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ORIGINAL RESEARCH

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Evaluating the reliability and usefulness of Instagram® content related to early childhood caries: a cross-sectional content analysis

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Abstract

Background: Early childhood caries (ECC) is a major public health problem in children under six. As social media increasingly serves as a health information source, this study evaluated the content, quality, and usefulness of ECC-related Instagram® posts for parents and caregivers using the Modified DISCERN instrument and a Usefulness score. **Methods**: A cross-sectional content analysis was conducted on public Instagram® posts collected on 16–17 October 2025 using a new account and the hashtags #earlychildhoodcaries and #erkençocuklukçağıçürüğü. Two independent researchers evaluated post and user characteristics, engagement metrics, information quality using Modified DISCERN (0–5), and usefulness (0–6). Data were analyzed using Mann-Whitney U, Kruskal-Wallis, and Spearman correlation tests ($p < 0.05$). **Results**: Of the 298 posts initially screened, 263 were included (#earlychildhoodcaries: n = 149; #erkençocuklukçağıçürüğü: n = 114). Most posts were shared by specialist dentists (68.1%) and were photo-based (98.1%); 81.7% were informational and 18.3% promotional. The median Modified DISCERN score was 2 (0–4), and the median Usefulness score was 1 (0–5), indicating generally low information quality and limited usefulness. Modified DISCERN scores differed by post purpose ($p < 0.001$) but not by hashtag or user type. Usefulness scores differed by user status, user type, post purpose, and hashtag type (all $p < 0.05$), with higher rank-based usefulness for #earlychildhoodcaries posts. Weak negative correlations were observed between usefulness and follower count, likes, and comments, whereas Modified DISCERN scores were not associated with engagement metrics. **Conclusions**: ECC-related Instagram® posts generally have low quality and limited usefulness, even when shared by healthcare professionals. As engagement does not reflect informational value, more evidence-based educational content is needed to support parents' and caregivers' informed decision-making.

Keywords

Early childhood caries; Social media; Instagram®; Oral health; Public health; Dental caries

1. Introduction

Early childhood caries (ECC) is a prevalent oral health condition worldwide that affects the primary teeth of children under six years of age and has a substantial negative impact on child health. Inadequate oral hygiene practices and inappropriate dietary habits are among the main risk factors, and maintaining oral health at an early age forms the foundation for oral health throughout childhood and adolescence [1, 2]. According to a recent systematic review and meta-analysis including studies based on World Health Organization criteria, the global prevalence of ECC among children aged six years and younger is estimated to be approximately 48% [3].

Promoting oral health through essential educational messages is a widely recognized approach to raising awareness among parents and caregivers regarding the prevention of early childhood caries (ECC). In this context, oral health initiatives increasingly use social media platforms, particularly Instagram®, to promote oral hygiene awareness and support healthy behaviors [4–6]. Individuals frequently prefer these platforms to obtain health-related information and communicate with healthcare professionals, as digital media is often perceived as more accessible than face-to-face consultations [7].

Consequently, in the field of dentistry, platforms such as Instagram® (version 404.0.0, Meta Platforms, Inc., Menlo Park, CA, USA), X® (formerly Twitter®; version 11.34.0-

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release.0, X Corp., San Francisco, CA, USA), and YouTube® (version 20.42.43, Google LLC, Mountain View, CA, USA) are widely employed for clinical communication, marketing, and educational activities [8, 9]. While these platforms offer unique potential for patient education, misleading or inaccurate content shared by unverified sources may result in misinformation and potential harm to patients [10]. In recent years, the evaluation of dental health information on social media platforms has gained significant academic attention. Previous researchers have investigated public perceptions of dental care affordability on Twitter [9] and assessed the reliability and quality of root canal treatment videos on YouTube [11]. While these existing studies provide valuable insights into digital dental communication, they predominantly focus on economic perspectives, alternative platforms, or adult endodontic treatments, leaving a substantial gap in the context of pediatric preventive dentistry.

When the literature was reviewed, no study was found that directly addressed the information quality of Instagram® posts related to ECC. This study differs from previous social media content analyses by focusing specifically on ECC a critical public health issue that heavily relies on parental education and by examining how information quality varies across different "user types" (defined herein as dental clinics, specialist dentists, general dentists, and commercial accounts). Selecting the content source as our main grouping factor is grounded in the rationale that a creator's professional background fundamentally dictates their underlying motive (*e.g.*, clinical education versus commercial marketing), which directly influences the scientific accuracy of the disseminated data. Therefore, this study aimed to comprehensively evaluate the usefulness and information quality of ECC-related Instagram® posts across information delivery, education, awareness creation, and engagement dimensions using the Modified DISCERN scale and the Usefulness score. The Modified DISCERN scale was selected as it represents a widely validated, objective instrument specifically optimized for assessing the reliability and structural quality of consumer health information on digital platforms [11]. To complement this, the Usefulness score was employed to directly quantify the practical, educational value of the content from a caregiver's perspective [12]. Utilizing these dual evaluation standards, as established in prior methodological literature, allows for a comprehensive assessment of both scientific reliability and clinical utility. By conducting this methodological cross-sectional content analysis, we intended to reveal the scientific validity of existing digital content, establish a methodological framework for social media utilization in dentistry, and address a critical public health gap that heavily relies on parental education. To establish a neutral baseline for testing whether professional credentials actually translate into superior content quality on unregulated platforms, the null hypothesis of the study assumed that there would be no statistically significant difference in the usefulness and information quality of the posts among different user types, whereas the alternative hypothesis assumed that the usefulness and/or information quality would differ significantly according to user type.

