frontiers | Frontiers in Developmental Psychology

TYPE Original Research
PUBLISHED 04 September 2024
DOI 10.3389/fdpys.2024.1375009

OPEN ACCESS

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RECEIVED 23 January 2024
ACCEPTED 07 August 2024
PUBLISHED 04 September 2024

CITATION
He J and Liu H (2024) How does interpersonal curiosity impact peer rejection? The mediating effect of relative deprivation and malicious envy. *Front. Dev. Psychol.* 2:1375009. doi: 10.3389/fdpys.2024.1375009

How does interpersonal curiosity impact peer rejection? The mediating effect of relative deprivation and malicious envy

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Objective: Peer rejection is one of the key indicators for measuring interpersonal relationships among adolescents. Considering that interpersonal curiosity plays a significant role in interpersonal relationships, however, the influence of interpersonal curiosity on peer rejection is still unknown. This study is grounded in social comparison theory and aims to investigate the impact of adolescent interpersonal curiosity on peer rejection. The study explores the impact of interpersonal curiosity on peer rejection and further investigates the mediating role of relative deprivation and malicious envy.

Methods: The study employed the stratified cluster sampling method to select 418 adolescents in Shaanxi Province. The Adolescents' Relative Deprivation Scale was used to measure relative deprivation, the Benign and Malicious Envy Scale was used to measure benign envy and malicious envy, and the School Adaptation Inventory was used to measure peer rejection. The statistical software SPSS 24.0 and AMOS 24.0 were used for statistical analysis, and the common method deviation test was conducted using the Harman single-factor control method. Finally, the bootstrap sampling method was used to test the significance of the intermediary effect.

Results: The results of the mediation model show that interpersonal curiosity can directly and positively affect peer rejection ($\beta = 0.317$, $p < 0.001$). Malicious envy plays a completely mediating role ($b = 0.125$, $p < 0.001$), while relative deprivation plays a partially mediating role ($b_{direct-path} = 0.071$, $p = 0.004$; $b_{indirect-path} = 0.064$, $p < 0.001$). Further discovery of the chain mediation model shows that interpersonal curiosity can impact individual peer rejection through the chain mediation of relative deprivation and malicious envy ($b = 0.026$, $p < 0.001$), and there is no significant gender difference in this result.

Conclusion: Interpersonal curiosity can enhance peer rejection in adolescents, with relative deprivation and malicious envy completely mediating this process. This study reveals the impact of interpersonal curiosity on adolescents' peer rejection from the viewpoint of social comparison theory and provides a new perspective for fostering the formation and growth of positive peer relationships among adolescents.

KEYWORDS

interpersonal curiosity, peer rejection, relative deprivation, envy, adolescents

1 Introduction

Interpersonal curiosity plays a crucial role in establishing and sustaining good interpersonal relationships and influencing interactions and communication between individuals and is a significant factor in social interactions and interpersonal relationships (Han et al., 2023; Kashdan et al., 2011). Although interpersonal curiosity is important throughout an individual's life, adolescence is a developmental period during which individuals seek close friendships and undergo a shift in interpersonal adaptation, gradually transitioning from relying on parents to relying on peers (Steinberg and Silverberg, 1986). Given the unique nature of this period, this study focuses on adolescents. Curiosity is a crucial social skill for adolescents (Collins and Steinberg, 2008), influencing the development of their interpersonal relationships. Peer rejection is an important indicator for measuring adolescent peer relationships (Sandstrom and Zakriski, 2004), but few studies have explored the impact of interpersonal curiosity on adolescents' peer rejection. Exploring this relationship not only helps us understand the formation and development mechanism of interpersonal relationships but also provides important theoretical and practical guidance for promoting adolescent peer relationships. Therefore, this study focuses on adolescents to explore the potential impact of interpersonal curiosity on peer rejection.

1.1 Interpersonal curiosity and peer rejection

In collectivist societies, interpersonal curiosity is one of the key factors in establishing deep relationships with others. Interpersonal curiosity is the desire for new information about people driven by internal motivation, such as life experiences, habits, inner thoughts, feelings, and interests (Litman and Pezzo, 2007). This psychological ability is crucial and is linked to individual adaptation, learning, and the application of experiences (Ashforth et al., 2007). It includes three types: private interpersonal curiosity, curious exploration, and general interpersonal curiosity (Xiang, 2017). Lieberman (2013) suggests that the brain tends to seek an understanding of other people's thoughts and feelings. Curiosity can lead to empathy for others because it prompts us to comprehend the emotional world of others and then act in ways that benefit them and our relationships with them. For example, when we show interest and curiosity toward others, they feel respected and valued and are willing to share more information and emotions. Currently, no research has directly explored the association between curiosity and peer rejection. However, research by Kashdan and Roberts (2004) revealed a positive correlation between the trait of interpersonal curiosity and positive interpersonal relationships. Similarly, a study by Kashdan et al. (2011) found that being curious about other people's information has a positive impact on individual interpersonal interactions. Good peer relationships are characterized by fewer instances of peer rejection (Bagwell et al., 2001). Based on this theory, this study proposes Hypothesis 1: Interpersonal curiosity can have a negative correlation with peer rejection.

