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Bibliometric Analysis of Papers Dealing with Dental Videos on YouTube

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Abstract: The aim of this study was to perform a bibliometric analysis to discover what topics of dental YouTube videos have been investigated by the scientific literature, and evaluate how video characteristics were related to citation count. The Scopus electronic literature database was accessed to identify relevant papers. After screening, a total of 128 papers entered the analysis. The bibliographic data were provided by Scopus, whereas content evaluations were manually performed. Most papers evaluated videos recorded in English (85.9%). Each of the 128 papers analyzed a mean (±SD) of 79.2 ± 61.6 videos. Mean journal impact factor was 1.8 ± 1.4, and mean citation count was 13.0 ± 22.4. The preference for publication of papers was inclined towards dental journals (80.5%), with the majority (54.7%) being published without open access. Papers dealing with videos targeting patients/public had higher citations than those targeting dental professionals only (14.1 ± 23.4 vs. 4.0 ± 6.3, $p < 0.001$). The most represented as well as the most highly cited specialty of the dental YouTube publications was oral and maxillofacial surgery/oral medicine. Some twin or triplet studies published in the same year covering the same topic were identified, but they often covered a different number of videos.

Keywords: YouTube; health; Global Quality Scale; DISCERN; video information and quality index; bibliometric

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1. Introduction

In this era of digital technology, a large number of individuals, particularly young adults, tend to spend a considerable amount of time online. According to a recent study, YouTube ranked as the second most commonly used social media platform among young adults [1]. In addition, the study found that these individuals considered YouTube as a more favorable source of health information compared to online texts. Using YouTube and other social media networks as a source of health-related information represents an issue with growing significance for the public due to information reliability concerns [2,3]. Unlike journal articles, YouTube videos are not peer-reviewed or "fact-checked" so there is no guarantee about the quality of the video contents uploaded to the platform. Instead, academics, from time to time, have conducted studies that evaluated YouTube videos on specific topics to reveal what contents were covered by the videos and how well the topics were covered. Several literature reviews have been published to summarize the existing

findings in studies of healthcare-related YouTube videos. For instance, a review published back in 2015 reviewed 18 papers on healthcare videos and concluded that YouTube was used as a medium to promote unscientific or unapproved therapies and drugs, and might influence the beliefs of patients concerning controversial topics such as vaccinations [4].

In the past, the literature on healthcare or medical YouTube video analysis was relatively small, with only 13 papers assessed in a 2013 review [5] and 37 papers in a 2016 review [6]. However, the literature has since grown significantly, with a recent review published in 2022 covering 202 papers on health-related YouTube videos [7]. With the increasing number of healthcare YouTube videos and research studies on these videos, there has also been a growing concern about misinformation [2], such as antivaccine messages [8] and cancer-related content [9]. In addition, it was estimated that approximately 15.3% of the global population experiences dental fear and anxiety [10], which can be managed or alleviated by watching YouTube videos related to dental problems before visiting a dentist or undergoing dental treatment [11]. Many YouTube videos also provide information on pharmacological or non-pharmacological interventions to alleviate dental fear and anxiety [12].

With this background, the present work aimed to review the published studies to discover what topics of dental YouTube videos have been investigated by the scientific literature. More importantly, this work aimed to assess whether the attention from the general population (e.g., number of videos posted to YouTube on a specific topic and average number of views) and other aspects of the publishing (e.g., journal category, journal impact factor, or open access status) could be related to the scientific attention (e.g., number of papers on the specific topic and number of citations per paper). Such relationships have not been so far tested or revealed in the existing bibliometric literature, to the best of the authors' knowledge.

2. Materials and Methods

2.1. Data Source and Search Strategy

In this bibliometric study, the Scopus database was accessed on 6 November 2023 and queried with the following search strings:

- Step 1 (#1): SUBJAREA (dent) AND TITLE-ABS-KEY (youtube* OR "you tube*").
- Step 2 (#2): TITLE-ABS-KEY (youtube* OR "you tube*") AND TITLE-ABS-KEY (tooth OR teeth OR dental OR dentist* OR oral OR odont*).
- Step 3: Combination of two datasets from the above steps, i.e., #1 OR #2.
- Step 4: Limiting the resultant records to journal publications written in English.

