

Regular Article

Bidirectional relations between altruistic tendency and benign/malicious envy among adolescents: A longitudinal study and weekly diary study

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Abstract

Altruism is a prosocial tendency that has developed through long-term evolutionary selection. The present study adopts social comparison and evolutionary psychology theories to examine how benign/malicious envy can affect altruism and how altruism can affect the two types of envy in turn, respectively. In Study 1, 513 adolescents participated in a three-wave longitudinal survey to explore the relationships between dispositional altruistic tendency and dispositional benign/malicious envy. The cross-lagged analysis showed a long-term and stable negative bidirectional relationship between dispositional altruistic tendency and dispositional malicious envy and a short-term positive bidirectional relationship between dispositional altruism and dispositional benign envy. In Study 2, 109 adolescents kept a weekly diary for seven consecutive weeks to record state levels of altruistic tendency and benign/malicious envy in their daily lives. The hierarchical linear model demonstrated that weekly altruistic tendency and weekly benign envy could positively predict each other, and weekly altruistic tendency presented a negative bidirectional relationship with weekly malicious envy. These findings offer an effective way to study the relationship between human behavior and emotions from perspectives of social comparison and evolutionary psychology theories. Meanwhile, it also has practical significance for the harmonious development of society.

Keywords: altruistic tendency; benign envy; longitudinal study; malicious envy; weekly diary

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Introduction

Altruism, a long-standing topic of interest in psychology, sociology, and economics, is typically characterized as voluntary behavior to promote the well-being of other people (Batson & Shaw, 1991). From an individual perspective, altruism as a noble virtue results in a happier and more meaningful life for the altruist, which suggests that altruism is a predictor of subjective well-being (Huang et al., 2018; Pareek & Jain, 2012; Xi et al., 2017). From a social perspective, altruism plays an important role in building a harmonious society (Gualda, 2022; Staub, 2013). Given that altruism exerts a positive influence on both individuals and society, examining the mechanisms of altruism is crucial to the promotion of happiness and the development of society. The literature review found that the altruistic tendency was closely associated with negative emotions (Carni et al., 2013; de Hooe et al., 2010). Remarkably, this association has a two-sided nature to some extent. To be more specific, negative emotions not only inhibit altruism but also might inspire it (de Hooe et al., 2011). The negative state relief model, which supports the view that negative

emotions inspire altruism, suggests that because altruism helps to alleviate the discomfort generated by negative emotions, individuals will seek to engage in altruistic behavior to eliminate the discomfort when they experience negative emotions (Cialdini & Fultz, 1990; Cialdini & Kenrick, 1976). Meanwhile, envy (“Shakespeare describes it as the green-eyed monster”), arising from upward social comparison, is a negative emotion that is the most universal and even natural (Smith et al., 1999; Soesilo et al., 2021). Envy permeates almost all aspects of human social interaction, such as organizational behavior (Duffy et al., 2012), network behavior (Meier & Schäfer, 2018), and traveling behavior (Martin et al., 2019). Considering that altruism is an important form of social interaction, several studies have explored the relationship between it and envy. However, previous studies mainly focused on the unidirectional negative mechanism between envy and altruism (Gino & Pierce, 2009; Yu et al., 2018), while the potential prosocial aspects of envy and the prediction of altruistic tendency to envy have not been well studied. In fact, envy can be divided into benign envy and malicious envy in terms of reactions (Van de Ven et al., 2009). While benign envy and malicious envy are both negative emotions, malicious envy is more negative than benign envy (Dong et al., 2020; Van de Ven, 2016). Benign envy results in positive reactions, and the envious person will make themselves as successful as others by trying to improve themselves. Conversely, malicious envy results in a negative outcome in which the envious person eliminates the difference by destroying the advantage of others (Lange & Crusius, 2015a; van de Ven,

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2016). The question that arises is: Are there different patterns of influence between the two subtypes of envy and the altruistic tendency? Therefore, based on social comparison theory and evolutionary psychology theory, the present study uses the longitudinal design combined with the diary method to systematically examine the bidirectional predictive relationship between altruistic tendency and benign/malicious envy.

