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The Consumption of Weight-loss Content by University Students Exhibiting High Engagement on Xiaohongshu

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Abstract. The phenomenon of information cocoons has now emerged as a hot issue across society. Some researchers have found that algorithmic recommendation has a significant impact on the formation of the information cocoon. However, there is still a lack of a unified explanation for the influence of gender differences on it. Therefore, this study aims to examine the relationship between information cocoons and gender differences by surveying university students with high engagement on Xiaohongshu, taking algorithmic recommendation as the mediating variable, to study the relationship between the information cocoon and gender differences. The research methods of this study are as follow. Firstly, data on the consumption of weight loss content by university students with high engagement to Xiaohongshu are collected. Secondly, descriptive statistical analysis and correlation analysis are conducted on the data. Research has found that gender differences significantly affect the types of weight loss content that university student users are exposed to on the Xiaohongshu platform. However, the mediating role of algorithmic recommendation in gender differences and the formation of information cocoons is not significant. Therefore, gender differences affect the exposure of highly sticky university students on Xiaohongshu to weight-loss content through algorithmic recommendations.

Keywords: Information cocoon, gender difference, algorithmic recommendation

1. Introduction

This study focuses on the fact that the information cocoon effect caused by the algorithmic recommendation mechanism has become a hotly discussed social issue at present. Moreover, with the rapid development of the Internet in China, algorithmic recommendation technology has tended to be mature. As a result, the information cocoon effect occurs more and more commonly in social media.

This research is of great significance for the influence of gender differences on the information cocoon, because in the public view, the information cocoon effect seems to mostly focus on its connection with the algorithmic recommendation mechanism, while overlooking gender difference. In existing literature, only a limited number of studies have analyzed gender differences in relation to social media usage motivations. He Lin holds that gender differences only have a strong

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correlation with the comprehensive needs of social connections, but have no significant correlation with the information cocoon [1]. However, there are many differences in the algorithmic mechanisms that users are exposed to on different platforms. Is there really no correlation between gender differences and the information cocoon effect? Does algorithmic recommendation play a mediating role in this? This study is mainly carried out specifically from the aspect of gender differences, taking the highly sticky group of university students on Xiaohongshu as the research object, and using the literature analysis method to search for and read relevant materials and literature. Moreover, data is collected in the form of questionnaires. The advantage of this method lies in that it can well analyze the mechanism of action between the information cocoon phenomenon and the gender differences of users, which is conducive to the progress of the research. A total of 131 questionnaires were collected in this survey, with a male-to-female ratio of 1:2. The ultimate goal of this study is to explore the influence of gender differences on the information cocoon and whether algorithmic recommendations play a mediating role. To achieve the goal, the general algorithm recommendation mechanism and information cocoon were refined, with gender difference as the independent variable, the algorithm recommendation mechanism as the mediating variable, and the information cocoon as the dependent variable.

2. Literature review

2.1. Algorithm recommendation and information cocoon

With the rapid development of Internet technology, algorithmic recommendation technology has been widely applied on various social media platforms. One of the key applications of algorithms in the field of communication is the intelligent delivery of personalized information. The information distribution subject collects the basic data of users and combines information such as users' behaviors, social relationships, and geographical locations to infer users' preferences and needs, thereby depicting user portraits and conducting data tagging. Building on this foundation, the system proactively recommends information and products that align with users' interests [2]. However, algorithmic recommendations may also lead to the formation of information cocoons, whereby users become confined to the information fields they are interested in, reducing their exposure to information in other fields. The concept of the "information cocoon" was proposed by Sunstein. It refers to the situation where an individual or group is enveloped in a closed information barrier. Through active or passive solidification of information screening behavior into continuous selection of specific types of content, they gradually form psychological identification and emotional dependence on similar information, while simultaneously generating a rejection reaction towards other heterogeneous information [3].

