

Formation Mechanisms of Information Cocoons among University Students in the Networked Media Environment and Pathways for Media Literacy Cultivation: A Mediation Analysis Based on the College Students' Social Mentality Survey

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Abstract

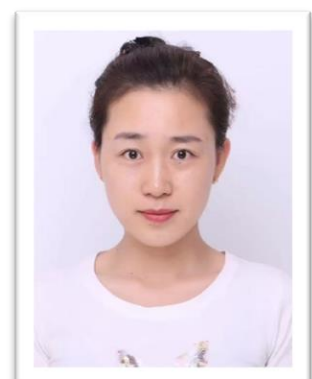
The widespread adoption of digital technologies and algorithmic recommendation systems has rendered information cocoons a prominent challenge to university students' cognitive development and value formation. Against this backdrop, drawing on a large-scale dataset of 4,268 valid responses from the 2025 Chinese College Students' Social Mentality Survey, this study classifies networked media into acquaintance-based social media, public-discussion media, and vertical-dissemination media. By constructing a multiple mediation model that integrates structural, behavioral, and technological dimensions, it systematically examines the formation mechanisms of information cocoons and the moderating role of media literacy. Results reveal divergent cocoon effects across media types: acquaintance-based social media substantially reinforce information cocoons, public-discussion media mitigate them, and vertical-dissemination media slightly facilitate cocoon formation. Specifically, social network homogeneity, information-seeking initiative, and algorithm dependence separately mediate the link between media use and information cocoons. Furthermore, media literacy attenuates cocoon-fostering pathways and amplifies cocoon-breaking ones. Based on these findings, this paper proposes four intervention paths targeting social connection, information criticism, algorithmic awareness, and situational adaptation to enhance students' media literacy. The findings provide robust empirical evidence and practical guidance for alleviating information cocoons and optimizing college students' online information environment.

Keywords

Networked media, Information cocoons, Formation mechanisms, Media literacy, University students, Mediation effects



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Introduction

Mobile internet has spread widely. Algorithmic recommendation technologies keep updating. Contemporary university students are digital natives. They depend heavily on networked media. They use these media to get information, interact with others, and form personal attitudes [1]. Online resources offer abundant information. These resources can broaden students' cognitive scope. At the same time, information cocoons and echo chambers may narrow people's cognition. They can also lead to rigid attitudes and value polarization. These issues create real difficulties. They bring challenges for ideological and political education and talent training in universities [2].

This study uses data from the 2025 national survey of college students' social mentality. It tries to answer three core research questions. First, do different types of networked media create different information cocoon effects among university students? Second, what mediating processes lead to information cocoons? Do these processes vary for different media types? Third, can media literacy adjust the cocoon effects of networked media? What targeted training strategies can this study build based on this finding [3]?

Literature review and research hypotheses

Conceptual evolution and measurement of information cocoons

The "information cocoon" describes a specific phenomenon. Personalized algorithms filter public information according to individual preferences. People are then limited to content that matches their tastes. They end up trapped within a narrow information space, just like silkworms inside cocoons [4]. Later studies split information cocoons into two core dimensions. The first is structural cocoons. It means people's social networks share similar class backgrounds and viewpoints. The second is content cocoons. It means people repeatedly

encounter similar information and opinions.

Most domestic research adopts this two-dimensional measurement framework. However, many studies only examine one single platform or treat new media as a broad general concept. They do not pay enough attention to varied cocoon effects produced by different media. Cinelli and colleagues analyzed large cross-platform social media datasets. They ran comparative tests across many online spaces. Their results show that platform and media features create clearly different echo chamber and cocoon effects. Their findings offer valuable support for the type-based analysis in this study.

Networked media types and information cocoons

Scholars have not formed a consistent conclusion about how networked media relate to information cocoons. Some studies state that algorithm-powered new media make information narrowing more serious [5]. Other empirical evidence shows recommendation algorithms do not greatly lower the diversity of content users receive [6]. One major reason for this inconsistent result is that many studies ignore media type differences. Different platforms follow distinct communication structures and user connection rules [7].