1.2 The mediating role of relative deprivation

Relative deprivation is a judgment of an individual's perception of being in a disadvantaged position compared to others in a group (Smith and Pettigrew, 2015). On the one hand, the information gap theory holds that when an individual realizes that there is a gap between their current knowledge and the knowledge they want to acquire, that is, when they realize that there is an information gap in their knowledge or understanding, they will become curious and explore new information to fill the gap (Loewenstein, 1994). But, in fact, not all information is sufficient to arouse an individual's curiosity. Curiosity depends on the comparison between a person's objective situation and subjective reference points (Alicke and Zell, 2008). Frequent comparisons with those who are perceived as having higher social status are often linked to an increase in feelings of relative deprivation (Buunk et al., 2003). Therefore, we suggest that interpersonal curiosity can have a positive impact on relative deprivation.

On the other hand, when individuals engage in social comparisons, they typically focus on the comparison goals, themselves, and the gap between themselves and their comparison goals (Xing and Yu, 2006). When individuals realize that they are at a disadvantage in comparison, this relative deprivation may lead to negative emotions such as anger and dissatisfaction (Tian et al., 2021). There is a significant correlation between relative deprivation and higher levels of negative interpersonal reactions such as hostility and aggression (Greitemeyer and Sagioglou, 2019a,b). This negative reaction has a detrimental impact on an individual's interpersonal relationships (Coie et al., 1991; Greitemeyer and Sagioglou, 2017). Furthermore, experiencing higher relative deprivation can result in increased social withdrawal, which, in turn, can lead to higher peer rejection (Rubin et al., 1990; Ai-Shu et al., 2011; Shin and Lee, 2017). Based on this, the study proposes Hypothesis 2: Relative deprivation can mediate the path of interpersonal curiosity on peer rejection.

1.3 The mediating role of malicious envy

Indeed, an individual's existing knowledge is considered objective, while the knowledge they aspire to acquire is deemed subjective. Consequently, the pursuit of information that individuals subjectively seek is influenced by their frame of reference and their current knowledge base. As mentioned by Alicke and Zell (2008), in a typical social comparison context, a focal event or outcome will prompt the comparator to seek relevant comparison targets to clarify their position on a certain attribute. For example, students who receive exam scores may want to know about the performance of others. When an individual (the comparator) becomes inquisitive about a reference object (the person being compared), they are driven to seek out others' information and engage in social comparison. Consequently, envy arises from comparing oneself with others (especially upward social comparison; Van de Ven, 2017). Litman and Pezzo (2007) found that excessive curiosity is associated

with negative emotions. Envy is typically viewed as a negative emotion, and we suggest that interpersonal curiosity can positively impact envy.

However, envy can be categorized as benign envy and malicious envy. Among them, benign envy focuses more on the good qualities of the person being envied, and its behavioral tendencies are aimed at improving oneself; malicious envy focuses more on the person being envied, and its behavioral tendencies aim to pull down the envied person from a superior position (Lange et al., 2018; Van de Ven, 2016). Based on this, we suggest that malicious envy, when contrasted with benign envy, exerts a more pronounced influence on interpersonal relationships. Malicious envy refers to the hostile emotions toward individuals who are superior to oneself in terms of achievement, status, wealth, or other aspects of social comparison. In particular, malicious envy typically arises when an individual subjectively believes that the status of a superior person is undeserved (Van de Ven et al., 2012). Its inclination is to diminish the superior status of the envied person (Van de Ven, 2016). It involves feelings of inferiority, hostility, and resentment, often causing individuals to perceive others' successes as their failures and attempt to undermine the person they envy (Lange and Crusius, 2015; Smith and Kim, 2007; Takahashi et al., 2009). Previous studies have found that, compared to benign envy, malicious envy often leads individuals to develop qualities that are less conducive to establishing and maintaining positive peer relationships. These qualities include an increased perception of injustice, lower altruistic tendencies, and higher hostility (Navarro-Carrillo et al., 2018; Xiang and Zhou, 2023), ultimately causing peer rejection (Beeson et al., 2020). In upward social comparison, malicious envy is more likely to trigger bullying and peer rejection compared to benign envy. Based on this, this study proposes Hypothesis 3 (H3): Malicious envy can mediate the path of interpersonal curiosity on peer rejection.

