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Shortcomings in Public Health Authorities' Videos on COVID-19: Limited Reach and a Creative Gap

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Video communication has played a key role in relaying important and complex information on the COVID-19 pandemic to the general public. The aim of the present study is to compare Norwegian health authorities' and WHO's use of video communication during the COVID-19 pandemic to the most viewed COVID-19 videos on YouTube, in order to identify how videos created by health authorities measure up to contemporary video content, both creatively and in reaching video consumers. Through structured search on YouTube we found that Norwegian health authorities have published 26 videos, and the WHO 29 videos on the platform. Press briefings, live videos, news reports, and videos recreated/translated into other languages than English or Norwegian, were not included. A content analysis comparing the 55 videos by the health authorities to the 27 most viewed videos on COVID-19 on YouTube demonstrates poor reach of health authorities' videos in terms of views and it elucidates a clear creative gap. While the videos created by various YouTube creators communicate using a wide range of creative presentation means (such as professional presenters, contextual backgrounds, advanced graphic animations, and humour), videos created by the health authorities are significantly more homogenous in style often using field experts or public figures, plain backgrounds or PowerPoint style animations. We suggest that further studies into various creative presentation means and their influence on reach, recall, and on different groups of the population, are carried out in the future to evaluate specific factors of this creative gap.

Keywords: COVID-19, youtube, video, communication, public health, authorities, WHO, creativity

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INTRODUCTION

During the coronavirus pandemic, health sciences have taken centre stage in guiding politicians in how to respond to the situation. With an infectious disease's potential for exponential growth and corresponding rapid spread, individual behavior has a direct impact on others, and the collective behavior of the population is crucial for controlling the spread of the virus. Quickly reaching out to large numbers of people with information founded in health science in general, and infectious diseases in particular, has been quintessential.

People's consumption of online information has increased rapidly in recent years. In Norway, people now spend on average almost 3 h online every day (Statista, 2020a), a considerable portion of this is video. Online video consumption is steadily increasing globally, and 80% of all internet traffic is estimated to be video by 2022 (CISCO, 2018). With the pandemic confining people to their homes,

people have spent even more time watching online video content. In Norway, the share of individuals watching online videos weekly increased from 85 to 89% during COVID-19 (Statista, 2020c).

There are numerous online video providers. Most major TV broadcasters, as well as national and international newspapers and media outlets, now have their own online video channels. Subscription Videos on Demand (SVoD) services such as Netflix and HBO have changed people's TV- and film viewing habits from being pre-programmed and linear to viewing on-demand. In addition to this, anyone with an internet connection and basic video recording- and editing tools can now create video content and publish it on video sharing platforms like YouTube and Vimeo. Both professionally produced content and user generated content (UGC) contribute to the success of these platforms YouTube is the largest video sharing platform with >2 billion users (YouTube, 2020). Every minute more than 500 h of video is uploaded to YouTube, and one billion hours of video is watched on the platform every day (Statista, 2020b; YouTube, 2020). It is the world's second most visited internet site–beaten only by google.com (Armstrong, 2019) – thus serving as a reference for online video communication. YouTube is used daily by 46% of Norwegians (Statista, 2020d), mostly by males aged 18–29 years (68% of this group uses YouTube daily) and 30–39 years (68%), and least by women aged >60 years (19%) (Statista, 2020e).

Commercial online providers of video streaming options, with their million-dollar budgets, alongside UGC on platforms like YouTube, provide consumers with a wealth of choice at their fingertips – and the option of choosing what to watch and when to watch it. To successfully reach out to a general audience with science-based knowledge and insights it is essential that communicators know how to best utilise video as a communication medium. In order to help advance viewers' knowledge, science communication videos should be truthful, accurate and provide viewers with rigorous information (García Avilés and de Lara, 2018, 24). Studies on science communication on YouTube have evaluated the educational and medical content, as well as popularity factors of the videos (Tewfik et al., 2020, 1–7; Welbourne and Grant, 2016, 706–718; Velho et al., 2020a, 3–12), and have found that a video's popularity is made up of three factors: *content-related factors* (such as topic, theme, editing features, duration, video style/format etc), *content-agnostic factors* (including channel data and popularity metrics such as video age, channel productivity, number of likes, comments and other external metrics), and *YouTube's recommendation system* (Welbourne and Grant, 2016, 707, 710–714; Velho et al., 2020a, 3–4). In a study by Welbourne and Grant (2016, 711-715) they identified six video styles used for the science communication videos in their sample: vlogs, hosted videos, interviews, presentations, voice over visuals, and text over visuals. They were, however, unable to assess the association between video style and view counts as several YouTube channels included in their study consistently used only one of these styles for delivery of content. However, they did find that the most popular science communication videos were user generated video content with a consistent communicator who actively engages with the YouTube community, and that videos in which information was delivered more rapidly were more popular than slow-paced videos. In a study on Brazilian science videos on YouTube, Velho et al. (2020a) identified nine factors related to video views, including both content-related factors and content-agnostic factors. In their study, *video format* was identified as a contributing factor to video popularity, with vlogs, animations and group conversations being the most popular formats. The most relevant content-agnostic factors on popularity were number of likes on video, channel productivity and video age.

Science communicators on YouTube are facing increasing pressure to produce high-quality videos to reach viewers in this competitive online market (Velho et al., 2020b, 12–13). In an extensive study on 826 online science communication videos León and Bourk (2018a) found that an expert panel in online video production (directors, producers, academics and science journalists) agree that videos should be brief, visually attractive and easy to watch, as well as truthful, accurate and rigorous (León and Bourk, 2018b, 7; García-Avilés and de Lara, 2018, 15, 24–25). While images, along with innovative and contemporary audiovisual formats–such as hyperlinking, multimedia and interactivity–are considered important in attracting viewers in the 'competitive attention market' of online video communication, they are not commonly used in science communication videos (León and Bourk, 2018b, 5; García-Avilés and de Lara, 2018, 24–25; Erviti, 2018, 34–38). Rather, the field of audiovisual science communication is dominated by traditional TV-style productions, and primarily use expository style narratives. Innovative and creative presentation techniques such as entertainment, humour, and storytelling techniques are seldomly used by scientific institutions (Davis and León, 2018, 56, 59, 98; Erviti, 2018, 35; Bourk and León, 2018, 9). Most scientists lack the communication and performance skills needed to reach the public, yet two thirds of scientific institutions use scientists as communication actors (Erviti, 2018, 31–33).