To further explain, step 1 searched for YouTube video papers published in dental journals, and step 2 searched for any YouTube video papers mentioning tooth- or dentistry-related words in their title, abstract, or keywords published in any journals, including non-dental journals. Besides limiting our search to journal publications and English-language articles, no additional filter was placed to restrict the search results. Therefore, the search should include papers published in any publication year as long as they have already been indexed by Scopus on the day of the search. Following these inclusion criteria, the Scopus search yielded 264 papers. The abstract and full text of these papers were read to assess their relevance. Within the literature set, 136 papers were excluded; 134 papers did not evaluate the content of dental YouTube videos, 1 paper was not written in English, and 1 paper was a duplicate. Hence, 128 papers entered the analysis (Figure 1). The export function of Scopus was used to download the bibliographic data of the papers, such as the publication year, citation count, and open access status (yes/no).

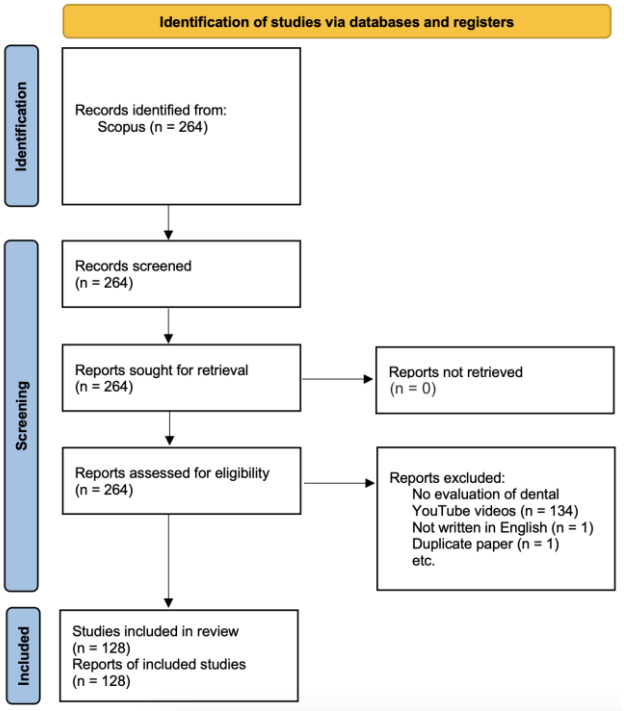


Figure 1. PRISMA flow chart of the literature search process.

2.2. Manual Data Extraction

The following information was manually extracted from each of the 128 papers:

- Dental specialty concerned;
- The exact dental topic under investigation;
- Video target (dental professionals only vs. patients/public);
- Number of videos evaluated;
- Average view of the videos (the mean number was recorded by default, and median was recorded if the former was unavailable);
- Video language (English only, English + others, or non-English only);
- Tools used to evaluate the video content: customized scale, Global Quality Scale (GQS) [13], DISCERN and its shortened form [14,15], Journal of American Medical Association (JAMA) benchmark [16], video information and quality index (VIQI) [17], etc.;
- Journal impact factor;
- Journal category (dental journal or not).

The journal impact factor was recorded from the Journal Citation Reports platform hosted by Clarivate [18]. For papers published in 2023, the journal impact factor from the year 2022 was used, as the data from the year 2023 were not yet available.

2.3. Statistical Analysis

SPSS 28.0 (IBM, New York, NY, USA) was used to conduct statistical analysis. Test results with $p < 0.05$ were considered statistically significant. Independent sample *t*-tests were conducted to evaluate if there was a significant difference in the mean citation count between (1) papers that investigated videos targeting dental professional only and papers that investigated videos for the patients/public; (2) papers dealing with videos in English only and those dealing with non-English videos; (3) papers published in dental journals and those published in non-dental journals; (4) papers published with open access and those published without open access. Pearson's correlation tests were conducted to evaluate if there was a significant correlation between citation count and various parameters, such as number of videos, average number of views for the videos, and journal impact factor.

