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Cross-Platform Evaluation of Cognitive Behavioral Therapy for Insomnia Content Quality on Chinese Social Media: A Comparative Analysis of TikTok, Kwai, RedNote and Bilibili

Miao-yu Ye
Chengdu University of Traditional Chinese medicine
Yu-ting Fan
Chengdu University of Traditional Chinese medicine
Jun-jie Chen
Chengdu University of Traditional Chinese medicine
Yong-bing Kuang
Hospital of Chengdu University of Traditional Chinese medicine
Wen-han Li
Hospital of Chengdu University of Traditional Chinese medicine
Ting Liu
Hospital of Chengdu University of Traditional Chinese medicine
Xi-lai Zhang
Chengdu University of Traditional Chinese medicine
Jin-xin Dong
727732094@qq.com
Hospital of Chengdu University of Traditional Chinese medicine

Article

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Abstract

Background

Cognitive Behavioral Therapy for Insomnia (CBTI) is the first-line treatment for chronic sleep disturbances, yet patients increasingly access therapeutic guidance through short-form video platforms where information quality remains poorly characterized. This study evaluates the reliability, completeness, and engagement patterns of CBTI-related content across TikTok, Kwai, RedNote, and Bilibili.

Methods

We systematically analyzed 292 videos using four validated instruments (Global Quality Scale, modified DISCERN, Video Information Quality Instrument, and JAMA benchmarks). Fresh platform accounts minimized algorithmic bias in sampling. Composite Quality Index scores were correlated with engagement metrics to assess the relationship between reliability and visibility.

Results

Significant heterogeneity emerged across platforms. Bilibili demonstrated superior overall reliability (highest JAMA and GQS scores, 96.3% authorship attribution) attributable to its long-form format and institutional creator dominance (63.0%). TikTok showed the only significant positive correlation between quality and user engagement ($r = 0.461$, $P < 0.001$), despite shorter video durations. Conversely, Kwai, RedNote, and Bilibili exhibited a quality-engagement paradox where high-reliability content failed to achieve proportional visibility. RedNote displayed a bimodal quality distribution reflecting its lifestyle-oriented ecosystem and high proportion of non-medical creators (51.9%). Notably, Bilibili's high formal compliance (70.4% content completeness) coexisted with relatively low factual accuracy (42.6%), significantly below RedNote's performance (82.7%).

Conclusions

Platform architecture fundamentally shapes CBTI information quality, with Bilibili offering the most comprehensive yet algorithmically disadvantaged content, while TikTok alone successfully aligns quality with reach. The pervasive disconnect between reliability and engagement on three of four platforms poses public health risks, necessitating algorithmic reforms and enhanced creator credential verification to ensure patients encounter evidence-based guidance rather than virally amplified misinformation.

Introduction

Chronic insomnia is the second most common neuropsychiatric ailment, with nearly a third of the general population experiencing insomnia symptoms [1]. Key symptoms include subjective perceptions of difficulty with sleep initiation, sleep maintenance, waking up too early, and dissatisfaction with the sleep duration and overall sleep quality [2]. Epidemiological studies report a prevalence of chronic insomnia among adults at 12%–20% in various parts of the world, with nearly 50% of the cases having a chronic course [3]. Insomnia not only affects the individual’s quality of life and ability to function during the daytime, but also affects the economy through the increased burden on healthcare systems [4, 5]. Thus, chronic insomnia is a disorder that clinicians and public health researchers need to devote their attention to.

Pharmacological and non-pharmacological treatments are used to manage chronic insomnia [6]. Cognitive behavioral therapy for insomnia (CBTI) is a first-line non-pharmacological treatment that integrates systematic components such as stimulus control, sleep restriction therapy, cognitive restructuring, and sleep hygiene education [7]. Results from systematic reviews indicate that CBTI is significantly effective in reducing sleep latency, improving sleep efficiency, and maintaining sleep, with

these effects persisting after treatment concludes [8, 9]. Although its efficacy has been established, the widespread adoption of CBTI is limited by a shortage of trained professionals and limited access to sleep clinics [10], resulting in insufficient public awareness of this treatment option.

With the advent of the digital age, short-video platforms are no longer merely tools for entertainment; they have evolved into new platforms for disseminating educational and medical information [11]. Modern applications such as TikTok and Kwai, with their fast-paced presentation styles and high levels of interactivity, have become important channels for health communication [12, 13]. RedNote has attracted millions of users through its lifestyle-sharing ecosystem [14], while Bilibili primarily engages a young audience via long-form video formats and interactive bullet comments [15]. These platforms exhibit significant structural differences-including the volume of permitted content, target audiences, and algorithmic recommendation logic—resulting in a heterogeneous information environment. Furthermore, the widespread dissemination of medical content on such platforms has raised concerns regarding the authenticity and clinical accuracy of the information [16]. Of particular concern is the so-called “quality-engagement paradox” : recommendation algorithms may boost the visibility of superficial or emotionally provocative content, while high-fidelity, evidence-based medical content struggles to gain sufficient exposure [17, 18].

Given that a considerable proportion of individuals with insomnia prefer self-management approaches to address their sleep disturbances [19, 20], the quality of CBTI-related information on these mainstream social and short-video platforms carries substantial public health significance. Accordingly, this study systematically evaluated CBTI-related educational content across TikTok, Kwai, RedNote and Bilibili platforms, conducting a comprehensive assessment of content quality and informational reliability while examining the congruences and disparities between medical accuracy and user engagement characteristics across different platform contexts.

Materials and Methods

Search Strategy and Data Collection

We executed a cross-sectional study of CBTI-related content on four major Chinese social media platforms: Bilibili, Kwai, RedNote and TikTok. To prevent bias from search history algorithms, we used new accounts with no prior browsing history. Data collection took place on January 14-15th, 2026. To maximize search coverage, we employed two distinct Chinese search terms: the full medical phrase “Cognitive Behavioral Therapy for Insomnia” and the globally recognizable abbreviation “CBTI”. We sampled the results in excess of 110 keywords search in each platform (a total of 440 videos) for screening purposes because previous research has demonstrated that search engine users often peruse less than 100 search results [21].