Studies on COVID-19 related videos on YouTube are primarily focused on the presence and absence of educational and medical content in the videos (Basch et al., 2020; Hernández-García and Giménez-Júlvez, 2020; Li et al., 2020; Moon and Lee 2020). In a study on Spanish-language videos on COVID-19 Hernández-García and Giménez-Júlvez (2020) found that three out of four prevention measures of the World Health Organisation (WHO) appeared in less than 42% of the videos, and that misinformation was found in over 10% of the videos screened. Similarly, Moon and Lee (2020) found misleading information in 37% of Korean-language COVID-19 videos, and Li et al. (2020) found misleading information in 28% of English-language COVID-19 videos. Dutta et al. (2020) found that COVID-19 videos on YouTube score low on reliability and often contain inaccurate content, yet less so than in videos for previous epidemics. This abundance of misinformation and disinformation online hinders the delivery of accurate information, causes distrust, and endangers countries' abilities to stop the pandemic (WHO, 2020a; Li et al., 2020, 5–6). D'Souza et al. (2020) assessed the 113 most viewed YouTube videos about COVID-19 for medical content at the early phases of the pandemic and found that WHO had only one useful video

(providing scientifically correct information related to COVID-19) and the Centers for disease Control in the US had none.

In order to get people to follow protective measures and to fight misinformation, ensuring accuracy, credibility, and high-quality health information during a pandemic is important (Jardine et al., 2015, 2; King et al., 2018, 519; Lep et al., 2020, 7). It is also important to consider that different audiences and demographics consume and trust information differently, users with non-medical education, for instance, find it difficult to judge the reliability of health information online (Hernández-García and Giménez-Júlvez, 2020, 7). A variety of measures to improve the reliability of content in COVID-19 videos have been suggested, such as including sources in the videos, or creating a rating system to evaluate their educational and medical content (Tewfik et al., 2020, 6).

The choice of communicator or presenter is an important factor in gaining viewers' trust (Welbourne and Grant, 2016, 715). It has been recommended that medical professionals and scientists should have a more active role in communicating health-related information during the pandemic; interact more with the audience, and be better trained for communicating through YouTube and the media (Dutta et al., 2020, 14; King et al., 2018, 519; Lep et al., 2020, 7; Luth et al., 2013, 8; Lai et al., 2020, 2).

People tend to trust health experts and scientists more than officials and mass media (Jardine et al., 2015, 12; Lep et al., 2020, 5; King et al., 2018, 519). Yet traditional mass media, social media, as well as friends and relatives, are the most used sources to obtain information (Meier et al., 2020, 7; Riiser et al., 2020, 5; Jardine et al., 2015, 14). Notably, Luth et al. (2013) found that when Canadian public health officials appeared on television they did so wearing business attire which made them appear more as government officials than health professionals, this was believed to negatively impact trust.

Studies on communication during disease outbreaks, epidemics and pandemics, have found a clear disconnect between what people find credible and trustworthy, and what they actually use and find useful (Jardine et al., 2015, 14; King et al., 2018, 519). While the importance of trust has been explored extensively in risk communication studies (Siegrist, 2019; Earle, 2010; Balog-Way et al., 2020), creative choices in the video production process have been largely neglected.

Creative choices relating to storytelling and narration style have been found to have a direct impact on a video's reach and peoples' ability to recall important information from it. One such study of a video on Climate Change, Davis et al. (2020) tested how narration style–be it expository (using facts and explanations) or infotainment (a blend of 'information' and "entertainment") – influences both video popularity and information recall. While expository narration was liked and believed more across age, gender, and irrespective of people's online habits, people were able to recall information better from the infotainment version. This infotainment version was also liked more by people without a university education. Notably, recall of information was more accurate at the start of the video (Davis et al., 2020, 695), indicating that the most important information should be put up front in the video. Other studies in science communication have found that videos using a narrative get more views than videos without a narrative (Hut et al., 2016, 2512–2513).

Other creative choices made during the production of science communication videos have also been studied, including video editing features, video duration, video style/format, choice of presenter, use of jargon, and use of narrative (Welbourne and Grant, 2016, 710–711; Velho et al., 2020a, 1–14; Hut et al., 2016, 2511–2513). Further creative choices including set design and choice of location or context, the use of props, colour, multimedia effects, and humour, have been studied less, including in pandemic video communication. Studies of health authorities' and governments' COVID-19 related videos on YouTube have explored engagement (number of views, likes, followers, and comments) and quality of content (misinformation and usability of the information), yet none have explored creative choices related to video creation (Berg et al., 2021).

Research has pointed to a disconnect between creative and technological practices in the health sector and health authorities on the one hand, and contemporary practices used in online video and social media communication on the other (Li et al., 2020, 5–6; Moon and Lee, 2020, 9). Researchers have recommended that health authorities and governments could: receive training in creating online videos and using social media; or collaborate with YouTube producers, influencers, and entertainment news to create high-quality content to increase reach, public awareness, and minimise misinformation (Li et al., 2020, 5–6; Moon and Lee, 2020, 10–11). However, existing studies on COVID-19 videos do not make recommendations regarding the creative and artistic choices in the videos.

The aim of the present study is to compare Norwegian health authorities' and WHO's use of video communication during the COVID-19 pandemic to the most viewed COVID-19 videos on YouTube, in order to identify how videos created by health authorities measure up to contemporary video content, both creatively and in reaching video consumers.

MATERIALS AND METHODS

The study is a directed content analysis (Hsieh and Shannon, 2005) of search results from YouTube, with both predefined and inductive codes, comparing COVID-19 videos produced by Norwegian health authorities and WHO, with the most viewed on YouTube, produced by a variety of creators.

Data Collection

In September–October 2020 websites and social media platforms of ten Norwegian national health entities at national and regional level were searched for COVID-19 related visual and media content: the Government (Regjeringen), the four Regional Health Authorities (Helse Nord RHF, Helse Midt-Norge RHF, Helse Sør Øst RHF, Helse Vest RHF), Norwegian Directorate of Health (Helsedirektoratet), Norwegian Institute of Public Health–NIPH (Folkehelseinstituttet), The Norwegian Medicines Agency (Statens Legemiddelverk), the Norwegian Health Network (Norsk Helsenett), and Helsenorge–the digital health services in Norway (helsenorge.no) (see **Supplementary**

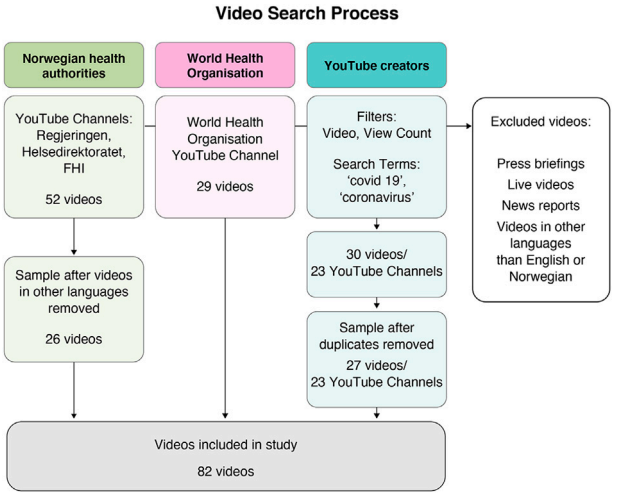

FIGURE 1 | Flow chart of video search process.

