

ORIGINAL ARTICLE

## Between information campaign and controversy: a quantitative newspaper content analysis about COVID-19 vaccination in Switzerland and Austria

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### Abstract

**Aims:** Because media portrayal reflects and shapes public opinion and health policy, investigating news coverage of public health issues is highly relevant for public health research and practice. Addressing a topical issue, this study investigated how newspaper coverage framed COVID-19 vaccines in Austria and German-speaking Switzerland and how it developed over time. **Methods:** A quantitative newspaper content analysis of six newspapers from Austria and German-speaking Switzerland published between January 1 and 31, 2022 was conducted. Frames were identified for each country separately through hierarchical cluster analysis (Ward's method) based on frame elements. **Results:** Four frames were identified in both countries: (1) Evaluating new vaccines, (2) Discussing mandates, (3) Promoting vaccination, (4) Mentioning vaccines. In Frames 1 (Switzerland 86.4%, Austria 93.3%) and 3 (Switzerland 92.7%, Austria 98.9%), most articles included vaccine-endorsing statements, with Swiss coverage including additional negative statements more often than Austrian coverage (43.2%/44.6% vs 4.0%/3.3%). Frame 2 was closely linked to vaccine skepticism only in Austria and contained more evaluative statements in Austrian newspapers (25.4% endorsing, 35.4% rejecting; in Switzerland 14.5%/18.1%). The Austrian tabloid *Kronen Zeitung* published most articles (497/1091, 45.6%). **Conclusions:** **The commercialized and comparatively high share of tabloid news coverage in Austria may have contributed to oversimplified and polarizing COVID-19 vaccine debates in this context. Insufficiently balanced and adequate information may contribute to a loss of public trust in vaccination and may therefore affect vaccination uptake. Authorities and public health professionals should consider this effect when designing information campaigns.**

**Keywords:** COVID-19, vaccination, public debate, print media, content analysis, frame analysis, Switzerland, Austria

### Introduction

Information sourcing through traditional mass media, online media, and social media has played an important role in COVID-19 vaccine acceptance. In the United States, conservative media consumption is associated with vaccine hesitancy and misinformation [1]. Other studies indicate a link between vaccine hesitancy and tabloid news consumption [2] and the use of social media [3]. Social media have constituted a significant forum for discussing

COVID-19 vaccination [4]. While online news platforms and social media have reduced the role of traditional newspapers [5], journalist-edited media continue to play a significant role in stable media environments. They contribute to setting the agenda for matters of concern [6] and are considered trustworthy information sources, particularly in times of crisis [2]. In light of the “infodemic” accompanying the COVID-19 pandemic, journalistically edited newspaper content gains importance in correcting

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false information and guiding people through the ever-changing landscape of scientific evidence [7].

As the aforementioned studies on COVID-19 vaccination indicate [1,2], mass media can inform people's views on vaccines. At the same time, media content itself is shaped by broader societal discourses and policy debates. Media portrayal of public health issues thus both reflects and shapes public opinion. This two-way effect points to a need for systematic media analysis to inform health policy and practice. More specifically, media analyses can reveal who may be influential in these debates, what topics become pertinent at a given time, and how these are evaluated [8]. Even though a content analysis of frames alone cannot generate direct insights into the effects media coverage elicits in recipients, it allows for a retrospective reflection on the nature and change of public debates. Moreover, media analyses are indicators of public and political engagement with public health issues, which can be useful for an informed, two-sided exchange with public health scholars from research and practice.

This complex network of dependencies between individual attitudes, vaccination policies, and mass media portrayal has received little systematic attention. Longitudinal studies about the content of newspaper articles are scarce, with few exceptions [9–11]. This study thus explored the course of the debate on COVID-19 vaccination in German-language newspapers from Austria and Switzerland, asking, How did public debates in high-coverage newspapers on COVID-19 vaccination take shape over time, and what frames became dominant in the contexts of Austria and German-speaking Switzerland?

## Materials and methods

We used framing theory, an established approach in communication sciences, to address our research question. Framing theory postulates that mass media influence public debates—and individual readers—by emphasizing certain aspects of a topic while neglecting others [12]. Definitions and operationalizations of what constitutes a frame have been subject to intense debate in the communication sciences. Given the empirical nature of this study, we adopted Entman's commonly cited definition, where “to frame is to select some aspects of a perceived reality and make them more salient in a communicating text” [13].

