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Research on the Mechanism of Social Platform Algorithms Influencing Public Information Cognition

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Abstract. With the rapid development of social platforms, algorithm recommendation has gradually become an important way for users to obtain online information. When changing the user's information exposure range, it will also have an impact on their understanding and judgment of information. This article takes social platform users as the research object to explore the internal mechanism of algorithmic factors affecting public information cognition. This article verifies the validity of 377 questionnaires through reliability and validity analysis, regression analysis, and mediation effect test. The research results indicate that algorithmic perception has a significant negative impact on information cognitive bias, while algorithmic transparency and algorithmic control significantly affect users' information cognitive bias. Further analysis reveals that algorithmic perception and algorithmic control generate partial mediating effects through platform trust, while algorithmic transparency generates complete mediating effects through platform trust. Research shows that social platform algorithms not only affect the way users receive information, but also influence their information judgment process through their trust in the platform.

Keywords: Social media platforms, Recommendation algorithm, Information cognitive bias

1. Introduction

In recent years, social platforms such as Tiktok, Xiaohongshu and Weibo have gradually become important places for people to obtain information. Unlike traditional media, social platforms mainly use intelligent recommendation algorithms to analyze user behavior data and complete content recommendations based on users' browsing history, likes, duration of stay, and other information. The algorithm continuously strengthens the existing information selection tendency. However, excessive reliance on user profiles for content distribution can also lead to users being exposed to similar information for a long time, reducing their exposure to different perspectives and thus affecting their judgment of related issues.Previous studies have mainly focused on two aspects: the process of information dissemination and user cognitive responses. The prevalence of ADHD in children and adolescents in China is as high as 6.3%, and about two-thirds of children still have ADHD symptoms in adulthood [1]. ADHD diagnosis still faces considerable challenges, requiring comprehensive consideration of individual clinical manifestations, comorbidities, and developmental experiences. In the context of the widespread application of recommendation

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algorithms in social media communication, analyzing the impact of algorithm recommendations on the public's information cognition process is of great significance and can provide theoretical basis for improving public media literacy [2].

2. Research model construction and hypotheses

2.1. Research variables

(1) Independent variable. This article selects algorithm perception, algorithm transparency, and algorithm control perception as independent variables. Algorithm perception reflects the level of understanding of platform algorithm recommendations; algorithm transparency reflects the degree of openness of the operating rules; algorithm control perception reflects recommendation ability [3].

(2) Intermediary variable. This article selects platform trust as the mediating variable, which reflects the degree of user recognition of the fairness and reliability of algorithm recommendations [4].

(3) Dependent variable. This article uses information cognitive bias as the dependent variable to measure the impact of algorithm recommendations on public information acquisition, understanding, and judgment, mainly manifested as limited information sources, fixed viewpoints, and cognitive biases [5].

(4) Result variable. This article takes algorithm resistance behavior as the outcome variable to analyze users' active response behavior after being influenced by algorithms, including adjusting recommendation settings, actively seeking other sources of information, and reducing algorithm dependence. This article summarizes the research variable information, as shown in Table 1.

Table 1. Research variables

Variable Type	Variable Name	Variable Symbol	Variable Definition	Measurement Dimensions
Independent Variable	Algorithm Perception	AP	Perception level of media algorithm recommendation, content filtering, and information distribution mechanism	AP1–AP3
	Algorithm Transparency	AT	Perception level of platform algorithm rules, recommendation logic, and information sorting mechanism disclosure	AT1–AT3
	Algorithm Control Perception	AC	Users believe they can adjust, influence, and control algorithmic recommendation results	AC1–AC3
Dependent Variable	Information Cognitive Bias	ICB	The deviation in information acquisition, viewpoint reinforcement, and judgment caused by recommendations	ICB1–ICB3
Outcome Variable	Algorithm Resistance Behavior	AR	Users' proactive behaviors to reduce algorithmic influence, including adjusting, avoiding, or using platforms in alternative ways	AR1–AR3
Mediating Variable	Platform Trust	PT	Users' recognition and acceptance of the fairness, reliability, and security of social media recommendations	PT1–PT3

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2.2. Model construction

Model 1: The model of algorithm factors and psychological mechanisms on information cognitive bis.