2.4. Exploratory Analysis

If some pairs of similar articles published in the same year were identified after data coding, their methodology would be compared and contrasted.

Ethical approval was not applicable to this study.

3. Results

The 128 papers that evaluated dental YouTube videos (listed in Supplementary File S1) were published during 2011–2023. Most of them were published since 2020, although videos published before that were generally cited more often (Figure 2). For instance, only three papers were published in 2016, but they had an average citation count of 110.0 times (80, 118, and 132 citations, respectively). Meanwhile, all but 3 of the 128 papers were labelled as original articles according to Scopus. Most papers evaluated videos recorded in English (n = 110, 85.9%) (Figure 3). Portuguese and Spanish were the most recurring non-English languages, each including five papers that covered either a mixture of English and non-English videos or non-English videos only. The highest number of publications come from Turkish authors (n = 58, 45.3%), followed by India and the United Kingdom (n = 9 each, 7.0%).

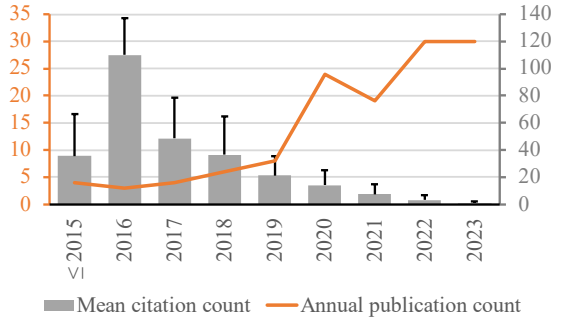


Figure 2. Total publication and citation counts of dental YouTube papers.

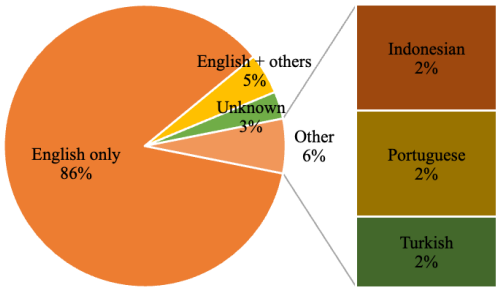


Figure 3. Pie chart showing the distribution of the dental YouTube papers according to the language of their analyzed videos.

On average, each of the 128 papers analyzed a mean (±SD) of 79.2 ± 61.6 videos, which had 221,860.2 ± 1,231,252.9 views. The mean journal impact factor was 1.8 ± 1.4, and mean citation count was 13.0 ± 22.4. The journals with the highest number of publications were *International Journal of Dental Hygiene* (n = 7, current impact factor = 2.4) and *Oral Diseases* (n = 6, current impact factor = 3.8). The papers were preferably published in dental journals (n = 103, 80.5%) and without open access (n = 70, 54.7%).

In terms of the dental specialty, the most represented specialty was oral and maxillofacial surgery/oral medicine (n = 32, mean citation per paper = 19.0) (Table 1). Papers that evaluated videos of this specialty had the highest citation per paper. Meanwhile, general dentistry papers had the highest average number of video views, as a paper dealing with videos on toothbrushing and another paper on tooth whitening had an average number of video views of 12,845,608 and 2,189,819, respectively. This pair of papers had the highest average video view counts among the 128 papers.

Table 1. Breakdown of dental specialties involved in the YouTube papers.