### *Study design*

We applied a “most similar systems design” by comparing newspaper reporting from Austria and German-speaking Switzerland [14]. Comparing two

countries with similar cultural, political, and media systems allowed for a more fine-grained interpretation of differences in the findings, as these could not be explained by different systemic features. Located in central Europe with around 8 and 9 million inhabitants, respectively, both countries constitute consociational democracies with a federalist structure that provides the framework for implementing central vaccination policies at a regional level. Even though 75% of Austrian and 69% of Swiss residents have been vaccinated against COVID-19 [15], both countries featured some degree of vaccine hesitancy [16,17].

Their media systems share important similarities, too, and thus lend themselves well to comparison. Both are considered “democratic corporatist” [18] media systems, characterized by power sharing, seeking compromise in public and political discourse, and a history of the press taking political stances and traditions. Even though the latter has been replaced in more recent decades by more liberal, commercialized media markets, a considerable ratio of press entities in Austria (18% in 2010) still belong to public or political interest groups (in Switzerland only 1%) [19]. Differences between the Swiss and Austrian media systems include the comparatively strong influence of the tabloid press in Austria and the multi-lingual media landscape in Switzerland (German-, French-, and Italian-speaking), resulting in several small media markets [20]. Thus, while the Swiss and Austrian media systems feature similarities, these differences might affect this study's results.

### *Article sampling*

The most influential newspapers in terms of their reach and reputation were selected for the analysis based on functional equivalence in their respective media systems (Table S1) [21]. Additional inclusion criteria included variety in traditional political orientation (liberal vs conservative) and availability in the Factiva database for consistent sampling. Relevant articles were identified by keyword search in the Factiva database (Dow Jones) and the Austrian Press Agency. The analysis is based on a random sample of these articles. The search algorithm and detailed sampling strategy are available in the Supplementary methods (Figure S1).

### *Operationalization of frames*

Several methodologies have been proposed to measure frames in content analysis [22] but they were criticized for having weak validity and/or reliability [23]. We followed Matthes and Kohring, who addressed this criticism by combining the quantitative coding

of inductively derived frame elements (following Entman’s frame definition) with statistical cluster analysis [23]. We thus coded the following frame elements: context, cited actors, risks and benefits, evaluations, and action calls. Each frame element consists of a set of binary-coded variables. In addition, we coded article features (i.e., interview, commentary, reader’s letter, etc.) and the relative importance of the topic of COVID-19 vaccination in the article. A form programmed in LibreOffice Base was used for data collection. The codebook and a detailed description of how it was generated are available as Supplementary files.

Inter-coder reliability with three coders based on 50 randomly selected articles was calculated with Fleiss’s  $\kappa$  [24] using the Python package statsmodels 0.14.0.  $\kappa$  was calculated for each binary variable (see Table S2), with mean scores in each frame element being  $\kappa = 0.715$  (context),  $\kappa = 0.678$  (cited actors),  $\kappa = 0.755$  (benefits),  $\kappa = 0.570$  (risks),  $\kappa = 0.607$  (evaluations), and  $\kappa = 0.668$  (action call). Moreover, we coded the variables feature ( $\kappa = 0.691$ ) and importance of vaccination in the article ( $\kappa = 0.847$ ).

Because inter-coder reliability was inconsistent among binary variables despite intensive coder training and codebook refinement, we took recommended measures to improve reliability [25]. First, we combined similar binary variables into combined scores. Second, we excluded all binary variables with  $\kappa < 0.400$  [24]. Third, some 58 articles were double-checked by a second coder upon the request of the original coder.

*Statistical analysis*

Descriptive and statistical analyses were performed in SPSS Statistics 28.0 (IBM). To identify the frames, we performed a hierarchical cluster analysis (Ward’s method) based on the binary-coded frame elements’ context, actors, benefits, harms, evaluations, and action calls. Variables coded in less than 3.0% of articles were excluded from the analysis. For each country, the dendrogram resulting from the cluster analysis was used to determine the most suitable number of clusters (Figure S2).

The statistical significance of differences between the clusters was tested through a  $z$ -test-based pairwise comparison of column proportion using the Bonferroni correction for multiple testing. We applied one-way analysis of variance (ANOVA) to test for differences between frames, including post hoc multiple comparisons (Bonferroni method).

