SIN-CHN
SCIENTIFIC PRESS PTE.LTD.

Molecular & Cellular Biomechanics 2025, 22(2), 896.
https://doi.org/10.62617/mcb896

Article

A study on the consumption behavior of community group buying leaders in selling agricultural products—From a biomechanical perspective

Yingbo Wang

School of Economics, Hunan Agricultural University, Changsha 410125, China; wybwenzhang@163.com

CITATION

Wang Y. A study on the consumption behavior of community group buying leaders in selling agricultural products—From a biomechanical perspective. Molecular & Cellular Biomechanics. 2025; 22(2): 896. https://doi.org/10.62617/mcb896

ARTICLE INFO

Received: 24 November 2024
Accepted: 3 December 2024
Available online: 24 January 2025

COPYRIGHT

Copyright © 2025 by author(s). *Molecular & Cellular Biomechanics* is published by Sin-Chn Scientific Press Pte. Ltd. This work is licensed under the Creative Commons Attribution (CC BY) license. https://creativecommons.org/licenses/by/4.0/

Abstract: This article explores how group leaders in community group buying influence consumer behavior regarding agricultural product purchases, analyzing their psychological motivations and relational mechanisms. The concept of biomechanics offers a novel and illuminating perspective to understand this phenomenon. First, the article defines the role and functions of community group leaders in promoting agricultural products. It examines the leaders' promotional actions and behaviors as research subjects, selecting representative traits to analyze their specific effects on consumers' decisions to purchase agricultural products endorsed by these leaders. Combining qualitative and quantitative research methods, the study conducts field interviews and surveys among community group buying users. The Theory of Planned Behavior (TPB) model is employed to test hypotheses, SPSS software is utilized for descriptive statistical analysis and reliability and validity testing, and AMOS software is used to construct a structural equation model to investigate consumer behavior in purchasing agricultural products promoted by group leaders. In summary, this study aims to unravel the mechanisms underlying consumers' purchasing behaviors of products promoted by group leaders. From a biomechanical perspective, the linguistic and behavioral promotions of group leaders act as powerful stimuli. Their words and actions can be seen as biomechanical signals, much like the chemical signals insects use to communicate. For instance, a leader vividly describing the taste and texture of a freshly harvested fruit is equivalent to a bee releasing a pheromone trail to guide its fellows to a food source. By analyzing how these promotional actions shape consumers' perceptions and expectations of agricultural products, we can draw parallels to how organisms respond to environmental cues. This study thus highlights the opportunities and challenges of group leader-led agricultural product promotion compared to traditional sales models, similar to comparing a newly evolved survival strategy in nature with an established one. Furthermore, in terms of energy efficiency and resource management, just as organisms have evolved to optimize their energy use, community group leaders must also streamline their operations. They need to balance the energy expended in promotion, coordination with suppliers, and logistics, similar to how a migrating animal conserves energy during its journey. By efficiently allocating resources, they can enhance the overall success of agricultural product promotion within the community, creating a sustainable model that benefits both consumers and the local agricultural economy, all while being inspired by the principles of biomechanics.

Keywords: community group buying; consumers; group leader-promoted agricultural products; purchasing behavior; influencing factors; biomechanical perspective

1. Research background and literature overview

Agriculture is a foundational industry in China, playing a vital role in the national economy. With the advancement of internet technologies, community group buying has emerged as a new e-commerce model. Leveraging advantages such as competitive pricing, logistical convenience, and the accessibility of online social networks, it has

begun to make significant inroads in the sale of agricultural products. Community leaders, serving as intermediaries between suppliers and consumers, play a pivotal role in influencing purchasing decisions. Through their personal influence and credibility, these leaders guide consumers to develop purchase intentions for the agricultural products they promote, catering to the demand for fresh and convenient shopping experiences. By analyzing the behaviors of these leaders, researchers can gain insights into consumer perceptions and expectations of agricultural products, thereby stimulating purchases and providing new growth avenues for agricultural sales.

To date, most academic studies on consumer purchase intentions in this domain have focused on aspects such as group buying platforms, product quality, and consumer trust. However, there are significant differences between e-commerce models for agricultural products and traditional market structures. In the e-commerce context, neither consumers nor group leaders are constrained by time or geographical limitations, nor are they reliant on supermarkets or farmers' markets for purchases. This study seeks to explore four key areas: (1) Define the role and influence of community leaders in promoting agricultural products, selecting representative behaviors and analyzing their specific impact on consumers' purchasing decisions; (2) Examine the effects of leader promotions on consumer purchase intentions, behaviors, and psychological factors during purchasing; (3) Investigate, from a psychological perspective, how consumers establish trust in community leaders and the factors influencing this process; (4) Identify the opportunities and challenges posed by the leader-driven promotion model compared to traditional agricultural product sales models.

