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Professionalism vs. engagement: quality of SSc information on WeChat

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Background: Systemic sclerosis (SSc) is a rare autoimmune disease, and WeChat is a major source of health information in China. This study assesses the quality of SSc information on WeChat to understand its impact on public knowledge and engagement.

Methods: A total of 375 articles from 9 WeChat public accounts were systematically analyzed using the DISCERN and Global Quality Scale (GQS) tools. Article quality was evaluated based on source credibility, content accuracy, and user engagement, including metrics such as views, likes, and comments.

Results: Individual authors posted 50% of the articles, while non-profit organizations posted 21%, with non-profits providing higher quality content. Disease knowledge dominated (52.8%), yet readers showed higher interest in policy interpretation and rehabilitation. The average DISCERN and GQS scores were 28.96 and 1.62, indicating low quality across articles.

Conclusion: While WeChat facilitates SSc information dissemination, the overall quality is lacking. Enhancing professionalism and interactivity on health information platforms like WeChat could better meet the needs of patients and the public for reliable information.

KEYWORDS

systemic sclerosis, rare diseases, autoimmune disease, WeChat public account, health information quality, DISCERN, social media

Introduction

Systemic sclerosis (SSc), also known as scleroderma, is a rare and complex autoimmune disease characterized by fibrosis of the skin and internal organs, vasculopathy, and immune dysregulation (1–4). Its pathogenesis remains incompletely understood, involving genetic susceptibility, environmental triggers, and immune abnormalities. SSc is more prevalent in North America and Europe, with a U.S. prevalence of approximately 50 per 100,000 and an incidence of 5.6 per 100,000 person-years, predominantly affecting women aged 30–50 (5, 6). The disease often leads to widespread vascular dysfunction and multi-organ involvement, with prognosis strongly influenced by disease subtype (diffuse vs. limited) and the presence of pulmonary arterial hypertension (PAH) or interstitial lung disease (ILD) (7, 8). Although epidemiological data are limited in China, incidence appears to be rising, with significant diagnostic and treatment challenges in resource-limited areas.

In modern society, access to reliable health information is crucial for patients and their families to manage diseases effectively (9, 10). With the rapid development of the internet and information technology, social media has become an important source of health-related content (11, 12). These platforms provide convenient access to information and facilitate communication among patients, contributing to the formation of broader support networks (13, 14). In China, WeChat serves as the most widely used social media platform, offering distinct advantages for health communication due to its large user base and multifunctionality (15, 16). Through official accounts, medical institutions, non-profit organizations, and individuals can share information on disease knowledge, treatment approaches, and recent medical developments (17–19). Ensuring the scientific rigor and reliability of this information remains essential for its effective dissemination (20–22).

The widespread use of WeChat official accounts presents new opportunities for disseminating rare disease information (23). With features such as real-time updates, strong interactivity, and broad reach, WeChat has become an important tool for health communication. However, the quality of health information on the platform varies, with some content lacking scientific basis or potentially misleading. It affects patient decision-making and health management and impacts the credibility of information providers and the platform itself (24–26). Studies on health communication via WeChat show that users can engage through comments, likes, and shares, enhancing the spread and understanding of health content (27). The platform's real-time update capability also helps patients and families access the latest health information and supports personalized health management (28, 29).

Assessing the quality of health information is essential for ensuring that patients receive reliable content (30, 31). DISCERN and Global Quality Scale (GQS) are commonly used tools for evaluating health content's scientific accuracy, practicality, and credibility (32–34). DISCERN focuses on information reliability and treatment options quality, while GQS assesses overall quality and usability (35–37). Applying these tools helps ensure patients receive evidence-based guidance, enhances the credibility of health information, and improves communication effectiveness (38–40). Access to high-quality information is particularly important in rare diseases such as SSc. As a complex autoimmune disorder with diverse clinical manifestations and treatment strategies, SSc requires patients and healthcare providers to rely on accurate medical information for effective management and improved quality of life. Enhancing information quality and optimizing health communication through social media can positively contribute to public health education and patient care.

The study evaluates the quality of treatment information for systemic sclerosis on WeChat and analyzes the long-term operational factors of related WeChat public accounts in information dissemination. Identifying gaps in information quality encourages health information providers to enhance professionalism and reliability, improving patients' access to accurate information. The findings also inform rare disease communication strategies and promote the establishment of more effective information-sharing mechanisms on WeChat by healthcare institutions and non-profit organizations.

Materials and methods

Ethical considerations

Ethical considerations the information utilized in this study was solely derived from publicly available WeChat data, with no involvement of any personal privacy concerns. Clinical data or human specimens were not included in the research, nor was there any direct interaction with users. Consequently, ethical review was deemed unnecessary.

Data collection and analysis

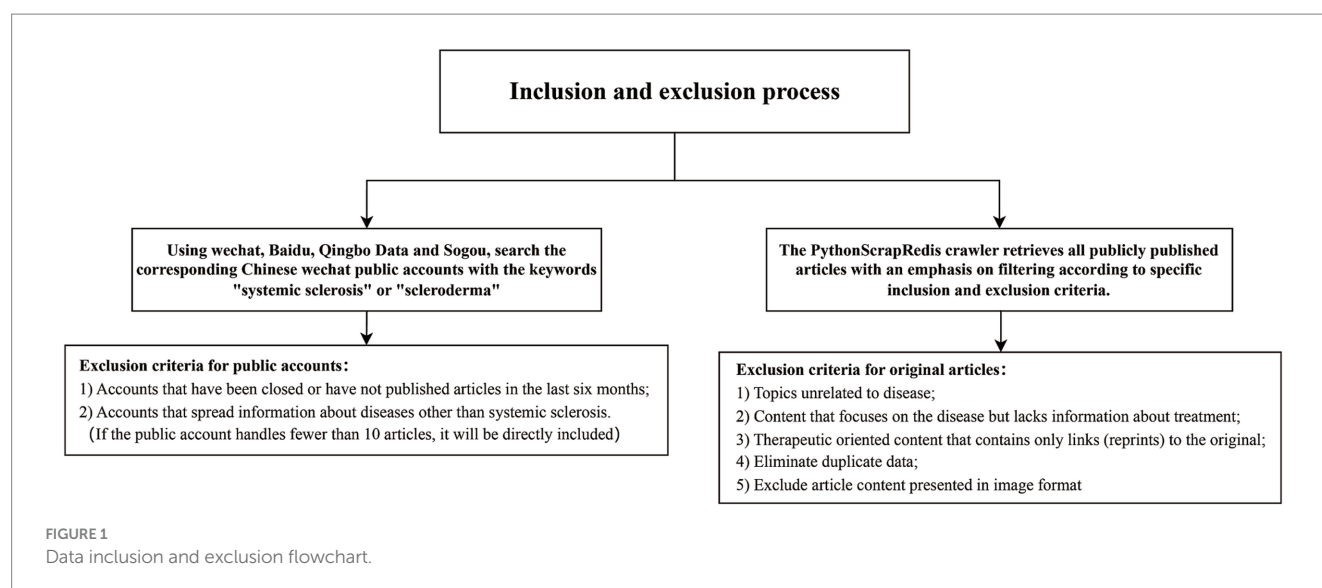
On September 10, 2023, data was collected from WeChat, Baidu, Qingbo, and Sogou, using the keywords “Systemic Sclerosis” or “scleroderma” to identify relevant Chinese WeChat public accounts. Due to the limited number of SSc-related accounts, manual data collection was employed to ensure quality. Researchers manually searched and recorded details of public accounts related to systemic sclerosis or scleroderma, excluding deactivated accounts, those inactive for over 6 months, and accounts not focused on SSc. Account details were documented, such as registration date, operator, posting frequency, and article count.