Table S1 for more information about the agencies). All sources are publicly available.

All entities except the Norwegian Health Network have their own dedicated YouTube channel. However, only three of them featured COVID-19 related content on their channel: The Government, Norwegian Directorate of Health, and NIPH. These three Norwegian organisations thus make up the key providers of national COVID-19 health communication videos to the Norwegian public, henceforth referred to as the Norwegian health authorities. In addition to these Norwegian entities, the WHO, of which Norway is a member, was also included in the video search. WHO also has a dedicated YouTube channel featuring COVID-19 related videos.

Data collection took place in September and October 2020, and we logged all COVID-19 related videos on YouTube created by the Norwegian health authorities, at the time totaling 26 (the Government – 2; Norwegian Directorate of Health – 20; NIPH – 4), and 29 videos created by WHO. Press briefings, live videos, news reports, and videos recreated/translated into other languages than English or Norwegian, were not included.

To assess how official health communication measure up to contemporary video practices we also logged the most popular COVID-19 related videos on YouTube. To minimise the influence of YouTube's recommendation system and Safari web browser's content customisation, search cookies relating to 'find relevant content' and 'use location' were deactivated in YouTube, and all search history was cleared in Safari before performing any of the searches. On October 27, 2020 we selected the top 15 videos for each of the search terms "covid 19" and "coronavirus", using the YouTube search engine (**Figure 1**). Other similar search terms were also tested, but either gave similar results or gave results in languages other than English or Norwegian, and were not included (e.g. "COVID-19" gave the same results as "covid 19" and "covid" and "korona" instead of "corona" gave results in other languages). The search filters 'Video' and 'Video count' were applied to the search. The top 15 videos were selected for each search term. Again, press briefings, live videos and news reports were excluded, as were videos in languages other than English and Norwegian as these would generally not be understandable by the general Norwegian population. Three of the videos appeared in both search results, resulting in a total of 27 videos included in the sample. These 27 videos were all English language videos. See **Supplementary Table S2** for all video data.

To avoid infringing on any copyright, permission was sought from all video creators to include thumbnails of their videos in the analysis and presentation of our findings. Images have been included for videos in which permission was granted (64 out of 82 videos).

Data Coding

The final sample was made up of a total of 82 videos: 26 from Norwegian health authorities, 29 from WHO, and 27 from YouTube creators. Of these 82 videos one is a duplicate: One of WHO's videos is included in both the WHO and the 'most viewed on YouTube' sample. On 27th–28th October 2020, we manually coded each of the 82 videos. The videos were coded for video-agnostic factors and content-related factors. The video-agnostic factors related to channel and video data from YouTube, and used the following predetermined codes: channel/creator, channel subscribers, search term, date published, video duration, video views, video likes, video dislikes, and number of video comments.

Content-related factors included video style and creative presentation means. Video style categorisation was based on existing literature, and combined codes and definitions from Welbourne and Grant (2016) and Velho, Mendez and Azevedo (2020, 4). As some of these predetermined codes were considered either too narrow or not accurate enough for our sample, new or amended video styles were developed inductively. We specifically set out to develop mutually exclusive categories that related to fundamental communication choices made in the initial stages of a video production process (e.g. whether the video is of a person talking to the camera, an interview or a discussion between two or more people, or an animated explainer video). Existing categorisations tended to mix such communication choices with other creative choices such as location/stage and style of talk or interviews. The Vlog video style/format used in both previous studies, for instance, was combined with the codes Presentation and Talk to form a new code Presentation/Talk because all three video styles share a similar visual expression (i.e. a 'talking head'/a person presenting to the camera). See **Table 1** for the precise definitions of the video styles compared to the previous studies and how they have been combined or amended, along with a flow chart representation in **Figure 2**. This process resulted in six mutually exclusive video styles:

1. Presentation/Talk–a presenter talking to the camera (be it an amateur, a field expert, or a professional presenter, in a studio setting or on location).
2. Interview–someone being interviewed in a Q&A type manner, in a studio or online, with a visible or hidden interviewer.
3. Graphics/Animation–all animated video content (2D, 3D or text-based graphics, and Power Point style presentations using text and/or graphic content).

TABLE 1 | Development of Video Style codes based on Welbourne and Grant (2016) and Velho et al. (2020b).

Welbourne and Grant (2016)	Velho et al. (2020b)	Our study
Video Style	**Video Format**	**Video Style**
Vlog: an iconic YouTube video style where the presenter delivers content by talking directly to the camera	**Vlog:** a format in which the host talks directly to the camera, usually alone and appearing from the chest up	
Hosted: stylistically similar to vlog where the communicator presents the information; however, other people such as members of the public or interviewees are also part of the video content;	**Interview:** in which the host interviews someone	
Interview: videos where the person delivering content is being interviewed by a person off camera who is often the video creator	**Short documentary or reportage:** similar to a tv documentary, in which the host presents the topic using a variety of footage and voice-over effects	**Presentation/Talk:** a presenter talking to the camera (be it an amateur, a field expert, or a professional presenter, in a studio setting or on location). This style combines "Vlog", "Presentation" and "Talk" categories from the two other articles. Replaces vlog to also include presentation/delivering of content in more formal style than the "conversational" vlog format – i.e. a monologue in a studio, or to an audience
Presentation: the presenter is presenting information to an audience and not the camera specifically	**Hangout:** online conversation in which host(s) and guests discuss certain topics	**Interview:** someone being interviewed in a Q&A type manner, in a studio or online, with a visible or hidden interviewer. This style combines and replaces the 'interview', 'hosted' and 'hangout' categories since they all involve discussions and/or interviews between two or more people
Voice over visuals: videos where someone talks over animated or static visuals	**Video animation:** such as live-drawings or 3D animations	**Graphics/Animation:** all animated video content (2D, 3D or text-based graphics, and Power Point style presentations using text and/or graphic content). This style combines "Text over visuals" and "Video Animation" categories (plus "Voiceover Visuals" when containing graphic/animated content)
Text over visuals: similar to voice over visual, but with text in place of the voice	**Live conversations:** in which the video host talks with a guest about a certain theme in a free-dynamics, non-interview style	**Voice Over/Video Collage:** real footage with voice over audio or a collage of real footage. This style replaces "Voice Over Visuals" for videos using video or photography (not animated/graphic), and 'Commented Video'
	Commented video: in which a video from a different author is commented through voice-over effects	**How-To/Demo:** videos that visually demonstrate how to do something or how something works, often using some sort of props, and videos that are instructional. This style replaces "Vlog", "Presentation" and "Commented video" categories when either of these are a demonstration or showing how to do something
	Talk: such as a TED presentation	**Mixed Media:** videos using a mix of the above interchangeably so that the video does not naturally fit in to any single, main category. This style is new and not covered in Welbourne et al. but partly covered by Mendez et al. in 'Short Documentary or Reportage'

4. Voice Over/Video Collage–real footage with voice over audio or a collage of real footage.
5. How-To/Demo–videos that visually demonstrate how to do something or how something works, often using some sort of props, and videos that are instructional.
6. Mixed Media–videos using a mix of the above interchangeably so that the video does not naturally fit in to any single, main style.

