

Teething beliefs and amber necklaces: a content analysis of users' perspectives from Facebook comments

Crenças em odontíase e colares de âmbar: uma análise de conteúdo das perspectivas dos usuários em comentários do Facebook

Creencias sobre la odontiasis y los collares de ámbar: un análisis de contenido de las perspectivas de los usuarios en comentarios de Facebook

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Abstract This digital qualitative study conducted an inductive content analysis of 1,000 Facebook comments about the use of amber necklaces for teething symptom relief, aiming to understand users' perceptions of this practice. The comments were divided into units of analysis ($n=2,166$) and coded into thematic categories in QDA Miner. Using Word Stat software, category frequencies, word clouds, and cluster analysis were determined. The Chi-square test was used to compare the distribution of categories across three distinct time points. Most comments were made by users with white personas (81.8%), female gender (96.3%), and Brazilian nationality (97.8%). The most frequent categories were "the information is useful or potentially useful" (18.8%) and "acquisition or intention to acquire the necklace" (12.1%), with respective increases of 5.9% to 23.6% and 15.7% to 24.5% over time. The frequencies of "concern/anxiety about the use of the amber necklace" and "teething experience" decreased from 5.8% to 2.0% and from 12.0% to 3.1%, respectively. Despite the reduction in reports of teething symptoms, there is a growing trend among Brazilians to consider the amber necklace a valid solution for teething symptoms.

Key words Tooth eruption, Amber, Social media, Qualitative research

Resumo Estudo qualitativo digital que conduziu uma análise de conteúdo indutiva em 1.000 comentários no Facebook sobre o uso de colares de âmbar para alívio de sintomas da dentição, buscando entender as percepções dos usuários em relação a essa prática. Os comentários foram divididos em unidades de análise ($n = 2.166$) e codificados em categorias temáticas no QDA Miner. Com o software Word Stat, foram determinadas frequências das categorias, nuvem de palavras e análise de cluster. O teste qui-quadrado foi utilizado para comparar a distribuição das categorias em três tempos distintos. A maior parte dos comentários foi feita por usuários com personas brancas (81,8%), do sexo feminino (96,3%) e brasileiros (97,8%). As categorias mais frequentes foram "a informação é útil ou potencialmente útil" (18,8%) e "aquisição ou intenção de adquirir o colar" (12,1%), com aumentos respectivos de 5,9% para 23,6% e de 15,7% para 24,5% ao longo do tempo. As frequências de "preocupação/ansiedade sobre o uso do colar de âmbar" e "experiência de dentição" diminuíram de 5,8% para 2,0% e de 12,0% para 3,1%, respectivamente. Apesar da redução nos relatos de sintomas de dentição, há uma tendência crescente entre os brasileiros em considerar o colar de âmbar como uma solução válida para os sintomas de dentição.

Palavras-chave Erupção dentária, Âmbar, Mídia social, Pesquisa qualitativa

Resumen Este estudio cualitativo digital analizó 1.000 comentarios en Facebook sobre el uso de collares de ámbar para aliviar la dentición, dividiéndolos en unidades de análisis ($n=2166$) y codificándolos manualmente en categorías temáticas. Se determinaron las frecuencias de las categorías, nube de palabras y análisis de clúster. La prueba de Chi-cuadrado comparó la distribución de las categorías en tres momentos distintos. El análisis mostró que la mayoría de los comentarios provino de usuarios con perfiles blancos (81,8%), femeninos (96,3%) y brasileños (97,8%). Los comentarios se clasificaron más frecuentemente en las categorías "la información es útil o potencialmente útil" (18,8%) y "adquisición o intención de adquirir el collar" (12,1%). Temporalmente, hubo un aumento en la frecuencia de estas dos mismas categorías (del 5,9% al 23,6% y del 15,7% al 24,5%, respectivamente). Hubo una reducción de los comentarios clasificados como "preocupación/ansiedad sobre el uso del collar de ámbar" (del 7,4% al 5,2%) y "experiencia de dentición" (del 12,0% al 3,1%) a lo largo del tiempo. Aunque han disminuido los relatos sobre síntomas de dentición, sigue creciendo entre los usuarios de habla portuguesa, especialmente en Brasil, la percepción del collar de ámbar como una solución válida y deseable.

Palabras clave Erupción dental, Âmbar, Redes sociales, Investigación cualitativa

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Introduction

Despite the lack of high-quality scientific evidence, especially prospective cohort studies and systematic reviews based on primary studies, symptoms such as pain, drooling, fever, and irritability are often associated with the eruption of deciduous teeth¹. This causes many parents and caregivers to approach the process with apprehension, seeking solutions¹⁻³. Consequently, the amber necklace has emerged as a popular non-pharmacological option among several approaches promising to reduce the discomfort observed during teething. It supposedly works through the analgesic properties of succinic acid, which is released from amber beads and absorbed through the skin. However, the effects of these amulets have been demonstrated to be implausible, as succinic acid-containing amber beads cannot be released without their liquefaction. This would require high-temperature thresholds incompatible with human life⁴. Additionally, it is well-documented several health risks caused by amber necklaces to babies, such as strangulation, aspiration, ingestion of beads, allergic reactions, and microbial proliferation⁵⁻⁸. Even considering these findings, people are still interested in social media content about amber necklaces for combating teething-related discomfort⁹.