This study adopts a platform-user co-construction perspective. It sorts networked media by two standards. The standards are communication structure and user connection patterns. Communication structure can be horizontal or vertical. User connections can be open or closed. This classification yields three media types. The first type is acquaintance-based social media. Examples include WeChat and QQ. These platforms form closed strong-tie networks built from offline social relationships. Interactions here are mostly horizontal. The second type is public-discussion media. Examples include Weibo, Zhihu and Baidu Tieba. These platforms support open user connections. Their main function is opinion

exchange and public discussion. The third type is vertical-dissemination media. Examples include news applications and short-video platforms. Information flows mainly from content producers to users. Users have few horizontal connections with one another.

Hypothesis 1 (H1): Different types of networked media exert significantly different effects on university students' information cocoons.

H1a: Acquaintance-based social media significantly and positively predicts information cocoons (cocoon-building effect).

H1b: Public-discussion media significantly and negatively predict information cocoons (cocoon-breaking effect).

H1c: Vertical-dissemination media have a non-significant or marginally significant positive predictive effect on information cocoons.

Formation mechanisms of information cocoons

Existing research has explored the causes of information cocoons at technological, social, and individual levels but lacks systematic mediation testing [8]. At the technological level, algorithmic recommendation is regarded as a core driver of content narrowing, though empirical studies show that algorithmic effects are jointly moderated by platform attributes and user behavior [9]. At the social level, homogeneous social networks are the core source of structural cocoons, as strong ties based on real-world relations lead to opinion convergence and information filtering [10]. At the individual level, psychological and behavioral characteristics such as information-seeking initiative and need for cognitive closure affect individuals' acceptance of heterogeneous information [11].

This study converts the three levels above into three mediating variables. They are social network homogeneity for the structural mechanism, information-seeking initiative for the behavioral mechanism, and algorithm dependence for the technological mechanism. It puts forward Hypothesis 2 (H2). Multiple mediation

pathways can explain the formation of information cocoons. These three mechanisms work differently across media types.

H2a: Social network homogeneity mediates the relationship between networked media use and information cocoons.

H2b: Information-seeking initiative mediates the relationship between networked media use and information cocoons.

H2c: Algorithm dependence mediates the relationship between networked media use and information cocoons.

Media literacy and information cocoons

Media literacy refers to individuals' capacity to access, analyze, evaluate, and disseminate information and is widely regarded as an important lever for dismantling information cocoons. Studies confirm that higher media literacy enhances individuals' information criticism capacity and willingness to obtain diverse information, reducing reliance on algorithmic recommendation [12]. However, existing research mostly focuses on the direct effects of media literacy, rarely examining its moderating effects across different media scenarios, and lacks empirical testing of specific boundary conditions.

Hypothesis 3 (H3): Media literacy plays a negative moderating role in the link between networked media use and information cocoons. Higher media literacy weakens the cocoon effects of networked media.

Research design

Data source

Data come from the 2025 Chinese College Students' Social Mentality Survey. The Social Governance Research Center of Fudan University ran this survey. It worked with 12 universities across the country. The survey took place from March to June in 2025. The research team used stratified multistage random sampling. The sampling process included two steps. First, researchers divided the sample by eastern, central and

western regions. They selected 18 universities at different levels from each region. These universities include Project 985, Project 211, regular undergraduate institutions and vocational colleges. Second, researchers sampled students randomly within each university. They grouped students by grade and major. The team sent out 5,000 electronic questionnaires. Some responses were invalid. These invalid submissions had very short completion times or repeated patterned answers. The researchers removed these responses. Finally, 4,268 valid samples remained. The effective response rate reached 85.36%. The sample includes participants of different genders, grades, majors, university tiers and regions. It has sound national representativeness.

