Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Regenerative endodontics on YouTube: a cross-sectional analysis of the quality, reliability and popularity of educational videos

Tarun Kumar Singh
All India Institute of Medical Sciences
R Periyasamy
periyasamy1800@gmail.com

All India Institute of Medical Sciences
Ashish J Johnson
All India Institute of Medical Sciences
Ikroop Gill
All India Institute of Medical Sciences

Research Article

Keywords: Regenerative endodontics, YouTube, Social media, Dental education, Health information quality, Immature permanent teeth, Cross-sectional study

Posted Date: November 20th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11635786/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Regenerative endodontics on YouTube: a cross-sectional analysis of the quality, reliability and popularity of educational videos

Tarun Kumar Singh[1], Periyasamy R[1,*], Ashish J Johnson[1], Ikroop Gill[1]

[1]Division of Conservative Dentistry and Endodontics, Department of Dentistry, All India Institute of Medical Sciences (AIIMS), Mandi Dabwali Road, Bathinda 151001, Punjab, India

ORCID

Tarun Kumar Singh: https://orcid.org/0000-0002-1008-7846

Periyasamy R: https://orcid.org/0009-0003-7299-1632

Ashish J Johnson: https://orcid.org/0009-0003-5490-5411

Ikroop Gill: https://orcid.org/0009-0001-8050-9266

***Corresponding author**

Dr Periyasamy R, Division of Conservative Dentistry and Endodontics, Department of Dentistry, All India Institute of Medical Sciences (AIIMS), Mandi Dabwali Road, Bathinda 151001, Punjab, India. Email: periyasamy1800@gmail.com

Abstract

Background Regenerative endodontic procedures (REPs) are a treatment option for immature permanent teeth with pulp necrosis, and clinicians and students increasingly learn them from YouTube, which has no peer review. Three studies published in 2022 assessed YouTube videos on REPs, but none judged content against current clinical guidance or measured source transparency, and they disagreed on whether popularity reflects quality. This study re-evaluated YouTube videos on REPs four years later to address these gaps.

Methods YouTube was searched on 30 August 2026 for "regenerative endodontics". Two calibrated examiners rated 27 eligible videos using the Global Quality Score (GQS), the modified DISCERN tool, the Journal of the American Medical Association (JAMA)

benchmark criteria and a nine-item Total Content Score (TCS) based on American Association of Endodontists and European Society of Endodontology guidance. Kruskal–Wallis tests, Spearman correlation and multiple linear regression were used.

Results Mean scores were 3.48 ± 0.85 for GQS (1–5), 3.37 ± 0.88 for modified DISCERN (0–5), 2.41 ± 0.89 for JAMA (0–4) and 5.67 ± 1.44 for TCS (0–9). Content was moderate in 63.0% of videos, rich in 29.6% and poor in 7.4%, and no video covered all nine content items. Scores did not differ by upload source. Views, likes, viewing rate and video power index correlated positively with GQS, modified DISCERN and TCS ($\rho = 0.479–0.735$), and duration correlated with all four scores ($\rho = 0.567–0.765$). Number of views ($\beta = 0.648$, $p = 0.016$) and duration ($\beta = 0.432$, $p = 0.010$) independently predicted GQS ($R^2 = 0.639$).

Conclusions YouTube videos on REPs are mostly of moderate quality, and source transparency is their weakest feature. In contrast to an earlier report, longer and more widely viewed videos tended to be better, but no video covered the full guideline-based protocol. Clinicians and students should rely on current guidelines and peer-reviewed evidence, and academic and professional bodies should produce complete, referenced and transparent videos.

Keywords Regenerative endodontics, YouTube, Social media, Dental education, Health information quality, Immature permanent teeth, Cross-sectional study

Background

Regenerative endodontic procedures (REPs) are biologically driven treatments intended to replace damaged dentine and root structure, together with the cells of the pulp–dentine complex [1]. For many years, immature permanent teeth that had lost pulp vitality were managed by apexification, in which a hard tissue barrier was induced at the open apex with calcium hydroxide or, later, an apical plug of Mineral Trioxide Aggregate (MTA) was placed. The weakness of that approach is that it only closes the apex mechanically. The root does not

go on growing in length, its walls stay thin, and the tooth is left fragile and prone to fracture [2].

Regenerative treatment works differently. By stimulating the resident cells, it allows the root to keep maturing and new dentine to be laid down, so that the tooth gains strength over time. Case reports and clinical trials have documented continued root development, apical closure and thicker dentinal walls after REPs, which makes the approach an attractive long-term option for immature teeth with necrotic pulps [3]. The concept is borrowed from tissue engineering, a field that brings together cell biology, biomaterials science and molecular biology to rebuild lost tissue. Three elements (stem cells, a scaffold and signalling molecules) make up the so-called tissue engineering triad on which REPs rest [4]. Because both the biology and the clinical protocol keep evolving, dentists and dental students need to update their knowledge regularly, and many of them now do so through audiovisual material found online.

Regenerative endodontics is closely tied to dental traumatology. Pulp necrosis is the most common complication after traumatic dental injuries, and it mostly affects the maxillary incisors of children and adolescents, often before their roots have finished developing [5]. The International Association of Dental Traumatology (IADT) guidelines accordingly recognise regenerative endodontic treatment, alongside apexification, as an option for immature permanent teeth that develop pulp necrosis after fractures, luxation injuries or avulsion [6, 7]. A clinician who has to decide how to manage a traumatised immature incisor, or a student preparing to do so, is therefore one of the people most likely to look for videos on REPs.

People now go online first when they want health information, largely because it is quick and costs nothing [8, 9]. YouTube has gained more from this habit than most platforms: it is free, it shows rather than tells, and it reaches more than 2.5 billion users each month, who between

them watch upwards of a billion hours of video every day [10, 11]. With an audience of that size, the platform has real influence over what learners come to believe, which is reason enough to scrutinise the accuracy and teaching value of what it hosts.

Earlier work has examined YouTube content on many endodontic subjects, including minimally invasive endodontics, irrigant activation, root canal treatment, dental trauma, vital pulp therapy, bioceramic sealers and access cavity design [12–20]. Three studies published in 2022 assessed videos on REPs [21–23]. Kaval et al. rated 60 videos with the Video Information and Quality Index, the Global Quality Score (GQS) and DISCERN and reported that most were produced by dental professionals and focused on clinical application [21]; Jadhav et al. reported no association between video quality and popularity metrics such as views, likes or duration [22]; and Durmazpınar et al. found that most of 70 videos were of poor-to-moderate educational quality [23]. These studies left three questions open. First, none judged video content against the current clinical guidance of the American Association of Endodontists (AAE) and the European Society of Endodontology (ESE), so it remains unclear whether videos teach the recommended protocol. Second, none assessed source transparency (authorship, references, dating and disclosure), although this is what allows a viewer to judge whether a video can be trusted. Third, their findings on whether popularity reflects quality were inconsistent, and the 2022 data predate four years of uploads, removals and re-ranking on a platform whose content changes continuously. The present study therefore re-evaluated YouTube videos on REPs with a guideline-based content score, the Journal of the American Medical Association (JAMA) benchmark criteria for transparency, and multivariable analysis of popularity and duration as predictors of quality.