2. Materials and methods

2.1 Study design and data collection

To minimize potential bias, a new Instagram® account was created, and data were collected on 16–17 October 2025 by two independent researchers (HSŞ and MG) using the same smartphone device. Only publicly accessible Instagram® posts were included. During data collection, various hashtags were explored using Instagram®'s auto-complete feature, which is commonly used by users; based on preliminary screening, the hashtags #earlychildhoodcaries and the Turkish hashtag #erkençocuklukçağıçürüğü were selected as they provided the most comprehensive dataset. These two specific hashtags were selected because they represent the most globally and locally recognized, high-traffic terms that directly capture the target discourse on ECC. Selecting these primary, overarching hashtags maximized the representativeness of our sample by capturing the widest possible spectrum of relevant content. Although conversational or layman terms (*e.g.*, "children tooth decay" or "dental caries in children") are intuitively common among non-professionals, dynamic preliminary searches revealed that Instagram®'s search algorithm automatically aggregates user traffic and historical content toward these standardized, higher volume global tags. Furthermore, professional and institutional content creators who serve as the primary sources of health information on the platform routinely anchor their educational posts with these overarching academic hashtags to optimize reach, meaning that selecting these umbrella terms simultaneously captured the vast majority of relevant caregiver-oriented content without omitting lay-person discourse. Furthermore, data collection was completed within a concentrated two-day timeframe to obtain a standardized, real-time snapshot. This cross-sectional duration eliminates chronological biases and data duplication caused by Instagram®'s fluid and constantly changing algorithm, thereby ensuring a stable and reliable sample size without compromising data integrity.

The analyzed posts were evaluated according to user status; user type (dental clinic, specialist dentist, general dentist, commercial account, parent); language of the post; country of origin; number of followers; post format (photo/video); post purpose (informational/promotional); hashtags used; and numbers of likes and comments. To ensure a rigorous and standardized evaluation of the global dataset, which primarily consisted of posts in English (52.9%) and Turkish (43.7%), alongside a minimal share of other regional languages (3.4%), both evaluating researchers maintained full bilingual proficiency in English and Turkish. This academic language competence allowed for direct comprehension and qualitative coding of the textual captions, video audio, and clinical content. For the minor fraction of posts in other languages, standardized and validated digital translation tools were cross-referenced to verify that no misinterpretation occurred. All posts across all language tracks were strictly subjected to the exact same standardized scoring rubrics of the Modified DISCERN and Usefulness instruments, ensuring complete methodological uniformity.

2.2 Inclusion and exclusion criteria

A total of 298 posts were identified through the Instagram® search. Predefined exclusion criteria were applied to ensure the methodological validity of the evaluation tools. Posts were excluded if they were not directly related to early childhood caries; consisted of other dental procedures, duplicate, or irrelevant content. Posts with "insufficient visual and/or textual information" were also excluded, which strictly referred to content containing only an isolated graphic or emoji without any descriptive caption, video commentary, or assessable medical claims, making it impossible to calculate Modified DISCERN or Usefulness scores. Furthermore, a clear distinction was made between clinical promotions (which were included in the analysis as "promotional posts") and "purely commercial product advertisements" (which were excluded). Purely commercial content was defined as direct e-commerce or retail marketing from non-dental commercial brands (*e.g.*, product sales of specific bottles, pacifiers, or commercial toothpaste discounts) that lacked any medical advice or parental guidance. Because the Modified DISCERN instrument is explicitly designed to evaluate the quality and reliability of health information, it cannot technically score purely transactional product advertisements. Cartoon posts, patient–dentist images, and posts with hidden like or view counts were also excluded. Following application of these criteria, 35 posts were excluded, and a final sample of 263 posts was included in the analysis (Fig. 1).

Each post's URL (Uniform Resource Locator) was recorded, and eligible content was classified according to predefined criteria.

2.3 Measuring tools

The information quality of the posts was independently evaluated by two researchers (HSŞ and MG), both of whom are qualified dental professionals specialized in pediatric dentistry, using the Modified DISCERN instrument and the Usefulness score. Prior to the consensus discussion, the interrater reliability between the two researchers was evaluated using Cohen's kappa coefficient, which demonstrated an excellent agreement ($\kappa = 0.85$). In cases of disagreement between the researchers, the relevant posts were jointly reviewed and a consensus was reached.