Using the PythonScrapRedis crawler, all publicly published articles were retrieved and filtered according to specific inclusion and exclusion criteria. PythonScrapRedis, combining Python and Redis, facilitated efficient automated data scraping and processing. Inclusion criteria required articles to be original and provide treatment information related to rare diseases (RDs), while exclusion criteria eliminated irrelevant topics, content without treatment details, reposted links, duplicates, and articles in image format unsuitable for DISCERN evaluation (Figure 1).

This research was designed as a cross-sectional study, with sample size calculation based on previous studies (41–43). An average DISCERN score of 32.3 (SD = 11) was expected. With a 5% invalid data rate, a minimum of 218 cases was required. Proportional random sampling was conducted using R3.4.2 software, ensuring representativeness. Accounts with fewer than 10 processed articles were fully included to maintain sampling accuracy.

Classification of articles

Articles are categorized based on the primary source of WeChat operations (how different entities or organizations publish and manage content on the platform) and the treatment methods introduced in each article. The sources of articles are divided into three categories: (1) public interest organizations (medical funds), (2) commercial companies, and (3) individuals/patients without medical professional backgrounds. The content categories are as follows: (1) functional rehabilitation; (2) nursing; (3) disease knowledge; (4) Western medicine; (5) psychology; (6) policy interpretation; (7) traditional Chinese medicine; and (8) comprehensive treatment involving two or more modalities. The articles are downloaded, and information extracted between September 10, 2023, and October 10, 2023.



Evaluation tools

This study assessed the quality of health information using the DISCERN tool and the GQS. DISCERN evaluates treatment-related health information through 16 items divided into three sections: Part 1 (questions 1–8) assesses reliability, Part 2 (questions 9–15) focuses on treatment quality, and Part 3 (question 16) provides an overall rating (43, 44). Each item is scored on a 5-point scale based on five key criteria: clarity and achievement of objectives, use of reliable sources such as published literature or expert opinion, balance and impartiality of content, availability of additional resources, and discussion of uncertainties. Total scores range from 16 to 80 and are classified as very poor (16–26), poor (27–38), fair (39–50), good (51–62), and excellent (63–80).

The GQS provides an overall assessment of patient content quality and educational value (43, 45). A score of 1 indicates poor quality, missing information, or misleading content with minimal educational value; 2 indicates limited and incomplete content with low technical quality; 3 reflects moderate quality, partially informative content, and basic technical adequacy; 4 indicates good quality with comprehensive and useful content; and 5 represents excellent quality, complete information, and strong educational value.

All evaluations were independently conducted by two senior rheumatologists with extensive clinical experience in systemic sclerosis (Haojie Chen and Yingying Gao). Each rater applied DISCERN and GQS to assess the selected content, with final scores calculated as the average. In cases of significant discrepancy, consensus was reached through team discussion. Inter-rater reliability was assessed using Pearson correlation analysis based on raw scores.

User feedback and behavioral analysis

Two individuals recorded the data. The researchers were experienced senior rheumatologists proficient in diagnosing and treating SSc, utilizing the DISC method during the screening and grading process.

This study delves into understanding user satisfaction and concerns by collecting user feedback on SSc-related articles on the WeChat

platform. The specific methods involved gathering user comments and questions and classifying and conducting sentiment analysis on these responses using natural language processing techniques. User comments and feedback were classified using a Naive Bayes classifier into positive, neutral, and negative categories. Sentiment analysis models and modern pre-trained models (e.g., BERT, GPT) were employed to capture and interpret emotional content in the comments. The study assessed post-article behaviors by analyzing user engagement data, including shares, discussions, and click-through rates. Data collection was facilitated through the data interfaces provided by the WeChat public platform, enabling user comments, shares, and click data extraction.

Application of multiple assessment tools

For a comprehensive and accurate evaluation of therapeutic information related to SSc on the WeChat platform, this study introduced various tools for assessing the quality of medical information. Initially, the accuracy and timeliness of medical information were assessed, evaluating the authenticity, reliability, and whether the content reflects the latest research or clinical guidelines. Rheumatology experts scored the articles to ensure content accuracy and relevance. A reader satisfaction questionnaire was also designed and distributed to collect readers' evaluations of the articles' content, format, and practicality through the WeChat public platform. The questionnaire results were compared and analyzed against the scores from other assessment tools to provide a comprehensive quality assessment. Finally, the survey results were combined with other assessment tools for a comprehensive quality evaluation. Finally, the study developed an integrated evaluation framework using DISCERN and GQS scores to rank and assess the overall quality of the articles.

Statistical methods

Continuous variables were presented using the mean and standard deviation, while non-continuous variables were depicted using the median (interquartile range, IQR). Percentages represented

categorical variables. Group differences were assessed using the Kruskal-Wallis test for non-normally distributed quantitative variables and Dunn's multiple comparison test for pairwise comparisons. Spearman correlation analysis was employed to evaluate relationships between quantitative variables. Statistical significance was defined as $p < 0.05$. Statistical analyses were performed using GraphPad Prism 9.0.0 for Windows (GraphPad Software).

Results

Key directions to enhance content quality and user engagement

This study analyzed 6,408 articles from 9 WeChat public accounts, of which 59% were original content. A random sample of 375 articles was further examined (Table 1). The analysis showed high readership for SSc-related articles, with a total of 172,841 views and a median of 265 views per article. However, user interactions (likes, comments, and shares) were relatively low, with only 2,094 likes, 705 comments, and 1,377 shares. This suggests that despite significant interest in the topic, user engagement remains limited, indicating a one-way flow of information.

Among the accounts, “Multiple Sclerosis Home” showed high activity and readership but relied heavily on reposted content, with a low proportion of original articles. On the other hand, “Scleroderma Systemic Sclerosis” had high posting frequency but low engagement, possibly due to content quality or distribution issues. Notably, “Purple Conch Public Welfare Service Center” and “Scleroderma” demonstrated strong original content creation and good user interaction, highlighting their effective content strategies.

The increasing role of WeChat platform in SSc information dissemination

This study analyzed the time distribution of 6,408 articles published between January 1, 2015, and September 10, 2023, to monitor the activity of WeChat public accounts. Starting in 2019, publication frequency increased noticeably, with a significant peak observed during 2020–2021 (Figure 2).

The data shows that in 2015 and 2016, the number of articles was relatively low, with 25 and 91 articles, respectively. In 2017 and 2018, the number increased slightly to 101 and 193 articles, indicating modest growth. A significant rise occurred in 2019, with 550 articles published, marking increased activity in public

TABLE 1 General information of the public number.