When a video fit into more than one video style, the dominating video style was selected. When a dominating style could not be identified, 'Mixed Media' was assigned.

During the initial viewing of the videos when categorising the six main video styles, videos were organised in an online interactive media grid with filtering options enabling the visual comparison of videos according to creator and video styles. Seeing the videos visually compared in the grid shed light on the visual and creative diversity of videos belonging to the same video styles. This led us to develop a list of creative presentation means for further visual comparison of the videos. This small set of creative presentation means was coded inductively and relates to: type of presenter, set design and visual backdrops, graphic animation type, style of storytelling, and mood (see full list of creative presentation means with descriptions in **Supplementary Table S3**). Creative presentation means factors were added as filters in the online media grid.

Codes for video-content factors were defined by and agreed on by two of the authors (MTS, JR). The same two authors then

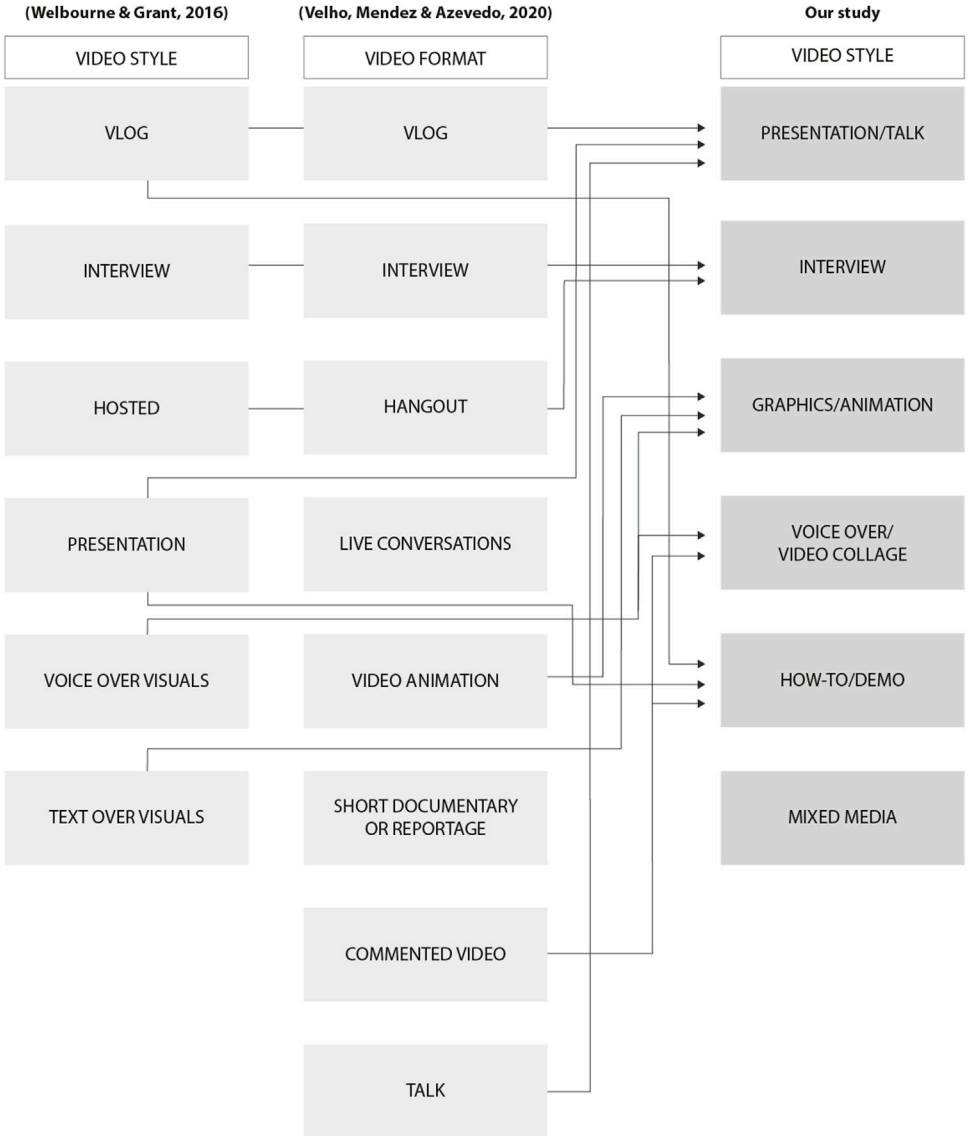

FIGURE 2 | Video Styles developed based on Video Styles by Welbourne and Grant (2016) and Video Formats by Velho et al. (2020b).

viewed all of the videos in the sample separately and assigned each video a category. They then met to compare their assessments. When they did not agree on a categorisation, they reached a decision by consensus through discussion, which led to either agreement on a category, or the development of a new code. For video style, the two coders agreed on 68 of the 82 videos (83%). A majority of the categorisation disagreements were however due to the same reason–lack of specificity and/or fluid borders between the two video styles originally named Voice Over Video and Graphics/Animation. Through a consensus process the video styles were defined more clearly, and a total of four of the six video styles were adjusted in name and/or description for clarification. Voice Over Video was renamed to Voice Over/ Video Collage and the description was updated to include specification of it being related to real footage with voice over or a collage of real footage. The How-To/Demo video style was updated in description to also include videos that are instructional–as some of the disagreements revolved around videos that could not be classified as How-To or a Demo but were still instructional. The Interview video style changed description to focus on Q&A type situations rather than including any type of dialogue. These specifications resolved all but one of the disagreements between the coders, a video which was eventually agreed to be labelled a Graphics/Animation video–since this was the dominating visual style of that video.

The same process of first coding separately by two of the authors (MTS, JR), followed by comparison of results, and reaching agreement through consensus, was also used for the coding of the creative presentation means. Here coders agreed on all codes, thus no further adjustments of the codes were needed.

TABLE 2 | View counts for COVID-19 related videos by different creators.

	Total	Median	Min	Max
Norwegian health authorities	3 594 836	5 649	36	714,649
WHO	18,997 390	58,939	2 769	5 551 178
YouTube creators	274,390 008	9 716 760	1 357 396	27,532 983

Data Analysis

All 82 videos were logged and coded in an Excel spreadsheet. Video and channel data was compared using percentages, and median and range. Video styles were also compared using bar charts.

