The relationship between gratitude and social well-being: Evidence from a longitudinal study and a daily diary investigation

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Abstract

The positive psychological construct of gratitude is crucial for health and well-being. Previous studies have shown a significant positive correlation between gratitude and social well-being. However, to the best of our knowledge, no studies have examined this potentially reciprocal relationship from a longitudinal perspective. According to the broaden-and-build theory and gratitude amplification theory, we hypothesized that gratitude has a predictive effect on social well-being. In addition, based on the personality and social relationships model and self-determination theory, we proposed that social well-being is an antecedent to gratitude. In summary, this research combines a longitudinal study and a daily diary investigation to systematically explore the causal relation between gratitude and social well-being.

Study 1 employs a two-wave cross-lagged design to explore the long-term relationship between trait gratitude and social well-being. The sample comprised 563 undergraduate students, who all participated online. Pursuant to the study purpose, participants were asked to complete the gratitude and social well-being scales twice, separated by a seven-month interval. The cross-lagged path analysis suggested reciprocal effects between trait gratitude and social well-being. To reduce recall bias and explore the short-term association between gratitude and social well-being, Study 2 employs a daily diary method. A total of 274 young adults completed daily gratitude and social well-being measures for 21 consecutive days.

In Study 1, trait gratitude at T1 significantly positively predicted social well-being at T2, while social well-being at T1 also significantly predicted trait gratitude at T2. These effects remained significant after controlling for age and gender. Consistent with Study 1, Study 2 also revealed a reciprocal relationship: state gratitude on one day positively predicted social well-being the next day, while social well-being on one day also positively predicted state gratitude the next day. Moreover, these relationships were stable after controlling for time trends. Overall, the results of Study 1 and Study 2 support the hypotheses by showing reciprocal predictive effects between gratitude and social well-being.

In summary, we predicted that experiencing gratitude would lead to higher social well-being, which would, in turn, result in higher gratitude, activating an upward spiral. This work deepens understanding of the interaction between gratitude and social well-being, paving the way for future intervention research to help increase both.

Keywords gratitude; social well-being; longitudinal study; daily diary method

1 Introduction

Gratitude is a longstanding spiritual heritage, esteemed as a virtue in countries around the world. In the West, it is known as the "mother of virtues" (McCullough et al., 2001). However, gratitude did not receive much attention in psychology until the emergence of positive psychology. McCullough et al. (2002) suggested that gratitude is a positive emotion experienced by individuals in response to receiving benevolence and their inclination to reciprocate. It can be distinguished into two forms: trait gratitude and state gratitude. Trait gratitude refers to the enduring tendency of individuals to experience grateful emotions, exhibiting cross-situational consistency, while state gratitude is context-specific and manifests as an immediate experience (McCullough et al., 2002; Wood et al., 2010). Existing research indicates that gratitude serves a wide range of adaptive functions. It can help individuals reduce stress (Kreitzer et al., 2019), alleviate negative emotions (Ducasse et al., 2019; Mason, 2019; Sherman et al., 2020), and mitigate depression (Cregg & Cheavens, 2021; Liang et al., 2020). It also enhances

coping (Tong & Oh, 2021) and well-being (Chopik et al., 2019; Emmons & McCullough, 2004; Portocarrero et al., 2020; Yang et al., 2021). As a prosocial emotion, gratitude also enhances social bonding (Emmons & McCullough, 2004; Emmons & Shelton, 2002) and promotes engagement in prosocial behaviors (Bono et al., 2019; Yu et al., 2020).

In recent years, there has been increasing attention from researchers regarding the relationship between gratitude and well-being. Cross-sectional studies have found a significant positive association between gratitude and both subjective and psychological well-being (Ding & Zhao, 2018; Lin & Yeh, 2014; Mason, 2019; Sood, 2012). Longitudinal studies have further shown that gratitude positively predicts subjective and psychological well-being, while the reverse relation is not supported (Jans-Beken et al., 2018; Nezlek et al., 2019). However, previous research has primarily focused on subjective well-being and psychological well-being. These two types of well-being emphasize individual emotional experience and psychological functioning, reflecting personal characteristics of well-being, also known as personal well-being (Miao et al.,

2008). In contrast, researchers have also proposed the concept of social well-being. Social well-being refers to individuals' evaluation of their current social circumstances and their assessment of their social functioning, reflecting the meaningfulness or value of their contributions to others or society and the state of their social functioning (Keyes, 1998). According to social well-being theory, social well-being is composed of social integration, acceptance, contribution, coherence, and actualization (Keyes, 1998). The positive mental health model proposed by Keyes (2007) further suggests that well-being is a state of fulfillment in individuals' psychological experiences, integrating subjective well-being, psychological well-being, and social well-being, which are interrelated yet independent. These three types of well-being reflect individuals' assessment of three aspects of their quality of life: their satisfaction with life, psychological functioning, and social functioning. Additionally, Gallagher et al. (2009) found through confirmatory factor analysis that the three-factor model for these types of well-being had a significantly better fit than the one-factor and two-factor models. Similar findings were obtained by domestic scholars (Chen & Li, 2014). In summary, subjective well-being, psychological well-being, and social well-being are three dimensions of well-being that are interconnected and yet possess certain independence. However, there have been only a few studies investigating the relationship between gratitude and social well-being. This study aims to further investigate this relationship based on existing theories and research.

