RESEARCH PAPER

Longitudinal Effect of Gratitude on Prosocial Behavior among Young Adults: Evidence from the Bi-factor Model of Gratitude

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Abstract

Prior research has revealed the relationship between gratitude and prosocial behavior, but less is known about the predictive effects of cognitive and affective aspects of gratitude on prosocial behavior. The objective of this study was to explore the cross-sectional and longitudinal effects of affective gratitude and cognitive gratitude on prosocial behavior applying the bi-factor model. Study 1 employed a cross-sectional approach including measurements of affective gratitude, cognitive gratitude and prosocial behavior in a sample of 329 participants (294 females, M_{age} = 20.02, SD_{age} = 2.38) and revealed that general gratitude but not affective gratitude or cognitive gratitude positively predicted prosocial behavior even after controlling for relevant demographic variables. In study 2, a total of 237 college students (213 females, M_{age} = 20.43, SD_{age} = 2.12) participated in a two-wave longitudinal study and the results showed the same pattern that only general gratitude, neither affective gratitude nor cognitive gratitude, independently predicted subsequent prosocial behavior over 6 months. These findings provide preliminary evidence for the link between the bi-factor structure of gratitude and prosocial behavior, highlight the essential role of overall tendency to experience gratitude in predicting prosocial behavior, and offer new perspectives in promoting prosocial behavior via gratitude interventions.

Keywords Cognitive gratitude · Affective gratitude · Prosocial behavior · Longitudinal study · Bi-factor model

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1 Introduction

In the literature, gratitude has been defined as the perception for benefactors' good intention (McConnell & Terrance, 1993), a positive emotional response generated by it (Tsang & Jo-Ann, 2006), and a recognition of being unable to return it (Hulzen, 2021). Prior research has identified the positive relationship between gratitude and prosocial behavior (PB) (Bartlett & Desteno, 2006; Dubrow & Dunham, 2018; Ma et al., 2017). Yet less is known about how affective and cognitive aspects of gratitude are related with PB. Moreover, the controversial results concerning the magnitude of gratitude's impact on PB reflect a lack of comprehension regarding which aspects of gratitude to emphasize (Ma et al., 2017). In order to bridge this gap, our study utilized both cross-sectional and two-wave longitudinal methods to investigate the relationship between these two dimensions of gratitude and PB, and to provide suggestions on intervention designs that target gratitude to foster PB.

1.1 Cognitive and Affective Components of Gratitude

Although gratitude is commonly seen as a personality trait or emotional state (McCullough et al., 2002; Froh et al., 2008; Wood et al., 2010), early psychologists conceptualized it as a type of cognition (Munk, 1963). As Seligman et al. (2005) wrote: "Gratitude is being aware of and thankful for the good things that happen", some researchers have proposed that gratitude encompasses both cognitive and affective elements. For instance, Colby et al. (1989) regarded gratitude as a state that falls under the category of emotion-cognitive conditions, where both affective and cognitive parts are the main semantic components of it. Emmons and McCullough (2004) described gratitude as a cognitive-affective state that is linked to the perception of benevolent intentions from others.

Over the past decade, advances have been made in refining the concept of gratitude. For example, qualitative studies through analyses of the interview data have identified gratitude as a multidimensional construct that includes affective, behavioral, and cognitive dimensions (Bock et al., 2016; Hlava & Elfers, 2014). Furthermore, daily diary studies have indicated that the affective and cognitive aspects of gratitude are linked to well-being in distinct ways (Krejtz et al., 2016; Nezlek et al., 2017; Sztachańska et al., 2019). Specifically, affective gratitude assessed by Gratitude Adjectives Checklist (GAC, Emmons & McCullough, 2003) on a given day positively predicted well-being on the following day, whereas cognitive gratitude evaluated by Gratitude Questionnaire (GQ, McCullough et al., 2002) on current day did not predict well-being on next day (Nezlek et al., 2017). Additionally, Sztachańska et al., (2019) measured cognitive gratitude using three questions from the GQ and assessed affective gratitude using the terms "grateful" and "appreciative" from the GAC, and found that negative affect was only linked to affective gratitude. Moreover, Zhang et al. (2022) utilized bifactor modeling to examine the connection between gratitude and subjective well-being (SWB), and found that general gratitude and affective gratitude but not cognitive gratitude had independently predictive effects on SWB.