Visual research is believed to require visual analysis (Ardèvol, 2012), so both virtual and visual methods were utilised in the analysis of the videos. The media grid was created virtually to enable the dynamic embedding of videos from YouTube for visual and interactive comparison. The media grid enabled a side-by side visual comparison of videos according to creator and/or video styles, and revealed further visual and creative similarities and differences across the video samples. The observations made through these visual comparisons led to the development of the codes for creative presentation means. Such observations could not have been made purely from the information captured in the Excel spreadsheet, nor by watching each video in the sample separately. The online interactive media grid was further used to create images for presentation of these results (**Figures 5–7** described in the Results section below).

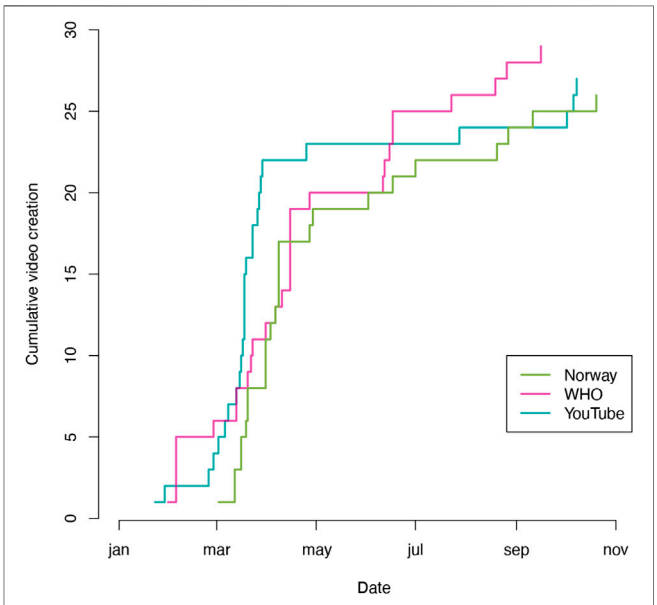

FIGURE 3 | Publication dates for COVID-19 videos in our sample.

RESULTS

The content was analysed for both content-agnostic and content-related factors to assess and compare how health authorities' videos on COVID-19 measure up to those most viewed on YouTube across these different factors (see all coding data in **Supplementary Appendix SA3**).

Video and Channel Data

Our sample of 82 videos from 26 YouTube channels have over 297 million (M) views in total (on the day of data collection). Videos by YouTube creators other than health officials made up more than 274M (92.4%) of the views (**Table 2**). Number of views is generally heavily skewed, with a few videos making up for large portions of the total view count, and most videos generating relatively few views in comparison. Videos created by the Norwegian health authorities have a median (range) number of views of 5,649 (36, 714,649), with a total view count of 3.5M. Norway is a country of 5.385 million people (Statistics Norway, 2020), implying that the median video has reached out to 0.1% of the population.

The 29 videos created by WHO have a larger global target audience, totaling just under 19M views. Also here there is a large spread in view counts (**Table 2**). The 27 most viewed videos by YouTube creators have 274M views in total. Notably, the most popular YouTube video ('The Coronavirus Explained and What You Should Do' by German animation studio Kurzgesagt) has 27.5M views, thus alone reaching out to 8.5M more people than all videos created by the WHO combined.

There are also vast differences when comparing number of channel subscribers. Kurzgesagt, the YouTube channel with the most viewed COVID-19 related video, has 13.3M subscribers. WHO has 613 thousand (k) subscribers and the three Norwegian health authorities have 9.65k subscribers combined (the Government – 507; Norwegian Directorate of Health – 6.21k; NIPH – 2.94k).

Of the 82 videos 62 (76%) were published January–April 2020, with most videos published in March (35: 43%) (**Figure 3**). **Figure 3** shows how non-official video creators rapidly responded to the emerging pandemic and produced a high number of videos in a very short time: 18 of the 27 (67%) videos by YouTube creators in the sample were created in March. The official health authorities were slower to respond, but have also continued to produce videos even after that initial rush, though at a slower pace than in the initial phases of the pandemic.

Video Styles

Coding the 82 videos according to the six video styles provides insights into creative choices of the health authorities as compared to current practices and consumer behavior

TABLE 3 | Video styles for videos published by Norwegian health authorities, WHO, and YouTube creators.

Video style	Norwegian health authorities	WHO	YouTube creators	Total
Presentation/Talk	9	5	9	23
Interview	1	2	1	5
Graphics/Animation	8	9	8	25
How-To/Demo	3	3	3	9
Voice Over/Video Collage	4	8	1	13
Mixed Media	1	2	5	8
Total	26	29	27	—

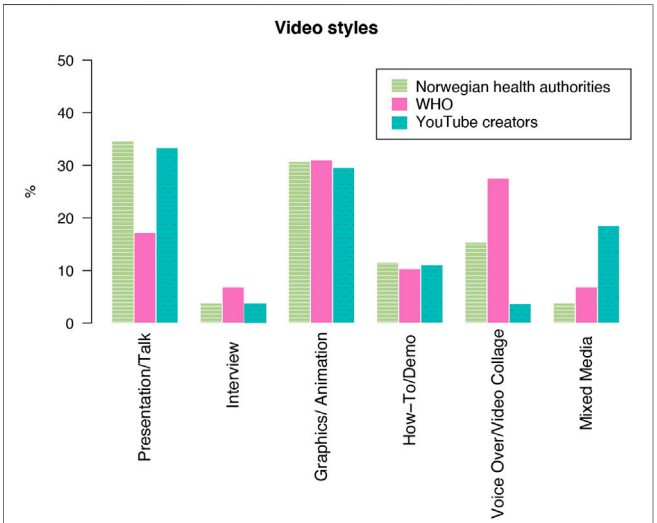

FIGURE 4 | Percentages of Video Styles utilised in COVID-19 videos by Norwegian health authorities, WHO and YouTube creators.

(**Table 3**). WHO have several videos in the Voice Over/Video Collage video style, which is the least used video style by YouTube creators. Comparingly, YouTube creators have more videos in the Mixed Media video style than does WHO and Norwegian health authorities. Graphics/Animation is the overall most used category, while Presentation/Talk is the most recurring category for Norwegian health authorities and YouTube creators (**Table 3**). Visualising the video style fractions in a bar chart (**Figure 4**) demonstrates how the Norwegian health authorities, WHO and YouTube creators emphasise their creative efforts differently.