Social comparison theory is helpful to gain in gaining better insight into the predictive effect of benign/malicious envy on an altruistic tendency. Festinger (1954) suggested that humans have the drive to assess themselves, which motivates people to obtain a clear self-evaluation by constant comparison with other people. In the field of comparison, the upward comparison is comparing someone who is superior to oneself (Thornton & Arrowood, 1966). According to the theory, the effects of upward social comparison on individuals could be both positive and negative (Collins, 1996). Taking social comparison theory a step further, the positive consequences might be reflected in a complex emotion resulting from upward comparison - benign envy (Van de Ven et al., 2009). On the one hand, in social comparison, benign enviers can bridge the gap with others through self-improvement (Van de Ven et al., 2012). This counterintuitive type of envy triggers some constructive outcomes, such as having higher well-being (Briki, 2019) and predicting faster race results for athletes (Lange & Crusius, 2015a). Importantly, as part of the process of self-improvement, the envious person will emulate the envied person's behaviors beneficial to other people or society (Polman & Rutan, 2012), which might enhance the altruistic tendency. On the other hand, a few researchers have even directly evidenced that benign envy evokes a willingness to help (Gan, 2020; Hareli & Weiner, 2002), which implies that individuals with a higher propensity for benign envy are more inclined to help others. Thus, benign envy might enhance the individual's altruistic tendency. The negative effect might be in the form of malicious envy, a type of envy closer to what is traditionally understood (Van de Ven, 2017). In upward social comparisons, malicious envy stimulates a negative motivation that the envier wants the superior person to lose their advantages (Van de Ven et al., 2009). Based on this motivation, then, maliciously envious people would usually commit more destructive behaviors (Duffy et al., 2012). A wealth of empirical evidence also supports the non-altruistic nature of malicious envy (Gino & Pierce, 2009; Habimana & Massé, 2000; Van de Ven et al., 2009). Such as a study conducted on hospitality staff which revealed that employees with significant malicious envy traits were less likely to help their colleagues on their own accord (Kim et al., 2010). Thus, malicious envy may inhibit the altruistic tendency. Moreover, cognitive neuroscience researchers have found that envious people gain satisfaction from the misfortune and pain of others (Takahashi et al., 2009). In other words, malicious enviers desire events that are harmful to others rather than beneficial to other people, which might also indicate that malicious envy reduces the altruistic tendency. Based on social comparison theory and previous research, it is reasonable to hypothesize that benign envy positively predicts altruistic tendency, while malicious envy negatively predicts altruistic tendency.

Conversely, can the altruistic tendency affect the two subtypes of envy? Evolutionary psychology claims that altruism has not vanished in the process of natural selection, not only because altruistic behavior is of great value to the recipient but can also be a valuable evolutionary advantage for the altruist (Wilson & Wilson, 2007; Xie et al., 2017), such as altruism promotes interpersonal relationships and is beneficial to health (Crocker et al., 2017). On this basis,

some researchers have posited the self-incentive effect of altruism in evolution; that is, altruism can generate psychological benefits for the altruist through the internal self-incentive process (Hu et al., 2016). First of all, the increased sense of control has been shown to be an important advantage that the self-incentive effect brings to the altruist (Thoits & Hewitt, 2001). And in upward social comparisons, the perceived control affects whether envy tends toward benign or malicious. Then, considering that altruists have a higher level of control over their lives and tend to be convinced that they could change their lower position, which in turn might be more likely to develop benign envy (Lange & Crusius, 2015a; Van de Ven et al., 2012). It is, therefore, reasonable to hypothesize that the altruistic tendency promotes benign envy. Secondly, altruists can suppress negative emotions via a self-incentive effect by adjusting psychological resources (Li & Li, 2022). Since malicious envy refers to a painful negative emotion (Lange & Crusius, 2015b), a high level of altruistic tendency may predict a lower level of malicious envy. Also, altruism is exactly the opposite of malicious envy as the former inspires positive emotions of other-focused and affirming others while the latter attempts to "level others down" (Cohen-Charash & Mueller, 2007; Kwok et al., 2017). Beyond this, the altruistic tendency can be understood as a positive moral trait (Nie et al., 2015). Rather, malicious envy is a hostile and even immoral emotion that leads people to break away from their moral standards (Zhao et al., 2020). Therefore, a person who shows a high level of the altruistic tendency may be less likely to develop malicious envy because of a higher level of morality. Based on the above analysis, this article hypothesizes that altruistic tendency will also play a positive predictive role in benign envy and a negative predictive role in malicious envy.