Serial number	Official account	Registration time	Operate body	Last watch interval (days)	Post frequency (week/post)	Number of posts	Number of posts read (M)	Original (%)
1	“Scleroderma Terminus”	20,190,703	Personal	7	3	210	60	208 (99)
2	“Multiple Sclerosis Home”	20,200,326	Institution	1	3	690	693.5	130 (18)
3	“Multiple Sclerosis Research and Treatment Center”	20,200,423	Personal	24	1	147	501	85 (58)
4	“Inner Mongolia Systemic Sclerosis Home”	20,170,921	Personal	19	2	199	23	37 (19)
5	“Scleroderma Systemic Sclerosis”	20,191,031	Individual	1	32	2,765	2	1,682 (61)
6	“Demyelination Fragmentation Mindset”	20,170,101	Personal	51	8	655	262	224 (34)
7	“Science popularization of scleroderma”	20,230,715	Personal	1	4	40	2	40 (100)
8	“Purple Conch Public Welfare Service Center”	20,200,707	Institution	2	7	1,007	422	535 (53)
9	“Scleroderma”	20,160,204	Company	62	2	695	185	690 (99)

*Last correction interval (days): indicates the time difference between the search date and the date the article was last updated.

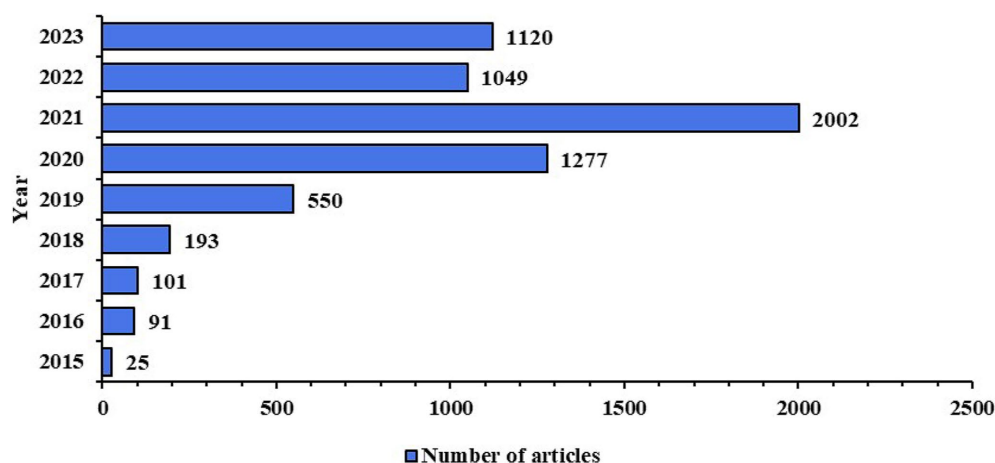


FIGURE 2
Distribution pattern of publication time in the academic paper.

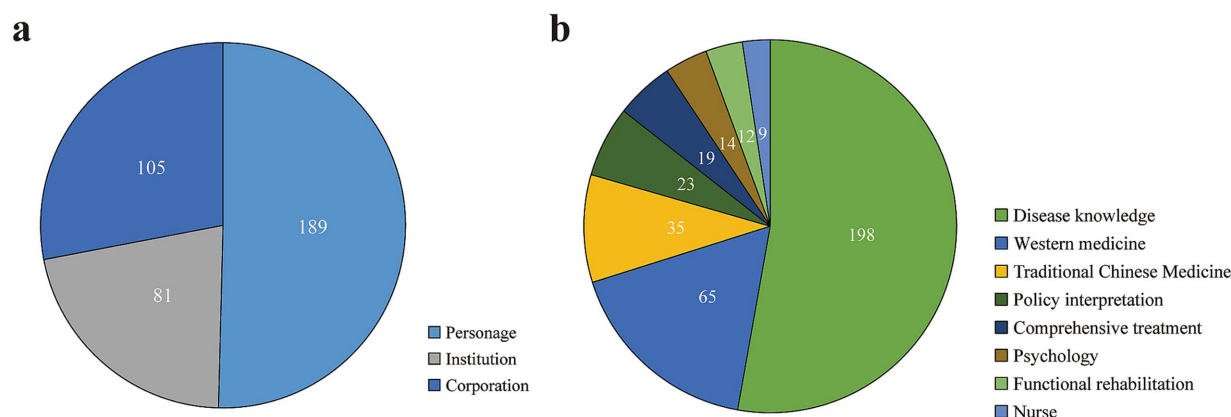


FIGURE 3
Analysis of article sources and content characteristics. (a) Distribution of article sources from the SSc topic on the WeChat public account. (b) Distribution of article themes from the SSc topic on the WeChat public account.

accounts. In 2020 and 2021, articles surged to 1,277 and 2,002, respectively. This spike can be attributed to the expansion of the WeChat user base and a growing demand for SSc-related information. Although the number of articles slightly decreased in 2022 and 2023 to 1,049 and 1,120, respectively, they remained relatively high.

Optimizing content strategy to enhance user engagement

Based on the cited sources (Figure 3a), individuals account for 50% of the articles (189/375), followed by companies at 28% (105/375) and institutions at 21% (81/375). In terms of content, disease knowledge dominates, representing 53% of the total articles (198/375), while other content types include Western medicine (17%), traditional Chinese medicine (9%), and policy interpretation (6%) (Figure 3b). Table 2 presents descriptive statistics for these sources and content types.

Articles on policy interpretation (1,035 views) and functional rehabilitation (852 views) garnered the highest readership, indicating strong reader interest. Articles from institutions had an average reading volume of 538, significantly higher than those from individuals (110) and companies (265), suggesting greater reader engagement with authoritative sources.

Despite the many disease knowledge articles, their user engagement and readership were relatively low. Institutional articles had the highest readership but fewer likes and comments. Although individuals published the most articles, their engagement and readership were moderate. Company articles ranked between those from individuals and institutions across all metrics. Policy interpretation articles had the highest user interaction, followed by functional rehabilitation. Articles on Western medicine and psychology showed moderate readership but lower interaction, while traditional Chinese medicine and comprehensive therapy had the lowest engagement. In summary, policy interpretation and functional rehabilitation articles attracted more readership and engagement than other content types.

TABLE 2 Characteristics of articles by sources and contents [M(IQR)].

Variables	N%	Reading	Likes	Comments	Watching
Article sources					
Personal	189 (50.4)	110 (41,481)	4 (0,8)	0 (0,0)	4 (1,8)
Institution	81 (21.6)	538 (342,1,012)	2 (1,6)	0 (0,1)	1 (0,3)
Company	105 (28)	265 (168,356)	1 (0,2)	1 (0,3)	1 (0,1)
Article content					
Functional Rehabilitation	12 (3.20)	852 (68,1,078)	6 (1,13)	0 (0,0)	7 (1,12)
Nursing Matters	9 (2.40)	146 (39,217)	2 (0,4)	0 (0,4)	1 (1,3)
Disease Knowledge	198 (52.8)	217 (82,398)	2 (0,4)	0 (0,1)	1 (0,3)
Western Medicine	65 (17.33)	450 (310,848)	2 (1,5)	0 (0,1)	1 (0,3)
Mental	14 (3.73)	300 (185,694)	7 (5,16)	1 (0,8)	5 (3,9)
Policy Interpretation	23 (6.13)	1,035 (523,1,379)	22 (6,35)	4 (1,8)	10 (5,16)
Traditional Chinese Medicine (TCM)	35 (9.33)	81 (32,167)	2 (0,5)	0 (0,0)	2 (0,4)
Combination Treatment	19 (5.07)	100 (59,937)	6 (1,13)	0 (0,0)	4 (1,11)

TABLE 3 Article DISCERN score by item ($\bar{X} \pm S$).