Variable measurement

(1) Independent variable

This classification is tailored to the 2025 Chinese online media landscape and college students' media habits. Information channels are sorted into three categories: acquaintance-based social media (WeChat, QQ). Public-discussion media (Weibo, Zhihu, Tieba). Vertical-dissemination media, including news apps (Toutiao, Tencent News), short-video platforms (Douyin, Kuai-shou, Bilibili), and content communities (Xiaohongshu). The survey question asks respondents about their main online channel for national affairs and public issues. Researchers assign a value of 1 to respondents who pick a given medium. Others receive a value of 0. This process creates three binary variables.

(2) Mediating variable

Social network homogeneity reflects the structural mechanism. Researchers measured it with three statements. The first statement reads "Most people I contact online share similar backgrounds to mine." The second reads "Most people I interact with online hold views consistent with mine." The third reads "My online social circle basically comes from my real-life circle." This section uses a 5-point Likert scale. One point stands for strongly disagree. Five points stand for strongly

agree. Higher scores mean stronger social network homogeneity (Cronbach's $\alpha=0.812$).

Information-seeking initiative reflects the behavioral mechanism. This variable uses reverse coding. It also contains three items. The first item is "I actively search for information from different positions." The second is "I often follow accounts with views different from mine." The third is "When encountering controversial events, I verify information from multiple sources." Higher scores correspond to lower initiative in seeking diverse information. Respondents with higher scores are more likely to fall into content cocoons (Cronbach's $\alpha=0.789$).

Algorithm dependence reflects the technological mechanism. Three items measure this construct. The first item states "I mainly rely on platform recommendations to obtain information." The second states "I rarely modify platform recommendation settings." The third states "Recommended content basically matches my interests." Higher scores show greater reliance on algorithmic recommendation (Cronbach's $\alpha=0.805$).

(3) Dependent variable

This variable has structural and content dimensions. The structural item is "Most people I contact through the internet are concentrated in similar social strata." The content item is "Most opinions and information I encounter online are consistent with my own views." The measurement uses a 5-point Likert scale. Higher scores represent stronger information cocoons (combined Cronbach's $\alpha=0.764$).

(4) Moderating variable

The measurement draws on the general media literacy scale developed for Chinese university students. It includes 12 items across four dimensions. These dimensions are information acquisition ability, information criticism ability, information production ability, and media ethics. Respondents answer on a 5-point scale. Higher scores indicate a higher level of media literacy (total Cronbach's $\alpha=0.857$; all dimension coefficients above 0.700).

(5) Control variable

The analysis includes six control variables. They are gender, age, political affiliation, major type, university tier, and place of upbringing. Gender is coded as male=1 and female=0. Political affiliation is coded as party member=1 and other=0. Major type is coded as humanities=1 and science, technology, engineering, mathematics (STEM)=0. University tier is coded as Project 985 or 211=1 and other=0. Place of upbringing is coded as urban=1 and rural=0.

Analytical methods

The Statistical Package for the Social Sciences (SPSS) 26.0 and the Hayes PROCESS macro were used. Descriptive statistics and correlation analysis were conducted first; ordered logit regression tested the main effects of different media on information cocoons. PROCESS model 4 tested multiple mediation effects, and model 1 tested the moderating effect of media literacy.

Empirical results**Descriptive statistics**

The sample comprised 40.23% male and 59.77% female students. Mean age was 20.12 years, standard deviation (SD)=1.34. grade distribution was 24.18% freshmen, 26.75% sophomores, 25.33% juniors, 19.89% seniors, and 3.85% graduate students and above. 6.72% were

Party members and 85.43% Communist Youth League members. 58.62% were humanities majors and 41.38% STEM majors. 18.37% attended Project 985 or 211 universities, 56.28% regular undergraduate institutions, and 25.35% vocational colleges. 62.49% grew up in urban areas and 37.51% in rural areas.

