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## How Informed are the Swiss about Covid-19 and Prevention Measures?

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### Results of a Survey on Information Awareness, Behaviour, and Deficits

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### Abstract

Since the coronavirus (SARS-CoV-2) pandemic began, large amounts of (mis)information have been disseminated worldwide. We conducted an online survey in Switzerland ( $N = 1,129$ ) in April 2021 to ask respondents which information has received too little attention in public discourse, which measures help containing coronavirus infection and Covid-19, and about subjectively perceived Covid-19 misinformation. Content analysis of the open answers revealed that vaccination and its potential side effects, aspects related to political measures, psychological and social aspects, as well as science and research topics deserved more attention in the eyes of the respondents, mostly from politics or media. The most frequently mentioned effective measures were social distancing, wearing masks, general hygiene, and vaccination. Notably, the number of measures mentioned was related to the degree to which the pandemic affected individuals subjectively, trust in public institutions, and their individual level of science-related populism. Swiss residents with less trust in public institutions and who consume less news media on Covid-19 are more likely to believe misinformation on (in)effective measures against the virus. Most respondents encountered Covid-19 misinformation and could name examples, including sources. Education and information use affect the frequency of subjectively encountered misinformation. More highly educated people can name more misinformation instances encountered than less educated people.

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## Keywords

Information awareness, information behaviour, information deficits, informedness, misinformation, Covid-19, Switzerland.

Soon after the Covid-19 pandemic began, a massive amount of health-related information on the coronavirus was published on topics such as protective behaviours, preventive measures, treatment options, and various safety recommendations. It now has become clear that this pandemic has been accompanied by an *infodemic*, i.e. an overabundance of valid and invalid Covid-19 health information (World Health Organization [WHO], 2020). The pandemic has placed dramatic strains on the general population to select information and critically reflect on it to gauge the relevance of information as well as to transfer information to everyday practice (Dadaczynski et al., 2021). The objective of the present study was to investigate the information awareness and information deficits related to Covid-19 as well as prevention measures of the Swiss during the Covid-19 pandemic. These factors contribute to the ability of individuals and consequently society as a whole to cope with the Covid-19 pandemic. Finally, only if policymakers know how people in Switzerland think and what information they lack, can targeted and appropriate prevention measures be implemented, used and become effective in society.

Existing studies have examined general information behaviour and information awareness during the pandemic (e.g., Friemel et al., 2020; Nielsen et al., 2021). However, feelings of being generally informed may vary with respect to specific pieces of information. It remains largely unclear what explicit information about Covid-19 has been subjectively underreported in public discourse in the opinion of Swiss. That is, where are subjectively perceived information deficits? Accordingly, the first question to be asked is: Which information on Covid-19 has received too little attention in the opinion of the Swiss population and by whom?

Being (un)informed about Covid-19 and its prevention measures does not necessarily correlate with whether people find these measures effective, so the question is: Which measures does the Swiss population consider (in)effective in preventing coronavirus infection and thus the spread of Covid-19? Various measures have been recommended and/or imposed in Switzerland during the pandemic to protect people against Covid-19 (Bundesamt für Gesundheit [BAG], 2021). Most surveys have taken a standardised approach towards gauging respondents on measures taken, and on approval trends for selected measures that were recommended or required by the Swiss government (e.g., Friemel et al., 2021). However, it remains unclear which other actions had been taken or discussed and which measures people have deemed ineffective at preventing coronavirus infection.

To be informed should not be based on false information. Since the onset of the Covid-19 pandemic, a great deal of misinformation and disinformation has been disseminated worldwide (World Health Organization [WHO], 2020). Such phenomena are seen as problematic for pandemic containment, as they may discourage citizens from identifying effective preventive measures (Allington et al., 2020; Roozenbeek et al., 2020). Nevertheless, little is known to date about this crucial information deficit (i.e., what is concretely known about the specific misinformation people have encountered). However, only when this deficit is examined, it can be compensated effectively (Roozenbeek & van der Linden, 2022).

Important variables, whose influence on information awareness related to Covid-19 and prevention measures, we also investigate, include information use, people's trust in different

sources of information and in public authorities, personal concerns, education, and science-related populism, that is, the preference for common sense over supposedly elitist scientific knowledge (Mede et al., 2021).

As a starting point, an overview of the current research on information behaviour and misinformation related to Covid-19 and prevention measures in general is provided. Hereof, the study's research questions and hypotheses were deduced. Subsequently, the methodology is explained, followed by the presentation and discussion of the results.

### *Information Behaviour Related to Covid-19*

In most countries, the news are increasingly consumed online, as are general information searches (Newman et al., 2020). People are obtaining news and information about Covid-19 from their ubiquitous digital environment, from social media, video platforms, to messaging applications (Nielsen et al., 2020). However, traditional news organisations overall still play a central and important role in helping people to navigate the pandemic and are in many countries the single most widely used source of information about Covid-19 (Nielsen et al., 2020, 2021). Most respondents, who were part of an analysis of eight countries (Switzerland was not included) by Nielsen et al. (2021), stated that news media had helped them understand the pandemic, and that they felt confident in their knowledge about vaccine efficacy, safety, and general functions.

A population-representative survey in Switzerland indicated that people encountered the topic of Covid-19 most frequently on TV, during conversations with friends and other acquaintances, and on the internet (Science Barometer Switzerland, 2020). When asked about sources, while searching for information on health or medical topics in general, a majority (55%) cited digital sources, followed by physicians or other health professionals (28%; De Gani et al., 2021). A representative survey by De Gani et al. (2021) found that almost half of Switzerland's population (49%) demonstrated low health literacy and reported frequent difficulties when dealing with health information. In particular, most Swiss inhabitants disclosed recurrent difficulties to process digital information and digital services (72%). Accordingly, they also scored low in digital health literacy. The most difficult aspect seems to be assessing online information, i.e. judging whether there are ulterior motives (commercial or other) and if information is trustworthy.

During crises – when uncertainty about potential risks, measures, and consequences is high – decisions can have far-reaching consequences and far-reaching decisions must be made. This results in a strong demand for trustworthy information (Perse & Lambe, 2016). Successful management of crises often crucially depends on citizens' willingness to follow public advice, which is notably based on presuming competence and the best intentions by those in charge, i.e. believing in the probability that certain measures will alleviate the crisis, and that those instituting them have integrity (Frischlich & Humprecht, 2021). *Trust* can be defined, according to Blöbaum (2016), as a relationship between the one who trusts, and the object of trust, based on free decisions oriented towards the future but rooted in both the trustor's prior experiences and their perceptions of the trustee's trustworthiness.