2.4 Modified DISCERN criteria

The quality of the Instagram® posts was evaluated using the Modified DISCERN instrument, which consists of five items assessing the reliability and quality of health-related information:

1. Is the aim of the post clear, concise, and understandable?
2. Are the sources of information reliable (*e.g.*, cited scientific publications, content based on valid studies, or information provided by dentists)?
3. Is the information presented in a balanced and unbiased manner (*e.g.*, does it refer to alternative treatment or prevention options)?

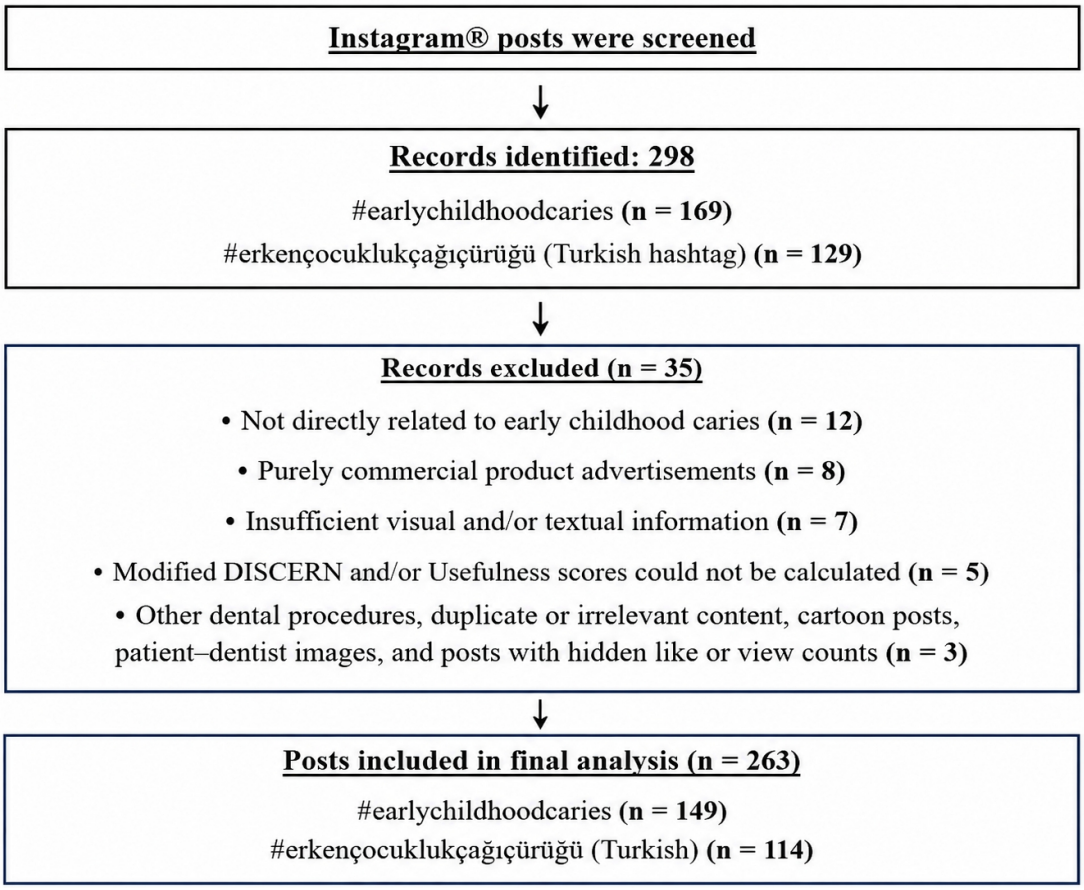


FIGURE 1. Flow diagram of Instagram® post selection process.

4. Are additional sources of information or references provided?

5. Does the content refer to areas of uncertainty or limitations of current knowledge?

Each item was scored as 1 (yes) or 0 (no), yielding a total Modified DISCERN score ranging from 0 to 5, with higher scores indicating higher information quality [11–13].

2.5 Usefulness score criteria

The usefulness of the Instagram® posts was evaluated using a structured usefulness scoring system adapted from previous studies [12, 14]. Each post was assessed based on the presence of the following informational components:

1. Does the post provide information regarding the indications and/or contraindications of the condition or preventive/therapeutic approach discussed?

2. Does the post describe the advantages of the preventive or therapeutic approaches presented?

3. Does the post explain the procedures involved in the prevention or management of the condition discussed?

4. Does the post mention possible complications or risks associated with the condition or its management?

5. Does the post provide information regarding prognosis or long-term outcomes related to the condition?

6. Does the post include information related to treatment or prevention costs?

Each item was scored as 1 (present) or 0 (absent), yielding a total Usefulness score ranging from 0 to 6, with higher scores indicating greater informational usefulness.