Therefore, we suggest that gratitude consists of both cognitive and affective components. The cognitive component involves the perception and recognition of the benefit from others, while the affective component represents one's emotional response elicited by such benefits. While this dual-component structure of gratitude has been established theoretically

and empirically, and its link with well-being has been well-established, it remains unclear whether and how these two components are related to PB.

1.2 Gratitude and Prosocial Behavior

Grateful individuals typically act prosocially and such actions facilitate their long-term social bonds with others (Harpham, 2004). This perspective aligns with the find-remind-and-bind theory, which posits that gratitude has evolutionary significance to help individuals find new friends, remind them of the importance of maintaining high-quality relationships, and strengthen the bond with existing friends (Algoe et al., 2008). Furthermore, the mechanism that gratitude could enhance relationships between individuals may be facilitating the behaviors of helping and appreciating each other (Algoe, 2012). Hence, gratitude is likely to be closely associated with PB.

Previous research has substantiated this assumption. An extensive body of literature has revealed that gratitude exhibited a positive correlation with PB regarding either cognitive or affective aspects of gratitude (Grant & Dutton, 2012; Janjira Wangwan, 2014; Tsang & Martin, 2017; You et al., 2020; Krieger et al., 2021). Experimental evidence has demonstrated that gratitude plays a crucial role in motivating helping behavior toward both benefactors and strangers (Tsang & Jo-Ann, 2006; Bartlett & Desteno, 2006; Grant & Gino, 2010; Shoshani et al., 2020). The longitudinal relationship between them has also been investigated. For instance, Froh et al. (2010) found that gratitude measured via the GAC predicted PB after 3 months. Furthermore, a recent study that amalgamated the scores of both the GQ-6 and GAC into a composite gratitude index ascertained the predictive effect of gratitude on PB (Bono et al., 2019).

While strides have been made in the investigation of gratitude and PB, it remains ambiguous as to how both affective and cognitive aspects of gratitude are intertwined with PB. This topic of research is important and indispensable due to its potential for enhancing our understanding of the specific correlations between both components of gratitude and PB, as well as designing more precise interventions aimed at promoting gratitude and fostering social harmony.

1.3 The Bi-factor Model of Gratitude

Prior research has demonstrated that cognitive gratitude is moderately linked with affective gratitude (McCullough et al., 2004; Froh et al., 2011). Moreover, cognitive and affective gratitude manifest distinct correlations with well-being (Nezlek et al., 2017; Sztachańska et al., 2019; Zhang et al., 2022). Thus, it seems plausible that a bi-factor model would be more suitable to explore the structure of gratitude. Consistent with this, Zhang et al. (2022) tested the cognitive-affective structure of gratitude and found that the bi-factor model of gratitude fit the data most favorably when compared to the one-factor and two-factor models.

The bi-factor model is particularly useful for multidimensional constructs (Reise, 2012). It is comprised of one general factor and several specific factors (i.e., cognitive gratitude and affective gratitude in current study). The general factor reflects shared variance across all items in the model, while the specific factors capture unique variance of particular items (Chen et al., 2006; Reise et al., 2007, 2013). As the model can segregate the specific factors from the general factor (Chen et al., 2012), it enables us to ascertain the independent influ-

ences of general, cognitive, and affective gratitude on PB. Nonetheless, to the best of our knowledge, no study has examined the relationship between PB and the general and specific factors of gratitude. Therefore, it remains unknown whether and how the bi-factor structure of gratitude is linked to PB.

1.4 The Present Study

To sum up, the present study aimed to elucidate the effects of gratitude's general and specific factors on PB through cross-sectional and two-wave longitudinal designs. Since the general factor accounts for the shared variance among all item responses, in the current study, general gratitude represents an overarching inclination to experience gratitude that reflects individuals' comprehensive cognitive-affective assessments of benefits from others (Zhang et al., 2022). Drawing on the find-remind-and-bind theory (Algoe et al., 2008), gratitude would facilitate the behaviors of giving to and appreciating one another to strengthen individuals' social bonds. Hence, we expect that general gratitude, as an aggregate measure of individuals' responses to others' goodwill, would positively correlate with PB in both the short and long run. Besides, according to the broaden and build theory, positive emotions could broaden individuals' momentary thought–action repertoire and make them enact indirect and long-term adaptive behaviors to build enduring personal resources (Fredrickson, 2004). As prior research has indicated, a positive state of mind is likely to promote positive thinking, which in turn, facilitates positive behavior such as PB (Cunningham et al., 1990; Whitaker & Bushman, 2012; Snippe et al., 2018). Therefore, with regard to the affective dimension of gratitude, it is reasonable to expect that the high level of positive affect induced by affective gratitude would broaden people's thinking and motivate them to engage in more helping behaviors. Consequently, we hypothesize that affective gratitude would positively predict PB.

