The spread of rumors on social media networks and the individual's perception of freedom of expression

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Abstract. Due to the widespread use of social media, users are more able to share their thoughts and opinions, but individual differences in perception of freedom of speech may lead to frequent online rumors. This study adopts a questionnaire survey method to explore the relationship between the spread of rumors on social media networks and individuals' perceptions of freedom of speech. Based on the theories of freedom of speech and rumor dissemination, although no significant correlation was found between the degree of rumor dissemination and individual freedom of speech, it is clear that individual differences in their perception of freedom of speech can affect their behavior on social media. The results show that people's different understandings of freedom of speech can affect their reactions to online rumors. In the future, efforts should be made to strengthen the cultivation of users' ability to discern information, educate young people, and increase the scrutiny of social media platforms to create a healthy environment.

Keywords: Online rumors; rumor propagation; freedom of speech; individual users.

1. Introduction

With the popularity of the Internet and social media, individual users enjoy more freedom of expression through online media in a society with mature network technology and a high degree of freedom of expression, but at the same time, they are faced with the risk of rampant online rumors and fast transmission speed. Rumors are a complex social phenomenon, typically referring to language expressions that lack factual basis or have not been confirmed [1]. The emergence of social media has greatly changed the characteristics of traditional public opinion, stimulating changes in the way public opinion is expressed, platforms, and the effects [2]. Online rumors are constantly changing subtly, providing people with a way to vent their psychological conflicts and meeting the needs of some people to release their emotions when facing pressure or difficulties.

Freedom of speech encourages people to freely express their views and opinions, but on the other hand, abuse of freedom of speech may lead to the proliferation of false information, posing a threat to social order and individual rights. Speech is subject to certain restrictions, especially when it comes to public order, the reputation of others, etc [3]. Personal perception of freedom of expression is complex and diverse and is affected by cultural background, personal experience, and the Internet. This perception can also vary in different social and cultural environments. Freedom of speech is vague and difficult to grasp, and individuals' perception of freedom of speech is even more difficult to grasp. At present, the governance of online rumors has attracted the attention of many media and users. However, despite the complex and constantly evolving principles of freedom of speech and regulation of fake news, rumors continue to spread at lightning speed worldwide, influencing opinions and actions within minutes [4].

The changes and harm of rumors on social media networks are a multidimensional issue. In recent years, driven by the combined forces of natural, social, and technological factors, spreading rumors has become an increasingly normalized public opinion activity [5]. Therefore, effective prevention and control of online rumors also require involvement in multiple fields such as information technology, social psychology, laws, and regulations.

This study uses a questionnaire survey method to analyze the differences in individuals' cognitive and behavioral responses to freedom of speech, aiming to explore the relationship between the spread of rumors on social media networks and individuals' perceptions of freedom of speech. The theory of

freedom of speech provides a foundation for research, explaining the impact of individual perception on social media behavior, and revealing the complex relationship between the two in conjunction with rumor dissemination theory. Research has shown that the degree of rumor dissemination is positively correlated with individual perception of freedom of speech, with individual perception of freedom of speech being the key dependent variable, providing a reference for regulating information dissemination and safeguarding the right to freedom of speech.

2. Organization of the Text

2.1. Rumor Spread Theory

The theory of rumor dissemination emphasizes the special role of freedom of speech in individuals and explores the dissemination mechanism and impact of false information in populations, meeting on an equal footing [6]. In the past, under the guidance of rumor theory research, scholars proposed the Periodic External Shocking (PES) model, which indicates that certain public opinions spread more widely and faster in sparse structures [7]. The theory of rumor propagation explores the dissemination mechanism and impact of false information among the population.

The spread of rumors is a complex social and psychological process. Proper modeling of this process requires both a correct description of the underlying social networks that spread rumors and the quantification of various behavioral mechanisms that motivate individuals to participate in rumor dissemination. Rumors spread in a crowd through paired contact between spreaders and other people in the crowd, following the rules of group action. Research has found that the initial spread rate of rumors on scale-free networks is much higher [8]. This highlights the urgent need to find a balance between safeguarding the right to freedom of speech and reducing the spread of online rumors.