2.6 Statistical analysis

Data were recorded and organized using Microsoft Excel (version 2021, Microsoft Corporation, Redmond, WA, USA), and statistical analyses were performed using the R programming language (version 4.4.1). Normality of data distribution was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests.

Since the data were non-normally distributed, the Mann-Whitney U test was used for comparisons between two groups, while the Kruskal-Wallis H test was applied for comparisons among three or more groups. Pairwise multiple comparisons were conducted using Dunn's test with a conservative Bonferroni alpha-adjustment to control for Type I errors. Relationships between quantitative variables were examined using Spearman's rho correlation analysis.

To control for potential confounding variables and evaluate independent associations, multivariable ordinal logistic regression models were constructed, as the dependent variables (Modified DISCERN and Usefulness scores) represented ordinal data. In these models, Adjusted Odds Ratios (aOR) and 95% Confidence Intervals (CI) were calculated by simultaneously adjusting for categorical covariates (user status, user type, post format, post purpose, and hashtag language) and continuous engagement metrics (follower count, likes, and comments), which were transformed using $\log_{10}(x + 1)$ to ensure model stability. Continuous variables were presented as mean ± standard deviation and median (minimum–maximum), while categorical variables were expressed as frequency and percentage. Statistical significance was set at $p < 0.05$.

3. Results

Descriptive statistics related to user status, user type, post language, country of origin, post format, and post purpose are presented in Table 1. Regarding user status, 66.5% of the posts were shared by unverified accounts, while 33.5% were posted by verified accounts. In terms of user type, the majority of posts were shared by specialist dentists (68.1%), followed by dental clinics (19.0%), general dentists (8.4%), and commercial accounts (4.6%). With respect to post language, more than half of the posts were in English (52.9%), and a substantial proportion were in Turkish (43.7%), whereas other languages accounted for a limited share (3.4%). Analysis of the countries in which the posts were shared revealed that Türkiye (43.7%) and India (28.1%) had the highest proportions, while the remaining countries each accounted for between 0.4% and 5.7% of the posts. In terms of post format, the vast majority of posts consisted of photographs (98.1%), with video content representing a small proportion (1.9%). According to post purpose, 81.7% of the content was informational, whereas 18.3% was promotional in nature. Regarding hashtag use, #earlychildhoodcaries was used more frequently (56.7%) than the Turkish hashtag #erkençocuklukçağıçürüğü, which appeared in 43.3% of the posts. The mean number of followers was 14,259.94 (median: 2543), the mean number of likes was 55.19 (median: 36), and the mean number of comments was 2.62 (median: 0). The mean Modified DISCERN score, reflecting information quality, was 2.08 (median: 2), while the mean Usefulness score was 1.24 (median: 1) (Table 1).

The comparisons of Modified DISCERN and Usefulness scores according to categorical variables are presented in **Supplementary material**. Regarding the information quality, no statistically significant differences were observed in median Modified DISCERN scores based on user status ($p = 0.363$), user type ($p = 0.962$), post format ($p = 0.898$), or hashtag type ($p = 0.143$). In contrast, Modified DISCERN scores differed significantly according to post purpose ($p < 0.001$), with informational posts demonstrating higher scores than promotional content. Regarding the clinical utility, a statistically significant difference was observed in median Usefulness scores according to user status, with unverified accounts exhibiting higher scores than verified accounts ($p < 0.001$). Usefulness scores also differed significantly by user type ($p = 0.039$); however, *post-hoc* multiple comparisons did not reveal any statistically significant pairwise differences between individual user groups. No statistically significant difference in Usefulness scores was found according to post format ($p = 0.424$). In contrast, Usefulness scores differed significantly according to post purpose, with informational posts demonstrating higher scores than promotional content ($p = 0.006$). Additionally, a statistically significant difference was identified based on hashtag type ($p < 0.001$), whereby posts tagged with #earlychildhoodcaries exhibited higher Usefulness scores compared with those using the Turkish hashtag #erkençocuklukçağıçürüğü (**Supplementary material**).

No statistically significant associations were observed be-

TABLE 1. Descriptive characteristics of Instagram® posts included in the study.

