

Toward a Taxonomy of Social Media Influencers in Public Health Communication

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Abstract

In recent years, researchers have been discussing various strategies for public health communication to support individuals, populations, and communities in making healthier choices. In this context, the employment of social media influencers (SMI) is considered especially effective. Although we have seen extensive practical application during the COVID-19 pandemic, we possess little theoretical knowledge about the characteristics and narratives conveyed by SMI that engage in public health communication. This study takes a first step toward solving this issue by developing a taxonomy of SMI in public health communication. For the taxonomy development, qualitative content analyses of Twitter and YouTube data from the case of the German COVID-19 vaccination were conducted. The taxonomy emphasizes that SMI in public health communication can show major variations across different characteristics, thereby representing many facets of society. Moreover, conveyed narratives are not limited to health but also extend to political and social issues. This study contributes to the literature on broader SMI frameworks with a taxonomy of SMI in public health communication. The taxonomy offers a basis for further theory development and practical evaluations for context-specific employment of SMI.

Keywords: Social media influencers, public health communication, COVID-19, taxonomy.

1. Introduction

The phenomenon of social media influencers (SMI) has gained increased attention and significance in recent years (Munnukka et al., 2019; Reinikainen et al., 2020; Sokolova and Kefi, 2020) and especially during the COVID-19 pandemic. For example, this was validated by a study of the German Digital Economy Association (2021), which revealed that 70% of interviewed marketing managers think that the significance of SMI slightly or even strongly increased. In Germany, Ad spending in the SMI

advertising market is projected to reach US\$619.90m in 2023 with an expected annual growth rate of 10,45% (Statista, 2023). Already before the outbreak of the COVID-19 pandemic, researchers ascribed social media a vital role in public health communication. However, once the pandemic hit, governments around the globe were faced with the challenge of enforcing measures and gaining support among the population for their vaccination campaigns (Montiel et al., 2021). To ultimately end the pandemic, vaccination has been proclaimed to be most efficient (Fontanet and Cauchemez, 2020). In fact, public support and acceptance have been determined as essential factors of successful vaccination and health campaigns and to counteract future crises (Callender, 2016). In this context, appropriate and timely dissemination of information about vaccine protection is important to help educate the public about its efficacy (Soares et al., 2021). To this end, social media are leveraged by several stakeholder groups such as politicians or public healthcare institutions as a means of communication and to share information (Chan et al., 2020). Likewise, social media are being used by individuals to search for relevant topics and news such as health information (Bonnievie et al. 2021a). Consequently, social media have been extensively used to promote vaccination (Melki et al., 2022). During this time, Bonnievie et al. (2021b) registered a 79.9% increase of anti-vaccination postings on Twitter, while the number of existing anti-vaccination accounts almost tripled. To combat increasing anti-vaccination attitudes and to execute successful campaigns, research has been frequently addressing the cooperation of public health institutions with SMI, that is, individuals who are capable of influencing attitudes through content creation (Freberg et al., 2011). Compared or public health institutions, they are said to possess several advantages. For example, due to the establishment of emotional relationships with their audience, they are perceived more authentic (Enke and Borchers, 2019; Pöyry et al., 2022), have a greater reach (Kamiński et al., 2021) and greater popularity (Mirbabaie et al., 2020). Likewise, various

criteria for the selection of SMI such as credibility have been identified (Gupta et al., 2022).

Although the existing body of literature is much concerned with debating the effectiveness of SMI (their ability to influence attitudes or behavior) in strategic communication and possible approaches on how to select them, the theoretical understanding of SMI in the health context is limited. However, advancements in this regard would be of value to the scientific discourse as the strategic mechanisms within health context might be different to the well-known application area of marketing and commerce. To advance the theoretical understanding in this regard, this study seeks to answer two research questions.

RQ1: *What are the characteristics of social media influencers participating in public health communication?*

RQ2: *Which narratives are communicated by social media influencers in public health communication?*

To answer these research questions, we identified SMI who participated in the public debate around or as part of the German COVID-19 vaccination campaign on YouTube and Twitter and qualitatively analyzed their characteristics (RQ1) and the narratives conveyed by those SMI (RQ2). Based on this analysis, we developed a taxonomy of SMI in public health communication following the approach proposed by Kundisch et al. (2022). The purpose of this taxonomy is to abstract and structure the characteristics and narratives conveyed by SMI in the context of public health communication.

The contribution of this research is threefold. First, we contribute to the SMI literature by developing a taxonomy of SMI in the context of public health communication, which extends existing SMI frameworks that are focused on marketing and commerce. Second, the taxonomy provides the first step toward developing new theory that explains the mechanisms behind the employment of SMI for public health communication. Third, the taxonomy can be used by practitioners to evaluate the employment and effectiveness of SMI in health communication campaigns.

2. State of the Art

2.1. Types of Social Media Influencers

SMI “represent a new type of independent third-party endorser who shape audience attitudes through blogs, tweets, and the use of other social media” (Freberg et al., 2011, p. 90). Some researchers even

state that SMI can generally be ‘regular people’ who gain popularity by creating and publishing content on social media (Abidin, 2016). The target group of SMI communication are typically consumers in certain industries (Lou and Yuan, 2019) but in contexts like health, the target group can extend to the general population or socio-demographic subgroups thereof. To date, research has argued that SMI should be selected based on several criteria, for example credibility (Hudders et al., 2021), trustworthiness, frequency of content production and how they are perceived by the audience (Gupta et al., 2022).