Rumor information provides a way for people to vent their psychological conflicts, and social platforms also provide channels for venting, making social media a high-risk area for online rumors [9]. It may even affect the behavior of certain specific users in handling online rumors. Scholars have found through investigation that the basic understanding of rumors by the public is related to their growth environment [10]. For example, scholars such as Chang Jinfeng found in their research that the interweaving and mutual construction of true and false information during the epidemic makes the adolescent population extremely susceptible to becoming victims of online rumors related to the epidemic [11]. Teenagers, due to their strong curiosity and weak discernment ability, may be more likely to participate in online rumors, which not only affects their personal cognitive development but may also exacerbate social instability in the online world. This study will predict an individual's behavioral response to rumors based on the theory of rumor propagation, which may affect their perception of freedom of speech.

2.2. Freedom of speech theory

The theory of freedom of speech emphasizes individual freedom of expression and diversity of thought. John Mill mentioned in "On Freedom" that the theory of freedom of speech includes individual freedom and freedom of thought and speech [12]. Finding a balance between freedom of speech and rumor control is a daunting task. Freedom of speech is an important cornerstone of a democratic society, but excessive freedom of speech can also lead to the spread of rumors and disrupt social order. Therefore, understanding and responding to the complex relationship between online rumors and freedom of speech is of great significance for maintaining a healthy online public opinion environment.

The freedom of online speech presents characteristics of anonymity, diversity, and dissemination [13]. These characteristics not only accelerate the spread of online rumors but also reduce the psychological burden of spreaders. Citizens may exceed the limits of freedom of speech and abuse their right to freedom of speech on the internet when exercising this right [14]. So the right to freedom of speech on the internet has its advantages and disadvantages. The internet provides convenience for citizens to express their opinions, but it also has negative impacts. The anonymity of the internet can

make people more willing to speak freely and express their true thoughts, which can also exacerbate the phenomenon of group polarization and create uncontrollability [15].

3. Methodology

3.1. Questionnaire survey

The survey questionnaire is divided into four parts. The first part is a question about the basic information of the respondents, mainly asking about their personal basic information, including different genders, occupations, ages, educational levels, and social media usage frequency, to ensure the diversity and representativeness of the sample. The second part is to ask about the social media rumors that the respondents have been exposed to. The third part is to investigate the respondents' perception of freedom of speech. The fourth part is to ask the respondents about their behavior in using social media. This study conducted basic descriptive statistics on the collected data and employed data from valid questionnaires to be entered into SPSS software. Data processing involves cleaning and encoding the entered data to ensure its accuracy and consistency.

3.2. Participants

Through an online survey platform, questionnaire links were distributed to social media users. The questionnaire was distributed on various social media platforms and collected data from 207 users nationwide. From the basic population information, the gender distribution shows that the number of males (N=121) is higher than that of females (N=86), accounting for 58.45% and 41.55% respectively.

From the perspective of occupational distribution, the survey respondents are mainly from the upper class (N=139), accounting for 67.15%; In terms of age distribution, the age range of 25-34 years old is the main group (N=106), accounting for 51.21%; From the perspective of education level, undergraduate/vocational education is the main type (N=128), accounting for 61.84%; From the frequency of using social media, it is mainly multiple times a day (N=112), accounting for 61.07%; From the situation of exposure to online rumors, 1-5 items are the main ones (N=140), accounting for 64.22%, as shown in Table 1.

Table 1. Basic information.

Items	Option	Frequency	Percentage (%)
Gender	Male	121	58.45
	Female	86	41.55
occupation	Student	43	20.77
	Office worker	139	67.15
	Professional	25	12.08
Age	Under 18 years old	6	2.9
	18-24 years old	67	32.37
	25-34 years old	106	51.21
	35-44 years old	20	9.66
	45 years old and above	8	3.86
Educational level	High school/vocational school or below	11	5.31
	High school/vocational school	45	21.74
	Undergraduate/Associate Degree	139	67.15
	Master's degree or above	12	5.8
Frequency of using social media	Once a day	34	16.43
	Multiple times a day	128	61.84
	Once a week	27	13.04
	How many times per week	17	8.21
	Rarely used	1	0.48
Number of rumors exposed to the internet	0 items	19	9.18
	1-5 items	132	63.77
	6-10 items	38	18.36
	More than 10 items	18	8.7
Total		207	100

