



Longitudinal Associations Among Personal Relative Deprivation, Trait-Anger and Cyber-Aggression

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Abstract. Cyber-aggression (CA) is an increasing societal concern. While personal relative deprivation (PRD) is known to predict CA, their longitudinal relationship and underlying mechanisms remain unclear. Based on the General Aggression Model and Script Theory, this study uses a two-wave longitudinal design (6-month interval) with 940 Chinese college students to examine the reciprocal relationships among PRD, trait-anger (TA), and CA. Cross-lagged analysis revealed that PRD (T1) predicted subsequent TA and CA (T2), and TA (T1) also predicted PRD and CA (T2). Furthermore, TA (T2) mediated the association between PRD (T1) and CA (T2). These findings reveal a cyclical relationship between these variables, deepening our understanding of cyber-aggression and providing theoretical guidance for its prevention.

Keywords: Personal relative deprivation, Trait-anger, Cyber-aggression, Cross-lagged model, Mediation

1 Introduction

Cyber-aggression (CA), defined as repetitive aggressive behavior using electronic devices, is a major issue among college students [1]. Compared to traditional aggression, CA has no time or space constraints and offers strong concealment [2]. In China, where emotional expression is often discouraged, adolescents may be more likely to vent anger online [3]. Given its severe adverse consequences for victims [1], exploring the influencing factors and psychological mechanisms of CA is critical.

The General Aggression Model (GAM) [4] and Script Theory [5] provide a framework for understanding CA. The GAM posits that personal and situational factors influence behavior through their impact on an individual's internal state (cognition, affect, and arousal). Script Theory suggests that repeated aggressive behavior can create "aggression scripts" that are stored and retrieved in future situations. This study integrates these theories to examine the complex interplay between personal relative deprivation, trait anger, and cyber-aggression.

1.1 Personal Relative Deprivation and Cyber-Aggression

Personal relative deprivation (PRD) is the negative emotion (e.g., frustration, anger) individuals feel when perceiving themselves as disadvantaged compared to others [6]. Relative deprivation theory argues that this perception leads to negative emotions, increasing the likelihood of aggressive behavior [7]. Equity theory further suggests that individuals may act to restore fairness. Given the anonymity of the internet, cyber-aggression can become a tool to vent these negative feelings. While PRD correlates with traditional aggression [8], research on its link to CA is limited. Conversely, engaging in CA might increase PRD. Attackers may face social condemnation, damaging their self-esteem [9] and leading them to perceive greater unfairness. Thus, we propose Hypothesis 1: There is a bidirectional longitudinal relationship between PRD and CA.

1.2 Trait-Anger and Cyber-Aggression

Trait-anger (TA) refers to a stable disposition to experience anger frequently and intensely across various situations [10]. Individuals with high TA are more likely to respond aggressively to stimuli, a tendency amplified by the anonymity of the internet [11]. TA is a known predictor of cyberbullying [12]. According to the GAM, if aggressive behavior is deemed effective, the related emotions and cognitions are reinforced. Therefore, frequent CA may strengthen an individual's anger-related scripts, fostering a more anger-prone disposition. We propose Hypothesis 2: There is a reciprocal relationship between TA and CA.

1.3 The Mediating Role of Trait-Anger

PRD is a potent source of anger. Prolonged feelings of deprivation can lead to chronic irritability, i.e., high TA [13]. Individuals with high TA, in turn, are more likely to perceive social comparisons as unfair, further deepening their PRD. As an internal emotional state, TA is a key proximal cause of aggression within the GAM framework. It acts as a crucial link between the distal experience of deprivation and the enactment of aggressive behavior online. Therefore, we propose Hypothesis 3: Trait-anger mediates the longitudinal relationship between PRD and CA.

Based on this, our study aims to: (a) examine the reciprocal relationships among PRD, TA, and CA using a cross-lagged panel model, and (b) test the mediating role of TA in the link between PRD and CA.

2 Methods

2.1 Participants and Procedure

Participants were part of a larger longitudinal study. Using cluster sampling, data were collected from four Chinese universities at two time points in 2024, six months apart. At T1, 1042 students participated. At T2, 963 completed the survey (93.26%

retention). After data cleaning, 958 participants were included in the final analysis ($M_{age} = 19.76$, $SD = 0.86$; 73% female). The study received ethical approval, and informed consent was obtained.

2.2 Measures

- **Personal Relative Deprivation:** Assessed with the 5-item Personal Relative Deprivation Scale [14] (1 = Strongly disagree to 6 = Strongly agree). Cronbach's α was 0.917 at T1 and 0.942 at T2.
- **Trait-Anger:** Measured using the 10-item Trait Anger subscale of the State-Trait Anger Expression Inventory [15] (1 = Almost never to 4 = Almost always). Cronbach's α was 0.859 at T1 and 0.907 at T2.
- **Cyber-Aggression:** Assessed with the 29-item Cyber-Aggression Typology Questionnaire [16] (1 = Strongly disagree to 4 = Strongly agree). Cronbach's α was 0.972 at T1 and 0.980 at T2.