Questions (1–5 marks/item)	$\bar{X} \pm S$	95%CI
Reliability of article content (8 items)		
1. Is the goal clear?	1.64 ± 0.63	1.57 ~ 1.69
2. Have you achieved your expected goals?	1.96 ± 0.78	1.87 ~ 2.03
3. Does the content meet the needs of patients?	1.97 ± 0.51	1.91 ~ 2.01
4. Is the source of the content information clear?	1.98 ± 0.78	1.91 ~ 2.07
5. Is the source of the information used or reported in the article clear?	2.04 ± 0.57	1.98 ~ 2.10
6. Is it objective and impartial?	2.22 ± 0.79	2.14 ~ 2.30
7. Do you provide details such as sponsor and citation information?	2.17 ± 0.70	2.09 ~ 2.23
8. Does it mention areas that have not yet been defined?	2.25 ± 0.77	2.17 ~ 2.32
Details of treatment information (7 items)		
9. Is each treatment option described?	1.83 ± 0.76	1.76 ~ 1.91
10. Are the benefits of each therapy described?	1.38 ± 0.78	1.3 ~ 1.46
11. Are the risks of each therapy described?	1.64 ± 0.76	1.57 ~ 1.72
12. Does it describe the possible consequences of not pursuing treatment?	1.48 ± 0.9	1.39 ~ 1.57
13. Is the impact of treatment options on quality of life described?	1.37 ± 1.31	1.31 ~ 1.42
14. Is there a clear description of the multiple therapies that may exist?	1.47 ± 0.78	1.39 ~ 1.56
15. Do you support joint decision making?	1.50 ± 0.5	1.45 ~ 1.56
Overall article quality (1 item)		
16. Based on the above questions, score the overall quality	2.04 ± 0.69	1.96 ~ 2.11
Total points	28.96 ± 7.13	28.24 ~ 29.69

The urgency of enhancing information quality on SSs through DISCERN evaluation

This study assessed the quality of systemic sclerosis-related articles on WeChat using the DISCERN tool (Table 3). The results showed an average score of 28.96 (SD = 7.13), with an overall quality rating of “poor.” The analysis indicated that scores were mainly concentrated in

Parts 1 and 2, with few high scores (4 and 5), reflecting deficiencies in content reliability and treatment details (Figure 4).

In Part 1 (content reliability), the average score for 8 items was 16.23 (SD = 3.42). Better-performing questions included “Is the information objective and impartial?” (2.22, SD = 0.79) and “Does it address undefined areas?” (2.25, SD = 0.77). However, low scores for “Is the objective clear?” (1.64, SD = 0.63) and “Has the objective been

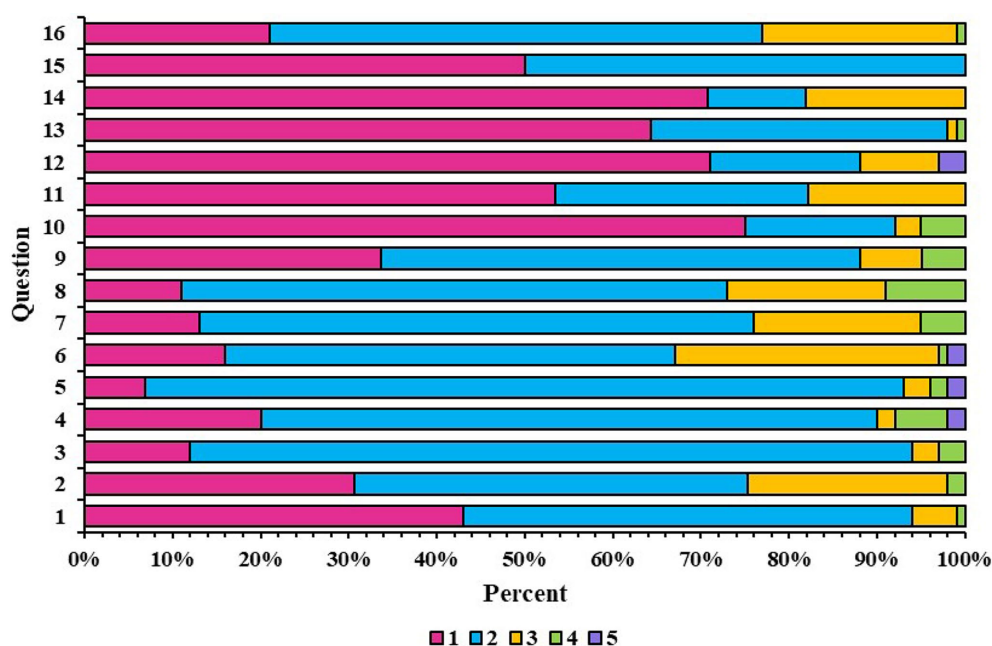


FIGURE 4
Individual distribution of DISCERN scores in percentage.

achieved?" (1.96, SD = 0.78) indicated weaknesses in goal setting and achievement.

In Part 2 (treatment information details), the average score for 7 items was 10.69 (SD = 3.75). The lowest scores were for "Does it describe the benefits of each therapy?" (1.38, SD = 0.78) and "Does it describe the impact of treatment options on quality of life?" (1.37, SD = 1.31), indicating significant information gaps. Relatively higher scores were observed for "Does it describe each treatment option?" (1.83, SD = 0.76) and "Does it describe the risks of each therapy?" (1.64, SD = 0.76), but overall, these aspects were still lacking.

In Part 3 (overall article quality), the average score was 2.04 (SD = 0.69), indicating poor overall quality, particularly due to the lack of detailed descriptions of treatment benefits and quality of life impacts.

DISCERN scores for different categories

The DISCERN scores for articles from different sources (Figures 5a–d) and content types (Figures 5e–h) were evaluated (Figure 5). In Part 1 (Content Reliability), non-profit organizations scored significantly higher than businesses and individuals ($p = 0.0007$ and $p = 0.016$). Articles on common knowledge and psychology outperformed those on traditional Chinese medicine and disease knowledge ($p = 0.046$, $p = 0.0005$, and $p = 0.042$), highlighting the higher reliability of non-profit articles, particularly in these areas.

In Part 2 (Treatment Information Details), non-profit organizations again achieved significantly higher scores than businesses and individuals ($p < 0.0001$ and $p = 0.0005$). Articles on functional rehabilitation, Western medicine, and policy interpretation scored better than those on disease knowledge

($p = 0.002$, $p = 0.0058$, and $p = 0.014$), while psychology also outperformed both disease knowledge and traditional Chinese medicine ($p < 0.001$ and $p = 0.013$).

In Part 3 (Overall Quality), non-profit organizations continued to lead with significantly higher scores compared to businesses and individuals ($p < 0.0001$ in both comparisons). Articles on psychology and Western medicine scored better than disease knowledge ($p = 0.006$ and $p = 0.017$). Overall, non-profit organizations had superior total scores across all sections ($p < 0.0001$ and $p = 0.009$), with articles on functional rehabilitation, Western medicine, policy interpretation, and psychology consistently outscoring disease knowledge and traditional Chinese medicine ($p = 0.007$, $p = 0.023$, $p = 0.019$, $p = 0.0002$, and $p = 0.043$).