Unlike traditional retail methods, community group buying operates on a pre-sale model, effectively achieving zero inventory for platforms. Bulk procurement enables economies of scale, creating significant price advantages. For instance, Taocaicai adopts a consumer-driven approach, delivering high-quality fresh agricultural products on schedule. This not only meets consumer demand for healthy and eco-friendly products but also significantly increases repeat purchase rates, fostering a loyal consumer base. Word-of-mouth marketing among consumers further enhances daily order volumes over time. Similarly, the Meituan Select platform benefits from a strong corporate backing, enabling community leaders to establish trust among consumers. Meituan Select emphasizes the quality of fresh agricultural products, providing detailed information such as origin, storage conditions, production date, and shelf life, along with recommended reasons for purchase. Its robust after-sales service ensures proactive communication in the event of stock shortages and efficient resolution of quality issues through community leaders. These personalized services distinguish Meituan Select from other community group buying platforms.

A review of domestic and international literature reveals that studies on consumer behavior in community group buying primarily focus on platform services and product quality, often employing qualitative research methods based on consumer characteristics and product attributes. However, quantitative studies specifically addressing consumer behavior towards agricultural products promoted by community leaders are relatively scarce. For instance, Wu Chunya identified that demographic differences such as age, gender, education level, and income influence consumers' intentions to purchase agricultural products online, resulting in behavioral deviations

[1]. Chen Xi highlighted the significant impact of product characteristics and safety concerns on consumer purchasing behavior [2]. Yet, quantitative research on consumer behavior driven by leader-led promotions remains limited. Scholar Zhou Chao explored live-stream e-commerce, proposing the "experience theory", which frames consumption as an emotional experience [3]. Song Sigen introduced the "equilibrium theory", suggesting that consumption seeks a balance of value exchange [4]. Existing studies predominantly analyze external, objective factors such as logistics, quality control, and transaction security, emphasizing service improvements to enhance consumer purchase behaviors. Zhang Jingmin advocated for the establishment of effective incentive mechanisms by community group buying platforms to improve leader service levels [5]. Additionally, Kim noted that the community group buying model involves three key stakeholders: Platforms, offline service providers (leaders), and consumers [6].

Currently, research on consumer intentions and behaviors regarding agricultural products promoted by leaders often focuses on objective external factors such as cold chain logistics, quality control by agricultural producers, and transaction security on group buying platforms. While these studies prioritize platform services and product quality, research from the perspective of "leader-driven promotions", especially in the context of community group buying, remains underexplored. Further investigation into consumer purchasing behavior is thus warranted.

2. Analysis of the group buying model for agricultural products

2.1. Food safety concerns in fresh agricultural products

The food supply chain involves diverse raw material sources, creating an information asymmetry where producers possess full knowledge of raw materials while consumers remain uninformed. This imbalance complicates the traceability of ingredients post-production. Consequently, many consumers distrust products purchased through community group buying. Survey data indicate that 57.41% of respondents harbor quality concerns regarding online purchases. Research by Wang Huijuan and Wang Puqing highlights the complexity of frequent food safety incidents, spanning multiple distribution stages [7,8].

In agricultural production, challenges such as regulatory difficulties, low professional competence among producers, dispersed production regions, and inconsistent scales of operation often lead to overuse of fertilizers, pesticides, and hormone-laden additives, posing significant safety risks. In food processing, lengthy supply chains, multiple production stages, unauthorized use of chemical additives, obscure raw material origins, and substandard hygiene further complicate management. These issues exacerbate food safety concerns, as reflected in studies.

2.2. Challenges in cold chain preservation for agricultural products

Due to their perishable nature, agricultural products demand high standards for logistics efficiency and cold chain distribution. In China, the spoilage rate caused by cold chain interruptions is one to two times higher than in developed countries. Estimates suggest that such disruptions annually result in the loss of approximately 12

million tons of fruit and 130 million tons of vegetables, with economic damages exceeding 100 billion yuan.

Most fresh products in China are transported and delivered under ambient conditions, resulting in a preservation rate far below the 90% benchmark in other countries. Losses are particularly high for perishable items such as fruits, vegetables, eggs, and grains, directly affecting consumer satisfaction and taste. Despite efforts, the cold chain transportation rate for primary agricultural products in China remains significantly lower than in developed nations—80%–90% for fruits, vegetables, meat, and seafood compared to China's 15%, 30%, and 40%, respectively. Additionally, cold chain interruptions occur in 67%, 50%, and 42% of cases, far exceeding rates in developed countries. High operational costs exacerbate the problem, as cold storage equipment entails significant investments that are challenging to recover in the short term. Wang Weiping pointed out that ensuring the freshness of fresh agricultural products during transport necessitates costly refrigerated facilities, further burdening logistics providers [9]. Data analysis reveals that over half of consumers report inadequate freshness upon product delivery, with 21.97% of respondents expressing dissatisfaction with their experience.

2.3. Consumer experience in purchasing fresh agricultural products

Frequent concerns about food quality and safety diminish consumer trust in community group buying models, leading to unstable loyalty and low confidence. The non-face-to-face nature of transactions on virtual platforms further exacerbates these uncertainties. For instance, in March 2021, Mr. Dong from Henan ordered a 65g product on a group-buying platform but discovered upon receipt that it weighed only 50g. This discrepancy sparked disputes between the consumer and the platform, undermining trust. Moreover, compared to general products, the quality of fresh agricultural products is harder to assess, particularly regarding internal contamination, pesticide residues, and heavy metal content. The absence of authoritative quality certification agencies exacerbates this challenge. In one notable case reported by *The Paper* in April–May 2022, a fraudulent group leader used software to falsify product information, misrepresented conventional products as organic, and sold them at inflated prices through WeChat groups.