Variable	n (%)	Mean ± SD	Median (Min–Max)
User status			
Unverified	175 (66.5)		
Verified	88 (33.5)		
User type			
Dental clinic	50 (19.0)		
Specialist dentist	179 (68.1)		
General dentist	22 (8.4)		
Commercial account	12 (4.6)		
Post language			
German	2 (0.8)		
Hindi	1 (0.4)		
English	139 (52.9)		
Spanish	4 (1.5)		
Polish	1 (0.4)		
Romanian	1 (0.4)		
Turkish	115 (43.7)		
Country of origin			
United States	14 (5.7)		
Abu Dhabi	2 (0.8)		
Germany	5 (1.9)		
Australia	3 (1.1)		
United Arab Emirates	5 (1.9)		
Bolivia	1 (0.4)		
Czech Republic	1 (0.4)		
Indonesia	6 (2.3)		
India	74 (28.1)		
Spain	2 (0.8)		
Italy	2 (0.8)		
Canada	5 (1.9)		
Kenya	1 (0.4)		
Lebanon	2 (0.8)		
Malaysia	2 (0.8)		
Mexico	3 (1.1)		
Egypt	3 (1.1)		
Pakistan	2 (0.8)		
Poland	1 (0.4)		
Romania	5 (1.9)		
Slovakia	1 (0.4)		
Türkiye	115 (43.7)		
Oman	1 (0.4)		
Jordan	1 (0.4)		
Venezuela	3 (1.1)		
New Delhi	1 (0.4)		
Greece	1 (0.4)		

TABLE 1. Continued.

Variable	n (%)	Mean ± SD	Median (Min–Max)
Post format			
Photo	258 (98.1)		
Video	5 (1.9)		
Post purpose			
Informational	215 (81.7)		
Promotional	48 (18.3)		
Hashtag			
#earlychildhoodcaries	149 (56.7)		
#erkençocuklukçağıçürüğü (Turkish)	114 (43.3)		
Number of Followers		14,259.94 ± 50,759.61	2543 (18–397,000)
Number of Likes		55.19 ± 93.63	36 (0–996)
Number of Comments		2.62 ± 5.41	0 (0–43)
Modified DISCERN Score		2.08 ± 1.04	2 (0–4)
Usefulness Score		1.24 ± 1.13	1 (0–5)

SD: Standard Deviation; Min: Minimum; Max: Maximum.

tween Modified DISCERN scores and follower count, number of likes, or number of comments ($p = 0.936$, $p = 0.522$, and $p = 0.050$, respectively). In contrast, statistically significant negative associations were identified between usefulness scores and engagement metrics. Usefulness score showed a very weak negative correlation with follower count ($r = -0.134$; $p = 0.030$), a weak negative correlation with number of likes ($r = -0.231$; $p < 0.001$), and a very weak negative correlation with number of comments ($r = -0.160$; $p = 0.010$) (Table 2).

Multivariable ordinal logistic regression analyses were performed to identify factors independently associated with Modified DISCERN and Usefulness scores. Regarding our primary hypothesis, user type was not independently associated with Modified DISCERN scores ($p > 0.05$), although commercial accounts demonstrated a trend toward higher odds compared to specialist dentist accounts (aOR = 3.73; 95% CI: 0.97–14.37; $p = 0.056$). Similarly, no statistically significant independent association was observed between user type and Usefulness scores, with commercial accounts again showing a non-significant elevation compared to specialist dentists (aOR = 2.95; 95% CI: 0.84–10.34; $p = 0.091$). Among the secondary adjusted covariates, post purpose demonstrated the strongest independent association: informational posts were significantly more likely to receive higher Modified DISCERN scores (aOR = 14.22; 95% CI: 6.68–30.26; $p < 0.001$) and higher Usefulness scores (aOR = 5.93; 95% CI: 3.03–11.61; $p < 0.001$) compared to promotional posts. Posts shared by verified accounts had significantly lower odds of achieving higher Modified DISCERN scores than those shared by unverified accounts (aOR = 0.24; 95% CI: 0.10–0.58; $p = 0.001$). Regarding hashtag language, posts utilizing the Turkish hashtag had higher odds for Modified DISCERN scores (aOR = 2.66; 95% CI: 1.09–6.48; $p = 0.031$), but significantly lower odds for Usefulness scores (aOR = 0.19; 95% CI: 0.08–0.45; $p < 0.001$) compared to #earlychildhoodcaries. Post format and quantitative engagement metrics (follower count, likes, and comments) were not independently associated with either outcome score (Table 3).

Item-level analysis of the Usefulness Score revealed that treatment methods were the most frequently addressed component, appearing in 124 posts (47.1%), followed by general information in 107 posts (40.7%) and preventive methods in 83 posts (31.6%). In contrast, complications, prognosis, and cost were rarely discussed, being included in only 4 (1.5%), 7 (2.7%), and 1 (0.4%) posts, respectively. These findings indicate that the low overall Usefulness scores were largely attributable to the limited coverage of complications, prognosis, and cost-related information (Table 4).

4. Discussion

Based on the findings of this study, the null hypothesis stating that there is no significant difference in the usefulness and information quality of Instagram® posts related to early childhood caries across different user types was partially rejected. Although univariate analysis revealed a statistically significant difference in Usefulness scores across user types ($p = 0.039$), no significant difference was identified for Modified DISCERN scores ($p = 0.962$). In the multivariable ordinal logistic regression model, user type did not remain an independent significant predictor, though commercial accounts exhibited a trend toward higher odds for both Modified DISCERN ("aOR" = 3.73, $p = 0.056$) and Usefulness ("aOR" = 2.95, $p = 0.091$) compared to specialist dentist accounts (the baseline reference group).