Globally, the Covid-19 pandemic is a threatening, uncertain situation, during which people need security and guidance. The pandemic, as well as other past health crises (e.g., influenza virus H1N1 and other coronavirus outbreaks), generally resulted in greater (short-term) public trust in governments, health agencies, science, and other societal institutions, and in lower

science-related populism (Deurenberg-Yap et al., 2005; Jensen et al., 2021; Mede & Schäfer, 2021; Nielsen et al., 2021). This phenomenon has been described as the “rally-around-the-flag dynamic” (Devine et al., 2020, p. 4). In many countries, national and global health authorities, as well as scientists, medical doctors or other health professionals have remained highly and broadly trusted, even a year after the pandemic began (Nielsen et al., 2021). Regarding media sources of information, the following can be seen across the eight countries covered in the study by Nielsen et al. (2021): About half the respondents rated news organisations as a relatively trustworthy source of Covid-19 information, but a trust gap was detected between Covid-19 information from news organisations and information provided by other online platforms.

At the beginning of the pandemic, Switzerland appeared to have a well-functioning communications infrastructure that allowed for large sections of the population to be well-informed during the crisis (Eisenegger et al., 2021; Friemel et al., 2020). The information that the federal government and Swiss TV stations provided was particularly important (Friemel et al., 2020). However, when the Swiss population was asked about how appropriate they found the scope and tone of the reporting, less than half were satisfied (Friemel et al., 2020). Some criticism entailed allegations of too little coverage and an overly downplaying tone. Yet, an even larger proportion of Swiss people complained about too much coverage and an overly dramatic tone. Nevertheless, reporting quality was generally rated high. Shortcomings have been pointed out e.g., in relation to a lacking meta-journalistic discourse, alarmism, and a lack of contextualisation of figures on the pandemic (Eisenegger et al., 2021). In terms of content, Swiss media coverage of preventive measures, aside from vaccination, has focussed primarily on mask-wearing, with the contact tracing app and social distancing receiving less media attention (Friemel et al., 2021). The Swiss government’s measures to contain the pandemic were evaluated with varying degrees of criticism in Swiss media over time: During the first wave, about 6% of articles explicitly supported preventive measures, while during the second wave only 0.3% supported them (Eisenegger et al., 2021). In April 2021 (the present study’s survey period), willingness to wear a mask was at 89%, and willingness to engage in social distancing was at 63% in Switzerland (Friemel et al., 2021). However, a quarter of the population remained sceptical about Covid-19 vaccination (Gordon et al., 2020).

Studies suggest that Covid-19 communication and information behaviour is associated with protective behaviour. Friemel and Geber (2021) found that Covid-19 communication modes (news media, social media, and interpersonal communication) are distinct in relevance to protective behaviour in Switzerland. The news media’s importance as an information source was identified to correlate most with the perceived efficacy of protective measures such as social distancing, perceived social norms, and Covid-19 threat.

### *Misinformation Related to Covid-19: Dissemination, Belief, and Identification*

Information and misinformation have undoubtedly shaped how people perceive and respond to the pandemic. Moreover, they have contributed to the public perception of the capabilities of officials and institutions to contain the pandemic (Nielsen et al., 2020): “Erosion of trust at the level of societal institutions – such as politics or the media, between social groups or individuals’ conspiracy beliefs – increases societies’ vulnerability to mis- and disinformation, endangers social stability and substantially impairs successful control of public crises such as the Covid-19 pandemic” (Frischlich & Humprecht, 2021, p. 23). How people respond to mis-

and disinformation varies depending on their trust in the actors and media disseminating the information.

The spread of coronavirus was accompanied by an unprecedented global spread of mis- and disinformation (Frischlich et al., 2020; High representative of the union for foreign affairs and security policy, 2020). Both mis- and disinformation entail false content. While disinformation is intentional, created and shared to do harm, misinformation is shared by people without being aware that the information is false (Wardle & Derakshan, 2017). Disinformation is usually tied to various actors' ideological, political, or economic interests, with country-specific waves of dissemination (AFP et al., 2020; Smith et al., 2020). Given the difficulty of knowing or assessing the reasons or intentions behind dissemination, we use the term *misinformation* throughout this study to refer broadly to any type of false information – including disinformation (see also Brennen et al., 2020).

Covid-19 misinformation-related issues have been very prominent on several large digital platforms (Smith et al., 2020). YouTube and Facebook, as well as messenger apps such as WhatsApp and Telegram, were found to be major vectors for the dissemination of misinformation, including health-related topics (Echtermann, 2021; Vosoughi et al., 2018; Smith et al., 2020; Wilson & Wiysonge, 2020). Similarly, greater exposure to digital media, social media and messaging apps is associated with greater misinformation beliefs, while greater exposure to traditional media is associated with fewer misinformation beliefs – also in Switzerland (Allington et al., 2020; De Coninck et al., 2021; Nielsen et al., 2021). Furthermore, those using social media are more likely to state, that they have been exposed to Covid-19 misinformation than non-users (Newman et al., 2021; Jurkowitz & Mitchell, 2020). Across the eight countries that Nielsen et al. (2021) surveyed, 30% of the respondents declared that they had encountered a lot or a great deal of false or misleading information about Covid-19 on social media in the past week. However, public concern over false or misleading information about Covid-19 was first and foremost centred around these countries' political actors (35%).

Regarding public belief in Covid-19 misinformation, evidence indicates that it is not particularly common, yet a substantial proportion of people in each country, including Switzerland, still views this type of misinformation as highly reliable (Allington et al., 2020; Kuhn et al., 2021; Nielsen et al., 2021; Roozenbeek et al., 2020). Large-scale cross-country comparative studies have found a clear link between susceptibility to Covid-19-related misinformation and both vaccine hesitancy as well as a reduced likelihood of complying with health guidance measures (Allington et al., 2020; Roozenbeek et al., 2020). Along with these more direct and indirect individual negative consequences, a more systematic direct consequence from misinformation for society is bungled policy responses to the pandemic in some countries (De Ridder, 2021). It is therefore important to counteract the spread of misinformation.