Dental Specialty	No. of Papers	Mean No. of Videos	Mean No. of Video Views	Citations per Paper
Oral and maxillofacial surgery/oral medicine	32	68.0 ± 41.3	155,299 ± 468,184	19.0 ± 32.8
Orthodontics	25	96.9 ± 98.5	72,105 ± 115,041	15.7 ± 20.9
Pedodontics	21	77.8 ± 70.7	31,908 ± 32,152	11.4 ± 18.6
Implant dentistry	10	93.8 ± 45.1	75,233 ± 155,164	12.3 ± 18.5
Endodontics	8	59.6 ± 28.9	93,185 ± 99,208	13.4 ± 27.1
General dentistry	7	104.7 ± 29.2	2,684,129 ± 5,047,116	4.1 ± 4.3
Dental videos related to systemic disease	7	76.7 ± 28.2	55,018 ± 108,250	13.3 ± 8.9
Prosthodontics	5	83.6 ± 38.2	86,106 ± 93,754	6.8 ± 7.7
Operative dentistry	5	56.6 ± 45.7	73,383 ± 125,563	0.6 ± 0.5
Oral and maxillofacial radiology	5	39.8 ± 12.4	26,618 ± 30,880	3.6 ± 3.3
Periodontology	3	106.3 ± 82.5	66,262 ± 22,663	4.7 ± 8.1

In terms of the exact topic, root canal treatment and oral hygiene (n = 5 videos each) were most frequently investigated, followed by teeth aligners (n = 4). The majority of the papers dealt with videos targeting the patient/public (n = 114, 89.1%) rather than the dental professional only (n = 14, 10.9%).

The most cited paper among the 128 was published in 2016: a content analysis of 188 YouTube videos on oral cancer [19] (132 citations). Among the top 10 most cited papers, oral and maxillofacial surgery/oral medicine and orthodontics occupied three papers each (Table 2).

Table 2. Top 10 most cited dental YouTube papers.

Paper	Reference	Citation
1. Hassona, Y., Taimeh, D., Marahleh, A., & Scully, C. (2016). YouTube as a source of information on mouth (oral) cancer. Oral Diseases, 22(3), 202–208.	[19]	132
2. Delli, K., Livas, C., Vissink, A., & Spijkervet, F. K. (2016). Is YouTube useful as a source of information for Sjögren's syndrome? Oral Diseases, 22(3), 196–201.	[20]	118
3. Hegarty, E., Campbell, C., Grammatopoulos, E., DiBiase, A. T., Sherriff, M., & Cobourne, M. T. (2017). YouTube™ as an information resource for orthognathic surgery. Journal of Orthodontics, 44(2), 90–96.	[21]	86
4. Lena, Y., & Dindaroğlu, F. (2018). Lingual orthodontic treatment: A YouTube™ video analysis. Angle Orthodontist, 88(2), 208–214.	[22]	84
5. Nason, K., Donnelly, A., & Duncan, H. F. (2016). YouTube as a patient-information source for root canal treatment. International Endodontic Journal, 49(12), 1194–1200.	[23]	80
6. Gao, X., Hamzah, S. H., Yiu, C. K. Y., McGrath, C., & King, N. M. (2013). Dental fear and anxiety in children and adolescents: qualitative study using YouTube. Journal of Medical Internet Research, 15(2), e2290.	[24]	67
7. Knösel, M., & Jung, K. (2011). Informational value and bias of videos related to orthodontics screened on a video-sharing Web site. Angle Orthodontist, 81(3), 532–539.	[25]	57
8. ElKarmi, R., Hassona, Y., Taimeh, D., & Scully, C. (2017). YouTube as a source for parents' education on early childhood caries. International Journal of Paediatric Dentistry, 27(6), 437–443.	[26]	54
9. Abukaraky, A., Hamdan, A. A., Ameera, M. N., Nasief, M., & Hassona, Y. (2018). Quality of YouTube TM videos on dental implants. Medicina Oral, Patologia Oral y Cirugia Bucal, 23(4), e463.	[27]	50
10. Ustdal, G., & Guney, A. U. (2020). YouTube as a source of information about orthodontic clear aligners. Angle Orthodontist, 90(3), 419–424.	[28]	48

Most of the papers evaluated the videos with their customized scale/criteria (n = 114, 89.1%, Figure 4), followed by evaluations based on GQS (n = 61, 47.7%) and DISCERN

(n = 45, 35.2%). Apart from these recurring tools and JAMA benchmark and VIQI, seldom-used tools were the Patient Education Materials Assessment Tool for Audiovisual Materials (PEMAT-AV) (n = 2) [29] and HONcode (n = 1) [30].

