The Effect of Evidence Type on Headline Selection for Online Health Information: An Eye-Tracking Experiment and Implications (Postprint)

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Abstract

[Purpose/Significance] Massive amounts of online health information are competing for users' attention, making the creation of attractive titles particularly important. An increasing number of health information titles are beginning to adopt story-based or data-based evidence to achieve this goal. Therefore, it is necessary to investigate how different title evidence types influence users' selection of online health information.

[Method/Process] An experimental approach was adopted to explore the relationships among the evidence type of online health information titles (story-based/data-based), users' internal states, and users' title selection, while considering the moderating role of users' thinking styles. The experiment required each participant to complete a browsing task of 40 online health information items (including titles and article content) within a specified time limit. Relevant scales were used to collect their internal emotional and cognitive states, and eye movement patterns and click behaviors were captured through the screen recording function of a Tobii eye tracker and its supporting software.

[Results/Conclusions] Compared with story-based titles, participants exhibited higher levels of pleasure and arousal toward data-based titles and were also more likely to elicit click behavior. Arousal mediated the relationship between title evidence type and click behavior. Thinking style moderated the relationships between title evidence type and both fixation duration and fixation count. The findings of this study contribute to the understanding in the field of information behavior regarding how intrinsic features of information affect information selection and provide valuable insights for creating effective online health information titles.

Full Text

The Influence of Evidence Type on Online Health Information Title Selection: An Eye-Tracking Experiment and Implications

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Abstract: [Purpose/Significance] The vast amount of online health information competes for users' attention, making the creation of attractive headlines increasingly important. More health information titles now adopt narrative or statistical evidence to achieve this goal. This study investigates how different headline evidence types influence users' selection of online health information. [Method/Process] Using an experimental approach, we explored the relationships among online health information title evidence type (narrative/statistical), users' internal states, and title selection behavior, while considering the moderating role of thinking style. Participants completed a browsing task involving 40 online health information items (titles and articles) within a time limit. Their internal emotional and cognitive states were measured using relevant scales, while eye-tracking data and click behavior were captured using a Tobii eye tracker and its built-in screen recording software. [Result/Conclusion] Compared with narrative titles, participants experienced higher levels of pleasure and arousal in response to statistical titles and were more likely to click on them. Arousal mediated the relationship between title evidence type and clicking behavior. Thinking style moderated the relationship between title evidence type and both fixation duration and fixation count. These findings enhance understanding of how information characteristics affect information selection in information behavior research and provide useful implications for creating effective online health information headlines.

Keywords: online health information; information title; evidence type; narrative; statistical; S-O-R Model

1 Introduction

The Internet serves as a crucial source for individuals seeking health information, with most users searching online for health-related content covering specific diseases, treatment options, diet, wellness, exercise, smoking, alcohol consumption, and more. Health information providers aim to persuade people to adopt healthy behaviors or abandon unhealthy ones through online health articles, employing various writing techniques to enhance persuasiveness, such as evidence type, argument quality, temporal framing, metaphor usage, and message framing.

Unlike traditional print information, online information is typically presented to audiences in a list format comprising titles, hyperlinks, and abstracts. By

clicking hyperlinks, users can access detailed article content. In this context, headline effectiveness directly influences whether users click to view details or ignore the information, with effectiveness closely tied to headline characteristics. Evidence type represents one such content characteristic, broadly categorized as narrative or statistical. Increasingly, online health information titles employ stories or data, raising questions about how title type affects effectiveness. This study examines how different title types attract visual attention and elicit clicking behavior among online health information users, while also considering thinking style as an important individual difference variable that influences the persuasiveness of narrative versus statistical evidence.

2 Related Research

2.1 Information Titles and Selection

Online information titles primarily function to attract user attention and motivate clicks to view full article content. Information providers can enhance title effectiveness through various writing techniques, including sensational, selective, or negative framing, using special symbols like question marks, quotation marks, or numbers, and altering title position, format, font size, or length. User information selection involves two fundamental activities: visual attention and actual behavior. Attention is inherently selective, determining which stimuli users perceive, while observable behaviors include clicking, recommending, and commenting, which may or may not align with attention.

Research demonstrates that headlines significantly impact information selection. Title characteristics affect fixation duration, with external links, images, larger fonts, and source credibility increasing viewing time. Headline features also influence user behavior (clicks, recommendations, comments, downloads). Titles appearing earlier in lists are more likely to be clicked. The number of negative emotional words in news headlines follows an inverted-U relationship with click rates. Participants are more likely to click on news titles with positive emotional images, though some studies find negative emotional images increase clicks. Advertisement titles with numbers generate more clicks, while question-format titles have the opposite effect. For academic papers, more entertaining titles correlate with higher download rates, while shorter titles correlate with more citations.