All videos to be considered for the analysis had to be in Mandarin Chinese or English with Chinese subtitles. Strict search criteria were used to remove duplicate uploads, sponsored ads, and irrelevant content (e.g., videos that had no educational value, were just music, or were just still images), yielding 292 videos to be analyzed (Figure 1).

We analyzed each video in terms of: (1) basic properties (title, length, upload date), (2) presentation (likes, comments, favorites, shares), (3) channel owner identity (who they are, how many followers they have), and (4) video content.

Video Content and Quality Evaluation

Metadata details were collected for every video. This included the URL, engagement metrics such as likes, comments, collections, and shares, video length and duration, creator information, follower count, and a summary of video content.

Creator accounts were taxonomically classified into five distinct categories: licensed physicians, healthcare institutions or medical trainees, patients or laypersons, official media outlets, and independent content creators. Video content depth was graded on an ordinal scale reflecting informational comprehensiveness: Frame Only (Grade A), Single Content (Grades B–F), Multiple Contents (Grade G), and Complete Elaboration (Grade H).

For the purpose of assessing the information quality and reliability, we developed a multi-dimensional evaluation model, which combined four different evaluation models: the Global Quality Scale (GQS), modified DISCERN (mDISCERN), Video Information Quality Instrument (VIQI), and the Journal of the American Medical Association (JAMA) benchmark indicators [22-26]. Based on the aforementioned evaluation tools, we created a Comprehensive Quality Index (CQI) spanning individual scales: GQS (1-5), mDISCERN (0-5), and VIQI (0-20). The scores of these scales were first normalized to a common range of 0-100 using Min-Max normalization and then combined through weighted averaging. The contribution of GQS was set at 40%, while mDISCERN and VIQI were each set at 30%, thereby giving GQS more weight because its evaluation model is more comprehensive in assessing information quality than the other models.

User engagement can be statistically analyzed with a composite metric based on the following formula:

Engagement Score = Likes + (2 × Comments) + (3 × Shares) + (1.5 × Collections)

Engagement Score reflects that comments and shares are rated higher, indicating that they are more valuable and represent a stronger motivation to engage with and disseminate the content.

For the purpose of coding reliability, the research team developed a particular format. This encompassed a total of three iterative pilot coding sessions, which were followed by reconciliation of differences. Scoring in this regard was undertaken independently by two researchers (YMY and FYT), and was complemented by a third author (ZXL) to eliminate all forms of ambiguity.

Data Analysis

The SPSS 27.0 software was used to analyze the data. Continuous variables were tested with a Shapiro-Wilk test to examine their normality. Continuous variables that were normally distributed were described by the mean and standard deviation. The independent samples t-test was used to conduct comparisons between two groups, and the one-way analysis of variance (ANOVA) was used to conduct comparisons among more than two groups. Not normally distributed data were expressed in terms of median (interquartile range). The Mann-Whitney U test was used to compare two groups, and the Kruskal-Wallis H test was used to compare two or more groups. Frequency was used to indicate categorical variables. The chi-square test or Fisher's exact test was used to compare the groups, and multiple comparisons were adjusted with the Bonferroni test. Rank correlation analysis was conducted to determine the strength of the correlation between JAMA scores and engagement scores across platforms, and Pearson correlation analysis was conducted to examine the linear relationship between content depth and other quality scores. The main effects and interaction effects of platform type and content depth were analyzed in a two-way ANOVA to determine the effect on CQI. The effect sizes (η^2) were divided into small, medium, and large according to the predetermined ranges 0.01, 0.06, and 0.14, respectively. The Tukey HSD test was used to conduct post-hoc pairwise comparisons. All were two-sided tests, and a P-value of less than 0.05 was regarded as significant.

Results

Sample Characteristics and Platform Comparison

In total, 292 CBTI-related videos were included for final analysis. Significant heterogeneity emerged across platforms regarding video characteristics and user engagement metrics (Table 1). TikTok had the highest engagement among all platforms, with a median of 72 likes (IQR: 30-128), 6 comments (IQR: 2-16), 18 collections (IQR: 6-69), and 9 shares (all $P < 0.001$ for comparisons with Kwai and RedNote). In contrast, Bilibili videos had a median duration of 1,064 seconds (IQR: 206–2,208), which was significantly longer than TikTok (108 s), Kwai (71 s) and RedNote (141 s) (all $P < 0.001$). Only view count data were available for comparative analysis; Kwai videos had a significantly higher median view count of 1,336 (IQR: 249-2,993) compared to Bilibili (350, IQR: 102-1,410). Additionally, Bilibili content had the oldest median publication dates (780 days, IQR: 420–1,185), compared to TikTok (175 days), Kwai (184 days) and RedNote (138 days). This indicates bias and differences in the content lifecycle among platforms.

Table 1 Characteristics of videos about CBTI on TikTok/ Kwai/ RedNote/ Bilibili

Platform Characteristic	TikTok (N=84)	Kwai (N=74)	RedNote (N=81)	Bilibili (N=54)	*P*-value					
					A VS.B	A VS.C	A VS.D	B VS.C	B VS.D	C VS.D
Likes	72(30–128)	12(4–32)	9(3–21)	3(1–27)	***	***	***	0.157	*	0.076
Comments	6(2–16)	2(1–4)	0(0–2)	0(0–0)	***	***	***	***	***	*
Collections	18(6–69)	1(0–4)	5(1–18)	12(1–94)	***	***	0.318	**	***	0.152
Shares	9(3–43)	2(0–5)	3(0–6)	11(3–322)	***	***	0.226	0.318	***	***
Views	—	1336 (249–2993)	—	350 (102–1410)	—	—	—	—	*	—
Video Length (s)	108 (72–170)	71 (50–146)	141 (73–216)	1064 (206–2208)	**	0.192	***	***	***	***
Publication Days	175 (80–259)	184 (114–512)	138 (68–356)	780 (420–1185)	*	0.318	***	*	***	***

A = TikTok, B = Kwai, C = RedNote, D = Bilibili; ** p < 0.05, ** p < 0.01, *** p < 0.001*.