Nevertheless, it has been demonstrated that individuals may harbor resentment and negative sentiments toward benefactors once they become aware of things to be grateful for (Elster, 1999). Furthermore, the realization of indebtedness that accompanies the recognition of receiving a benefit (Mathews & Green, 2010) may decrease the likelihood of individuals returning the favor in the future (Watkins et al., 2006). Hence, we posit that the mere acknowledgement of being aided (i.e., cognitive gratitude) without an accompanying emotional response may not enhance PB.

2 Study 1

The aim of Study 1 was to evaluate the potential predictive role of general gratitude, affective gratitude, and cognitive gratitude in prosocial behavior. To achieve this, we adopted a cross-sectional design. Gender, age, and family subjective socioeconomic status (FSSS) were considered as control variables, given the extant literature suggesting that these demographic factors may exert an impact on individuals' PB (Eagly, 2009; Matsumoto et al., 2016; Robinson & Piff, 2017).

2.1 Method

2.1.1 Participants and Procedures

A total of 329 undergraduate students were recruited as participants in Study 1. The mean age of the participants was 20.02, comprising 35 males and 294 females. All the participants voluntarily agreed to participate in the study and provided informed consent prior to the survey, which was administered online via QQ. The comprehensive survey comprised multiple sections including measures of affective gratitude, cognitive gratitude, prosocial behavior, and demographic information. The study received ethical approval from the Ethics Committee of the local university.

2.1.2 Measures

2.1.2.1 Gratitude Cognitive gratitude was evaluated by the 4 items of the Chinese version of the GQ-6 (McCullough et al., 2002) which has been proved to have good reliability and validity to examine cognitive gratitude in Chinese sample (Zhang et al., 2022). The majority of items on the GQ center around the factors that trigger feelings of gratitude (an intentional or object-focused state), such as "I have so much in life to be thankful for", "If I had to list everything that I felt grateful for, it would be a very long list", which highlight the cognitive aspect of gratitude (Nezlek et al., 2017). Although the GQ was originally developed and employed to evaluate trait gratitude, it is recommended that it be employed to measure cognitive gratitude by excluding 2 affective items (i.e., the fourth and sixth item) (Zhang et al., 2022). This questionnaire was rated on a 7-point Likert scale (1=strongly disagree to 7=strongly agree). The Cronbach's α coefficient of this scale was 0.82.

Affective gratitude was measured by the Chinese version of 3-item GAC (Emmons & McCullough, 2003). Participants were required to point out to what degree did they feel grateful, thankful, and appreciative in general using a 5-point Likert scale ranging from 1 (never) to 5 (very often or always). While the GAC was originally developed to evaluate state gratitude, it is suggested that it be used to measure affective gratitude by modifying the instructions of it to capture the trait components of gratitude corresponding to the GQ (Guse et al., 2019; Kong et al., 2017; Ruser et al., 2021; Zhang et al., 2022). The Cronbach's α coefficient of this scale was 0.88.

2.1.2.2 Prosocial Behavior PB was evaluated by the 26-item Prosocial Tendency Measure (PTM) developed by Carlo et al. (2003) and translated into Chinese by Kou et al. (2007). The PTM is a 5-point self-report scale from 1 (does not describe me at all) to 5 (describes me very well). It measures six types of prosocial tendency which are public (example item: I can help others best when people are watching me.), anonymous (example item: I tend to help needy others most when they do not know who helped them.), altruistic (example item: I think that one of the best things about helping others is that it makes me look good.), compliant (example item: When people ask me to help them, I don't hesitate.), emotional (example item: I tend to help others particularly when they are emotionally distressed.), and dire (example item: I tend to help people who hurt themselves badly.) tendencies. And

it was demonstrated to be a reliable and valid measurement in Chinese populations (Yu et al., 2018). The Cronbach's alpha of each subscale was 0.81, 0.86, 0.84, 0.83, 0.82 and 0.67.