1.4 The chain mediating role of relative deprivation and malicious envy

Relative deprivation theories suggest that individuals experience negative feelings when they compare their material position with those of others who possess more (Smith et al., 2012). Relative deprivation and malicious envy are both negative feelings about the perceived superiority of others (Neufeld and Johnson, 2016; Smith and Kim, 2007). Among them, relative deprivation focuses on inequality and can easily trigger anger and resentment (Greitemeyer and Sagioglou, 2019b; Smith et al., 2012), which is the central element of malicious envy (Lange and Crusius, 2015). In addition, Loewenstein (1994) also suggests that curiosity may arise from individuals perceiving a gap in their knowledge, which can enhance the individual's relative deprivation. As Zhao and Zhang (2022) found, relative deprivation has a significant positive effect on malicious envy. Therefore, we suggest that relative deprivation can have a positive impact on malicious envy. Furthermore, malicious envy is associated with traits that are harmful to interpersonal relationships, such as the dark triad personality, deception (Moran and Schweitzer, 2008), hindering cooperation (Parks et al., 2002), and gloating over others' failures (Smith et al., 1996), which ultimately leads to peer rejection. Based on this, the study proposes Hypothesis 4: Relative deprivation can influence the impact of interpersonal curiosity on peer rejection by intensifying malicious envy.

In addition, female students are often more sensitive to interpersonal relationships and have higher levels of interpersonal curiosity than male students (Giambra et al., 1992). Given the potential gender differences in interpersonal curiosity, we evaluated the chain mediation model for gender-based variations to reveal possible differences among them.

2 Materials and methods

2.1 Procedure and participants

This study selected students from a large junior high school in Shaanxi Province of China as participants by using a convenience sampling method. This school included a total of 2,200 students in 42 classes at the time of the study. With the support of the school leaders, the class teachers informed the students about the purpose, recruited students who were willing to participate (recruited 10 students from each class through voluntary registration), and sent the survey with informed consent. Specifically, electronic questionnaires (using an online questionnaire program called Questionnaire Stars) were distributed to the students on the weekends of 1–2 and December 9–10 December 2023. In total, 418 students from 42 classes participated in the study, and 418 valid questionnaires were collected, resulting in a 100% effective response rate. Among the participants, 195 were girls (46.7%), and 223 were boys (53.3%); the mean age was 13.32 years ($SD = 0.951$, range = 11–16 years). Additionally, 171 students were in the first grade of junior high school ($M_{age} = 12.50$, $SD = 0.535$, 49.7% male), 223 were in the second grade ($M_{age} = 13.41$, $SD = 0.494$, 43.8% male), and 119 in the third grade ($M_{age} = 14.40$, $SD = 0.587$, 45.4% male). The study received approval from the ethics committee of the author's institution.

2.2 Research tools

2.2.1 Interpersonal curiosity

Interpersonal curiosity was assessed using the Chinese Adolescents' Interpersonal Curiosity Questionnaire developed by Xiang (2017). There are 16 items on three dimensions: general interpersonal curiosity (7 items, e.g., wanting to know how others live), private interpersonal curiosity (5 items, e.g., wondering what others are arguing about when they argue), and exploratory behavior (4 items, e.g., enjoying observing other people's facial expressions). Each item is rated on a 5-point Likert scale (1 = *Completely Not Consistent*, 5 = *Completely Consistent*). A higher score indicated a higher level of interpersonal curiosity among adolescents. In addition, a previous study demonstrated that the questionnaire was effective with a sample of adolescents (Zhou, 2022). In this study, the Cronbach's α coefficient of the questionnaire was 0.921.

2.2.2 Relative deprivation

Relative deprivation was assessed using the Adolescent Relative Deprivation Scale developed by Tian et al. (2021). There are 10 items on two dimensions: emotional deprivation (5 items, e.g., when compared to my classmates, I feel dissatisfied with my poor financial conditions) and cognitive deprivation (5 items, e.g., compared to my classmates, they have better academic performances). Each item is rated on a 5-point Likert scale (1 = *Completely Not Conforming*, 5 = *Completely Conforming*). A higher score indicated a higher level of relative deprivation among adolescents. In addition, a previous study demonstrated that the questionnaire was effective with a sample of adolescents (Chen and Ye, 2023). In this study, the Cronbach's α coefficient of this scale was 0.874.

2.2.3 Benign and malicious envy

Benign envy and malicious envy were assessed using the Benign and Malicious Envy Scale developed by Lange and Crusius (2015). The scale consists of 10 items, with 5 items for each subscale. The benign envy subscale included items such as "When I envy others, I focus on how I can become equally successful in the future." On the malicious envy subscale, there are items such as "I wish that superior people would lose their advantage." Each item is rated on a 6-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*), and the higher the score, the higher the level of envy. Xiang and Zhou (2023) have indicated that the scales are applicable to Chinese population samples. In this study, the Cronbach's α coefficient for benign envy was 0.851, and for malicious envy, it was 0.837.