Uploader Characteristics

There were also large inter-platform variations in the distributions of uploader identity (Table 2). Individual physicians dominated on both TikTok and Kwai (60.7% and 56.8%, respectively), whereas Bilibili had the highest number of medical institutions or trainees (63.0%, P < 0.001 compared to all other platforms). RedNote showed a distinctive mixture of independent content creators (51.9%, P < 0.001 compared to other platforms) and was the only platform that had official media accounts (2.5%). Patient uploaders were only found on Kwai, RedNote, and Bilibili (1.4%, 3.7%, and 3.7%, respectively). Median follower counts varied significantly across platforms (P < 0.001), with Bilibili showing the highest (8,370, IQR: 558-17,000) and RedNote the lowest (1,310, IQR: 147-4,229; P < 0.001 versus other platforms).

This study employed the four benchmarks established by JAMA to systematically evaluate the reliability of health information across four mainstream short-video platforms: Bilibili, RedNote, Kwai, and TikTok. The results revealed significant variations in compliance rates across different platforms and dimensions, reflecting the varying degrees of misalignment between platform content moderation mechanisms and medical communication standards.

Regarding authorship attribution (JAMA-1), Bilibili demonstrated the highest compliance rate at 96.3% (P < 0.05), significantly outperforming other platforms. This finding suggests that content creators on Bilibili demonstrate greater adherence to academic norms by actively attributing sources or author credentials, possibly attributable to the platform's long-established culture of knowledge-sharing and intellectual transparency. Similarly, in terms of content completeness (JAMA-2), Bilibili again led with a compliance rate of 70.4% (P < 0.001), indicating that health-related content on this platform more comprehensively covers essential medical elements, including etiology, symptoms, treatment modalities, and prognosis.

Interestingly, the information accuracy (JAMA-3) dimension presented a distinct platform advantage. RedNote achieved the highest accuracy rate at 82.7% (P < 0.001), significantly surpassing the other three platforms. This finding suggests that despite its origins as a lifestyle-sharing community, RedNote's health content may benefit from robust user interaction and feedback mechanisms that facilitate rapid identification and correction of erroneous or misleading information. In contrast, Bilibili's relatively modest performance in accuracy (42.6%) indicates that high rates of formal compliance (authorship

attribution) do not necessarily guarantee substantive content quality, highlighting a disconnect between procedural adherence and factual precision.

However, conflict of interest disclosure (JAMA-4) emerged as a universal deficiency across all platforms. Only Kwai (13.5%) and Bilibili (14.8%) demonstrated any disclosure behavior ($P < 0.05$ compared to TikTok and RedNote at 0%), yet even these rates remained below 15%.

Aggregating the four criteria into total JAMA scores, Bilibili achieved the highest mean score of 2.24 ± 0.70 ($P < 0.001$ compared to TikTok and RedNote), followed by Kwai at 1.92 ± 0.68 ($P < 0.05$ versus TikTok). TikTok (1.60 ± 0.93) and RedNote (1.58 ± 0.67) ranked lowest. This hierarchy indicates that Bilibili's strengths in formal compliance (attribution and completeness) compensated for its deficiencies in accuracy, while RedNote's leadership in the accuracy dimension was offset by its comprehensive shortcomings in other areas, resulting in lower overall reliability ratings. Notably, the substantial standard deviations—particularly TikTok's 0.93—suggest significant heterogeneity in content quality within platforms, indicating the coexistence of high-quality medical education and low-quality health misinformation, a phenomenon demanding urgent regulatory attention.

Table 2 Comparison of uploader characteristics and information quality across TikTok/ Kwai/ RedNote/ Bilibili

Platform Characteristic	TikTok (N=84)	Kwai (N=74)	RedNote (N=81)	Bilibili (N=54)	**Overall *P*-value**
Author Identity [n (%)]					
Physician	51 (60.7)	42 (56.8)	27 (33.3)***	13 (24.1)***	***
Medical Institution/Trainee	11 (13.1)	23 (31.1)**	7 (8.6)**	34 (63.0)***	***
Patient	0 (0.0)	1 (1.4)	3 (3.7)	2 (3.7)	*
Official Media	0 (0.0)	0 (0.0)	2 (2.5)	0 (0.0)	*
Other Self-Media	22 (26.2)**	8 (10.8)**	42 (51.9)***	5 (9.3)**	***
Followers, Median (Q1, Q3)	7,431 (1,112, 26,063)	4,367 (100, 21,697)	1,310 (147, 4,229)***	8,370 (558, 17,000)	***
JAMA Score [%]					
JAMA-1	84.5	86.5	58.0***	96.3*	***
JAMA-2	28.6	36.5	17.3***	70.4***	***
JAMA-3	46.4	55.4	82.7***	42.6	***
JAMA-4	0.0**	13.5*	0.0**	14.8*	***
Overall Score (Mean±SD)	1.60 ± 0.93	1.92 ± 0.68*	1.58 ± 0.67	2.24 ± 0.70***	***

Video Content and Information Quality Assessment

Content dissemination for videos was not the same for each platform ($P < 0.001$ regarding overall differences). These videos that provide thorough explanations about each component of CBTI all categorize themselves as dominant on TikTok (39.76%), followed by Bilibili (37.04%), RedNote (29.63%), and Kwai (24.32%). Therapeutic technique specialization (e.g., stimulus control therapy and sleep hygiene education) and some TikTok and RedNote content were absent from these categories and were poorly represented.

Patterns are similar when looking at multidimensional quality assessment (Table 3 and Figure 2). Bilibili and Kwai have higher GQS (3.57 ± 0.77 and 3.43 ± 1.01) than each other, while RedNote (2.80 ± 0.94) and TikTok (2.66 ± 0.93) have much lower GQS. The mDISCERN total score was also highest for Kwai and Bilibili (3.28 ± 0.73 and 3.19 ± 0.83), followed by RedNote

(3.05 ± 0.88), and was lowest for TikTok (2.69 ± 0.73; P < 0.001). Importantly, Bilibili showed excellent compliance rates for mDISCERN-1 (100.0%). With VIQI also total scores, which are markedly different (P < 0.001), TikTok recorded the highest mean score (14.65 ± 2.48), although the baseline production quality (VIQI-1) showed great differences across the board (7.2-31.5%, P > 0.05).

