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Decoding how the older adults identify misinformation: an analysis of internal mechanisms

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Abstract

Introduction. This study aims to explore the key factors influencing misinformation recognition among older adults, understand the internal mechanisms of how they identify misinformation, and ultimately promote age-friendly improvements in the information environment of the AI era.

Method. Using in-depth interviews, we selected 55 misinformation recognition events as research subjects and applied content analysis and binary logistic regression methods.

Analysis. Quantitative content analysis was conducted on interview data, followed by binary logistic regression analysis on nine variables, which were later consolidated into three dimensions.

Results. The findings reveal that public information sources, interpersonal information sources, information content, information perspectives, and evidence significantly impact misinformation recognition. Information sources play a crucial role in older adults' misinformation recognition, while the influence of information dimensions is not fully realized, and the direct impact of the information users' dimension is limited.

Conclusion. These findings reveal the mechanisms of misinformation identification by older adults, emphasizing the need for age-friendly improvements in information literacy and digital environments to enhance older adults' ability to recognize misinformation.

Introduction

The development of generative artificial intelligence (Generative AI), especially large language models (LLMs), has profoundly advanced transformations across various fields. *'It can creatively generate new content based on input'* (Zhang et al., 2023), significantly changing *'the production, circulation, and utilization of information and knowledge'* (Zhao & Cao, 2023). However, the powerful generative capabilities of large language models have also made the creation of misinformation more convenient and rapid. *'AI-generated content (AIGC) possesses characteristics such as complex corpus sources, variable modalities, and a combination of reality and fiction'* (Li et al., 2023), further exacerbating issues like deepfakes and expanding their scope of harm. In the era of AI algorithms, the total amount of misinformation is rapidly increasing and becoming more difficult to distinguish, leading to unprecedented harm to information users.

Among these issues, the harm of misinformation to the elderly population is particularly prominent. Due to various factors such as physical function (Wu, 2022), cognitive ability (Eich et al., 2014), digital literacy (Song & Peng, 2024), and psychological factors (Lichtenberg et al., 2016), older adults are more susceptible to adopting misinformation and being misled by it, making them the primary vulnerable group to misinformation. Therefore, this study recruits older adults with experiences in recognizing and adopting misinformation, selecting misinformation recognition events obtained through in-depth interviews as research subjects. We aim to explore the main factors influencing misinformation recognition among older adults to gain a deeper understanding of the internal mechanisms of how they identify misinformation and further promote age-friendly improvements in the information environment of the AI era.

Literature review

Unlike factual information, misinformation refers to information that is false or inaccurate (Wardle & Derakhshan, 2017), often capable of intentionally or unintentionally misleading the decision-making behavior of information recipients. Against the backdrop of exponential growth in misinformation, issues related to older adults and misinformation have gained attention in academia. Existing research has compared older adults with other groups, exploring the characteristics of the elderly when facing misinformation in terms of focusing on contradictory details (Huff & Umanath, 2018), dissemination and sharing (Zhou et al., 2023), and information management (Zhou et al., 2023). Studies have focused on the relationship between older adults and various categories of misinformation such as rumours (Wu et al., 2019; Song et al., 2020), health misinformation (Cao et al., 2022; Choudhury, 2021; Peng et al., 2024), and false memories (West & Stone, 2014), with particular emphasis on the harm of misinformation to older adults (Chen, 2020; Tessoulin et al., 2020; Zhang & Su, 2019) and corresponding governance measures (Wu, 2022). However, existing research has paid limited attention to the issue of misinformation identification by older adults. Understanding the factors influencing misinformation identification among older adults is an important foundation for comprehending its internal mechanisms and has significant implications for mitigating the harm of misinformation to the elderly population. Therefore, this paper attempts to explore the internal mechanisms of misinformation identification among older adults, specifically addressing the following research questions:

RQ1: What are the main factors older adults rely on to judge the authenticity of information?

RQ2: How do these factors influence older adults' information judgment?

Research design

As part of a larger research project, this study conducts quantitative analysis based on preliminary grounded theory findings. The data were collected through in-depth interviews with 19 adults aged 60 and above who had experience in identifying and adopting misinformation. The sampling

process continued until theoretical saturation was achieved, with no new themes emerging from the final three interviews. Each 30-70 minutes interview was recorded with informed consent and transcribed, yielding over 152,000 words of standardized text materials. Interview duration varied based on participants' number of relevant experiences and communication styles, while ensuring core questions were thoroughly addressed.

The misinformation recognition events used in this study were collected from the interview texts. Initially, 83 potential cases were identified from 19 interviewees' narratives. Through fact-checking using authoritative sources, official documents, and expert consultation, we verified the authenticity of each case. After excluding cases where the information's authenticity could not be conclusively determined, 55 confirmed misinformation recognition cases from 18 elderly individuals (A1-A18) were retained for analysis. These cases covered nine major categories including politics, society, entertainment, life, health, work, finance, and knowledge. The basic characteristics of the interviewees are shown in Table 1.