2.2.4 Peer rejection

Peer rejection was assessed using the sub-questionnaire from the School Adaptation Inventory developed by Cui (2008). Six items were used to measure peer rejection, such as "In school, no classmates play with me." Each item is rated on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). All items are reverse-scored, with higher scores indicating high rates of peer rejection. In addition, a previous study demonstrated that the questionnaire was effective with a sample of adolescents (Dong et al., 2023). In this study, the Cronbach's α coefficient for peer rejection was 0.910.

2.3 Statistical analysis

We used SPSS 24.0 and Amos 24.0 for all data analysis. First, SPSS 24.0 was used to test for common method variance in the data. Second, SPSS 24.0 was utilized to conduct Pearson bivariate correlation analysis to explore the relationship between interpersonal curiosity, relative deprivation, envy, and peer rejection. Afterward, Amos 24.0 was used to analyze the fit of the hypothesized structural equation model. Specifically, this study assessed the indirect effects of interpersonal curiosity on peer rejection through five models: (a) the model mediated by relative deprivation (Model 1), (b) the model mediated by envy (Models 2 and 3), and (c) the chain model mediated by relative deprivation and envy (Models 4 and 5). In this study, a bootstrap of 5,000 was used to test for the mediation effect and estimate confidence intervals (see Figure 1). Finally, Amos 24.0 was used to analyze the gender differences in the chain mediation model.

According to the references, the overall fit of the model was evaluated using a series of goodness-of-fit indices, including the comparative fit index (CFI), the Tucker–Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). The goodness of fit for all models should meet the following criteria: the CFI and the TLI ≥ 0.90, and the RMSEA and the SRMR ≤ 0.08 (Hu and Bentler, 1998).

2.4 Common method variance

Because this study only utilized the self-report method to collect data, there may be a potential for common method variance. There are several methods for testing common method variance, and the Harman single-factor test is the most commonly used approach. After completing the data collection, we utilized Harman's single-factor test to examine the common method bias of the survey (Zhou and Long, 2004). The results indicate that there are a total of eight factor characteristic roots >1. The first factor can explain 25.687% of the standard threshold value, which is <40%. This suggested that there was no significant common method bias problem in this study.

3 Results

3.1 Statistical and correlation analyses

As shown in Table 1, the Pearson bivariate correlation analysis results indicated that interpersonal curiosity was significantly positively correlated with relative deprivation, malicious envy, and peer rejection. The correlation between benign envy and interpersonal curiosity, relative deprivation, and peer rejection was not significant.

3.2 Examination of the mediating effects of relative deprivation

The direct model examines the relationship between interpersonal curiosity (as the independent variable) and peer rejection (as the dependent variable) while controlling for age. The results showed that the model fits well ($\chi^2 = 27.696$, $p = 0.001$, $df = 8$; RMSEA = 0.077; SRMR = 0.049; CFI = 0.982; TLI = 0.966). When no mediating variables (relative deprivation and envy), interpersonal curiosity positively affected peer rejection ($\beta = 0.317$, $p < 0.001$).

The mediation model (Model 1) set interpersonal curiosity as the independent variable, peer rejection as the dependent variable, relative deprivation as the mediating variable, and age as the control variable. The results showed that the model fits well ($\chi^2 = 53.851$, $p < 0.001$, $df = 16$; RMSEA = 0.075; SRMR = 0.049; CFI = 0.971; TLI = 0.950). Interpersonal curiosity positively affected peer rejection ($\beta = 0.173$, $p = 0.002$) and relative deprivation ($\beta = 0.346$,

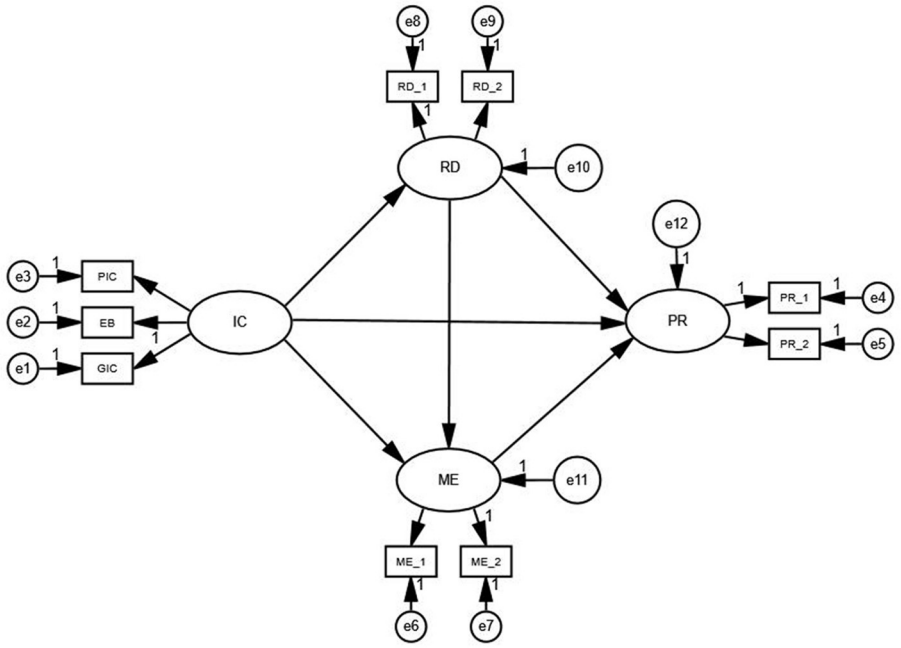

FIGURE 1
The chain mediation model of interpersonal curiosity influencing peer rejection. IC, interpersonal curiosity; PR, peer rejection; RD, relative deprivation; PIC, private interpersonal curiosity; EB, exploratory behavior; GIC, General interpersonal curiosity; BE, benign envy; ME, malicious envy.