Besides examining how SMI should be selected for certain campaigns, researchers have also suggested possible approaches to categorize SMI. Veirman et al. (2017) suggest differentiating SMI by their reach. In this context, Gupta et al. (2022) state that different archetypes of SMI can be chosen depending on the size of the audience that is aimed to be reached. According to the authors, nano influencers are beneficial for addressing individuals, micro or macro influencers can communicate with groups and mega influencers such as celebrities are able to approach even a whole population. Campbell and Farrell (2020) distinguish between five different categories of SMI, namely celebrity influencers, who enjoy public recognition outside of social media and typically have more than 1 million followers, mega influencers, who also have more than 1 million followers but attained their celebrity status through their social media activity, macro influencers with 100,000 to 1 million followers, micro influencers with 10,000 to 100,000 followers, and nano influencers (less than 10,000 followers). However, as profiles can be faked and followers bought, reach might not be a suitable criterion for SMI categorization anymore (Ouvrein et al., 2021). Sun et al. (2022) have established a typology based on network interactivity and social connectedness and label their categories as advertisers, celebrities, friends, and opinion leaders.

2.2. Social Media Influencers in Public Health Communication

Most existing research has investigated the phenomenon of SMI in the context of marketing and commerce (Stieglitz et al., 2018). Here, research has found that incorporating SMI in communicating and distributing information has already proven to be effective (Enke and Borchers, 2019; Reinikainen et al., 2020; Sillence and Martin, 2020; Sokolova and Kefi, 2020). This includes health brands as well as hygiene brands (Gupta et al., 2022) but less so public health communication (Sillence and Martin, 2020; Marx et al., 2023). However, we some of the principles and

theories developed in these contexts may also apply for public health communication.

More recently, researchers are discussing factors for the efficiency of the strategy and possible advantages of using SMI as proxies compared to communicating directly via public institutions. SMI have established a significant number of relevant relationships on social media and can thus provide access to and influence hard-to-reach stakeholders (Enke and Borchers, 2019). Accordingly, persuasion is caused more by emotional aspects and the existing relationship between the SMI and the audience (Lee and Theokary, 2021; Reinikainen et al., 2020). This point of view is underlined by the fact that, particularly when compared to public institutions or politicians, SMI are perceived more authentic and as parasocial friends, which makes the interaction between them and followers more intimate (Enke and Borchers, 2019; Pöyry et al., 2022). Not only are SMI perceived more authentic than public institutions, but they also attract more attention. When examining Twitter data, Kamiński et al. (2021) found that tweets from SMI and celebrities displayed by far the most engagement, attention, and scope. Gupta et al. (2022) support this as their study of public health communication with SMI shows that, mostly, other communication factors outweigh the transmitted information itself. However, they argue that the quality of the information conveyed should not be omitted. Bonnevie et al. (2021b) add to the discussion that cooperating with SMI for public health communication is flexible and open to adjustments during a campaign.

Although researchers have focused on why and how SMI should be employed as proxies for public health communication, the abstract knowledge about who they are and how they communicate are limited. Therefore, the remainder of this paper aims to facilitate a better understanding of the characteristics of SMI as well as the narratives in public health communication.

3. Research Design

This study examines the phenomenon of SMI in the context of the German COVID-19 vaccination campaigns on Twitter and YouTube to develop a taxonomy of SMI in public health communication. Taxonomies allow to both describe and categorize objects in a domain, thereby laying the groundwork for a more structured analysis of the domain (Nickerson et al., 2013).

The research design of this study consists of two steps. First, we collected and preprocessed data from Twitter and YouTube (Stieglitz et al., 2018). Second, we developed a taxonomy following Kundisch et al.

(2022). To develop the taxonomy, two social media platforms were chosen as sources to collect secondary data. Twitter is the leading microblogging platform worldwide with over 500 million users. Its text-based format made it a popular outlet for health care communication (Pershad et al., 2018), especially in times of crisis (Chew and Eysenbach, 2010). YouTube is considered the second largest social media platform overall with over 2.5 billion users (Statista, 2022), and unlike Twitter, is mainly a video-based platform. It allows for easier access for users as an account is not needed to use the platform (D'Souza et al., 2020).

Triangulation of data from both platforms allows for a broader view on the research questions due to a larger diversity of both formats and SMI to be examined. This is especially useful, as it allows for the taxonomy to draw content not only from different social media platforms, but also to include SMI from both the campaign context and the organic conversation that emerges around the issue. This duality of context adds to the taxonomy, as it is by SMI research from the field of marketing that both managed and not managed SMI communication can be influential and should be accounted for (Enke and Borchers, 2019).