With over 3 billion monthly active users, Facebook remains the most widely used social media platform worldwide. In this scenario, Brazil represents the largest Latin American market for this platform, being ranked fourth in the highest number of users in the world¹⁰. A previous study demonstrated that Facebook users significantly interact with posts containing false information about the effectiveness of amber teething necklaces in relieving symptoms of deciduous teeth eruption¹¹. A population consuming information burdened by myths can contribute to the formation of negative beliefs that shape health discourse, leading individuals to adopt harmful behaviors, which may result in adverse public health consequences, such as discrediting health sciences and professionals¹².

Social media activity, including the creation, consumption, and interaction with health content, offers researchers valuable insights into people's health experiences and behaviors. In this context, this study aimed to qualitatively explore Facebook users' beliefs, experiences, impressions, knowledge, and interests related to amber necklaces. For that, it examined comments in Portuguese about posts that promoted

amber necklaces for teething symptoms relief. For surveillance purposes, this analysis also focused on the timing of the comments and the sociodemographic characteristics of the commenters.

To the best of our knowledge, no other studies have explored users' comments on social media to assess parents' and caregivers' opinions regarding tooth eruption, highlighting the originality of this approach. This study may contribute to dentists and public health professionals in developing strategies that address caregivers' perceptions and reduce the impact of misinformation on this topic.

Material and methods

The authors followed the recommendations of the Consolidated Criteria for Reporting Qualitative Research (COREQ).

Study design

This is a qualitative digital study with a complementary quantitative approach that conducted a content analysis of comments on Facebook posts containing supportive messages about using amber necklaces to alleviate teething symptoms. These comments were sourced from a primary study that employed the CrowdTangle platform to collect and evaluate posts. One investigator collected a sample of 1,000 comments, which included authors' sociodemographic characteristics related to their *personas* (gender, race, and location) and the time since their posting on Facebook (number of days). To perform an inductive thematic content analysis, the investigator used QDAMiner software to divide the comments into units of analysis (sentences, $n = 2,166$) and manually coded them into predefined and pilot-tested thematic categories. These categories were derived from the model "Seeking Health-Related Information Online". The frequencies of the categories, word clouds, and cluster analyses were generated using WordStat software.

Ethics

This study was deemed exempt from approval by the Council of Ethics in Human Research of Bauru School of Dentistry, University of São Paulo. The exemption was granted because federal regulations do not apply to research using publicly available data that does not involve

human subjects. It is noteworthy that while the user data is publicly accessible, it has been anonymized to ensure confidentiality prior to its inclusion in the data repository.

Inclusion and exclusion criteria

To be included in this analysis, the comments must meet all the following criteria: i) the comment must be published in Portuguese; ii) the comment must be related to the use of amber necklace for preventing teething symptoms; and iii) the comment must contain text expressing Facebook users' beliefs, experiences, impressions, knowledge, or interests related to amber necklaces. Conversely, the comments did not provide substantial content for the analysis, and duplicates were subsequently excluded from consideration.

Selection of comments

Given the impracticality of manually evaluating all available content, a sample of 1,000 comments was selected based on criteria established in a previous study¹³. This sample is deemed representative for elucidating the interests of media users. One investigator (OSJ) assessed 3,284 comments from 23 posts with the highest number of total interactions observed in a primary study, which was conducted to evaluate the interaction of Facebook users with amber necklace-related content between August 2016 and August 2021.

In order to reach the number of comments, it was planned to collect 50 comments from each of the 20 posts with the highest number of interactions, totalizing 1,000 posts. Both the posts and comments were presented in order of relevance, as determined by Facebook. If a post had fewer than the required number of comments (fewer than 50 comments), only the comments that met the inclusion criteria were collected, and additional posts were accessed until the final sample size was reached. Comments consisting only of emojis, like “:-)” or those using profile names as markers, such as “Juliana Oliveira” were categorized as having “non-significant content.” Comments not referencing amber necklaces, such as “*this little one is getting more beautiful every day!*” (sentence translated from Portuguese), were also excluded from the analysis.

Fifty comments were collected from posts ranked #1, #3, #4, #7, #12, #13, #17, #25, and #26. No comments were collected from posts ranked #10, #14, #15, #18, #35, #38, and #39,

as none met the inclusion criteria. From posts ranked #2, #5, #6, #8, #9, #11, #16, #19, #20, #21, #22, #23, #24, #27, #28, #29, #30, #31, #32, #33, #34, #36, #37, #40, and #41, the number of comments collected varied from 3 to 49.