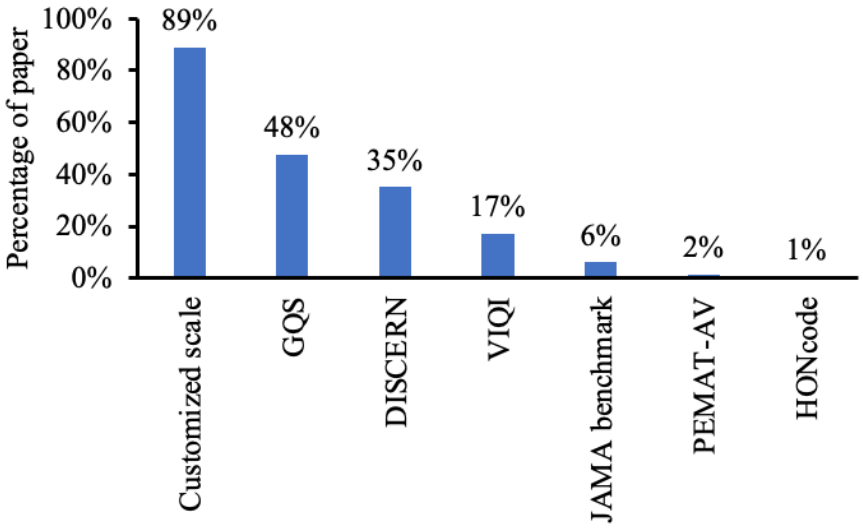


Figure 4. Video content evaluation tools used by the dental YouTube papers.

Statistical tests indicated that only video target had a significant relationship with the citation count, namely that papers dealing with videos targeting patients/public had higher citations than those dealing with videos targeting dental professionals only (Table 3). Other variables, such as video language, journal category, open access status, number of videos analyzed, average video views, and journal impact factor did not have a significant relationship (Tables 3 and 4).

Table 3. Citation count according to video and publication type.

Group	Mean Citation Count ± SD	*p*-Value
Video target		<0.001
Dental professional only (n = 14)	4.0 ± 6.3	
Patient/public (n = 114)	14.1 ± 23.4	
Video language		
English only (n = 110)	13.4 ± 23.3	0.206
Non-English involved (n = 14)	5.4 ± 8.0	
Journal category		
Dental (n = 103)	14.1 ± 23.7	0.246
Non-dental (n = 25)	8.3 ± 15.0	
Open access		
Yes (n = 58)	11.8 ± 22.7	0.612
No (n = 70)	13.9 ± 22.2	

For video language, 4 papers did not report details and thus were not tested.

Table 4. Pearson's correlation between citation count and number of videos, average video views, and journal impact factor.

	Pearson Correlation Coefficient (r)	*p*-Value
No. of videos	0.102	0.252
Average video views	−0.058	0.536
Journal impact factor	0.070	0.435

If the papers were divided into two publication year groups (2015–2018 and 2019–2023), there was no significant group difference in the ratio of video target, video language, journal category, and open access status (Table 5).

Table 5. Breakdown of video and publication types according to two publication year groups.

Item	Papers Published in 2015–2018 (n)	Papers Published in 2019–2023 (n)	*p*-Value
Video target			0.473
Dental professional only	1 (5.9%)	13 (11.7%)	
Patient/public	16 (94.1%)	98 (88.3%)	
Video language			
English only	14 (93.3%)	96 (88.1%)	0.546
Non-English involved	1 (6.7%)	12 (11.9%)	
Journal category			
Dental	14 (82.4%)	89 (80.2%)	0.833
Non-dental	3 (17.6%)	22 (19.8%)	
Open access			
Yes	11 (64.7%)	59 (53.2%)	0.373
No	6 (35.3%)	52 (46.8%)	

For video language, 4 papers did not report details and thus were not tested.