The study had two aims: first, to measure the educational quality, clinical accuracy and reliability of YouTube videos on REPs; and second, to find out whether the popularity of a video tells viewers anything about its educational worth. Two null hypotheses were tested:

1. Global Quality Score (GQS), modified DISCERN (mDISCERN), Journal of the American Medical Association (JAMA) benchmark and Total Content Score (TCS) values of regenerative endodontics videos do not differ according to who uploaded them.

2. GQS, mDISCERN, JAMA and TCS scores of regenerative endodontics videos are not correlated with popularity or viewer engagement metrics.

Methods

Ethical Approval

This study was reviewed by the Institutional Ethics Committee of the All India Institute of Medical Sciences, Bathinda, which granted it exemption from full review because it analysed only publicly available videos and involved no human participants or identifiable personal data.

Study Design

This was a descriptive cross-sectional study of publicly available YouTube videos, designed to assess their educational quality, reliability and content and to examine how these related to video popularity.

Search Strategy and Video Selection Criteria

Before the search, Google Trends (Alphabet Inc., Mountain View, CA), which reports how often terms are searched on Google and related services, was used to compare five candidate terms: 'pulp revascularisation', 'regenerative endodontic treatment', 'regenerative endodontic procedure', 'revitalization' and 'regenerative endodontics'. The last of these had the highest relative search interest, so it was adopted as the search term because it best reflects how users actually look for the topic. The search was run on YouTube (https://www.youtube.com/) on 30 August 2026, between 10:00 AM and 6:00 PM. A newly created account was used so that earlier viewing history and personalised recommendations could not shape the results, and the default relevance ranking was kept. English-language videos dealing with regenerative

endodontics were eligible. Videos were excluded if they had been uploaded more than 10 years earlier, lasted less than 1 minute or more than 30 minutes, were not in English, lacked usable sound or picture, had comments switched off, duplicated another video, or did not relate to the search term Of the 203 videos initially retrieved, 45 duplicates were removed, and 131 of the remaining 158 were excluded, leaving 27 for analysis (Fig. 1).

Video Evaluation Criteria

Following the approach of earlier studies of this kind, the following details were noted for each video: length in minutes, number of views, number of likes, days elapsed since upload, uploader, profession of the speaker and country of origin. Three derived measures were then calculated: viewing rate (views ÷ days since upload × 100), interaction index (likes ÷ views × 100) and video power index (VPI; interaction index × viewing rate ÷ 100). Dislikes were not used, because YouTube no longer displays them publicly. Uploaders were grouped as (I) dentists, (II) institutions and research groups, or (III) commercial companies. The profession of the speaker was recorded separately as a descriptive variable with three categories: endodontists, general dentists, and personnel of commercial companies.

Total Content Score

Content was graded with a Total Content Score (TCS) that the authors developed after reviewing the current literature and the regenerative endodontics guidance issued by the European Society of Endodontology (ESE) and the American Association of Endodontists (AAE). The TCS has nine items (Table 1): (1) definition and biological basis; (2) indications and contraindications; (3) disinfection and intracanal medicaments; (4) scaffolding and clot induction; (5) coronal barrier and sealing materials; (6) advantages and disadvantages; (7) complications and their management; (8) step-by-step clinical procedure; and (9) clinical prognosis and follow-up. An item scored 1 if the video covered it and 0 if it did not, giving a

total between 0 and 9. Videos totaling 0–3 were classed as poor, 4–6 as moderate and 7–9 as rich in content.

Quality and Reliability Scores

Overall quality was rated using the Global Quality Score (GQS), a five-point Likert scale that considers the quality of the information, how easy it is to follow, and how useful it would be to the viewer; a score of 1 indicates poor quality and 5 excellent quality. Reliability was judged with the modified DISCERN (mDISCERN) instrument, a shortened version of the original DISCERN questionnaire. It poses five yes/no questions, with one point for every "yes", so that a higher total indicates more trustworthy information [24]. Transparency of the source was assessed with the JAMA benchmark criteria, which award one point each for authorship, attribution of sources or references, currency of the content and disclosure [25]. All scores were entered into a Microsoft Excel sheet.

Examiner Calibration and Agreement

Two examiners with expertise in endodontics scored the videos. Before the main assessment they went through a calibration exercise, modelled on the one used in previous studies [12, 20], so that the GQS, mDISCERN, JAMA and TCS would be applied in the same way. Eight videos picked at random were rated jointly, and wherever the two examiners disagreed, the point was discussed with a third expert until consensus was reached. After calibration, each examiner scored all the videos independently. Agreement between examiners was measured with Cohen's kappa for every instrument, and intra-examiner reliability was also checked. The mean kappa value was 0.86 (range 0.82–0.94), showing very good agreement.

Statistical Analysis

Statistical analysis was carried out in Python 3.13 using SciPy 1.18, statsmodels 0.15 and scikit-posthocs 0.17. Normality of continuous variables was checked with the Shapiro–Wilk test; because most variables were not normally distributed, they are reported as median (first–

third quartile) as well as mean ± standard deviation. The Kruskal–Wallis test was used to compare upload sources and content categories, followed where significant by Dunn's post hoc test with Bonferroni correction. Associations between variables were examined with Spearman's rank correlation (ρ). Multiple linear regression was used to identify independent predictors of GQS; the number of views was log10-transformed because of its marked right skew, and multicollinearity was checked with tolerance and variance inflation factor (VIF) values. All tests were two-tailed, and $p < 0.05$ was considered significant.

Results

Table 2 summarises the general characteristics of the 27 videos that met the inclusion criteria. Fifteen (55.6%) were uploaded by dentists, 10 (37.0%) by academic institutions or research groups and 2 (7.4%) by commercial companies. Thirteen videos (48.1%) came from India and 7 (25.9%) from the United States, followed by Egypt (n = 2, 7.4%); Iraq, the United Kingdom, Saudi Arabia, France and Malaysia contributed one video each (3.7% apiece). Fifteen presenters (55.6%) were endodontists, 10 (37.0%) were general dentists and 2 (7.4%) were personnel of commercial companies. TCS values ranged from 3 to 8; content was moderate in 17 videos (63.0%), rich in 8 (29.6%) and poor in 2 (7.4%) (Table 2; Fig. 2A). Descriptive statistics for all video metrics and assessment scores are also given in Table 2. The videos had a median of 1,100 views (Q1–Q3: 337–4,300; range 7–14,000) and 30 likes (11.5–107.5), and lasted 11.82 ± 6.49 min on average (range 2.43–27.93 min). The mean GQS was 3.48 ± 0.85 (range 2–5), the mean mDISCERN score 3.37 ± 0.88 (range 2–5), the mean JAMA score 2.41 ± 0.89 (range 1–4) and the mean TCS 5.67 ± 1.44 (range 3–8). Only duration, days since upload and TCS were normally distributed.