$p < 0.001$). Relative deprivation positively affected peer rejection ($\beta = 0.449$, $p < 0.001$).

The deviation-corrected percentile bootstrap method, involving repeated sampling 5,000 times, was used to test the mediating effects of relative deprivation on the relationship between interpersonal curiosity and peer rejection. The results of the mediation effect and the bootstrap 95% confidence interval are shown in Table 2. Interpersonal curiosity directly affected peer rejection ($b = 0.071$, $p = 0.004$), and relative deprivation mediated the influence of interpersonal curiosity on peer rejection ($b = 0.064$, $p < 0.001$).

TABLE 1 **Average, standard deviation, and correlation coefficient of each variable.**

	M	*SD*	1	2	3	4	5
1 IC	36.538	12.678	-				
2 RD	26.067	6.870	0.257***	-			
3 BE	19.794	5.704	0.053	−0.075	-		
4 ME	9.778	5.310	0.473***	0.379***	0.104*	-	
5 PR	9.878	4.918	0.296***	0.404***	−0.059	0.510***	-

IC, interpersonal curiosity; PR, peer rejection; RD, relative deprivation; BE, benign envy; ME, malicious envy. *$p < 0.05$ and ***$p < 0.001$.

3.3 Examination of the mediating effects of envy

The mediation model (Model 2) had interpersonal curiosity as the independent variable, peer rejection as the dependent variable, benign envy as the mediating variable, and age as the control variable. The results showed that the model fits well ($\chi^2 = 47.201$, $p < 0.001$, $df = 16$; RMSEA = 0.068; SRMR = 0.054; CFI = 0.977; TLI = 0.960). Interpersonal curiosity positively affected peer rejection ($\beta = 0.308$, $p < 0.001$), but the influence of interpersonal curiosity on benign envy ($\beta = -0.026$, $p = 0.384$) and benign envy on peer rejection ($\beta = -0.091$, $p = 0.325$) were non-significant.

The deviation-corrected percentile bootstrap method, involving repeated sampling 5,000 times, was used to test the mediating effects of benign envy on the relationship between interpersonal curiosity and peer rejection. The results of the mediation effect and the bootstrap 95% confidence interval are shown in Table 2. Interpersonal curiosity positively affected peer rejection ($b = 0.117$, $p < 0.001$), but malicious envy mediating the influence of interpersonal curiosity on peer rejection was non-significant ($b = 0.001$, $p = 0.118$).

The mediation model (Model 3) had interpersonal curiosity as the independent variable, peer rejection as the dependent variable, malicious envy as the mediating variable, and age as the control variable. The results showed that the model fits well ($\chi^2 = 86.927$, $p < 0.001$, $df = 16$; RMSEA = 0.103; SRMR = 0.064; CFI = 0.957; TLI = 0.925). Interpersonal curiosity positively affected malicious envy ($\beta = 0.506$, $p < 0.001$), malicious envy positively affected peer rejection ($\beta = 0.595$, $p < 0.001$), but the influence of interpersonal curiosity on peer rejection was non-significant ($\beta = 0.033$, $p = 0.562$).

The deviation-corrected percentile bootstrap method, involving repeated sampling 5,000 times, was used to test the mediating effects of malicious envy on the relationship between

TABLE 2 Mediation effect test based on Bootstrap.

	Paths	Effect	Boot LLCI	Boot ULCI	Ratio of indirect to total effect
Model 1	IC→ PR	0.071	0.021	0.125	52.6%
	IC→ RD→ PR	0.064	0.034	0.108	47.7%
	Total effect	0.135	0.078	0.199	
Model 2	IC→ PR	0.117	0.061	0.186	99.2%
	IC→ BE→ PR	0.001	−0.002	0.010	0.8%
	Total effect	0.118	0.065	0.189	
Model 3	IC→ PR	0.013	−0.041	0.070	9.4%
	IC→ ME→ PR	0.125	0.072	0.192	90.6%
	Total effect	0.138	0.082	0.205	

IC, interpersonal curiosity; PR, peer rejection; RD, relative deprivation; BE, benign envy; ME, malicious envy; Boot LLCI, bootstrap lower limit of confidence interval; Boot ULCI, bootstrap upper limit of confidence interval.

interpersonal curiosity and peer rejection. Results of the mediation effect and bootstrap 95% confidence interval are shown in Table 2. Malicious envy completely mediated the influence of interpersonal curiosity on peer rejection ($b = 0.125$, $p < 0.001$).