Furthermore, given that altruistic tendency and benign/malicious envy have been conceptualized as possessing not only trait characteristics but also state-like components (Sharabany & Bartal, 1982; Wu & Srite, 2021). The trait could be understood as a person's characteristic that remains stable through time and context, and the state is considered to reflect a person's adaptation to a particular context (Hamaker et al., 2007). The trait is relatively stable and usually not susceptible to change with time and context. However, the state is susceptible to time and context, which might not be accurately reflected in general longitudinal data (Zhang et al., 2016). Because the traditional longitudinal data survey collects only cumulative memories of events and experiences, it is difficult to reveal the dynamic process of change of daily variables influenced by the context. In recent years, a growing number of researchers have taken an intensive longitudinal method to investigate the state-like qualities of variables, of which the most common one is the diary method (Sened et al., 2018). Compared to traditional surveys, diary surveys provide more valid information about people's daily and episodic experiences in natural situations (Bolger et al., 2003; Ohly et al., 2010). Given that the diary method requires participants to report the events of the day rather than recalling experiences from months or even longer ago. This method of data collection both reduces recall bias and provides a comprehensive understanding of the dynamic process of variables from a daily perspective (Hufford, 2007). Above all, the present study built on Study 1 to further examine the relationship between a weekly altruistic tendency and benign/malicious envy through a weekly diary method in Study 2. By integrating a longitudinal design and a weekly diary method, the trait and state perspectives could be synthesized to comprehensively and effectively investigate the predictive mechanisms between benign/malicious envy and altruistic tendency.

Based on social comparison theory and evolutionary psychology theory, Study 1 used three-wave longitudinal data collected from 513 adolescents to examine the reciprocal relationship between altruistic tendency and benign/malicious envy. Building on Study 1, Study 2 explored the association between the altruistic tendency and the two types of envy at the state level through the diary study method. Specifically, the current study proposed the following hypotheses: (1) At the trait level, benign envy could positively predict the altruistic tendency, and malicious envy could negatively predict the altruistic tendency; (2) At the trait level, the altruistic tendency could positively predict benign envy and negatively predict malicious envy; (3) At the state level, the altruistic tendency has a positive effect on benign envy and a negative effect on malicious envy; and (4) At the state level, benign envy has a positive predictive effect on altruistic tendency, and altruistic tendency has a negative predictive effect on malicious envy.

Study1: a longitudinal study on the bidirectional relations between altruistic tendency and benign/malicious envy

Participants and procedure

The study adopted cluster sampling to select students from a senior high school in Guangdong Province as the participants for a 2-year tracking survey and measured three times in 2 years, each 8 months apart: 723 students were measured at T1; after 8 months, 600 students participated at T2; and 513 students were administered at T3. The main reasons for sample attrition were transferring schools or being unable to participate due to class-organized exams at the time of measurement. The final valid sample consisted of 513 senior high school students ($M_{\text{age}} = 15.38$, $SD = 0.54$; 229 female; 279 male), of which 5 students did not report their gender information. We eliminated two types of questionnaires during the screening process: (1) Questionnaires in which the entire page of items was not answered due to the carelessness of the participants; and (2) Questionnaires with apparent regularity of answers.

Meanwhile, it is important to consider the sample size when conducting a longitudinal study. Some researchers have noted that sample attrition rates of around 40%–50% are acceptable in longitudinal studies (Pan & Zhan, 2020; Williams & Babbie, 1976). In the current study, the sample attrition rate was 17.0% (<40%) for T1 to T2 and 14.5% (<40%) for T2 to T3. Furthermore, we examined the variance between the lost and non-lost samples' scores on the major variables, and the results showed that there was no structural attrition among the participants (see Table 1). This study was approved by the ethics committee of the authors' institution.

Measures

Altruistic tendency

The altruistic tendency was measured using five items related to altruistic behavior (e.g., Helping the students with problems related to their studies or life) from the Organisational Citizenship Behaviour scale (OCB) developed by Coyle-Shapfro (2002). All items are measured on a 6-point Likert scale (1 = *strongly disagree*; 6 = *strongly agree*) and higher scores indicated a higher altruistic tendency. It has been verified that the reliability and validity of the scale are satisfactory in the Chinese culture (Chao & Gu, 2021) and the Cronbach's alpha were 0.835, 0.878, 0.873 for the scale at the three-time points, respectively.