GQS scores for articles of different categories

Based on the evaluation of article quality from different sources (a) and content (b), the overall average GQS score was 1.62 (SD = 0.72), indicating a classification of "poor." The results depicted in Figure 6 show that the scores of articles from public organizations were significantly higher than those from companies and individuals ($p < 0.0001$ and $p = 0.001$). Functional rehabilitation, psychology, policy analysis, and general knowledge scores were notably higher than disease knowledge (with respective p -values of 0.01, 0.000, 0.04, and 0.017). The findings indicate that the quality of articles from public organizations surpasses those from businesses and individuals. Additionally, articles relating to functional rehabilitation, Western medicine, psychology, policy analysis, and general knowledge demonstrated higher quality than others.

Based on the DISCERN and GQS scores mentioned above, it was found that the quality of WeChat articles related to SSC was subpar,

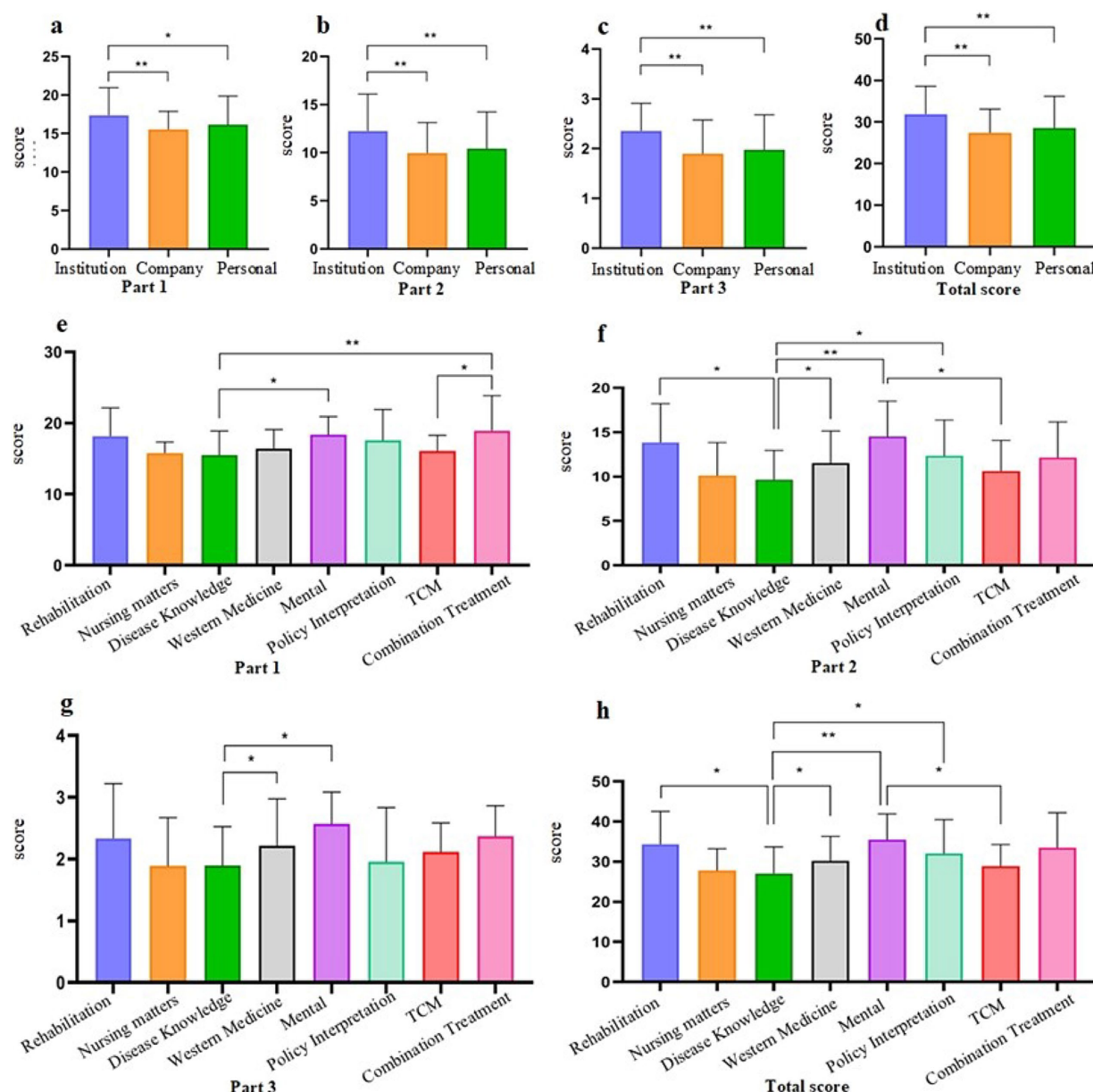


FIGURE 5
DISCERN scores originating from different sources (a–d) and content types (e–h) (* $p < 0.05$, ** $p < 0.001$).

with a maximum DISCERN score of 199 (375 points, accounting for 53%) and a maximum GQS score of 196 (100 points, accounting for 52%). Upon pairwise comparison of the five levels in DISCERN and GQS, no significant differences were observed ($Z = -0.105$, $p = 0.916$), indicating that both scoring systems used for evaluation equally reflected article quality (Table 4 and Figure 7).

Correlation analysis: enhancing article quality to increase user engagement

Spearman correlation analysis reveals significant relationships among the number of reads, likes, comments, and views of articles

on SSc. Specifically, a strong positive correlation is observed between the number of reads and likes ($r = 0.54$, $p < 0.0001$), indicating that articles with higher readership tend to receive more likes. Furthermore, a moderate positive correlation exists between reads and views ($r = 0.42$, $p < 0.0001$), suggesting increased readership is associated with more views. While the correlation between comments and reads is weak ($r = 0.11$, $p = 0.042$), it is statistically significant. There is also a moderate positive correlation between likes and comments ($r = 0.16$, $p = 0.003$) and a strong correlation between likes and views ($r = 0.55$, $p < 0.0001$). Overall, there is a strong positive correlation between comments and views ($r = 0.33$, $p < 0.0001$), indicating a certain interplay of user interaction across different metrics (Table 5).