Several researchers have suggested that gratitude may be an important factor influencing social well-being from a theoretical perspective. Firstly, the broaden-and-build theory explains the long-term promoting effect of gratitude on social well-being. This theory proposed that gratitude, as a positive emotion, expands individuals' thought-action patterns and builds lasting personal and social resources, thus enhancing social well-being (Fredrickson, 2004). Specifically, gratitude enables individuals to be more creative in reciprocating kindness after receiving help (e.g., using expressive language or caring for those in need), which builds enduring social resources such as close friendships and positive social relationships and enhances social well-being. Secondly, the gratitude amplification theory explains the short-term predictive effect of gratitude on social well-being. This theory suggests that gratitude amplifies the positive aspects of daily life, particularly in social domains, allowing individuals to experience higher levels of social well-being (Watkins, 2013). In summary, gratitude may have both long-term and short-term effects on social well-being. In this regard, considering that trait gratitude is relatively stable in the short term while state gratitude is influenced by situational factors (McCullough et al., 2002; Wood et al., 2010), we propose that the long-term effects mainly manifest at the level of trait gratitude, while the short-term effects mainly manifest at the level of state gratitude. Based on these theories, we hypothesize that gratitude has both long-term and short-term predictive effects on social well-being.

On the other hand, social well-being may also predict gratitude. The PERsonality and SOCial relationships model (PERSOC model; Back et al., 2011) suggests that people's behaviors and perceptions of social relationships are related to personality development. As such, because social well-being involves positive perceptions of the external social environment (e.g., society is improving; I am aware of what is happening around me), this positive perception promotes individuals to engage in new social adaptive behaviors (such as social participation and volunteering) (Cicognani et al., 2008; Son & Wilson, 2012; Yu et al., 2021), thus influencing the development of their personality traits (such as gratitude). Therefore, social well-being may have a long-term predictive effect on gratitude. Additionally, according to the self-determination theory, a meaningful life is an important pathway to experiencing positive emotions (DeHaan & Ryan, 2014). Huta and Waterman (2014) stated that social well-being is an important component of a meaningful life because it reflects an individual's good social functioning. Thus, when social well-being is high, individuals are more likely to perceive their daily lives as meaningful, resulting in the experience of more positive emotions. Gratitude, as an important positive emotion (Emmons & McCullough, 2004), can also be enhanced in this process. In addition, self-determination theory proposed that whether individuals can achieve optimal functioning depends on the satisfaction of three basic needs: autonomy, competence, and relatedness. Among these, satisfying relatedness needs reflects improved social functioning. When individuals experience higher levels of social well-being, their social functioning develops well, and their relatedness needs are adequately met (Keyes, 1998), allowing them to perceive more goodwill and experience more gratitude in social interactions. A daily diary study also reported that satisfying relatedness needs longitudinally predicted gratitude (Lee et al., 2015). Therefore, social well-being may also have a short-term predictive effect on gratitude. Given the above, we hypothesize that social well-being has both long-term and short-term predictive effects on gratitude.

Although the relationship between gratitude and social well-being has recently gained attention from researchers, several important issues remain unanswered. Previous studies have heavily relied on cross-sectional data to examine this relationship (Caputo, 2015; Palhares et al., 2018; Portocarrero et al., 2020; Wang et al., 2015), thus failing to reveal the causal predictive relationship between them. To solve the problem above, Study 1 aims to investigate the long-term causal predictive relationship between trait gratitude and social well-being through a two-wave longitudinal research with an interval of 7 months. Since tracking for more than six months is considered long-term tracking (Eid & Larsen, 2008), Study 1 employs a two-wave tracking method with a seven-month interval to explore the long-term causal predictive relationship between trait gratitude and social well-being. Secondly, existing research has primarily relied on retrospective evaluations of individuals' life circumstances to measure social well-being, which can introduce recall bias. The use of diary methods can reduce recall bias and enhance the ecological validity of the research, making it one of the gold standards for measuring well-being (Gunthert & Wenze, 2011). Therefore, Study 2 will further explore the short-term causal predictive relationship between state gratitude and social well-being using the daily diary method. In conclusion, this study will combine the longitudinal design (Study 1) and the daily diary method (Study 2) to explore the causal predictive relationship between gratitude and social well-being in adults. Hypotheses 1 and 2 are proposed based on the broaden-and-build theory and amplification theory, and hypotheses 3 and 4 are proposed based on the PERSOC model and self-determination theory. The specific hypotheses are as follows:

H1: Higher trait gratitude predicts higher social well-being seven months later.

H2: State gratitude on the previous day predicts social well-being on the next day.

H3: Higher social well-being predicts higher trait gratitude seven months later.

H4: Social well-being on the previous day predicts state gratitude on the next day

2 Study 1: Effects of trait gratitude on social well-being - Evidence from a two-wave longitudinal design

Study 1 examined the long-term causal predictive relationship between trait gratitude and social well-being using a two-wave longitudinal design.

2.1 Participants

First, we carried out a power analysis to determine the sample size using G × Power 3.1 (Faul et al., 2007). We estimated that a minimum sample size of 193 was required to achieve 80% statistical power with $\alpha = 0.05$ and effect size $r = 0.20$. In our study, at time 1 (T1), 563 students were recruited. Seven months later (T2), the participants were reassessed, and a total of 504 samples were collected from the same participants at T1. After excluding 22 participants who were lost, missed questions, or gave duplicate answers, the final effective sample size was 482, with a valid response rate of 85.6%. The mean age of participants was 20.30 years old ($SD = 1.40$). Among them, there were 228 males and 254 females. Throughout the study, participants had the right to withdraw at any time. Our study was approved by the Shaanxi Normal University committee.