A total of 2,284 comments were excluded from the analysis for the following reasons: a) the comment was not published in Portuguese ($n = 1$), b) the comments were not related to the topic of interest ($n = 1,548$), c) the comments did not express significant content for the analysis ($n=536$), and d) duplicate comments ($n = 199$) (Figure 1). It is important to emphasize that these exclusions did not influence the study's findings, as they were a direct consequence of adhering to the inclusion and exclusion criteria. Furthermore, this did not hinder the attainment of the target of 1,000 comments.

Finally, the database with the 1,000 selected comments was created in Google Docs by copying and pasting directly from the Facebook posts. The date of publication of each comment was recorded. Subsequently, all data were entered into a Google Sheets table (Google, Mountain View, USA).

Preprocessing of comments

The included comments were divided into 2,166 units of analysis (sentences), considering commas, periods, exclamation, question marks, and conjunctions. For example, the following comment was divided into four units of analysis: (1) “It was the best thing I did...” (2) “I had no problems with her teething.” (3) “The first little teeth appeared at 6 months” (4) “and today she has 12 little teeth” (sentences translated from Portuguese).

Conceptual framework

The qualitative analysis was conceptualized based on the Seeking Health-Related Information Online model¹⁴, which integrates factors from the three most relevant models related to the topic: the Comprehensive Model of Information Seeking¹⁵, the Situational Theory of Problem Solving¹⁶, and the Planned Risk Information Seeking Model¹⁷. The model comprises psychosocial, instrumental, contextual, and demographic factors.

Psychosocial factors

The Seeking Health-Related Information Online model synthesizes seven psychosocial factors from the models: attitudes towards seek-

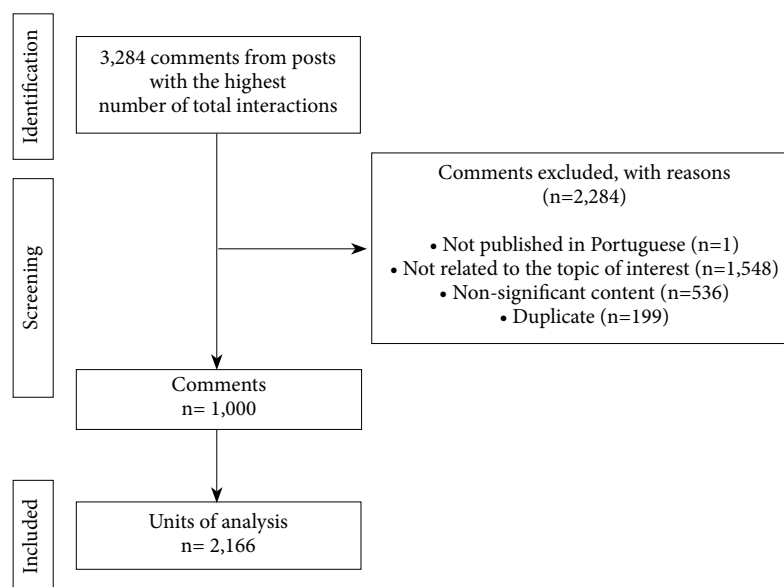


Figure 1. Flowchart illustrating the data collection.

Source: Authors.

ing, subjective norms of seeking, perceived behavioral control over seeking, risk perception, affective responses to risk, perceived knowledge, and knowledge insufficiency. Accordingly, this study interprets the psychosocial factors as a) the user's self-efficacy in obtaining information on social media, b) the risk perception of teething, c) concern/anxiety about teething symptoms, and d) concern/anxiety about the use of amber necklaces.

Instrumental factors

Instrumental factors are related to the perceived reliability and utility of information-seeking channels. The model identifies four pertinent instrumental factors: i) utility, concerning the satisfaction of an individual's health information needs and preferences; ii) reliability, denoting the belief in the information source's dependability; iii) credibility, referring to the trustworthiness of the information conveyed; and iv) quality, regarding the evaluation of the information's merit. In this context, quality, reliability, and utility were assessed in terms of users' judgments about the information presented in the posts and Facebook's effectiveness as a health information source.

Contextual factors

Although the Seeking Health-Related Information Online model introduces Internet usage as a contextual factor, this study does not include it, assuming active Facebook commenters inherently use the Internet for such interactions. Therefore, all analyzed comments came from Internet users.

Demographic factors

Each profile responsible for the comments was analyzed individually, and its sociodemographic characteristics were collected. The gender of the persona (*female* or *male*) was classified based on the analysis of the user's name and profile picture. Race (*white* or *non-white*) was determined by analyzing the profile picture, when it depicted a person. In cases where gender and race could not be identified – either due to ambiguity in the name (e.g., Feeh Duarte; Rô Batista) or the absence of a person in the profile picture (such as images of landscapes, animals, or illustrations) – the variables were classified as “*undefined*”. Additionally, information about the user's location (*country of origin*) was recorded, and was also considered “*undefined*” if this information was unavailable.