Benign envy and malicious envy

Benign and malicious envy was measured using the Benign and Malicious Envy Scale (BeMaS) developed by Lange and Crusius

Table 1. Major variables for lost and non-lost participants

	Lost		Non-lost		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
BE-T1	4.602	0.836	4.594	0.740	0.118	0.906
ME-T1	2.692	1.043	2.733	1.039	−0.474	0.636
AT-T1	4.284	0.814	4.271	0.832	0.184	0.854

Note. BE, benign envy; ME, malicious envy; AT, altruistic tendency; T1, time 1.

(2015a). The scale includes five items for benign envy (e.g., If I notice that another person is better than me, I try to improve myself) and five items for malicious envy (e.g., Envious feelings cause me to dislike the other person). All items were rated on a six-point Likert scale (1 = *strongly agree*; 6 = *strongly disagree*) and higher scores indicated a higher level of envy. The scale has satisfactory reliability and validity in China (Dong et al., 2020; He & Xiang, 2021; Zhang & Yang, 2022). In the present research, the Cronbach's alpha of benign envy and malicious envy subscale were 0.778 and 0.852 at T1, 0.852 and 0.861 at T2, and 0.831 and 0.848 at T3.

Data analyses

SPSS 23.0 and Mplus 8.3 were used for statistical analyses. First, we tested the correlations between altruistic tendency, benign envy, and malicious envy at three-time points. Then, cross-lagged panel models were applied to analyze the mutual effects between altruistic tendency, benign envy, and malicious envy.

Results

Common method deviation test

In this study, self-reported methods were used to collect data, so there may be common method bias effects. First, it is important to control for common method bias in the measurement procedure (e.g., explaining to participants that the data will be used only for scientific research). Second, we applied Harman's single-factor test to analyze the extent to which the measure was affected by common method bias. As a result, it was found that there were 10 factors with eigenvalues > 1. The variance explained by the first factor was 27.09%, which was less than the critical criterion of 40% (Podsakoff et al., 2003). It indicates that the current study was not significantly affected by common method bias.

Descriptive statistics and correlations

Table 2 shows the means, standard deviations, and correlations of the variables involved in this study. As predicted, for all three-time points, AT (altruistic tendency) was positively related to BE (benign envy), while AT was negatively related to ME (malicious envy). The results provide preliminary evidence for the proposed hypotheses.

Cross-lagged effect analyses

Based on the correlation analysis, we construct a cross-lagged model containing three-time points to elucidate the temporal directional relationship between AT, BE, and ME. Figure 1 shows the results of the cross-lagged panel model. All fit indices of the model were good: $\chi^2 = 45.917$, comparative fit index = 0.981, Tucker–Lewis index = 0.944, root mean square error of

Table 2. Descriptive statistics and correlations for the major variable

	1	2	3	4	5	6	7	8	9
1.BE-T1	–								
2.ME-T1	0.025	–							
3.AT-T1	0.430**	−0.296**	–						
4.BE-T2	0.525**	−0.048	0.441**	–					
5.ME-T2	−0.043	0.606**	−0.260**	−0.054	–				
6.AT-T2	0.269**	−0.260**	0.627**	0.500**	−0.228**	–			
7.BE-T3	0.559**	−0.026	0.327**	0.620**	−0.065	0.318**	–		
8.ME-T3	−0.006	0.648**	−0.241**	−0.096*	0.663**	−0.219**	−0.047	–	
9.AT-T3	0.331**	−0.247**	0.566**	0.429**	−0.243**	0.669**	0.451**	−0.273**	–
<i>M</i>	22.980	13.661	21.347	22.443	12.702	20.881	23.002	12.494	21.532
<i>SD</i>	3.681	5.176	4.146	4.295	5.126	4.359	3.963	4.903	4.174

Note. BE, benign envy; ME, malicious envy; AT, altruistic tendency; T1, time 1; T2, time 2; T3, time 3.
**p* < .05.
***p* < .01.

Figure 1. Standardized regression coefficients in the cross-lagged panel model. Note. BE, benign envy; ME, malicious envy; AT, altruistic tendency; T1, time 1; T2, time 2; T3, time 3 **p* < .05, ***p* < .01, ****p* < .001.