2.2 Measures

2.2.1 Gratitude Questionnaire

The Gratitude Questionnaire-Six Item Form (GQ-6) developed by McCullough et al. (2002) was used to assess trait gratitude. The scale consists of six items (e.g., "I am grateful to a wide variety of people"), and participants are asked to rate on a scale from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicate higher levels of gratitude. The GQ-6 has been shown to have good reliability in Chinese populations (Kong et al., 2017; Kong et al., 2020; Yang et al., 2021). In the present study, Cronbach's alpha coefficients of this scale were 0.85 at T1 and 0.88 at T2, respectively

2.2.2 Social Well-being Scale

The social well-being subscale of the Evaluation of the Mental Health Continuum-Short Form (MHCSF) developed by Keyes et al. (2008) was used to measure social well-being. The social well-being subscale consists of five items that assess five dimensions: social integration, social acceptance, social contribution, social coherence, and social actualization. The scale is scored on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Its Chinese version has satisfactory reliability and validity (Yin & He, 2012). In the current study, Cronbach's alpha coefficients of this measure were 0.85 at T1, and 0.93 at T2, respectively.

2.3 Data Analysis Methods

In Study 1, data analysis was performed using SPSS 25.0 and Mplus 8.0. Descriptive statistics, correlation analyses, and common method bias were first conducted with SPSS 25.0 (Table 1). Based on the results of correlation analysis, cross-lagged analysis was carried out using Mplus 8.0. We constructed four structural equation models to examine the relationship

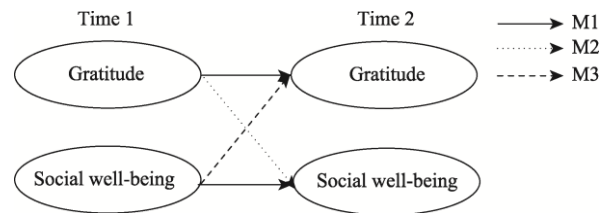between trait gratitude and social well-being (Figure 1).

Figure 1. Cross-lagged model of gratitude and social well-being.

Model 1 (M1) is an autoregressive model that examines the time stability of the main variables. Model 2 (M2) is an antecedent model that includes a cross-lagged path from gratitude at T1 to social well-being at T2 to investigate whether gratitude at T1 predicts social well-being at T2. Model 3 (M3) is a consequence model that includes a cross-lagged path from social well-being at T1 to gratitude at T2 based on M1. Finally, Model 4 (M4) is a reciprocal influence model of gratitude and social well-being that includes autoregressive and all cross-lagged paths. Furthermore, according to the fit indices criteria recommended by Hu and Bentler (1998), if RMSEA < 0.08, SRMR < 0.10, CFI > 0.90, and TLI > 0.90, it indicates a good model fit.

2.4 Common method biases

Since the study relied on self-reporting, common method bias may have occurred. To address this concern, Harman's single-factor test (Zhou & Long, 2004) was used to examine common method bias. The findings revealed that there were five factors with eigenvalues greater than 1. The first factor explained 38.1% of the total variance, which is less than 40%. This suggests that there is no significant common method bias in the data.

2.5 Results

The means, standard deviations, and correlations between gratitude and social well-being were shown in Table 1. As anticipated, the results indicated that all variables were correlated with each other.

Table 1
Mean, standard deviation, and correlation matrix of gratitude and social well-being (N = 482)

Variables	M	SD	1	2	3	4
1. T1 Gratitude	33.67	5.92	1			
2. T1 Social well-being	20.98	4.73	0.31**	1		
3. T2 Gratitude	32.98	6.35	0.43**	0.26**	1	
4. T2 Social well-being	22.67	4.50	0.29**	0.38**	0.55**	1

Note. T1: variables at time 1; T2: variable at time 2; ** $p < 0.01$

Then, we tested the autoregressive and cross-lagged models of gratitude and social well-being. The autoregressive model M1 fitted the data well (see Table 2). In this model, the stability coefficients for both gratitude and social well-being were significant, indicating that the variables remained relatively stable over time (see Table 3).

The results of the positive causal model M2 also showed a good fit. Compared to M1, M2 fitted better: $\Delta\chi^2$ (1, 482) = 20.44, $p < 0.001$. The path coefficient from gratitude at T1 to social well-being at T2 was significant ($\beta = 0.22$, $p < 0.001$), indicating that trait gratitude positively predicts social well-being.

Table 2
Fit indices of the model

Models	χ^2	df	p	RMSEA	SRMR	CFI	TLI	Model Comparison	$\Delta\chi^2$	p
M1	829.58	194	<0.001	0.08	0.08	0.92	0.91			
M2	809.14	193	<0.001	0.08	0.06	0.92	0.91	M1−M2	20.44	<0.001
M3	814.57	193	<0.001	0.08	0.07	0.92	0.91	M1−M3	15.01	<0.001
M4	799.97	192	<0.001	0.08	0.05	0.92	0.91	M1−M4	29.61	<0.001

Note. RMSEA: root mean square error of approximation; SRMR: standard root mean square residual; CFI: comparative fit index; TLI: Tucker-Lewis index