2.1.2.3 Family Subjective Socioeconomic Status FSSS was measured by the MacArthur Scale of Subjective Social Status (Adler et al., 2000). We showed the participants an image of a 10-rung ladder representing the relative subjective social class of a family in China. Individuals with the highest income, education and employment status correspond to the top rung. Participants needed to indicate their position by marking the rung from 1 (lowest) to 10 (highest). The scale has been proved to be reliable and valid in Chinese culture (Lin & Liu, 2020; Yan et al., 2021).

2.1.3 Data Analysis

Initially, we conducted descriptive and correlation analyses of cognitive gratitude, affective gratitude, prosocial behavior, and demographic variables using IBM SPSS 22.0. Subsequently, we utilized structural equation modeling techniques to evaluate the predictive effect of the bi-factor structure of gratitude on prosocial behavior using Mplus 8.0. Specifically, we tested three competing structural equation models, including affective gratitude, cognitive gratitude, and general gratitude. Next, we established a bi-factor model in which four GQ items were loaded onto both the specific factor of cognitive gratitude and the general gratitude factor. Similarly, three GAC items were loaded onto both the specific factor of affective gratitude and the general gratitude factor. The correlations among the specific factors and the general factor were set to zero, as the model operates under the assumption of orthogonal relationships among all factors (Reise et al., 2018). Finally, we conducted regression analyses with the three factors of gratitude as independent variables and prosocial behavior as the dependent variable.

2.2 Results

As self-reported surveys may pose a potential common method variance issue in this study, we conducted Harman's single-factor test by running an exploratory factor analysis (EFA) where all items were loaded on a single factor. The first factor explained 34.42% of the variance, suggesting a low possibility of common method bias distorting the results of this study, in accordance with Podsakoff et al.'s (2003) guidelines.

The correlation matrix among average scores of affective gratitude, cognitive gratitude, PB and demographic variables presented in Table 1 reveals a moderate association ($r=.64$) between affective and cognitive gratitude according to Dancey and Reidy (2020). Moreover, all three key variables exhibit positive correlations with one another, while the demographic variables evince a weak relationship with prosocial behavior.

Further, the results of the regression analyses showed that the general factor of gratitude significantly predicted PB in a positive direction ($\beta=0.52$, $p=.002$). However, the specific factor of affective gratitude ($\beta = -0.04$, $p=.808$) and the specific factor of cognitive gratitude ($\beta=0.15$, $p=.589$) were found to have no significant predictive effect on PB.

Table 1 Descriptive statistics and correlations for variables in Study 1

Variables	1	2	3	4	5
1. AG	1				
2. CG	0.617**	1			
3. PB	0.404**	0.437**	1		
4. SSS	0.146**	0.082	0.158**	1	
5. Age	−0.020	−0.098	−0.122*	−0.001	1
M	3.818	6.040	3.750	4.520	20.020
SD	0.717	0.960	0.524	1.410	2.384

Note. AG, specific factor of affective gratitude; CG, specific factor of cognitive gratitude; FSSS, family subjective social status; *p<.05; **p<.01

3 Study 2

In Study 1, we discovered that general factor of gratitude was exclusively linked with prosocial behavior. Nevertheless, due to the cross-sectional nature of the study, we were unable to draw definitive conclusions. Therefore, in Study 2, we employed a two-wave longitudinal design to examine the temporal predictive impact of gratitude on prosocial behavior.

3.1 Method

3.1.1 Participants and Procedure

A total of 292 participants took part in this research and completed measures, including cognitive gratitude, affective gratitude, and prosocial tendency at Time 1 (T1). All participants at T1 were invited to participate in the study again, and a total of 275 respondents completed the same measures 6 months later at Time 2 (T2). Due to missing or incorrect IDs, the final sample consisted of 237 participants (213 females, 26 males; Mage=20.43, SDage=2.12). Power analysis results indicated that a small to medium correlation (r=.20, α=0.05, 1-β=0.80) required at least 193 participants.

Prior to the investigation, informed consent was obtained. The online survey included assessments of affective gratitude, cognitive gratitude, and PB. And this research received approval from the institutional review board of the local university.