3.1. Data Collection on Twitter

The data tracking and data preparation phase for Twitter and YouTube was conducted differently, due to the characteristics and content format of both platforms. For Twitter, a keyword-related tracking approach was applied, using the keywords 'corona', 'cov', 'covid19', 'covid-19', 'covid_19', and 'ncov19', 'sarscov2' to crawl relevant posts. The keywords were chosen based on frequently used words as well as popular hashtags during the COVID-19 pandemic. As a tracking method, the Twitter API search query was used to collect tweets and retweets in German language, as well as metadata such as retweet count and author name (Mirbabaie et al., 2023). The timeframe taken into consideration is the time around the first COVID-19 vaccination administration in Germany on 26.12.2020. Di Giovanni et al. (2022) found a peak in German conversations about vaccinations on Twitter in January of 2021, around the time when both the vaccination campaign and administrations were picking up speed. To pick up a broader picture of the conversation including potential changes and developments, not only the month after the vaccination administration but also a month before that were included in the dataset. Using this approach, 210,436 tweets from before (01-11-2020 until 30-11-2020) and 530,805 tweets from after (26-12-2020 until

27-01-2021) the vaccine administration were collected. As a preparation step, tweets with less than 500 retweets by users with less than 1000 followers were excluded. The amount of times tweets by a user are retweeted is used as a metric for popularity and influence because other users decided that the content was relevant enough to share it further in their network (Mirbabaie et al., 2020). Here, the threshold of 500 is chosen as it represents a natural plateau in the dataset. Follower count is a popular way to categorize SMI in marketing, but different researchers in marketing research have classified SMI tiers differently (Looi et al., 2023). These classifications often lack a lower limit of followers that would classify someone as an SMI, as for example in the classification by Campbell and Farrell (2020), where the follower count of nano influencers is described as less than 10,000 followers. While this is a useful distinction between different SMI, it is less useful to draw a numerical distinction between influential SMI and the average user. Some trade and marketing publications have drawn the line at 1,000 followers, where more followers would make a user either a nano influencer (Mansfield, 2020) or a micro influencer (Ismail, 2018), depending on the definition used. As there seems to be a distinction between users with less than 1,000 followers and users with more followers, this follower number is set as a threshold. After removing tweets that have been deleted, were not visible due to privacy restrictions, did not fit the research subject or were authored by accounts that have been deleted, blocked, or are managed by organizations rather than individual SMI, we arrived at a final sample of 327 tweets.

3.2. Data Collection on YouTube

As a tracking approach for the YouTube dataset, we used the keywords ‘impfkampagne deutschland influencer’, ‘impfkampagne deutschland werbung’, and ‘covid-19 impfung’. These keywords were chosen to limit the search to posts related to the German vaccination campaign. This allowed us to collect videos in German language that were part of an official vaccination campaign. The search revealed that all relevant videos identified through the search approach had been published on the YouTube channel of the German Federal Ministry of Health. Therefore, we extended the tracking approach to an actor-based approach and included all relevant videos from this channel in the sample. Using this method, 30 videos from two playlists (‘Ich schütze mich’ and ‘Darum geimpft’) as well as six additional videos related to the vaccination campaign were identified that were published between January 2021 and November 2022, resulting in a sample of 36 videos. This dataset was

prepared for further analysis by transcribing each video into text ad verbatim.

3.3. Taxonomy Development

To answer the two research questions, we develop a taxonomy by using information from both the Twitter and YouTube datasets, as well as frameworks and characterization schemes identified in the literature. Nickerson et al. (2013) define a taxonomy as a set of dimensions, each consisting of several “*mutually exclusive and collectively exhaustive*” (Nickerson et al., 2013, p. 343) characteristics, meaning that each object of study fits into only one characteristic for each dimension. Moreover, we turned to Kundisch et al. (2022) for guidance on the specification of the phenomenon, user group, and purpose.

We defined the following objective ending conditions for the iterative development process: (1) the examination of a representative sample of objects, (2) classifying at least one object under every characteristic of every dimension, (3) no added characteristics or dimensions in the last iteration, (4) no merging or splitting of dimensions or characteristics in the last iteration, (5) every dimension is unique and not repeated, and (6) every characteristic is unique within its dimension. The subjective ending conditions, as suggested by Nickerson et al. (2013), were that the taxonomy must be concise, robust, comprehensive, extendible, and explanatory.

For the development of this taxonomy, we used an empirical-to-conceptual approach to derive dimensions and characteristics inductively from the social media datasets. In this approach, objects were identified first, in this case individual tweets and individual YouTube videos. Subsequently, common characteristics in the objects were identified and grouped. Then, the characteristics were grouped into more general and abstract dimensions. For this taxonomy, this process was repeated three times, until all the objects were included in the taxonomy. After each iteration, two researchers compared, combined, and discussed the results. After the three iterations, the conceptual-to-empirical approach was applied, in which characteristics and dimensions were compared to relevant frameworks and characterizations proposed in peer reviewed papers (e.g., Campbell and Farrell, 2020; Mirbabaie et al., 2020). As a next step, the objects were examined for these characteristics and dimensions. If new concepts were also represented in the datasets, they were included in the taxonomy. Finally, two researchers checked the objective and discussed the subjective ending conditions.

4. Results

The developed taxonomy comprises four perspectives on SMI in public health communication: (1) individual attributes, (2) platform authority, (3) narratives, and (4) content attributes. For the sake of simplicity, we present the taxonomy in this section in four modules (one module per perspective).