For core variables: 21.37% rely primarily on acquaintance-based social media, 38.61% on public discussion media, and 37.56% on vertically distributed content media. The overall mean score of information cocoon is 2.76, (SD=0.92). Social network homogeneity is Mean (M)=3.02 (SD=0.88). Reversed information-seeking initiative is M=2.58 (SD=0.91). Algorithm dependence is M=3.15 (SD=0.94). Media literacy is M=3.42 (SD=0.76).

Cocoon effects of different networked media

With the total information cocoon score as the dependent variable, control variables and the three media variables were entered into an ordered logit regression (in Table 1). After controlling for demographic variables, acquaintance-based social media use significantly and positively predicted information cocoons ($\beta=0.315$, $p<0.001$), confirming H1a. Public-discussion media significantly and negatively predicted information cocoons ($\beta=-0.247$, $p<0.001$), confirming H1b. Vertical-dissemination media showed a marginally significant positive effect ($\beta=0.102$, $p<0.1$), indicating a mild cocoon-building tendency and partially supporting H1c.

Table 1. Ordered logit regression results for the effects of different networked media on information cocoons.

Variable	Coefficient	SE	Z	p
Gender	0.124	0.078	1.590	0.112
Age	-0.032	0.029	-1.103	0.270
Political affiliation	-0.187	0.125	-1.496	0.135
Major type	0.095	0.076	1.250	0.211
University tier	-0.203**	0.073	-2.781	0.005
Place of upbringing	0.156*	0.079	1.975	0.048
Acquaintance-based social media	0.315***	0.082	3.841	0.000
Public-discussion media	-0.247***	0.069	-3.580	0.000
Vertical-dissemination media	0.102 ⁺	0.061	1.672	0.094
Constant	1.245**	0.426	2.922	0.003
N	4,268			
Pseudo R ²	0.062			

*Note: SE=standard error; ⁺ $p<0.1$, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Multiple mediation analysis of cocoon formation mechanisms

This analysis adopts PROCESS model 4. The three media types serve as independent variables. Information

cocoons act as the dependent variable. Social network homogeneity, information-seeking initiative and algorithm dependence are the mediating variables. Demographic variables are included as controls as shown in Table 2.

Table 2. Multiple mediation effects.

Media type	Mediation pathway	Effect	SE	95% CI
Acquaintance-based social media	Social network homogeneity	0.128	0.025	[0.082, 0.181]
	Information-seeking initiative	0.074	0.018	[0.041, 0.113]
	Algorithm dependence	0.036	0.015	[0.009, 0.068]
	Total indirect effect	0.238	0.034	[0.174, 0.307]
	Direct effect	0.077	0.076	[-0.072, 0.226]
Public-discussion media	Social network homogeneity	-0.093	0.021	[-0.137, -0.054]
	Information-seeking initiative	-0.085	0.019	[-0.125, -0.050]
	Algorithm dependence	-0.021	0.012	[-0.047, 0.003]
	Total indirect effect	-0.199	0.029	[-0.258, -0.144]
	Direct effect	-0.048	0.065	[-0.175, 0.079]
Vertical-dissemination media	Social network homogeneity	0.025	0.014	[-0.003, 0.055]
	Information-seeking initiative	0.032	0.015	[0.005, 0.063]
	Algorithm dependence	0.068	0.019	[0.034, 0.108]
	Total indirect effect	0.125	0.026	[0.077, 0.179]
	Direct effect	-0.023	0.057	[-0.135, 0.089]

For acquaintance-based social media, all three indirect paths are significant. Social network homogeneity constitutes the dominant mediator. For public discussion media, social network homogeneity and information-seeking initiative significantly mediate the de-cocooning effect, while algorithm dependence is non-significant. For vertically distributed content media, information-seeking initiative and algorithm dependence are significant mediators, but social network homogeneity is not. H2 is generally supported.