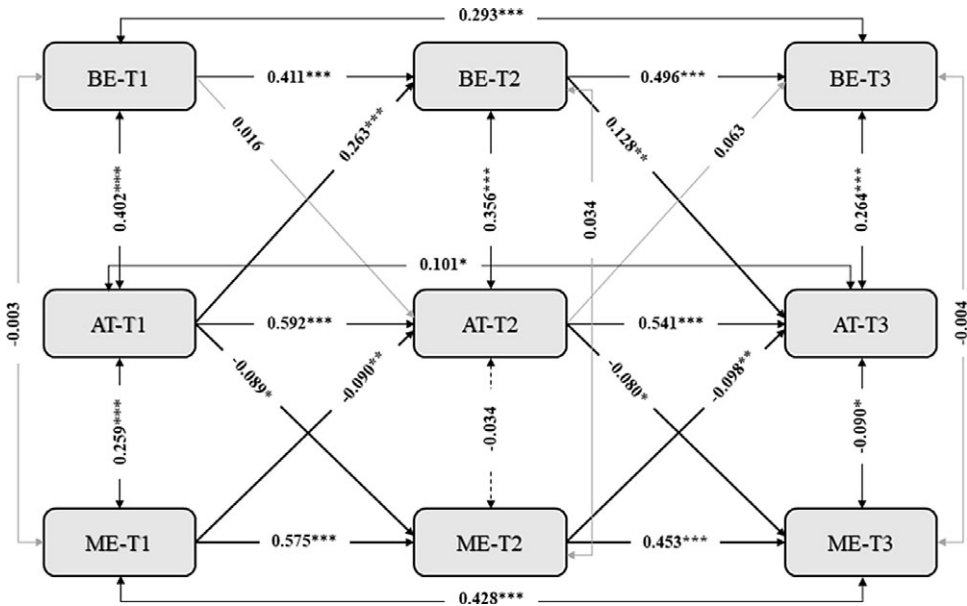


Table 3. Fit indicators for the model

	χ^2	<i>df</i>	CFI	TLI	RMSEA	SRMR
Model	45.917	11	0.981	0.944	0.056	0.035

Note. CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, root mean square error of approximation; SRMR, standardized root mean squared residual.

approximation = 0.056, standardized root mean squared residual = 0.035 (see Table 3). Focusing on the cross-lagged path of three variables: AT at T1 could positively predict BE at T2 ($\beta = 0.263$, $p < 0.001$), but AT at T2 could not predict BE at T3 ($\beta = 0.063$, $p > 0.05$). Moreover, the prediction effect of BE at T1 on AT at T2 was nonsignificant ($\beta = 0.016$, $p > 0.05$), however, BE at T2 shows a positive predictive effect on AT at T3 ($\beta = 0.128$, $p < 0.01$). Finally, ME at T1 and T2 were significantly predicted by AT at T2 and T3, respectively ($\beta = -0.090$, $p < 0.01$; $\beta = -0.098$, $p < 0.01$). Similarly, the AT at T1 and T2 negatively

forecasted the ME at T2 and T3, respectively ($\beta = -0.089$, $p < 0.05$; $\beta = -0.080$, $p < 0.05$).

To some extent, Study 1 supports our hypotheses that there is a bidirectional relationship between AT, ME, and BE at the trait level.

Study2: a weekly diary study on the predictive effects between altruistic tendency and benign/malicious envy

Participants and procedure

The current study used cluster sampling to recruit students from a high school in Hunan Province as participants. After excluding invalid diary entries (failure to complete the seven surveys or highly consistent answers). The final valid sample was 109 senior high school students ($M_{\text{age}} = 15.43$, $SD = 0.57$; 36 female; 73 male). For seven consecutive weeks, participants completed a weekly diary questionnaire at the end of their school psychology course. All students participate in the survey voluntarily and have the right

Table 4. Reliability and variance of daily measures

Daily measure	Between-person variance (τ_{00})	Within-person variance (σ^2)	ICC	Reliability
AT	0.55	0.64	0.34	0.86
BE	0.33	0.52	0.39	0.82
ME	0.39	0.41	0.49	0.87

Note. BE, benign envy; ME, malicious envy; AT, altruistic tendency.

to withdraw freely. This study obtained approval from the Ethics Committee of the Department of Psychology, Hunan Normal University.

Measures

Daily altruistic tendency

To reduce the burden of repeated measurements in diary studies and comply with the requirements of status assessments, the day-level altruistic tendency was assessed with an adaptation of 2 items in the OCB related to altruistic tendency (Coyle-Shapfro, 2002) (e.g., Today, I am willing to help those students who have difficulties in their study and life). A hierarchical linear modeling (HLM 6.08) was performed to analyze the reliability estimates of the items and showed acceptable reliability (see Table 4).