Chart 1. Codification system of the inductive thematic content analysis of comments based on psychosocial and instrumental factors of OHIS model.

Codes	Examples of comments
Psychosocial factors	
A. Self-efficacy (sense of competence to seek, obtain and use health information)	
A1. Competence perceived by the receiver	"I was able to find what I needed, I always manage to find what I want, I said I would find a solution to the issue, it was easy to find this, it seems easy to use this..."
A2. Incompetence perceived by the receiver	"I don't understand any of this, I need help to understand this, I never find what I need, it's so difficult to find a solution to my problem, I don't know how to resolve this anymore..."
A3. Additional receiver's asks related to the amber necklace	"Where can I find more information about this? What is this used for? How do you use this? They say this is good, is it true?"
B. Risk perception of teething (perceived susceptibility and severity of teething, prompting the need for intervention in its management, such as the acquisition or intention to acquire amber teething necklaces)	
B1. Perceived severity by the receiver	"This is more serious than I thought, it's very severe, my child seems like he's going to die..."
B2. Severity not perceived by the receiver	"This isn't a serious issue, it's not severe, my child doesn't feel any of it..."
B3. Receiver's need to take action	"I have to do something about this, I can't stand this situation anymore..."
B4. Lack of receiver's need to take action	"There's no need to do anything, just wait."
B5. Acquisition or intention to acquire the necklace	"I just bought one for my daughter, where can I buy one? How much does it cost? It's beautiful, I want one..."
B6. Lack of intention to acquire the necklace	"I will never buy this, I won't waste money on it, anyone who buys this is throwing money away."
C. Concern/anxiety about teething symptoms (expresses concern/anxiety about teething symptoms)	
C1. Physical discomfort	"I'm worried/anxious about my child's discomfort (pain), I fear that he's suffering a lot..."
C2. Crying	"My daughter is screaming so much, I've never seen so much crying, is it normal to cry this much?"
C3. Fever	"I'm worried/anxious because my daughter has a fever, is it normal to have a fever with the teething...?"
C4. Diarrhea	"My daughter has diarrhea every day because of her teeth. I'm very afraid of a more significant problem..."
C5. Drooling	"My son doesn't stop drooling for a second, he drools a lot!"
C6. Putting hands or objects in the mouth	"Is it normal for a child to have their hand in their mouth all the time while teething? My son puts everything in his mouth, thanks to those teeth!"
C7. Other perceived conditions	"My son has lots of white spots on the roof of his mouth, what could that be?"
D. Concern/anxiety about the use of amber necklace (expresses concern/anxiety about the use of amber teething necklaces)	
D1. Danger alert	"I'm afraid this necklace might cause an accident, what if my child gets strangled by it...?"
D2. Fear of accidents	"Warning! Don't buy or use this necklace! It can be very dangerous..."
D3. Dentist contraindication	"Dentists don't recommend using this necklace. I talked to my daughter's dentist, and she told me not to buy or use it."

it continues

Content analysis

The inductive thematic content analysis utilized QDA Miner and Word Stat software (Provalis Research, Montreal, Canada) for

coding each unit of analysis (n = 2,166) into a single thematic category, based on the Seeking Health-Related Information Online Model (Chart 1). Initially, two independent investigators (OSJ and JRL) analyzed 10% of the to-

Chart 1. Codification system of the inductive thematic content analysis of comments based on psychosocial and instrumental factors of OHIS model.

Codes	Examples of comments
Instrumental Factors	
E. Quality of information (classification of post quality by the receiver)	
E1. The information is of high quality	"Excellent post! Congratulations on the content! Very informative!"
E2. The information is of low quality	"Bad post! Not great, huh? Terrible!"
E3. The information is of questionable quality	"I'm somewhat skeptical about this, I'll believe it when I see it..."
F. Social media reliability (classification of the reliability of Facebook in providing health information by the receiver)	
F1. Facebook is reliable for information about amber necklace	"Everything I find on Facebook is great, Facebook is fantastic!"
F2. Facebook is not reliable for information about amber necklace	"Nothing on Facebook is worth it! What a shame, Facebook!"
G. Information utility (evaluation of content usefulness by the receiver)	
G1. The information is useful or potentially useful	"This information was very helpful, look how great it is, @maria!"
G2. The information is useless	"Useless post! Why is this, my God! Is there nothing better to do than write nonsense?"
H. Teething experience (classification of the receiver's level of experience regarding teething)	
H1. Current experience with the condition	"I'm going through this right now, only God! Only God can help me; it's tough!"
H2. Past experience with the condition	"Thank goodness I've been through this already! Thank God it's over!"
H3. No experience with the condition	"I've never been through this, but it must be tough. I can empathize even without knowing what it's like..."
I. Amber necklace experience (classification of the type of real or expected experience with the amber teething necklace)	
I1. Neutral experience/ knowledge about the amber necklace	"It is very common in Europe, amber is a natural resin from the Baltic Sea, succinic acid is released upon contact with the skin..."
I2. Positive experience from using the amber necklace	"I used it on my daughter, and it was wonderful! I recommend it! Besides being beautiful, it works..."
I3. Negative experience from using the amber necklace	"I used it, and it didn't do anything, it was the same as water..."
I4. Positive expectation about using the amber necklace	"I received one of these from my mom, and I think it'll be great for relieving my child's pain..."
I5. Negative expectation about using the amber necklace	"I got a necklace like this at the baby shower, but I don't really believe it will work. I'll believe it when I see it..."

