveness depends on far-reaching compliance but to which people may not adhere because of their own interests (Diekmann, 2020). While high social norms have been theorised as a factor motivating behaviours in social norms theories (e.g., Cialdini et al., 1990; Rimal & Real, 2005), the free-riding mentality may undermine the behaviour-motivating effect of high social norms and turn it into a negative effect (Galizzi et al., 2022). This is an area of further inquiry which requires a profound elaboration on moderation or mediation mechanisms, that is, whether freeriding serves as a moderator of the norms-intention relationship and/or as a mediator between normative perceptions and vaccination intention. If some freeriding-mechanisms within the norm-intention association are further evidenced, this has implications for prevention and intervention strategies, as the communication of a high descriptive norm may lead to an unwanted contradictory effect, thwarting vaccination willingness in the population (Agranov et al., 2021). A possible way to deal with that might be the explicit communication of the social benefit of getting vaccinated (i.e., protection of others), because previous cross-cultural experimental research has shown that this increases pro-social vaccination behaviour (Betsch et al., 2017; Böhm et al., 2016).

Limitations

This study provides a comprehensive understanding of the cultural dimension of normative and communicative influences on vaccination intention during the Covid-19 pandemic, but it faced limitations that must be considered and that provide directions for future research.

First, there are limitations to the general study design. Because the analysis was based on cross-sectional data, we cannot make causal assumptions. However, the primary aim of the study was to examine cultural differences in the covariances between communication, normative perceptions, and vaccination intention and not to test theoretical claims in a causal sense. Furthermore, we did not measure actual media content but collected data on self-reported media attention. Future projects might combine survey studies and content analyses (Vreese et al., 2017) to avoid possible biases in self-report about media attention and to gain more insights into which features of media content form which kind of (normative) perceptions on the part of media users. Last, to empirically test whether the theoretically discussed national differences in media systems and cultural values are empirically linked to the differences in communicative and normative influences, a broader sample of countries and multilevel analyses are needed.

Second, regarding the sampling, we note that data collection focused on the German-speaking part of Switzerland and did not include the Swiss-French and the Swiss-Italian regions. Nevertheless, our data represent Switzerland relatively well, as the German region is the largest (63%; Federal Statistical Office, 2020). In comparison, the Singaporean survey was conducted in English, which is the main and official language in Singapore, with around 50% of the inhabitants primarily speaking English at home. While this does not mean that the rest of the population does not speak English, it may have excluded people who only speak Mandarin or other languages (e.g., Malay).

Third, culture is a complex and multi-faceted construct. In addition to differences in media systems and cultural values of collectivism/individualism, variations in communication and norms as well as their influences might be, for instance, linked to the political system (e.g., government efficiency, authoritarianism) and other cultural values. In this regard, the

tightness–looseness dimension (Gelfand et al., 2011) promises to be particularly insightful for future research because it reflects the degree to which cultures have strict norms and punishments for deviance and thus can be understood as a kind of meta-norm that coordinates compliance with behaviour-specific norms. Future studies should incorporate those macro factors (e.g., system structures, cultural values) in the study design to empirically test their interactions with communicative and normative influences on population's crisis prevention behaviours.

Fourth, with regard to our conceptualisation of media effects, we did not measure the use of media but attention paid to them. This implies that we focused on active, deliberate information behaviour and, thus did not cover effects of unconscious media exposure (Chaffee & Schleuder, 1986), which would require an observational approach in future studies. In this context, it should be noted that interpersonal communication and observation (e.g., of other people's behaviour or gestures) may also play a role in the formation of normative perceptions, which provides a direction for future research. Furthermore, future studies might not only focus on cultural differences, but also consider individual characteristics that might moderate effects of media exposure, as discussed in the differential susceptibility to media effects model (Valkenburg & Peter, 2013). For instance, individual-level differences in individualism and collectivism orientation (Wang, 2022) or vaccine-scepticism (Luyten et al., 2014) might moderate communicative and normative influences and might also interact with national-level differences in cultural orientation. Additionally, such individual factors are supposed to guide media selection (Valkenburg & Peter, 2013) and thus might help understand which people are exposed to more positive or negative media content (Zhang et al., 2021).

Fifth, we measured the intention to get vaccinated before the rollout of the vaccination, which is not the same as actual vaccination behaviour (Sheeran & Webb, 2016). Related to this, media attention, normative perceptions, and vaccination intention may have changed during the vaccine rollout. For instance, people may have more direct experiences and observations of vaccination, which could have altered their vaccination intentions. Thus, given the highly dynamic pandemic-related developments, this study can only provide a snapshot of the role of communication and social norms regarding vaccination intention before the vaccine rollout.

Conclusion

Our results underscore the importance of mass media in a (health) crisis. Future research should strive to better understand the process of norm formation and examine which messages and features of media reporting shape normative perceptions. Further, the results of this study show that the meaning of social norms relating to different reference groups—namely, the population and the personal environment—depends on the cultural context. In collectivistic cultures, perceived norms in the population and the personal environment seem to motivate preventive behaviours, whereas in rather individualistic cultures, the personal environment appears to be the predominant reference group that provides guidance in a normative sense. Interestingly, our results suggest that a high descriptive norm in the population might even be destructive in individualistic cultures due to a certain free-riding mentality. Further inquiry is needed to understand the interrelations between free-riding, social norms, and cooperation behaviours.