3. Analysis of trust issues in community group buying involving group leaders

3.1. Sales and service challenges with group leaders

Pre-sale and after-sale services for fresh agricultural products are critical for consumer satisfaction. Group leaders are expected to address post-purchase concerns and handle unforeseen issues to mitigate trust problems. Survey data reveal that 39.76% of consumers value the agricultural knowledge of group leaders, while 42.43% prioritize high-quality service and professional competence. However, disputes frequently arise when consumers challenge product quality, demanding explanations or compensation from group leaders. The inability to guarantee product quality or prevent deceptive practices erodes consumer trust and jeopardizes

transaction fairness, making the reliability of group leaders a key determinant of consumer loyalty.

3.2. Platform switching among group leaders

In community group buying models, group leaders act as intermediaries for product promotion and information dissemination. Their enthusiasm and loyalty significantly impact platform influence and sales. However, low platform loyalty among group leaders and frequent switching between platforms undermine stability. Research by Li Yuan confirms that group leaders often juggle multiple roles as operators, agents, and promoters, making regulation difficult [10]. Divided attention across platforms reduces the time and effort devoted to any single platform, weakening service quality and sales performance. Survey data show that once group leaders establish stable purchasing relationships with consumers, 72.18% of consumers remain loyal to their group leader, while 74.55% prioritize purchasing from the same leader when the need arises.

4. Mechanisms of purchase behavior

"The Mechanisms of Product Promotion by Group Leaders in Agricultural Product Community Group Buying and Their Impact on Consumer Purchase Behavior". This study integrates the Theory of Planned Behavior (TPB) model to explore the mechanisms of consumer purchase behavior influenced by group leaders' product promotions. The TPB model provides a framework for understanding individual behavioral patterns, positing that behavior results from deliberate choices influenced by factors such as attitudes, subjective norms, perceived behavioral control, and purchase intention.

4.1. Analysis of direct effects on consumer behavior

In direct effects, factors such as consumer attitudes, subjective norms, and perceived behavioral control directly influence purchase intentions.

1) Consumer attitudes and purchase behavior

Ajzen defines attitude as the positive or negative evaluation an individual holds toward a specific behavior, reflecting their overall assessment of the behavior [11]. Attitudes can influence consumer purchase behavior both positively and negatively. Positive attitudes, shaped by favorable perceptions and word-of-mouth, drive consumer behavior. From the perspective of group leaders, their promotion strategies—such as high-quality content, personal charisma, and interactive incentives—can also shape consumer attitudes positively, as supported by Wang Yanyan. Thus, consumer attitudes have a direct impact on purchasing products promoted by group leaders [12].

2) Subjective norms and purchase behavior

Subjective norms refer to social pressures influencing an individual's decision-making, often stemming from significant others or social groups. Keith notes that individuals often comply with the expectations of those they deem important [13]. Consumer behavior in purchasing group leader-promoted agricultural products can be influenced by recommendations from friends, family, or influential figures,

manifesting in two forms: Active Change: Positive word-of-mouth from trusted individuals leads to purchase behavior. Passive Change: Social conformity or external pressures from professionals or media guide consumer decisions. Thus, subjective norms directly impact consumer behavior regarding group leader-promoted products.

3) Perceived behavioral control and purchase behavior

Ajzen emphasizes perceived behavioral control as the ease or difficulty individuals associate with performing a specific behavior [14]. Xiao Hongbo highlights that consumer-perceived value—the balance between perceived cost and benefit—plays a pivotal role in evaluating consumption experiences [15]. Consumers assess their ability to evaluate and act upon their preferences, directly influencing their purchase behavior.

4.2. Analysis of indirect effects on consumer behavior

Purchase intention mediates the relationship between attitudes, subjective norms, perceived behavioral control, and purchase behavior. Defined as the strength of an individual's motivation to engage in a specific behavior, purchase intention predicts actual behavior. A stronger purchase intention translates to more pronounced purchasing behavior, thus serving as an indirect mechanism through which group leader promotions influence consumer behavior.

5. Research hypotheses

5.1. Relationship between group leader promotion and purchase intention

Research on consumer willingness in community group buying has been active domestically, with a relatively novel focus on the role of community leaders in driving sales. This research examines the influence of community leaders within social networks. For instance, Setiani demonstrated that trust has a positive impact on consumers' willingness to purchase through e-commerce platforms led by such leaders. Similarly, Chen Huixian argued that consumers' willingness to purchase fresh products in community group buying is primarily influenced by factors such as product quality, pricing, delivery service, and social dynamics [16].

Furthermore, Duan Shengda confirmed that opinion leaders significantly affect consumer willingness, while Zhang Xiaofei explored the mechanisms by which interactive behaviors between community leaders and consumers influence purchase intentions. Building on these findings, this study posits the hypothesis H1: Community leaders have a significant impact on consumers' purchase intentions in group buying contexts, proposing the following assumption:

H1a: Consumer attitudes positively correlate with purchase intentions.