Creative Presentation Means

The video styles refer to overarching choices that can be made to bring forth a message, yet say nothing of the creative *execution* thereof. And while Norwegian health authorities appear rather similar to YouTube creators in terms of video styles used, visually comparing videos in the interactive media grid illustrates a visual and creative difference between them. Thumbnails for videos created by Norwegian health authorities (**Figure 5**) are significantly more homogenous (i.e. use of colour, visual backdrops, typographic styles, animation style) than videos from WHO (**Figure 6**) and by YouTube creators (**Figure 7**), with the latter being much more varied in visual style and creative expression.

Comparing the selected creative presentation means for the most recurrent video styles, Presentation/Talk and Graphics/Animation, reveals some striking differences between Norwegian health authorities, WHO, and YouTube creators (**Table 4**). While videos in the Graphics/Animation style published by the Norwegian health authorities are mostly basic PowerPoint style videos using text, simple graphics and basic animated transitions, this style is not used in any of the videos by YouTube creators or WHO. Most of WHO's Graphic Animation videos use basic stop motion animation–mostly simple line-illustration animations on a white background. Half of the Graphics/Animation videos by YouTube creators are also basic-stop motion animations, whereas the other half are advanced graphic animations.

In the Presentation/Talk video style, half of the videos by Norwegian health authorities and WHO feature a person presenting health information in the form of a monologue, against a single-colored backdrop, without any additional creative presentation means, are serious in mood, and use expository storytelling (**Table 4**). In contrast, YouTube creators utilise a range of creative presentation means across their videos in this style, including: professional presenters, narratives, humour, and contextual backgrounds (**Table 4**). The majority of videos by YouTube creators (67%) in this style use narrative storytelling while WHO's videos are exclusively expository. None of the YouTube creators' videos use a public figure, lay person/unknown, or plain background, whereas Norwegian health authorities rely on public figures and lay persons/unknown for all their videos, along with field experts, plain backgrounds, and expository videos.

DISCUSSION

In this study we compared 82 videos on the communication of health science related to the COVID-19 pandemic, from Norwegian health authorities, WHO, and various YouTube video creators. We compared both content-agnostic factors and content-related factors of the videos (Welbourne and Grant, 2016, 707, 710–711; Velho et al., 2020b, 1,4). The analysis has identified differences in reach and a creative gap between videos created by Norwegian health authorities and WHO, and videos with the highest view count on YouTube. That is, there is a gap between the science-based videos which health care professionals and officials present to the public on YouTube, and the videos which people tend to choose to watch.

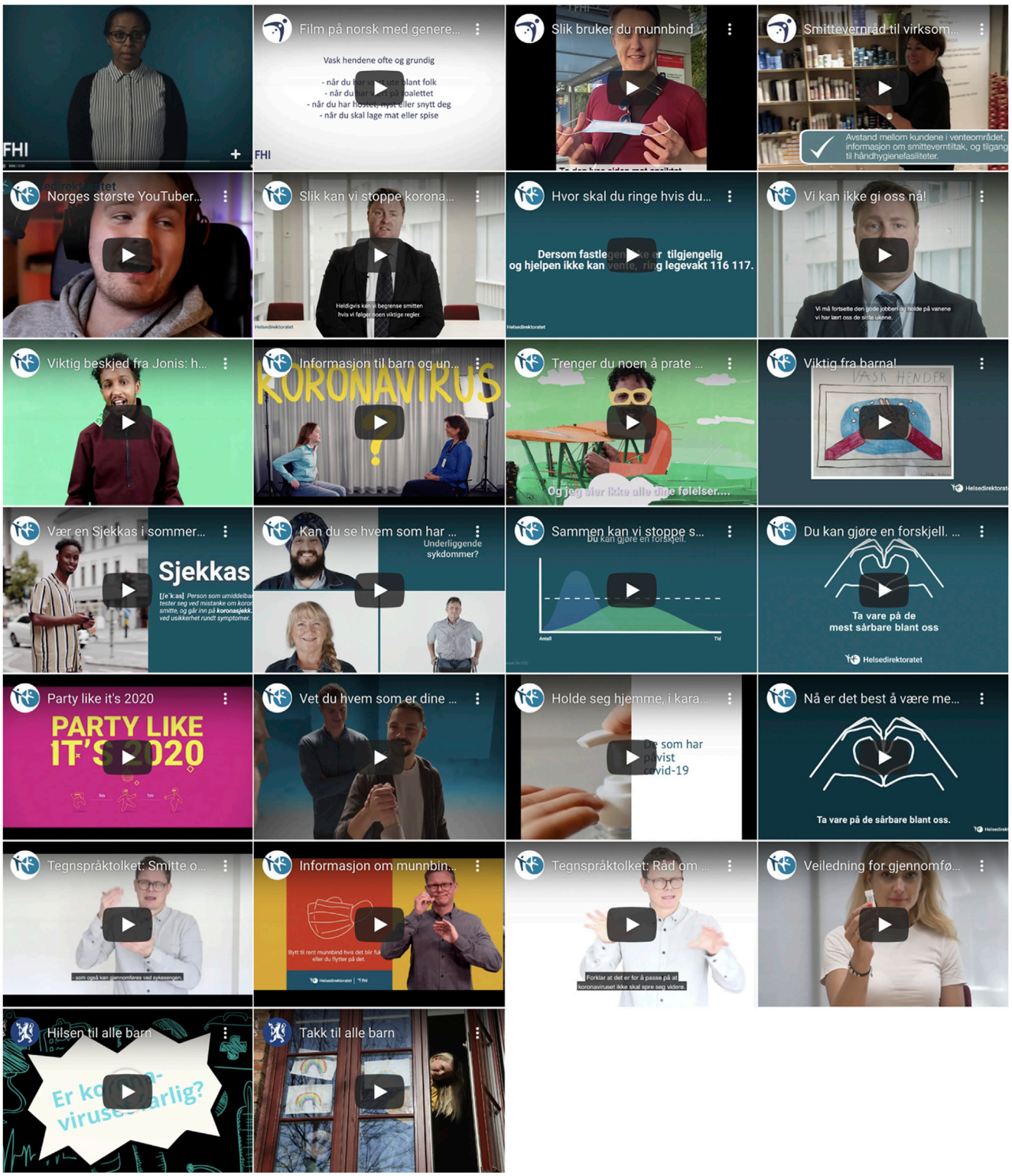

FIGURE 5 | Thumbnail images for COVID-19 videos published by Norwegian health authorities (Image credits: © Folkehelseinstituttet[1], © Helsedirektoratet[2] © Regjeringen–Barne-og familiedepartementet[3]).

FIGURE 6 | Thumbnail images for COVID-19 videos published by WHO (Image credits: © WHO[4]).

FIGURE 7 | Selection of thumbnail images for most popular COVID-19 videos published by YouTube creators (Image credits from top left: © Kurzgesagt[5] © AsapSCIENCE[6], © The Daily Show With Trevor Noah[7], © Guardian News and Media[8], © MinutePhysics[9], © Ninja Nerd Lectures[10] © Neural Academy[11], © It's Okay To Be Smart/Joe Hanson[12], © Centers for disease Control and Prevention (CDC)[13]).