4. Result

4.1. The current situation of online rumors encountered

In terms of the ability to distinguish online rumors, the majority of respondents believe that it is relatively easy to identify online rumors (N=111), accounting for 53.62%. This indicates that most people have confidence in their ability to identify online rumors; From the distribution of unacceptable types of online rumors, the majority of respondents cannot accept political opinion-based online rumors and celebrity hot topic-based online rumors, accounting for 45.89% and 28.99% respectively. This may be due to the high sensitivity of political rumor spreaders. Secondly, the public is relatively resistant to topics involving personal privacy or hype, especially rumors related to celebrities, which can easily mislead the public and trigger unnecessary attention and discussion, as shown in Table 2.

Table 2. The current situation of online rumors encountered.

Items	Option	Frequency	Percentage (%)
Ability to distinguish online rumors	Very easy to identify	34	16.43
	Relatively easy to identify	111	53.62
	commonly	48	23.19
	Difficult to identify	11	5.31
	Very difficult to identify	3	1.45
You cannot accept rumors involving different types	politic view	95	45.89
	Celebrity hot topics	60	28.99
	Hot topics in social life	50	24.15
	Other: Rice circle tearing	1	0.48
	Other: Yellow Rumors	1	0.48

4.2. Perception of Freedom of Speech

From the perspective of individuals' perception of freedom of speech, regarding the Opinion on Restricting Freedom of Speech, the largest number of people (N=128) believe that moderate restrictions should be implemented, accounting for 61.84%; From the perspective of the perceived level of freedom of speech on social media, the majority of respondents believe that it is universal and relatively free, with 63 and 78 people respectively, accounting for 30.43% and 37.68%, respectively. A considerable number of people believe that if freedom of speech is not restricted, the negative impact of this lack of restriction will cause some concerns, as shown in Table 3 and Figure 1.

Table 3. Perception of Freedom of Speech.

Items	Option	Frequency	Percentage (%)
Opinions on Restrictions on Freedom of Speech	Strict restrictions should be imposed	46	22.22
	Moderate restrictions	128	61.84
	No need for too many restrictions	30	14.49
	It should not be restricted	3	1.45
Perceived level of freedom of speech on social media	Very unfree	13	6.28
	Not very free	41	19.81
	Commonly	63	30.43
	Relatively free	78	37.68
	Very free	12	5.8

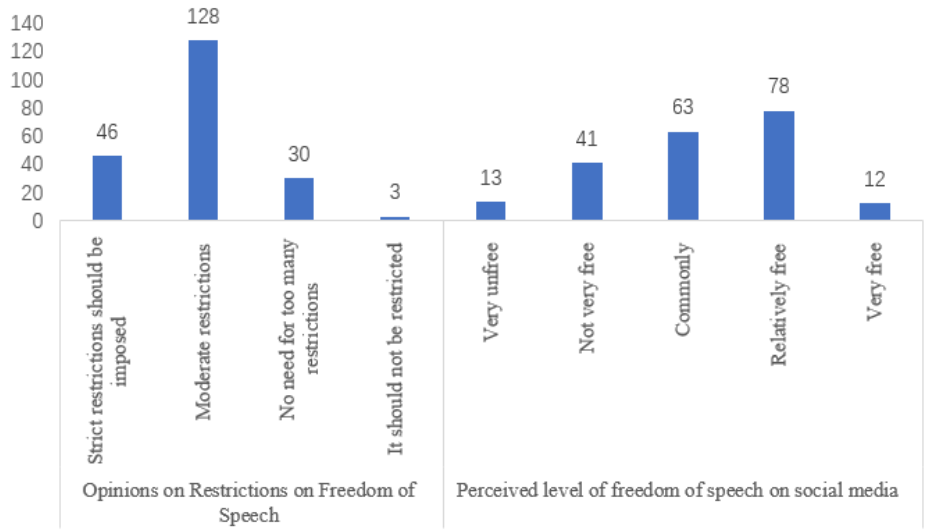


Fig 1. Perception of Freedom of Speech.