In the research on the relationship between algorithmic recommendation and the information cocoon, many scholars have conducted discussions. Li Yunwei and other scientists pointed out that the current algorithmic recommendation mechanism is regarded as a threat to citizens' online health and security, especially the information cocoon effect it triggers, which is an important tool that restricts people's thinking and endangers their physical and mental health [4]. Therefore, we must promptly recognize the impacts brought about by information cocoons. This study holds that the algorithmic recommendation mechanism is an important external factor that exacerbates this phenomenon. Moreover, for the Xiaohongshu platform, weight loss content is already a highly popular topic, and college students are the main group suffering from "body anxiety". Therefore, they are more likely to form an information cocoon effect due to long-term exposure to weight loss related content [5]. These studies provide an important theoretical foundation for understanding the

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relationship between algorithmic recommendation and the information cocoon. However, most of the existing studies focus on the overall user group, giving comparatively little attention to the role of gender differences. Gender, as an important individual characteristic, may affect users' usage behavior and information preferences for algorithmic recommendations, and thereby influence the formation of the information cocoon.

2.2. Research on gender differences and information behavior

Gender, as an inherent attribute of an individual, not only has differences in physiology and psychology, but also affects consumers' preferences and choices for information content [6]. The natural physiological differences between men and women, as well as the different expectations of men and women in society and culture, have led to significant differences in the behaviors of men and women in real life [7].

In terms of information selection, the research of Zhou Xingsheng found that women preferred "leisure and entertainment information" more, while men preferred "sports information" more [8].

Maghferat and Stock found that women's search behaviors are more complex and comprehensive, with a tendency to obtain information via social networks and a relative lack of reliance on search engines, whereas men, possessing stronger search-engine proficiency, are more inclined to use such engines for information retrieval [9]. This difference may be related to gender roles and social culture. Women pay more attention to social interaction and interpersonal relationships, while men pay more attention to efficiency and professionalism.

In summary, gender differences affect users' information behaviors and preferences, thus offering a crucial theoretical foundation for examining how algorithmic recommendations shaped by gender disparities influence the formation of information cocoons.

Based on the gender differences in content consumption and the information cocoon effect caused by algorithmic recommendations, this study proposes the following hypotheses:

H1: Gender differences have a significant impact on the information cocoon effect.

H2: Algorithmic recommendation plays a mediating role between gender and the information cocoon effect.

3. Research method

This study adopted the method of a questionnaire survey. The target group for questionnaire distribution was university students from the first to the fourth year who had a high engagement to Xiaohongshu. The goal was to obtain the attitudes of college student users of different genders who had a high stickiness to Xiaohongshu towards weight loss content, the differences in weight loss content they were concerned about, and their perception of the information cocoon.

3.1. Questionnaire design

This study aims to explore how gender differences influence users' consumption behavior of weight loss content on the Xiaohongshu platform through algorithmic recommendation mechanisms, and further analyze its association with the information cocoon effect. To verify the theoretical path of "gender → algorithm → information cocoon", the questionnaire was developed around the two hypotheses of this study.

The overall structure of the questionnaire consists of basic user information, usage behavior, content consumption preferences, perceptual algorithm recommendations, information cocoon

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effect, and psychological and behavioral influences. User basic information is collected as a demographic variable to identify the core research subjects through gender, user identity, and their usage frequency. By tagging and categorizing users' usage habits and presenting both male-biased and female-biased options together, the platform can produce a mirror image of gender preferences in its content production. Setting the consumption preference for weight loss content is to quantify the influence of gender on the preference for content types, while setting the algorithmic recommendation perception is to measure the mediating effect of algorithmic recommendation. The purpose of specifying the information-cocoon effect is to quantify the extent of that cocoon. The final measure is designed to control for its influence on actual behavior, thereby preventing it from biasing the study's outcomes.

3.2. Data analysis method

3.2.1. Descriptive statistical analysis

Descriptive statistics is a relatively fundamental tool in quantitative research. It can visually present the distribution characteristics of samples, variable trends, and the overall profile of data [10]. This study needs to clarify relevant data such as the gender ratio of highly sticky university students on Xiaohongshu, the frequency of content consumption, interactive behaviors, and preferences for content types, to provide a basis for subsequent analysis. Therefore, this analytical approach should commence with data preparation: first, conduct frequency and percentage analyses for the gender variable to determine the proportions of male and female participants; next, calculate the proportion of university students exhibiting high engagement with Xiaohongshu, thereby gauging the scale of the target population within the sample. In terms of multiple-choice questions, count the frequency and frequency of each option's selection to gain insights into the distribution of users' browsing motivations. As for issues related to gender-based content preferences, for options with different gender tendencies, count their selection frequencies and frequencies respectively, conduct cross-analysis, and clearly present the correlation between gender and content preferences. Finally, the above results are visually presented using tables to make the data features more intuitive and clear, laying the foundation for subsequent in-depth analysis.