Categories	Subcategories	Quantity	Categories	Subcategories	Quantity
Gender	Male	9	Education level	Elementary and below	2
	Female	9		Junior high	4
Age group	60-69 Years	4		High school/vocational	5
	70-79 Years	4		Bachelor's/associate	6
	80 and above	10		Above bachelor's	1

Table 1. Basic information of interviewees

Based on the preliminary grounded theory research, this study uses quantitative content analysis to quantify the interview data, extracting various factors relied upon by older adults in misinformation identification events. Each event case was scored dichotomously (present = 1, absent = 0) for nine variables. The coding framework and examples are shown in Table 2.

No.	Variable Name	Coding Range	Original Text Example	Variable Category
1	Public Information Sources	Focus on the credibility of public media information sources such as TV, newspapers, internet, etc. when judging the authenticity of information	TV is reliable, this information is from TV, which means it must be true to some extent	Information Source
2	Interpersonal Information Sources	Use direct interpersonal information sources as a basis for judging the authenticity of information, or be influenced by interpersonal information sources in judging the authenticity of information	It's from someone with whom I have a close relationship, won't doubt it	
3	Information Content	Judge the authenticity of information based on the words, logical relationships, and meanings of the information itself	The title and content are inconsistent, it should be untrue	Information
4	Information Viewpoints	Judge the authenticity of information based on the degree of overlap between the information viewpoint and one's own viewpoint	Content that aligns with my view, even if some details are not true, I might doubt specific details, but will generally accept it	
5	Evidence	Judge the authenticity of information based on the completeness and credibility of evidence provided in the information	It's shown in the picture, there's evidence	
6	Information Usefulness	Judge the authenticity of information based on its relevance and usefulness to oneself	Disaster information from other provinces and cities isn't relevant to me, generally I'll assume it's true	
7	Corroborating Information	Judge the authenticity of information by obtaining other information	This content (on the phone) wasn't broadcast on TV, I don't believe it	
8	Knowledge Structure	Judge the authenticity of information using existing knowledge, common sense, etc.	Older people can judge many things using common sense	Information User Factors
9	Practice	Judge the authenticity of information through personal practice after receiving the information	For health-related information, I'll try it myself and judge whether it's true through practice	

Table 2. Text coding framework and examples

Following this coding framework and standards, each of the 55 events of different categories was scored, and the statistical frequencies of each variable are shown in Table 3. Since the dependent variable (misinformation identification result) in this study is a binary variable (correct recognition = 1, incorrect recognition = 0), this paper uses IBM SPSS Statistics 26.0 to analyse the influence of independent variables through a binary logistic regression model. The data analysis is conducted in two steps: First, analysing the influence of nine original independent variables on the identification result; Second, combining the independent variables by category (see Table 2) to analyse the influence of information sources, information itself, and information users on the dependent variable.

Category	Public Info Sources	Interpersonal Info Sources	Info Content	Info Viewpoints	Evidence	Info Usefulness	Corroborating Info	Knowledge Structure	Practice	Correct Identification
Frequency	26	14	14	5	7	16	18	35	7	38

Table 3. Frequency of variable statistics

Logistic analysis of misinformation identification events among older adults

When conducting logistic analysis on the nine variables, the model accuracy was 0.73, indicating relatively high predictive accuracy. The Hosmer-Lemeshow test result ($p = 0.481 > 0.05$) showed good fit. The regression results are shown in Table 4, where Exp(B) represents the odds ratio for each variable. An odds ratio greater than 1 indicates that the variable increases the likelihood of correctly identifying misinformation, while less than 1 decreases the likelihood. The larger the value, the greater the influence of that variable.

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)
Public Info Sources	1.980	0.635	9.713	1	0.002	7.245	2.085 - 25.171
Interpersonal Info Sources	0.970	0.781	1.542	1	0.215	2.637	0.571 - 12.185
Info Content	1.554	0.694	5.015	1	0.025	4.731	1.215 - 18.425
Info Viewpoints	0.894	0.807	1.227	1	0.268	2.445	0.503 - 11.887
Evidence	0.778	0.753	1.068	1	0.301	2.177	0.498 - 9.516
Info Usefulness	0.517	0.747	0.479	1	0.488	1.677	0.388 - 7.250
Corroborating Info	-0.237	0.750	0.100	1	0.753	0.789	0.182 - 3.426
Knowledge Structure	0.312	0.752	0.172	1	0.678	1.367	0.313 - 5.967
Practice	-1.820	1.037	3.078	1	0.080	0.162	0.021 - 1.237

Table 4. Logistic regression analysis results of nine variables in misinformation identification events among older adults

To further explore the relationships between variables, this study combined the 9 original independent variables into 3 dimensions:

x1 (information source) = Public information sources + Interpersonal information sources

x2 (information) = Information content + Information viewpoints + Evidence + Information usefulness + Corroborating information

x3 (information user factors) = Knowledge structure + Practice

After dimension combination, the logistic regression model accuracy was 0.82, and the Hosmer-Lemeshow test result ($p = 0.884 > 0.05$), showing significantly improved model accuracy and fit. The regression results are shown in Table 5.