Daily benign envy and malicious envy

Daily benign and malicious envy was evaluated by adopting four items from BeMaS (Lange & Crusius, 2015a). Two items were used to assess benign envy (e.g., Today, I am willing to learn from them when I envy others) and the other two to assess malicious envy (e.g., Today, when I envy others, I want to make them suffer). The results indicated that the reliability estimation was good (see Table 4).

Results

Preliminary analyses

We built unconditional models for weekly AT, BE, and ME. The unconditional model provides parameter estimates for each weekly variable, which estimates how much of the variance in each weekly variable is attributable to within-person (Level 1) and between-person (Level 2):

$$\text{Level 1 : } \gamma_{ij} = \beta_{0j} + r_{ij}$$

$$\text{Level 2 : } \beta_{0j} = \gamma_{00} + \mu_{0j}$$

Meanwhile, Level 1 and Level 2 in the unconditional model have no independent variables, allowing for the estimation of reliability and Intraclass Correlation Coefficient (ICC). ICC was calculated by adding within-person variation and between-person variation to the equation:

$$ICC = \frac{\tau_{00}}{\tau_{00} + \sigma^2}$$

According to Cohen (1988) criteria, ICCs between 0.059 and 0.138 are moderate within-person correlations, and greater than 0.138 are high between-person correlations. The results show that $ICC > 0.059$, hence, we could perform further multilevel analysis.

Table 5. Means, SDs, and correlations between the weekly diary study variable

	1	2	3
1. Week-level AT	–		
2. Week-level BE	0.473**	–	
3. Week-level ME	–0.279**	–0.297**	–
<i>M</i>	5.339	4.602	1.791
<i>SD</i>	1.093	0.918	0.888

Note. BE, benign envy; ME, malicious envy; AT, altruistic tendency.

** $p < .01$.

Table 6. Weekly effect analyses

Path	Fixed effect				Random effect			
	Coef	SE	<i>t</i>	<i>p</i>	SD	VC	χ^2	<i>p</i>
BE→AT								
Intercept	2.987	0.288	10.375	0.000	2.250	5.062	243.875	0.000
Slope	0.514	0.060	8.518	0.000	0.466	0.217	235.960	0.000
ME→AT								
Intercept	5.862	0.158	37.037	0.000	1.382	1.910	381.914	0.000
Slope	–0.305	0.073	–4.173	0.000	0.579	0.335	278.218	0.000
AT→BE								
Intercept	2.672	0.215	12.444	0.000	1.358	1.844	189.408	0.000
Slope	0.359	0.038	9.459	0.000	0.225	0.050	159.572	0.001
AT→ME								
Intercept	2.745	0.230	11.918	0.000	1.653	2.734	216.488	0.000
Slope	–0.177	0.039	–4.557	0.000	0.250	0.250	172.399	0.000

Note. BE, benign envy; ME, malicious envy; AT, altruistic tendency.

Descriptive statistics and correlations

Table 5 shows the means, standard deviations, and correlation coefficients of the variables involved in Study 2. The results demonstrate a significant correlation between the variables

The relations between weekly altruistic tendency and weekly benign/malicious envy

We construct hierarchical linear modeling by HLM6.08 to examine the relationship between weekly AT and weekly BE/ ME:

$$\text{Level 1 : } AT_{ij} = \beta_{0j} + \beta_{1j}(BE_i) + \beta_{2j}(AT_i) + r_{ij}$$

$$AT_{ij} = \beta_{0j} + \beta_{1j}(ME_i) + \beta_{2j}(AT_i) + r_{ij}$$

$$BE_{ij} = \beta_{0j} + \beta_{1j}(AT_i) + \beta_{2j}(BE_i) + r_{ij}$$

$$ME_{ij} = \beta_{0j} + \beta_{1j}(AT_i) + \beta_{2j}(ME_i) + r_{ij}$$

$$\text{Level 2 : Person-level intercept : } \beta_{0j} = \gamma_{00} + \mu_{0j}$$

$$\text{Person-level slope : } \beta_{1j} = \gamma_{10} + \mu_{1j}; \beta_{2j} = \gamma_{20} + \mu_{2j}$$

The results demonstrated that the AT to BE/ME and BE/ME to AT predictions were significant (the fixed effect and random

effect). Initially, weekly BE could positively predict weekly AT significantly ($\gamma_{10} = 0.514$, $SE = 0.060$, $t = 8.518$, $p < .001$), conversely, weekly ME has a negative predictive effect on weekly AT ($\gamma_{10} = -0.305$, $SE = 0.073$, $t = -4.173$, $p < .001$). Secondly, the weekly AT could predict the weekly BE and ME positively and negatively, respectively ($\gamma_{10} = 0.359$, $SE = 0.038$, $t = 9.459$, $p < .001$; $\gamma_{10} = -0.177$, $SE = 0.039$, $t = -4.557$, $p < .001$) (see Table 6).