Moderating effects of media literacy

PROCESS model 1 tested the moderating role of media literacy across the three media pathways. Media literacy exerted significant negative moderation in all three pathways ($p < 0.05$), supporting H3. Simple slope analysis further showed:

For acquaintance-based social media, the cocoon-building coefficient was 0.426 ($p < 0.001$) in the low-literacy group (M-1SD) and dropped to 0.204 ($p < 0.05$) in the high-literacy group (M+1SD), a 52.11% attenu-

ation.

For public-discussion media, the cocoon-breaking coefficient was -0.152 ($p < 0.05$) in the low-literacy group and rose to -0.342 ($p < 0.001$) in the high-literacy group, a 125.00% enhancement.

For vertical-dissemination media, the cocoon-building coefficient was 0.218 ($p < 0.01$) in the low-literacy group and became -0.014 ($p > 0.05$) in the high-literacy group, indicating that high media literacy can fully offset the mild cocoon-building effect.

Analysis of cocoon formation mechanisms

Acquaintance-based social media: Relationship closure-driven structural cocoons

The cocoon effect of acquaintance-based social media is essentially a “relationship cocoon”, with network homogeneity arising from the online extension of real-world social relations as the core mechanism. Social networks on platforms such as WeChat and QQ derive from real-world kinship and school ties, inherently featuring closed

circle boundaries. University students' online contacts are mostly classmates, family members, and friends who share highly overlapping backgrounds, cognitive levels, and values, directly reinforcing structural information cocoons.

This social setting has low anonymity. It encourages ingratiating expression. Individuals actively screen out controversial opinions. They stay away from diverse information. They want to keep good interpersonal ties and prevent social conflicts. These behaviors lower their initiative to seek information. They form self-built content cocoons. Algorithmic recommendation only strengthens this trend as a supporting factor. It is not the core cause. This finding supports the view. Information cocoons are essentially rooted in social structures. Technology itself is not the main source of the problem.

Public-discussion media: Opinion clash-driven cocoon breaking

The cocoon-breaking effect of public-discussion media stems from their "marketplace of ideas" attribute. Platforms such as Weibo and Zhihu are centered on interest-based rather than relationship-based connections. Users' core demands are information acquisition and opinion expression rather than maintaining social image. The open platform structure breaks the constraints of real-world social circles, enabling students to encounter people of different strata and positions, expanding weak-tie networks and reducing social homogeneity.

Anonymity lowers the cost of expressing heterogeneous views, and pluralistic discussion of public issues prompts students to actively seek information from different positions and verify facts from multiple sources, enhancing information-seeking initiative and criticality [13]. In public-discussion scenarios, algorithmic recommendation does not become a driver of information narrowing; rather, dominated by users' active search behavior, it becomes a tool for expanding information boundaries.

Vertical-dissemination media: Algorithmic immersion-driven content cocoon evolution

Vertical-dissemination media exhibit a mild cocoon-building tendency, driven by iterative upgrading of algorithmic technology and increasing user stickiness. In recent years, recommendation algorithms on short-video and news platforms have evolved from interest matching to immersion matching. They create highly personalized feeds with detailed user profiles. This process makes users used to passive information reception. Users are less likely to actively search for diverse content. Their information-seeking initiative drops accordingly.

Notably, the cocoon effect of vertical-dissemination media appears only at the content level. It produces no significant structural influence. Users do not have close horizontal social ties. They can hardly form shared opinions within closed circles. For this reason, its overall cocoon-building effect is much weaker than that of acquaintance-based social media. This indicates that algorithms do not inherently produce information cocoons; cocoon effects emerge only when users lose information-seeking initiative and become fully absorbed in algorithmic feeding.

Media literacy cultivation pathways

Based on the triple formation mechanisms and the moderating effects of media literacy, this study constructs precise and differentiated cultivation pathways along four dimensions.

