

The Effect of Risk Perception on Group Polarization in Online Communities: Postprint

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Abstract

[Purpose/Significance] In social media, the group polarization phenomenon triggered by the online circle group effect is intricate and complex, posing severe challenges to the guidance and governance of online public opinion. This study seeks to investigate the influence mechanism of multi-dimensional environmental risk perception on group polarization within online circles, providing theoretical support for governing group polarization. [Method/Process] Based on protection motivation theory and circle group structure theory, a theoretical model is established. Data collection is conducted using the “6.10” assault incident as a case study, obtaining two sets of comparative data from the perspectives of random groups and circle groups, and a structural equation model is constructed to conduct empirical analysis of the research hypotheses. [Results/Conclusion] 1 冤 Compared with random groups, online circle groups exhibit high degree of viewpoint homogenization with significant circle group effects; 2 冤 Risk perception has a significant positive influence on the formation of group polarization, among which risk response behavior has a more pronounced influence on group polarization; 3 冤 Online circle groups have a significant positive influence on the formation of group polarization, among which “surface” has a more pronounced influence on group polarization; 4 冤 Online circle groups play a mediating role between multi-dimensional risk perception and group polarization.

Full Text

Preamble

Title: The Influence of Risk Perception on Group Polarization in Network Circle Groups

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Abstract:

In social media, the phenomenon of group polarization triggered by network circle group effects has become increasingly complex, posing severe challenges to the guidance and governance of online public opinion. This study aims to explore the influence mechanism of multi-dimensional environmental risk perception on group polarization within network circle groups, providing theoretical support for managing group polarization. Based on Protection Motivation Theory and Circle Group Structure Theory, a theoretical model was established. Using the “6.10 Hitting Incident” as a case study, data were collected from two comparative groups—random individuals and circle group members—to construct a structural equation model for empirical hypothesis testing. The results show that: (1) Compared with random groups, network circle groups exhibit higher degrees of opinion homogenization with significant circle group effects. (2) Risk perception has a significant positive impact on the formation of group polarization, with risk response behavior perception showing the most pronounced effect. (3) Network circle groups significantly and positively influence group polarization formation, with the “structure” dimension having the greatest impact. (4) Network circle groups mediate the relationship between multi-dimensional risk perception and group polarization.

Keywords: group polarization; risk perception; network circle group; structural equation model

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1. Introduction

Online group polarization represents a complex and frequent challenge in network governance. As information technology advances and internet user populations explode, the influence of online cluster behaviors has grown increasingly widespread, reshaping individual and collective cognitive patterns, expression structures, and behavioral logics. While these phenomena can facilitate communication and unite public sentiment, their extreme expressions also breed online chaos [?]. Understanding the internal mechanisms of network group polarization is crucial for cultivating a clean cyberspace and advancing network social governance.

In cyberspace, individuals often seek emotional sanctuaries through personalized tags and symbols, exchanging and validating opinions on social hotspots through network channels. This process reveals the growing complexity of network circle group subjects, group factionalism, and cultural heterogeneity between circles [?], providing fertile soil for group polarization. Once controversial events emerge, group polarization rapidly intensifies. Fundamentally, group polarization stems from individual risk perception, as people act according to

their perceived reality [?].

Existing research on network circle groups and group polarization remains substantial yet fragmented. Studies on network circle groups typically focus on three aspects: characteristic analysis [?], ideological education in colleges [?], and ideology [?]. Research on group polarization, spanning sociology, communication, and psychology, has explored formation mechanisms [?], evolution patterns [?], and psychological mechanisms [?] through modeling and empirical analysis. However, few scholars have integrated circle group effects, risk perception, and group polarization to examine their intrinsic logical connections. This study addresses this gap by investigating how risk perception within circle groups influences group polarization, using the “6.10 Hitting Incident” as an empirical case to provide theoretical insights for governance strategies.