TABLE 4 | Creative presentation means for video styles graphics/animation and presentation/talk.

	Norwegian health Auth. (26 videos)	WHO (29 videos)	YouTube creators (27 videos)
Graphics/Animation Videos	8	9	8
Graphic animation type			
- PowerPoint Type Presentation	7 (88%)	0 (0%)	0 (0%)
- Basic Stop-Motion Animation	1 (13%)	7 (78%)	4 (50%)
- Advanced Graphic Animation	0 (0%)	2 (22%)	4 (50%)
Presentation/Talk Videos	9	5	9
Type of presenter			
- Field Expert	0 (0%)	4 (80%)	1 (11%)
- Professional Presenter	0 (0%)	0 (0%)	8 (89%)
- Public Figure	5 (56%)	0 (0%)	0 (0%)
- Lay Person/Unknown	4 (44%)	1 (20%)	0 (0%)
Set-Design/Visual Backdrops			
- Plain Background	3 (33%)	4 (80%)	0 (0%)
- Contextual Background	0 (0%)	0 (0%)	2 (22%)
- Multimedia Means	5 (56%)	1 (20%)	7 (78%)
Style of Storytelling			
- Narrative	4 (44%)	0 (0%)	6 (67%)
- Expository	5 (56%)	5 (100%)	3 (33%)
Mood			
- Humour	2 (22%)	0 (0%)	6 (67%)
- Serious	7 (78%)	5 (100%)	3 (33%)

WHO have 19M total views for their 27 videos and 612K channel subscribers, thus reaching only a fraction of their intended global audience. WHO is 'responsible for international public health' and 'working for better health for everyone, everywhere' (WHO, 2020c), but the reach of their videos on YouTube does not reflect these aims and responsibilities. Studies have shown that channel popularity has an impact on video views (Welbourne and Grant, 2016, 707), suggesting that the low number of subscribers to WHO's YouTube channel negatively affects their video views, particularly when competing with the more popular YouTube channels and their millions of subscribers. Comparing data for COVID-19 videos by WHO with those most viewed on YouTube by a variety of creators–both with intended global audiences–reveal large gaps in video reach as measured by number of views.

COVID-19 was characterised as a pandemic by WHO on March 11, 2020 (WHO, 2020b). The majority of the 82 videos in our sample were published within just a few weeks of this announcement, at a time when the corona virus caught the attention of a global audience. Non-official creators were quick to respond and published multiple videos (**Figure 3**), with the result that many videos on the same topic competed for viewers' attention simultaneously. Indeed, national health authorities are up against a wide range of video content creators with a dedicated and global following. These YouTubers–professionals and amateurs–are on top of their game, both creatively and technically, when it comes to producing videos for online consumption. For science communicators there is constant pressure to produce high-quality videos and maintain channel productivity in order to break through in this competitive online market and to reach new audiences (León and Bourk, 2018b, 5; García-Avilés and de Lara, 2018, 24–25; Erviti, 2018, 38; Velho et al., 2020b, 12–13). Pandemic video communication is no exception. Simply creating a health information video and assuming people will watch it for the sole reason that it contains useful health and risk communication, or features a trusted source or field expert, will not suffice, and is not aligned with contemporary online culture and its creative, fast paced, and responsive approach to communication.

Video content factors, such as the video format–or video style–have been found to influence video popularity (Velho et al., 2020b, 11). In our sample, the most recurring video styles overall were Graphics/Animation and Presentation/Talk. The major differences in video styles between Norwegian health authorities and WHO compared to popular videos on YouTube was for Voice Over/Video Collage, which was a popular choice with the health authorities but not among YouTube creators, and Mixed Media, which was a popular choice among YouTube creators but not with the health authorities.

A closer look at thumbnails for the various videos (**Figures 5–7**) indicates that videos from YouTube creators are much more varied in visual and creative expression (e.g. backgrounds, visual effects, mood) than those from Norwegian health authorities and WHO. While this is natural given that the videos have different creators, it also implies that viewers enjoy the variation of video styles available on YouTube. Comparing videos within the same video style across a number of creative presentation means elucidated this creative gap even more clearly.

Previous studies have found that field experts/healthcare professionals are the most trusted and credible sources (King et al., 2018, 519; Lep et al., 2020, 5; Jardine et al., 2015, 14), and healthcare authorities tend to use field experts/healthcare professionals as presenters in their videos. Indeed, WHO use a field expert in 4/5 of their Presentation/Talk style videos. However, the low reach of these videos indicates that these videos are not attention-grabbing, engaging, and enticing viewers to click 'play' on a video. In contrast, only one of the videos by YouTube creators in our sample featured a field expert, the rest relied on professional presenters. It appears that little attention has been given to creative presentation means–or the lack of variation thereof–in the WHO Presentation/Talk style

[1]Links to videos by Folkehelseinstituttet on YouTube: https://youtu.be/Lb9kk_6GhFM, https://youtu.be/94__328EXu0, https://youtu.be/QcO8QVU6178, https://youtu.be/Tj-_Zuo4iXY (Last retrieved on 28.10.2020)

[2]Links to videos by Helsedirektoratet on YouTube: https://youtu.be/DdcB-s7cBqo, https://youtu.be/_USpctjaZZg, https://youtu.be/CLIXFb3lxmk, https://youtu.be/Rd4iQ1tk2eA, https://youtu.be/IHZt3r2SSIA, https://youtu.be/v1W249tl1vA, https://youtu.be/2q5VlrL79BM, https://youtu.be/GFdtO-dDnJQ, https://youtu.be/I3xEdwohtqA, https://youtu.be/hXQ71-bwm4g, https://youtu.be/TGvbB1qc5TQ, https://youtu.be/K7nWgLldIuU, https://youtu.be/itl-0NGR55g, https://youtu.be/5meS0eNDfZg, https://youtu.be/QIWm6Lq45M4, https://youtu.be/xFOx2EfHODY, https://youtu.be/CyRUA2xBLVw, https://youtu.be/DkxBxTeVVJg, https://youtu.be/HUjdwgTbuHQ, https://youtu.be/y5yQYqhh4vw (Last retrieved on 28.10.2020)

[3]Links to videos by Regjeringen on YouTube: https://youtu.be/IMenA2yO-Jk, https://youtu.be/IIFEkArRW9Q (Last retrieved on 28.10.2020)