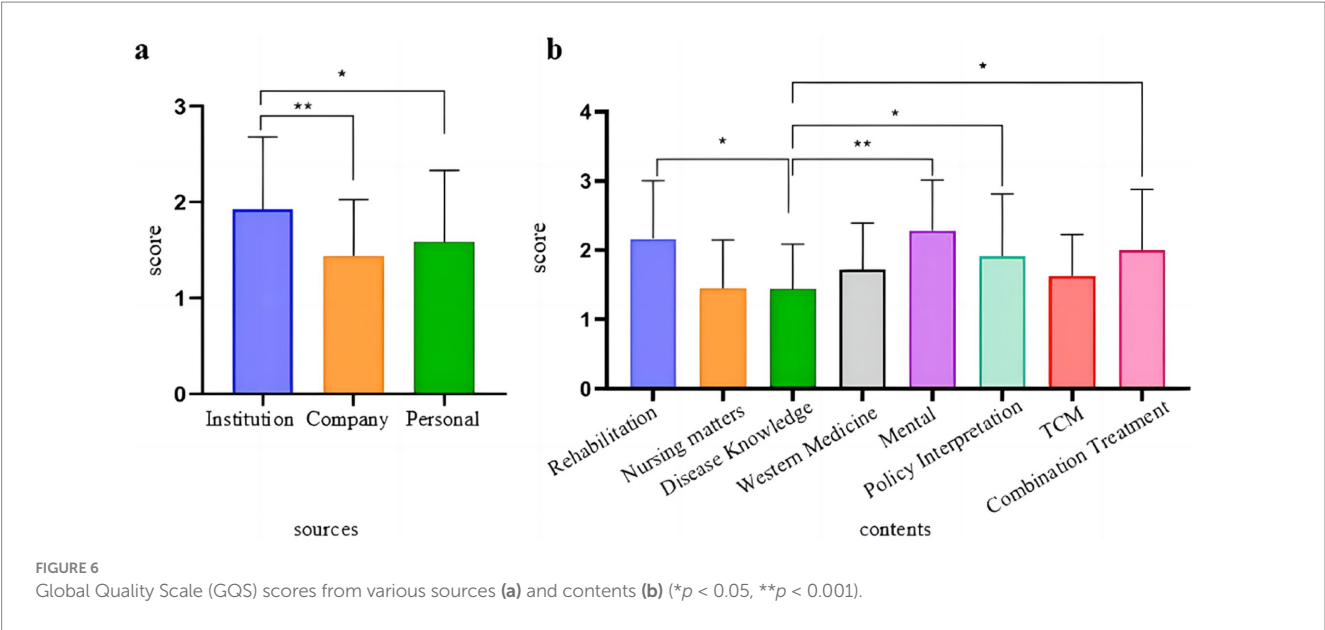
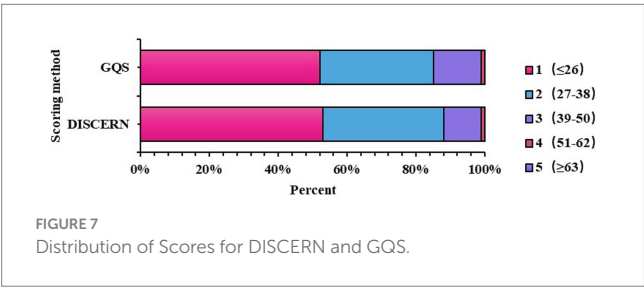


TABLE 4 Five-level distribution of DISCERN and GQS ($n = 375$).

Variables	N%
DISCERN	
≤26, Very bad	199 (53)
27–38, Poor, average	132 (35)
39–50, Intermediate	43 (11)
51–62, Good	1 (1)
≥63, Excellent	0 (0)
GQS	
1 Very poor	196 (52)
2 Poor, average	127 (33)
3 Medium	51 (14)
4 Good	1 (1)
5 Excellent	0 (0)



Furthermore, the study indicates a significant positive correlation between article quality scores (DISCERN score) and the number of reads ($r = 0.37$, $p < 0.0001$), likes ($r = 0.33$, $p < 0.0001$), and views ($r = 0.28$, $p < 0.0001$). GQS score also shows a positive correlation with reads ($r = 0.35$, $p < 0.0001$), likes ($r = 0.29$, $p < 0.0001$), and views ($r = 0.26$, $p < 0.0001$). These findings suggest that articles of higher quality are more likely to attract readers, likes, and views (Table 6).

User feedback and behaviors revealing information needs

The sentiment analysis of user comments reveals that out of a total of 300 comments, positive sentiments hold the highest proportion at 40% (120 comments), followed by neutral comments at 35% (105 comments) and negative comments at 25% (75 comments) (Table 7 and Figure 8A). Furthermore, the study examines user behavior data following article publication, encompassing sharing, discussing, and click-through rates. The analysis of user behavior data indicates that post-reading actions primarily concentrate on click-through rates (41.7%, 250 times), discussions (33.3%, 200 times), and sharing (25%, 150 times), signifying substantial user interest in the related articles (Table 8 and Figure 8B).

Multidimensional assessment of SS*c* information quality

For a comprehensive and accurate evaluation of treatment-related information on the WeChat platform concerning SS*c*, this study introduced various tools for assessing the quality of medical information. Firstly, accuracy and timeliness assessments were conducted by experts in the rheumatology field to rate the content of the articles, ensuring the accuracy and timeliness of the information. The expert ratings showed an average accuracy score of 7.8 (SD = 1.2), and an average timeliness score of 8.1 (SD = 1.1) (Figure 9a). A reader satisfaction survey was also designed and distributed to collect readers' feedback on the articles' content, format, and utility through the WeChat public platform. The survey results were compared and analyzed alongside scores from other evaluation tools to provide a comprehensive quality assessment. The reader satisfaction survey indicated an average score of 4.2 for content quality (SD = 0.8), a 4.0 average score for design (SD = 0.7), and a 4.5 average score for utility (SD = 0.6), suggesting overall high satisfaction (Figure 9b). Finally, by combining DISCERN and GQS scores, a comprehensive evaluation index system was developed to rate and rank the overall quality of the articles. The results of the comprehensive evaluation index system demonstrated that the average DISCERN score

TABLE 5 Correlation analysis among variables.

Variables	Statistics	Reads	Likes	Comments	Watching
Reads	R-value	1	–	–	–
	p-value	–	–	–	–
Likes	R-value	0.54	1	–	–
	p-value	< 0.0001 ^b	–	–	–
Comments	R-value	0.11	0.16	1	–
	p-value	0.042 ^a	0.003 ^a	–	–
Watching	R-value	0.42	0.55	0.33	1
	p-value	< 0.0001 ^b	< 0.0001 ^b	< 0.0001 ^b	–

^a*P* < 0.05, ^b*P* < 0.001.

TABLE 6 Correlation analysis between variables and ratings.

Variables	Statistics	DISCERN	GQS
Reads	R-value	0.37	0.35
	p-value	<0.0001	<0.0001
Likes	R-value	0.33	0.29
	p-value	<0.0001	<0.0001
Comments	r-value	0.09	0.08
	p-value	0.05	0.09
Watching	R-value	0.28	0.26
	p-value	<0.0001	<0.0001

^a*P* < 0.05, ^b*P* < 0.001.

TABLE 7 User comment sentiment analysis.

Affective category	Number of comments	Percent
Positive	120	40%
Neutral	105	35%
Passive	75	25%