3.2.2. Correlation analysis

To verify the influence of gender differences on the information cocoon effect and the mediating role of algorithmic recommendation, it is necessary to quantify the intensity and direction of the relationship between variables. Correlation analysis can test the statistical significance of the hypothesis and reveal the path of action through the mediating effect model.

The data collected from the questionnaire should be sorted and cleaned. For the correlation between gender and the degree of information cocooning, gender can be set as a categorical variable (male, female, etc.). The degree of information cocoon is comprehensively quantified through questions in the questionnaire such as "The proportion of a single type of weight loss content currently exposed to" and "the frequency of passively accepting non-preferred content due to algorithmic recommendations", and calculated using the Pearson correlation coefficient.

4. Research results

This report, based on 107 valid questionnaires, explores the gender differences in weight loss information consumption among highly sticky university students on the Xiaohongshu platform

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under the algorithmic recommendation mechanism. The research subjects were college students with an average daily usage time of more than one hour. Their content preferences, perception of algorithms, and behavioral feedback were analyzed from the gender dimension, with a focus on the gender differences in the consumption of muscle-building and fat-reducing content. Data shows that users have a clear perception of the dissemination chain of "gender tags - algorithm enhancement - information cocoon", with over 60% of respondents confirming that the algorithm amplifies the impact of gender on content types. Data shows that users have a clear perception of the dissemination chain of "gender tags - algorithm enhancement - information cocoon", with over 60% of respondents confirming that the algorithm amplifies the impact of gender on content types.

4.1. The mediating effect of algorithmic recommendation

This study examined the transmission mechanism of "gender difference → algorithm recommendation → information cocoon effect" through the SPSS mediating effect model, with a sample size of 107 people. The analysis results are as shown in Table 1:

Table 1: Results of regression analysis of the mediating effect of gender differences on the information cocoon effect (n=107)

	Independent variable					Intervening variable					Dependent variable				
	B	Standard error	t	p	β	B	Standard error	t	p	β	B	Standard error	t	p	β
Constant	-0.114	0.201	-0.569	0.571	-	3.361**	0.230	14.604	0.000	-	0.477	0.344	1.387	0.169	-
Gender	-0.075	0.117	-0.644	0.521	-0.063	-0.190	0.134	-1.423	0.158	-0.138	-0.109	0.116	-0.937	0.351	-0.091
Mediating variable											-0.176*	0.084	-2.099	0.038	-0.203
R 2	0.004					0.019					0.044				
Adjust R 2	-0.006					0.010					0.026				
F value	F (1,105) = 0.415, p=0.521					F (1,105) = 2.024, p=0.158					F (2,104) = 2.418, p=0.094				

*p<0.05 **p<0.01

The data in Table 1 shows that the influence of gender variables on the information cocoon effect does not reach statistical significance (B=-0.109, SE=0.116, t=-0.937, p=0.351, β=-0.091), and the model fitting degree is relatively low (R^2=0.004, adjusted R^2=-0.006). This result indicates that in the sample of this study, the role of gender differences in the formation of the information cocoon is relatively limited and is not yet sufficient to constitute a significant influencing factor.

The results show that the influence of gender on algorithmic recommendation does not reach the significance level (B=-0.190, SE=0.134, t=-1.423, p=0.158, β=-0.138), and the explanatory power of the model is weak (R^2=0.019), indicating that gender differences do not significantly affect individuals' perception of algorithmic recommendation.

However, after incorporating the mediating variable algorithm recommendation, its influence on the information cocoon effect was significant (B=-0.176, SE=0.084, t=-2.099, p=0.038, β=-0.203), indicating a certain correlation between an individual's perception of the algorithm recommendation and the diversity level of their information exposure. However, the direct impact of gender on the information cocoon effect has not yet reached a significant level (B=-0.109, p=0.351). When calculating the indirect effect by the Bootstrap method, the 95% confidence interval included 0 (the

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specific interval needs to be supplemented in combination with the Bootstrap results), and the mediating effect did not pass the significance test.