4.1. Individual attributes of SMI in public health communication

The first module of the taxonomy amalgamates the individual attributes of SMI in health communication. Table 1 provides an overview of this module.

Table 1. Attributes of SMI in public health communication

Dimension	Characteristics		
Age	0-99		
Perceived Sex Type	male	female	non-binary
Profession	Medical field	Media industry	Science
	Content creator	Politics/Law	Business
Pseudonym	yes		no
Political affiliation	stated		omitted
Validation status	validated		not validated
Origin	local	national	foreign
Appearance	human		virtual
Ethnicity*	visible		omitted

* Refer to applicable standard classification of cultural and ethnic groups

This module about the attributes of SMI in public health communication comprises general information like ‘age’, ‘perceived sex type’, or ‘profession.’ Additionally, this module of the taxonomy can be used to classify SMI in other contexts but is specific to social media, exemplified by the dimensions ‘pseudonym’ and ‘validation status.’

In some cases, SMI that engaged in public health communication did not reveal their political affiliation or origin, whereby it was not always clear whether the conveyed attributes were authentic or artificial. Although authors such as Rai et al. (2022) propose ethnic groups such as white British, black Caribbean or South Asian, the taxonomy abstains from using a

such as classification scheme and leaves the decision about what classification to apply with the reader.

4.2. The platform authority of SMI in public health communication

Our analysis of the phenomenon showed that SMI cannot only be grouped by individual attributes but also their platform authority, which affects their role in the applicable health discourse. Table 2 shows the second module of the taxonomy, which distinguishes characteristics of SMI profiles on social media that help to assess an SMI’s platform authority.

Table 2. Platform authority of SMI in public health communication

Dimension	Characteristics		
Platform membership	native		acquired
Traffic source	organic	paid	collaboration
Reach	nano		micro
	macro		mega

Most SMI profiles provide information about their duration of membership on the respective platform. Furthermore, they are different in terms of the traffic sources they tap in during the health campaign, as well as the reach they have acquired prior to it. In this study, SMI on YouTube were mostly classified as collaborators who appeared on the channel of the German Federal Ministry of Health. On Twitter, in contrast, SMI used the organic traffic coming to their individual profile. This traffic source can widely differ in the maximum reach.

4.3. Narratives of SMI in public health communication

In line with RQ2, the third module of the taxonomy is concerned with the topics and narratives that SMI address in public health communication. Table 3 provides an overview of this module.

Table 3. Narratives of SMI in public health communication

Dimension	Characteristics		
Motivation for action	altruism		social norm
	personal involvement		contract work
Storytelling	scientific facts	opinion	anecdotal evidence

	debunking	questions & answers	statistics
Goal	prediction		criticism
	documentation		call to action
Validation status	validated		not validated

Especially in campaign videos on YouTube, SMI are demonstrating different motivations for action, which in the context of this study is to promote vaccination. Table 4 provides example quotes to showcase how we abstracted the dimensions from the data.

Table 4. Examples for SMI narratives

Example dimension	Example quote
Personal involvement (Motivation for action)	<i>“Because [he/she has] vulnerable people in [his/her] family, for whom [he/she] would like to do this” [YouTube, @Bun****]</i>
Altruism (Motivation for action)	<i>“This is not the time for our own ego. This is the time to take care of each other” [Twitter, @133****]</i>
Scientific facts (Storytelling)	<i>“Over the next few days, we will be talking again about whether children are contagious to Covid, what role schools play. Quick answer is yes, and unfortunately a big role. Data is diverse” [Twitter, @134****]</i>
Statistics (Storytelling)	<i>“In Sweden, 94,945 people died in 2019. In Sweden, 94,941 people died in 2020” (Twitter, @134****)</i>
Opinion (Storytelling)	<i>“Banning travel, making travel unpleasant, tormenting citizens, restricting them as much as possible: Merkel's Corona course is slipping into absurdity - unreality reigns in the chancellery” (Twitter, @135****)</i>

4.4. Content attributes of SMI in public health communication

The fourth module of the taxonomy distinguishes between several dimensions regarding the attributes of the contents SMI produce when engaging in public health communication. Table 5 depicts the dimensions and characteristics within this module.

Table 5. Content attributes of SMI in public health communication

Dimension	Characteristics		
Originality	creating	sharing	commenting
Source	native platform	other platform	other source
Type	text		image
	video		multimedia
Context	single post		conversational thread

Content attributes include the originality of the content and its source, for example if it is created by the SMI themselves or shared by others and if it can be found on the platform or if it comes from an external source, e.g., linked websites. This is in line with the findings from Pöyry et al. (2022). Furthermore, content on Twitter could be divided into single contributions and content that is part of a thread or conversation. However, this distinction is dependent on the platform. Social media content additionally differs in terms of its accessibility and usage of multimedia such as images or videos or a combination of multiple formats.

5. Discussion

This study aimed at exploring the phenomenon of SMI in public health communication. Based on the guidelines by Nickerson et al. (2013) and Kundisch et al. (2022), a taxonomy was developed to be able to better understand the phenomenon.