Table 3 Evaluation of the content and quality of CBTI videos on TikTok/ Kwai/ RedNote/ Bilibili

Platform Characteristic	TikTok (N=84)	Kwai (N=74)	RedNote (N=81)	Bilibili (N=54)	**Overall *P*-value**
Video Content[n (%)]					
Framework only	22（26.51）	16（21.62）	17（20.99）	10（18.52）	（0.05
Cognitive therapy	10（12.05）	12（16.22）	14（17.28）	13（24.07）	（0.05
Sleep restriction therapy	3（3.61）	5（6.76）	7（8.64）	3（5.56）	（0.05
Stimulus control therapy	0（0.00）	4（5.41）	4（4.94）	0（0.00）	（0.05
Sleep hygiene education	0（0.00）	4（5.41）	0（0.00）	1（1.85）	*
Relaxation training	1（1.20）	2（2.70）	1（1.23）	0（0.00）	（0.05
Explains 2-3 in detail	14（16.87）	13（17.57）	14（17.28）	7（12.96）	（0.05
Explains all in detail	33（39.76）	18（24.32）	24（29.63）	20（37.04）	（0.05
GQS [Mean ± SD]	2.66±0.93	3.43±1.01	2.80±0.94	3.57±0.77	***
mDISCERN-1	81（97.6）	74（100.0）	81（100.0）	54（100.0）	***
mDISCERN-2	61（73.5）	61（82.4）	54（66.7）	47（87.0）	***
mDISCERN-3	77（92.8）	67（90.5）	81（100.0）	37（68.5）	***
mDISCERN-4	1（1.2）	35（47.3）	18（22.2）	4（7.4）	***
mDISCERN-5	3（3.6）	6（8.1）	13（16.0）	30（55.6）	***
mDISCERN-sum [Mean ± SD]	2.69±0.73	3.28±0.73	3.05±0.88	3.19±0.83	***
VIQI-1	6（7.2）	14（18.9）	12（14.8）	17（31.5）	（0.05
VIQI-2	15（18.1）	14（18.9）	10（12.3）	8（14.8）	***
VIQI-3	2（2.4）	5（6.8）	3（3.7）	1（1.9）	***
VIQI-4	24（28.9）	17（23.0）	17（21.0）	16（29.6）	***
VIQI-sum [Mean ± SD]	14.65±2.48	14.01±3.09	14.28±2.27	14.15±3.13	***

Statistical significance was set at *p < 0.05. * p < 0.05, ** p < 0.01, *** p < 0.001.*

The Relationship Between Cross-Platform Information Quality and User Engagement

Quality of information (according to JAMA benchmark criteria) and user engagement features were strongly associated for the four platforms tested (Table 4). TikTok exhibited heterogeneous characteristics that distinguished it from the other three platforms. Notably, TikTok achieved the highest proportion of videos comprehensively covering all core elements of CBTI (39.76%), alongside the highest median user engagement (128, compared to 24–106 on other platforms). Correlation analysis

revealed a positive-albeit-nonsignificant trend between the overall quality metric and the multidimensional user engagement metric (Pearson correlation coefficient r = 0.461), contrasting with the negative or negligible correlations observed on Kwai (r = 0.015), RedNote (r = 0.037), and Bilibili (r = -0.188). Although TikTok's absolute mDISCERN-sum was lower than Kwai and Bilibili, its mDISCERN-1 approached universal compliance (97.6%), and its algorithmic structure appeared to demonstrate selective amplification of comprehensive CBTI content. This suggests that while statistical significance was not achieved, TikTok's ecosystem may function as a relatively more effective curator compared to other platforms, where the disconnect between quality and visibility was more pronounced.

In contrast, the other three platforms exhibited a clear “quality-engagement paradox”. Kwai's compliance rates on key quality sub-metrics (including mDISCERN-2 and mDISCERN-4) were significantly higher than those of other platforms, but no meaningful correlation was found between these quality benchmarks and user engagement metrics. Bilibili was the top performer in GQS scores (3.57 ± 0.77) and achieved the highest scores in VIQI-1 (31.5%) and VIQI-4 (29.6%), but its algorithm showed no correlation between medical accuracy and user engagement distribution. The same disconnect occurred with RedNote, where quality was not predictive of the level of engagement of users. Such contrasting patterns imply underlying differences in the algorithmic philosophies of the platforms, with TikTok representing a distinct category where high-fidelity content and user engagement exhibit greater congruence, despite the absence of statistical significance.

Table 4 Quality-engagement paradox across TikTok/ Kwai/ RedNote/ Bilibili

Platform	N	JAMA (Mean ± SD)	Engagement (Mean ± SD)	Engagement (Median)	Spearman ρ	P value	Pattern
TikTok	84	1.60 ± 0.93	11,614 ± 85,210	128	0.461	<0.001	Positive
Kwai	74	1.92 ± 0.68	1,949 ± 13,841	24	0.032	0.787	Paradox
RedNote	81	1.58 ± 0.67	467 ± 1,943	26	0.157	0.162	Paradox
Bilibili	54	2.24 ± 0.70	1,302 ± 2,988	106	0.065	0.639	Paradox