H1b: Subjective norms positively correlate with purchase intentions.

H1c: Perceived behavioral control positively correlates with purchase intentions.

5.2. The relationship between group leader promotions and consumer purchase behavior

In recent years, the influence of group leader promotions on consumer purchasing behavior has garnered increasing attention from researchers. Ye Jing demonstrated that opinion leaders in vitual communities significantly impact apparel consumption behavior [17]. Similarly, Zhu Siqi found that opinion leaders in livestream campaigns promoting agricultural products significantly influence consumer behavior [18].

Moreover, other studies have focused on the impact of social media influencers and celebrities on consumer behavior in the age of social networks. For instance, research by Qin Suxiang and Wang Shuo identified that factors such as celebrity influence, entertainment value, credibility, and the frequency, format, and theme of their content dissemination can all affect consumer purchasing behavior [19,20].

Thus, this study proposes the following hypotheses regarding H2, which posits a significant influence of consumer attitudes towards group leader promotions on purchasing behavior:

H2a: Consumer attitudes positively correlate with purchase behavior.

H2b: Subjective norms positively correlate with purchase behavior.

H2c: Perceived behavioral control positively correlates with purchase behavior.

H2d: Purchase intentions positively correlate with purchase behavior.

5.3. Relationships among purchase intentions, attitudes, subjective norms, perceived behavioral control, and purchase behavior

Attitudes, subjective norms, and perceived behavioral control act as mediators between purchase intentions and consumer behavior in the context of group leader promotions. Zhang Duo noted that attitudes, subjective norms, and perceived behavioral control exert mediating effects between purchase intentions and actual consumer behavior [21]. Zhou Chongchong argued that consumers are often influenced by group dynamics, tending to build trust based on their neighbors' evaluations of products and services before deciding whether to participate. This herd mentality significantly shapes their willingness to engage in community group-buying activities, with their consumption choices guided by an assessment of neighbor feedback [22].

Hence, this study proposes the following hypotheses for H3, which investigates the mediating role of purchase intentions in the relationship among attitudes, subjective norms, perceived behavioral control, and purchase behavior:

H3a: Purchase intentions mediate the relationship between consumer attitudes and purchase behavior.

H3b: Purchase intentions mediate the relationship between subjective norms and purchase behavior.

H3c: Purchase intentions mediate the relationship between perceived behavioral control and purchase behavior.

6. Research design

6.1. Empirical model

The Theory of Planned Behavior (TPB), developed by Icek Ajzen in 1985, extends the Theory of Reasoned Action by incorporating perceived behavioral control as a key variable [23]. TPB suggests that individuals are more likely to perform a behavior when they perceive it as meaningful and socially endorsed while demonstrating a strong behavioral intention. This theory serves as the foundation for predicting and explaining human behaviors, especially in decision-making contexts.

The study applies the TPB framework to investigate the relationships between attitudes, subjective norms, perceived behavioral control, purchase intentions, and purchasing behavior. It hypothesizes that group leaders' promotional activities and product endorsements align with consumer attitudes and behavioral tendencies, ultimately influencing their purchase decisions. To enhance the applicability of this model, the research incorporates market insights and consumer feedback to address perceived risks and increase purchase enthusiasm.

6.2. Data collection and variable selection

Data for this study were collected through both online and offline channels. The online survey was conducted via a paid questionnaire on the *Questionnaire Star* platform. A total of 657 questionnaires were distributed, with 601 valid responses (91.47% response rate) after excluding invalid submissions (e.g., respondents who had never used community group-buying platforms or completed the survey in under two minutes and forty seconds). Among the respondents, 52.41% were female (315 participants), and 47.59% were male (286 participants), indicating a roughly equal gender distribution.

The questionnaire targeted consumers with experience in purchasing agricultural products through community group-buying platforms. The analysis revealed a growing trend of balanced gender roles within households, challenging traditional stereotypes of men focusing on work and women managing households.

Variable Selection: Subjective variables: Demographic information (e.g., age, gender, education level) and community group-buying behaviors (e.g., frequency of use, preferred platforms). External variables: Attitudes, subjective norms, perceived behavioral control, and purchasing behaviors related to community group-buying. Mediating variables: Purchase intentions within the community group-buying context.

7. Empirical analysis and hypothesis testing

According to the research requirements of this paper, a correlation test for reliability and validity is conducted on the selected variables. The reliability analysis results are presented in **Table 1**. The Cronbach's α values are as follows: Attitude (α = 0.843, with five items), Subjective Norms (α = 0.864, with five items), Perceived Behavioral Control (α = 0.808, with five items), Purchase Intention (α = 0.881, with five items), and Purchase Behavior (α = 0.738, with five items). The overall Cronbach's α value is 0.853, which exceeds the threshold of 0.8, indicating that the reliability of the data is high. All items meet the required reliability standards, suggesting that the reliability of the questionnaire is acceptable, allowing for further analysis.

Table 1. Summary of research hypotheses.