Comparisons by content category are shown in Table 3. GQS, mDISCERN and JAMA scores rose steadily from poor to moderate to rich videos (mean GQS 2.00, 3.24 and 4.38; mean mDISCERN 2.00, 3.06 and 4.38; mean JAMA 1.00, 2.18 and 3.25; all $p \leq 0.002$). On post

hoc testing, rich videos scored significantly higher than both poor and moderate videos on all three instruments ($p \leq 0.016$), whereas poor and moderate videos did not differ. Rich videos also had more views [median 11,000 (7,700–14,000) vs 494 (175–2,500) for moderate and 185 (133–237) for poor; $p = 0.002$], more likes ($p = 0.002$), a higher viewing rate ($p = 0.003$) and a higher VPI ($p = 0.004$). Duration differed between categories ($p = 0.014$), with rich videos lasting 16.80 ± 6.64 min, moderate videos 10.49 ± 5.04 min and poor videos 3.22 ± 1.12 min; the post hoc difference was significant only between rich and poor videos ($p = 0.023$). Days since upload and interaction index did not differ between content categories ($p > 0.05$).

When the videos were grouped by upload source, no video metric or quality score differed significantly between academic/research groups, dentists and commercial companies (all $p > 0.05$) (Table 3). Mean GQS was 3.30 ± 0.82 for academic/research uploads, 3.53 ± 0.83 for dentists and 4.00 ± 1.41 for commercial companies ($p = 0.703$), and the corresponding mean TCS values were 5.70 ± 1.34, 5.53 ± 1.51 and 6.50 ± 2.12 ($p = 0.705$).

The four scoring instruments correlated strongly and positively with one another ($\rho = 0.788$–0.899, $p < 0.01$) (Table 4). Views, likes, viewing rate and VPI correlated positively with GQS ($\rho = 0.648$–0.735), mDISCERN ($\rho = 0.479$–0.585) and TCS ($\rho = 0.537$–0.668) (all $p < 0.05$). Views, likes and VPI also correlated with JAMA ($\rho = 0.413$–0.472, $p < 0.05$), but viewing rate did not ($\rho = 0.376$, $p > 0.05$). Duration correlated with all four quality scores ($\rho = 0.567$–0.765, $p < 0.01$) (Fig. 2B, C). Days since upload and interaction index were not related to any quality score ($p > 0.05$).

The lower panel of Table 4 presents the multiple linear regression for GQS. The model was significant ($F(4,22) = 9.72$, $p < 0.001$) and explained 63.9% of the variance ($R = 0.799$, $R^2 = 0.639$, adjusted $R^2 = 0.573$). The number of views (log10; $\beta = 0.648$, $p = 0.016$) and duration ($\beta = 0.432$, $p = 0.010$) were independent positive predictors of GQS, whereas days since

upload (β = 0.056, p = 0.763) and interaction index (β = 0.269, p = 0.165) were not. Tolerance values of 0.268–0.691 and VIF values of 1.45–3.73 showed no problematic multicollinearity.

Discussion

Patients, students and clinicians alike now use YouTube to learn about dental topics [10, 11], and as regenerative endodontic treatment has gained wider acceptance in practice [2], the appetite for accessible videos on it has grown, not least among clinicians who manage traumatised immature teeth.

Most of the videos analysed were of moderate quality. Almost two-thirds (63.0%) fell into the moderate TCS category, fewer than one-third (29.6%) were rich in content, and the mean GQS of 3.48 sits only just above the midpoint of the scale. The overall picture is a little better than the poor-to-moderate quality reported for several other endodontic topics on YouTube [18, 19], possibly because REPs are a specialised subject whose videos are produced mainly by clinicians and teaching departments rather than by lay creators. Even so, only three videos reached a TCS of 8 and none covered all nine items, so a learner relying on a single video would usually miss part of the protocol. Source transparency was the weakest area: the mean JAMA score was 2.41 out of 4, which means that a typical video failed at least one or two of the criteria of authorship, referencing, dating and disclosure. Because the TCS was recorded as a total score, we could not identify which items were most often omitted, but the overall result echoes the call by Kock et al. for more comprehensive, clinically oriented teaching material online [19].

These findings extend, rather than repeat, the 2022 evaluations of REP videos [21–23]. The mean GQS in the present sample (3.48) was higher than the mean global score for educational value of 2.05 reported by Durmazpınar et al. [23], which suggests that the educational quality of REP content on YouTube may have improved as the procedure has

become more established, although differences in search strategy and sample prevent a direct comparison. Unlike Jadhav et al., who found no relationship between quality and video metrics [22], the present study found that views and duration independently predicted overall quality, so popularity may now be a more useful, if imperfect, signal for viewers. Most importantly, assessing videos against AAE and ESE guidance showed that no video covered the complete recommended protocol, and the JAMA criteria identified source transparency as the weakest feature of REP videos, a dimension that the earlier REP studies did not measure. These are the gaps that matter most to a clinician or student deciding whether a video can be relied on for practice.

Contrary to our expectation, upload source made no significant difference. Videos from academic or research institutions, from dentists and from commercial companies achieved similar GQS, mDISCERN, JAMA and TCS scores ($p > 0.05$), so null hypothesis 1 could not be rejected. Several earlier studies found that videos produced by health professionals were of better quality and more credible than those from other sources [12, 26]. The difference probably lies in the make-up of our sample: every presenter was either a dentist, an endodontist or a clinician presenting for a company, and no lay or patient-made video met the inclusion criteria. Kaval et al. similarly found that 91.7% of videos on REPs had been produced by dental professionals [21]. The two commercial videos scored well (mean GQS 4.00), but two videos are far too few for any firm conclusion. Commercial content can still emphasize the benefits of a particular product while saying little about its limitations or about alternatives, and since YouTube has no peer review, incomplete or biased information can circulate freely [27, 28]. Turky and Dummer have pointed out that social media can accelerate the adoption of new ideas in endodontics, but it is essentially unregulated and requires careful scrutiny to uphold scientific and ethical standards [29].

The second null hypothesis was rejected. Views, likes, viewing rate, and VPI were positively correlated with GQS, mDISCERN, and TCS, and all except viewing rate also with JAMA, and rich-content videos had attracted far more views than the rest (median 11,000 vs 494 for moderate videos). This agrees with studies that found popularity and quality moving together [14, 30], but differs from reports in which no such association was seen, including an earlier analysis of REP videos [22, 31]. One explanation is the audience: viewers searching for regenerative endodontics are mostly dental students and clinicians, who are better placed than the general public to recognize useful teaching and to share or recommend it. YouTube's ranking algorithm may then reinforce this by promoting videos that are already watched and liked. Popularity is not simply a matter of time online, because days since upload correlated with views but not with any quality score. Nevertheless, these are correlations, not proof of cause, and individual exceptions exist; one rich, high-scoring video had only about 1,100 views. Popularity metrics are therefore at most a rough guide to quality.

Video length is another factor that can affect content quality. A very long video may lose its audience, while a very short one cannot cover the subject properly, which is why videos under 1 minute or over 30 minutes were excluded here. In our sample, duration correlated with all four quality scores; rich-content videos lasted on average five times as long as poor ones, and duration remained an independent predictor of GQS in the regression model. This matches earlier work linking longer videos with higher quality scores [13, 32], and makes sense for a procedure as involved as REPs, which demands time to explain case selection, disinfection, bleeding induction, barrier placement, and follow-up.