4. Discussion

The present study analyzed 128 papers on dental YouTube videos and revealed the diversity of topics covered by the videos examined. The papers primarily evaluated videos recorded in English and dealing with patient-related concerns.

This study identified an imbalance in academic attention given to YouTube videos in different dental specialties. For instance, there were more studies evaluating videos related to oral and maxillofacial surgery/oral medicine and orthodontics than to operative dentistry and periodontology. Additionally, papers in the former two categories received more citations than those in the latter two. However, given that 35% of the global adult population has untreated, cavitated dental caries (severe tooth decay) and 11% has severe periodontitis [31], it is important to give equal attention to operative dentistry and periodontology. At first glance, a potential explanation to this imbalance in academic attention was that cancer was a large topic under the surgery specialty and that many cancer patients tended to seek online health information (54–59%, [32,33]), so it was natural to find many cancer videos on YouTube that attracted content analyses by healthcare researchers from time to time. However, in this study, the number of views and number of video views did not show a huge difference. Therefore, the academic preference in evaluating YouTube videos that belonged to a certain dental specialty did not necessarily reflect the popularity of that specialty (or the proportion of the population having dental problems relevant to that specialty) among the public who sought online health information. However, readers should be aware that YouTube did not provide a breakdown of the viewer population of the videos, so the analyzed studies could not provide any information on whether the viewer population was largely the general public or professionals.

One obvious missing piece in this literature of dental YouTube video evaluation was the lack of evaluations on non-English videos. A prior study estimated that 66% of the top 250 YouTube channels used English as their main language, but Spanish (15%), Portuguese (7%), Hindi (5%), and Korean (2%) also had a considerable share [34]. Furthermore, another prior study estimated that Russian, Arabic, Malay, French, German, Japanese, and Chinese were the main language in >2% each of the total YouTube videos uploaded [35]. In this study, we found that only 14 papers (11% of 128) analyzed non-English videos. Indonesian, Portuguese, Spanish, and Turkish videos were included in multiple papers, while videos in Chinese and Hindi were considered by one paper each. With China and India being the two countries with the largest population, it would be of great interest to academics and healthcare professionals to better understand the quality of online medical information in the format of YouTube videos, such as for various dental topics, as these videos may have a large potential audience. It was unclear why Turkish authors published so many papers on dental YouTube videos, but several of them contributed a lot, namely Büyük S. K. (n = 6), Gaş S. (n = 5), and Paksoy T. (n = 4). Perhaps Turkish authors have a general interest in

evaluating YouTube video contents, as a recent study found that Turkey ranked second behind the United States with the highest number of publications concerning YouTube videos during the period of 2006–2021 [36].

Another phenomenon observed from this study was the presence of twin or triplet papers. These were not duplicate papers, but rather papers published in the same year that focused on analyzing YouTube videos on the same topic. On a positive note, the concurrent investigation of the identical subject matter by multiple teams can guarantee a more comprehensive coverage of the pertinent videos by at least one of the studies. On the other hand, since the investigations were conducted nearly simultaneously, the dataset (videos) under investigation could be potentially similar without the added novelty of having updated materials relative to past studies, although this was not observed in our analysis. This might pose a potential concern of unnecessary or redundant publications [37]. Hence, future studies on YouTube videos should consider pre-registration of research protocols to avoid unnecessary duplication of research efforts [38].

In terms of citation count, it was reasonable to find that papers analyzing videos targeting the patient/public were generally more cited than those analyzing videos targeting the dental professional only. It was because the potential reach was much larger considering the general public, whereas the dental professional community was naturally much smaller. For instance, there are two dental education journals, *Journal of Dental Education* and *European Journal of Dental Education*, both of which are ranked in the third quartile among the dentistry journals in terms of journal impact factor 2022. This implied that papers dealing with educational purposes/aspects of dental professionals were usually less cited than dental papers dealing with other aspects, such as clinical or laboratory research that might have a more direct impact on patients. It is because the impact on patients could be of value to both professional and patient audiences. Even so, more studies in the future should attempt to evaluate videos targeting the professionals, as nearly all dental students in prior surveys indicated that they watched YouTube videos to learn certain clinical dental procedures [39,40]. It is crucial for students to learn with accurate/correct materials. Alarmingly, prior works have shown that YouTube videos for professional medical education were not always of high quality but might contain errors and omit important points [41–44]. Very recently, YouTube has introduced the YouTube Health feature: by applying and obtaining approval, videos produced by health professional channels from selected countries would have an information panel stating that the videos were provided by licensed healthcare professionals [45]. This could be another step forward. On the other hand, it would be interesting to compare the citation count of papers analyzing videos that present patient views versus those that present professional views. Unfortunately, such data were not available.