Hypothesis
H1: Significant impact of consumer attitudes toward group leader-promoted products on purchase intentions. H1a: Consumer attitudes positively correlate with purchase intentions. H1b: Subjective norms positively correlate with purchase intentions. H1c: Perceived behavioral control positively correlates with purchase intentions.
H2: Significant impact of consumer attitudes toward group leader-promoted products on purchase behavior. H2a: Consumer attitudes positively correlate with purchase behavior. H2b： Subjective norms positively correlate with purchase behavior. H2c: Perceived behavioral control positively correlates with purchase behavior. H2d: Purchase intentions positively correlate with purchase behavior.
H3: Mediating role of purchase intentions between attitudes, subjective norms, perceived behavioral control, and purchase behavior in the context of group leader promotions. H3a: Purchase intentions mediate the relationship between consumer attitudes and purchase behavior. H3b: Purchase intentions mediate the relationship between subjective norms and purchase behavior. H3c: Purchase intentions mediate the relationship between perceived behavioral control and purchase behavior.

In accordance with the research requirements of this study, it is necessary to conduct reliability and validity tests on the selected variables. First, the reliability analysis shows that, as indicated in **Table 2**, the Cronbach's α value for Attitude is 0.843 with 5 items; for Subjective Norm is 0.864 with 5 items; for Perceived Behavioral Control is 0.808 with 5 items; for Purchase Intention is 0.881 with 5 items; for Purchase Behavior is 0.738 with 5 items; and the overall Cronbach's α value is 0.853, which is greater than 0.8. These results indicate that the overall reliability of the research data is high and that all items meet the reliability requirements.

Table 2. Cronbach's α.

Dimension	Cronbach's α	Number of Items
Attitude	0.843	5
Subjective Norms	0.864	5
Perceived Behavioral Control	0.808	5
Purchase Intention	0.881	5
Purchasing Behavior	0.738	5
Total	0.853	25

An exploratory analysis was conducted on the data in **Table 3**. The study employed the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity to verify structural validity. The KMO value was 0.924, exceeding the threshold of 0.8, and Bartlett's test yielded a significant *p*-value (< 0.05). These results confirm the suitability of the data for factor analysis.

Table 3. KMO & bartlett.

KMO Value		0.875
Bartlett	Bartlett's Test (Chi-Square)	5865.025
	Degrees of Freedom (*df*)	300
	p-value	0.000

Exploratory factor analysis identified five factors with eigenvalues exceeding 1, collectively explaining 60.424% of the variance. This indicates robust structural validity.

7.1. Structural equation model

According to **Table 4**, the fit of the structural equation model (SEM) was tested using AMOS 26.0.

1) The test of substitutability index is $\chi^2/df = 1.494$, indicating that the model fit is acceptable.
2) The GFI fit index is 0.950, the CFI comparative fit index is 0.977, the NFI comparative fit index is 0.933, and the NNFI non-conforming comparative fit index is 0.974 indicating that the model has a good fit.
3) The RMSEA value is 0.029, which is less than 0.1.

In summary, it is concluded that the fit index of each measurement model indicates that the overall fit of the research model in this paper is relatively satisfactory.

Table 4. Structural model fit indices.

Fit Indices	χ^2/df	p	GFI	NFI	AGFI	CFI	RMSEA
Value	1.494	0.000	0.950	0.933	0.939	0.977	0.029

7.2. Path coefficient analysis

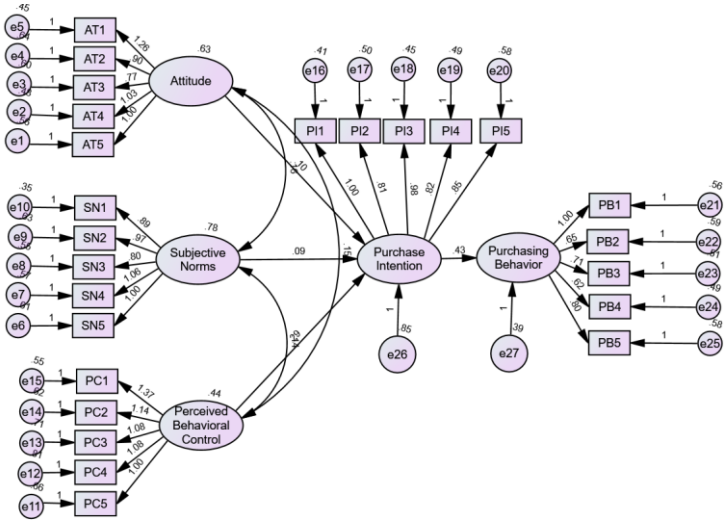

Figure 1. Results of structural equation analysis.