Table 3
Table of standardized stability and cross-lagged coefficients

Models	Autoregressive path	β	95% CI	Cross-lagged paths	β	95% CI
M1	Gratitude $_{T1}$→Gratitude $_{T2}$	0.38***	[0.30, 0.46]			
	Social well-being $_{T1}$→Social well-being $_{T2}$	0.34***	[0.26, 0.42]			
M2	Gratitude $_{T1}$→Gratitude $_{T2}$	0.46***	[0.38, 0.54]	Gratitude $_{T1}$→Social well-being $_{T2}$	0.22***	[0.13, 0.31]
	Social well-being $_{T1}$→Social well-being $_{T2}$	0.26***	[0.18, 0.35]			
M3	Gratitude $_{T1}$→Gratitude $_{T2}$	0.31***	[0.23, 0.40]	Social well-being $_{T1}$→Gratitude $_{T2}$	0.19***	[0.10, 0.28]
	Social well-being $_{T1}$→Social well-being $_{T2}$	0.41***	[0.33, 0.50]			
M4	Gratitude $_{T1}$→Gratitude $_{T2}$	0.40***	[0.31, 0.49]	Gratitude $_{T1}$→Social well-being $_{T2}$	0.19***	[0.09, 0.28]
	Social well-being $_{T1}$→Social well-being $_{T2}$	0.34***	[0.24, 0.43]	Social well-being $_{T1}$→Gratitude $_{T2}$	0.15**	[0.05, 0.24]

Note. β: standardization coefficient. ** $p < 0.01$, *** $p < 0.001$

The results of the reverse causality model M3 also showed a good fit. Compared to M1, M3 fitted better: $\Delta\chi^2$ (1, 482) = 15.01, $p < 0.001$. Social well-being at T1 has a predictive effect on gratitude at T2 (β = 0.19, $p < 0.001$). That is, social well-being inversely predicts trait gratitude.

The two-way causality model M4 also had a good fit. In addition, M4 fitted better compared to M1: $\Delta\chi^2$ (2, 482) = 29.61, $p < 0.001$. Compared to M3, M4 fitted better: $\Delta\chi^2$ (1, 482) = 14.60, $p < 0.001$. Gratitude at T1 positively predicted social well-being at T2 (β = 0.19, $p < 0.001$), and social well-being at T1 could positively predict gratitude at T2 (β = 0.15, $p = 0.002$).

In addition, after controlling for age and gender, a bidirectional predictive relationship between gratitude and social well-being remained (gratitude at T1 to social well-being at T2: β = 0.18, $p < 0.001$; social well-being at T1 to gratitude at T2: β = 0.15, $p = 0.001$), indicating that the results were not affected by age and gender.

In summary, Study 1 showed that gratitude at T1 positively predicted social well-being at T2, and social well-being at T1 positively predicted gratitude at T2. Thus, there is a long-term mutual predictive relationship between trait gratitude and social well-being.

3 Study 2: The effect of state gratitude on social well-being - Evidence from the daily diary method

To avoid recall bias, Study 2 further examined the short-term causal predictive relationship between state gratitude and social well-being using a daily diary method.

3.1 Participants

A total of 274 college students were recruited and volunteered to participate in this research. At the end of the study, a total of 248 valid participants (38 males) were obtained with an average age of 19.72 ±1.68 years, ranging from 17 to 26 years. During the 21-day questionnaire completion period, 7 participants missed one day, and 2 participants missed two days.

Consequently, a total of 5,197 data points were collected, and after substituting missing data with 999 pairs, a total of 5,208 data points remained, including 26 data points filled in the following morning. Monte Carlo simulation analysis was performed using the R language package simr to calculate the minimum sample size (Arend & Schäfer, 2019). The power analysis suggested that we need at least 130 individuals (2730 data points in total) to obtain a small within-group effect ($\gamma_{10.std}$ = 0.10, ICC = 0.50, α = 0.05). Therefore, the sample size met this requirement. The study was approved by the local ethics committee.

3.2 Measures

3.2.1 Daily gratitude

To reduce the burden on participants in the daily diary study, two items with the highest factor loadings were adapted from the gratitude scale used in Study 1 to measure daily gratitude (Garg et al., 2021; Gouveia et al., 2021). The original items "I have so much in life to be thankful" and "I am grateful to a wide variety of people" were adapted to "Today, I have so much in life to be thankful" and "Today, I am grateful to a wide variety of people". The within-person Omega reliability coefficient was 0.80 and the between-person Omega reliability coefficient was 0.87.

3.2.2 Daily social well-being

The social well-being scale from Study 1 was modified to accommodate the daily diary study to measure daily social well-being. In this study, the within-person and between-person Omega coefficients were 0.74 and 0.92, respectively.

Furthermore, given that traditional factor analysis methods may violate the assumptions of sample randomness and independence, we conducted a multilevel confirmatory factor analysis on daily gratitude and daily social well-being. In this model, both within-group and between-group included latent variables for gratitude and social well-being. The results indicated that the model fit well: χ^2 = 616.88, df = 26, χ^2/df = 23.73, CFI = 0.94, TLI = 0.91, RMSEA = 0.07, $SRMR_{(within)}$ = 0.04,

SRMR$_{(between)}$ = 0.09. Consequently, the measures of daily gratitude and daily social well-being had excellent structural validity.

3.3 Procedures

This study utilized an online platform to distribute and collect questionnaires. Prior to commencing the formal investigation, participants were asked to provide demographic information such as gender and age. During the 21-day diary study, daily questionnaires were sent out at 6 pm requesting participants to evaluate their gratitude and social well-being for the day. The questionnaire link was closed at midnight. The following day at 9 am, participants who had not completed the questionnaire were sent a link to assess their state from the previous day, with the questionnaire closing at noon.

3.4 Data Analysis

The study utilized SPSS 25.0 and Mplus 8.0 for data analysis. Data from participants who withdrew from the study were excluded and missing observations for 11 days were replaced with 999. Missing values were processed using full Information maximum-likelihood (FLML) estimation. Since daily observations ($N = 5208$) were nested within participants ($N = 248$), the data contained both within-subject and between-subject levels.