Serving as indicators of the variety and depth of the reporting in line with scholarship exploring the quality of media reports [26], the variety of actors (determined by summarizing all binary variables

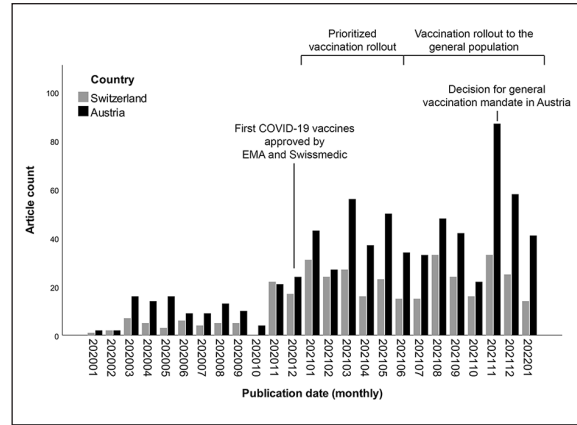


Figure 1. Distribution of total newspaper coverage over time.

from the actors’ categories), as well as the length of the articles (word count), was compared across countries through independent samples  $t$ -tests (including Welch’s correction if the Levene test for equality of variance implied unequal population variances). To test for time-related differences, the data were split into eight pandemic phases based on case development and COVID-19 policies (Table S3). The significance level for all tests was set at .05.

**Results**

We included a random sample of 1091 articles in the analysis, 373 (34.1%) from Switzerland and 718 (65.8%) from Austria. The number of articles published each month increased from November 2020, when the first COVID-19 vaccines were approved by the European Medical Agency and Swissmedic (Figure 1). In Austria, newspaper coverage was highest in November 2021 (87/718, 12.1%); in Switzerland, coverage peaked in August and November 2021 (each 33/373, 8.8%). Most articles were conventional news articles (76.9%, Table I). The tabloids *Blick* and *Kronen Zeitung* featured more letters to the editors and a higher ratio of short articles (<300 words) than the other newspapers (Table I).

*Contribution of tabloid coverage*

The Austrian tabloid *Kronen Zeitung* accounted for most articles in Austria (497/718, 69.2%; Table I) and published the highest ratio of short articles (77.5%). In comparison, the Swiss tabloid *Blick* published 65/373 articles (17.4%); 49.2% of them were shorter than 300 words. Due to the nature of tabloid articles and their higher share in our sample, articles from Austria were significantly shorter in length ( $M = 303.1$ ,  $SD = 260.9$ ) than Swiss articles ( $M = 554.6$ ,  $SD = 387.7$ ,  $t(551.773) = 11.271$ ,  $p < .001$ ;

Table I. Number of articles included per newspaper.

	Article feature											Total <i>N</i>
	News article	Reader's letter	Editorial	Interview	Satire	Guest comment	Other	News (<300 words)	Account (300–700 words)	Report (>700 words)		
Switzerland	<i>N</i> 129	5	12	7	1	1	6	62	62	37	161	
Tages-Anzeiger	% 80.1	3.1	7.5	4.3	0.6	0.6	3.7	38.5	38.5	23.0	100.0	
Neue Zürcher Zeitung	<i>N</i> 125	0	11	6	0	5	0	19	67	61	147	
Blick	% 85.0	0.0	7.5	4.1	0.0	3.4	0.0	12.9	45.6	41.5	100.0	
	<i>N</i> 51	8	4	2	0	0	0	32	29	4	65	
	% 78.5	12.3	6.2	3.1	0.0	0.0	0.0	49.2	44.6	6.2	100.0	
Subtotal Switzerland	<i>N</i> 305	13	27	15	1	6	6	113	158	102	373	
	% 81.8	3.5	7.2	4.0	0.3	1.6	1.6	30.3	42.4	27.3	100.0	
Austria	<i>N</i> 44	0	2	1	0	4	5	11	35	10	56	
Der Standard	% 78.6	0.0	3.6	1.8	0.0	7.1	8.9	19.6	62.5	17.9	100.0	
Die Presse	<i>N</i> 122	10	12	7	0	8	6	73	50	42	165	
	% 73.9	6.1	7.3	4.2	0.0	4.8	3.6	44.2	30.3	25.5	100.0	
Kronen Zeitung	<i>N</i> 368	74	32	19	0	1	3	385	97	15	497	
	% 74.0	14.9	6.4	3.8	0.0	0.2	0.6	77.5	19.5	3.0	100.0	
Subtotal Austria	<i>N</i> 534	84	46	27	0	13	14	469	182	67	718	
	% 74.4	11.7	6.4	3.8	0.0	1.8	1.9	65.3	25.3	9.3	100.0	
Total	<i>N</i> 839	97	73	42	1	19	20	582	340	169	1091	
	% 76.9	8.9	6.7	3.8	0.1	1.7	1.8	53.3	31.2	15.5	100.0	