2.2 Evidence Types: Narrative and Statistical

Evidence refers to information supporting a viewpoint, primarily divided into narrative and statistical types. Narrative evidence conveys information through specific events experienced by particular individuals in specific contexts, characterized as interesting, vivid, and easy to understand. Statistical evidence uses quantitative descriptions of events, people, places, and phenomena to prove points, offering objectivity, credibility, and verifiability.

Evidence types elicit emotional and cognitive responses. For cancer-related information, narrative messages more effectively improve users' perceptions of their exercise capacity, persuade breast cancer patients to participate in fitness activities, and convince women to get mammograms, though statistical information proves more effective for promoting mammography screening. Both types equally affect risk perception of human papillomavirus (HPV). For everyday health information, statistical messages are perceived as more credible and valuable, and more effective for smoking cessation. However, for low-educated adolescents, both types equally influence smoking-related beliefs, attitudes, and intentions. Statistical evidence more quickly triggers negative attitudes toward sexually transmitted infections. For weight-loss information, users prefer and spend more time reading narrative health messages.

Overall, narrative and statistical evidence types show inconsistent effects across studies. Most research suggests narrative information more significantly impacts emotional responses and achieves persuasion through affective pathways, with emotional reactions exerting stronger influence on behavioral intentions than cognitive responses. Statistical information tends to generate higher cognitive processing and significantly influences beliefs and attitudes.

2.3 The S-O-R Model

The Stimulus-Organism-Response (S-O-R) model from environmental psychology posits that environmental stimuli affect emotional states, which in turn influence behavioral responses. This linear framework comprises three elements: stimulus, organism, and response, with the organism mediating between stimulus and response. Stimuli are elements affecting users, the organism represents emotional and cognitive states, and both emotional and cognitive responses significantly influence behavior. The S-O-R model is widely applied in retail environment studies, typically measuring emotional and cognitive responses through pleasure, arousal, and perceived information quality.

We measured emotional reactions through pleasure and arousal. Pleasure refers to feeling good, happy, satisfied, and hopeful when encountering stimuli, easily influenced by surroundings. Arousal is a nervous system function related to alertness and readiness to respond, expressing activation or excitement levels after stimulus exposure. Cognitive reactions describe internal psychological processes and states, including attitudes, beliefs, attention, comprehension, memory, and knowledge. We also used perceived information quality to measure cognitive responses.

2.4 Thinking Styles

According to Cognitive-Experiential Self-Theory (CEST), thinking style is a personal characteristic reflecting individuals' differential reliance on experiential and rational information processing systems. Experiential system users prefer emotionally-oriented information presented as images, generalizations,

metaphors, and stories, with behavior influenced by resonance and emotions from past experiences. Rational system users prefer rule-based processing of abstract symbols, text, and numbers, taking action based on risk assessment.

Narrative information stimulates emotions and achieves persuasion through heuristic processing, while statistical information focuses on objective facts without emotional content. When the rational system is active, statistical information proves more persuasive. Highly rational users are more sensitive to charts and statistical data, perceiving advice-based (non-emotional) messages as higher quality, making statistical information more persuasive. Highly intuitive users perceive emotionally-containing information as higher quality, making narrative information more persuasive.

Existing evidence type research primarily focuses on message body content rather than titles, examining how narrative and statistical evidence embedded in text influences health behavior adoption or avoidance. Title characteristic research has explored expression patterns, presentation formats, and peripheral features, but rarely examines evidence type as an internal title characteristic or its impact on users' emotional and cognitive responses and behaviors. This study addresses this gap by focusing on how online health information title evidence type affects emotional and cognitive reactions and selection behavior, with thinking style as a moderator.

3 Research Questions

Based on the S-O-R model, this eye-tracking experiment on online daily health information titles explores relationships among title evidence type (S), users' internal emotional and cognitive states (O), and visual attention and selection behavior (R), while considering thinking style' s moderating role. We address three research questions: (1) Does health information title evidence type significantly affect title selection? (2) Do users'internal states mediate the relationship between title evidence type and selection? (3) Does thinking style moderate the effect of title evidence type on title selection?