2. Theoretical Framework and Research Hypotheses

2.1.1 Protection Motivation Theory

Risk perception refers to individuals' cognitive evaluation of threats in their environment and the resulting behavioral decisions and psychological responses. Rogers proposed Protection Motivation Theory in 1975, suggesting that threat information from environments and individuals triggers threat and coping appraisals that regulate attitude changes. When individuals perceive threats and believe effective measures exist, they develop self-efficacy to implement positive responses [?].

This study posits that when netizens encounter events involving personal interests or potential future stakes, their behavioral evolution toward group polarization is motivated by threat evaluation and efficacy assessment of coping behaviors. Drawing on existing risk perception classifications [?], we divide public opinion risk perception into three sub-dimensions: risk fact perception (cognitive understanding of social problems), risk loss perception (potential personal harm), and risk response behavior perception (efficacy in taking action). Among these, risk response behavior perception most significantly influences group polarization, as individuals prioritize government responses over individual actions when seeking to mitigate risks.

2.1.2 Circle Group Structure Theory

Circle Group Structure Theory, developed in 1950s American sociology, describes social relationship networks using circle group models. Network circle groups form interest-based communities bound by shared interests and emotions. Unlike physical societies constrained by time and space, virtual spaces enable individuals to rapidly find communities matching their preferences, creating personalized information centers.

The theory conceptualizes network circle groups through a “point-line-structure” framework [?]: “points” represent information source nodes, “lines” represent information transmission connections between members, and “structure” emerges from the intertwined mesh of internal relationships. This structure, combined with media resonance effects and internal homogenization mechanisms, creates unique characteristics for online circle groups.

2.2 Research Hypotheses

Based on Protection Motivation Theory, we identify three dimensions of risk perception (risk fact, risk loss, risk response behavior) and three layers of network circle groups (point, line, structure). The following hypotheses are proposed:

- H1:** Risk perception positively and significantly influences group polarization.
- H1a:** Risk fact perception positively influences group polarization.
- H1b:** Risk loss perception positively influences group polarization.
- H1c:** Risk response behavior perception positively influences group polarization.
- H2:** Network circle groups positively and significantly influence group polarization.
- H2a:** The “point” layer positively influences group polarization.
- H2b:** The “line” layer positively influences group polarization.
- H2c:** The “structure” layer positively influences group polarization.
- H3:** Risk perception positively and significantly influences network circle groups.
- H3a:** Risk fact perception positively influences the “point” layer.
- H3b:** Risk loss perception positively influences the “line” layer.
- H3c:** Risk response behavior perception positively influences the “structure” layer.
- H4:** Network circle groups mediate the relationship between multi-dimensional risk perception and group polarization.

The theoretical model is illustrated in [Figure 2: see original paper].

3. Methodology

3.1 Case Selection

The “6.10 Hitting Incident” (June 10, 2022) was selected as the research case. Following the incident, online focus shifted toward gender opposition, with female netizens particularly polarizing their attitudes toward men. Word cloud analysis reveals frequent terms like “black evil forces” and gender-related vocabulary, indicating how public concern transitioned from criminal elements to gender

issues. The incident's high visibility, significant influence, and pronounced female group polarization make it representative for studying how circle groups amplify risk perception.

3.2 Questionnaire Design

The questionnaire was designed based on established scales from relevant research, tailored to the "6.10 Hitting Incident." It comprises two main sections: (1) basic demographics and social media usage patterns, and (2) measurements of risk perception dimensions and group polarization indicators. All items use a 5-point Likert scale. The survey targeted two groups: women in circle groups (recruited through QQ, Douban female communities) and random women without circle group affiliations, enabling comparative analysis of circle group effects.

3.3 Data Collection and Statistical Analysis

Circle Group Sample: 600 questionnaires were distributed, yielding 505 valid responses (84.16% validity).

Random Sample: 600 questionnaires were distributed, yielding 554 valid responses (92.33% validity).

3.3.1 Basic Characteristics of Female Users Descriptive statistics show both groups are predominantly young adults (68.24% and 77.02% respectively) with undergraduate education or below (95.85% and 96.72%). Age and education distributions are shown in [Figure 4: see original paper] and [Figure 5: see original paper].