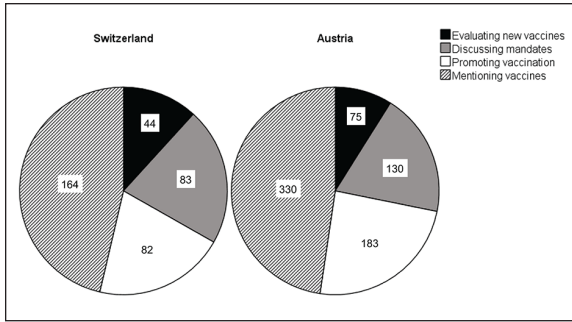


Figure 2. Frames identified in Swiss and Austrian newspaper coverage about COVID-19 vaccines.

Levene’s test showed that the variances were not equal,  $F(1089) = 67.057, p < .001$ ). Austrian articles also cited a significantly lower variety of actors ( $M = 1.17, SD = 1.024$ ) than Swiss articles ( $M = 1.63, SD = 1.215, t(651.332) = 6.289, p < .001$ ); Levene’s test showed that the variances were not equal,  $F(1089) = 24.699, p < .001$ ).

A one-way ANOVA test revealed a significant association between the length of articles and the newspaper:  $F(5,1085) = 75.442, p < .001$ . A post hoc Bonferroni test showed that the *Neue Zürcher Zeitung* had significantly longer articles on average than any other newspaper, and *Kronen Zeitung* had significantly shorter articles on average than any other newspaper (Table I, Table S4).

Identification of frames

Following dendrogram analysis (see Supplemental material) and by analyzing the content of each cluster in all scenarios, we identified four clusters (=frames) as providing sufficient complexity yet supportive simplicity for comparative analysis. The detailed results from the cluster analysis are presented in Table S5, the frames and their relative distribution in each country in Figure 2.

The first frame represented in both countries concerned the evaluation of the newly developed COVID-19 vaccines. The context variables development/approval (Switzerland: 34.1% of articles, Austria, 40.0%), vaccine effectiveness (Switzerland: 52.3%, Austria: 48.0%), and mechanisms of action (Switzerland: 20.5%, Austria: 26.7%) were significantly more often represented than in the other frames (Table S5). The debate in this frame was dominated by scientific actors (Switzerland: 50.0%, Austria: 46.7%). Austrian coverage also often cited actors from medicine (37.3%) and the pharmaceutical industry (29.3%), whereas Swiss articles often cited regulatory agencies and national advisory boards (40.9%). Vaccines were predominantly

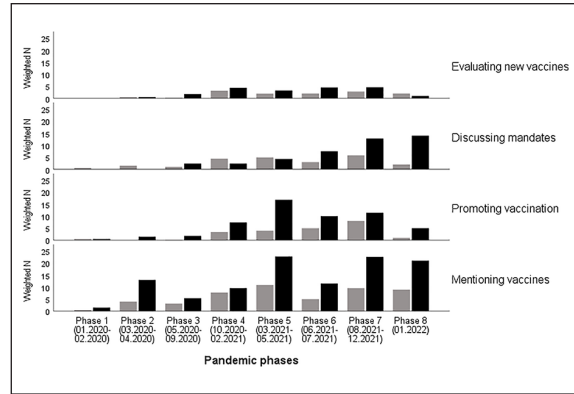


Figure 3. Distribution of frames along pandemic phases. Because the phases differ in length, the average number of articles per month is displayed. Gray = Switzerland, black.

endorsed in this frame (Switzerland: 86.4%, Austria: 93.3%); the Swiss coverage also included rejecting statements in 43.2% of articles in this frame (only 4.0% in Austria). In both countries, newspaper articles emphasized the benefits of vaccination for health protection (Switzerland: 84.1%, Austria: 61.3%). This frame represents endorsing scientific communication about COVID-19 vaccines when they were newly approved (Phase 4) and when they were distributed among the general population (Phase 7, Table S6).