This study demonstrated that the use of evaluation tools/scales was diverse. Many papers used their own customized scales or checklists to assess the videos, such as evaluating whether each video covered important messages and how well it covered them. This was of paramount importance and proved to be very useful, as no established (generic) tool could assess topic-specific content. The JAMA benchmark was specifically designed to assess online medical information [16]. Targeting all forms of online medical information, the JAMA benchmark did not particularly evaluate the audio-visual aspects of the information in a specific way, which was in turn addressed by PEMAT-AV [29]. However, these tools were not the most used ones. Instead, the GQS and (modified) DISCERN were. The GQS was designed and introduced in a study that evaluated the top 50 websites concerning patient information about inflammatory bowel disease [13]. Basically, it was a five-point Likert scale that was determined by the content quality, flow, and information comprehensiveness (usefulness to patients). In this study, GQS was the second-most used tool (37.5%), trailing behind the customized scale, a slightly larger proportion than a prior survey on 37 medical YouTube videos published prior to November 2016 (27.0%) [6]. Meanwhile, DISCERN was originally designed with 15 questions plus an overall quality rating to evaluate written patient health information [14]. The modified DISCERN, sometimes known

as the "reliability score", was introduced in a study of YouTube videos on rheumatoid arthritis that simplified the tool into five questions and changed the response format from a five-point Likert scale to binary yes (1 point)/no (0 point) answers [15]. Another commonly used tool was VIQI. The term VIQI was first coined in a study of YouTube videos on Ebola hemorrhagic fever [17]. VIQI resembles an expanded version of GQS. Instead of an overall five-point Likert scale, VIQI uses a five-point Likert scale for each of the four aspects: flow, information, quality, and precision. This finding of heterogenous use of evaluation tools was consistent with a prior work that analyzed 10 studies of YouTube videos on oral medicine [46]. For better comparison of results across studies, perhaps future studies can consider the use of GQS, the most commonly used evaluation tool.

There were some limitations in this study. One important limitation was that YouTube did not provide a breakdown of the viewer population of the videos. As a result, the analyzed studies could not provide such data. Any publications in journals not indexed by Scopus were missed in the current analysis. Furthermore, papers not written in English were excluded. Though this work reported that non-English videos were evaluated in just a few papers, they might actually be evaluated in more non-English papers not indexed by Scopus. Regardless, the authors were only competent in a few languages but not others, and hence unable to comprehend papers written in other languages such as Indonesian or Turkish.

5. Conclusions

Based on the analysis of 128 papers on dental YouTube videos, we found that the papers mainly assessed videos recorded in English and dealing with patient-related concerns. The most representative as well as the most highly cited specialty was oral and maxillofacial surgery/oral medicine, but it did not necessarily cover more videos or have higher average video views than other specialties. This work showed that the use of evaluation tools/scales was diversified. Many papers used their own customized scale or checklist to assess the videos, followed by GQS and (modified) DISCERN. Some twin or triplet studies, published in the same year covering the same topic of YouTube videos, were identified. Since they often resulted in quite different numbers of videos with different average view counts, readers and researchers of future studies should probably read all studies instead of relying on findings from a single work. Future studies should also include more non-English videos to provide a wider perspective for the global audience, and try to identify the viewers (whether they were professionals or the general public) if possible.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/publications12030022/s1, File S1: Coded datasheet of the analyzed papers.

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