3.3.2 Understanding of the Hitting Incident Survey data reveal significant differences between groups: - **Awareness:** 83.93% of circle group members vs. 55.81% of random women agreed they frequently saw incident-related content. - **Knowledge:** 77.62% vs. 50.82% claimed thorough understanding of the incident. - **Opinion Homogeneity:** 85.99% vs. 53.98% agreed the incident was entirely men's fault, demonstrating stronger opinion convergence in circle groups. - **Engagement:** 82.13% vs. 54.8% posted comments, and 70.58% vs. 57.32% shared content about the incident.

These results confirm that circle group members show higher attention, participation, and opinion uniformity.

3.4 Reliability and Validity Analysis

Cronbach's α coefficients were calculated for both samples. For the circle group sample, all dimensions exceeded 0.7, indicating good reliability. For the random sample, coefficients ranged between 0.6-0.7, showing acceptable reliability. KMO values for all dimensions exceeded 0.7, and Bartlett's tests were significant, confirming adequate validity for factor analysis. Detailed results are presented in and .

4. Results

4.1 Model Fit Assessment

Using AMOS 26.0, the initial model showed inadequate fit. Modification indices revealed correlations among risk fact, risk loss, and risk response behavior dimensions. After establishing covariances among these latent variables, model fit improved substantially. Fit indices (CFI, IFI, NFI) exceeded 0.9 for both samples, indicating excellent model fit. Detailed fit statistics are shown in .

4.2 Hypothesis Testing

4.2.1 Main Effects Analysis Circle Group Sample: All path coefficients were significant ($p < 0.05$), supporting H1, H2, and H3. Risk response behavior showed the strongest effect on group polarization ($\beta = 0.211$), followed by risk loss ($\beta = 0.160$) and risk fact ($\beta = 0.074$). Among circle group layers, “structure” had the greatest impact ($\beta = 0.173$), followed by “line” ($\beta = 0.160$) and “point” ($\beta = 0.074$).

Random Sample: Most paths were non-significant, with some showing negative relationships. This confirms that group polarization requires circle group contexts—randomly scattered individuals without discussion forums maintain independent views and resist polarization.

4.2.2 Mediation Effect Analysis Bootstrap mediation tests (5,000 samples) examined whether circle group layers mediate risk perception’s effect on group polarization. Results show all indirect effects were significant (95% CI excluding zero), confirming that network circle groups partially mediate the relationship. The mediation model explains how individual risk perception transforms into collective polarization through circle group dynamics.

5. Conclusion and Discussion

This study reveals the generation path of group polarization through network circle groups and multi-dimensional risk perception. Key findings include:

1. **Circle Group Homogenization:** Network circle groups exhibit significantly higher opinion homogeneity than random groups, with clear circle group effects.
2. **Risk Perception Effects:** Multi-dimensional risk perception positively influences group polarization, with risk response behavior perception being the most influential factor. When individuals perceive threats and believe collective action can mitigate risks, polarization intensifies.

3. **Circle Group Structure Effects:** Network circle groups significantly promote polarization, with the “structure” dimension (representing the intertwined mesh of relationships) having the strongest effect. Media resonance and internal homogenization accelerate opinion convergence.
4. **Mediation Mechanism:** Circle groups mediate between risk perception and group polarization. Individual risk perceptions drive people to seek like-minded communities, where information echo chambers amplify shared cognitions into extreme collective positions.

Limitations: The SEM model and questionnaire design rely on researchers’ subjective experience, potentially introducing selection bias. Future research should expand sample diversity and validate findings across different incident types.

Practical Implications: Governance strategies should focus on: (1) monitoring risk response behaviors to prevent escalation, (2) breaking information silos within circle groups, (3) improving official response efficacy to reduce public threat perceptions, and (4) promoting cross-group communication to mitigate polarization.

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Note: Figure translations are in progress. See original paper for figures.

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