From the perspective of enthusiasm for participating in topic discussions, the majority are relatively active and common, with 62 and 70 participants respectively, accounting for 29.95% and 33.82%. Participating in topic discussions can help one integrate into the group, break through traditional thinking frameworks, re-examine one's views on certain issues, and expand one's thinking, as shown in Table 4 and Figure 2.

Table 4. The enthusiasm to participate in hot-topic discussions.

Items	Option	Frequency	Percentage (%)
The enthusiasm to participate in hot-topic discussions	Very actively involved	28	13.53
	Actively participate	62	29.95
	Commonly	70	33.82
	Not very actively involved	35	16.91
	Never participate	12	5.8

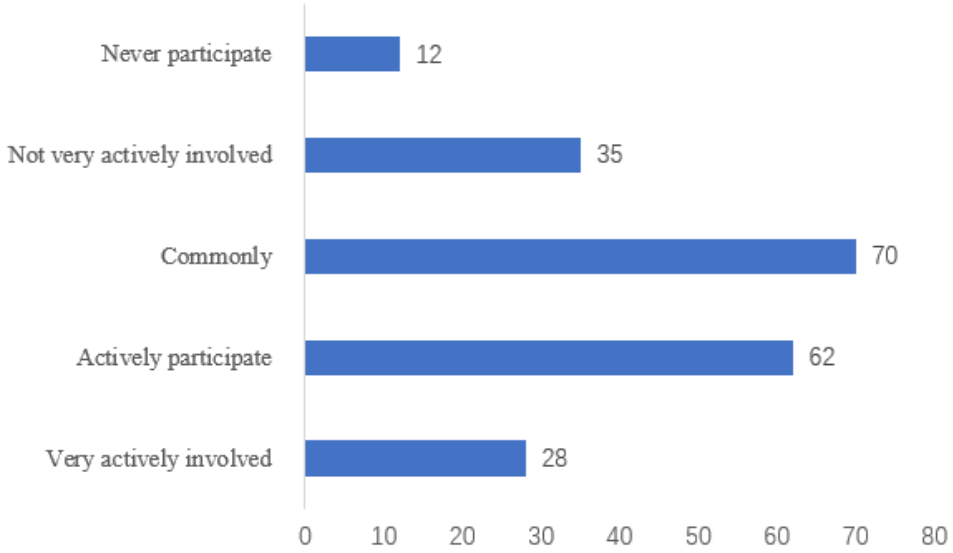


Fig 2. The enthusiasm to participate in hot topic discussions.

4.3. Behavior of using social media

From the basic methods of dealing with online rumors, most respondents will not forward or comment (report) after verifying the rumors. Neither forwarding nor commenting, these two numbers are 78 and 74, accounting for 37.68% and 35.75% respectively, as shown in Table 5 and Figure 3.

Table 5. Behavior of using social media.

Items	Option	Frequency	Percentage (%)
The usual approach to dealing with online rumors	Direct forwarding and commenting	12	5.8
	Verify rumors before forwarding and commenting	43	20.77
	After verifying rumors, do not forward or comment (report)	78	37.68
	Neither forwarding nor commenting	74	35.75
	Total	207	100