Several studies have underlined that education is a protective determinant against belief in misinformation (De Coninck et al., 2021; Kuhn et al., 2021). It has been hypothesised, that individuals with higher education levels are more competent to recognise misinformation. Indeed, people with higher education levels score higher on misinformation news analysis and detection tasks (Jurkowitz & Mitchell, 2020; Murrock et al., 2018; Preston et al., 2021). Specific to Covid-19 news, data from the Pew Research Centre indicated that highly educated citizens find it easier to separate fact from fiction and are more confident overall in that they can fact-check news (Gottfried, 2020). In contrast, other cross-national studies did not find a

clear link between education and beliefs in misinformation (Nielsen et al., 2021; Roozenbeek et al., 2020).

### *Research Questions and Hypotheses*

Individuals obtain information on the coronavirus pandemic via various media, which they trust in varying degrees (Nielsen et al., 2020). These media and even public institutions convey very different Covid-19-related information, e.g., about protective measures, with varying quality levels (Eisenegger et al., 2021). Importantly, trust in media (and their selection) and public institutions plays a decisive role in information behaviour in crises and contentment in public discourse (Frischlich & Humprecht, 2021; Perse & Lambe, 2016). In this study, we asked:

*RQ1a:* Which information regarding Covid-19 does the Swiss population believe has received too little attention?

*RQ1b:* Not enough attention is paid by whom?

The following hypotheses can be derived from the literature:

*H1.1:* Greater demand exists for more attention among those who have less trust in public institutions.

*H1.2:* A greater demand for more attention can be identified among those who obtain information on the internet and, in particular, via social media or messenger apps.

*H1.3:* A greater demand for more attention can be identified among those who rate their knowledge about Covid-19 as lower.

Knowledge and acceptance of effective prevention measures is crucial to counteract the spread of the coronavirus. It is unclear, which measures the people in Switzerland deem effective, which ones they view as ineffective, and to what extent this depends on their trust in public institutions, on science-related populism, on personal concern, or on information behaviour. Yet, lack of information and belief in misinformation regarding preventive measures can ultimately threaten public health. Covid-19 misinformation in general is disseminated mostly via the internet, particularly social media, and messenger apps (Echtermann, 2021; Vosoughi et al., 2018; Smith et al., 2020; Wilson & Wiysonge, 2020). Therefore, we aimed to be more specific and asked:

*RQ2:* Which measures does the Swiss population view as (not) effective in preventing coronavirus infection and, thus, the spread of Covid-19?

*H2.1:* Swiss residents who feel more negatively affected by Covid-19 report more effective measures compared to those who feel less negatively affected.

*H2.2:* Swiss residents with stronger trust in public institutions report more effective measures than Swiss residents with less trust.

*H2.3:* Swiss residents scoring high in science-related populism report fewer effective measures than Swiss residents with low levels of science-related populism.

*H2.4:* Swiss residents who trust public institutions less are more likely to believe misinformation regarding subjectively (in)effective measures against coronavirus infection.

*H2.5:* Swiss residents who obtained information on Covid-19 predominantly via the internet, particularly via social media or messenger apps, are more likely to believe misinformation regarding subjectively (in)effective measures against coronavirus infection.

Moreover, information deficits and uncertainties often arise from widespread misinformation. Several studies have examined belief in misinformation regarding Covid-19 and/or have analysed its prevalence (Allington et al., 2020; De Coninck et al., 2021; Kuhn et al., 2021; Nielsen et al., 2021; Roozenbeek et al., 2020). However, only few findings are related to subjectively identified misinformation and to the extent that people can name Covid-19 misinformation explicitly. This may be an indicator for information literacy skills in this area. Studies from other countries found that especially on social media, such misinformation can indeed be detected (Newman et al., 2021; Jurkowitz & Mitchell, 2020).

*RQ3a:* What subjectively perceived misinformation regarding Covid-19 have Swiss residents encountered so far?

*RQ3b:* Where have Swiss residents encountered this misinformation?

*H3.1:* Swiss residents who obtain more information via social media subjectively encounter misinformation more frequently.

*H3.2:* Highly educated individuals are more likely to be capable of naming misinformation they have encountered before, compared to less educated people.

## Method

Through a survey institute, we conducted an online survey of 1,129 Swiss inhabitants in April 2021. Quota sampling according to Swiss population statistics (Bundesamt für Statistik, 2021; Eurostat, 2018) was performed in terms of self-identified language region ( $n = 741$  from German-speaking Switzerland;  $n = 387$  from French-speaking Switzerland), age ( $M_{\text{age}} = 48$ ,  $SD = 15$ ; five age groups: 18–29 years [ $n = 160$ , 14.2%]; 30–39 years [ $n = 189$ , 16.7%]; 40–49 years [ $n = 227$ , 20.1%]; 50–59 years [ $n = 254$ , 22.5%]; and 60–74 years [ $n = 299$ ; 26.5%]), gender ( $n = 592$  females; 52.4%) and education (three education levels: low [ $n = 91$ , 8.1%]; medium [ $n = 568$ , 50.3%]; and high [ $n = 470$ , 41.6%]).

The following open questions were asked at the beginning of the survey:

(1) What information about Covid-19 do you think is receiving too little attention? And from whom?

(2) In your opinion, what measures are effective in preventing Covid-19 infection and, thus, the spread of Covid-19? Which ones are not?

(3) What misinformation (fake news) have you already come across regarding Covid-19? Where?

A trained coder assistant content-analysed and thematically bundled the open answers. The coding strategy of our qualitative content analysis, implemented according to Mayring (2010), combined inductive and deductive coding to conduct and apply variables, and to reduce the large amount of material to units of meaning with a particular relevance to our research questions' scope. The deductive basis served as main variables in the coding scheme (see Table A1 in the supplemental material). The intercoder reliability check involved comparing the assistants' coding to a master coding by the PI of 10% of the coded content. A comparison

between the codings revealed a satisfactory intercoder reliability ( $r_H > .83$ ; see Table A1 in the supplemental material).