Together, views and duration accounted for most of the explained variation in GQS: the regression model explained 63.9% of the variance (adjusted $R^2 = 0.573$), with both variables acting as independent positive predictors, whereas time since upload and interaction index added little. In other dental fields, duration and composite metrics have likewise emerged as

significant predictors of content completeness [33]. For learners, this suggests that a longer, widely viewed video is more likely to be useful, but the modest average scores mean that such signals cannot replace critical appraisal. With 27 videos and four predictors, the model should be regarded as exploratory and needs confirmation in larger samples.

The final sample of 27 videos is in keeping with similar focused analyses in dentistry and endodontics, which have generally examined between 20 and 120 videos [17, 26, 33]; it reflects both the narrow clinical niche of regenerative endodontics and the strict screening that was applied. Results were retrieved in "relevance" order because that is the default view seen by clinicians, students and patients when they search [20, 34]. Topic-specific checklists are widely used to judge the teaching value of dental videos on social media, although the way items are chosen and weighted can influence the scores obtained. For that reason, the TCS used here was based directly on the current ESE and AAE regenerative endodontics recommendations. The strong positive correlations between GQS, mDISCERN, JAMA and TCS ($\rho = 0.788–0.899$) suggest that the instruments capture related aspects of quality and behave consistently with one another, as Kaval et al. found for videos on REPs [21] and other studies have found for other topics [18, 35].

For learning the theory and mastering the clinical protocol of regenerative endodontics, the most dependable routes remain formal postgraduate training, peer-reviewed literature, accredited continuing education and the guidance published by bodies such as the AAE and ESE. YouTube is cheap, easy to reach and well suited to showing technically demanding steps such as chemical disinfection, induction of apical bleeding and placement of the coronal barrier, but without editorial control or peer review its reliability is limited. Videos on this platform are best regarded as an add-on to learning, not as an authoritative basis for clinical decisions or for carrying out treatment.

Clinical and Educational Implications

These findings matter clinically because REPs are most often considered for immature incisors that have lost pulp vitality after an injury, and the clinician making that decision may be a general dentist or paediatric dentist who sees such cases only occasionally [5, 6]. Because no video in this sample covered the complete regenerative protocol, and most failed basic transparency criteria, a clinician who relied on one video could easily miss steps that influence outcome, such as case selection, irrigant concentration, induction of bleeding, placement of the coronal barrier, or the long-term clinical and radiographic follow-up that the IADT guidelines recommend after trauma [6, 7]. Our data suggest that video length and number of views can help viewers shortlist videos, but they are no substitute for appraisal. The instruments used here, particularly the JAMA criteria and the mDISCERN questions, are simple enough to teach to undergraduate and postgraduate students and to general practitioners as a framework for judging online material. Professional bodies, trauma centres and academic departments are well placed to produce their own videos; institutional videos in this study scored no better than those from individual dentists, which suggests that this opportunity is not yet being used. Videos that name the presenter, give the recording date, cite current IADT, AAE and ESE guidance, and declare any commercial links would immediately score better on transparency. Future research could test whether clinicians taught to use such appraisal tools select better videos, and whether high-quality videos improve knowledge of trauma management compared with conventional teaching.

Limitations

Several limitations should be kept in mind. Only English-language videos were analyzed, so good material in other languages may have been missed, and the findings may not apply everywhere. Only YouTube was examined; other video platforms and professional learning portals, such as those run by dental societies or universities, were not, and future studies could compare several platforms. YouTube content also changes constantly as videos are

added, removed, and re-ranked, so these results describe the situation at one point in time. The search relied on a single keyword, "regenerative endodontics"; although this is the standard term used by the main endodontic societies, leaving out related terms such as "revascularization" or "revitalization" may have excluded some relevant videos.

The analysis has further limitations. Some subgroups were very small, with only two poor-content videos and two commercial uploads, which limits the power of group comparisons and makes a Type II error for upload source possible. The TCS was recorded only as a total for each video, so the coverage of individual topics, such as complications or follow-up, could not be analyzed. Days since upload were taken from the approximate upload age shown by YouTube; dislikes were not available, and the number of comments was not recorded, so engagement could be measured only through views and likes. The regression model was based on a small sample and should be confirmed in larger studies. The search was not specific to dental trauma, and the TCS was built from AAE and ESE guidance rather than from the IADT guidelines, so it did not record whether videos addressed trauma-specific points such as the type of injury, the trauma history or the follow-up schedule after injury. Finally, GQS, JAMA, mDISCERN and TCS all depend to some degree on the examiner's judgment; calibration and consensus scoring reduced this subjectivity but cannot remove it entirely. Future studies could widen the search terms, record item-level content scores, follow the same videos over time, and look specifically at how commercial interests and sponsorship shape the clinical messages given about regenerative endodontics.

Conclusions

YouTube videos on regenerative endodontics were mostly of moderate educational quality and reliability, and source transparency was their weakest feature. Quality did not depend on who uploaded the video, but longer and more widely viewed videos tended to be the better ones, and views and duration independently predicted overall quality. These signals can help

viewers choose what to watch, but no video covered the full protocol. Clinicians managing immature permanent teeth with pulp necrosis after traumatic dental injuries should therefore base treatment on current IADT, AAE and ESE guidance and peer-reviewed evidence, and academic and professional bodies should produce complete, fully referenced and transparent videos on regenerative endodontics.

List of abbreviations

AAE: American Association of Endodontists; $Ca(OH)_2$: calcium hydroxide; DAP: double antibiotic paste; EDTA: ethylenediaminetetraacetic acid; ESE: European Society of Endodontology; GQS: Global Quality Score; IADT: International Association of Dental Traumatology; JAMA: Journal of the American Medical Association; mDISCERN: modified DISCERN; MTA: Mineral Trioxide Aggregate; NaOCl: sodium hypochlorite; PRF: platelet-rich fibrin; PRP: platelet-rich plasma; Q1–Q3: first–third quartile; REPs: regenerative endodontic procedures; SD: standard deviation; TAP: triple antibiotic paste; TCS: Total Content Score; VIF: variance inflation factor; VPI: video power index

Declarations

Ethics approval and consent to participate

This study analysed only publicly available YouTube videos and involved no human participants, patient records or identifiable personal data. The Institutional Ethics Committee of the All India Institute of Medical Sciences, Bathinda, granted the study exemption from full ethical review. The study was conducted in accordance with the principles of the Declaration of Helsinki. Consent to participate was not applicable because no human participants were involved.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study (the list of evaluated videos and their scores) are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Authors' contributions

All authors contributed to conceptualization, methodology, investigation, data curation, formal analysis, software, resources, validation, visualization, project administration, supervision, and writing (original draft, review and editing). TKS and PR led the formal analysis, validation, visualization and drafting of the manuscript. All authors read and approved the final manuscript and agree to be accountable for all aspects of the work.

Acknowledgements

This work was carried out at the All India Institute of Medical Sciences, Bathinda, India.

References

1. American Association of Endodontists. Glossary of endodontic terms. 10th ed. Chicago: American Association of Endodontists; 2020.

2. Ariwala F, Calcuttawala M. Rooted in regeneration: an overview on regenerative endodontics. Med Res Arch. 2025;13. Available from: https://esmed.org/MRA/mra/article/view/6981

3. Almutairi W, Yassen GH, Aminoshariae A, Williams KA, Mickel A. Regenerative endodontics: a systematic analysis of the failed cases. J Endod. 2019;45:567–77.