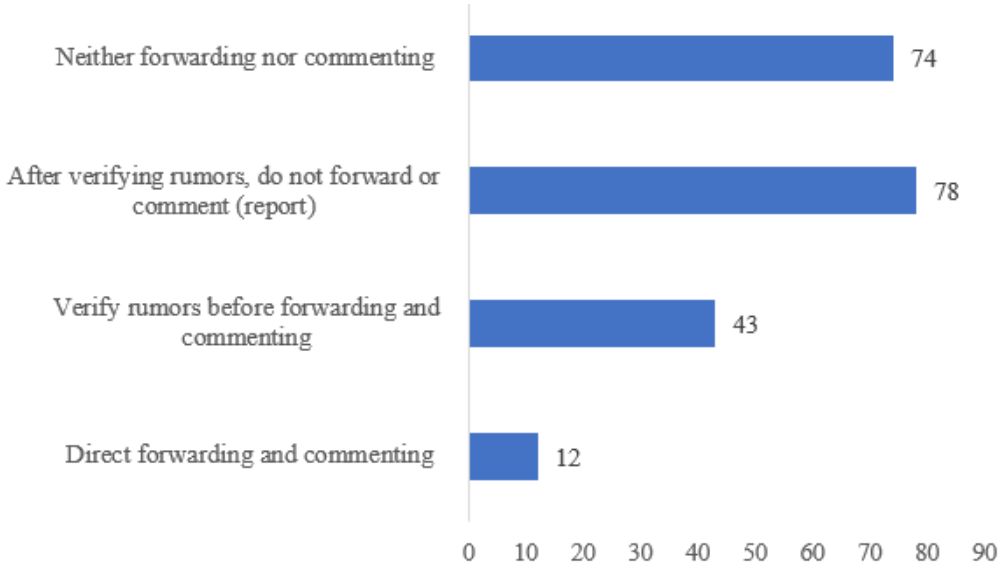


Fig 3. Behavior of using social media.

5. Discussion

Based on the previous research results, verify the relationship between rumors on social media networks and freedom of speech in hypothesis 1. According to chi-square analysis, the chi-square value is 20.945, P=0.051>0.05. Therefore, there is no significant correlation between the degree of rumor spread on social media networks and the degree of freedom of speech, and hypothesis 1 is not valid, as shown in Table 6.

Table 6. Chi-square analysis results.

Subject	Items	Number of rumors exposed to the internet				Total	$\chi 2$	p
		0	1~5	6~10	More than 10 items			
Perceived level of freedom of speech on social media	Very unfree	3(15.79)	5(3.79)	4(10.53)	1(5.56)	13(6.28)		
	Not very free	2(10.53)	23(17.42)	13(34.21)	3(16.67)	41(19.81)		
	commonly	3(15.79)	45(34.09)	10(26.32)	5(27.78)	63(30.43)	20.945	0.051
	Relatively free	8(42.11)	50(37.88)	11(28.95)	9(50.00)	78(37.68)		
	Very free	3(15.79)	9(6.82)	0(0.00)	0(0.00)	12(5.80)		
Total		19	132	38	18	207		

* p<0.05 ** p<0.01 *** p<0.001

Assumption 2: Individual cognitive differences in freedom of speech directly affect their behavioral differences on social media. After correlation analysis, the correlation coefficient is 0.168, P<0.05. The perceived level of freedom of speech is positively correlated with the motivation to participate in hot-topic discussions, as shown in Table 7.

Table 7. Pearson related.

	Perceived level of freedom of speech	Motivation to participate in hot-topic discussions
Perceived level of freedom of speech	1	/
Motivation to participate in hot-topic discussions	0.168*	1

* p<0.05 ** p<0.01 *** p<0.001

Regression analysis was conducted with perceived freedom of speech as the independent variable and motivation to participate in hot topic discussions as the dependent variable, with an R2 value of 0.028. Therefore, in the analysis of this article, the explanatory power of the perceived level of freedom of speech on the motivation to participate in hot topic discussions reached 2.8%, as shown in Table 8.

Table 8. Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.168[a]	.028	.023	1.067	.028	5.944	1	205	.016	1.784

a. Predictors: (Constant), Perceived level of freedom of speech
b. Dependent Variable: Motivation to participate in hot topic discussions

According to Table 9, F=5.944, sig=0.016<0.05, Therefore, at least one independent variable has a significant impact on the motivation to participate in hot topic discussions, as shown in Table 9.

Table 9. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.768	1	6.768	5.944	.016[b]
	Residual	233.415	205	1.139		
	Total	240.184	206			

a. Dependent Variable: Motivation to participate in hot topic discussions.
b. Predictors: (Constant), Perceived level of freedom of speech.

According to Table 10, the regression coefficient value is 0.178, P=0.016<0.05. Therefore, the perceived level of freedom of speech has a significant and positive impact on the motivation to participate in hot-topic discussions, and Hypothesis 2 holds, as shown in Table 10.