First, a null model without predictors was built to estimate the means, within-subject and between-subject variances, within-subject and between-subject correlations, and the intraclass correlation coefficient (ICC).

Subsequently, to further examine the relationship between gratitude and social well-being, a dynamic structural equation modeling (DSEM) approach was employed to construct a multilevel regression model. This model had within-group (Level 1) and between-group (Level 2) levels. Gratitude was the independent variable and social well-being was the dependent variable. In this model, gratitude, social well-being, and time were all estimated using random intercepts and random slopes. Additionally, consistent with previous research (Newman et al., 2020), in level one, time was added to the model as a control variable to account for the influence of linear trends. Time was coded according to the order in which the questionnaires were completed; For example, the first day was coded as "1," the second day as "2," and so on. Gratitude, social well–being, and time were group-mean centered. The specific model equations are shown below. For Level 1 (within-level), the social well-being of individual i on day j (y_{ij}) can be expressed as:

Within level: y_{ij} (social well-being) = $\beta_{0i} + \beta_{1i}(X_{ij} - \bar{X}) + \beta_{2i}(T_{ij} - \bar{T}) + r_{ij}$

β_{0i} corresponds to the intercept of social well-being, denoting the average social well-being level of individual i. β_{1i} and β_{2i} indicate the slopes, the rate of change of gratitude predicting social well-being of subject i, and the rate of change of time predicting social well-being. X_{ij} and $\bar{X}$ symbolize the gratitude level of subject i on day j and the average gratitude level of individual i. T_{ij} and $\bar{T}$ represent measurement time for individual i on day j and average measurement time. r_{ij} represents the error term, representing the fraction of the measured value y for individual i at observation time j that cannot be explained by the independent variable.

For level 2 (between level), the model expressions are as follows:

between levels: $\beta_{0i} = \gamma_{00} + u_{0i}$
$\beta_{1i} = \gamma_{01} + u_{1i}$
$\beta_{2i} = \gamma_{02} + u_{2i}$

β_{0i} represents the random intercept at level 1. β_{1i} and β_{2i} represent the random slopes at level 1. γ_{00}, γ_{01} and γ_{02} indicate the corresponding intercepts, and u_{0i}, u_{1i} and u_{2i} are the residuals of the corresponding equations, respectively.

To investigate the causal predictive relationship between daily gratitude and daily social well-being, we construct a multilevel cross-lagged panel model. As shown in Figure 2, γ_{1j} and γ_{4j} represent the autoregressive effects, and γ_{2j} and γ_{3j} represent the cross-lagged effects. $\mu_{gratitude}$ and $\mu_{social\ well-being}$ are the intercepts of gratitude and social well-being, respectively. In this model, both intercepts and slopes are assumed to be random. For the sake of simplicity, the equations for the within-group level analysis are not presented. The specific model equations are as follows:
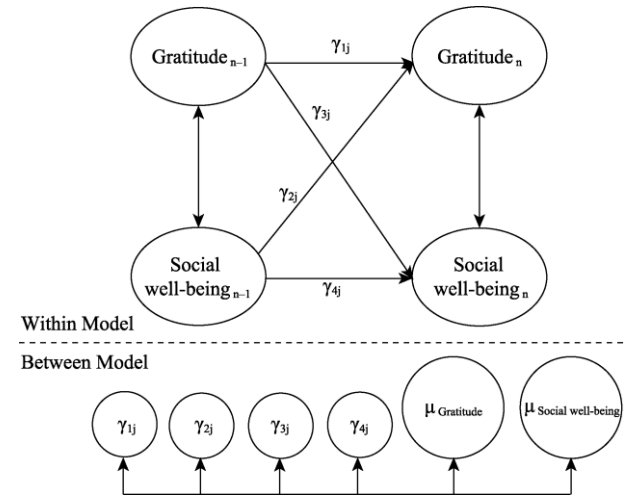

Figure 2. Two-level regression model graph for daily gratitude and daily social well-being.

γ_{ij} (gratitude $_n$) = γ_{0j} + γ_{1i} (gratitude $_{n-1}$) + γ_{2i} (social well-being $_{n-1}$) + r_{ij}

γ_{ij} (social well-being $_n$) = γ_{0j} + γ_{3i} (gratitude $_{n-1}$) + γ_{4i} (social well-being $_{n-1}$) + r_{ij}

γ_{1j} (gratitude $_{n-1}$) represents the slope indicating how the gratitude of subject i on the previous day predicts the gratitude on the subsequent day. γ_{2j} (social well-being $_{n-1}$) represents the slope indicating how the social well-being of subject i on the previous day predicts gratitude on the subsequent day. γ_{3j} (gratitude $_{n-1}$) represents the slope indicating how the gratitude of subject i on the previous day predicts social well-being on the subsequent day. γ_{4j} (social well-being $_{n-1}$) represents the slope indicating how the social well-being of subject i on the previous day predicts social well-being on the subsequent day.

Finally, to examine the stability of the results, an exploratory analysis of cross-level moderation effects was conducted to investigate the moderating role of age and gender on the cross-lagged effects. In this analysis, males were coded as "1" and females as "0". Gratitude and social well-being were treated as within-individual variables, while gender and age were treated as between-individual variables. Within-individual variables were group mean-centered, while between-individual variables were grand-mean centered.