4. Brizuela C, Huang GTJ, Diogenes A, Botero T, Khoury M. The four pillars for successful regenerative therapy in endodontics: stem cells, biomaterials, growth factors, and their synergistic interactions. Stem Cells Int. 2022;2022:1–17.
5. Kahler B, Lu J, Taha NA. Regenerative endodontic treatment and traumatic dental injuries. Dent Traumatol. 2024;40:618–35.
6. Bourguignon C, Cohenca N, Lauridsen E, Flores MT, O'Connell AC, Day PF, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 1. Fractures and luxations. Dent Traumatol. 2020;36:314–30.
7. Fouad AF, Abbott PV, Tsilingaridis G, Cohenca N, Lauridsen E, Bourguignon C, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dent Traumatol. 2020;36:331–42.
8. Bhangare SP, Ashturkar MD, Giri P. Use of internet for health information and health seeking behavior among adults: a cross-sectional study. Int J Community Med Public Health. 2024;11:3983–7.
9. Bujnowska-Fedak MM, Waligóra J, Mastalerz-Migas A. The internet as a source of health information and services. In: Pokorski M, editor. Advancements and innovations in health sciences. Cham: Springer; 2019. p. 1–16. (Adv Exp Med Biol; vol. 1211).
10. Oh SW. YouTube, health information, and health literacy. Korean J Fam Med. 2023;44:301–2.
11. Pradhan S, Das C, Panda DK, Mohanty BB. Assessing the utilization and effectiveness of YouTube in anatomy education among medical students: a survey-based study. Cureus. 2024. Available from: https://www.cureus.com/articles/220153-assessing-the-utilization-and-effectiveness-of-youtube-in-anatomy-education-among-medical-students-a-survey-based-study

12. Kurt Ö, Şimşek E. Content and reliability analysis of YouTube videos regarding minimally invasive endodontics: a cross-sectional analysis. Aust Endod J. 2025;51:398–406. https://doi.org/10.1111/aej.12954

13. Kilic Y, Tosun S, Karataslioglu E. YouTube and root canal irrigation activation: are we learning quality content? Aust Endod J. 2026;52:124–9.

14. Jung M, Seo MS. Assessment of reliability and information quality of YouTube videos about root canal treatment after 2016. BMC Oral Health. 2022;22:494. https://doi.org/10.1186/s12903-022-02540-4

15. Nangia D, Ballal V, Bhasin P, Sukhala E, Garg A, Singla MG, et al. Quality and accuracy assessment of YouTube videos on vital pulp therapy. Aust Endod J. 2026. https://doi.org/10.1111/aej.70085

16. Başkan HK, Başkan B. YouTube as a source of information on dental trauma: a quality, accuracy, and reliability analysis. Dent Traumatol. 2026;42:114–27. https://doi.org/10.1111/edt.13088

17. Topbaş C, Paksoy T, İslamoğlu AG, Çağlar K, Kul AK. Is it safe to learn about vital pulp capping from YouTube™ videos? A content and quality analysis. Int J Med Inform. 2024;185:105409.

18. Jamleh A, Aljohani SM, Alzamil FF, Aljuhayyim SM, Alsubaei MN, Alali SR, et al. Assessment of the educational value of endodontic access cavity preparation YouTube video as a learning resource for students. PLoS One. 2022;17:e0272765.

19. Kock JW, Yeap SKS, Chhabra N, Chien PYH, Bhatia S. Assessing the usefulness of educational videos on endodontic irrigation for dental students: a pilot study. BMC Med Educ. 2026;26:112. https://doi.org/10.1186/s12909-025-07647-0

20. Baris SD, Atli S, Gumus RB. YouTube as an information source for bioceramic-based root canal sealers in endodontics: a cross-sectional study. Aust Endod J. 2026. https://doi.org/10.1111/aej.70105

21. Kaval ME, Kandemir Demirci G, Atesci AA, Sarsar F, Dindaroğlu F, Güneri P, et al. YouTube™ as an information source for regenerative endodontic treatment procedures: quality and content analysis. Int J Med Inform. 2022;161:104732. https://doi.org/10.1016/j.ijmedinf.2022.104732

22. Jadhav GR, Mittal P, Bajaj NC, Banerjee S. Are YouTube videos on regenerative endodontic procedure reliable source for patient edification? Saudi Endod J. 2022;12:43–9. https://doi.org/10.4103/sej.sej_111_21

23. Durmazpınar PM, Kanmaz B, Adalı E. Is YouTube qualified as an information source for regenerative endodontics? Meandros Med Dent J. 2022;23:188–93. https://doi.org/10.4274/meandros.galenos.2021.02693

24. Osman W, Mohamed F, Elhassan M, Shoufan A. Is YouTube a reliable source of health-related information? A systematic review. BMC Med Educ. 2022;22:382. https://doi.org/10.1186/s12909-022-03446-z

25. Almobarak F. Assessing the quality, reliability, and transparency of YouTube videos on spiritual palliative care: a content analysis. Front Public Health. 2025;13:1497855.

26. Sarıbas EE, Kandemir M. Are videos uploaded by dental professionals on lip repositioning surgery of higher quality? A YouTube video analysis. PLoS One. 2025;20:e0327194.

27. Gökyar M, Özden İ, Öveçoğlu HS. Is YouTube a reliable source for learning pre-endodontic build-up? A cross-sectional study. Restor Dent Endod. 2025;50:e27.

28. Uslu B, Kaya Mumcu A. YouTube™ as an information source for non-surgical root canal retreatment: quality and content analysis. BMC Oral Health. 2026;26:750. https://doi.org/10.1186/s12903-026-08141-9

29. Turky M, Dummer PMH. When novelty outpaces evidence: social media as an unregulated force propelling innovation in endodontics: a narrative review. Int Endod J. 2026;59:1586–97.

30. Ustdal G, Guney AU. YouTube as a source of information about orthodontic clear aligners. Angle Orthod. 2020;90:419–24.

31. Hashim A, Shivappa AB. Evaluation of popularity, reliability, and quality of dental and oral microbiology videos on YouTube as sources of dental education. Int J Dent. 2026;2026:1509354. https://doi.org/10.1155/ijod/1509354

32. Ozdemir ZM, Yavuz SA, Gursel Surmelioglu D. YouTube as an information source in deep margin elevation: reliability, accuracy and quality analysis. PLoS One. 2025;20:e0318568.

33. Alsulaiman A, Alsulaiman O, Alkhateeb R, AlMuhaish L, Alghamdi M, Nassar E, et al. Orthodontic elastics: a multivariable analysis of YouTube™ videos. Clin Cosmet Investig Dent. 2024;16:115–25.

34. Tamošiūnaitė I, Vasiliauskas A, Dindaroğlu F. Does YouTube provide adequate information about orthodontic pain? Angle Orthod. 2023;93:403–8.

35. Kurt A, Serin Kalay T, Kibaroğlu E. An analysis of YouTube videos on the topics of coronavirus and dentistry. Middle Black Sea J Health Sci. 2022;8:87–97.