Source: Authors.

tal sample (n=217) to verify the sufficiency of predefined codes and the need for additional ones. The code I1, "*neutral experience/knowledge about the amber necklace*," was created for sentences conveying neutral information or curiosities about amber necklaces, e.g., "*amber is a fossil resin containing succinic acid*" (translated from Portuguese).

To assess variations in the content of comments about amber necklaces over time, the publication dates of comments on Facebook were recorded, allowing them to be divided into three groups. Comments without an available date were classified as "*undefined*". For comments with an available date, the median number of days since posting was calculated

to differentiate between older and more recent comments. Based on this median value (1,927 days), comments were classified into the following groups: $\leq 1,927$ days since posting (n = 491; 774 sentences) and $> 1,927$ days since posting (n = 493; 1,348 sentences).

Data analysis

QDA Miner software determined the frequency of each code from the manual content analysis. Additionally, automated content analyses through text mining were performed using Word Stat software, generating word clouds of the most frequent words and cluster analyses of word co-occurrences within sentences. The chi-square test ($p < 0.05$) was used to compare the distribution of categories between the three different times.

Results

Table 1 presents the frequency of sociodemographic characteristics observed in the commenters' profiles. Most comments were made by users identified as female (963, 96.3%) and white (818, 81.8%). Regarding country of origin, the profiles were predominantly from Brazil (978, 97.8%).

Table 2 displays the distribution of the frequencies of thematic sentence categories in comments, considering the time since the com-

ment was published. In general, the sentences most frequently related to “*amber necklace experience*” (Code I, n = 594, 27.4%), “*information utility*” (Code G, n = 420, 19.4%), and “*risk perception of teething*” (Code B, n = 381, 17.6%). Within these categories, most sentences were classified into “*positive experience from using amber necklace*” (Code I.2, n = 308, 14.2%), “*the information is useful or potentially useful*” (Code G.1, n = 407, 18.8%), and “*acquisition or intention to acquire the necklace*” (Code B.5, n = 263, 12.1%), respectively.

Some notable changes were identified comparing the content of comments over time (Table 2, $\chi^2 = 451.97$; $p < 0.001$). Concerning psychosocial factors, there was an increase in the frequencies of sentences categorized as “*receivers' doubts related to the information*” (Code A.3, from 5.6% to 8.1%) and “*acquisition or intention to acquire the necklace*” (Code B.5, from 5.9% to 23.6%). Conversely, there was a decrease in the frequencies of sentences categorized as “*perceived severity by the receiver*” (Code B.1, from 4.9% to 0.1%), “*severity not perceived by the receiver*” (Code B.2, from 1.6% to 0.1%), and “*safety warnings*” (Code D.1, from 3.4% to 1.0%).

Regarding instrumental factors, an increase was observed in the frequencies of sentences related to “*the information being useful or potentially useful*” (Code G.1, from 15.7% to 24.5%). In contrast, there was a decrease in the frequencies of sentences categorized as “*current experience with teething*” (Code H.1, from 5.9% to 0.3%), “*past experience with teething*” (Code H.2, from 4.8% to 2.5%), “*no experience with teething*” (Code H.3, from 1.3% to 0.3%), “*neutral experience/knowledge about the amber necklace*” (Code I.1, from 14.2% to 6.6%), and “*positive experience from using the amber necklace*” (Code I.2, from 16.3% to 10.3%). Notably, no sentences were categorized as “*social media reliability*” (Code F) throughout the analysis.

Figure 2 depicts a word cloud of the most frequently found words in the comments. The size of the words is proportional to their frequency within the content, indicating that the larger words were more commonly identified, such as: “*ter*” (to have), “*colar*” (necklace), “*meu*” (my/mine), “*usar*” (to use), “*comprar*” (to buy), “*olha*” (look), “*parir*” (to give birth), and “*dente*” (tooth).

The dendrogram in Figure 3 illustrates the word co-occurrence clusters and their respective distances from each other. Shorter distances between clusters indicate a stronger relation-

Table 1. Frequencies of persona-related sociodemographic characteristics of commenters.