The following (presumed to be relevant) variables were assessed to test the study's hypotheses: We measured information behaviour regarding Covid-19 and trust in public institutions, according to the Science Barometer Switzerland (Metag et al., 2020). We used the SciPop Scale to measure science-related populist attitudes as an additional component in terms of trust in societal institutions (Mede et al., 2021; Cronbach's  $\alpha = .89$ ). To measure self-assessed knowledge about Covid-19, we included items from the Science Barometer Switzerland (2020). To measure affectivity with Covid-19, we used items from Wave 32 of the COSMO survey (Betsch et al., 2021). We also asked how frequently and which (subjectively) Covid-19 misinformation respondents encountered. Other collected control variables included vaccination status and coronavirus infection.

For more detailed information on the constructs/variables measured, the exact question wordings, items, scale levels, index formation (if applicable) and means, see Table 1. The first author's university ethics committee approved the survey.

### Sample Description

With respect to their information usage about Covid-19 since the beginning of the pandemic in March 2020, respondents stated they were particularly likely to seek out Covid-19 information on TV ( $M = 3.5$ ,  $SD = 1.3$ ; on a five-point scale), on the internet ( $M = 3.5$ ,  $SD = 1.2$ ) and in conversations with friends and other acquaintances ( $M = 3.4$ ,  $SD = 1.1$ ). They rarely consumed printed daily newspapers, weekly newspapers, or magazines ( $M = 3.0$ ,  $SD = 1.3$ ), radio ( $M = 2.81$ ,  $SD = 2.8$ ), scientific journals ( $M = 1.9$ ,  $SD = 1.2$ ) or popular science magazines ( $M = 1.9$ ,  $SD = 1.1$ ) for this purpose. Of those who used the internet at least sometimes as an information source, most respondents specifically visited scientific institutions', authorities' and organisations' websites ( $M = 3.0$ ;  $SD = 1.3$ ) as well as websites of newspapers and magazines ( $M = 3.0$ ,  $SD = 1.4$ ), but only rarely accessed TV and radio stations' media libraries ( $M = 2.5$ ,  $SD = 1.3$ ); Facebook, Twitter or other social networks ( $M = 1.9$ ,  $SD = 1.2$ ); or YouTube or similar video platforms ( $M = 1.8$ ,  $SD = 1.1$ ) to obtain Covid-19 information.

Concerning trust in social institutions, most respondents demonstrated a medium level of trust in both representatives from cantonal authorities and federal offices ( $M = 3.1$ ,  $SD = 1.2$ ; on a five-point scale), and relatives, acquaintances, and colleagues ( $M = 2.9$ ;  $SD = 1.0$ ). Trust was highest in medical doctors and staff ( $M = 4.1$ ,  $SD = 1.0$ ), as well as in scientists and researchers ( $M = 4.0$ ,  $SD = 1.1$ ). In contrast, respondents generally reported low levels of trust in politicians ( $M = 2.5$ ,  $SD = 1.2$ ) and journalists ( $M = 2.4$ ,  $SD = 1.1$ ).

The items of this study also examined knowledge assessment, with the results indicating that respondents do not think they know a lot about Covid-19 ( $M = 3.2$ ,  $SD = 1.1$ ) and feel confused by the large amount of partly contradictory information from different sources ( $M = 3.3$ ,  $SD = 1.3$ ; on a five-point scale). Interestingly, respondents divergently stated that they either follow media coverage of Covid-19 very closely ( $M = 3.1$ ,  $SD = 1.3$ ) or have stopped paying attention to articles/contributions/broadcasts about Covid-19 all together ( $M = 3.1$ ,  $SD = 1.4$ ). Fewer respondents said they specifically searched for information about Covid-19 ( $M = 2.8$ ,  $SD = 1.3$ ), or that they have less knowledge about the current Covid-19 pandemic compared to most other people ( $M = 2.4$ ,  $SD = 1.1$ ).



Table 1. Description of the Survey Constructs/Variables

Construct	Source	Question	Measurement	Items	Mean	SD
Information use	Metag et al. (2020)	<p>A. In the following part, we are interested in your media use around the topic of COVID-19 since the beginning of the pandemic in March 2020. How often have you informed yourself about COVID-19 via the following (offline) channels since the beginning of the pandemic?</p> <p>B. FILTER: If you have been on the internet since the beginning of the COVID-19 pandemic, how often have you informed yourself about COVID-19 via the following channels on the internet?</p>	<p>Likert scale: 1 = <i>Never</i> to 5 = <i>Very often</i>; <i>don't know</i>-option; items randomised</p>	TV	3.5	1.3
				Radio	2.8	1.4
				Printed daily newspapers, weekly newspapers or magazines	3.0	1.3
				Popular science magazines (e.g., <i>PM</i> , <i>GEO</i> , or <i>Spektrum der Wissenschaft</i> )	1.9	1.1
				Scientific journals (e.g., <i>Science</i> , <i>Nature</i> , or <i>Lancet</i> )	1.9	1.2
				On the internet	3.5	1.2
				In conversations with friends and other acquaintances	3.4	1.1
				Newspapers and magazines' websites or apps	3.0	1.3
				TV and radio stations' media libraries	2.5	1.3
				Scientific institutions, authorities, and organisations' websites	3.0	1.3
				Facebook, Twitter or other social networks	1.9	1.2
				YouTube or similar video platforms	1.8	1.1
				Messenger apps such as WhatsApp and Telegram	1.9	1.2
				Trust in social institution	Metag et al. (2020)	Please indicate, on a scale of 1 to 5, how high your confidence is in statements about COVID-19 from the following actors:
Doctors and medical staff	4.1	1.0				
Politicians	2.5	1.2				
Representatives of cantonal authorities and federal offices	3.1	1.2				
Journalists	2.4	1.1				
Relatives, acquaintances and colleagues	2.9	1.0				

Table 1. Description of the Survey Constructs/Variables (continued)