3.1.2 Measures

3.1.2.1 Gratitude Cognitive gratitude was evaluated by the 4 items of the Chinese GQ-6 (McCullough et al., 2002) same as Study 1. The Cronbach's α coefficient of this scale was 0.66 at T1, and 0.76 at T2.

Affective gratitude was measured by the Chinese GAC (Emmons & McCullough, 2003) same as Study 1. The Cronbach's α coefficient of this scale was 0.88 at T1, and 0.84 at T2.

3.1.2.2 Prosocial Behavior PB was evaluated by the Chinese version of PTM same as Study 1. The Cronbach's α coefficient of each subscale was 0.80, 0.85, 0.81, 0.82, 0.86 and 0.73 at T1, and 0.85, 0.85, 0.80, 0.85, 0.85, and 0.76 at T2.

3.1.2.3 Family Subjective Socioeconomic Status FSSS was measured by the MacArthur Scale of Subjective Social Status (Adler et al., 2000) same as Study 1.

3.1.3 Data Analysis

We conducted descriptive and correlation analyses for all variables in IBM SPSS 22.0. And the autoregressive lagged analyses were performed in Mplus 8.0 with maximum likelihood robust estimation (MLR).

Firstly, we tested a confirmatory factor analysis (CFA) model that includes PB and the bifactor structure of gratitude controlling for demographic variables (i.e., gender, age and FSSS). We utilized three indices to examine the fitness of models: comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) (Hu & Bentler, 1999). Next, the metric and scalar invariance across time were verified to establish measurement reliability (Selig & Little, 2012). For metric invariance, factor loadings across different time points were constrained to be equal. For scalar invariance, both intercepts and factor loadings across time were controlled. The index of Changes of CFI (ΔCFI) was used to reflect whether the measurement properties of the latent variables are stable over time, and ΔCFI < 0.01 was acceptable (Cheung & Rensvold, 2002).

After that, we tested the autoregressive lagged model (see Fig. 1) to assess the longitudinal predictive effect of the bi-factor of gratitude on PB.

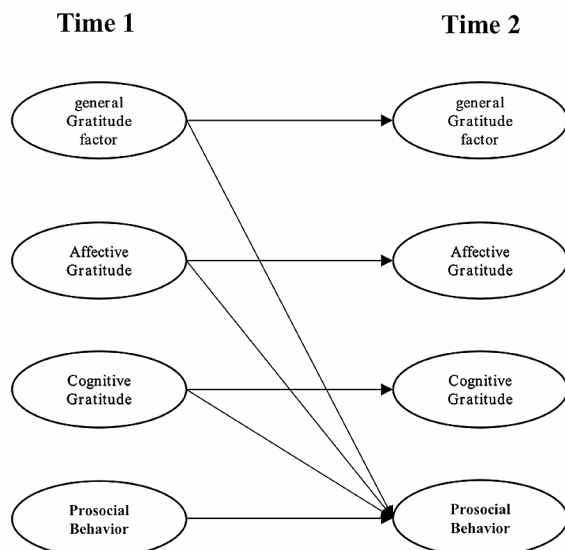**Fig. 1** Autoregressive lagged model between the bi-factor structure of gratitude and prosocial behavior

Table 2 Descriptive statistics and correlations for the main variables in Study 2

Variables	1	2	3	4	5	6
1. AG_{T1}	1					
2. CG_{T1}	0.528**	1				
3. PB_{T1}	0.421**	0.319***	1			
4. AG_{T2}	0.465**	0.391**	0.327**	1		
5. CG_{T2}	0.438**	0.572**	0.377**	0.552**	1	
6. PB_{T2}	0.315**	0.322**	0.631**	0.416**	0.497**	1
M	3.750	5.406	3.792	3.805	5.535	3.746
SD	0.643	0.821	0.480	0.623	0.915	0.461

Note. AG, affective gratitude; CG, cognitive gratitude; TI, Time 1; T2, Time 2; **$p < .01$; ***$p < .001$

Table 3 Fit Indices of the 4 models

Model	χ^2	df	CFI	AIC	BIC	SRMR	RMSEA
1 CFA model	501.062	328	0.948	12176.897	12648.553	0.053	0.047
2 Metric invariance	543.858	348	0.941	12189.428	12591.723	0.068	0.049
3 Scalar invariance	567.290	361	0.938	12187.584	12544.795	0.068	0.049
4 Autoregressive lagged model	639.548	370	0.919	10286.371	10581.157	0.174	0.055