3.5 Results

3.5.1 Descriptive statistics

Table 4 presents the means, intra- and inter-subject variances, intraclass correlation coefficients (ICC), and with-

in-subject and between-subject correlation coefficients for gratitude and social well-being. The results indicate that the ICC was 0.58 for gratitude and 0.67 for social well-being, suggesting that 42% of the variability in gratitude and 33% of the variability in social well-being can be attributed to individual differences within the participants. Therefore, a two-level analysis is appropriate for the research data (Zhang et al., 2003). Within-in-subject correlation analysis revealed a significant positive relationship between gratitude and social well-being ($r = 0.36$), suggesting that on days when participants reported higher levels of gratitude, they also reported higher levels of social well-being.

Table 4

Descriptive statistics results and intraclass correlation coefficients (ICC)

Variables	M	Variance		ICC	Gratitude	Social well-being
		Within	Between			
Gratitude	10.49	2.34	3.23	0.58	1	0.69***
Social well-being	26.88	6.87	14.00	0.67	0.36***	1

Note. Intra- and inter-subject correlations of gratitude and social well-being: between-person correlations are on the upper half and within-person correlations are on the lower half; *** $p < 0.001$

3.5.2 Multilevel regression analysis

To further examine the relationship between gratitude and social well-being, we constructed a multilevel regression model with gratitude as the predictor and social well-being as the outcome variable. The model showed that gratitude predicted individuals' social well-being ($\gamma = 0.59$, $SE = 0.04$, $t = 13.94$, $p < 0.001$). Furthermore, even after controlling for the effect of time, this result remained significant ($\gamma = 0.58$, $SE = 0.04$, $t = 13.85$, $p < 0.001$).

3.5.3 Multilevel cross-lagged path analysis

The results of the multilevel cross-lagged path analysis indicated that state gratitude on the previous day predicted state gratitude on the following day ($\gamma = 0.19$, $SE = 0.02$, $t = 9.58$, $p < 0.001$), and social well-being on the previous day predicted social well-being on the following day ($\gamma = 0.16$, $SE = 0.02$, $t = 8.15$, $p < 0.001$). This suggested that gratitude and social well-being showed high within-individual stability over a relatively short period of 21 days. In other words, once an individual exhibits high levels of gratitude and social well-being, it is likely to persist to a certain extent. In addition, state gratitude on the previous day predicted social well-being on the following day ($\gamma = 0.09$, $SE = 0.03$, $t = 2.90$, $p = 0.004$), and social well-being on the previous day also predicted state gratitude on the following day ($\gamma = 0.03$, $SE = 0.01$, $t = 2.84$, $p = 0.005$). Thus, there was a reciprocal predictive effect of gratitude and social well-being (see Table 5).

3.5.4 Cross-level moderating analysis

In addition, the results of the exploratory analysis on cross-level moderation effects indicated that age and gender did not significantly moderate the cross-lagged paths between gratitude and social well-being ($ps > 0.05$).

3.5.5 Additional analysis

Considering the potential differences in morning and evening psychological states, participants who responded on the second day were excluded, and the data were reanalyzed. The multilevel regression analysis revealed that state gratitude predicted social well-being ($\gamma = 0.57$, $SE = 0.04$, $t = 13.26$, $p <$

Table 5

Relationship between gratitude and social well-being

Effect	Variables	Fixed effects γ (SE)	Random effects τ (SE)
Intercept	Gratitude	10.54(0.12) ***	3.28(0.28) ***
	Social well-being	26.89(0.24) ***	14.30(1.22) ***
Autoregressive effect	Gratitude $_{T1} \rightarrow$ Gratitude $_{T2}$	0.19(0.02) ***	0.03(0.01) ***
	Social well-being $_{T1} \rightarrow$ Social well-being $_{T2}$	0.16(0.02) ***	0.03(0.01) ***
Cross-lagged effect	Gratitude $_{T1} \rightarrow$ Social well-being $_{T2}$	0.09(0.03) **	0.02(0.02)
	Social well-being $_{T1} \rightarrow$ Gratitude $_{T2}$	0.03(0.01) **	0.01(0.00) ***

Note. T1: variables at time 1; T2: variable at time 2; *SE*: standard error; ** $p < 0.01$, *** $p < 0.001$.

0.001). This effect remained significant even after controlling for time factors ($\gamma = 0.55$, $SE = 0.04$, $t = 13.10$, $p < 0.001$). The multilevel cross-lagged analysis further demonstrated that the previous day's state gratitude predicted the next day's social well-being ($\gamma = 0.09$, $SE = 0.03$, $t = 2.94$, $p = 0.003$), and the previous day's social well-being predicted the next day's state gratitude ($\gamma = 0.03$, $SE = 0.01$, $t = 2.40$, $p = 0.002$). Thus, the morning and evening psychological states did not significantly influence the results.

In summary, this study shows that there is a short-term bidirectional predictive relationship between state gratitude and social well-being.

4 Discussion

This study employed both longitudinal and daily diary methods to investigate the causal predictive relationship between gratitude and social well-being. Results from Study 1 indicated that trait gratitude significantly predicted social well-being later, while social well-being also significantly predicted later trait gratitude. Similarly, Study 2 found that state gratitude on the previous day significantly predicted social well-being on the following day and vice versa. These results were not influenced by demographic factors such as age and gender. In summary, this study provides systematic evidence for a bidirectional predictive relationship between gratitude and social well-being using both long-term and short-term longitudinal methods.