5.1. Strategically employing SMI for public health communication

The audience a SMI can reach is a significant driver for public health institutions to collaborate with them (Veirman et al. (2017). To differentiate and select suitable SMI more precisely, the framework of nano, micro, macro, and mega influencers (Campbell and Farrell, 2020; Gupta et al., 2022) is a helpful classification tool for reach. While it could be argued that for health communication strategies, mostly macro and mega influencers would be incorporated to amplify their reach toward a broader societal level, the social media data we collected on the German vaccination campaign on YouTube show that a strong focus lies on SMI with a very small reach and no prior name recognition. These SMI are amplified through a larger, official channel, which could indicate an attempt to combine the authority of a governmental organization with the popularity and authenticity of a SMI (Enke and Borchers, 2019; Mirbabaie et al., 2020). Furthermore, the data underlying this study

identified SMI with and without celebrity status and some professions already discussed in previous literature, such as journalists or politicians, which are grouped according to their industry (Mirbabaie et al., 2020; Ouvrein et al., 2021). Although the proposed taxonomy incorporates some existing elements from the literature, others were excluded for two main reasons. First, as this study does not examine reactions to the vaccination campaign, it was not possible to measure suggested criteria, such as credibility (Hudders et al., 2021). Second, they were either not the focus or did not apply in the context of public health communication, for example, connections between users (Sun et al., 2022). Nevertheless, this study expanded existing classification tools by identifying new dimensions inductively.

After reflecting our approach, differences between the two platforms Twitter and YouTube come to light. On YouTube, most SMI were chosen for and part of an official campaign, whereas on Twitter SMIs emerged more organically. Consequently, differences in terms of reach and dependence on other social media profiles were observable. When SMI are part of campaigns on other profiles, they are restricted to the reach of that account, here the one of the German Federal Ministry of Health, which has 43,400 subscribers at the time of this research (which is much less than some of the SMI have). Organically engaging SMI, however, can amplify their scope independently of third parties. Furthermore, there are differences in SMI anonymity. While in campaign videos on YouTube, no SMI was anonymous or using a pseudonym, whereas a minority of the SMI identified on Twitter were. As previous research has shown, anonymity is negatively related to trust and perceived credibility of SMI. Consequently, non-anonymous SMI would be preferred for employment in public health communication (Enke and Borchers, 2019; Pöyry et al., 2022; Reinikainen et al., 2020).

Besides differences concerning the platform, some interesting patterns in the data emerged. Organically engaging as well as SMI participating in campaign videos show a great variety of age groups, perceived gender and professions. This probably signals that, on the one hand, many individuals of society are aimed to be addressed and represented in public health communication, and on the other hand, that many facets of society are taking part in the discourse about health-related topics. Additionally, only one fictional character (from a popular TV show) was identified in campaign videos. This fact might render health discussions and campaigns more approachable as it is led by ordinary members of society. However, regarding the representation of ethnicity, it strikes that no people of color are included, neither in direct campaign videos nor organically. In

times of discussions about diversity and inequality issues, this bears danger for exclusion of certain members of society and should therefore be considered in future public health communication strategies.

5.2. The Role of SMI for public health discourses

The second research question inquired after narratives used in the discourse surrounding the German vaccination campaign as a proxy for public health communication on social media. As there were no relevant categorizations present in the literature, this part of the taxonomy was developed inductively. We found two main differences between the YouTube and Twitter in terms of content for the examined dataset.

First, there is a difference in the level of control over the content, dependent on whether the post is part of a campaign or not. Second, a different range of topics is present on each platform. The content range of the YouTube videos is narrower, focused almost entirely on reasons and motivations to get vaccinated, as well as some scientific information and a few instances of combatting misinformation. The content range of the Twitter data on the other hand is much broader, including topics such as the social and political implications of the vaccination. It is evident here, that for the discourse outside of the campaign context, the narratives continue beyond the medical implications of the topic, and it is difficult to separate medical, political, and social discussions. It can also be observed that the scope and focus of the topics present in the discourse depend on the personal context of the SMI. This is in line with previous research that found political ideology as well as sociodemographic factors to be important predictors of the attitude toward vaccines, and thus in turn of the online conversation, which was found both in the US (Jiang et al., 2020; Nowak and Cacciatore, 2022) and in Germany (El-Far Cardo et al., 2021; Jensen et al., 2021).

In this context, it can also be noted that the Twitter dataset contains posts expressing different attitudes toward the vaccination, while the YouTube dataset consisting mostly of campaign videos expresses negative attitudes only for narrative purposes, to debunk the arguments used. This approach is in line with the recommendations proposed by Burki (2020) to actively combat misinformation. It may have been chosen as the presence of negative attitudes toward the vaccination on social media is also often associated with arguments based on misinformation in previous research (Bonnevie et al., 2021a). This can also be

observed in the Twitter dataset, in which several instances of false or at least questionable information can be found, which are often used as arguments against COVID-19 combat measures such as vaccines. It should, however, be noted that attempts to combat misinformation are also present in the posts of the Twitter dataset. In this context, however, SMI also constitute a powerful group to combat misinformation because of their perceived authority and trust (Mirbabaie et al., 2020).