Based on the path coefficient estimation results from the path analysis in **Figure 1**, consumer attitude is positively correlated with purchase intention ($\beta = 0.047$, $p < 0.1$), suggesting that consumer attitude has a positive relationship with purchase intention, supporting hypothesis H1a. Similarly, the positive relationship between consumers' subjective norms and purchase intention is confirmed ($\beta = 0.058$, $p < 0.1$), indicating that subjective norms positively influence purchase intention, thus supporting hypothesis H1b. Furthermore, the positive impact of perceived behavioral control on purchase intention is validated ($\beta = 0.053$, $p < 0.001$), showing that perceived behavioral control positively affects purchase intention, which supports

hypothesis H1c. The path coefficient of purchase intention on purchase behavior is positive ($\beta = 0.041$, $p < 0.001$), indicating that purchase intention positively influences purchase behavior, thus confirming hypothesis H2d. The path coefficient for consumer attitude on purchase behavior is also positive ($\beta = 0.015$, $p < 0.05$), demonstrating that consumer attitude positively affects purchase behavior, thus supporting hypothesis H2a. The path coefficient for subjective norms on purchase behavior is positive ($\beta = 0.019$, $p < 0.01$), indicating a positive influence of subjective norms on purchase behavior, confirming hypothesis H2b. The path coefficient for perceived behavioral control on purchase behavior is positive ($\beta = 0.017$, $p < 0.005$), suggesting that perceived behavioral control positively affects purchase behavior, supporting hypothesis H2c.

In conclusion, the above hypotheses are all supported. Consumers' attitudes, subjective norms, and perceived behavioral control significantly influence their purchase intentions in the context of community leaders promoting agricultural products. The higher the consumer's attitude, subjective norm, and perceived behavioral control, the more positive their purchase intention toward the agricultural products promoted by community leaders. The influence of community leaders' promotion on consumers' agricultural product purchase intentions varies, with the effect of perceived behavioral control being stronger than that of attitude and subjective norms.

7.3. Mediation effect testing

The mediation effects within the structural model were tested, and the results are presented in **Table 5**. The mediating effect of purchase intention between attitude and purchasing behavior is significant, as both the indirect effects (a and b) are significant and the direct effect (c') is not significant, indicating full mediation. The confidence interval for the indirect effect is [0.013, 0.066]. Similarly, the mediating effect of subjective norms on consumer purchasing behavior is significant, with both a and b being significant and c' not significant, indicating full mediation, with a confidence interval of [0.009, 0.060]. Moreover, purchase intention mediates the relationship between perceived behavioral control and purchasing behavior, with a and b being significant and c' not significant. The confidence interval for this mediation is [0.032, 0.088] at the 95% confidence level, demonstrating a significant mediation effect. The following hypotheses were tested:

Project 1: Attitude → purchase intention → purchasing behavior.

Project 2: Subjective norms → purchase intention → purchasing behavior.

Project 3: perceived behavioral control → purchase intention → purchasing behavior.

Purchase intention plays a mediating role between attitude, subjective norms, perceived behavioral control, and purchasing behavior in the context of community group leaders promoting agricultural products. During the group leader-driven promotion process, consumers' attitudes, subjective norms, and perceived behavioral control regarding the leader's endorsement transfer to the products being promoted, thereby increasing their recognition of the product's value. The leader's ability to promote products enhances consumers' perceptions of the product's quality and

functional value, stimulating purchase intention and ultimately leading to purchasing behavior. Thus, purchase intention significantly mediates the relationship between consumer attitudes, subjective norms, perceived behavioral control, and purchasing behavior in the context of community leader-driven promotions.

Table 5. Path coefficients and significance.

Path			Non-standardized coefficient	Standardized coefficient	Standard deviation (S.E.)	C.R	*p*
Attitude	→	Purchase Intention	0.081	0.085	0.047	1.740	0.082*
Subjectie Norms	→	Purchase Intention	0.097	0.080	0.058	1.679	0.093*
Perceived Behavioral Control	→	Purchase Intention	0.210	0.200	0.053	3.939	0.000***
Purchase Intention	→	Purchasing Behavior	0.430	0.551	0.041	7.08	0.000***
Attitude	→	Purchasing Behavior	0.03	0.111	0.015	2.032	0.042**
Subjective Norms	→	Purchasing Behavior	0.078	0.227	0.019	4.132	0.000***
Perceived Behavioral Control	→	Purchasing Behavior	0.041	0.138	0.017	2.398	0.016**

Note: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

7.4. Robustness check

To ensure the reliability and validity of the research results, this study re-examined the empirical results of the original hypothesis by altering the empirical model, parameter settings, and variable measurements, in order to verify the robustness of the research outcomes. Specifically, this paper employs the robust regression model proposed by Piepel to conduct a robustness test. The application scope of robust regression includes two parts: first, conducting regression analysis when outliers are present in the data; and second, verifying the stability of the regression conclusions. The test results are shown in **Tables 6** and **7**, which presents the robust regression analysis of the model.

Table 6. Mediation effect testing.

Option	Total Effect (c)	Indirect Effect (a × b)	Direct Effect (c')	a × b (95%BootCI）	Test Conclusion
1	0.154***	0.039	0.115	0.013~0.066	Full Mediation
2	0.178***	0.034	0.144	0.009~0.06	Full Mediation
3	0.182***	0.058	0.124	0.032~0.088	Full Mediation

Note: *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 7. Robust regression analysis test.