Content Characteristics and Depth Analysis

Analysis of the Composite Quality Index (CQI) revealed a significant interaction between the platform and content depth ($P < 0.001$). Kernel density estimation results showed that the distribution characteristics of each platform differed (Figure 4, left panel). Kwai and Bilibili exhibited right-skewed distributions, with peaks located in the 60–70 range, suggesting that high-quality content is more concentrated on these platforms. In contrast, TikTok exhibited a clearly left-skewed distribution, with the peak concentrated in the 45–50 range, suggesting that low-quality content predominates. RedNote exhibited a bimodal distribution pattern, with peaks observed in the low-quality (40-50) and medium-quality (60-70) ranges, respectively. The interaction plot (Figure 4, right panel) showed varying trajectories of quality improvement at different levels of content depth. On all platforms, increasing content depth was correlated with incremental CQI improvement (all transitions $P < 0.05$), and the greatest difference was observed between a single static content category and multiple categories (+16.5 points). Per platform/x-axis, there were clear patterns as follows: Kwai had the steepest linear path, with CQI from Frame Only to 72.0 (Multiple Contents) all through to 83.3 (All Details). Bilibili showed a stable upward trend, attaining its optimum level with full content display (80.0). For TikTok, it revealed an aberrant pattern: quality rose from Frame Only (42.6) to Single Content (52.2), plunged at Multiple Contents (49.1), and then skyrocketed up when considering All Details (61.2). RedNote achieved rapid initial jumps from Frame Only (40.4) to Multiple Contents (67.1), though it flattened as depth levels (65.9 at All Details) increased, indicating a plateau beyond this moderate content complexity point.

Discussion

This is a large-scale cross-sectional survey that systematically reviewed 292 short videos of four popular Chinese social media sites: TikTok, Kwai, Red Note, and Bilibili to examine the informational content and determine the credibility of user-generated content in terms of CBTI. The health information presented was rated as moderately reliable on the whole but with

substantial differences in completeness and transparency, using predefined measures such as the Global Quality Scale, modified DISCERN, Video Information Quality Instrument, and JAMA benchmarks.

The researchers discovered that Bilibili and Kwai videos achieved the highest overall reliability, with Bilibili attaining the highest JAMA benchmark score (2.24 ± 0.70, P < 0.001) and GQS rating (3.57 ± 0.77), possibly due to their longer video duration (median 1,064 seconds for Bilibili) and a markedly higher rate of institution-affiliated uploaders on Bilibili (63.0%, P < 0.001). Conversely, TikTok demonstrated the most consistent correlation between the quality of content and user engagement (Pearson correlation coefficient r = 0.461, P < 0.001) despite its time-squeezed format (median 108 seconds), indicating that the strict content verification practices can be effective in raising the content standards at the baseline. The quality distribution of RedNote was bimodal, which was probably determined by the lifestyle-based ecosystem of the site and the content creators who were mostly non-medical users (51.9% independent creators, P < 0.001). Video reliability was significantly influenced by the professional background of the uploader; Bilibili's predominance of healthcare establishments and trainees contributed to its superior performance across GQS, mDISCERN (3.19 ± 0.83), and JAMA scales, while independent creator and lifestyle influencer content scored substantially lower on these metrics, highlighting the urgent necessity of increased regulatory control and professional gatekeeping of disseminating evidence-based sleep health interventions on social media platforms [27, 28].

Content Structure and Platform Diversity.

Here, we demonstrate that the quality of CBTI content differed significantly across the four platforms, with digital architecture being an important health communication potential determinant. Additionally, the information-rich nature of CBTI can be explained systematically and in a lecture by Bilibili's long-form video format (median duration = 1,064 seconds; IQR: 206–2,208), which is directly complementary with its knowledge-oriented content strategy on board the platform and significantly reflects on achieving its highest GQS (3.57 ± 0.77) [29]. This multitude of time also correlates with substantial coverage across all medically relevant constructs, from etiology to differential diagnosis, treatment modalities, and prognosis; a further proposition is that prolonged rounding allows space for the contextualization of evidence and detailed discussion of trade-offs in treatment [30]. Bilibili also stood out in compliance with authorship attribution, achieving an exceptionally high score of 96.3% (P < 0.05), significantly higher than other platforms.Conversely, while TikTok's time constraints (median of 108 seconds, IQR: 72–170) require rapid information delivery, the platform exhibited the highest rate of author attribution among individual physicians (60.7%). Although the text is brief, consistent with previous studies, the publisher's identity lends a degree of credibility to the text, thereby offsetting this limitation [31, 32]. The bimodal quality distribution and the lowest median number of followers observed on RedNote (1,310, IQR: 147-4,229, P < 0.001) reflect that non-medical creators constitute the largest proportion within the platform's lifestyle-oriented ecosystem. This disparity indicates that while the democratization of content creation has enhanced accessibility, the lack of strict professional oversight leads to significant variations in the reliability of information [25]. It is noteworthy that the user base of Kwai might be less health literate, but its mDISCERN score (3.28 ± 0.73) is comparable to Bilibili's, suggesting alternative pathways to quality maintenance [33].

Content Structure and Platform Diversity.

Significant differences in the quality of CBTI content were observed across the four platforms, highlighting that digital architecture is a key determinant of health communication potential. Bilibili’s long-form video format (median duration of 1,320 seconds) enables systematic, lecture-style explanations that elaborate on the complex content of CBTI, aligning with the platform’s knowledge-focused content strategy [29]. This abundance of time is associated with higher GQS scores, suggesting that more time allows for the contextualization of evidence and detailed discussions of treatment trade-offs. Conversely, while TikTok’s time constraints (median of 92 seconds) require rapid information delivery, the platform exhibited the highest rate of author attribution (60.7%) among posts published by individual physicians. Although the text is brief, consistent with previous studies, the publisher’s identity lends a degree of credibility to the text, thereby offsetting this limitation [31, 32]. The bimodal quality distribution and the lowest median number of followers observed on RedNote reflect that non-medical creators constitute the largest proportion (51.9%) within the platform’s lifestyle-oriented ecosystem. This

disparity indicates that while the democratization of content creation has enhanced accessibility, the lack of strict professional oversight leads to significant variations in the reliability of information [25]. It is noteworthy that the user base of Kwai might be less health literate, but its mDISCERN score is similar to Bilibili's [33].