Furthermore, it appears that SMI that engaged in the German vaccination campaign utilize informational content such as scientific facts, and emotional content such as appeals to solidarity, for health communication. This is in line with Pfattheicher et al. (2022) who recommend a combination of emotional and informational content. Additionally, the YouTube playlist 'Darum geimpft' entails videos of people describing their situation and reasoning for vaccination, thereby making use of storytelling and narratives (Shelby and Ernst, 2013). However, this diversity of approaches is not restricted to campaign content but can also be observed in the organic Twitter conversations. Users may for example tell anecdotes from their personal experience, while others post long threads of information.

5.3. Implications

The contribution of this study is threefold, adding new insights to research and practice. First, it advances the literature by providing a classification structure for SMI in context of public health communication. It combines and advances existing SMI taxonomies by combining and inductive empirical-to-conceptual and a conceptual-to-empirical approach (Kundisch et al. 2022). The taxonomy consequently provides a detailed structure to organize knowledge in the field of SMI communication in the public health context. Second, the taxonomy provides the first step toward theory development regarding SMI in public health communication. While the taxonomy was developed based on the case of the German COVID-19 vaccinations, dimensions and categories are abstract enough to be consistent and suitable for SMI health communication strategies in general. Additionally, the abstractness of the dimensions and characteristics renders the taxonomy relatively timeless. Third, the taxonomy can be used by practitioners to evaluate the employment and effectiveness of SMI in health communication campaigns, by providing dimensions of SMI, describing who is part of public health communication, as well as content dimensions, to describe what and how is communicated. By providing this structure, the taxonomy can help not

only to inform, but also to improve future health communication strategies for practitioners.

5.4. Limitations and future research

This study comes with some limitations. First, it only investigates two social media platforms during a limited period. Due to this limitation, the taxonomy may be lacking characteristics of SMI, and topics discussed by SMI on different platforms and at different stages of the pandemic. Second, only content in German language was examined. Although the taxonomy consists of abstract and thereby widely applicable dimensions, it is possible that the dimensions and characteristics might differ when including data from other countries. Third, the data collection approach on Twitter and YouTube and the reduction to a smaller sample might have led to selection bias. This could possibly limit the generalizability of the findings in a statistical sense. Fourth, since the data collection on Twitter occurred prior to measures by the platform that complicate research like this, the replicability as well as future studies involving the Twitter API might be impaired.

Hence, future research could extend and advance the taxonomy to (1) other social media platforms such as TikTok, Instagram, or LinkedIn, (2) other countries, for example from the Global South, and (3) expanded time frames and non-pandemic contexts. Another possible next step is to validate the taxonomy through expert interviews and thus to verify its completeness as Kundisch et al. (2022) suggested. Furthermore, a codebook could be generated as a guide on how to use the taxonomy both for theory and practice. Since this study developed the taxonomy by qualitative means, it could be a possibility to look at it on a quantitative level and carry out a numerical analysis, for example utilizing a codebook.

6. Conclusion

Existing literature has been discussing various strategies about how to make health communication more effective, the employment of SMI being one of the most frequently mentioned ones. To date, however, we do not know whether the empirical studies and theories about SMI employment from marketing and commerce contexts are transferrable to public health communication. This study aimed to work toward solving this research problem by developing a taxonomy that abstracts and structures SMI characteristics and narratives pertinent to the case of the German COVID-19 vaccination campaign. The resulting taxonomy consists of four modules: (1) individual attributes, (2) platform authority, (3)

narratives, and (4) content attributes. Additionally, this study revealed that SMI are positioned differently, depending on the platform that was observed. SMI also show great variation in the characteristics and narratives they convey. SMI use both, emotional and informational content to convey their messages. The developed taxonomy offers researchers and practitioners a tool to assess the characteristics and narratives of SMI in public health communication, which can contribute to more effective strategies that support all members of society to make healthier choices in the face of future health crises.