$$ICB = \alpha_0 + \alpha_1 AP + \alpha_2 AT + \alpha_3 AC + \alpha_4 PT + \epsilon_1 \tag{1}$$

Model 2: The impact of information cognitive bias on algorithm resistance behavior model.

$$AR = \beta_0 + \beta_1 ICB + \beta_2 PT + \epsilon_2 \tag{2}$$

Model 3: Intermediary model.

$$\begin{aligned} PT &= \gamma_0 + \gamma_1 X + \varepsilon \\ ICB &= \gamma_0 + \gamma_1 X + \gamma_2 PT + \varepsilon \end{aligned} \tag{3}$$

Among them, X represents algorithm perception, algorithm transparency, and algorithm control respectively, examining the role in the process of algorithmic factors affecting information cognitive bias.

2.3. Research hypothesis

(1) The Influence of Algorithm Factors on Information Cognitive Bias

As users' understanding of algorithm participation in the information distribution process continues to increase, algorithm perception will pay more attention to the influencing factors behind the recommended content, and re evaluate the information it receives, proposing.

H1: Algorithm perception has a significant positive impact on information cognitive bias.

If users can have a clear understanding of the reasons for the formation of platform recommended content, algorithm transparency can help improve their ability to distinguish information sources and content, and reduce cognitive biases caused by unclear algorithm mechanisms, proposing.

H2: Algorithm transparency has a significant positive impact on information cognitive bias.

Algorithmic control may encourage users to actively participate in information filtering. Users adjust recommended content based on their preferences, limit the scope of information exposure.

H3: The sense of algorithmic control has a significant positive impact on information cognitive bias.

(2) The intermediary role of platform trust

When users form varying degrees of platform trust, it will affect their information judgment process.

H4: Platform trust plays a mediating role.

Higher transparency helps reduce users' uncertainty when faced with recommendation mechanisms, and further affects information cognition by influencing platform trust, proposing.

H5: Platform trust plays a mediating role.

When users believe that they can influence the recommendation results, the platform algorithm based on algorithmic control will also change, and further affect information cognitive bias.

H6: Platform trust plays a mediating role.

(3) The Impact of Information Cognitive Bias on Algorithm Resistance Behavior

When discover that algorithm recommendations affect their own information judgment, they will take proactive measures such as adjusting the recommended content to reduce the algorithm impact.

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H7: Information cognitive bias positively affects algorithm resistance behavior.

3. Research results

3.1. Descriptive statistical analysis

This article presents the results of descriptive statistical analysis, as shown in Table 2.

Table 2. Descriptive statistical analysis results

	N	Min	Max	mean	standard deviation	variance
AP1	377	1	5	3.78	0.897	0.805
AP2	377	1	5	3.7	0.933	0.871
AP3	377	1	5	3.53	0.94	0.883
AT1	377	1	5	2.88	1.015	1.031
AT2	377	1	5	3.14	0.98	0.96
AT3	377	1	5	2.93	1.042	1.085
AC1	377	1	5	3.4	0.996	0.991
AC2	377	1	5	3.35	0.996	0.991
AC3	377	1	5	3.37	0.976	0.952
ICB1	377	1	5	3.27	0.991	0.983
ICB2	377	1	5	3.32	0.97	0.94
ICB3	377	1	5	3.48	0.962	0.926
AR1	377	1	5	3.43	0.982	0.963
AR2	377	1	5	3.37	0.992	0.985
AR3	377	1	5	3.54	0.975	0.951
PT1	377	1	5	3.06	1.008	1.016
PT2	377	1	5	3.06	1.041	1.084
PT3	377	1	5	3.12	1.012	1.024

3.2. Regression analysis results

This article conducts regression analysis on Model 1, as shown in Table 3.

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Table 3. Regression analysis results

	Non standardized coefficient		standardized coefficient	t	p	Collinearity diagnosis	
	B	Standard Error	Beta			VIF	Tolerance
Con.	2.148	0.666	-	3.227	0.002**	-	-
AP	-0.0661326	0.096	-0.204	0.0558345	0.004**	1.440	0.694
AT	-0.0150958	0.104	0.014	0.0525639	0.000**	1.523	0.657
AC	0.4147998	0.096	0.456	0.0496897	0.000**	1.228	0.814
PT	0.124575	0.093	0.126	0.0510415	0.000**	1.417	0.706
R2			0.348				
Adjust R2			0.313				
F			F (5,94)=10.019,p=0.000				
D-W			2.120				

This article conducts regression analysis on Model 2, as shown in Table 4.