3.4 Examination of the chain mediating effect of relative deprivation and envy

The chain mediation model (Model 4) had interpersonal curiosity as the independent variable, peer rejection as the dependent variable, relative deprivation, and benign envy as the mediating variables, and age as the control variable. The results showed that the model fits well ($\chi^2 = 84.289$, $p < 0.001$, $df = 27$; RMSEA = 0.071; SRMR = 0.053; CFI = 0.964; TLI = 0.940). Interpersonal curiosity positively affected peer rejection ($\beta = 0.173$, $p = 0.002$) and relative deprivation ($\beta = 0.347$, $p < 0.001$) but not benign envy ($\beta = 0.001$, $p = 0.975$). Relative deprivation positively affected peer rejection ($\beta = 0.445$, $p < 0.001$) but not benign envy ($\beta = -0.076$, $p = 0.451$). Benign envy negatively affected peer rejection ($\beta = -0.051$, $p = 0.033$).

The deviation-corrected percentile bootstrap method, involving repeated sampling 5,000 times, was used to test the mediating effects of relative deprivation and benign envy on the relationship between interpersonal curiosity and peer rejection. The results of the mediation effect and bootstrap 95% confidence interval are shown in Table 3. Only relative deprivation mediated the influence of interpersonal curiosity on peer rejection ($b = 0.063$, $p < 0.001$). The mediating effect of benign envy ($b = 0.000$, $p = 0.743$) and the chain mediating effect ($b = 0.001$, $p = 0.480$) was not significant.

The chain mediation model (Model 5) had interpersonal curiosity as the independent variable, peer rejection as the dependent variable, relative deprivation, and malicious envy as the mediating variables, and age as the control variable. The results showed that the model fits well ($\chi^2 = 119.107$, $p < 0.001$, $df = 27$; RMSEA = 0.090; SRMR = 0.059; CFI = 0.951; TLI = 0.919). Interpersonal curiosity positively affected relative deprivation ($\beta = 0.351$, $p < 0.001$) and malicious envy ($\beta = 0.386$, $p < 0.001$) but not peer rejection ($\beta = -0.012$, $p = 0.835$). Relative deprivation positively affected malicious envy ($\beta = 0.366$, $p < 0.001$) and peer rejection ($\beta = 0.283$, $p < 0.001$). Malicious envy positively affected peer rejection ($\beta = 0.480$, $p < 0.001$).

The deviation-corrected percentile bootstrap method, involving repeated sampling 5,000 times, was used to test the mediating effects of relative deprivation and malicious envy on the relationship between interpersonal curiosity and peer rejection. The results of the mediation effect and bootstrap 95% confidence interval are shown in Table 3. The mediating effect of relative deprivation ($b = 0.042$, $p < 0.001$) and malicious envy ($b = 0.077$, $p < 0.001$) were significant. The chain mediation of relative deprivation and malicious envy ($b = 0.026$, $p < 0.001$) was significant.

3.5 Gender differences

Finally, we used a multi-group analysis to determine whether the path coefficients of the chain mediation model have significant differences in the models between gender differences. Referring to the study of Byrne (2001), we established two models based on keeping the basic parameters (factor loadings, error variances, and structural covariances) stable. One allowed free estimations of the path coefficients between two genders (unconstrained structural paths), while the other limited them (constrained structural paths).

For Model 4, the results showed that there were no significant differences between these two models ($\Delta\chi^2 = 8.890$, $p = 0.447$). Meanwhile, when we compared other parameters in these two models, both models have good fits (see Table 4). Therefore, the parameter-limited deformable models in multiple groups are generally acceptable. The results indicated that there was no gender difference in Model 4.

For Model 5, the results showed that there were no significant differences between these two models ($\Delta\chi^2 = 6.062$, $p = 0.734$). Meanwhile, when we compared other parameters in these two models, both models have good fits (see Table 4). Therefore, the parameter-limited deformable models in multiple groups are generally acceptable. The results indicated that there was no gender difference in Model 5.

TABLE 3 The chain mediation effect test based on bootstrap.