Table 10. Coefficients.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.150	.243		8.840	.000					
	Perceived level of freedom of speech	.178	.073	.168	2.438	.016	.168	.168	.168	1.000	1.000

a. Dependent Variable: Motivation to participate in hot topic discussions

6. Conclusion

This study focuses on the relationship between the spread of rumors on social media networks and individuals' perceptions of freedom of speech. Through the analysis of a large sample of survey

questionnaires, although no significant correlation was found between the degree of tumor dissemination and individual freedom of speech, it was clarified that individual differences in perception of freedom of speech will affect their behavioral differences on social media. However, the sample size of the study may have limitations and the consideration of influencing factors may not be comprehensive enough. The research results indicate that people's different understandings of freedom of speech can lead to different reactions and behaviors when facing online rumors. In the future, it is necessary to strengthen the cultivation of social media users' ability to discern information, especially to carry out network security education and media literacy education for young user groups. At the same time, social media platforms should increase their content review efforts, establish strict review mechanisms, jointly create a healthy social media environment, and reduce the spread of rumors.

References

[1] Gu Jinxi (2017). Research on the dissemination mechanism of online rumors in the "micro era" - an analysis based on typical cases Journal of Zhejiang University (Humanities and Social Sciences Edition), Volume 47, (3), 93-104

[2] Li Jiaying (2021). The characteristics of public opinion in the era of social media Audiovisual (6), 169-170

[3] Chang Jinfeng, &Hu Kui (2020). Research on the cognition, attitude, and behavior of adolescents towards online rumors related to the epidemic Youth Journal (2), 45-49

[4] Leslie Gielow Jacobs, Freedom of Speech and Regulation of Fake News, The American Journal of Comparative Law, Volume 70, Issue Supplement_1, October 2022, Pages i278–i311

[5] Zhou Yuqiong: "Academic Investigation of 'Internet Rumors'", Beijing Daily, February 18, 2013, Issue 020. [Zhou Yuqiong, ″An Academic Study of ′Internet Rumors′″, Peking Daily, 2013-02-18, p.020.] https://doi.org/10.1093/ajcl/avac010

[6] Nadel, M. S. (1983). A unified theory of the first amendment: fordham urban law journal.

[7] Anonymous (2011). 2011 ieee 11th international conference on data mining.

[8] M. Nekovee, Y. Moreno, G. Bianconi, M. Marsili, Theory of rumour spreading in complex social networks, Physica A: Statistical Mechanics and its Applications, Volume 374, Issue 1,2007, Pages 457-470, ISSN 0378-4371, https://doi.org/10.1016/j.physa.2006.07.017.

[9] Zhang Zifan, &Wang Yong (2020). The reason, harm and countermeasures of rumor overflow in the social media era: based on the investigation of rumor spread in the COVID-19 News Forum (4), 62-65

[10] Guo Jun and Pan Dengwen (2023). Thoughts on the abuse of freedom of speech in the online environment Industry and Technology Forum, Volume 22, (23), 39-43

[11] Howard, Jeffrey W., "Freedom of Speech", The Stanford Encyclopedia of Philosophy (Spring 20 24 Edition), Edward N. Zalta & Uri Nodelman (eds.), URL = < https://plato.stanford.edu/archives/spr2024/entries/freedom-speech/ >.

[12] Zhang Jiliang (2017). A New Interpretation of John Mill's Theory of Freedom of Thought and Speech Journal of Wuhan University (Philosophy and Social Sciences Edition), Volume 70, (1), 108-114

[13] Huang Yonglin, &Yuan Yuan (2021). On the Freedom of Citizen Speech and the Effectiveness of Online Public Opinion Guidance Theoretical Monthly (12), 109-115

[14] Wang Ruqin (2020). Research on the abuse of freedom of speech on the internet Legal Expo (33), 51-52

[15] Liu Bingyu, &Ling Haoying (2012). Exploring the Public Opinion Variation of Mass Events in the Network Media Environment from a Sociological Perspective Modern Communication (Journal of Communication University of China) (9), 111-115