2.3 Statistical Analyses

Descriptive and correlation analyses were conducted with SPSS 24.0. Measurement models, longitudinal measurement invariance, cross-lagged panel models, and the mediation model were tested using Mplus 8.3. Model fit was evaluated with CFI, TLI, RMSEA, and SRMR. The mediation effect was tested using bootstrapping.

3 Results

3.1 Descriptive Statistics and Correlations

Table 1 presents the means, standard deviations, and correlations. All variables (PRD, TA, CA) were positively and significantly correlated with each other across and within time points, providing initial support for our hypotheses.

Table 1. Descriptive statistics and correlations among variables (N=958).

Variable	M	SD	1	2	3	4	5	6	7	8
1. Gender	—	—	1							
2. Age	20.57	0.857	-0.042	1						
3. PRD T1	2.917	1.113	-0.017	-0.078	1					
4. PRD T2	2.870	1.172	-0.082	-0.064	0.439	1				
5. TA T1	1.700	0.450	-0.015	-0.032	0.347	0.286	1			
5. TA T2	1.698	0.518	-0.069	-0.024	0.305	0.420	0.506	1		
6. CA T1	1.449	0.502	-0.020	-0.185	0.371	0.272	0.300	0.307	1	
7. CA T2	1.462	0.538	-0.048	-0.226	0.233	0.324	0.266	0.390	0.429	1

Note: PRD, Personal relative deprivation; TA, Trait-anger; CA, cyber-aggression; T1, time1; T2, time2.

3.2 Cross-Lagged Analyses

Longitudinal measurement invariance was established for all scales, supporting further analysis. The cross-lagged panel model (see Figure 1) demonstrated good fit ($\chi^2 = 33.366$, $df = 89$, $CFI = 0.980$, $RMSEA = 0.064$). Results showed that:

- PRD at T1 significantly predicted TA at T2 ($\beta = 0.148$, $p < .01$), and TA at T1 significantly predicted PRD at T2 ($\beta = 0.124$, $p < .01$), confirming a reciprocal relationship between PRD and TA.
- TA at T1 significantly predicted CA at T2 ($\beta = 0.119$, $p < .01$), and CA at T1 significantly predicted TA at T2 ($\beta = 0.128$, $p < .01$), supporting Hypothesis 2 on the reciprocal relationship between TA and CA.
- PRD at T1 significantly predicted CA at T2 ($\beta = 0.207$, $p < .001$), and CA at T1 significantly predicted PRD at T2 ($\beta = 0.212$, $p < .001$). This finding supports Hypothesis 1, revealing a bidirectional relationship between PRD and CA.

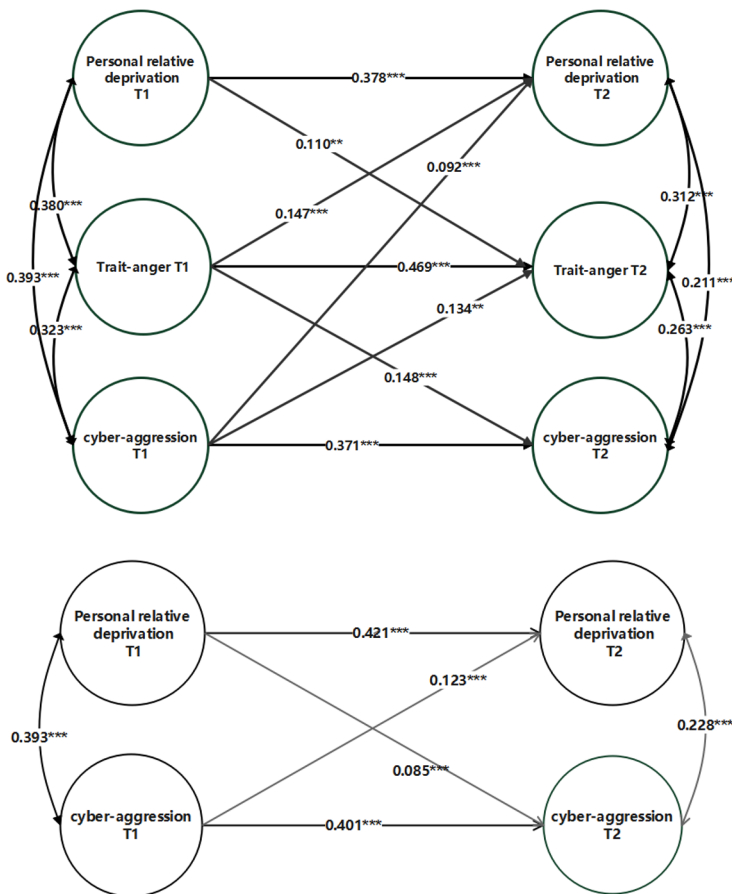


Fig. 1. Standardized Cross-Lagged Model

3.3 Longitudinal Mediation Analysis

To test Hypothesis 3, a mediation model (see Figure 2) was constructed with PRD (T1) as the predictor, TA (T2) as the mediator, and CA (T2) as the outcome, controlling for T1 levels of TA and CA, age, and gender. The model fit the data well ($\chi^2 = 154.86$, $df = 39$, $CFI = 0.988$, $RMSEA = 0.056$).