Sociodemographics	Comments (n = 1,000, 100%)
Gender	
Female	963 (96.3%)
Male	15 (1.5%)
Undefined	22 (2.2%)
Race	
White	818 (81.8%)
Non-white	148 (14.8%)
Undefined	34 (3.4%)
Location	
Brazil	978 (97.8%)
Portugal	2 (18.6%)
Australia	1 (0.1%)
Malta	1 (0.1%)
USA	1 (0.1%)
Undefined	17 (1.7%)

Source: Authors.

Table 2. Frequencies of thematic categories of comments' sentences (units of analysis) regarding time since comment publication. Consider percentages into each time frame.

	Time since comment publication			All
	> 1,927 days	≤ 1,927 days	Undefined	comments
Psychosocial Factors				
A. Self-efficacy	94 (6.9%)	80 (10.3%)	2 (4.6%)	176 (8.2%)
1. Competence perceived by the receiver	3 (0.2%)	3 (0.4%)	0 (0%)	6 (0.3%)
2. Incompetence perceived by the receiver	15 (1.1%)	14 (1.8%)	1 (2.3%)	30 (1.4%)
3. Receiver’s doubts related to the information	76 (5.6%)	63 (8.1%)	1 (2.3%)	140 (6.5%)
B. Risk perception of teething	180 (13.4%)	195 (25.0%)	6 (13.6%)	381 (17.6%)
1. Perceived severity by the receiver	66 (4.9%)	1 (0.1%)	3 (6.8%)	70 (3.2%)
2. Severity not perceived by the receiver	21 (1.6%)	1 (0.1%)	0 (0%)	22 (1.0%)
3. Receiver’s need to take action	2 (0.1%)	4 (0.5%)	2 (4.5%)	8 (0.4%)
4. Lack of receiver’s need to take action	7 (0.5%)	5 (0.6%)	0 (0%)	12 (0.6%)
5. Acquisition or intention to acquire the necklace	79 (5.9%)	183 (23.6%)	1 (2.3%)	263 (12.1%)
6. Lack of intention to acquire the necklace	5 (0.4%)	1 (0.1%)	0 (0%)	6 (0.3%)
C. Concern/anxiety about teething symptoms	76 (5.8%)	16 (2.0%)	8 (18.2%)	100 (4.5%)
1. Physical discomfort	20 (1.5%)	9 (1.2%)	2 (4.5%)	31 (1.4%)
2. Crying	15 (1.1%)	0 (0%)	0 (0%)	15 (0.7%)
3. Fever	13 (1.0%)	1 (0.1%)	0 (0%)	14 (0.6%)
4. Diarrhea	1 (0.1%)	1 (0.1%)	0 (0%)	2 (0.1%)
5. Drooling	5 (0.4%)	0 (0%)	0 (0%)	5 (0.2%)
6. Putting hands or objects in the mouth	1 (0.1%)	0 (0%)	1 (2.3%)	2 (0.1%)
7. Other perceived conditions	21 (1.6%)	5 (0.6%)	5 (11.4%)	31 (1.4%)
D. Concern/anxiety about the use of amber necklace	100 (7.4%)	40 (5.2%)	6 (13.6%)	146 (6.8%)
1. Safety warnings	46 (3.4%)	8 (1.0%)	0 (0%)	54 (2.5%)
2. Fear of accidents	32 (2.4%)	20 (2.6%)	6 (13.6%)	58 (2.7%)
3. Dentist contraindication	22 (1.6%)	12 (1.6%)	0 (0%)	34 (1.6%)
Instrumental factors				
E. Quality of information	83 (6.2%)	72 (9.4%)	3 (6.8%)	158 (7.3%)
1. Perception of high-quality information	51 (3.8%)	43 (5.6%)	3 (6.8%)	97 (4.5%)
2. Perception of low-quality information	4 (0.3%)	3 (0.4%)	0 (0%)	7 (0.3%)
3. Perception of questionable-quality information	28 (2.1%)	26 (3.4%)	0 (0%)	54 (2.5%)
F. Social media reliability	0 (0%)	0 (0%)	0 (%)	0 (0%)
1. Facebook is reliable for information about amber necklace	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2. Facebook is not reliable for information about amber necklace	0 (0%)	0 (0%)	0 (0%)	0 (0%)
G. Information utility	217 (16.1%)	197 (25.4%)	6 (13.6%)	420 (19.4%)
1. The information is useful or potentially useful	211 (15.7%)	190 (24.5%)	6 (13.6%)	407 (18.8%)
2. The information is useless	6 (0.4%)	7 (0.9%)	0 (0%)	13 (0.6%)
H. Teething experience	163 (12.0%)	23 (3.1%)	5 (11.4%)	191 (8.8%)
1. Current experience with teething	80 (5.9%)	2 (0.3%)	4 (9.1%)	86 (4.0%)
2. Past experience with teething	65 (4.8%)	19 (2.5%)	1 (2.3%)	85 (3.9%)
3. No experience with teething	18 (1.3%)	2 (0.3%)	0 (0%)	20 (0.9%)
I. Amber necklace experience	435 (32.3%)	151 (19.6%)	8 (18.1%)	594 (27.4%)
1. Neutral experience/knowledge about the amber necklace	191 (14.2%)	51 (6.6%)	2 (4.5%)	244 (11.3%)
2. Positive experience from using the amber necklace	220 (16.3%)	82 (10.6%)	6 (13.6%)	308 (14.2%)
3. Negative experience from using the amber necklace	17 (1.3%)	12 (1.6%)	0 (0%)	29 (1.3%)
4. Positive expectation about using the amber necklace	7 (0.5%)	6 (0.8%)	0 (0%)	13 (0.6%)
5. Negative expectation about using the amber necklace	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total	1,348 (100%)	774 (100%)	44 (100%)	2,166 (100%)