Construct	Source	Question	Measurement	Items	Mean	SD
Science-related populism	Mede et al. (2021)	Please tick off which of the following statements applies to you:	8 items, mean value index Behind each option Likert scale: 1 = <i>Do not agree at all</i> to 5 = <i>Agree completely</i> ; <i>don't know</i> -option; items randomised	1. What unites the ordinary people is that they trust their common sense in everyday life.	3.4	1.2
				2. Ordinary people are of good and honest character.	3.1	1.3
				3. Scientists are only after their own advantage.	2.4	1.2
				4. Scientists are in cahoots with politics and business.	2.7	1.3
				5. The people should have influence on the work of scientists.	2.5	1.3
				6. People like me should be involved in decisions about the topics scientists research.	2.5	1.3
				7. In case of doubt, one should rather trust the life experience of ordinary people than the estimations of scientists.	2.6	1.3
				8. We should rely more on common sense and less on scientific studies.	3.0	1.3
Mean index on science-related populism					2.8	1.0
Knowledge assessment	Schäfer et al. (2021)	COVID-19 is a multifaceted topic. How do you rate yourself and your personal knowledge of COVID-19?	Behind each option Likert scale: 1 = <i>Do not agree at all</i> to 5 = <i>Agree completely</i> ; <i>don't know</i> -option; items randomised	I am specifically looking for information about COVID-19.	2.8	1.3
				I know a lot about COVID-19.	3.2	1.1
				I feel confused by the large amount of partly contradictory information from different sources on COVID-19.	3.3	1.3
				I follow media coverage of COVID-19 very closely.	3.1	1.3
				Compared with most others, I know less about the current COVID-19 pandemic.	2.4	1.1
I have stopped paying attention to articles/contributions/broadcasts about COVID-19.	3.1	1.4				

Table 1. Description of the Survey Constructs/Variables (continued)

Construct	Source	Question	Measurement	Items	Mean	SD
Affect in relation to COVID-19	Betsch et al. (2021)	Please choose one answer per line. COVID-19 is for me ...	6 items; semantic differential scale; items randomised	1. Near/Far away 2. Something I think about all the time/Something I almost never think about 3. Scary/Not scary 4. Medially puffed up/Medially not paying enough attention 5. Worrying/Not worrying 6. Something I feel helpless about/Something I actively can do something about	3.5 4.1 4.1 3.1 3.5 4.1	1.6 1.6 1.7 1.6 1.8 1.8
Frequency of mis-information encounters		Misinformation (fake news) about COVID-19 that I have encountered myself so far	Ordinal scale	Hourly Daily Weekly Monthly Semiannually Never		
Vaccination status		Have you or will you get vaccinated against COVID-19 as soon as possible?	Nominal scale	Yes; No; Don't know yet; Not specified		
COVID-19 infection		A. Have you been or are you infected with COVID-19? B. FILTER: If yes, was the course mild or severe? C. Have there been or are there people in your family or acquaintances who have been infected with COVID-19?	Nominal scales	A. Yes; No; Not specified B. Mild; Heavy; Not specified C. Yes; No; Not specified		

In terms of how affected respondents were by Covid-19, most answered that they sometimes think about the virus ( $M = 4.1$ ,  $SD = 1.6$ ), view it as rather frightening ( $M = 4.1$ ,  $SD = 1.7$ ), and rather not exaggerated by the media ( $M = 3.1$ ,  $SD = 1.6$ ). Concerning science populist attitudes, the respondents demonstrated a medium level of science-related populism ( $M = 2.8$ ,  $SD = 1.0$ ). About half of the respondents disclosed that they had been vaccinated or would get vaccinated as soon as possible against SARS-CoV-2 (48%).<sup>1</sup> Notably, 73 (6.5%) of the respondents already had been infected with Covid-19, with 14 enduring severe courses of the disease. Half of the participants reported that members of their family or circle of acquaintances had already been infected with SARS-CoV-2 (50%).

## Findings

### *Demand for More Attention on Information on Covid-19*

On the question of which information about Covid-19 receives too little attention according to the Swiss population (RQ1a), the survey found that 783 people (84%), who answered the question meaningfully ( $n = 928$ ), could name a specific issue. In contrast, 16% of these stated either that Covid-19 did not receive too little attention ( $n = 114$ ) or even that the issue receives too much attention ( $n = 40$ , 4%). Respondents, who answered the question meaningfully, often listed the following aspects as receiving not enough attention: vaccination and vaccination side effects ( $n = 198$ , 17%); aspects related to political measures ( $n = 146$ , 14%); psychological and social aspects and consequences ( $n = 142$ , 13%); science and research ( $n = 97$ , 9%); political aspects in general ( $n = 88$ , 8%); and information on the virus, the risks, and dangers associated with it ( $n = 99$ , 8%). Furthermore, some respondents mentioned that too little attention was paid to contradictory opinions and critics ( $n = 71$ , 6%). Other aspects were mentioned even less frequently: media coverage in general ( $n = 71$ , 6%); clarification and facts in general ( $n = 66$ , 6%); consequences of the pandemic in general ( $n = 60$ , 5%); virus mutations ( $n = 57$ , 5%); economic aspects ( $n = 56$ , 5%); numbers and statistics ( $n = 56$ , 5%); and other health-related aspects ( $n = 51$ , 5%).

When examining whom the respondents hold accountable for the lack of attention, i.e., who is paying too little attention (RQ1b), we found that it was mainly politicians in general ( $n = 145$ , 19%), along with the government ( $n = 119$ , 15%), followed by the media in general ( $n = 119$ , 15%) scientists/researchers ( $n = 57$ , 7%), the population itself ( $n = 47$ , 6%), and, less frequently, the economy ( $n = 7$ , 1%).

To investigate the relationship between the expressed demand for more attention and trust in public institutions, we evaluated their correlation and found only trust in journalists ( $r_s = -.08$ ,  $p < .04$ , 95% CI [-.14, -.01]) not to correlate well. It only correlated significantly to the number of attention requests mentioned: Individuals with less trust in journalists mentioned more attention aspects. No significant results were found for public institutions, however. Thus, H1.1 must be rejected.

Regarding correlations between sources used to seek information about Covid-19 and demand for attention to certain aspects, only the use of scientific institutions', authorities', and organisations' websites yielded a significant, albeit weak, positive correlation ( $r_s = .15$ ,  $p < .001$ , 95% CI [.08, .22]). Thus, H1.2 must be rejected, too.

Regarding the evaluation of one's own knowledge level, only one variable correlated weakly with the number of attention requests. Individuals who indicated more that they had stopped

dealing with Covid-19 tended to cite fewer items receiving too little attention ( $r_s = -.09$ ,  $p < .013$ , 95% CI [-.15, -.01]). Thus, H1.3 must also be rejected.