Figure titles and legends

Fig. 1 Flowchart of the video search, screening and selection process.

Fig. 2 (A) Distribution of Total Content Scores (TCS) and content-quality categories. (B) Number of views and (C) video duration plotted against Global Quality Score (GQS); points

are coloured by content-quality category and slightly jittered vertically. ρ, Spearman correlation coefficient.

Table 1. Total Content Score (TCS) rubric used to evaluate the content of the videos

Evaluation parameter	Explanation	Score
Definition and biological basis	The definition, objectives, and tissue engineering principles (stem cells, scaffolds, growth factors) of regenerative endodontics are explained	1
Indications and contraindications	Clinical indications (e.g., immature necrotic teeth) and contraindications (e.g., inadequate restorable root structure) are specified	1
Disinfection and medicaments	Disinfection protocols, root canal irrigants (e.g., EDTA, NaOCl concentrations), and intracanal medicaments (TAP/DAP, modified TAP, $Ca(OH)_2$) are detailed	1
Scaffolding and clot induction	Methods for inducing apical bleeding, blood clot formation, or alternative scaffolds (e.g., PRF/PRP) are described	1
Coronal barrier and sealing materials	Application of biocompatible barrier materials (e.g., MTA, bioceramics) and coronal restoration sealing is specified	1
Advantages and disadvantages	The advantages (continued root maturation, apical closure, root wall thickening) and disadvantages/risks are discussed	1
Complications and management	Potential intraoperative or postoperative complications (e.g., tooth discoloration, lack of root development) and their management are mentioned	1
Step-by-step clinical procedure	The sequential clinical appointments, technique, and treatment workflow are explained	1
Clinical prognosis and follow-up	Expected treatment outcomes, success rates, and protocol for radiographic/clinical follow-up are provided	1

Table 2. General characteristics, video metrics and assessment scores of the included videos (N = 27)

Characteristic	Category	n (%)
A. Characteristics		
Upload source	Dentists	15 (55.6)
	Academic institutions / research groups	10 (37.0)
	Commercial companies	2 (7.4)
Speaker profession	Endodontists	15 (55.6)
	General dentists	10 (37.0)
	Commercial company personnel	2 (7.4)
Country of origin	India	13 (48.1)
	United States	7 (25.9)
	Egypt	2 (7.4)
	Iraq	1 (3.7)
	United Kingdom	1 (3.7)
	Saudi Arabia	1 (3.7)
	France	1 (3.7)
	Malaysia	1 (3.7)
Content quality (TCS)	Poor (0–3)	2 (7.4)
	Moderate (4–6)	17 (63.0)
	Rich (7–9)	8 (29.6)

Variable	Median (Q1–Q3)	Mean ± SD	Range
B. Video metrics and assessment scores			
Number of views	1,100 (337.0–4,300)	3,618 ± 4,955	7.00–14,000
Number of likes	30.00 (11.50–107.5)	98.89 ± 137.5	2.00–450.0
Duration (min)	10.97 (6.29–16.16)	11.82 ± 6.48	2.43–27.93
Days since upload	1,460 (547.5–2,190)	1,454 ± 1,012	120.0–3,285
Viewing rate (%)	83.33 (38.63–194.9)	587.5 ± 2,222	5.55–11,667
Interaction index (%)	3.04 (2.48–3.83)	4.53 ± 5.12	1.80–28.57

Video power index (VPI)	3.29 (1.65–5.22)	18.43 ± 71.41	0.21–375.0
GQS (1–5)	3.00 (3.00–4.00)	3.48 ± 0.85	2.00–5.00
mDISCERN (0–5)	3.00 (3.00–4.00)	3.37 ± 0.88	2.00–5.00
JAMA (0–4)	2.00 (2.00–3.00)	2.41 ± 0.89	1.00–4.00
TCS (0–9)	6.00 (5.00–7.00)	5.67 ± 1.44	3.00–8.00

Viewing rate = views / days since upload × 100; interaction index = likes / views × 100; VPI = interaction index × viewing rate / 100. GQS, Global Quality Score; mDISCERN, modified DISCERN; JAMA, Journal of the American Medical Association benchmark criteria; TCS, Total Content Score.

Table 3. Video metrics and assessment scores by content-quality category and by upload source, median (Q1–Q3)

Variable	Poor (n=2)	Moderate (n=17)	Rich (n=8)	p	Academic / research (n=10)	Dentists (n=15)	Commercial (n=2)	p
Number of views	185.0 (133.0–237.0)	494.0 (175.0–2,500)	11,000 (7,700–14,000)	0.002**	1,050 (479.8–4,525)	1,200 (232.0–6,650)	783.5 (625.2–941.8)	0.916
Number of likes	7.50 (5.25–9.75)	18.00 (10.00–45.00)	302.0 (168.0–376.2)	0.002**	27.50 (11.25–105.0)	36.00 (11.50–152.5)	30.00 (24.00–36.00)	0.907
Duration (min)	3.22 (2.83–3.62)	10.33 (5.60–14.87)	16.20 (11.59–19.90)	0.014*	13.80 (10.68–16.78)	10.32 (4.79–14.31)	11.65 (8.21–15.09)	0.311
Days since upload	1,095 (912.5–1,278)	1,460 (210.0–1,825)	2,190 (1,825–2,372)	0.248	1,460 (912.5–2,099)	1,095 (210.0–2,190)	2,372 (2,099–2,646)	0.413
Viewing rate (%)	22.57 (14.06–31.08)	76.10 (35.16–90.14)	490.9 (373.3–536.5)	0.003**	133.6 (44.22–186.9)	83.33 (57.34–319.2)	31.63 (28.61–34.65)	0.245
Interaction index (%)	3.93 (3.81–4.04)	3.04 (2.40–6.29)	2.85 (2.49–3.26)	0.312	2.47 (2.31–3.03)	3.21 (2.90–5.22)	3.83 (3.83–3.84)	0.143
Video power index (VPI)	0.92 (0.57–1.28)	2.74 (1.67–3.81)	12.89 (8.22–15.37)	0.004**	3.02 (1.68–4.55)	3.81 (2.38–7.42)	1.21 (1.10–1.33)	0.108
GQS (1–5)	2.00 (2.00–2.00)	3.00 (3.00–4.00)	4.00 (4.00–5.00)	<0.001**	3.50 (3.00–4.00)	3.00 (3.00–4.00)	4.00 (3.50–4.50)	0.703
mDISCERN (0–5)	2.00 (2.00–2.00)	3.00 (3.00–3.00)	4.00 (4.00–5.00)	<0.001**	3.00 (3.00–4.00)	3.00 (3.00–4.00)	4.50 (4.25–4.75)	0.186
JAMA (0–4)	1.00 (1.00–1.00)	2.00 (2.00–3.00)	3.00 (3.00–4.00)	0.002**	3.00 (2.00–3.00)	2.00 (2.00–2.50)	3.50 (3.25–3.75)	0.169
TCS (0–9)	3.00 (3.00–3.00)	5.00 (5.00–6.00)	7.00 (7.00–8.00)	<0.001**	6.00 (5.25–6.75)	5.00 (4.50–6.50)	6.50 (5.75–7.25)	0.705