Concurrently, among the secondary adjusted covariates evaluated in the multivariable model, post purpose emerged as the most critical independent predictor driving both information quality ("aOR" = 14.22, $p < 0.001$) and clinical usefulness ("aOR" = 5.93, $p < 0.001$). This multi-variable approach confirms that the format or creator type matters less than the baseline intent—whether informational or

TABLE 2. Correlation analysis between Modified DISCERN and Usefulness scores and quantitative variables.

	Modified DISCERN		Usefulness Score	
	r	*p*	*r*	*p*
Number of Followers	−0.005	0.936	−0.134	**0.030**
Number of Likes	−0.040	0.522	−0.231	**<0.001**
Number of Comments	−0.121	0.050	−0.160	**0.010**

r: Spearman's Rho correlation analysis. Bold values indicate statistical significance ($p < 0.05$).

TABLE 3. Multivariable ordinal logistic regression analysis of factors associated with Modified DISCERN and Usefulness scores.

Variable	Modified DISCERN aOR (95% CI)	*p* value	Usefulness Score aOR (95% CI)	*p* value
Verified account	0.24 (0.10–0.58)	**0.001**	1.10 (0.47–2.58)	0.823
Specialist dentist	1.59 (0.75–3.36)	0.228	1.32 (0.66–2.65)	0.426
General dentist	1.65 (0.59–4.64)	0.344	1.51 (0.60–3.77)	0.380
Commercial account	3.73 (0.97–14.37)	0.056	2.95 (0.84–10.34)	0.091
Video post	0.82 (0.10–6.42)	0.850	1.54 (0.31–7.58)	0.594
Informational post	14.22 (6.68–30.26)	**<0.001**	5.93 (3.03–11.61)	**<0.001**
Turkish hashtag	2.66 (1.09–6.48)	0.031	0.19 (0.08–0.45)	**<0.001**
Log_{10} number of followers	0.76 (0.51–1.15)	0.194	1.00 (0.69–1.44)	0.985
Log_{10} number of likes	0.71 (0.36–1.38)	0.309	0.78 (0.44–1.37)	0.381
Log_{10} number of comments	0.76 (0.39–1.48)	0.422	0.92 (0.49–1.75)	0.806

aOR, adjusted odds ratio; CI, confidence interval. Engagement variables were transformed using $log_{10}(x + 1)$. An aOR greater than 1 indicates increased odds of being in a higher score category. Statistically significant values are shown in bold.

TABLE 4. Item-level distribution of the Usefulness Score components.

Usefulness Score item	Present, n (%)	Absent, n (%)
General information	107 (40.7)	156 (59.3)
Preventive methods	83 (31.6)	180 (68.4)
Treatment methods	124 (47.1)	139 (52.9)
Complications	4 (1.5)	259 (98.5)
Prognosis	7 (2.7)	256 (97.3)
Cost	1 (0.4)	262 (99.6)

promotional—of the shared content.

Social media platforms have become important communication tools that individuals increasingly rely on to obtain information about diseases and treatment processes. In particular, patients in the field of oral and dental health frequently use social media to access information on topics of interest, ask questions, and review shared experiences [6, 14, 15]. However, it has been reported that these platforms may also contain inaccurate, misleading, or scientifically outdated medical information [16]. However, it has been reported that these platforms may also contain inaccurate, misleading, or scientifically outdated medical information. In the context of oral health, Instagram® studies have similarly documented misleading content and emphasized the need for professional guidance and improved content monitoring [17–19]. In this context, the absence of studies directly evaluating the information quality of Instagram® posts related to early childhood caries motivated the design of the present study, necessitating an assessment of such content using the Modified DISCERN instrument and a Usefulness score, as well as an examination of content characteristics in terms of information delivery, awareness, and engagement.

Concerns regarding the educational reliability of social media content also extend to ECC, as an evaluation of YouTube™ videos found generally low usefulness and concluded that the platform should not be considered a trusted source for parent education [20]. Similar concerns have been reported on Instagram®, where oral hygiene instruction posts showed limited