Table 4. Regression analysis results

	Non standardized coefficient		standardized coefficient	t	p	Collinearity diagnosis	
	B	Standard Error	Beta			VIF	Tolerance
Con.	2.489591	0.566	-	.2852021	0.000**	-	-
AP	0.1378579	0.100	0.137	.0486217	0.003**	1.173	0.853
AT	0.313045	0.096	0.328	.0485537	0.000**	1.201	0.832
AC			0.175				
PT			0.149				
R2			F (3,96)=6.766,p=0.000				
Adjust R2			1.885				

3.3. Mediating effect

This article presents a mediating effect on the results, as shown in Table 5.

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Table 5. Intermediary effect results

Path	c	a	b	a*b	Boot SE	z-value	p-value	95% BootCI	Direct Effect (c')	Conclusion
AP→PT→ICB	-0.216*	-0.184**	0.118**	-0.022	0.009	-2.444	0.015	-0.041~-0.006	-0.194*	Partial mediation
AT→PT→ICB	-0.02	-0.299**	0.118**	-0.035	0.012	-2.917	0.004	-0.061~-0.012	0.015	Full mediation
AC→PT→ICB	0.510**	0.301**	0.118**	0.036	0.013	2.769	0.006	0.014~0.065	0.475**	Partial mediation

The results show that algorithm perception, algorithm transparency, and algorithm control have an indirect impact on information cognitive bias through platform trust. Among them, the indirect effect of the AP→PT→ICB path is -0.022, and the 95% Bootstrap confidence interval is [-0.041, -0.006], excluding 0, indicating that platform trust plays a partial mediating role; The indirect effect of the AT→PT→ICB path is -0.035, with confidence intervals of [-0.061, -0.012], indicating that platform trust plays a fully mediating role; The indirect effect of the AC→PT→ICB path is 0.036, with a confidence interval of [0.014, 0.065], indicating that platform trust plays a partial mediating role.

Overall, platform trust is an important psychological mechanism through which algorithmic factors affect public information cognition. Algorithmic factors do not directly change user cognition, but further affect information judgment by changing users' trust in platform recommendation mechanisms.

4. Conclusion

4.1. Research conclusion

This article uses regression analysis and mediation analysis to test the proposed research hypothesis, The empirical results show that algorithm perception has a significant negative impact on information cognitive bias, that is, the more fully users understand the algorithm recommendation mechanism, the lower their information cognitive bias. Therefore, the direction of H1's influence differs from the null hypothesis. Both algorithm transparency and algorithm control have a significant positive impact on information cognitive bias, as verified by H2 and H3. The results of the mediation effect test indicate that platform trust plays an important role in the process of algorithmic factors affecting information cognitive bias. Among them, platform trust plays a partial mediating role between algorithm perception and algorithm control and information cognitive bias, and a complete mediating role between algorithm transparency and information cognitive bias. Therefore, H4, H5, and H6 are all supported. In addition, information cognitive bias can significantly promote algorithm resistance behavior, as verified by H7.

Overall, the research model constructed in this article has good explanatory power, and all research hypotheses are supported by data except for the direction of influence of H1, which differs from expectations. The research results indicate that algorithm factors can affect users' information cognition process, and platform trust plays an important transmission role in it, further affecting users' resistance behavior to algorithm recommendations.

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4.2. Research suggestions

One is to improve the algorithm disclosure mechanism and optimize the content recommendation mode. The research results indicate that algorithm recommendation can affect users' information cognition process. The platform can add a recommendation reason prompt function to let users know the main basis for certain types of content being pushed.

The second is to enhance users' awareness of algorithms and strengthen their ability to judge information. Research has found that algorithmic perception can affect users' information cognition results. The more fully users understand the algorithm recommendation mechanism, the more they can rationally view the information provided by the platform. Therefore, users should enhance their understanding of recommendation algorithms when using social platforms, and should not use platform push content as the only source of information.

The third is to help users form a reasonable way of using algorithms. Users can adjust recommendation settings according to their own needs, actively engage with different perspectives and types of information, and avoid staying in a single information environment for a long time.

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