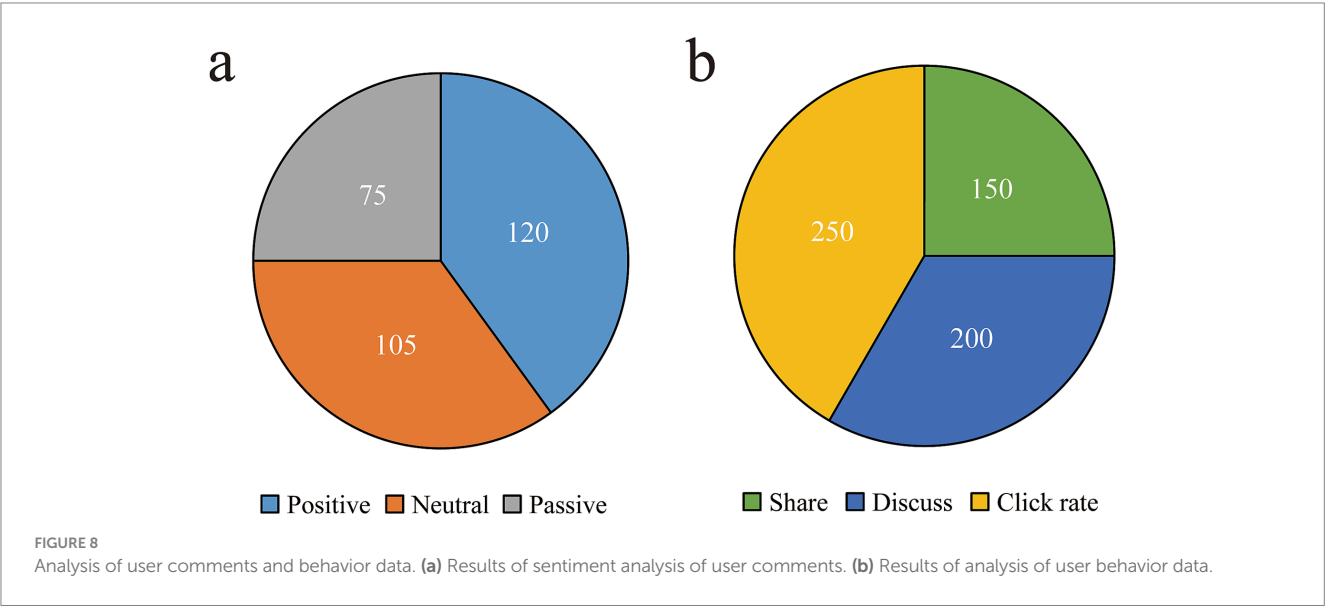
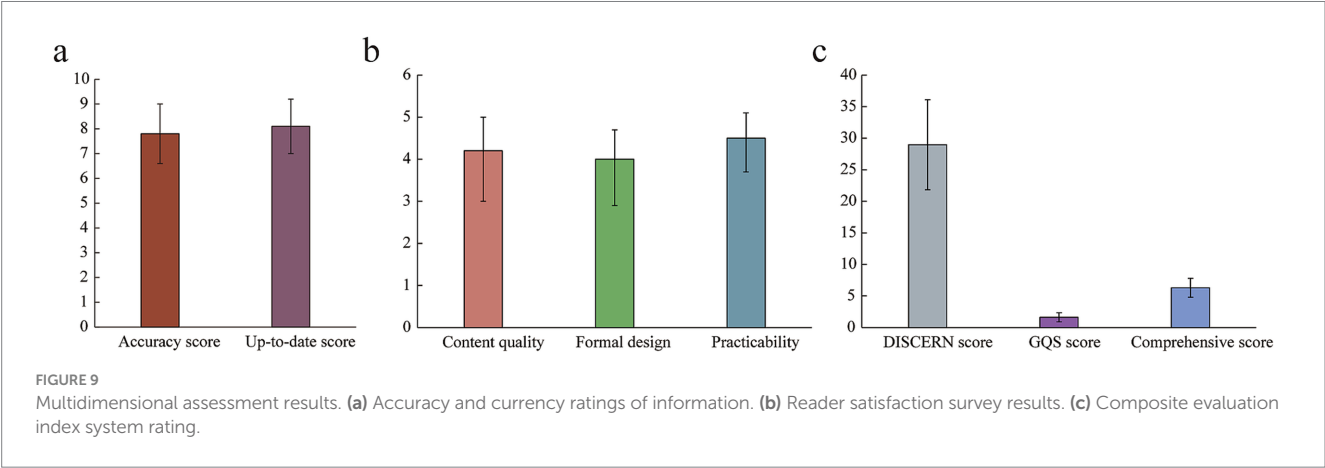


TABLE 8 User behavior data analysis.

Behavior category	Frequency of action	Percent
Share	150	25%
Discuss	200	33.3%
Click rate	250	41.7%



was 28.96 (SD = 7.13), the average GQS score was 1.62 (SD = 0.72), and the average composite score was 6.3 (SD = 1.5) (Figure 9c).

Discussion

This study aimed to systematically evaluate the quality of treatment-related information on SSc published via WeChat and to explore factors influencing the establishment and long-term operation of rare disease public accounts. A total of 375 treatment-related articles were randomly selected from various SSc-related WeChat accounts. Their sources, content, and dissemination characteristics were analyzed. The quality of the articles was assessed using the DISCERN and GQS tools, and interaction metrics such as comments, shares, and views were extracted via the WeChat platform interface to examine the relationship between information quality and user engagement. Results showed that although most articles were published by medical non-profit organizations and focused on health education, the overall quality was generally low. High-quality accounts were limited, making it difficult to fully meet the information needs of patients. This study provides data support for evaluating the quality of rare disease-related health content on WeChat and offers guidance for improving communication strategies and enhancing public access to reliable medical information.

Low-quality health information may pose multiple risks to patients with SSc. Misleading content can lead to delayed recognition of early symptoms such as Raynaud's phenomenon or skin thickening, resulting in missed opportunities for timely intervention. Some online articles underestimate the severity of SSc, mischaracterizing it as a minor skin or circulatory issue and delaying professional care. Claims about herbal remedies or supplements "curing" SSc, commonly found on social media,

often lack scientific support and may cause side effects or interfere with standard treatments (46, 47). On platforms like WeChat, traditional medicine content emphasizing "natural and side-effect-free" remedies may mislead patients into avoiding evidence-based treatments. Exaggerated descriptions of disease severity may also increase patient anxiety and affect mental health. Exposure to information that contradicts medical advice can weaken trust in healthcare professionals and reduce treatment adherence. Improving the quality of SSc-related health information is therefore critical to support informed decision-making, timely care, and long-term disease management. Articles authored by non-profit organizations demonstrated higher quality and broader reach. The significant variation in content quality across WeChat highlights the need for improved health communication strategies. Using tools such as DISCERN and GQS strengthens the reliability of the findings and provides a scientific foundation for enhancing the quality of SSc-related content on social media platforms.

This study identified several key similarities and differences compared to previous research on social media health information dissemination. Whereas previous studies often regarded health information authored by companies as high in quality and credibility, this study found that articles written by companies had relatively lower quality, possibly due to the authors' professional backgrounds and review mechanisms within these companies. Non-profit organizations, on the other hand, rigorously vet their information before publication, often having it written by professionals, which may be a primary reason for the higher quality of their articles (48–50). Articles written by individuals varied in quality, reflecting gaps in their medical knowledge and writing standards (51).