The second frame concerned vaccine mandates (Switzerland: 25.3%, Austria: 43.8%; Table S5). In Austria, this cluster correlated with an accumulation of the context variable skepticism (54.6%) and the risk of societal harm (19.2%). COVID-19 vaccination was more often negatively evaluated in this Austrian cluster as compared to the other clusters (44.6%). In Switzerland, this negativity was less pronounced, with 65.1% of articles in this frame endorsing vaccination (Austria: 40.0%). Moreover, there was also a greater occurrence of vaccination mandates evaluation in Austria (25.4% endorsing, 35.4% rejecting) as compared to Switzerland. Here, discussions of vaccine mandates featured endorsing statements in 14.5% of articles and statements rejecting mandates in 18.1% of articles. The most cited actors were politicians from other countries (22.9%). The vaccine mandates frame grew more important over time, particularly in Austria. Its importance diminished in Swiss coverage in Phase 8 while remaining present in Austrian coverage (Figure 3). This points to the politicized nature of vaccination in the Austrian context and the relative lack of national debate about vaccine mandates in Switzerland.

The third frame dealt with the promotion of vaccination. Vaccination was endorsed in 92.7%



(Switzerland) and 98.9% (Austria) of articles (Table S5). Articles predominantly encouraged getting vaccinated (Switzerland: 25.6%, Austria: 19.7%), while Swiss coverage additionally emphasized the risks incurred by not getting vaccinated (24.4%). Regional and national politics were the most frequently cited actors in this frame (Switzerland: 62.2%, Austria: 44.3%). The most mentioned context variables were vaccination rates (Switzerland: 26.8%, Austria: 18.6%) and national vaccination programs (Switzerland: 23.2%, Austria: 31.7%). In Austrian coverage, economic actors were cited more often than in the other clusters (15.8%). Rejective statements were registered in 3.3% of Austrian articles (in Switzerland 30.5%). Moreover, most articles in Austria were published in Phase 5 (when vaccination was still organized along the categorization of at-risk groups), whereas Swiss coverage on the matter peaked in Phase 7 (when vaccines were made available to the general population, Figure 3). This indicates a generally more positive endorsement of vaccination in newspapers that was even more pronounced in Austria than in Switzerland.

The fourth, largest cluster of articles was characterized by a high ratio of non-evaluative articles (Switzerland: 94.5%, Austria: 98.5%; Table S5) and a high variability of contexts and actors covered. Articles tended to be shorter than in the other frames (Table S6) and vaccines were more often mentioned merely as a buzzword without providing context in more than a sentence.

## Discussion

This study advances our understanding of the complex relationships between policies, attitudes, and media content. The comparative nature of this study allowed for a more nuanced interpretation of the findings in each country that was sensitive to contextual factors including media systems, political culture, and policy agendas. Understanding both similarities and differences facilitates policy learning for practitioners, too, as they will be more aware of what matters in their particular national context even when crises are cross-national. The development of news coverage over time mirrored the trajectory of how vaccines were developed, approved, and rolled out in Switzerland and Austria, indicating that newspapers anticipated and closely followed COVID-19 vaccines and related policies. Moreover, the study provides insights regarding the relative influence of governance actors in the two countries: the considerable prominence of economic actors and the pharmaceutical industry in Austria points to a direct influence of these stakeholders in the debate,

requiring further investigation that goes beyond the scope of this study.

Our analysis also speaks to the important function of mass media in providing information and shaping consensus. This role stands in contrast to that of social media, which cannot take on misinformation and vaccine hesitancy, at least not in times of crisis [27]. Our frame analysis of newspaper articles suggests that traditional newspapers portrayed more consensus regarding vaccination than social media discussions suggest. For one, vaccination was predominantly endorsed in the frames “evaluating new vaccines” and “promoting vaccination,” with a noteworthy difference between Switzerland and Austria: whereas Swiss coverage also included negative evaluations, these were virtually nonexistent in the Austrian coverage. In return, the controversial debates in the frame of “discussing mandates” were more pronounced in Austria and closely interlinked with vaccine skepticism. This reflects the recurrent political discussions and temporary installment of a COVID-19 vaccine mandate in Austria and supports studies suggesting that discussions of vaccine mandates may cause opposition among the general population [28]. It also points to a more polarized public debate in Austria, which constitutes a challenge to practitioners endeavoring to provide targeted, balanced information for individual vaccination decision-making [29]. This finding will be relevant for future studies on the relationship between media framings of policy issues and public attitudes toward them.