	Paths	Effect	Boot LLCI	Boot ULCI	The ratio of indirect to total effect
Model 4	IC→ PR (direct effect)	0.070	0.023	0.124	52.2%
	IC→ RD→ PR	0.063	0.036	0.114	47.0%
	IC→ BE→ PR	0.000	−0.005	0.005	0.0%
	IC→ RD→ BE→ PR	0.001	−0.002	0.003	0.8%
	Total indirect effect	0.064	0.036	0.115	47.8%
	Total effect	0.134	0.085	0.200	
Model 5	IC→ PR (direct effect)	−0.005	−0.057	0.048	3.3%
	IC→ RD→ PR	0.042	0.017	0.077	28.0%
	IC→ ME→ PR	0.077	0.037	0.134	51.3%
	IC→ RD→ ME→ PR	0.026	0.013	0.050	17.3%
	Total indirect effect	0.145	0.086	0.216	96.7%
	Total effect	0.140	0.082	0.208	

IC, interpersonal curiosity; PR, peer rejection; RD, relative deprivation; BE, benign envy; ME, malicious envy; Boot LLCI, bootstrap lower limit of confidence interval; Boot ULCI, bootstrap upper limit of confidence interval.

TABLE 4 Unconstrained and constrained structural paths across genders.

	χ^2	*df*	RMSEA	SRMR	CFI	TLI	GFI	NFI	AIC	ECVI
Constraint path model (Model 4)	149.804	82	0.045	0.714	0.958	0.954	0.932	0.912	205.804	0.495
Unrestraint path model (Model 4)	140.914	73	0.047	0.654	0.958	0.958	0.937	0.917	214.914	0.517
Constraint path model (Model 5)	186.659	82	0.055	0.077	0.945	0.939	0.891	0.906	242.659	0.583
Unrestraint path model (Model 5)	180.597	73	0.060	0.071	0.943	0.930	0.881	0.909	254.597	0.612

df, degrees of freedom; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; CFI, comparative fit index; TLI, Tucker–Lewis Index; GFI, goodness-of-fit index; NFI, normed fit index; AIC, akaike information criterion; and ECVI, expected cross-validation index.

In summary, interpersonal curiosity not only directly and positively affected peer rejection but also indirectly impacted peer rejection through the mediation of relative deprivation and malicious envy. Additionally, it can indirectly influence peer rejection through the chain mediator of relative deprivation to malicious envy. In addition, the results on gender differences showed that there was no gender difference in the results of the chain mediation models.

4 Discussion

Based on the social comparison theory, this study explores the relationship between interpersonal curiosity and peer rejection, as well as the mediating effect between relative deprivation and envy. The results indicate that interpersonal curiosity can enhance peer rejection in adolescents, with relative deprivation and malicious envy playing a mediating role in this process. Specifically, interpersonal curiosity can not only indirectly affect peer rejection through the independent mediating effect of relative deprivation and malicious envy but also affect peer rejection through the chain mediation of relative deprivation and malicious envy. There is no gender difference in the results. This study explains the possible reasons why adolescent interpersonal curiosity affects peer rejection from the perspective of social comparison theory and offers a new perspective for promoting the establishment and development of positive peer relationships among adolescents.

4.1 Interpersonal curiosity and peer rejection

The findings of this study suggest that interpersonal curiosity can positively impact peer rejection, rejecting Hypothesis 1. Kashdan and Roberts (2004) found that curiosity predicted better interpersonal relationships, and Kashdan et al. (2011) found that positive social interactions benefit from an open and curious mindset. However, our findings are not consistent with their results; one possible explanation for this inconsistency is that adolescents with heightened interpersonal curiosity may excessively focus on others' information, inadvertently comparing it to their own information and potentially leading to negative emotions (Van de Ven, 2017), and this may result in peer rejection. For example, studies of desire for "people information" correspond more to unpleasant experiences of uncertainty than to seeking the pleasurable stimulation of one's interest (e.g., Han et al., 2013;

Litman and Silvia, 2006), and unpleasant experiences often evoke negative emotions, such as anger and prompt coping responses like aggressive responses (Goodman and Southam-Gerow, 2010), which can contribute to peer rejection. Another possible explanation for this inconsistency is that adolescents may pose inappropriate or overly private questions when expressing curiosity, causing discomfort among their peers and potentially leading to rejection. For example, gossip is one way to gather and spread information about others. According to Cristina (2000), participating in negative gossip can predict higher peer rejection among female adolescents. It can be seen that while interpersonal curiosity can facilitate social engagement and relationship development in specific contexts, in the adolescent demographic, elevated levels of interpersonal curiosity may at times exert a detrimental influence on peer interactions, resulting in rejection by peers.

4.2 The mediating role of relative deprivation and malicious envy

The study's findings support Hypothesis 2 by revealing that interpersonal curiosity has an indirect influence on peer rejection through the mediator of relative deprivation. Specifically, individuals with higher interpersonal curiosity tend to experience a higher relative deprivation, which can contribute to increased peer rejection. This phenomenon may be attributed to the tendency of highly curious individuals to actively seek information from others (Litman and Pezzo, 2007) and unconsciously to compare themselves with the other (Galen and Underwood, 1997; Rosnow, 2001). Such comparisons, as suggested by Nadler et al. (2020), can enhance relative deprivation. On the one hand, the experience of high relative deprivation often triggers heightened levels of anxiety and discomfort, which can impede effective communication and interaction with peers, ultimately influencing peer relationships (La Greca and Lopez, 1998). On the other hand, elevated relative deprivation may compromise an individual's self-regulation capabilities, potentially leading to impulsive behaviors (Mishra and Novakowski, 2016), such as aggression (Kassab et al., 2021), further culminating in peer rejection (Coie et al., 1988).