Source: Authors.



Figure 2. Word cloud of the most frequent words found in the Facebook users' comments containing false information about amber necklaces.

Source: Authors.

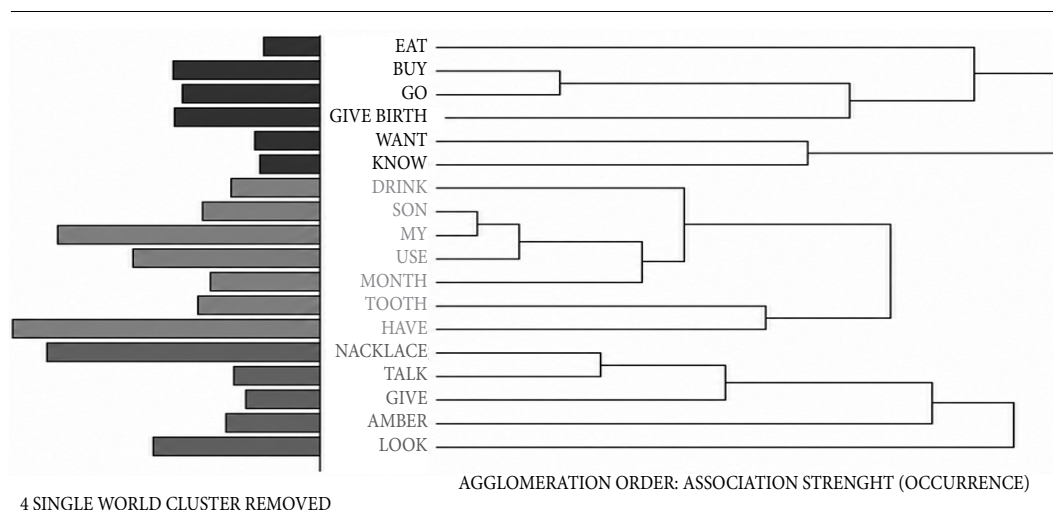


Figure 3. Dendrogram representing the three word clusters represented by dark gray, light gray and medium gray colors.

Source: Authors.

ship. Three clusters were identified, representing the concepts: “desire to learn more about amber necklaces for potential acquisition” (dark gray), “parental communication regarding the use of amber necklaces by their children” (light gray), and “highlights the amber necklace as a potentially relevant consideration” (medium gray).

Discussion

Based on the current state of knowledge, this study represents the first effort to analyze Facebook comments on posts published in Portuguese about amber necklaces. This method proves valuable by directly examining users' perspectives on amber necklaces and their views on teething experiences in an informal, every-

day context. The majority of comments came from users identified as white, female, and Brazilian, with increasing focus on the information value of the posts and the intended purchase of an amulet. However, comments describing personal experiences with teething or expressing concerns about using amber necklaces have significantly declined over time.

The growth of the health industry, along with increased internet access in recent years, has led to people becoming more engaged and interested in healthcare, sometimes challenging the authority of specialized professionals¹⁸. This development has popularized the concept of the ‘informed patient’—individuals who have the skills and knowledge to actively participate in decisions and the management of their own health¹⁹. This trend, combined with gender stereotypes that often depict women as more involved and responsible for childcare, may have influenced the findings of this study. In particular, women showed significant engagement with the topic of amber necklaces and symptoms associated with the eruption of deciduous teeth. These results are consistent with previous research showing that gender is a significant predictor of online health information-seeking behavior, with women accessing more general health information than men^{20,21}. In the context of amber necklaces, marketed to alleviate children’s teething problems, the Facebook comments section also serves as a vital platform for emotional and social support among caregiving women²². Other studies have similarly highlighted that online platforms, such as blogs and message boards, provide support by offering access to health information related to motherhood, including stories, advice, and encouragement from other women^{23,24}.