As predicted, weekly altruistic tendency and weekly benign envy were positively related to each other, while weekly altruistic tendency and malicious envy showed a negative predictive relationship with each other.

Discussion

Based on social comparison theory and evolutionary theory, the present study examined the bidirectional relationships between altruistic tendency and benign/malicious envy systematically using a three-wave cross-lagged analysis and weekly diary method. Study 1 supported the longitudinal bidirectional relationship between altruism and benign/malicious envy at the trait level: Benign envy positively predicts the altruistic tendency, and the altruistic tendency also has a positive predictive effect on benign envy, while a negative bidirectional predictive relationship was found between malicious envy and the altruistic tendency. Study 2 utilized the diary method to further elucidate the relationship between the variables at the state level and found that the weekly altruistic tendency and weekly benign/malicious envy were mutually predictive of each other. On the one hand, these findings reveal the directionality of the association between altruistic tendency and benign/malicious envy for the first time and investigate the relationship between altruistic tendency and benign/malicious envy from the perspective of daily life. On the other hand, it also provides a particular theoretical perspective on the cultivation of altruistic behavior among adolescents.

At the trait level, malicious envy at T1 and T2 had a significant negative cross-time predictive effect on altruistic tendencies at T2 and T3, respectively. Similarly, altruistic tendencies at T1 and T2 negatively predicted malicious envy at T2 and T3, respectively, which means there was a reciprocal negative relationship between a trait altruistic tendency and trait malicious envy. First of all, as hypothesized, malicious envy could negatively predict altruistic tendencies. As implied by social comparison theory, the perceived threat posed in the upward comparison domain inevitably reduces the individual's self-evaluation (Tesser, 2000). Then there might be a strong desire to repair the damaged self-evaluation by distinguishing oneself in the subsequent social life, which also implies that it may be egoism rather than altruism that dominates behavioral intentions. Malicious envy breeds exactly this kind of non-altruistic willingness to repair itself, containing more hostility and resentment (Smith & Kim, 2007). Hostile enviers usually tend to harm others (Van de Ven et al., 2009), and therefore, malicious envy inevitably reduces the individual's altruistic tendency. Besides, malicious envy, as one of the most typical negative emotions, can provoke the desire for retaliation (McCullough et al., 2001), which runs counter to selflessness and helping others, two core ingredients of altruism. The finding is partly in accordance with the research conducted by Hofer and Busch (2011), who performed a cross-sectional study based on adults from Germany and Cameroon and found that malicious envy decreases individuals' altruism and is linked to antisocial behaviors. Therefore the current study deployed a longitudinal study that explained the causal predictive relationship more convincingly

and extended the findings to adolescents in a Chinese cultural context. Secondly, the altruistic tendency can negatively and steadily predict malicious envy. According to positive psychology, altruism, as a character strength, could alleviate or inhibit painful experiences (Park & Peterson, 2009). And compared to benign envy, malicious envy is a more characteristic and pronounced painful emotion (Van de Ven, 2016). In that sense, people with a higher level of altruistic tendency rarely experience malicious envy. In summary, the trait altruistic tendency and the trait malicious envy could play a negative role in each other, which is an interesting and valuable finding because it clarifies a stable bidirectional relationship between the two variables.