The Discrepancy Between Information Quality and Popularity

It is noteworthy that there are significant differences across platforms in the relationship between information quality and user engagement. While a significant positive correlation was observed between the reliability score from the JAMA and overall engagement metrics on TikTok ($r = 0.461$, $P < 0.001$), no such correlation was found on Kwai ($r = 0.032$, $P = 0.787$), RedNote ($r = 0.157$, $P = 0.162$), or Bilibili ($r = 0.065$, $P = 0.639$). This quality-engagement paradox was most pronounced for Bilibili: despite achieving the highest composite quality ratings and VIQI production scores (31.5% for VIQI-1), its algorithm showed no correlation between medical accuracy and user engagement distribution. This suggests that the dissemination algorithms of the latter platforms may prioritize emotional resonance and creator popularity over clinical accuracy [34, 35]. Such a mismatch between reliability and visibility of content is a serious public health risk. The reason is that the content recommendation systems, which put more emphasis on the virality of content than on its credibility, can enhance superficial or misleading information, especially in the area of chronic diseases where patients self-manage [36–38].

However, Bilibili's leadership in formal compliance (attribution and completeness) masked a critical deficiency in substantive accuracy: while Bilibili achieved the highest JAMA aggregate scores, its information accuracy rate (JAMA-3) was merely 42.6%, significantly lower than RedNote's 82.7% ($P < 0.001$). This disconnect highlights that procedural adherence does not guarantee factual precision—a phenomenon particularly evident on Bilibili, where comprehensive, well-structured content occasionally contained clinical inaccuracies. Although this detachment is not evident on TikTok, it can probably be attributed to stringent verification measures of medical content creators (60.7% individual physicians). This will allow the algorithmic system to be able to find and spread credible sources. However, even within this platform, an "inverted U-shaped" trend has been observed in the Composite Quality Index distribution. Specifically, content quality tends to decline when the depth of content is moderate (Multiple Contents: 49.1) but improves again when comprehensive content is presented (All Details: 61.2). This phenomenon indicates that on short-form video platforms, content of moderate complexity often falls into a "valley of disinterest", forcing creators to choose between minimal guidance (Frame Only: 42.6) and detailed tutorials [39]. At the same time, these platforms show little tolerance for the gradual increase in difficulty required to master CBTI skills.

Content Depth and Professional Authority

CQI content depth analysis showed positive correlation across the board, but results showed contradictions across media platforms. Kwai showed significant content quality and quantity improvement from shallow to deep. In contrast, Bilibili showed slow, steady improvement with decent quality at significant depth [40]. TikTok's "valley of disinterest" demonstrated the opposite. Quality improved with increased quantity but decreased at mid-difficulty and only improved with high-quantity exposition [41]. This suggests the algorithm tolerates minimal or no small incremental skills. Educative short-form videos lack meaningful guidance or succumb to overly complex, dense exposition. RedNote showed the opposite. Lifestyle platforms have high expectations, and audiences lose interest when content is sophisticated. Initially, RedNote echeloned greater complexity but experienced the opposite, diminishing returns.

Creator identity emerged as a critical determinant of fidelity and comprehensiveness [42, 43]. Dominance of institutional and trainee accounts (63.0%) on Bilibili was in stark contrast to the reliance on independent creators on RedNote (51.9%) and the individual physician presence on TikTok (60.7%). Bilibili and TikTok have different verification architectures. Bilibili's knowledge-community model primarily attracts established, credentialed institutions that are able to produce systematic, lecture-style videos, while TikTok requires individual practitioners to be verified but does not have guaranteed institutional production quality. As expected from the literature on the quality of medical videos [44], licensed physicians and videos made by institution-affiliated creators produced better, on average, quality scores in GQS, mDISCERN, and JAMA than independent creators [45]. Quality of content was influenced by the platform on which it was published. TikTok, with a high presence of

individual physicians, did not result in a high score for overall composite reliability, while Bilibili, with institutional dominance, obtained the highest quality scores. Being able to provide a comprehensive evidence-based answer is determined by more than personal credentials. This evidence is in the institution's presence, the production quality of the videos, and the length of the videos [46].

Clinical and Public Health Implications

The widespread quality-engagement disconnect evident on three platforms, such as Bilibili, even with the highest composite quality scores (JAMA 2.24 ± 0.70, GQS 3.57 ± 0.77), has serious clinical consequences. Since one-third of adults report insomnia symptoms [47], algorithmic architectures that are more focused on virality than on accuracy can result in vulnerable populations being exposed to suboptimal or even harmful advice, especially in cases where the highest-quality content (e.g., institution-affiliated videos by Bilibili with 96.3% authorship attribution) does not attract proportional user attention because of zero correlation with the algorithm. CBTI requires strict adherence to behavioral guidelines; exposure to discontinuous or technically flawed material in terms of stimulus control therapy or sleep restriction therapy can lead to treatment failure, increased frustration, or unintended escalation of sleep problems [48, 49]. The dramatic difference between high levels of formal compliance (70.4% content completeness) and low levels of accuracy (42.6% JAMA-3) with Bilibili also indicates the possibility of patients being provided with well-formatted but clinically inaccurate information, which is just as dangerous as blatant misinformation.

In addition, the disparity in accessing high-quality content on different platforms poses a risk to worsening health disparities. Although TikTok was the only platform to show any meaningful positive association between JAMA reliability scores and engagement measures ($r = 0.461$, $P < 0.001$), and thus it may be possible to argue that algorithmic curation of credible medical content is possible, the same effect could not be observed on Kwai, RedNote, and Bilibili. Populations of low health literacy can be overrepresented on the platforms of lower-quality clinical versus lifestyle-focused content, especially on RedNote, where 51.9% of independent creators produce bimodally distributed quality (maximum CQI 40–50, 60–70), and on Kwai, where high mDISCERN scores (3.28 ± 0.73) are not reflected. Thus, patients who turn to CBTI advice have access to extremely different levels of evidence based on the platform of choice, thus increasing disparities in access to evidence-based sleep care [50].