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

Table 4 Standardized Estimates for the Autoregressive lagged Model

Autogressive path	β	lagged path	β
$AG_{T1} \rightarrow AG_{T2}$	0.233*	$AG_{T1} \rightarrow PB_{T2}$	−0.016
$CG_{T1} \rightarrow CG_{T2}$	−0.662**	$CG_{T1} \rightarrow PB_{T2}$	0.118
$gG_{T1} \rightarrow gG_{T2}$	0.621***	$gG_{T1} \rightarrow PB_{T2}$	0.148*
$PB_{T1} \rightarrow PB_{T2}$	0.434***		

Note. AG, specific factor of affective gratitude; CG, specific factor of cognitive gratitude; gG, general factor of gratitude; TI, Time 1; T2, Time 2; β, standardized coefficient. *$p < .05$, **$p < .01$, ***$p < .001$

3.2 Results

Participants' descriptive statistics and correlations among average scores of affective gratitude, cognitive gratitude, and PB at T1 and T2 were reported in Table 2. As expected, all variables were positively correlated with each other at two time points.

Next, the CFA model showed an acceptable fit, suggesting that each variable can be represented by its indicators (Table 2). Then, the longitudinal measurement invariance was tested, and the metric invariance model fitted well (ΔCFI=0.007). Besides, the results of scalar invariance were also satisfactory (ΔCFI=0.003). In addition, the autoregressive lagged model maintained a great fit to the data (Table 2).

As is presented in Table 3, the results of the autoregressive lagged model showed that the autoregressive paths of general gratitude and PB were significant, suggesting that these 2 variables were steady across time. Furthermore, the path from the general gratitude factor at T1 ($\beta=0.148$, $p=.039$) to PB at T2 was significant while the paths from affective gratitude at T1 to PB at T2 ($\beta=-0.016$, $p=.808$) and cognitive gratitude at T1 to PB at T2 ($\beta=0.118$,

$p = .221$) were not, which indicated that only general gratitude could positively predict PB over six months.

4 Discussion

The objective of this study was to examine the short term and long-term effects of affective and cognitive aspects of gratitude on PB using a bi-factor model. The results revealed that the general gratitude factor had a positive and significant effect on PB in both the short and long term, whereas neither the affective nor the cognitive aspect of gratitude had any independent predictive effects on PB. These results indicate that the bi-factor structure of gratitude may have a unique relationship with PB.

To begin with, our findings showcased the longitudinal consistency of the bifactor structure of gratitude, which implies that this structure is relatively constant over time. This is partially aligned with the study conducted by Tan et al. (2021) who discovered that the GQ, which evaluates cognitive gratitude, had longitudinal measurement invariance. Furthermore, the associations between the two gratitude aspects and PB at T1 and T2 were modest, signifying that these variables were inclined to fluctuate over time. Thus, we can further explore the longitudinal relationships between gratitude and PB.

As expected, our findings revealed that the general gratitude factor was able to predict PB both in a cross-sectional and longitudinal manner, which is consistent with a previous study that discovered that the combination of cognitive gratitude and affective gratitude could predict PB over a span of four years (Bono et al., 2019). This finding implies that individuals who possess a positive overall appraisal of benefits from others are more likely to demonstrate PB. This aligns with the find-remind-and-bind theory, which posits that gratitude can enhance interpersonal relationships by promoting reciprocal helping behaviors (Algoe, 2012).

Surprisingly, the results of both Study 1 and Study 2 indicate that affective gratitude does not have the ability to predict PB. That is to say, positive affective appraisals, without cognitive orientation, are not enough to induce people to engage in more helping behaviors. This result is partially in conflict with previous studies that found state gratitude, as measured by the GAC, predicted PB longitudinally (Froh et al., 2010). The reason for this discrepancy may be that affective gratitude in the current study was measured as a disposition rather than a state, and the gratitude-prosociality association was weaker for dispositional gratitude than for state gratitude (Ma et al., 2017). Furthermore, as an other-oriented emotion (Weiner et al., 1979), affective gratitude may increase PB by directing attention towards the needs and deservingness of others, rather than simply maintaining a positive mood (Tsang & Jo-Ann, 2006; Fredrickson, 2013). Thus, individuals with higher levels of affective gratitude may exhibit more helping behaviors when recognition is involved. Nonetheless, the mere affective response to positive events without cognitive orientation towards others, as represented by the specific factor of affective gratitude, would not have a predictive effect on PB.