In contrast to previous findings that suggest the dominant racial group in a country typically has higher socioeconomic status and better access to health resources²⁵, the majority of Brazil’s population is mixed race (45.3%), compared to 43.5% identifying as white²⁶. This suggests that digital content should engage both white and non-white individuals equally. However, the observed disparities may stem from racial bias in the digital space, where white individuals tend to have easier and faster access to information and communication technologies compared to non-white people²⁷. In Brazil, these social inequalities also influence the distribution of information about amber necklaces, which remain a luxury item more commonly owned by those of higher economic status.

Overall, content related to the risk perception of teething has increased over time, driven by the acquisition or intention to acquire amber necklaces. Interestingly, this rise was not reflected in concerns or anxiety about teething symptoms, which declined across all symptoms attributed to the eruption of deciduous teeth. Similarly, content discussing personal teething experiences also decreased over time. However, there was a rise in users’ doubts about the amber necklace, particularly regarding self-efficacy, which may indicate a growing interest in the product and a desire for more information²⁸. These findings suggest that posts about amber necklaces can generate a desire to purchase the product, even when users do not report experiencing related symptoms. In other words, the concept of teething is so culturally ingrained that it fosters an expectation of symptoms and motivates action³, leading to a perceived need to buy an amber necklace. Additionally, users are influenced by marketing tactics and false claims made by vendors on Facebook¹¹, driven by marketing forces that exploit *commodity fetishism*, attributing intrinsic value and power to the amulet.

Despite a slight increase in comments about negative experiences with amber necklaces, alongside a decrease in comments regarding positive experiences, reports of positive outcomes still predominated. This suggests that Facebook users remain inclined towards using amber necklaces, likely influenced by widespread beliefs in the product and the deeply ingrained societal perception of teething symptoms. As a result, users may have a skewed perception of the necklace’s effectiveness. Confirmation bias likely plays a role, as the expected relief from teething symptoms upon using the necklace is perceived as proof of its efficacy, regardless of the actual cause, reinforcing a mistaken belief in causality. This perception appears sufficient to persuade the population to consider using the amber necklace^{29,30}.

The frequent detection of content highlighting the usefulness of information may serve as an indicator of its diffusion, as users tag others, inviting them to view the information in the post³¹. Therefore, a user motivated to share information with a colleague because they find it useful contributes to the spread of inaccurate health information, such as the efficacy of amber necklaces for treating teething symptoms. Additionally, it is observed that individuals who interact more frequently on social media tend to have a greater influence on each other and share more aligned

interests, further increasing the likelihood of users adopting amber necklaces into their daily routines³². Moreover, the decline in reports of concerns and anxiety regarding the use of amber necklaces, encompassing safety warnings, fear of accidents, and dentist contraindications, indicates that Facebook users might not be informed about the risks associated with amber necklaces. This also suggests that dentists may not be communicating the contraindications of these necklaces to their patients efficiently.

This study has some limitations. First, the sociodemographic characteristics of users were determined based on information and photos collected from the users' profiles. This method may lead to the creation of *personas* that do not accurately reflect the real identities of the users. Second, the study did not include posts with videos in the sample. Although videos often receive high levels of engagement, they were excluded due to the complexity of obtaining, processing, and evaluating them according to the inclusion criteria. Third, the analyses were conducted exclusively in Portuguese. As a result, cultural factors might influence how users interact with posts, and it is not possible to determine if similar findings would apply to other languages and cultures. Finally, the virtual nature of the comments may not fully represent the individuals' true opinions about amber necklaces, as people tend to modify their discourse to align with their social networks³².

In conclusion, Portuguese-speaking Facebook users, particularly Brazilians, have shown interest in acquiring amber necklaces, even as testimonials about children's teething symptoms have decreased. The apparent lack of awareness among social media commenters about the misconceptions surrounding amber necklaces may explain the declining expressions of concern regarding the risks the amulet poses to infant health. These findings can help policy-makers understand the harmful impact of posts containing false information on communities, prompting the development of guidelines and laws to curb the spread of misinformation. Additionally, dental professionals should be aware of the myths surrounding amber teething necklaces to improve their interactions with patients. Beyond addressing necklace usage, adopting a family-centered care approach that prioritizes the child is essential. This approach includes providing personalized and respectful education to correct misconceptions about dental health, based on the prior identification of family needs and values³⁴. Additionally, ensuring universal access to oral health, enhancing digital health literacy, and offering high-quality dental information through public campaigns are crucial steps to prevent the spread of misleading messages and to increase the resilience of digital consumers against falsehoods.

Collaborations

Conceptualization: OS Jorge and T Cruvinel; methodology: OS Jorge and T Cruvinel; data curation: OS Jorge, JR Leite and DW Almeida; investigation: OS Jorge and JR Leite; formal analysis: OS Jorge, M Lotto and T Cruvinel; resources: OS Jorge and T Cruvinel; writing: OS Jorge; review and editing: all authors; supervision: T Cruvinel.

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Data availability statement

The data sources adopted in the research are indicated in the article's body. Link Scielo Data: <https://doi.org/10.48331/SCIELODATA.NIDUT2>

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