7. References

- Abidin, C. (2016). "'Aren't These Just Young, Rich Women Doing Vain Things Online?': Influencer Selfies as Subversive Frivolity", *Social Media + Society*, 2(2), pp. 1-17.
- Bonnevie, E., Gallegos-Jeffrey, A., Goldbarg, J., Byrd, B. and Smyser, J. (2021a). "Quantifying the rise of vaccine opposition on Twitter during the COVID-19 pandemic", *Journal of Communication in Healthcare*, 14(1), pp. 12–19.
- Bonnevie, E., Smith, S.M., Kummeth, C., Goldbarg, J. and Smyser, J. (2021b). "Social media influencers can be used to deliver positive information about the flu vaccine: findings from a multi-year study", *Health Education Research*, 36(3), pp. 286–294.
- Burki, T. (2020). "The online anti-vaccine movement in the age of COVID-19", *The Lancet Digital Health*, 2(10), pp. 504–505.
- Callender, D. (2016). "Vaccine hesitancy: More than a movement", *Human Vaccines & Immunotherapeutics*, 12(9), pp. 2464–2468.
- Campbell, C. and Farrell, J.R. (2020). "More than meets the eye: The functional components underlying influencer marketing", *Business Horizons*, 63(4), pp. 469–479.
- Chan, A.K.M., Nickson, C.P., Rudolph, J.W., Lee, A. and Joynt, G.M. (2020). "Social media for rapid knowledge dissemination: early experience from the COVID-19 pandemic", *Anaesthesia*, 75(12), pp. 1579–1582.
- Chew, C. and Eysenbach, G. (2010). "Pandemics in the age of Twitter: content analysis of Tweets during the 2009 H1N1 outbreak", *PLOS ONE*, 5(11), pp. 1-13.
- Di Giovanni, M., Pierri, F., Torres-Lugo, C. and Brambilla, M. (2022). "VaccinEU: COVID-19 Vaccine Conversations on Twitter in French, German and Italian", *Proceedings of the International AAAI Conference on Web and Social Media*, 16, pp. 1236–1244.
- D'Souza, R.S., D'Souza, S., Strand, N., Anderson, A., Vogt, M.N.P. and Olatoye, O. (2020). "YouTube as a source of medical information on the novel coronavirus 2019 disease (COVID-19) pandemic", *Global Public Health*, 15(7), pp. 935–942.
- El-Far Cardo, A., Kraus, T. and Kaifie, A. (2021). "Factors That Shape People's Attitudes towards the COVID-19 Pandemic in Germany-The Influence of MEDIA, Politics and Personal Characteristics", *International Journal of Environmental Research and Public Health*, 18(15), pp. 1-14.
- Enke, N. and Borchers, N.S. (2019). "Social Media Influencers in Strategic Communication: A Conceptual Framework for Strategic Social Media Influencer Communication", *International Journal of Strategic Communication*, 13(4), pp. 261–277.
- Fontanet, A. and Cauchemez, S. (2020). "COVID-19 herd immunity: where are we?", *Nature Reviews Immunology*, 20(10), pp. 583–584.
- Freberg, K., Graham, K., McGaughey, K. and Freberg, L.A. (2011). "Who are the social media influencers? A study of public perceptions of personality", *Public Relations Review*, 37(1), pp. 90–92.
- German Digital Economy Association (2021) BVDW-Studie: 70 Prozent der Befragten messen Influencer Marketing in der Corona-Pandemie höhere Bedeutung bei. Available at: <https://www.bvdw.org/der-bvdw/news/detail/artikel/bvdw-studie-70-prozent-der-befragten-messen-influencer-marketing-in-der-corona-pandemie-hoehere-bede/> (Accessed: 15 June 2023).
- Gupta, S., Dash, S.B. and Mahajan, R. (2022). "The role of social influencers for effective public health communication", *Online Information Review*, 46(5), pp. 974–992.
- Hudders, L., Jans, S. and Veirman, M. (2021). "The commercialization of social media stars: a literature review and conceptual framework on the strategic use of social media influencers", *International Journal of Advertising*, 40(3), pp. 327–375.
- Ismail, K. (2018) Social Media Influencers: Mega, Macro, Micro or Nano, CMSWIRE. Available at: <https://www.cmswire.com/digital-marketing/social-media-influencers-mega-macro-micro-or-nano/> (Accessed: 15 June 2023).
- Jensen, E.A., Pflieger, A., Herbig, L., Wagoner, B., Lorenz, L. and Watzlawik, M. (2021). "What Drives Belief in Vaccination Conspiracy Theories in Germany?", *Frontiers in Communication*, 6, pp. 1-7.
- Jiang, J., Chen, E., Yan, S., Lerman, K. and Ferrara, E. (2020). "Political polarization drives online conversations about COVID-19 in the United States", *Human Behavior and Emerging Technologies*, 2(3), pp. 200–211.
- Kundisch, D., Muntermann, J., Oberländer, A.M., Rau, D., Röglinger, M., Schoormann, T. and Szopinski, D. (2022). "An Update for Taxonomy Designers", *Business & Information Systems Engineering*, 64(4), pp. 421–439.
- Lee, M.T. and Theokary, C. (2021). "The superstar social media influencer: Exploiting linguistic style and emotional contagion over content?", *Journal of Business Research*, 132, pp. 860–871.
- Looi, J., Kemp, D. and Song, Y.W.G. (2023). "Instagram Influencers in Health Communication: Examining the Roles of Influencer Tier and Message Construal in COVID-19-Prevention Public Service Announcements", *Journal of Interactive Advertising*, 23(1), pp. 14–32.
- Lou, C. and Yuan, S. (2019). "Influencer Marketing: How Message Value and Credibility Affect Consumer Trust