### *Perceived Effective Measures in Preventing SARS-CoV-2 Infection*

Regarding RQ2, almost all respondents (93%) named subjectively effective measures. Most named two to five measures (70%,  $M = 3.5$ ,  $SD = 1.9$ ), but less than half named subjectively ineffective measures (37%). The most frequently mentioned effective measures were social distancing ( $n = 745$ , 66%), wearing masks ( $n = 665$ , 59%), and general hygiene ( $n = 491$ , 44%), but vaccination ( $n = 290$ , 26%) and specific disinfection measures ( $n = 260$ , 23%) were also mentioned relatively often. Measures mentioned less frequently included testing ( $n = 58$ , 5%), border closures ( $n = 57$ , 5%), and a healthy lifestyle or bolstering one's immune system ( $n = 56$ , 5%). The most frequently mentioned subjectively ineffective measures related mainly to government bans or restrictions in general ( $n = 207$ , 18%) and to mask wearing ( $n = 106$ , 9%), including specific statements such as "scarf or similar instead of mask is ineffective" or generalising "mandatory mask is ineffective". Less frequently, ineffectiveness was mentioned in relation to social distancing ( $n = 60$ , 5%) or vaccinations ( $n = 31$ , 3%).

To test H2.1, we assessed the correlations between the number of effective measures mentioned and the affect variables measured in relation to Covid-19. Significant-but-weak correlations ( $p < .001$ ) emerged for five of the variables. In particular, respondents for whom Covid-19 was more likely to be felt as being near ( $r_s = .17$ , 95% CI [.11, .23]), who were more likely to think about it constantly ( $r_s = .14$ , 95% CI [.07, .20]), who felt it received too little media attention ( $r_s = .16$ , 95% CI [.09, .22]), and who found it worrisome ( $r_s = .19$ , 95% CI [.13, .26]) or scary ( $r_s = .12$ , 95% CI [.06, .18]) mentioned more measures. Thus, H2.1 is supported.

For H2.2, we found confirmatory evidence. Namely, that trust in scientists correlates most positively with the number of effective measures reported, followed by trust in representatives of cantonal or federal authorities, medical doctors, politicians, and even journalists (see Table 2).

**Table 2.** Correlation Between Trust in Social Institutions and Number of Effective Measures Mentioned

	False measures		
	Spearman's rho	95% CI	
		LB	UB
Trust in statements from scientists and researchers	.270***	.206	.326
Trust in statements from doctors and medical staff	.243***	.186	.305
Trust in statements from politicians	.179***	.12	.242
Trust in statements from representatives of cantonal authorities and federal offices	.259***	.198	.318
Trust in statements from journalists	.186***	.127	.249
Trust in statements from relatives, acquaintances, and colleagues	.007	-.056	.072

Note.  $n = 883$ . \*\*\*  $p < .001$

Swiss residents, who felt more negatively affected by Covid-19, cited more measures than those, who felt less negatively affected. Regarding mentioning of effective measures and respondents' level of science-related populism, Swiss residents with high levels of science-related populism reported fewer effective measures than those with low levels of science-related populism ( $r_s = -.26, p < .001, 95\% \text{ CI } [-.33, -.20]$ ). Thus, H2.3 is supported.

Notably, we also assessed if effective and ineffective measures were assigned correctly. Altogether, ineffective measures were listed incorrectly as effective 214 times by 136 people (13%), and effective measures were falsely named as ineffective 408 times by 286 people (27%). In conclusion, the Swiss inhabitants surveyed struggled more to identify ineffective measures.

To address hypotheses 2.4 and 2.5, we first calculated correlations (see Tables 3 and 4): Trust in actors of public institutions correlates negatively with the number of false (in)effective measures. The higher the trust in scientists, medical doctors, politicians, representatives of cantonal or federal authorities or journalists, the fewer wrongly (in)effective measures are mentioned, thereby supporting H2.4. With respect to information use, more frequent consumption of news media – such as TV, radio, and print products and their online offerings – correlates negatively with the number of false (in)effective measures mentioned. However, no correlation was found with internet use, social media, or messenger apps. Thus, H2.5 cannot be supported.

### *Subjectively Perceived Misinformation Regarding Covid-19*

When asked about subjectively perceived misinformation on Covid-19 that Swiss residents have encountered so far (RQ3a), respondents mentioned 1,443 instances of misinformation, 68 of which were actually found to be true statements. Notably, men had encountered misinformation more often than women ( $F(1, 1051) = 14.62, f = .12$ ), but did not list significantly more items of misinformation.

In terms of assessed knowledge level, it appears that individuals who stated to know a lot about Covid-19 ( $r = .13, p < .001, 95\% \text{ CI } [.04, .22]$ ) or more about the coronavirus crisis than others ( $r = .16, p < .001, 95\% \text{ CI } [.09, .24]$ ) were also able to name more specific

**Table 3.** Correlation Between Trust in Social Institutions and False (In)Effective Measures Mentioned

	False measures		
	Spearman's rho	95% CI	
		LB	UB
Trust in statements from scientists and researchers	-.20***	-.27	-.13
Trust in statements from doctors and medical staff	-.19***	-.26	-.13
Trust in statements from politicians	-.21***	-.28	-.14
Trust in statements from representatives of cantonal authorities and federal offices	-.24***	-.31	-.17
Trust in statements from journalists	-.18***	-.25	-.12
Trust in statements from relatives, acquaintances, and colleagues	-.01	-.08	-.06

Note.  $n = 883$ . \*\*\*  $p < .001$

Table 4. Correlation Between Information Use and False, (In)Effective Measures Mentioned

	False measures		
	Spearman's rho	95% CI	
		LB	UB
TV	-.17***	-.24	-.11
Radio	-.11**	-.18	-.04
Printed newspapers or magazines	-.11**	-.17	-.04
Popular science magazines	-.10**	-.16	-.04
Scientific journals	-.06	-.13	< .01
Internet	.02	-.04	.09
Conversations with friends & acquaintances	< .01	-.07	.08
Websites or apps of newspapers and magazines	-.07*	-.14	-.00
Media libraries of TV and radio stations	-.07*	-.14	-.01
Websites of scientific institutions, authorities, and organisations	-.08*	-.14	-.01
Facebook, Twitter, or other social networks	.04	-.03	.10
YouTube or similar video platforms	.06	-.01	.12
Messenger apps such as WhatsApp and Telegram	< .01	-.07	.07

Note.  $n = 883$ . \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

misinformation instances. Those who reported specifically searching for information ( $r = .13$ ,  $p < .001$ , 95% CI [.04, .21]) on the novel coronavirus also cited significantly more misinformation instances. Meanwhile, respondents who felt more confused by too much conflicting information from different sources ( $r = -.08$ , 95% CI [-.17, -.02]) tended to cite fewer misinformation instances.