- The direct effect of PRD (T1) on CA (T2) was significant ($\beta = 0.152$, $p < .001$, 95% CI [0.072, 0.08]).
- The indirect effect of PRD (T1) on CA (T2) via TA (T2) was also significant ($\beta = 0.143$, $p < .001$, 95% CI [0.056, 0.066]).

This indicates that TA partially mediates the longitudinal relationship between PRD and CA, supporting Hypothesis 3.

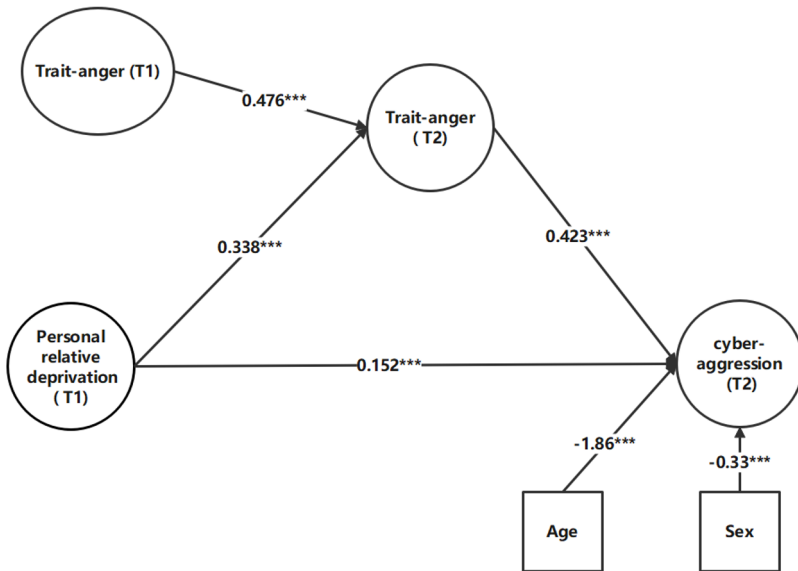


Fig. 2. Mediation Model

4 Discussion

This longitudinal study provides robust evidence for the complex, reciprocal relationships among personal relative deprivation, trait-anger, and cyber-aggression, extending the GAM and Script Theory.

First, our results support a bidirectional relationship between PRD and CA. Individuals who feel deprived may use CA to vent frustration or restore a sense of equity [8]. Conversely, perpetrating CA can lead to social condemnation and damaged self-esteem, reinforcing a sense of being disadvantaged and marginalized [9]. This creates a vicious cycle where deprivation and aggression fuel each other. Second, we

found a reciprocal relationship between TA and CA. High TA predisposes individuals to react aggressively, especially in anonymous online environments [11]. In turn, successfully enacting CA reinforces aggression-related scripts and normalizes anger as a response, thereby strengthening TA over time. This finding directly supports the feedback loop proposed by the GAM, where aggressive behavior can alter an individual's internal state [4]. Third, the relationship between PRD and TA was also reciprocal. Experiencing deprivation triggers anger, and prolonged exposure to such feelings can lower an individual's anger threshold, fostering a stable trait of anger [13]. Simultaneously, individuals with high TA are more prone to hostile attribution biases, leading them to perceive neutral or ambiguous situations as unfair and thus experience greater deprivation. Finally, our mediation model demonstrates that trait-anger is a key psychological mechanism through which PRD leads to future cyber-aggression. PRD creates a context of persistent frustration and unfairness, which fosters a general disposition to experience anger (TA). This internal state then makes individuals more likely to engage in aggressive behavior, with the internet providing a convenient and anonymous outlet. This finding clarifies the "how" in the PRD-CA link.

4.1 Implications

The findings suggest that interventions aimed at reducing cyber-aggression should target both the perception of deprivation and the management of anger. Educators can foster positive mindsets and resilience to mitigate feelings of relative deprivation. Crucially, providing psychological education and emotion management training (e.g., anger regulation skills) can help students cope with frustration constructively, breaking the cycle that leads from deprivation to aggression.

4.2 Limitations and Future Directions

This study has limitations. The sample consists of Chinese college students, which may limit generalizability. Future research should replicate these findings in more diverse samples. The use of self-report measures may introduce shared method variance; future studies could incorporate peer reports or behavioral data. Despite these limitations, this study provides compelling longitudinal evidence for the cyclical interplay between PRD, TA, and CA, significantly advancing our understanding of cyber-aggression.

5 Conclusion

This study reveals a reciprocal cycle among personal relative deprivation, trait-anger, and cyber-aggression. Trait-anger serves as a crucial mediating mechanism linking PRD to subsequent CA. These findings support and extend the General Aggression Model, offering a deeper understanding of cyber-aggression and highlighting potential targets for prevention and intervention.

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