*Kruskal–Wallis test; *p < 0.05, **p < 0.01. Content category, Dunn post hoc test with Bonferroni correction: for views, likes, viewing rate, VPI, GQS, mDISCERN, JAMA and TCS, rich videos differed significantly from both poor and moderate videos (p ≤ 0.023); for duration, only rich and poor videos differed (p = 0.023); poor and moderate videos did not differ on any variable. Upload source: no significant differences. The poor-content and commercial groups each contain only 2 videos.*

Table 4. Correlates and independent predictors of video quality

Variable	GQS	mDISCERN	JAMA	TCS
A. Spearman correlation (ρ) of video metrics with assessment scores				
Number of views	0.690**	0.515**	0.413*	0.635**
Number of likes	0.735**	0.585**	0.472*	0.668**
Duration (min)	0.618**	0.586**	0.567**	0.765**
Days since upload	0.335	0.214	0.152	0.258
Viewing rate (%)	0.658**	0.479*	0.376	0.552**
Interaction index (%)	-0.250	-0.030	-0.025	-0.206
Video power index (VPI)	0.648**	0.541**	0.448*	0.537**

**p < 0.05; **p < 0.01 (two-tailed). The four assessment scores were strongly inter-correlated (ρ = 0.788–0.899, all p < 0.01).*

Predictor	B	SE	β	t	p	Tolerance	VIF
B. Multiple linear regression with GQS as the dependent variable							
Number of views (log10)	0.636	0.243	0.648	2.62	0.016*	0.268	3.73
Duration (min)	0.057	0.020	0.432	2.80	0.010*	0.691	1.45
Days since upload	0.0000	0.0002	0.056	0.31	0.763	0.484	2.07
Interaction index (%)	0.045	0.031	0.269	1.44	0.165	0.467	2.14

*Model: $F(4,22) = 9.72$, $p < 0.001$; $R = 0.799$, $R^2 = 0.639$, adjusted $R^2 = 0.573$. Views were log10-transformed because of strong right skew. B, unstandardised coefficient; SE, standard error; β, standardised coefficient; VIF, variance inflation factor. *$p < 0.05$.*

Identification

YouTube search (30 August 2026)
Keyword: "regenerative endodontics"

Screening

Videos screened
(n = 203)

Duplicate videos removed
(n = 45)

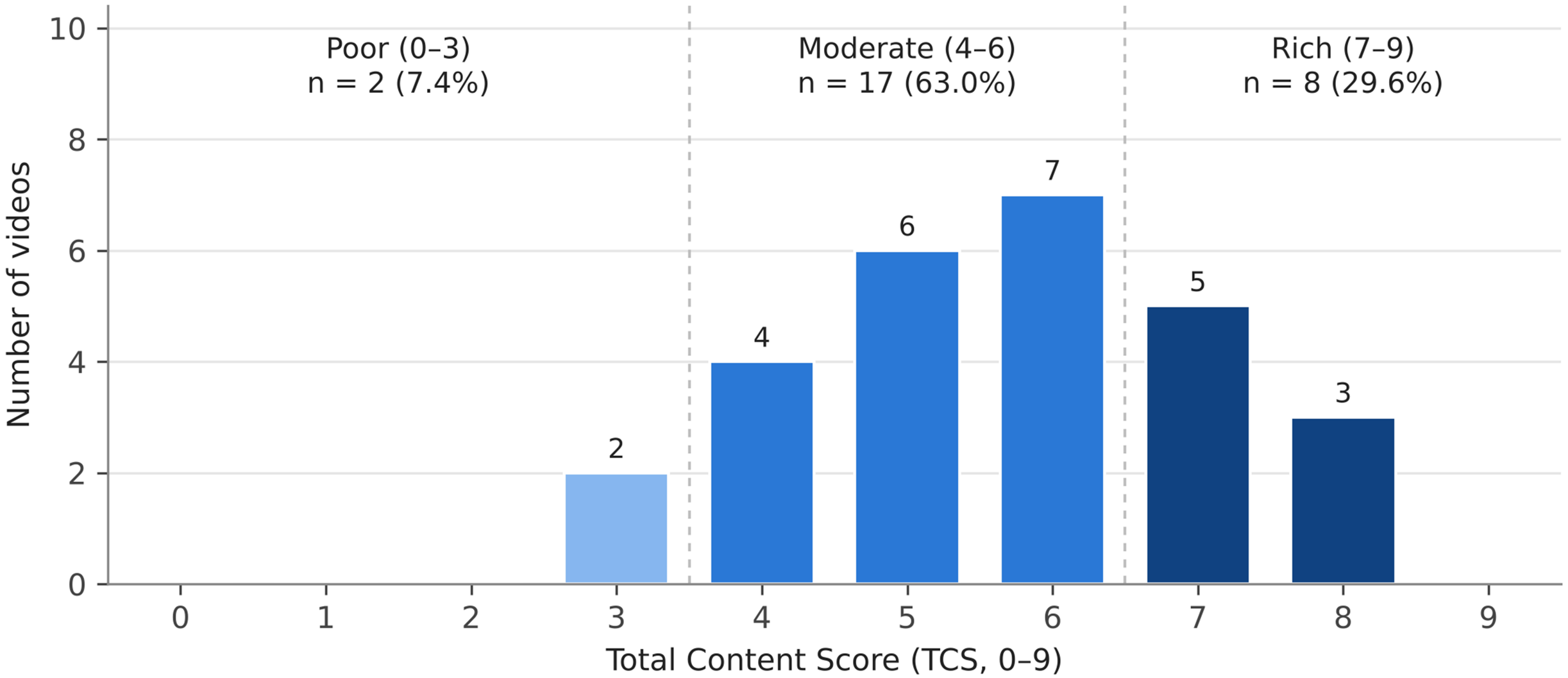
Videos assessed for eligibility
(n = 158)

Videos excluded (n = 131)
- Duration < 1 min (n = 38)
- Duration > 30 min (n = 13)
- Non-English language (n = 24)
- Irrelevant/off-topic content (n = 35)
- Poor audio/visual quality (n = 13)
- Silent/animation-only without commentary (n = 8)