Strengths and Limitations

This research has a number of methodological strengths. Our use of four instruments and creating a composite index of quality has made us able to embrace the multidimensionality of the concept of video reliability, which is often overlooked by single-tool measures. This methodology showed a pattern of platform specificity, like the presence of high formal compliance and accuracy deficits in some ecosystems. An evaluation of four different architectures (and their different user audiences and content strategies) can be used to understand the influence of digital environments on health communication with the nuance of why quality and engagement converge on certain platforms but not others. The search results of freshly registered accounts were less personalized and enhanced the sample representativeness.

There are a number of limitations that are worth considering. The cross-sectional design offers a point in time only, which does not allow the analysis of time trends or changes in algorithms. The representation of the platforms was disproportionate; this is because the amount of CBTI content on the sites was relatively abundant; this could limit the statistical power of some between-platform comparisons. Although pilot calibration was done to achieve inter-rater reliability, quality assessment is still subjective, and therefore there is the possibility of variation in scoring, especially in instruments that exhibit ceiling effects on certain subscales. We filtered publicly available Mandarin-language video only, and this restricts the generalizability to non-Chinese settings. We also failed to evaluate actual user behavior or clinical outcomes, so it is not clear whether high-completeness content is associated with greater patient adherence compared to high-engagement content. Finally, platform algorithms evolve constantly; replication at different time points might yield different samples, particularly given the marked variation in content lifecycles across platforms.

Conclusion

Platform architecture fundamentally shapes CBTI information quality, with Bilibili offering the most comprehensive yet algorithmically disadvantaged content, while TikTok alone successfully aligns quality with reach. The pervasive disconnect between reliability and engagement on three of four platforms poses public health risks, necessitating algorithmic reforms and enhanced creator credential verification to ensure patients encounter evidence-based guidance rather than virally amplified misinformation.

Declarations

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Ethical considerations

This study utilized publicly accessible video data from four major Chinese social media platforms: TikTok, Kwai, RedNote, and Bilibili. All analyzed content was openly available, and no personally identifiable information was extracted or processed. In accordance with relevant ethical guidelines, institutional review board approval was not required.

Author contributions

YMY, FYT, ZXL and LWH: Data curation, Formal analysis, Investigation.

KYB and LT: Methodology, Visualization.

CJJ and DJX: Validation, Supervision.

All authors contributed to the conceptualization, manuscript preparation, and approved the final version for submission.

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Conflict of interest

The authors declare no competing interests.

Supplementary material

Supplementary data for this article are available online.