In summary, although algorithmic recommendation has shown certain explanatory power in predicting the information cocoon effect, the mediating path of "gender → algorithmic perception → content solidification" has not yet received data support, and the mechanism by which gender affects the diversity of information exposure through algorithmic perception still needs further empirical verification.

4.2. Gender differences have a significant impact on the information cocoon effect

To examine whether gender differences significantly affect the formation of the information cocoon, in this study, "the frequency with which you passively accept non-preferred content due to algorithmic recommendations" was taken as the dependent variable (ordered multicategorical variable, with options of "always", "often", "occasionally", "rarely", and "never"), and gender (male/female) was taken as the independent variable. The chi-square test was used to analyze the distribution differences between groups. There were 37 males (34.6%) and 70 females (65.4%) in the sample, totaling 107 people.

Table 2: Frequency distribution of passive acceptance of non-preferred content by different genders (N=107)

Title	Name	Gender(%)		Total	χ2	p
		Male	Female			
The frequency with which you passively accept non-preferred content due to algorithmic recommendations	Always	9(24.32)	10(14.29)	19(17.76)	18.308	0.001**
	Often	7(18.92)	30(42.86)	37(34.58)		
	Occasionally	13(35.14)	28(40.00)	41(38.32)		
	Very few	8(21.62)	1(1.43)	9(8.41)		
	Never	0(0.00)	1(1.43)	1(0.93)		
Total		37	70	107		

* p<0.05 ** p<0.01

Table 2 presents the distribution of passive reception frequencies and the chi-square test results of different genders. As shown in Table 2, there is a significant association between gender and the frequency of passive acceptance (χ^2=18.163, p=0.001**, two-sided test), reaching an extremely significant level (p<0.01), indicating that there are statistically significant differences in the behavioral patterns of passive acceptance of non-preferred content between men and women.

From the perspective of frequency distribution:

The proportion of women who were "frequently" passively accepted (42.86%) was significantly higher than that of men (18.92%), approximately 2.27 times that of men. This indicates that women are more likely to be exposed to non-preferred content through algorithmic recommendations. On the contrary, the proportion of men who passively accept "always" (24.32%) is higher than that of women (14.29%), but the proportion of men who passively accept "rarely/never" (21.62%) is much higher than that of women (1.43%), indicating significant internal differences within the male group. Some men may frequently come into contact with non-preferred content due to algorithmic recommendations, while others have very little contact with it. The proportion of "occasional" passive acceptance between the two sexes was close (35.14% for men vs. 40.00% for women), showing no significant difference.

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This section confirmed through the chi-square test that gender has a significant impact on the frequency of passive acceptance of non-preferred content. Women are more inclined to passively accept "frequently", while the male group shows polarization.

5. Discussion

5.1. Analysis of the reasons why hypothesis 1 was not supported

5.1.1. Variable operation and measurement deviation

Both the mediating variable and the dependent variable are synthesized from the subjective questions in the questionnaire survey. Users have deviations in their understanding of the algorithm mechanism. Therefore, when answering similar questions such as "The recommended content is related to gender", the accuracy of self-reports is difficult to guarantee.

In addition, combining "the frequency of passively accepting non-preferred content" and "the frequency of actively searching for atypical content (reverse scoring)" to construct the information cocoon index, the processing of reverse scoring may increase the measurement error. Meanwhile, using a single index is also difficult to fully reflect the multi-dimensional characteristics of the information cocoon, which simplifies the complex information selection behavior. These deviations may lead to the obtained data being unable to support the hypotheses of this study.

5.1.2. The limitations of the theoretical framework and the imbalance of data

This study is based on the linear conduction hypothesis of "gender → algorithm → content solidification", and there is a certain theoretical simplification causing hypothesis bias. First of all, the algorithmic recommendation mechanism is a complex dynamic system that integrates data from multiple dimensions such as user behavior data (such as browsing, likes, and collection records), content semantic tags, social network relationships, and real-time hotspots, while gender tags are only one of the reference indicators. Furthermore, there is a significant difference in the ratio of men to women in the data collected by the questionnaire, resulting in an imbalance of the data. In mediation analysis, a sufficient sample size is crucial for detecting indirect effects. Moreover, when the samples are further divided into two groups by gender, the unbalanced inter-group size will significantly weaken the efficiency. The smaller group cannot provide sufficient information to robustably estimate the impact of gender differences on the algorithm's recommendation path, reducing the sensitivity to testing indirect effects. Even if the mediation relationship exists, It is also difficult to achieve statistical significance.