Structural dimension: Expanding social connection literacy and breaking circle barriers

Targeting the structural cocoon mechanism of acquaintance-based social media, this study explores ways to cultivate students' capacity for social network expansion. First, provide cognitive guidance to help students recognize the cognitive limitations of strong-tie social networks and understand the potential impact of circled information environments on attitude formation,

fostering awareness of cross-circle communication. Second, build practical platforms through campus clubs, academic forums, and social practice to create cross-major, cross-grade, and cross-regional online and offline exchange opportunities for pluralistic dialogue on public issues. Third, cultivate empathy, guiding students to respect differences and tolerate dissent in online interaction and to communicate effectively with people of different backgrounds.

Content dimension: Cultivating information criticism literacy and building diverse information horizons

Targeting content-level cocoon formation, enhances students' information criticism and diverse acquisition capabilities. First, incorporate fact-checking and information verification into the media literacy curriculum, teaching methods for identifying information sources, verifying authenticity, and discerning stance bias. Second, guide students to establish a "multiple information sources" acquisition model, encouraging them to follow media and accounts of different positions and actively engage heterogeneous views. Third, conduct issue-based critical thinking training using controversial social events as cases, organizing multi-perspective analysis to enhance tolerance and avoid black-and-white polarization.

Technological dimension: Enhancing algorithm cognition literacy and information autonomy

Targeting algorithm-dependent cocoon mechanisms, integrate algorithm literacy into media literacy education to dismantle the "algorithm black box". First, popularize algorithmic principles, explaining the operating logic, technical limitations, and potential risks of recommendation algorithms so that students understand the information filtering behind "personalized recommendation" and abandon blind trust. Second, teach intervention methods, guiding students to adjust

recommendation settings, actively search for diverse content, and use "not interested" functions to regain information autonomy. Third, cultivate digital moderation, guiding rational control of time spent on short-video and news apps to avoid immersive algorithmic feeding and reduce psychological dependence on algorithms.

Scenario dimension: Implementing differentiated strategies by media type

Given differences in cocoon formation mechanisms across media, media literacy education should avoid a one-size-fits-all approach. For students relying mainly on acquaintance-based social media, emphasize social expansion and expressive courage. For heavy users of public-discussion platforms, focus on information verification and rational discussion. For frequent users of short-video and news apps, strengthen algorithm cognition and attention management. Integrate media literacy education into classroom teaching, campus culture, and online ideological education, employing case teaching, scenario simulation, and hands-on practice to enhance pertinence and effectiveness.

Conclusion

Based on the 2025 national survey of college students' social mentality, this study systematically examines the information cocoon effects of different networked media types, their formation mechanisms, and the moderating role of media literacy. The main conclusions are as follows. First, cocoon effects differ significantly across media types. Acquaintance-based social media shows a significant cocoon-building effect. Public-discussion media deliver a significant cocoon-breaking effect. Vertical-dissemination media carry a mild cocoon-building tendency. These findings suggest limits to the technological determinist claim that algorithms inevitably create information cocoons. They also highlight the central role of platform-user co-

construction. Second, three mediation pathways explain cocoon formation. Social network homogeneity serves as the core mechanism for acquaintance-based social media. Information-seeking initiative works as a shared pathway for all three media types. Algorithm dependence acts as the main driver behind vertical-dissemination media. Third, media literacy offers an effective way to reduce information cocoons. Strong media literacy greatly weakens cocoon-building effects and strengthens cocoon-breaking effects. It can even cancel out the mild cocoon influence from vertical-dissemination media.

This study has three limitations. Cross-sectional data cannot capture dynamic causal links between information cocoons and media literacy. The survey only records respondents' single most-used medium. It does not capture complex effects from combined media use. All cocoon indicators depend on self-reported answers. These self-reports may differ from users' actual online exposure. Future research may use longitudinal designs alongside platform behavioral records and in-depth interviews. Such approaches can better track how information cocoons develop and identify sustainable literacy cultivation strategies.

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Conflicts of Interest

The authors declare no conflict of interest.

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