Moreover, the results demonstrated that benign envy at T1 was not a significant predictor of the altruistic tendency at T2. However, over time, benign envy had a significant and positive predictive effect on the altruistic tendency from T2 to T3. There are two different views in previous research on the relationship between benign envy and prosociality, one suggesting that benign envy does not make individuals behave in favor of others (Lange, Weidman, et al., 2018) and another indicating that benign envy promotes a prosocial tendency (Polman & Rutan, 2012). Interestingly, the results of the current study correspond to these two different views: benign envy did not affect the altruistic tendency from T1 to T2 but boosted the altruistic tendency from T2 to T3. What are the causes of this difference? There could be two reasons. On the one hand, participants had newly enrolled in a new academic period (first grade in senior high school) during the first and second assessments, which implies that they were in a new context. As a result, participants may be socially distant from others. Social distance can influence individuals' altruistic tendencies (Braams et al., 2014). As the social distance between teachers and classmates grows closer in the latter two assessments, the positive motivation generated by benign envy was more likely to stimulate the altruistic tendency. Another potential reason is the fact that although benign envy functions as a positive motivator, it may not always prompt people to engage in behavior that is beneficial to others (Dong et al., 2020). Taking these two reasons together, benign envy at T1 did not affect the altruistic tendency at T2, but over time, benign envy at T2 could positively predict the altruistic tendency at T3. While the altruistic tendency at T1 could predict benign envy at T2 positively and significantly, there is no significant predictive effect of the altruistic tendency on benign envy from T2 to T3. This result can be explained by the individuals with greater prosociality usually hold stronger beliefs about justice (Chen et al., 2020), which means they prefer to believe what others possess is what they deserve. Notably, such thinking can determine what type of envy individuals perceive (Van de Ven et al., 2012). That is to say, altruists tend to believe others' strengths are what they deserve in social comparisons, which makes altruists more likely to perceive benign envy. However, benign envy remains an essentially negative emotion, except that it is less negative than malicious envy (Lange, Paulhus, et al., 2018). With the above mentioned, the altruistic tendency and benign envy show a predictive relationship in the short term, yet this relationship demonstrates an unstable trend in the long term.

At the state level, there was a significant and reciprocal predictive relationship between the weekly altruistic tendency and weekly benign envy, further supporting the results obtained in study I (longitudinal study). State envy is more intense than trait envy in terms of emotional experience and behavioral intentions (Cohen-Charash, 2009; Cohen-Charash & Mueller, 2007). It is not surprising, then, that stronger weekly benign envy is associated

with a higher level of altruistic tendency. Equally, stronger weekly malicious envy is linked to a lower level of altruistic tendency. Moreover, previous research has shown that altruistic behaviors are closely linked to self-acceptance (Song et al., 2019). And malicious enviers attempt to bridge the gap with other people in a destructive manner (Sterling et al., 2016), which essentially reflects a lack of self-acceptance. Therefore, people who are more altruistic in their daily lives are less likely to experience malicious envy. Importantly, regarding the relationship between altruistic tendency and benign envy. From the perspective of evolutionary psychology, altruism is a quality that has been preserved through a long natural selection process and is one of the most positive qualities (Hoffman, 1981). Although benign envy has some positive effects, such effects might be temporary since some researchers suggest that benign envy also has a dark side (Lange, Paulhus, et al., 2018). Therefore, altruism and benign envy present a short-term predictive relationship with each other, which coincides with our finding in Study 1 that these variables are mutually predictive in the short term, but this relationship is absent in the long term.

Certain limitations should also be taken into account in considering the current findings. First, the findings are based on self-report measures, which may be subject to social desirability bias. Therefore, alternative assessment methods should be adopted in future studies. Secondly, the diary method employed in Study 2 is still essentially a correlation analysis, so to some extent, it fails to arrive at a causal relationship. Besides, we recruited participants who were Chinese adolescents. Thus, culturally diverse and different age groups could be recruited for extension studies.

Despite the limitations, this research is the first to examine the bidirectional relations between altruism and benign/malicious envy from a general longitudinal and intensive longitudinal perspective. Overall, the theoretical implications of the current study are as follows: The findings reveal a bidirectional effect pattern between altruistic tendency and benign/malicious envy, which supports social comparison theory and evolutionary psychology theory. It also has practical significance in fostering the development of altruistic behavior in adolescents. Since the effects of benign/malicious envy on altruistic tendencies are quite different, it is necessary to adopt different educational and guidance strategies depending on the type of envy in order to weaken or even eliminate the negative effects of envy and stimulate the altruistic function of envy.

Conclusion

We empirically explored the relationship between benign/malicious envy and altruistic tendency. The present research suggests a long-term negative bidirectional relationship between malicious envy and altruistic tendency and a positive bidirectional relationship between benign envy and altruistic tendency in the short-term. These results provide an important step in understanding the complex relationship between negative emotions and prosocial behavior.

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