Notes

1. For the sake of clarity, their paths are not displayed in Figure 1, but their coefficients are documented in Table A2 in the appendix.

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Conflict of Interest

The authors have no conflicts of interest to disclose.

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Appendix

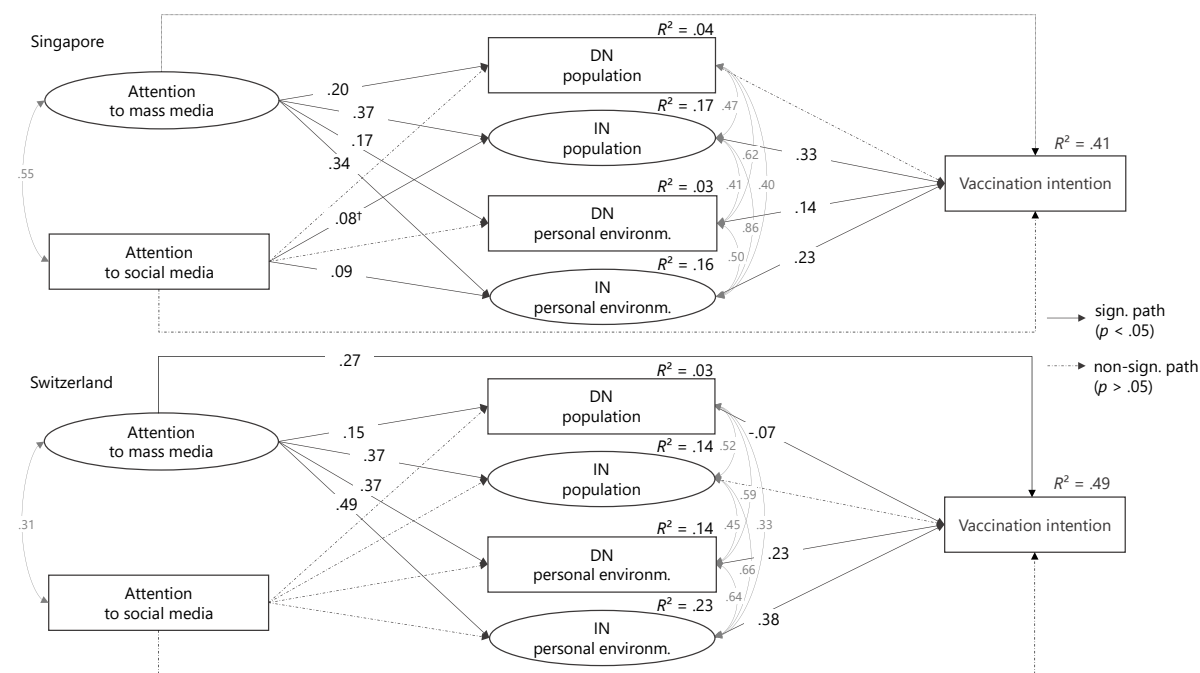


Figure A1. Structural Equation Model in Singapore and Switzerland Without Control Variables

Note. $N_{SG} = 998$, $N_{CH} = 1,022$; structural equation model with robust maximum likelihood estimator (MLM); $\chi^2(96) = 446.39$, $p < .001$; $\chi^2/df = 4.65$; CFI = 0.975; RMSEA = .065; SRMR = .031; ellipses represent latent measures; correlations between norm variables represent covariances of residuals; only significant paths are displayed (at the 5% level, $p < .05$); scores report standardised coefficients; $^\dagger p = .05-.06$; $R^2 = r$ square; DN = descriptive norms, IN = injunctive norms.

Table A1. Mean, SD, and ANOVA for the Main Constructs

	Singapore		Switzerland		F(1, 2018)
	M	SD	M	SD	
Vaccination intention	3.26	1.27	2.83	1.52	46.69, $p < .001$
Attention to mass media	3.47	1.19	2.97	1.16	93.2, $p < .001$
Attention to social media	3.48	1.33	1.91	1.28	724.6, $p < .001$
DN population	67.2	21.6	50.4	18.2	354.9, $p < .001$
IN population	3.77	0.82	3.25	0.84	201.8, $p < .001$
DN personal environment	62.1	25.3	47.4	25.1	171.5, $p < .001$
IN personal environment	3.71	0.88	3.15	1.09	162.4, $p < .001$

Note. $N_{SG} = 998$, $N_{CH} = 1,022$; ANOVA = analysis of variance; M = arithmetic mean; SD = standard deviation; F = F statistic of the ANOVA; DN = descriptive norms, IN = injunctive norms.

Table A2. Coefficients of Control Variables

	Singapore		Switzerland	
	beta	<i>p</i>	beta	<i>p</i>
<i>Personal experiences</i>				
Personal infection	.04	.193	-.01	.809
Risk group	.03	.277	.04	.105
Personal environment infection	.07	.022	-.02	.538
Personal environment risk group	-.06	.023	.00	.929
<i>Further controls</i>				
Health professional	.00	.943	.01	.614
General rejection of flu vaccination	-.10	< .001	-.23	< .001
<i>Sociodemographics</i>				
Age	-.09	.001	-.03	.318
Gender (female)	-.05	.052	-.04	.093
Education	.01	.792	-.03	.295

Note. $N_{SG} = 998$, $N_{CH} = 1,022$; table reports the paths coefficients of control within the structural equation model displayed in Figure 1; beta = standardised path coefficients.