	Coefficient	**Std.**	***t***	***p***	**95% CI**	R^2	**Adjusted^2R**
Constant	1.386	0.145	9.545	0.000***	1.101~1.670		
Attitude	0.078	0.029	2.678	0.007***	0.021~0.135		
Subjective Norm	0.124	0.027	4.565	0.000***	0.071~0.178	0.254	0.249
Perceived Behavioral Control	0.086	0.030	2.884	0.004***	0.027~0.144		
Purchase Intention	0.297	0.027	11.144	0.000***	0.245~0.349		

Note: Dependent Variable: Purchase Behavior; *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Based on the table above, we used robust regression analysis with attitude, subjective norm, perceived behavioral control, and purchase intention as independent variables, and purchase behavior as the dependent variable. The following are the analysis results: The coefficient for attitude is 0.078 (t = 2.678, p = 0.007<0.01), indicating that attitude has a significant positive impact on purchase behavior.

The coefficient for subjective norm is 0.124 (t = 4.565, p = 0.000<0.01), suggesting that subjective norm has a significant positive impact on purchase behavior. The coefficient for perceived behavioral control is 0.086 (t = 2.884, p = 0.004 < 0.01), implying that perceived behavioral control has a significant positive impact on purchase behavior. The coefficient for purchase intention is 0.297 (t = 11.144, p = 0.000 < 0.01), demonstrating that purchase intention has a significant positive impact on purchase behavior.

In summary, the analysis concludes that attitude, subjective norm, perceived behavioral control, and purchase intention all have significant positive impacts on purchase behavior.

8. Conclusion and outlook

8.1. Research conclusions

This study centers on the core issue of consumer purchasing behavior in the context of community group-buying leaders promoting agricultural products. It offers an innovative perspective on the impact of group-buying leaders on consumer behavior. By analyzing the behavioral characteristics of consumers purchasing agricultural products from these leaders, the study identifies significant influences on consumer behavior. Drawing on the Theory of Planned Behavior (TPB), marketing psychology, consumer behavior, and interpersonal relationship theories, it constructs hypotheses and models. Using survey data, the study conducts an empirical analysis of the relationships between the characteristics of group-buying leaders and consumer purchasing behaviors. The findings confirm a correlation between group-buying leaders' activities and consumer purchasing behavior, with purchase intention serving as a mediating factor between consumer attitudes, subjective norms, perceived behavioral control, and actual purchasing behavior. Key conclusions include:

1) Significant impact of purchase intentions on consumer behavior under group leaders' influence

Consumer attitudes, subjective norms, and perceived behavioral control toward group-buying leaders significantly enhance their purchase intentions for agricultural

products promoted by these leaders. Among these, perceived behavioral control exerts a greater influence on purchase intention than attitudes and subjective norms. Thus, all three factors are positively correlated with purchase intentions.

2) Mediating role of purchase intention

Purchase intention mediates the relationships between consumer attitudes, subjective norms, perceived behavioral control, and purchasing behavior. In the context of agricultural products promoted by community leaders, consumers transfer their attitudes and norms regarding the leaders to the promoted products. Group leaders' abilities enhance consumer perceptions of product value, driving purchase tendencies and behaviors.

3) Direct impact on consumer purchasing behavior

Consumer attitudes, subjective norms, and perceived behavioral control significantly influence purchasing behaviors under the guidance of community group-buying leaders. Regression analysis reveals that subjective norms have the most pronounced impact, while perceived behavioral control notably enhances consumer attitudes. These factors collectively demonstrate a strong positive correlation with purchasing behavior.

As the community "group-buying leader" model evolves, it has brought significant changes to daily life and agricultural product purchasing, offering improved services and consumer experiences. However, this model also presents challenges, such as adapting marketing strategies, increasing economic benefits, and fostering social relationships. Most existing studies focus on analyzing the current state of community group-buying and its challenges rather than linking it with consumer behavior theories. This study bridges that gap by exploring the impact of group-buying leaders on consumer behavior using a structured framework, providing a basis for further research in this area.

8.2. Research implications

The study aims to contribute academically and address challenges in the "group-buying leader" model for agricultural product marketing. Drawing on relationship marketing and consumer attitude theories, the research provides insights into optimizing the community agricultural group-buying industry and enhancing service quality.

1) Enhancing group leaders' abilities and building trust

Community residents often rely on group leaders for product recommendations and problem resolution, given limited direct interaction with agricultural platforms. The study highlights the importance of group leaders' expertise, product knowledge, and interactive abilities in fostering consumer trust and driving agricultural product purchases. Leaders should refine their product knowledge and adopt innovative marketing techniques, such as leveraging social media strategies, to create engaging and trustworthy interactions.

2) Ensuring high-quality product selection

Promoting high-quality agricultural products is essential for building consumer trust and enhancing purchase motivation. Leaders should ensure objective and transparent communication about product features while avoiding exaggerated claims.

High-quality products foster positive reputations and long-term loyalty, while problematic products can severely damage trust and consumer relationships.

8.3. Outlook for future research

In the context of the e-commerce economy, factors such as the inherent characteristics of agricultural products, industry dynamics, and policy influences also affect consumer purchasing intentions. While extensive research exists on consumer adoption of community group-buying, empirical studies specifically examining the role of group leaders remain limited. Future research should address this gap by analyzing intermediary variables and paths influencing consumer purchasing behavior.