The most frequently mentioned examples for misinformation concerned the virus' origin ( $n = 195$ ), such as "Bill Gates invented/spread the virus" ( $n = 43$ ) followed by statements such as that "the virus is harmless" ( $n = 157$ ) or "... does not exist" ( $n = 83$ ). Next was misinformation about deaths or infection rates ( $n = 182$ ), masks ( $n = 103$ ), vaccination ( $n = 167$ ), tests ( $n = 28$ ), preventive interventions ( $n = 50$ ), contagion and transmissibility ( $n = 71$ ), various protective and curative products ( $n = 133$ ), and a conspiracy of those in power to create the pandemic ( $n = 128$ ). The statement "The virus came from a lab", which remains controversial (Maxmen & Mallapaty, 2021; Thacker, 2021), was also mentioned frequently ( $n = 115$ ). Regarding the sources of subjectively perceived misinformation (RQ3b), social media ( $n = 197$ ), news media ( $n = 186$ ), the internet in general ( $n = 119$ ), TV ( $n = 100$ ), politicians ( $n = 93$ ), and friends and family ( $n = 72$ ) were named most frequently.

Furthermore, 25% of respondents said they encountered Covid-19 misinformation at least daily – 40% at least once a week since the pandemic began. Only 14% said they had not perceived/noted any misinformation (yet). The higher the respondents' education level, the more often they encountered misinformation ( $r = .15$ ,  $p < .01$ ). Furthermore, people who used TV more frequently as a source of Covid-19 information, reportedly encountered less misinformation ( $r = -.11$ ,  $p < .01$ , 95% CI [-.18, -.05]), and people who used scientific ( $r = .16$ ,  $p < .01$ , 95% CI [.11, .22]) or popular science magazines ( $r = .20$ ,  $p < .01$ , 95% CI [.15, .26])

stated that they encountered misinformation more frequently. No evidence was found to support the hypothesis that Swiss residents who obtain more information via social media encountered misinformation more often (H3.1).

A multiple regression analysis indicated that sociodemographic factors and information use affected the frequency of subjectively encountered misinformation ( $F(10, 1009) = 9.05$ ,  $p < .001$ ,  $f = .30$ ,  $R^2 = 0.082$ , see Table 5). However, the independent variables explained only 8% of the dispersion encounter frequency. All in all, this study supports H3.2, i.e., highly educated people can name more different misinformation instances they have encountered compared to less educated people.

## Discussion and Limitations

In the following, we discuss the findings along with the research questions related to the information awareness and information deficits related to Covid-19 and prevention measures of Swiss inhabitants during the Covid-19 pandemic, as well as the findings regarding the influencing variables that were studied.

Most respondents in Switzerland desire more attention would be paid to certain topics in the public discourse, especially on vaccinations and their potential side effects. In Switzerland, as in other German-speaking countries, in contrast to other European countries such as Portugal, Norway or Denmark, there has been a visible anti-vaccination (“anti-vax”) movement, which presumably contributes to this specific perceived information deficit (Jones & Chazan, 2021). However, even in these countries, people are better informed about the vaccination than residents of Switzerland (Yoker, 2021) and, in general, their health-related information literacy is also higher (cf. digital health literacy; The HLS19 Consortium of the WHO Action Network M-POHL, 2021).

As in the Swiss Science Barometer’s representative survey of the Swiss population (Science Barometer Switzerland, 2020), our study demonstrates that the most common sources of information are TV, conversations with friends and other acquaintances, and the internet. Dramatic and unprecedented events increase the need for guidance, subsequently leading to increased news consumption. Previous studies have indicated that in times of crisis, people

*Table 5.* Regression Analysis to Explain the Variance in the Subjective Frequency of Encountering Misinformation

Model		<i>b</i> *	<i>p</i>
Sociodemographics	Education	-.09	.005
	Gender	.12	< .001
	Age	.03	.344
	(constant)		< .001
Information use	TV	.12	.002
	Radio	< .01	.984
	Print products	.05	.229
	Popular science magazines	-.05	.210
	Scientific journals	-.15	< .001
	Internet	-.01	.729
	Friends and colleagues	-.06	.105



tend to rely on media capable to provide immediate news updates, particularly TV and online news sources (Van Aelst et al., 2021; Westlund & Ghersetti, 2015).

The most frequently mentioned measures respondents find effective include social distancing, wearing masks, general hygiene, and vaccination. These are also the measures covered most frequently in the media and officially recommended by Swiss health officials at the time (BAG, 2021; Friemel et al., 2021). Individuals personally affected by Covid-19 mentioned more effective measures compared to those, who had not been affected personally. Immediate fear and worry, as well as subjective proximity to the virus, are understandably and comprehensively associated with increased knowledge of effective measures. Meanwhile, people are less likely to worry about contracting SARS-CoV-2 and researching protective measures if they feel the pandemic is outside of their personal danger zone. This relationship was also observed in other studies on Covid-19. In a study by Harper et al. (2020), the researchers found that “the only predictor of positive behaviour change (e.g., social distancing, improved hand hygiene) was fear of Covid-19” (p. 1875). Perceptions of threat and risk factors are crucial and culturally uniform proven determinants of protective behaviour (Jørgensen et al., 2021).

Most respondents in this study encountered subjectively perceived COVID-19 misinformation and identified its source as predominantly originating from social media. Other surveys also confirmed that social media, in particular, was reported as a misinformation source (Allington et al., 2020; De Coninck et al., 2021; Nielsen et al., 2021). Further, we can extend Friemel and Geber’s (2021) findings insofar as we discovered that Covid-19 communication channels (e.g., news media, social media, and interpersonal communication) are distinct not only in their relevance for protective behaviours, but also in terms of belief in misinformation on protective measures in Switzerland.