The independent variable is online health information title evidence type (narrative vs. statistical). Mediators include emotional states (pleasure, arousal) and cognitive states (perceived information quality). Dependent variables are visual attention (fixation duration, fixation count) and clicking behavior. The moderator is thinking style (dual-high, dual-low, rational, intuitive).

4 Research Design

4.1 Participant Recruitment

We recruited 24 participants through convenience sampling (ages 19-26; 5 male, 19 female; 13 undergraduates, 11 graduate students). Pre-experiment surveys revealed all participants had previously sought health information online, with 19 doing so regularly (at least weekly). Primary health interests included diet

(N=19, 79.2%), exercise (N=18, 75%), sleep (N=17, 70.8%), lifestyle habits (N=14, 58.3%), skin care (N=13, 54.2%), and mental stress (N=12, 50%), aligning with common health information needs among China's post-1990 generation.

Before the experiment, participants completed the Rational-Experiential Inventory (REI), including the Need for Cognition (NFC) scale (Cronbach' s Alpha=.874) and Faith in Intuition (FI) scale (Cronbach' s Alpha=.808) to measure rational and experiential thinking. NFC scores ranged from 42-78 (median=60.5); FI scores ranged from 22-48 (median=37.5). Following Shiloh et al.' s method, we used medians to create four groups of six participants each: dual-high (high NFC/high FI), dual-low (low NFC/low FI), rational (high NFC/low FI), and intuitive (low NFC/high FI).

4.2 Experimental Materials

Considering post-1990 generation health information needs, participant interests, and popular online health topics, we selected ten themes: diet, exercise, sleep, weight loss, smoking, eye protection, electronic device hazards, skin care, hygiene habits, and mental stress. We collected 40 real articles from platforms like 39 Health Net and Health Times, with four articles per theme. Researchers rewrote original titles as narrative or statistical versions while controlling for confounding features, creating 40 new titles (15-18 characters, no punctuation, declarative sentences, avoiding special styles like exaggeration or sentimentality). Each theme included two narrative and two statistical titles, with Arabic numerals in statistical titles.

Using Health Times Net as a template, we created experimental prototypes with Axure, including a health title list page and article detail pages simulating real health websites. Each title on the list page was designated as an Area of Interest (AOI) for data analysis. To control for position effects, we used a 2$×$2 Latin square to alternate narrative and statistical titles, creating two list page orders with three participants viewing each version.

4.3 Experimental Task and Procedure

The formal task required participants to browse the health information website without specific goals, following their usual online habits for three minutes (determined through pilot testing where five participants averaged three minutes). Participants wore Tobii X3-120 eye trackers while performing the task, with Tobii Studio software capturing eye-tracking and click data. Afterward, researchers identified which titles participants noticed from eye-tracking data and had them complete pleasure, arousal, and information quality perception scales for each noticed title. Scales were seven-point semantic differential scales. The entire experiment lasted approximately 30 minutes.

5 Results

5.1 Descriptive Statistics

We measured selection through visual attention (fixation duration and count) and clicking behavior. Participants noticed 252 titles total (132 statistical, 120 narrative) and clicked 66 titles (47 statistical, 19 narrative), averaging 10.5 noticed and 2.75 clicked per participant. Statistical titles received longer average fixation duration (0.409 > 0.373) and more fixations (5.682 > 5.175) than narrative titles. Pearson correlation showed fixation duration and count were positively correlated (r=0.819, P<0.001), while Kendall' s tau-b analysis revealed neither fixation duration (Kendall' s tau-b=-0.009, P=.859) nor fixation count (Kendall' s tau-b=0.082, P=0.128) correlated with clicking behavior.

5.2 Reliability and Validity

Internal consistency was excellent, with Cronbach' s Alpha coefficients for all three scales exceeding 0.8. Confirmatory factor analysis assessed convergent and discriminant validity. Initial model fit was poor; we removed three measurement items with standardized factor loadings below 0.5 ("bored-relaxed," information understandability, and task/interest relevance). After further model correction by removing three additional items with high modification indices ("unawakened-awakened," "leisurely-excited," "calm-thrilled"), model fit improved (^{2}=103.528, df=41, P<0.001, CFI=0.973). Standardized factor loadings approached or exceeded 0.7, composite reliability exceeded 0.8, and average variance extracted values exceeded 0.5, demonstrating good convergent and discriminant validity.

5.3 Title Evidence Type Effects on Selection

Linear regression examined effects on fixation duration and count; binary logistic regression tested effects on clicking behavior. Title evidence type did not significantly affect fixation duration (F=0.669, P=0.414) or count (F=0.995, P=0.320). However, it significantly influenced clicking behavior (^{2}=13.070, P=0.000<0.001, OR=0.340), with statistical titles clicked significantly more than narrative titles.