usefulness and actionability despite most being educational [21]. The Modified DISCERN instrument has been widely applied to assess the quality of health-related information shared on social media platforms [22]. Previous studies have consistently shown that information presented in Instagram® posts is often inadequate or of low quality, potentially due to the use of irrelevant hashtags, marketing-oriented content, and the prioritization of personal opinions over scientific evidence [23–25]. To reflect the national context, Turkish language posts were also examined in the present study, and the hashtag #erkençocuklukçağıçürüğü was included in the analysis. No statistically significant difference was found between hashtag types (#earlychildhoodcaries *vs.* #erkençocuklukçağıçürüğü) in terms of median Modified DISCERN scores ($p = 0.143$). In contrast, Usefulness scores differed significantly by hashtag type ($p < 0.001$). These findings suggest that while information quality is comparable across languages, English tagged posts may have relatively higher usefulness potential. This dynamic was further illuminated by our multivariable model, which revealed a striking divergence: while utilizing a Turkish hashtag independently predicted higher odds for information quality (aOR = 2.66, $p = 0.031$), it simultaneously served as a strong negative predictor for clinical usefulness (aOR = 0.19, $p < 0.001$). This paradox suggests that while localized Turkish ECC content may satisfy structural quality criteria (such as clear aims or bias minimization), it severely lacks actionable, comprehensive clinical guidance for parents, remaining superficial in terms of actual disease management.

Nevertheless, the overall low usefulness observed for both hashtags highlights substantial gaps in ECC-related information delivery and awareness on social media.

Similar patterns have been reported in Instagram® studies of other dental topics, with dental professionals identified as prominent content contributors [12, 14, 26]. Additionally, photographs have been identified as the most commonly used post format due to their practicality [12, 27–29]. Studies of dentistry content on Instagram® have found that promotional posts predominate, while broader analyses of dental content have also documented the frequent use of before-and-after clinical images for advertising purposes [30, 31]. In contrast, in the present study, informational content predominated among ECC-related posts, and specialist dentists and dental clinics constituted the majority of content providers. Furthermore, the fact that posts were largely photo based is consistent with trends reported in the literature.

Simsek *et al.* [32] reported that 60% of teeth-whitening videos uploaded to YouTube™ were shared by non-professional accounts. Similarly, Lotto *et al.* [18] found that more than half of fluoride-related Instagram® posts were shared by lay users. In contrast, Buldur *et al.* [14] reported that the majority of accounts sharing dental images belonged to dentists or dental clinics. Consistent with these findings, 68.1% of ECC-related posts in the present study were shared by specialist dentists and 19% by dental clinics, indicating that ECC-related content is predominantly disseminated by professionally competent accounts.

In a methodological study on Instagram® posts related to smile aesthetics, Şahin and Ural reported significantly higher mean Modified DISCERN scores for dentist/clinic accounts compared with other user groups, attributing this to greater reliability in information quality [12]. Similarly, Buyuk *et al.* [33] emphasized that orthodontic-related In-stagram posts shared by dentists tended to be more accurate and informative. Other studies have also indicated that content uploaded by individual users is more likely to be misleading than content shared by authorized professionals or experts [34, 35]. However, Öz's analysis of Instagram® posts shared under the hashtags #pedi-atriczirconiacrowns and #pediatriccrowns revealed that although most posts were shared by pediatric dentists, the majority offered only moderate or low usefulness, with very few posts classified as "highly useful" [23]. Contrary to these findings, no statistically significant difference was observed in median Modified DISCERN scores across user types in the present study ($p = 0.962$). This suggests that, similar to Öz's findings [23], the information quality of ECC-related Instagram® content generally remains at a low-to-moderate level regardless of the content source. Although Usefulness scores differed significantly by user type ($p = 0.039$), *post hoc* analyses revealed no significant pairwise differences, indicating that this variation did not translate into a clear superiority of any specific user group. These results demonstrate that content shared by professionally qualified accounts does not necessarily guarantee higher usefulness or superior information quality. However, the multivariable regression model captured a compelling trend that univariate *post-hoc* tests lacked the power to isolate; commercial accounts demonstrated borderline higher odds for both Modified DISCERN (aOR = 3.73, $p = 0.056$) and Usefulness scores (aOR = 2.95, $p = 0.091$) compared to specialist dentist accounts. This trend indicates that while professional academic accounts (specialists) dominate the volume of posts, commercial or marketing-oriented accounts often structure their limited informational outputs with higher structural compliance or specific practical keywords, highlighting a competitive digital communication strategy that pediatric dentistry professionals must examine.

To provide concrete clinical recommendations and unveil the exact structural deficits causing the universally low Usefulness scores, an item-by-item analysis was instrumental. The data unveiled a critical clinical oversight in ECC communication on Instagram®:cost-related information was completely absent in 99.6% of the content, complications were entirely omitted in 98.5%, and prognosis was ignored in 97.3%. Even treatment methods, which represented the most frequently covered clinical dimension, appeared in less than half of the posts (47.1%). This indicates that social media content regarding ECC is heavily skewed toward basic diagnostic visualization or aesthetic showcases, completely neglecting the holistic, long-term therapeutic reality of the disease. For parents and caregivers, a post that fails to outline potential complications or procedural costs offers practically zero actionable educational utility. Therefore, public health stakeholders and pediatric dentists must transition from sharing simple "awareness" posts to designing comprehensive, multi-layered infographics that explicitly detail disease prognosis, financial realities, and risk management.