In Switzerland, by contrast, the political narrative consistently suggested that vaccine mandates were not a viable option. Even though the Swiss Epidemic Act allows the enforcement of vaccine mandates targeted toward specific groups of people (e.g. healthcare workers), decision-makers have not defined any sanctions, leading to uncertainty regarding the implementation of mandates in Switzerland [30]. Healthcare professionals responding to a recent national survey were also generally opposed to vaccine mandates [31]. The relative absence of mandates on the political agenda was reflected in Swiss newspaper coverage, too, where vaccine mandates were often mentioned while citing politicians from abroad. Future research on public health policies (including but not limited to vaccination) might thus focus on the framing of specific policy instruments and triangulate media analysis with research on public attitudes toward these policies.

Austrian coverage was significantly shorter on average than Swiss coverage, indicating a more simplified representation of the topic to the public. The results from *Kronen Zeitung* illustrate an example of a

commercialized tabloid newspaper with a high number of short articles to enhance click rates. A study on local newspaper coverage from the United States presents similar findings in the context of COVID-19 vaccines [32]. The differences regarding the relative importance of tabloid coverage in Switzerland and Austria might thus help explain the differences observed in terms of article length and amount of coverage. The commercialized media landscape has led to a shift in the function of journalism that is particularly harmful in the context of a public health crisis: when the need to produce entertaining, easily digestible news is prioritized over nuanced, well-researched reporting [18], this diminishes the function of journalistic mass media as trustworthy information sources in the context of the overwhelming infodemic [7]. This calls for more research on the commercialization of media systems, the role of tabloids in crises, and the risks this poses for public trust in information regarding hotly debated policy issues, including vaccination, environmental degradation, and novel technologies.

Returning to the specific topic of COVID-19, extant scholarship indeed indicates that intentions to vaccinate differ depending on the reaction of the tabloids versus high-quality newspapers [2] and traditional mass media versus alternative information sources [3], and are similarly shaped by the consumption of conservative media outlets [1,33]. Our findings regarding rejective statements in the tabloids may also inform further qualitative inquiry: for instance, a Canadian study found that sensational as well as contradictory reporting affected people's confidence in COVID-19 vaccines and their willingness to get vaccinated [34]. Qualitative inquiries on stances toward COVID-19 vaccines among residents in Europe illustrate how stances toward and decision-making regarding COVID-19 vaccination are most often dynamic and embedded in people's social surroundings and sociopolitical context [35]. Mass media undoubtedly form part of this social context, and longitudinal analyses could thus help to understand why attitudes may change over time. Our analysis also speaks to the relevance of traditional mass media regarding willingness to vaccinate as well as the important function of journalistically edited media and their potential in shaping perceptions of the pandemic [36,37].

### *Limitations*

Our study does not allow for any conclusions on the effects of media coverage on people's willingness to get vaccinated against COVID-19. Yet, describing how certain media framed COVID-19 vaccines can

lead to hypotheses on potential effects. Moreover, the analytical approach presented here is but one way of exploring media coverage of vaccination, and frames could be analyzed in other ways, too [22]. A qualitative analysis, for instance, would have allowed for a more nuanced picture and more in-depth knowledge of the repertoires that inform evaluative statements (such as moral, ethical, social, or economic repertoires). Our analysis, however, prioritized a broad comparative approach across time based on a high number of articles. Even though our sampling procedure points to representative results [38], the lower sample size resulted in reduced statistical power. Despite intensive coder training, the measured reliability scores were moderate. Further, we only analyzed newspaper content; other media coverage, including online media, television, radio, or social media was not considered, even though they crucially contributed to public debates about COVID-19 vaccines. Yet, despite declining readership numbers, newspapers have important functions in the media system, rendering their reporting a suitable indicator of public debate: the newspapers selected for this study are influential for other mass media reporting, journalists, and societal elites and have a reputation for high-quality journalism. Finally, even though Switzerland includes other language regions with separate media outlets, we only included German-speaking newspapers rendering findings from Switzerland not representative of the whole country.