The study's findings support Hypothesis 3 by revealing that interpersonal curiosity has an indirect influence on peer rejection through the mediator of malicious envy. Specifically, interpersonal curiosity leads to peer rejection by enhancing malicious envy. Those with high levels of interpersonal curiosity often seek information from others for social comparison (Festinger, 1954; Snyder et al., 1985), which can trigger feelings of malicious envy (Van de Ven, 2017). This envy may manifest as hostility toward others in social settings, causing discomfort or perceived threat to the envied individual and resulting in their alienation or rejection, thereby straining interpersonal dynamics (Van de Ven, 2016). Additionally, studies, such as Litman and Pezzo (2007), have linked excessive curiosity to negative emotions, with malicious envy being a common response to upward social comparison (Van de Ven, 2017). This envy can prompt individuals to adopt behaviors that hinder the establishment and maintenance of positive peer relationships, such as heightened perceptions of injustice, reduced altruism, and increased hostility (Navarro-Carrillo et al., 2018; Xiang and Zhou, 2023), finally leading to the deterioration of peer connections.

4.3 The chain mediating role of relative deprivation and malicious envy

The study's results showed that relative deprivation and harmful envy play a significant chain mediating role in the impact of interpersonal curiosity on peer rejection, confirming Hypothesis 4. According to the social comparison theory, individuals have a need to comprehend their own level of ability and status. In the absence of objective information, people often use others as a benchmark to evaluate themselves, a process that can lead to forming accurate judgments for self-evaluation (Festinger, 1954). Adolescents are at a critical stage of growth and development, and they are sensitive to self-judgments and self-evaluation, making them susceptible to social comparisons (Collins, 1996; Dunning, 2000). When individuals engage in social comparisons, they typically focus on the comparison goals, themselves, and the gap between themselves and their comparison goals (Xing and Yu, 2006). Therefore, motivated by social comparison, individuals may cultivate interpersonal curiosity (Gibbons and Buunk, 1999). When a person becomes curious about others' lives and emotions, they may start comparing their situation with that of others. If an individual feels disadvantaged in an unexpected comparison, they may experience a sense of relative deprivation (Kim et al., 2018; Smith et al., 2012). This negative feeling may trigger negative emotions, such as dissatisfaction and resentment toward others (Bernstein and Crosby, 1980; Kim et al., 2018), among others, causing the development of malicious envy (Lange and Crusius, 2015), which, in turn, increase peer rejection. In addition, the study also found no gender differences, meaning that the positive influence of interpersonal curiosity on peer rejection is the same for both men and women.

4.4 Limitations and prospects of this study

In summary, based on previous research, this study investigated the impact of interpersonal curiosity on peer rejection by a chain mediation model based on social comparison theory. Research findings revealed that experiencing relative deprivation and malicious envy can enhance the positive impact of interpersonal curiosity on peer rejection. However, in interpersonal communication, adolescents often experience relative deprivation and malicious envy (Ng et al., 2020; Xuan et al., 2021). Therefore, research findings suggest educators and parents should emphasize cultivating positive attitudes and interpersonal communication skills among adolescents. Through education and guidance, adolescents establish healthy self-awareness and self-esteem, cultivate their appreciation and admiration for peer success, and thereby reduce relative deprivation and malicious envy. Meanwhile, educators should also focus on guiding adolescents to have a correct understanding of the relationship between competition and cooperation, promoting their positive curiosity in interpersonal communication, and

reducing peer rejection. In addition, adolescents themselves should also recognize the harm of relative deprivation and malicious envy to interpersonal relationships. By enhancing self-awareness, self-worth, and emotional management abilities, they can overcome the challenges of negative emotions and establish healthy and positive interpersonal relationships to reduce peer rejection.

This study also has the following limitations. First, students were drawn from a single school and were therefore not representative of all students. Whether the results are applicable to other cultures, regions, and schools remains to be verified. Therefore, future efforts should be made to expand the scope of the investigation to improve the reliability of the results. Second, the study used cross-sectional data, and the causal relationship between variables still needs to be verified. Third, the study is limited by the self-report method, and future research should explore various data collection methods.

5 Conclusion

Based on social comparison theory, this study revealed that interpersonal curiosity leads to effects on peer rejection both directly and indirectly. Interpersonal curiosity positively impacts peer rejection, and the indirect impact is mediated by relative deprivation and malicious envy. Furthermore, this indirect influence on peer rejection is also mediated through the sequential pathway from relative deprivation to malicious envy.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Ethics Committee of Xi'an Eurasian University in China. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

JH: Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. HL: Investigation, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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