With respect to engagement metrics, Buldur *et al.* [14] reported generally low levels of information quality across all user groups and found that posts with moderate information

scores achieved higher engagement than those with lower scores. Similarly, Simsek *et al*. [32] observed higher engagement coefficients for videos with lower information quality. In the present study, the absence of significant associations between Modified DISCERN scores and follower count, likes, or comments suggests that this measure of reliability and information quality operates independently of engagement indicators. In contrast, weak but statistically significant negative correlations were identified between Usefulness scores and engagement metrics, indicating that posts with higher numbers of followers, likes, and comments tended to exhibit lower usefulness. These findings underscore that high engagement does not necessarily equate to greater informational or educational value. Instead, popularity on social media platforms is heavily driven by external factors such as visual appeal, professional graphic design, optimized posting times, and targeted digital marketing strategies rather than scientific content quality. Consequently, engagement metrics alone should not be considered reliable indicators of health information quality.

4.1 Limitations

This study has several limitations that should be considered when interpreting the findings. First, data were collected within a limited time frame (16–17 October 2025), providing a cross-sectional snapshot that may not reflect temporal variations or changes in posting behavior over time. Because Instagram® algorithms continuously change over time, altering content visibility and engagement, the results obtained from this specific time period may not be fully reproducible if the study is replicated in a different timeframe, which potentially affects the long-term generalizability of the findings. Second, content retrieval was limited to two specific hashtags; therefore, ECC-related posts shared without these hashtags or using alternative terms or spellings may have been overlooked, potentially affecting the generalizability of the results. Third, although a newly created Instagram® account was used to minimize personalization, platform specific algorithms may still have influenced content visibility and introduced selection bias. In addition, only publicly accessible posts were evaluated, as private accounts could not be assessed. Finally, engagement metrics such as likes and comments are influenced by multiple external factors including visual appeal, account popularity, posting time, and marketing strategies and may not accurately reflect the educational quality or informational value of the content.

4.2 Strengths

This study employed a rigorous methodological approach by using a newly created Instagram® account and a single device to minimize personalization and algorithm related bias. All posts were independently evaluated by two researchers, with consensus achieved in cases of disagreement, enhancing the reliability of the assessments. The inclusion of both an international English hashtag (#earlychildhoodcaries) and a Turkish hashtag (#erkençocuklukçağıçürüğü) allowed evaluation of ECC-related content from both global and national perspectives. Furthermore, information quality and usefulness were assessed using standardized and previously validated instruments, enabling comparison with existing studies. The comprehensive evaluation of multiple content characteristics provides a detailed overview of ECC-related information available on Instagram®.

5. Conclusions

This methodological study demonstrated that Instagram® posts related to early childhood caries generally provide low information quality and limited usefulness, as reflected by low median Modified DISCERN and Usefulness scores. Overall, these findings indicate that ECC-related content on Instagram® is characterized by limited informational quality and usefulness, alongside a clear disconnect between engagement metrics and educational value. The consistently low Modified DISCERN and Usefulness scores, the minimal influence of user type on information quality, and the negative associations observed between usefulness and engagement indicators collectively emphasize the need for cautious interpretation of social media based oral health information. From a public health perspective, these patterns raise concerns regarding how widely accessed digital platforms may influence parental understanding of early childhood caries and underscore the risks of relying on largely unregulated social media content for disease prevention and health promotion. While information quality did not significantly differ according to hashtag or user type, usefulness varied across several content characteristics, with English-tagged posts exhibiting higher rank-based usefulness than Turkish tagged posts. Importantly, higher engagement was not associated with improved informational value; instead, usefulness showed weak negative correlations with follower counts, likes, and comments. Taken together, these findings indicate that ECC-related content on Instagram® may be insufficient as a standalone educational resource for parents and caregivers without professional guidance. There is a clear need for dentists, academic institutions, and public health stakeholders to develop and disseminate evidence-based, referenced, and educational content, as well as to promote quality standards for social media communication in pediatric oral health.

ABBREVIATIONS

ECC, Early Childhood Caries; URL, Uniform Resource Locator; aOR, Adjusted Odds Ratios; CI, Confidence Intervals.

AVAILABILITY OF DATA AND MATERIALS

The data generated or analysed during this study are included in this article and its **Supplementary material**.

AUTHOR CONTRIBUTIONS

YPY—designed the research study and supervised the project; prepared the original draft of the manuscript, visualized the results, and analyzed the data. HSŞ, MG, AMÇ, BA and ECT—provided scientific input, advice, and critical feedback

throughout the study. All authors developed the methodology, conducted the investigation, performed the formal analysis, and curated the data; reviewed and edited the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript and agreed to the published version of the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval and informed consent were waived because this study analyzed only publicly available Instagram® content. No human participants were recruited, and no personal or identifiable information was collected. The study did not involve human biological materials or animal subjects.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://....

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