This study identifies a need for deeper exploration of consumer motivations and group-buying leader strategies. It highlights the potential for integrating more sophisticated data collection methods and advanced analytical models to enrich this field of research. Additionally, future studies could examine consumer, platform, and community characteristics to offer more tailored recommendations. The evolving role of group leaders will remain pivotal in shaping consumer purchasing behaviors and advancing the community group-buying model.

Ethical approval: Not applicable.

Conflict of interest: The author declares no conflict of interest.

References

1. Wu, C., Xia, Z., & Luo, W. (2019). Analysis of the discrepancy between consumers' willingness and behavior in purchasing geographical indication agricultural products online. Agricultural Economics Issues, 2019(05), 110-120.
2. Chen, X., Tan, X., & Ou, X. (2018). Is small-scale farming an obstacle to food safety? A game theory analysis of participants' interactions. Rural Economy, 2018(10), 23-29.
3. Zhou, C. (2021). The theory, issues, and countermeasures of the business model of live-streaming sales by internet celebrities. Economic Circle, 2021(01), 43-47.
4. Song, S., & Li, J. (2022). The impact of initiator characteristics and product perceived value on consumers' willingness to participate in community group buying. Journal of Tianjin University of Commerce, 42(03), 49-58.
5. Zhang, J., & Sun, X. (2021). Incentive mechanisms for community group buying supply chains under asymmetric information. Business Economic Research, 2021(09), 83-86.
6. Kim, J., Han, D., Hwang, W., et al. (2017). 3D face recognition via discriminative keypoint selection. Proceedings of the 14th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), 2017.
7. Wang Huijuan, Zhou Ailian, Liang Xiaohe, Xie Nengfu, Li Xiaoyu, Wu Saisai. Research on the Application of Blockchain Technology in Agricultural Product Traceability. Chinese Agricultural Science Bulletin, 2020, 36(36):158–164.
8. Wang Puqing, Qu Xiang, Xiong Hang, Wang Zhiguang. The Application of Blockchain Technology in Food Safety Management. Agricultural Technology Economics, 2019(09):82–90.
9. Wang Weiping. Research on Loss Control in Cold Chain Logistics for Fresh Agricultural Products. China Business Review, 2021(24):77–79.
10. Li Yuan, Li Jing. Driving Forces, Issues, and Countermeasures of E-commerce Livestreaming Under Marketing Model Upgrades. Business Economics Research, 2021(21):74–76.
11. Ajzen, I. Prediction of Leisure Participation from Behavioral, Normative, and Control Beliefs: An Application of the Theory of Planned Behavior. Leisure Sciences, 1991, 13(3).
12. Wang Yanyan, Huang Xincheng, Xie Wei. The Impact of Book Livestreaming on Users' Purchase Intentions. Journal of Beijing Institute of Graphic Communication, 2023, 31(11):39–45.

13. Keith, M. J., Babb, J., Lowry, P. B., et al. Limited Information and Quick Decisions: Consumer Privacy Calculus for Mobile Applications. Social Science Electronic Publishing, 2016.
14. Ajzen, I. Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. Journal of Applied Social Psychology, 2002, 32(4):665–683.
15. Xiao Hongbo. Analysis of Consumer Psychological Experience Pathways and Influencing Factors in Agricultural Product Livestreaming Models. Business Economics Research. 2024;(03):115–118.
16. Chen Huixian, Zheng Yaqin. Enhancing Regional Agricultural E-commerce Development: A Path Study Using fsQCA—A Case Analysis of 28 Provinces and Cities. Journal of Changchun University of Science and Technology (Social Science Edition), 2022, 35(04):108–115+123.
17. Ye Jing, Liang Saijun. The Influence of Virtual Community Fashion Opinion Leaders on Clothing Consumption Behavior. Silk, 2021, 58(08):60–66.
18. Zhu Siqi. The Impact of Opinion Leader-Assisted Livestreaming on Consumer Behavior. China Business Review, 2023(02):95–99.
19. Qin Suxiang, Zhu Tao. The Relationship Between Celebrity Livestream Hosts' Characteristics and Consumer Purchase Intentions: The Mediating Role of Social Presence. Business Economics Research, 2023(10):81–84.
20. Wang Shuo, Sheng Wenhong, Li Jingjing. The Impact of Embedded Advertising by Self-Media on College Students' Purchase Intentions. Management and Administration:1–12 [Published online: March 7, 2024].
21. Zhang Duo. Consumer Green Product Purchasing Behavior from the Perspective of Environmental Concern. Price Theory and Practice, 2021(09):197–200.
22. Zhou Chongchong, Yu Bin. An Empirical Analysis of the Impact of External Variables in Community Group Buying on Consumer Participation Willingness. Business Economics Research, 2023(05):96–99.
23. Carah D. Porter, Claire I. Groves, Christopher Huong, Denver M.Y. Brown. Predicting physical activity behavior among university students using the multi-process action control framework, Psychology of Sport and Exercise, 75, 2024, 102716