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)
x1	1.761	0.538	10.722	1	0.001	5.821	2.030 - 16.692
x2	1.576	0.512	9.475	1	0.002	4.838	1.771 - 13.213
x3	-0.005	0.755	0.000	1	0.995	0.995	0.227 - 4.366

Table 5. Logistic regression analysis results of three dimensions in misinformation identification events among older adults

Research findings

The logistic model analysis indicates that older adults' misinformation identification is influenced by multidimensional factors. Among these, public information sources, information content, and interpersonal information sources are the three most significant factors.

The important role of information sources in misinformation identification by older adults

Preliminary grounded theory analysis shows that older adults often rely on information sources to distinguish the authenticity of information. Most older adults consider television and newspapers as '*official channels (A7)*' when identifying information, believing that the information they publish has higher credibility, while information from mobile phones '*has a lot of false content (A14)*' and lower credibility. Moreover, older adults' identification of misinformation is also influenced by strong ties in interpersonal information sources, with some respondents stating that '*information from closer relationships is more reliable (A9)*'. In specific misinformation identification events, information from credible public information sources and strong-tie interpersonal sources is easily identified by older adults as true information, while information from less credible sources such as weak-tie interpersonal information sources undergoes more rigorous examination by older adults.

Among the nine original independent variables, focusing on public information sources ($p = 0.002$, $\text{Exp}(B) = 7.245$) is the most significant factor influencing older adults' misinformation identification. When older adults use public information sources to judge the authenticity of information, the possibility of correctly identifying misinformation is 7.245 times that of not using public information sources. The regression analysis of the three dimensions similarly shows the significance of the influence of information sources ($p = 0.001$, $\text{Exp}(B) = 5.821$). According to the frequency statistics of independent variables, in 55 events, older adults more often relied on public information sources (26 times) and interpersonal information sources (14 times) to identify misinformation. Therefore, information sources are factors that receive attention from older adults and have a significant impact on misinformation identification.

The influence of information dimensions on misinformation identification has not been fully realized

The analysis results show that the information dimension ($p = 0.002$, $\text{Exp}(B) = 4.838$) has a significant impact on older adults' identification of misinformation, with attention to the information dimension increasing the accuracy of identification by 4.838 times. Among these, information content, information viewpoints, evidence, and information usefulness all play relatively significant roles, while the influence of corroborating information is limited. Respondents use factors such as '*unrealistic details (A11)*', '*biased viewpoints (A2)*', and '*lack of evidence (A14)*' to complete their judgment on the authenticity of information. However, when identifying misinformation, older adults have limited focus on elements such as information content (14 times), viewpoints (5 times), and evidence (7 times), indicating that the influence of the information dimension on misinformation identification has not been fully realized. To further enhance older adults' ability to identify misinformation and reduce its harm, it is necessary to strengthen their ability to analyse various attributes of the information dimension and increase their attention to the authenticity of the information itself.

Limited direct influence of information user factors on misinformation identification

The regression analysis results show that the user-related factors ($p = 0.995$, $\text{Exp}(B) = 0.995$) has limited influence on older adults' misinformation identification. Combined with the previous grounded theory research findings, personal factors of older adults often indirectly influence

misinformation identification by affecting information sources and information dimensions. For example, older adults' judgment of the credibility of information sources and various attributes of the information dimension often relies on elements of knowledge structure such as industry background (A14), experience (A9), and common sense (A8), which in turn affects their identification of misinformation. Moreover, information users' factors vary greatly between individuals; older adults with more comprehensive knowledge structures can use this factor to promote misinformation identification, while those with weaker knowledge structures may be negatively inhibited by this factor.

Additionally, practice ($p = 0.080$, $\text{Exp}(B) = 0.162$) has a negative impact on the results of misinformation identification. At the same time, grounded theory research finds that when older adults verify information authenticity through practice, they have already adopted the information, and the false content within it has already caused harm to them.

Conclusion

Based on text data obtained from in-depth interviews and building upon preliminary grounded theory research, this paper conducted content analysis and binary logistic regression analysis to reveal key factors influencing misinformation identification among older adults. The results show that public information sources, interpersonal information sources, information content, information viewpoints, and evidence significantly influence misinformation identification. Furthermore, in older adults' misinformation identification, information sources play a crucial role, the influence of information dimensions has not been fully realized, and the direct influence of the information user factors is limited. These findings are significant for understanding and addressing the challenges older adults face with misinformation and are expected to provide insights for promoting age-friendly improvements in the information society.

Moreover, based on the findings of this study, we are currently examining the factors influencing misinformation identification by LLMs and their differences from older adults. In the next phase of our research, we will discuss how to better leverage LLMs to assist older adults in identifying misinformation.

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