5.4 Mediating Role of Internal States

Following Baron and Kenny' s and Iacobucci' s mediation analysis methods, we tested mediation effects. Since title evidence type only significantly affected clicking behavior, we used it as the independent variable, clicking as the dependent variable, and pleasure, arousal, and information quality perception as mediators.

Linear regression showed title evidence type significantly affected pleasure (F=4.912, P=0.028<0.05, β=-0.355) and arousal (F=10.593, P=0.001<0.05, β=-0.427), with statistical titles eliciting higher levels than narrative titles, but did not affect information quality perception (F=0.978, P=0.324>0.05). Binary

logistic regression of mediators on clicking behavior showed the model was significant (^{2}=26.147, P=0.000<0.001). Pleasure and information quality perception did not significantly predict clicking (P=0.280>0.05; P=0.198>0.05), while arousal did: higher arousal increased clicking likelihood (P=0.000<0.001, OR=2.405).

Final regression analysis with title evidence type, arousal, and clicking behavior confirmed significant mediation (|Mediation|=3.126>1.96). Arousal significantly mediated the relationship between title evidence type and clicking behavior.

5.5 Moderating Role of Thinking Style

One-way ANOVA examined thinking style' s moderating effect on the relationship between title evidence type and visual attention. Results showed significant moderation on both fixation duration and count (F=5.138, P=0.002<0.05; F=3.931, P=0.009<0.05). As shown in Figure 2 [Figure 2: see original paper], rational and dual-high participants showed longer fixation duration and more fixations on statistical than narrative titles, while intuitive participants showed the opposite pattern. Dual-low participants showed no significant differences between title types.

Binary logistic regression tested moderation on the title evidence type-clicking relationship, finding no significant moderating effect (^{2}=8.529, P=0.068>0.05).

6 Discussion

6.1 Comparing Title and Message Body Evidence

Our findings differ from previous message body research in three key ways:

First, title evidence type significantly affects clicking behavior, with arousal mediating this relationship. Statistical titles attract more clicks than narrative titles by generating higher arousal and emotional responses. In contrast, narrative evidence in message bodies more significantly impacts emotional responses and behavioral intentions. Narrative messages enhance attractiveness and entertainment value while masking persuasive intent and negative content, guiding audiences into stories that elicit emotional acceptance. Unlike full messages, titles cannot present complete stories, limiting emotional conveyance and user immersion. In the constrained space of headlines, statistical titles' combination of text and numbers better captures attention.

Second, title evidence type did not significantly affect information quality perception, whereas message body research typically finds statistical messages perceived as more credible and valuable, triggering higher cognitive processing. This may be because brief titles provide insufficient information for credibility and value judgments compared to full messages.

6.2 Thinking Style' s Influence on Information Selection

Title evidence type alone did not significantly affect fixation duration or count, possibly because brief titles limit viewing time and fixations, minimizing detectable differences. However, incorporating thinking style as a moderator revealed that rational participants spent more time and fixations on statistical titles, while intuitive participants did the opposite for narrative titles. This confirms that intuitive processors prefer concrete images, generalizations, metaphors, and stories, while rational processors prefer abstract symbols, text, and numbers. This difference in information processing across thinking styles also applies to health message body research, where rational users show lower risk perception and negative emotions toward narrative skin cancer information, while intuitive users show higher risk perception and negative emotions.

6.3 Research Value and Limitations

This study makes two theoretical contributions. First, it enriches health information research by shifting focus from message body evidence types to title evidence types and their effects on emotional, cognitive, and behavioral responses, incorporating thinking style. Second, it expands title characteristic research beyond length, position, and referential words to examine evidence type and its impact on internal responses and behavior, complementing and extending news headline research.

Practically, statistical titles generate higher pleasure and arousal, leading to more clicks. Health information providers should design statistical titles with narrative message bodies to maximize dissemination. As information overload confronts users, personalization and recommendation systems become crucial. Our finding that thinking style moderates attention to different title types suggests providers can offer personalized title presentations for different thinking styles.

Limitations include: (1) Participant constraints—college students with high information literacy may limit generalizability to less educated or lower-literacy populations. Future research should consider gender differences. (2) Material constraints—focusing on daily health information for young people may not generalize to disease-specific information titles.

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Note: Figure translations are in progress. See original paper for figures.