### **Conclusions**

Our study revealed a systematic and detailed quantitative picture of the public debates as portrayed in newspaper coverage about COVID-19 vaccines in Switzerland and Austria. While our study does not allow for an analysis of causative media effects on attitudes toward vaccination, it suggests an association between country-specific differences in newspaper coverage and people's vaccination stances, particularly in the context of vaccine mandates. Austrian coverage seemed to be more polarized than in German-speaking Switzerland, with newspapers leaving aside discussions of potential negative aspects, such as side effects. This might aggravate the situation of those who are hesitant to get vaccinated as they may not feel adequately informed by and represented in newspapers. Thus, future research endeavors could focus on the effects of media coverage on vaccine hesitancy or attitudes toward other preventive public health policies.

While we observed similarities in the overall context, benefits, and challenges of the frames between the two countries, the country comparison revealed

differences in the amount of coverage as well as how newspapers evaluated vaccines, vaccination, and vaccine mandates. It seems that the importance of the tabloid *Kronen Zeitung* in Austrian news coverage and ongoing discussions about vaccine mandates among Austrian policymakers shaped how newspapers portrayed COVID-19 vaccination to the public. Our findings illustrate the importance of a stable media system that is oriented toward public service rather than economic profit in the context of major health crises. This is particularly relevant in public health contexts where balanced and adequate information is key for building trust among the general population. For example, public health interventions should consider planning additional information campaigns in regions where people predominantly read tabloids—as these seemed to have provided short, and therefore rather superficial, information about COVID-19 vaccination.

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### Supplemental material

Supplemental material for this article is available online.

### References

- Lueck JA and Callaghan T. Inside the 'black box' of COVID-19 vaccination beliefs: revealing the relative importance of public confidence and news consumption habits. *Soc Sci Med* 2022;298: 114874.
- Frissen T, Coninck D de, Matthys K, et al. Longitudinal evidence of how media audiences differ in public health perceptions and behaviors during a global pandemic. *Front Public Health* 2020;8:583408.
- Piltch-Loeb R, Savoia E, Goldberg B, et al. Examining the effect of information channel on COVID-19 vaccine acceptance. *PLoS ONE* 2021;16:e0251095.
- Martin S and Vanderslott S. "Any idea how fast 'It's just a mask!' can turn into 'It's just a vaccine!'?": From mask mandates to vaccine mandates during the COVID-19 pandemic. *Vaccine* 2022;40:7488–99.
- Norris P. *A virtuous circle: political communications in post-industrial societies*. Cambridge: Cambridge University Press, 2000.
- McCombs ME and Guo L. Agenda-setting influence of the media in the public sphere. In: Fortner RS and Fackler M (eds) *The handbook of media and mass communication theory*. Chichester: Wiley, 2014, pp. 249–68.
- Nielsen RK, Fletcher R, Newman N, et al. Navigating the 'infodemic': how people in six countries access and rate news and information about coronavirus, <https://reutersinstitute.politics.ox.ac.uk/infodemic-how-people-six-countries-access-and-rate-news-and-information-about-coronavirus> (2020, accessed 4 May 2023).
- Henderson L and Hilton S. The media and public health: where next for critical analysis? *Crit Public Health* 2018;28:373–6.
- Catalan-Matamoros D and Penafiel-Saiz C. The print media in times of anti-vaccine lobby: a content analysis of national newspaper reporting in Spain. *West J Commun* 2021;85:692–713.
- Ghasiya P and Okamura K. Investigating COVID-19 news across four nations: a topic modeling and sentiment analysis approach. *IEEE Access* 2021;9:36645–56.
- Jiang FK and Hyland K. COVID-19 in the news: the first 12 months. *Int J Appl Linguistics* 2022;32:241–58.
- Chong D and Druckman JN. Framing Theory. *Annu Rev Polit Sci* 2007;10:103–26.
- Entman RM. Framing: toward clarification of a fractured paradigm. *J Commun* 1993;43:51–8.
- Teune H and Przeworski A. *The logic of comparative social inquiry*. New York: Wiley-Interscience, 1970.
- Mathieu E, Ritchie H, Ortiz-Ospina E, et al. A global database of COVID-19 vaccinations. *Nat Hum Behav* 2021;5:947–53.
- Deml MJ, Buhl A, Huber BM, et al. Trust, affect, and choice in parents' vaccination decision-making and health-care provider selection in Switzerland. *Sociol Health Illn* 2022;44:41–58.
- Schmid D, Holzmann H, Schwarz K, et al. Measles outbreak linked to a minority group in Austria, 2008. *Epidemiol Infect* 2010;138:415–25.
- Hallin DC and Mancini P. *Comparing media systems: three models of media and politics*. Cambridge, New York: Cambridge University Press, 2004.
- Lucht J and Udris L. Kommerzialisierung und Konzentration der Medien im internationalen Vergleich [Commercialization and concentration of the media in an international comparison]. In: fög - Forschungsinstitut Öffentlichkeit und Gesellschaft (eds) *Jahrbuch Qualität der Medien 2013*. Zurich: Schwabe Verlag, 2013.
- Blum R. *Lautsprecher und Widersprecher: Ein Ansatz zum Vergleich der Mediensysteme [Speakers and opponents: an approach to comparing media systems]*. Köln: Herbert von Halem, 2014.
- Wirth W and Kolb S. Designs and methods of comparative political communication research. In: Esser F and Pfetsch B (eds) *Comparing political communication: theories, cases, and challenges*. Cambridge: Cambridge University Press, 2004, pp. 87–111.
- Matthes J. What's in a Frame?: A content analysis of media framing studies in the world's leading communication journals, 1990–2005. *Journal Mass Commun Q* 2009;86:349–67.
- Matthes J and Kohring M. The content analysis of media frames: toward improving reliability and validity. *J Commun* 2008;58:258–79.
- Fleiss JL, Levin BA and Paik MC. *Statistical methods for rates and proportions*. 3rd ed. Hoboken, NJ: Wiley, 2003.