As to cognitive gratitude, our results revealed that it did not predict PB either cross-sectionally or longitudinally. This suggests that the motivation of PB would be compromised when gratitude became the sole recognition of things to be grateful for. Bartlett and Desteno (2006) reported similar results, indicating that the effect of gratitude on PB dissipated when injunctive norms were made salient and emotional reactions were isolated from social

norms. It is important to note that recognizing things to be grateful for not only induces a sense of indebtedness (Mathews & Green, 2010) but also directs attention towards prosocial norms, which are not necessarily the cause of PB (Bartlett & Desteno, 2006), Therefore, cognitive gratitude did not predict PB independently. This may explain why gratitude exercises focused solely on recognition of things to be appreciated were ineffective in promoting PB in interventions (Froh et al., 2008; Fey, 2018).

Our results emphasize the importance of general gratitude beyond the cognitive and affective dimensions of gratitude, which is a novel finding for the current gratitude literature. General gratitude concurrently associated with higher levels of PB, both in the present moment and over a six-month span. Collectively, these findings suggest that the overall experience of gratitude underlying the specific factors of gratitude play a more vital role in predicting PB. This general factor of gratitude might capture the overall tendency to perceive and feel the benevolence of others. Therefore, this tendency to see the goodness in people can predict the extent to which a person is willing to do somethings good for them.

Whilst our findings present a fresh viewpoint on the subject of gratitude and PB, several limitations should be noted. First, our study solely relied on a sample of Chinese individuals. Prior research has shown that children from Chinese culture are inclined towards expressing more connective gratitude and less concrete gratitude in comparison with their peers from other cultures (Mendonça et al., 2018) and that Chinese individuals are more likely to experience negative emotions upon receiving expressions of gratitude (Zhang et al., 2018). Consequently, a cross-cultural perspective would be beneficial for future investigations. In addition, although our study indicated the temporal directionality between gratitude and PB, the correlational nature of this research prohibits us from making causal inferences. Thus, future studies should test these associations through experimental designs. What's more, given that our sample primarily consisted of college students, our results necessitate further cross-validation with a more diverse age range. Finally, since gender has been shown to have associations with both gratitude and PB (Eagly, 2009; Kashdan et al., 2009), there could be gender-specific nuances in the connection between gratitude and PB. However, the sample contained a limited number of male participants, which may have prevented the detection of moderator effects of gender.

Despite these limitations, this study represents the first investigation into the impact of affective and cognitive gratitude on PB from both cross-sectional and longitudinal perspectives. Our findings revealed that, over a period of six months, general gratitude - beyond the specific factors of affective and cognitive gratitude - was the sole predictor of PB. The divergent outcomes of previous studies on promoting PB through gratitude interventions may be attributed to differences in intervention design that focus on inducing distinct aspects of gratitude. For instance, the "grateful thinking" intervention, which involves enhancing the awareness of the social-cognitive appraisals of beneficial social exchanges (Froh et al., 2014), may possess a greater efficacy in fostering cognitive gratitude. While the "gratitude visit" intervention, which entails in-person expressions of gratitude to those who have significantly influenced one's life (Seligman et al., 2005), may be better suited for eliciting affective gratitude. Consistent with this, studies have found that certain interventions have distinct effects on cognitive and affective gratitude (Bohlmeijer et al., 2021; Lai & O'Carroll, 2017). Thus, the findings of our study provide a novel insight towards the current situation where gratitude interventions have demonstrated limited effects (Davis et al., 2016; Renshaw & Olinger Steeves, 2016), which is to develop interventions that utilize a

variety of strategies targeting both cognitive and affective gratitude. Only in this way can the intervention fulfill its potential, effectively elevate individuals' overall levels of gratitude and enhance the level of PB over an extended period.

Declarations

Informed Consent Written informed consents were gained in advance from all participants included in the study.

Compliance with Ethnic Standards The study was conducted according to the Declaration of Helsinki and was approved by the Shaanxi Normal University committee.

Conflict of Interest The authors declare that there are no potential conflicts of interest or financial conflicts related to the research, authorship, and/or publication of this article.

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