4.1 The predictive role of gratitude on social well-being

Study 1 found that trait gratitude positively predicted later social well-being. This supports hypothesis H1 that trait gratitude has a long-term effect on social well-being. This is consistent with previous research (Froh et al., 2010) and supports the broaden-and-build theory (Fredrickson, 2004). Gratitude expands individuals' behavior and cognition and improves their interaction patterns with the external environment. Algoe et al. (2016) have also confirmed that individuals who experience gratitude tend to hold more optimistic and positive attitudes in interpersonal relationships. Consequently, they are more inclined to adopt relationship maintenance strategies, which contributes to the establishment of enduring social support systems and enhances social well-being. Wang et al. (2022) found that gratitude positively predicted social support after six months through a longitudinal study. Lambert and Fincham (2011) showed that expressing gratitude to partners enhances their

positive evaluations of intimate relationships and promotes a sense of comfort when expressing relationship concerns, thus contributing to the maintenance of long-term relationships. In summary, gratitude prompts individuals to cultivate supportive social relationships and build lasting social resources, thereby enhancing their social well-being.

Study 2 found that state gratitude on the previous day positively predicted social well-being on the following day. This supports hypothesis H2 that state gratitude has a short-term effect on social well-being. This is consistent with previous findings (Khanna & Singh, 2021). Building upon this foundation, the present study provides new evidence of the daily-level predictive role of state gratitude on social well-being. Consistent with the broaden-and-build theory of gratitude, state gratitude stimulates individuals' prosocial motivations and encourages them to engage in positive social behaviors (Watkins, 2013). These positive social interactions enhance individuals' perceived social connections, thereby boosting their social well-being.

Additionally, Yang et al. (2021) found through a two-wave longitudinal study that gratitude predicts personal well-being. Similar results were obtained by Zhang et al. (2022) using a daily diary method. Therefore, gratitude has a promoting effect on both individual and social well-being. Gratitude can lead individuals to adopt a more positive and optimistic perspective on their personal and social lives, motivating them to engage in positive behaviors, and thereby enhancing daily personal and social well-being. Furthermore, gratitude can help individuals build enduring personal and social resources, thereby enhancing long-term individual and social well-being.

4.2 The predictive role of social well-being on gratitude

Study 1 found that social well-being positively predicted trait gratitude 7 months later. This supports hypothesis H3 that social well-being has a long-term predictive effect on trait gratitude. This is consistent with previous research (Joshanloo, 2018) and further extends this finding to a specific emotional dimension (i.e., gratitude). Based on the PERSOC model (Back et al., 2011), personality development is influenced by cognition and interactive patterns of social relationships. Individuals with higher levels of social well-being have a more positive perception of their social relationships, are willing to engage in social activities and integrate into community organizations, and exhibit more prosocial behaviors. These positive patterns of social interaction contribute to the development of a relatively stable disposition of gratitude in individuals.

Study 2 further revealed that social well-being can also influence state gratitude in the short term, confirming hypothesis H4. Currently, there is limited research investigating the short-term longitudinal relationship between social well-being and gratitude, and thus this study provides preliminary evidence in this field. Based on self-determination theory (DeHaan and Ryan, 2014), individuals with high levels of social well-being have well-functioning social connections and actively engage and interact with others in daily life, fulfilling their relational needs and facilitating the experience of gratitude. Additionally, social well-being can enhance one's sense of value and life meaning, further triggering positive emotions such as gratitude.

In summary, social well-being allows individuals to perceive greater personal significance and value in their interactions with others, and positive social interactions fulfill their daily relational needs, thereby experiencing more gratitude. Moreover, individuals with high social well-being are more willing to participate in social activities and display prosocial behaviors, which further enhances their disposition of gratitude. However, this effect does not seem to exist in personal well-being. Previous research utilizing long-term tracking methods and diary studies separately examined the predictive effects of personal well-being on gratitude at the trait and state levels, but no significant effects were found. This may be due to the different components that constitute these two types of well-being, suggesting the independent nature of social well-being and personal well-being.

4.3 The dual upward spirals of gratitude and social well-being

In summary, this study is the first to combine longitudinal and daily diary methods to explore the long-term and short-term casual predictive effects of social well-being and gratitude. Combining the results of Study 1 and Study 2, a bidirectional relationship between gratitude and social well-being was found. To elucidate this outcome, the study proposes a bidirectional spiral model of influence, drawing on relevant theories regarding gratitude and social well-being. Specifically, gratitude amplifies individuals' attentiveness to the positive aspects of life, particularly within their social interactions. For example, gratitude amplifies the benefits received from a benefactor, enabling the beneficiary to perceive them as favors rather than obligations. This leads individuals to have a more positive evaluation of their current social life, thereby enhancing their social well-being in the short term. On the other hand, as a positive emotion, gratitude broadens an individual's thought-action repertoire, enabling them to reciprocate in more diverse and multifaceted ways after receiving help. Positive interactions with others facilitate the establishment of long-term social resources, such as cultivating positive social relationships and acquiring effective social skills, thereby enhancing individuals' long-term social well-being. Conversely, an elevated level of social well-being also contributes to a stronger sense of social belonging, identity, and perceived social value. These enhanced social functions fulfill individuals' daily relational needs, imbuing their lives with meaning and allowing for a greater experience of gratitude. Simultaneously, the elevation of social well-being perception stimulates individuals to perceive the external social environment and their own social capabilities more positively. This, in turn, inspires them to engage in new social adaptive behaviors (such as volunteering and providing support to others), which further contribute to the long-term development of gratitude. These interconnected processes form a reciprocal spiral model of mutual influence between gratitude and social well-being.