5.2. Practical enlightenment

This study reveals the mediating effect of algorithmic recommendation, enhances users' cognitive level of algorithmic recommendation technology, thereby improving their perception of the information cocoon and advocating that they consciously and proactively break their inherent habits and broaden the sources of information. It should also be recognized that the tendency of attitude is the main reason for the emergence and maintenance of the information cocoon, and changing this attitude is an important way to break the information cocoon [11]. When female users are confronted with emotionally rich information, they should make more rational judgments, learn to analyze the information from multiple perspectives, and not blindly believe or spread it; When male users receive rational information, they should also avoid overly one-sided interpretations and can

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comprehensively consider factors such as emotions and society. Meanwhile, users should cultivate critical thinking, maintain a skeptical attitude towards the information recommended by the algorithm, and actively verify the source and authenticity of the information. For instance, when encountering hot events, one can refer to reports from multiple authoritative media outlets to avoid forming one-sided cognition due to the single information perspective recommended by algorithms, thereby effectively countering the negative impacts brought by the information cocoon.

In addition to users, the platform can also optimize the personalized setting function of the platform based on this research, in view of the characteristic that female users tend to accept default recommendation Settings, the platform can introduce a more diverse proportion of options in the default recommendation content. For instance, in content related to beauty and parenting, a certain proportion of popular science knowledge and career development information should be appropriately interspersed. In response to the active adjustment of recommendation settings by male users, the platform should provide more detailed classification tags and filtering conditions, enabling them to conveniently access content from other fields such as culture and art while paying attention to information in areas like technology and politics, thereby reducing the excessive solidification of the information cocoon caused by active filtering. Furthermore, the platform can design gender-neutral recommendation templates to avoid the phenomenon of information cocoon reinforcement caused by the algorithm's preset gender preferences.

5.3. Limitation analysis

Current research mainly focuses on the difference analysis of the traditional binary gender framework, while ignoring the information behavior of non-binary gender groups in the algorithmic recommendation environment. As society's understanding of gender diversity deepens, an increasing number of users identify themselves as non-binary gender identities such as transgender and gender queer. However, the existing research pays insufficient attention to these groups, which may lead to the research results not being able to comprehensively cover all user groups.

Furthermore, current research mainly explores gender differences from a static perspective, with less consideration given to the dynamic changes of gender concepts and information behaviors over time and in the social and cultural environment. Therefore, it is difficult to accurately capture the dynamic evolution process of the relationship between gender and algorithmic recommendation, as well as the information cocoon.

In terms of data collection, this study only adopted the method of questionnaire survey. Although this method can obtain the data of users' surface behaviors relatively comprehensively, the data it acquires is highly dependent on the subjective recollections and self-perceptions of the respondents, resulting in significant memory biases. On the one hand, the respondents may deliberately conceal or exaggerate certain information for considerations of social norms or self-image building, but it is difficult to delve deeply into such behaviors. On the other hand, information behaviors are often habitual actions accumulated over a long period of time. Respondents may have difficulty accurately recalling the specific behavioral details and frequencies, resulting in data errors and an inability to truly reflect the actual manifestations of gender differences in information behaviors.

6. Conclusion

By studying the weight loss content consumption of highly sticky college students on Xiaohongshu, the research result of this study is to find a significant correlation between gender differences and the information cocoon, but the mediating role of algorithmic recommendation in it is not

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significant. Thus, it is further concluded that gender differences have a significant impact on the information cocoon effect, while the mediating effect of algorithmic recommendation between the two still requires further research. This research provides a lot of valuable reference significance for future research in this direction, mainly influencing the aspect of "How the recommendation mechanism of social media platforms affects the content consumption patterns of users of different genders", and expanding the application of the information cocoon theory in the field of vertical content consumption. Future research should focus more on in-depth studies in the direction of the role of algorithmic recommendation between gender and the information cocoon.

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