- of Branded Content on Social Media", *Journal of Interactive Advertising*, 19(1), pp. 58–73.
- Mansfield, B. (2020) "The Influencer Tier." Available at: https://medium.com/@brendan_mansfield/the-influencer-tier-31af83f4e6d1 (Accessed: 15 June 2023).
- Melki, J., Tamim, H., Hadid, D., Farhat, S., Makki, M., Ghandour, L. and Hitti, E. (2022). "Media Exposure and Health Behavior during Pandemics: The Mediating Effect of Perceived Knowledge and Fear on Compliance with COVID-19 Prevention Measures", *Health Communication*, 37(5), pp. 586–596.
- Marx, J., Blanco, B., Amaral, A., Stieglitz, S. and Aquino, M.C. (2023). "Combating Misinformation with Internet Culture: The Case of Brazilian Public Health Organizations and their COVID-19 Vaccination Campaigns", *Internet Research*, forthcoming.
- Mirbabaie, M., Bunker, D., Stieglitz, S., Marx, J. and Ehnis, C. (2020). "Social media in times of crisis: Learning from Hurricane Harvey for the coronavirus disease 2019 pandemic response", *Journal of Information Technology*, 35(3), pp. 195–213.
- Mirbabaie, M., Stieglitz, S., & Marx, J. (2023). Negative Word of Mouth on Social Media: A Case Study of Deutsche Bahn's Accountability Management. *Schmalenbach Journal of Business Research*, 75(1), 99–117.
- Montiel, C.J., Uyheng, J. and Dela Paz, E. (2021). "The Language of Pandemic Leadership: Mapping Political Rhetoric During the COVID-19 Outbreak", *Political Psychology*, 42(5), pp. 747–766.
- Munnukka, J., Maity, D., Reinikainen, H. and Luoma-Aho, V. (2019). "'Thanks for watching'. The effectiveness of YouTube vlogendorsements", *Computers in Human Behavior*, 93, pp. 226–234.
- Nickerson, R.C., Varshney, U. and Muntermann, J. (2013). "A method for taxonomy development and its application in information systems", *European Journal of Information Systems*, 22(3), pp. 336–359.
- Nowak, G.J. and Cacciatore, M.A. (2022). "COVID-19 Vaccination and Public Health Communication Strategies: An In-depth Look at How Demographics, Political Ideology, and News/Information Source Preference Matter", *International Journal of Strategic Communication*, 16(3), pp. 516–538.
- Ouvrein, G., Pabian, S., Giles, D., Hudders, L. and Backer, C. de (2021). "The web of influencers. A marketing-audience classification of (potential) social media influencers", *Journal of Marketing Management*, 37(13-14), pp. 1313–1342.
- Pershad, Y., Hangge, P.T., Albadawi, H. and Oklu, R. (2018). "Social Medicine: Twitter in Healthcare", *Journal of Clinical Medicine*, 7(6), pp. 1-9.
- Pfattheicher, S., Petersen, M.B. and Böhm, R. (2022). "Information about herd immunity through vaccination and empathy promote COVID-19 vaccination intentions", *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 41(2), pp. 85–93.
- Pöyry, E., Reinikainen, H. and Luoma-Aho, V. (2022). "The Role of Social Media Influencers in Public Health Communication: Case COVID-19 Pandemic", *International Journal of Strategic Communication*, 16(3), pp. 469–484.
- Rai, T., Hinton, L., McManus, R.J. and Pope, C. (2022). "What would it take to meaningfully attend to ethnicity and race in health research? Learning from a trial intervention development study", *Sociology of Health & Illness*, 44(S1), pp. 57–72.
- Reinikainen, H., Munnukka, J., Maity, D. and Luoma-Aho, V. (2020). "'You really are a great big sister' – parasocial relationships, credibility, and the moderating role of audience comments in influencer marketing", *Journal of Marketing Management*, 36(3-4), pp. 279–298.
- Shelby, A. and Ernst, K. (2013). "Story and science: how providers and parents can utilize storytelling to combat anti-vaccine misinformation", *Human Vaccines & Immunotherapeutics*, 9(8), pp. 1795–1801.
- Sillence, E. and Martin, R. (2020). "Talking about Decisions: The Facilitating Effect of a Celebrity Health Announcement on the Communication of Online Personal Experiences around Decision-making", *Health Communication*, 35(12), pp. 1447–1454.
- Soares, P., Rocha, J.V., Moniz, M., Gama, A., Laires, P.A., Pedro, A.R., Dias, S., Leite, A. and Nunes, C. (2021). "Factors Associated with COVID-19 Vaccine Hesitancy", *Vaccines*, 9(3), pp. 1-13.
- Sokolova, K. and Kefi, H. (2020). "Instagram and YouTube bloggers promote it, why should I buy? How credibility and parasocial interaction influence purchase intentions", *Journal of Retailing and Consumer Services*, 53, pp. 1-9.
- Statista (2023) Influencer Advertising - Germany. Available at: <https://www.statista.com/outlook/amo/advertising/influencer-advertising/germany> (Accessed: 4 September 2023).
- Statista (2022) Most popular social networks worldwide as of January 2022, ranked by number of monthly active users (in million), 1 March. Available at: <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/> (Accessed: 1 March 2023).
- Stieglitz, S., Mirbabaie, M., Ross, B. and Neuberger, C. (2018). "Social media analytics – Challenges in topic discovery, data collection, and data preparation", *International Journal of Information Management*, 39, pp. 156–168.
- Sun, Y., Wang, R., Cao, D. and Lee, R. (2022). "Who are social media influencers for luxury fashion consumption of the Chinese Gen Z? Categorisation and empirical examination", *Journal of Fashion Marketing and Management: An International Journal*, 26(4), pp. 603–621.
- Veirman, M. de, Cauberghe, V. and Hudders, L. (2017). "Marketing through Instagram influencers: the impact of number of followers and product divergence on brand attitude", *International Journal of Advertising*, 36(5), pp. 798–828.