In other countries such as the US, the most widespread misinformation is usually politically motivated (Enders et al., 2020), whether it be beliefs that this virus was invented only to harm former president Donald Trump or that it is a Chinese bioweapon created to target the U.S.. As our study indicates, this is not the case in Switzerland, possibly due to both nations’ different political and media systems. For example, a study by Humprrecht et al. (2020) showed that the U.S. is less resilient against misinformation, possibly due to the U.S. news media’s weak public service agenda, comparatively fragmented news consumption, and the nation’s sharp political divisions. Previous research also found that Switzerland is comparatively resistant to disinformation (Humprrecht et al., 2020), as it has a public democratic-corporatist media system and comparatively low audience fragmentation and polarisation.

The important influence of trust in public authorities on knowledge of effective Covid-19 prevention measures and on belief in misinformation about Covid-19 is evident in our survey, as has previously been postulated in other studies (Frischlich & Humprrecht, 2021; Plohl & Musil, 2021; Science Barometer Switzerland, 2020). Trust in scientists correlates most positively with the number of effective measures reported, followed by trust in representatives of cantonal or federal authorities, medical doctors, politicians, and even journalists. Very similar findings are shown by the Science Barometer Switzerland (2020) that feature general science recognition in Switzerland. However, “believing in science is not understanding the science” (Pasternak & Orsi, 2020: 1). This means that our findings show a correlation between trust and knowledge of effective Covid-19 prevention measures. However, we cannot say whether these measures and their effects were understood.

Our findings indicate, in line with others' (Murrock et al., 2018; Preston et al., 2021), that more highly educated individuals and those who read scientific literature for Covid-19 information are likely to have more competence in misinformation recognition. However, a particular limitation in the conclusion that education and misinformation detection are related is that education does not necessarily impart the cognitive ability to detect misinformation. It would be better to use a specific misinformation detection literacy scale, yet to be developed, to provide a solid control variable. Undoubtedly, the direct question about subjectively received misinformation bears no conclusions about the general belief in misinformation on Covid-related topics.

Finally, all limitations applicable to online surveys in general restrict our survey. The method is obtrusive; we cannot control the survey situation, and the sample contains a bias in terms of those who are willing to participate in an online survey (i.e., self-selection bias) (see Schaurer & Weiss, 2020), which negatively affects representativity. A further limitation lies in socially desirable responses — particularly as our survey concerns Covid-19 measures, a normative-loaded topic (Paulhus, 2017). Moreover, well-known limitations were found in relation to open-ended questions (e.g., different response differentiation) (Kessler & Engelmann, 2019). Furthermore, the study's cross-sectional design did not allow for statements on causality, as this cannot be tested. Moreover, it represents only a snapshot — particularly given the constantly adapted Covid-19 measures in Switzerland (BAG, 2021). Considering that different measures were emphasised or promoted in each country, the results are also not completely generalisable to other countries. However, we assume that the hypotheses in particular are generalisable and can be transferred to other democratic countries. Thus, future cross-country comparative studies will yield valuable lessons.

### *Conclusion and Implications*

Through a representative survey, the present study investigated Swiss residents' information awareness and information deficits related to Covid-19 and prevention measures during the Covid-19 pandemic. Specifically, the survey investigates information, which subjectively has received too little attention, measures that Swiss residents have stated are (in)effective at preventing SARS-CoV-2 infection and subjectively perceived misinformation regarding Covid-19 that Swiss residents have encountered. A content analysis of the open answers of our survey revealed that vaccination and its potential side effects, aspects related to political measures, psychological and social aspects, as well as science and research topics, deserved more attention, mostly from politics or media. The public demand for information during the pandemic is undoubtedly enormous. Accessible and reliable information is highly relevant in unfamiliar situations, such as a pandemic, given that individuals derive implications for their personal risk assessment and behaviour from it. Neither the media nor science itself could satisfy this demand for instant, comprehensive information about the virus.

The most frequently mentioned effective measures were social distancing, wearing masks, general hygiene, and vaccination. The correlations between higher trust in public authorities and lower science-related populism with a higher number of prevention measures named and correctly assessed as effective lead to the implication that if trust in public institutions is strengthened and science-related populism is weakened in Switzerland, this can potentially lead to an increase in valid knowledge and the acceptance of preventive measures that can reduce the spread of the coronavirus. In particular, non-evidence-based recommendations that later

turn out to be wrong, which were given by Swiss policy makers in the early days of the pandemic, should not be adopted as they can reduce trust in public authorities and subsequently the assessment of the effectiveness of measures (Wong Sak Hoi, 2020). Accordingly, care must be taken even by policy makers to ensure that science-related populism does not sprawl further in Switzerland, and that populist ideas be countered by evidence-based arguments from the outset. In the interest of societal health and safety, it is thus crucial even for science itself to take steps to build public trust in science and scientists. Therefore, Plohl and Musil (2021) propose the following steps, among others: “Actively participating [of scientists] in public discussions (by providing facts in a way that is easily understood by the public), informing the public about the key aspects of the scientific process, and promoting ethical and transparent research practices within the scientific community” (p. 10).

Our study found that most respondents in Switzerland, who had encountered subjectively perceived Covid-19 misinformation, can name examples and identify sources hereof, mostly social media. Education and information use affected the frequency of subjectively encountered misinformation and likely also influenced the ability to recognise misinformation. From this and from other studies on the positive influence of media and information literacy and the specific promotion of misinformation detection skills on individual resilience to misinformation, a political educational mandate can be derived (Guess et al., 2020; Jones-Jang et al., 2021).

Our study even revealed that a relevant proportion of Swiss respondents struggled to correctly distinguish effective from ineffective prevention measures. Mostly, these are Swiss residents with less trust in public institutions and who consume less news media on Covid-19. This poses a serious challenge for the efforts to contain the coronavirus in Switzerland. To address these difficulties, on the one hand, more effective communication measures are required in Switzerland (Yoker, 2021). This appeal is also supported by the results of this study with regard to the points which, in the opinion of the respondents, did not receive sufficient attention in public discourse. On the other hand, for more individuals to confidently find, understand, and assess valid health communication information, increasing the general health literacy and digital literacy is needed in Switzerland, which ranks in the lower third of European countries in this regard (The HLS19 Consortium of the WHO Action Network M-POHL, 2021).

## Notes

1. The survey took place at a time, when only a few Swiss residents had been offered vaccinations (high-risk groups for Covid-19).

## Ethical Approval

The research project was approved by the ethics committee of the Faculty of Arts and Social Sciences of the University of Zürich on 24.03.2021. The approval number is 21.2.6.

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## Conflict of Interest

The authors have no conflicts of interest to declare.

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