25. Krippendorff K. Testing the reliability of content analysis data. In: Krippendorff K and Block MA (eds) *The content analysis reader*. Thousand Oaks, CA: Sage Publications, 2009, pp. 350–7.
26. Holtzman NA, Bernhardt BA, Mountcastle-Shah E, et al. The quality of media reports on discoveries related to human genetic diseases. *Community Genet* 2005;8: 133–44.
27. Eberl J-M and Lebernegg N. The pandemic through the social media lens: correlates of COVID-19-related social media use in Austria. *MfJ* 2022;45:5–15.
28. Sprengholz P, Korn L, Eitze S, et al. Attitude toward a mandatory COVID-19 vaccination policy and its determinants: evidence from serial cross-sectional surveys conducted throughout the pandemic in Germany. *Vaccine* 2022;40:7370–7.
29. Ihlen Ø, Toledano M and Just SN. Using rhetorical situations to examine and improve vaccination communication. *Front Commun* 2021;6.
30. Desson Z, Kauer L, Otten T, et al. Finding the way forward: COVID-19 vaccination progress in Germany, Austria and Switzerland. *Health Policy Technol* 2022;11:100584.
31. Dietrich LG, Lüthy A, Lucas Ramanathan P, et al. Healthcare professional and professional stakeholders' perspectives on vaccine mandates in Switzerland: a mixed-methods study. *Vaccine* 2022;40:7397–7405.
32. Bailard CS. Do local newspapers mitigate the effects of the polarized national rhetoric on COVID-19? *Int J Press Polit*, 2022.
33. Ruiz JB and Bell RA. Predictors of intention to vaccinate against COVID-19: results of a nationwide survey. *Vaccine* 2021;39:1080–6.
34. Parsons Leigh J, Halperin D, Mizen SJ, et al. Exploring the impact of media and information on self-reported intentions to vaccinate against COVID-19: a qualitative interview-based study. *Hum Vaccines Immunother* 2022;18:e2048623.
35. Paul KT, Zimmermann BM, Corsico P, et al. Anticipating hopes, fears and expectations towards COVID-19 vaccines: a qualitative interview study in seven European countries. *SSM Qual Res Health* 2022;2:100035.
36. Stamm TA, Partheymüller J, Mosor E, et al. Determinants of COVID-19 vaccine fatigue. *Nat Med* 2023;29:1164–71.
37. Eisenegger M, Oehmer F, Udriș L, et al. Die Qualität der Medienberichterstattung zur Corona-Pandemie [The quality of media reporting during the COVID-19 pandemic]. In: Forschungszentrum Öffentlichkeit und Gesellschaft (fög) (eds) *Jahrbuch Qualität der Medien Schweiz*. Basel: Schwabe, 2020, pp. 29–50.
38. Riffe D, Aust CF and Lacy SR. Effectiveness of random, consecutive day and constructed week sampling. In: Krippendorff K and Block MA (eds) *The content analysis reader*. Thousand Oaks, CA: Sage Publications, 2009, pp. 54–9.