[4]Links to videos by WHO on YouTube: https://youtu.be/mOV1aBVYKGA, https://youtu.be/1APwq1df6Mw, https://youtu.be/Ded_AxFfJoQ, https://youtu.be/bPITHEiFWLc, https://youtu.be/6Ooz1GZsQ70, https://youtu.be/8c_UJwLq8PI, https://youtu.be/9Tv2BVN_WTk, https://youtu.be/qF42gZVm1Bo, https://youtu.be/i0ZabxXmH4Y, https://youtu.be/y7e8nM0JAz0, https://youtu.be/esM_ePHn0aw, https://youtu.be/677pSwGauqs, https://youtu.be/ZTl-5AjDb48, https://youtu.be/vinh0lIG1p0, https://youtu.be/9ETufT1IdlA, https://youtu.be/CmaA00M4kNI, https://youtu.be/HNkl1Zqs_40, https://youtu.be/qRp6CkUi9Ic, https://youtu.be/ZUmXHxk2E9c, https://youtu.be/sM3efZX2iAQ, https://youtu.be/xTR_uEhWYVE, https://youtu.be/xcCDvpZt7bg, https://youtu.be/ogJUASq5Gv0, https://youtu.be/csAPS-0magI, https://youtu.be/MKUiu4O7oOU, https://youtu.be/c_bj4mbxBO4, https://youtu.be/2Dy7dVm7qVE, https://youtu.be/179d0dT-FOo (Last retrieved on 27.10.2020)

[5]Link to video by Kurzgesagt on YouTube: https://youtu.be/BtN-goy9VOY (Last retrieved on 27.10.2020)

[6]Link to video by AsapSCIENCE on YouTube: https://youtu.be/OTYfke545vI (Last retrieved on 27.10.2020)

[7]Link to video by The Daily Show with Trevor Noah on YouTube: https://youtu.be/8A3jiM2FNR8 (Last retrieved on 27.10.2020)

[8]Link to video by The Guardian on YouTube: https://youtu.be/aerq4byr7ps (Last retrieved on 27.10.2020)

[9]Link to video by MinutePhysics on YouTube: https://youtu.be/54XLXg4fYsc (Last retrieved on 27.10.2020)

[10]Link to video by Ninja Nerd Lectures on YouTube: https://youtu.be/PWzbArPgo-o (Last retrieved on 27.10.2020)

[11]Link to video by Neural Academy on YouTube: https://youtu.be/Xj1nUFFVK1E (Last retrieved on 27.10.2020)

[12]Link to video by It's Okay to be Smart on YouTube: https://youtu.be/fgBla7RepXU (Last retrieved on 27.10.2020)

[13]Link to video by CDC on YouTube: https://youtu.be/qPoptbtBjkg (Last retrieved on 27.10.2020)

videos, which all use a plain background, expository story telling style, and are serious in mood.

Norwegian health authorities have also used creative presentation means that are rarely used by popular YouTube creators, such as public figures, lay persons/unknown, plain backgrounds, and PowerPoint type animations. Neither Norwegian health authorities nor WHO have used the more advanced and creative presentation means that are frequently used by YouTube creators, such as professional presenters, advanced graphic animations, contextual backgrounds and humour. In addition to Health authorities' reliance on field experts, public figures, and lay persons/unknown as presenters in the videos, they may benefit from also exploring using professional presenters, trained in presenting content for audiences in an engaging manner–or provide the necessary training for health authority spokespersons in this craft.

Norwegian Directorate of Health, who is central in providing video communication on COVID-19 to the Norwegian public, has to some degree experimented with contemporary creative content. This experimentation includes the use of influencers, celebrities and a comedian, as well as an up-beat COVID-19 song with a bright animation. Their most viewed COVID-19 video is the video featuring Norway's most famous YouTubers, so this creative experimentation seems to have had a positive impact on the reach of their videos. Yet such efforts are underrepresented by health authorities, and further research should be invested in this area.

CONCLUSION

We have identified a creative and technological gap between the type of videos the healthcare authorities produce and videos most viewed on YouTube. Multimedia means, narrative, humour, advanced graphic techniques and the use of professional communicators as actors are techniques found to improve learning, recall of information, and, importantly, reach of the videos (Davis et al., 2020, 695; Hut et al., 2016, 2512–2513; León and Bourk, 2018b, 5; García-Avilés and de Lara, 2018, 24–25; Erviti, 2018, 34–38) and are frequently used by YouTube creators, yet are underexplored in health authorities' pandemic video communication.

While trust is central in pandemic video communication, there is a lack of evidence regarding the role of creative choices and their impact on reach, trust, recall and behaviour change. This study addresses this evidence gap by charting out some of the creative differences that exists between health authorities' videos and those most viewed on YouTube. We suggest future research grow the evidence relating to creative choices and their impact on reach, trust, recall and behaviour change, as well as on different groups of the population to evaluate specific factors of this creative and technological gap. We recommend that health authorities aim to improve their pandemic video communication, in collaboration with professional creative communicators, to create timely and contemporary content more in line with current online video consumption of their intended audiences.

Limitations

Certain limitations regarding the data collected must be noted. We have only taken into account views from YouTube–these views include people watching the videos directly on YouTube and on other social media channels when shared from YouTube. If the same video has been uploaded natively (rather than shared from YouTube) to other social media channels such as Facebook or Twitter, or shown on TV, these views are not included. View count and video popularity is therefore only considered in the context of YouTube. In Norway, YouTube is used more by younger people–so views cannot be assumed to reflect online habits of the entire Norwegian population. There are also limitations as to what information and analytics we can access from YouTube. We do not, for instance, have access to demographic and geographically specific video analytics to determine views by country and by different parts of the population. Further, we do not know what *impact* the videos have had on viewers in terms of knowledge gain or changes in attitude or behaviour. Videos by Norwegian health authorities–which have a national target audience–cannot be directly compared to the popularity of videos by YouTube creators and WHO, with their global target audiences. We chose to compare WHO and Norwegian health authorities with videos by YouTube creators because it is the largest and most frequently used video sharing platform, and because currently there are no single organisations within health/risk/science communication to compare to that have views–and arguably creativity and a grasp of contemporary online video culture–as high as the most popular videos on YouTube. Also, the quality and accuracy of content in the videos have not been evaluated or compared, as this was outside the scope of this study. Finally, future studies should explore discrepancies between video styles–particularly when a video is a combination of video styles–more systematically.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

Written informed consent was not obtained from the individual(s), nor the minor(s)' legal guardian/next of kin, for the publication of any potentially identifiable images or data included in this article. However, permission to include video thumbnail images was sought and granted from the video creators for all video images presented.

AUTHOR CONTRIBUTIONS

This study was conducted by an interdisciplinary team of researchers. MTS and JR had the idea for the study. MTS, JR, and IS discussed the initial coding and methodology approach.

MTS and JR analysed the data. MTS drafted the initial manuscript. All authors (JR, SW, SHB, IS, DAL, HT) provided critical feedback on the manuscript, and all approved the final manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fcomm.2021.764220/full#supplementary-material

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