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Figures

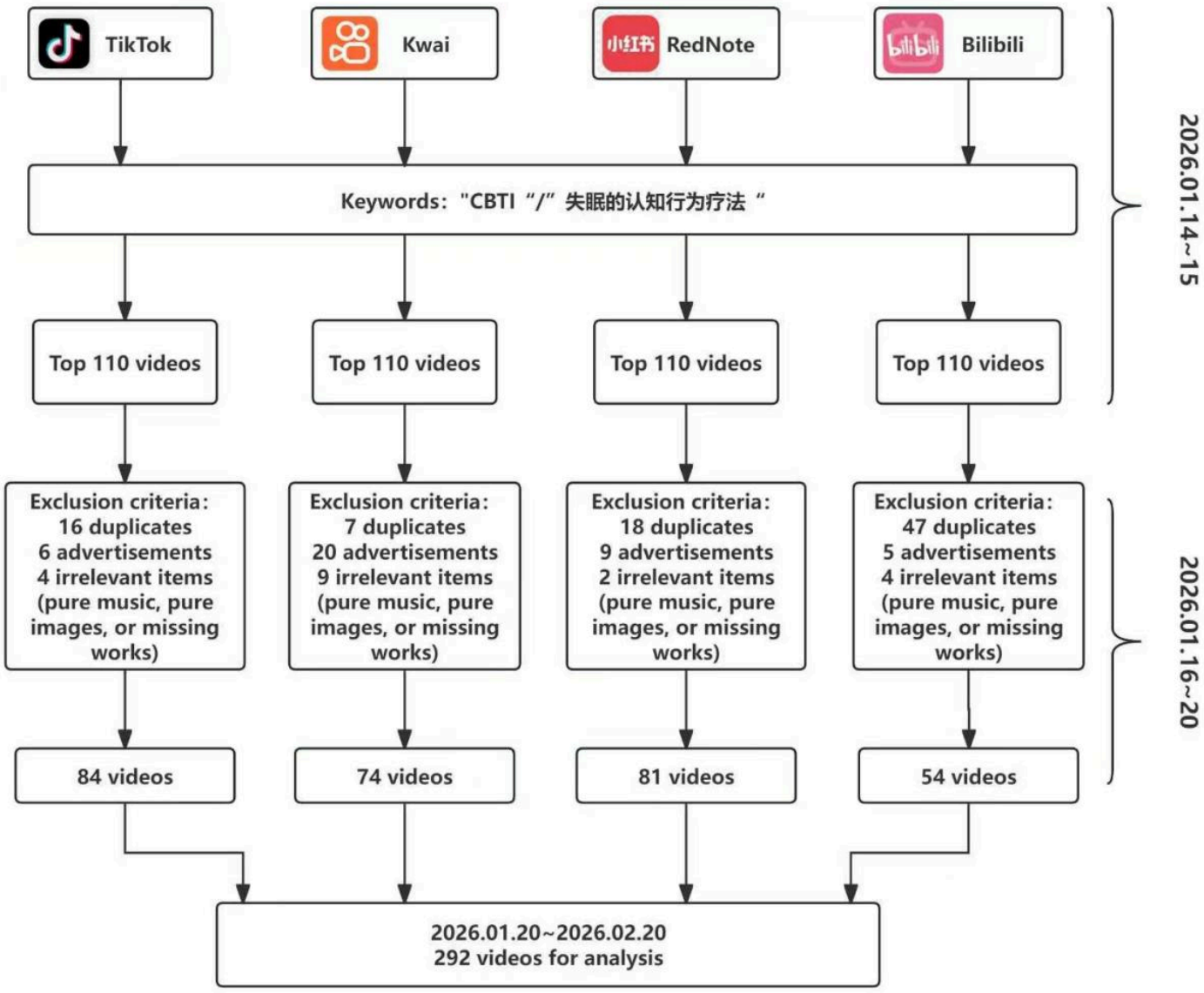


Figure 1

CBTI videos screening flowchart

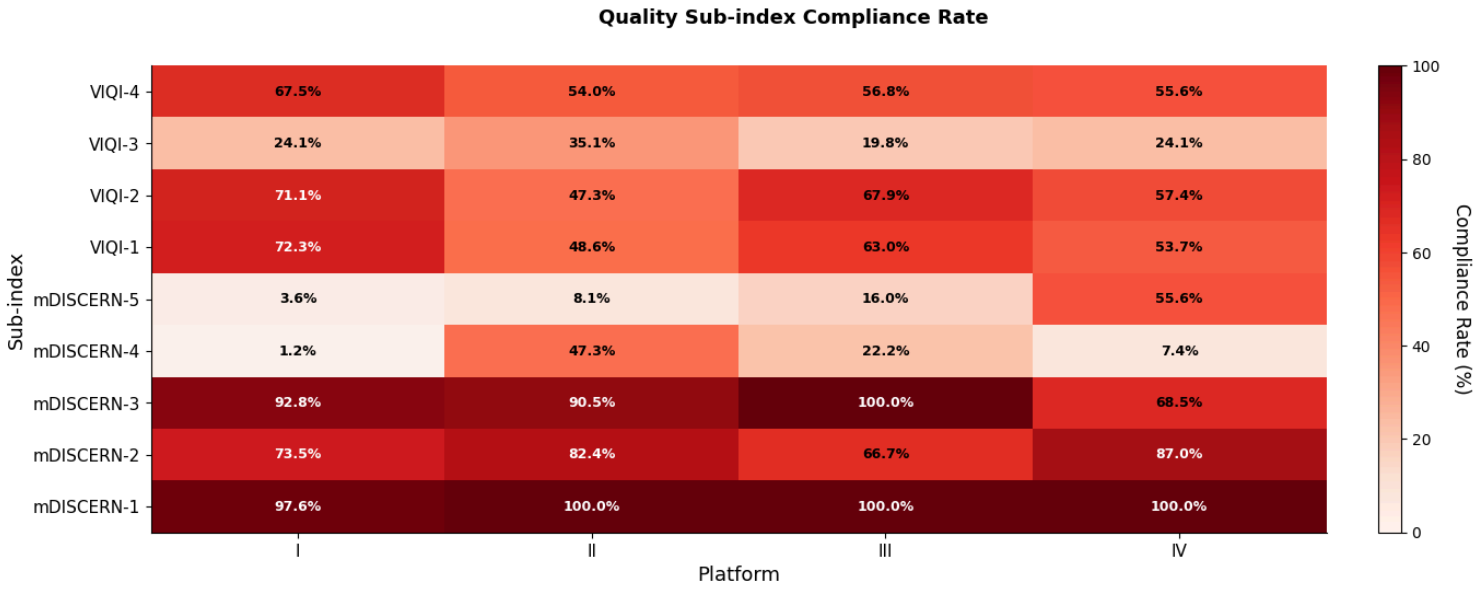


Figure 2

Quality assessment of CBTI videos across four platforms

 = TikTok, = Kwai, = RedNote, = Bilibili.

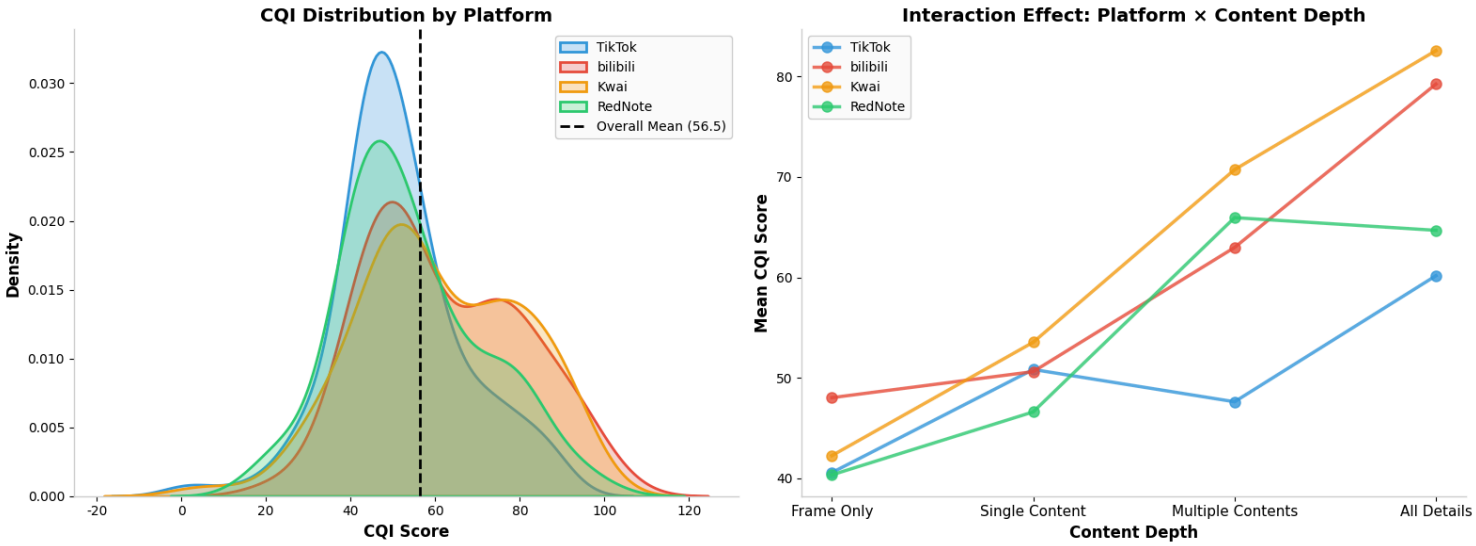


Figure 3

Figure 4. Distribution of Comprehensive Quality Index across platforms and

interaction effects with content depth

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplementary1Videodate.xlsx
- Supplementary2.doc