The study revealed a correlation between information quality and reader engagement. High-quality articles tended to attract

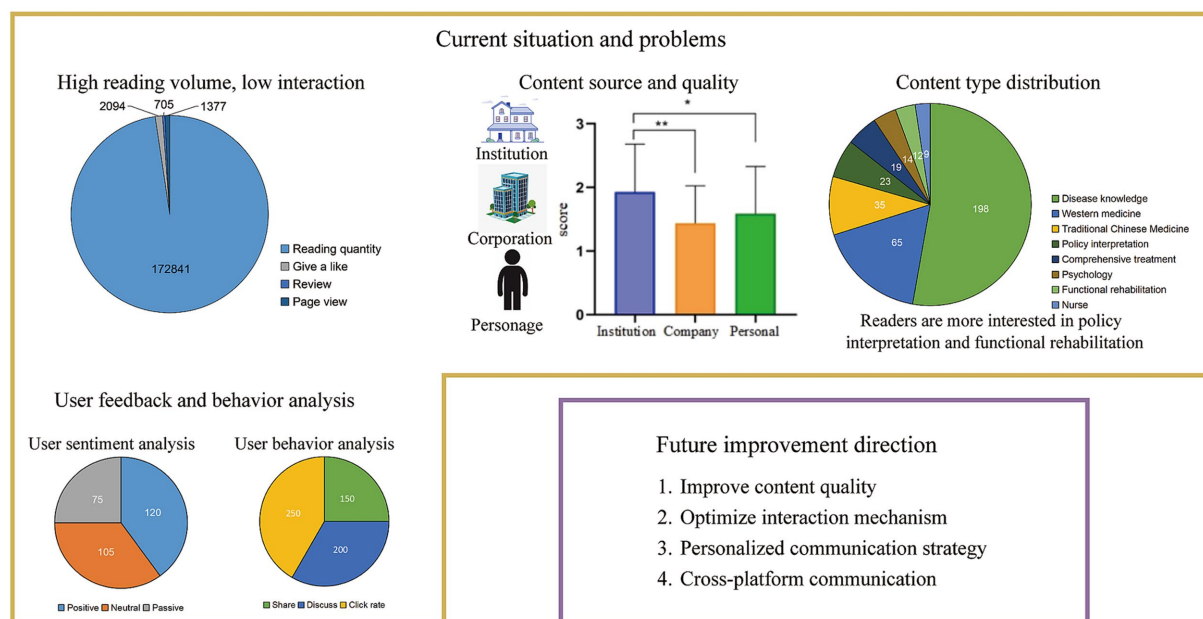


FIGURE 10

Current situation and improvement direction of SSC information dissemination on WeChat platform.

more views, likes, and comments, aligning with findings on other social media platforms. Specifically, articles on policy interpretations and functional rehabilitation addressed readers' practical needs and demonstrated higher engagement levels (52, 53). Improving information quality enhances reader engagement and fosters trust in the information source (54–56).

In this study, the quality of health information was systematically assessed using two evaluation tools, DISCERN and GQS. DISCERN primarily evaluates the reliability and quality of treatment choices in information, while GQS assesses the overall quality and utility of the information (57). The results indicated that most WeChat articles received low DISCERN and GQS scores, indicating subpar quality. Compared to other information quality assessment tools, DISCERN and GQS are straightforward and provide comprehensive evaluations; however, they still entail subjectivity. Future research could integrate multiple evaluation tools to enhance the objectivity and accuracy of assessment results (58). These strategies will enhance the effectiveness of systemic sclerosis information dissemination on WeChat, better meeting users' health information needs.

WeChat faces challenges in disseminating information about systemic sclerosis, including varying credibility and content quality, but it also offers unique opportunities, such as expert Q&A and interaction in the comment section (59, 60). Enhancing the professionalism and training of information publishers can improve content quality (61). Non-profit organizations are crucial in spreading high-quality information that positively impacts patient education and disease management. Standardizing content review and publishing processes can help raise the overall quality of health information on the platform.

Improving the quality and efficiency of WeChat health communication requires establishing a trusted information environment that offers better support and community connections for

SSc patients. WeChat can prioritize and promote high-quality SSc articles based on metrics such as views, likes, and comments, enhancing reliable health information delivery. A multi-tiered content review system should be established to ensure that health information is professionally vetted, improving its scientific accuracy and reliability. This approach will not only increase the credibility of information sources but also motivate authors to produce higher-quality content. Encouraging patients and families to share personal stories or treatment experiences and integrating them into the content will foster engagement and provide valuable insights for others.

Operating a WeChat public account dedicated to RDs requires a focus on professionalism, interactivity, and sustainability (23). Non-profit organizations have accumulated valuable experience through long-term operations, and their successful practices can serve as models for other public accounts (50, 62, 63). For instance, strategies such as regularly publishing high-quality articles, organizing online and offline activities, and providing professional consultation services (64–66) are crucial. Reader engagement is also a key operational strategy; enhancing user loyalty and trust by responding to reader comments and inquiries is essential. In the future, public accounts should pay further attention to the content's professional nature and readers' actual needs in information dissemination (67, 68).

This study has several limitations. First, the sample was drawn from only nine WeChat public accounts, which may not fully represent all SSc-related health information on the platform, introducing potential selection bias. Second, although DISCERN and GQS are evidence-based tools, the evaluation process is still influenced by subjective judgment. Differences in interpreting criteria such as "reliability" or "completeness" may lead to inconsistent scores. Moreover, the GQS provides a relatively general assessment, making it less effective in distinguishing finer differences in content quality.

Future research can improve objectivity and reliability by increasing the number of evaluators and conducting inter-rater reliability analyses, such as calculating Cronbach's alpha or ICC. NLP and other AI tools are also recommended to evaluate scientific accuracy and content completeness, reducing human bias. Incorporating objective indicators, such as citation of authoritative sources, data support, and frequency of updates, may enhance comprehensiveness. Engaging patients and experts in the evaluation process can combine user experience with professional judgment, improving practical relevance. The Delphi method could be used to develop more detailed and consistent scoring criteria. Future work should also examine long-term dissemination metrics such as reader feedback, link clicks, and social engagement. Expanding the sample and comparing it across different social media platforms will help to better understand the role of WeChat in health information dissemination.

Overall, this study found that the general quality of SSc-related health information on WeChat is low, though content from non-profit organizations showed better quality and wider reach. The findings provide scientific and clinical references for improving the quality and effectiveness of rare disease communication on the platform. To enhance content quality, the implementation of expert review labels, source credibility tags, and classification systems is suggested. Introducing user rating mechanisms may increase transparency, interaction, and trust, supporting patient education and disease management. These limitations highlight the need for larger-scale studies to validate and extend the current findings. Improving publisher training, content accuracy, and user engagement may better serve patients and families affected by SSc, ultimately improving their quality of life and disease-coping capacity.

Conclusion

This study highlights WeChat public accounts as an important channel for disseminating information on systemic sclerosis (SSc), with non-profit organizations contributing the most reliable content. While disease education dominates published materials, users are more interested in policy and rehabilitation topics. Overall, the quality of SSc-related information is low, especially in content authored by individuals or commercial entities, as reflected by DISCERN and GQS assessments.

Despite high readership, user engagement remains limited, suggesting a need for better interaction mechanisms. Expert evaluations indicate acceptable accuracy and timeliness, but further improvement is needed in treatment-related content and quality of life discussions. Reader satisfaction was generally high, though feedback suggests enhancing content design and practicality.

This study underscores the importance of evaluating health information quality on social media. Clinically, it supports the need to guide patients toward trustworthy sources to improve decision-making, treatment adherence, and outcomes (Figure 10).

Data availability statement

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

Author contributions

LW: Conceptualization, Data curation, Formal analysis, Writing – original draft. YX: Data curation, Formal analysis, Writing – original draft. TW: Data curation, Investigation, Visualization, Writing – original draft. YG: Methodology, Resources, Writing – review & editing. HC: Resources, Validation, Writing – review & editing. XC: Methodology, Project administration, Supervision, Writing – review & editing. BZ: Funding acquisition, Supervision, Writing – review & editing. JC: Supervision, Validation, Writing – review & editing. TC: Conceptualization, Supervision, Writing – review & editing. MW: Funding acquisition, Project administration, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

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