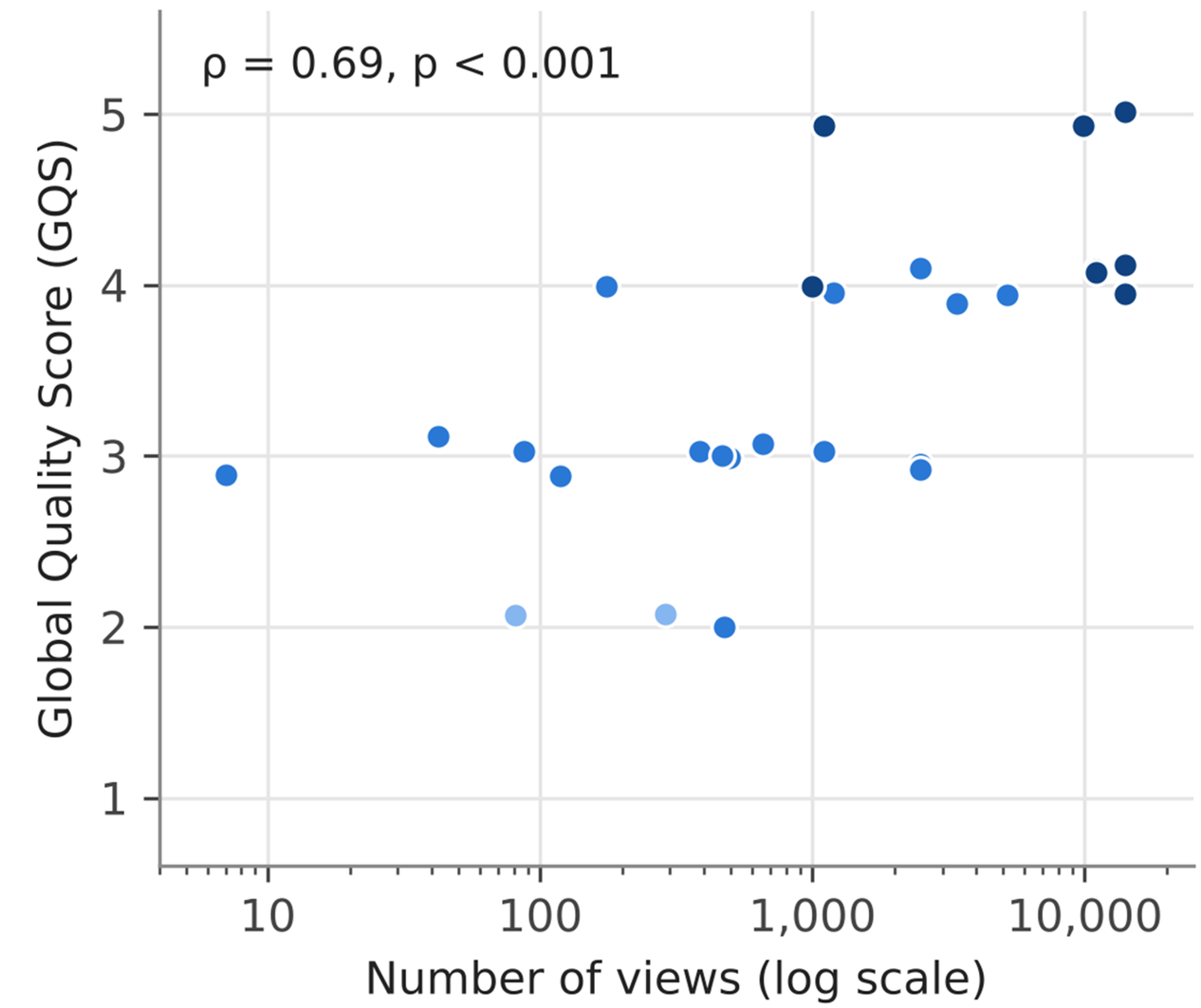
Included

Videos included in the analysis
(n = 27)

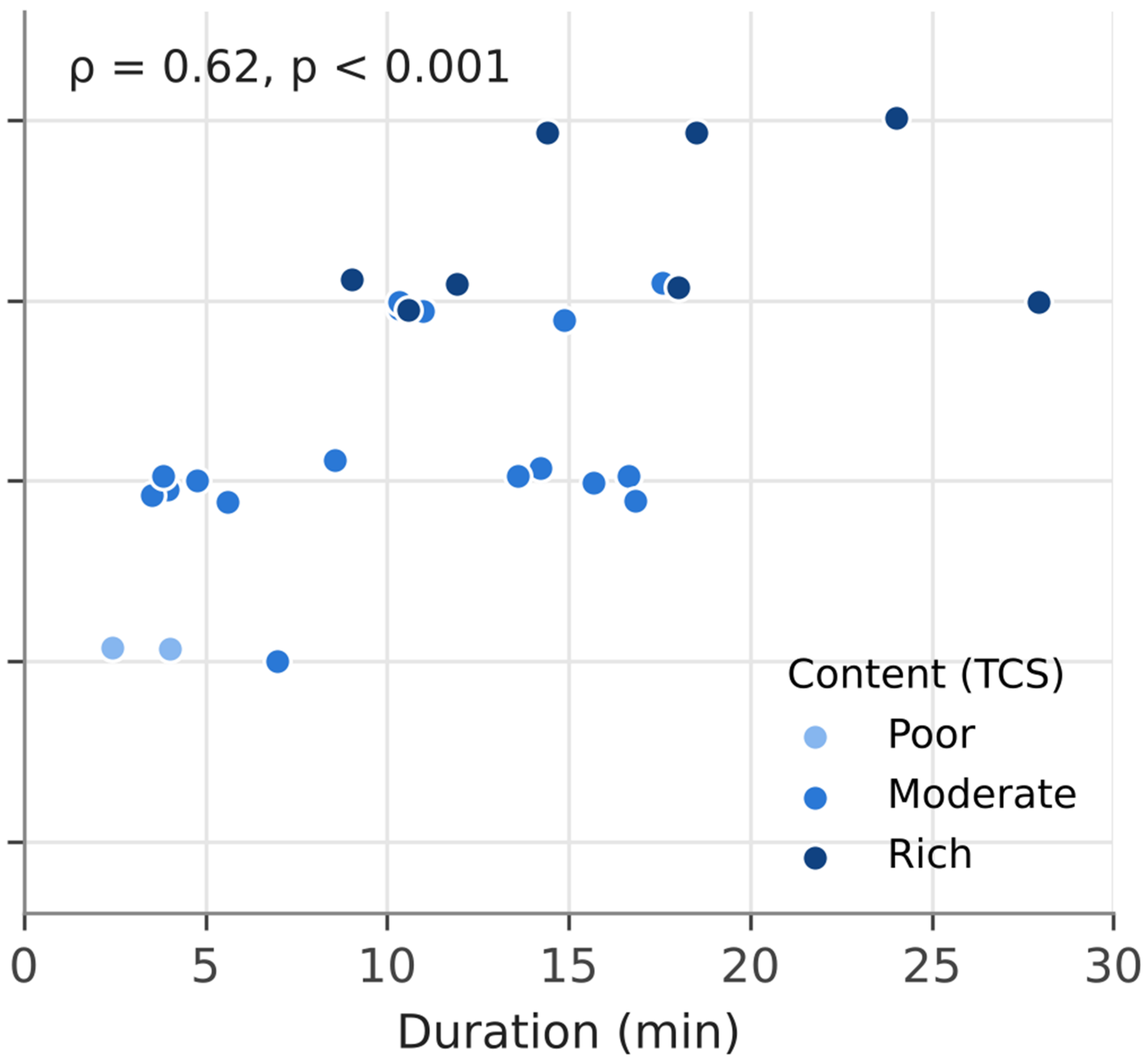
A


Poor (0–3)
n = 2 (7.4%)
Moderate (4–6)
n = 17 (63.0%)
Rich (7–9)
n = 8 (29.6%)
Number of videos
Total Content Score (TCS, 0–9)
2
4
6
7
5
3

B


ρ = 0.69, p < 0.001
Global Quality Score (GQS)
Number of views (log scale)

C


ρ = 0.62, p < 0.001
Duration (min)
Content (TCS)
Poor
Moderate
Rich