Although this study has identified a reciprocal predictive relationship between gratitude and social well-being, the same pattern does not hold true for the relationship between gratitude and individual well-being. For instance, while Yang et al. (2021) confirmed the predictive effect of trait gratitude on personal well-being using a two-wave longitudinal design, they did not find evidence of personal well-being predicting trait gratitude. Similarly, Zhang et al. (2022) using a daily diary method found that state gratitude predicted personal well-being but not vice versa. Therefore, the proposed spiral model of reciprocal influence may not be applicable to individual well-being. This discrepancy could be attributed to the fact that both gratitude and

social well-being are socially oriented concepts, and their emergence and development are interdependent and influenced by one another. Social well-being involves the perception of one's own interpersonal relationships, while gratitude is a typical relational emotion (Algoe et al., 2008) that depends on individuals' social relationships. In comparison, subjective well-being and psychological well-being emphasize individual emotional experiences and psychological functioning, without direct connections to social relationships. Thus, they may not predict the experience of gratitude. The results of this study reveal the functional differences and relative independence between social well-being and individual well-being, suggesting that enhancing gratitude levels should be approached through the lens of social well-being rather than individual well-being.

4.4 Limitations, Implications, and future directions

This study has some limitations and areas for improvement. Firstly, despite the good reliability and validity of the instrument used in this study, self-report bias may still exist. Future studies could use the combination of informant and self-report measures to obtain a more accurate evaluation. Furthermore, the majority of participants in Study 2 were female, so future research should further investigate whether the findings are applicable to male populations as well. Thirdly, previous cross-cultural research has shown that Eastern cultures, compared to Western cultures, place greater emphasis on gratitude in relationships (Mendonça et al., 2018; Wang et al., 2015), which may have a greater impact on individuals' social well-being. Therefore, future research should further investigate the generalizability of the current findings to other cultural groups. Fourthly, although longitudinal studies can reveal potential causal relationships among variables to some extent, causal claims still need to be made with caution. Future research could consider using experimental methods to further reveal the causal relationship between gratitude and social well-being.

Despite these limitations, this study has several strengths. To our knowledge, few studies have examined the longitudinal relationship between gratitude and social well-being, and thus, this study provides new evidence in this area. Firstly, given that research in the field of well-being often focuses on individual well-being while neglecting the social aspects of well-being, this study enriches the research on the relationship between gratitude and well-being. Additionally, this study explores the causal relationship between gratitude and social well-being, identifying a reciprocal predictive relationship and proposing a spiral model of reciprocal influence between gratitude and social well-being. In addition to its theoretical contributions, the findings of this study also hold important practical implications. On one hand, educators and practitioners can focus on gratitude education and cultivation to enhance individuals' social well-being. On the other hand, researchers can design intervention programs to improve gratitude levels and further enhance social well-being.

5 Conclusion

This study combined longitudinal and daily diary methods to explore the causal predictive relationship between gratitude and social well-being. The results showed that both trait and state gratitude predicted social well-being and vice versa. Therefore, there is a bidirectional predictive relationship between gratitude and social well-being.

References

Algoe, S. B., Haidt, J., & Gable, S. L. (2008). Beyond reciprocity: Gratitude and relationships in everyday life. *Emotion, 8*(3), 425−429. https://doi.org/10.1037/1528-3542.8.3.425

Algoe, S. B., Kurtz, L. E., & Hilaire, N. M. (2016). Putting the "you" in "thank you": Examining other-praising behavior as the active relational ingredient in expressed gratitude. *Social Psychological and Personality Science, 7*(7), 658−666.

Arend, M. G., & Schäfer, T. (2019). Statistical power in two-level models: A tutorial based on Monte Carlo simulation. *Psychological Methods, 24*(1), 1−19. https://doi.org/10.1037/met0000195

Back, M. D., Baumert, A., Denissen, J. J. A., Hartung, F.-M., Penke, L., Schmukle, S. C., …Wrzus, C. (2011). PERSOC: A unified framework for understanding the dynamic interplay of personality and social relationships. *European Journal of Personality, 25*, 90−107.

Bono, G., Froh, J. J., Disabato, D., Blalock, D., McKnight, P., & Bausert, S. (2019). Gratitude's role in adolescent antisocial and prosocial behavior: A 4-year longitudinal investigation. *The Journal of Positive Psychology, 14*(2), 230−243. https://doi.org/10.1080/17439760.2017.1402078

Caputo, A. (2015). The relationship between gratitude and loneliness: The potential benefits of gratitude for promoting social bonds. *Europe's Journal of Psychology, 11*(2), 323−334. https://doi.org/10.5964/ejop.v11i2.826

Chen, Z., & Li, Q. (2014). Test the integrated model of well-being in different ages and gender. *Chinese Journal of Clinical Psychology, 22*(1), 78−83.

Chopik, W. J., Newton, N. J., Ryan, L. H., Kashdan, T. B., & Jarden, A. J. (2019). Gratitude across the life span: Age differences and links to subjective well-being. *The Journal of Positive Psychology, 14*(3), 292−302. https://doi.org/10.1080/17439760.2017.1414296

Cicognani, E., Pirini, C., Keyes, C., Joshanloo, M., Rostami, R., & Nosratabadi, M. (2008). Social participation, sense of community and social well being: A Study on American, Italian and Iranian university students. *Social Indicators Research, 89*(1), 97−112. https://doi.org/10.1007/s11205-007-9222-3

Cregg, D. R., & Cheavens, J. S. (2021). Gratitude interventions: Effective self-help? A meta-analysis of the impact on symptoms of depression and anxiety. *Journal of Happiness Studies, 22*(1), 413−445. https://doi.org/10.1007/s10902-020-00236-6

DeHaan, C., & Ryan, R. M. (2014). Symptoms of wellness: Happiness and eudaimonia from a self-determination perspective. In K. M. Sheldon & R. E. Lucus (Eds.), *Stability of happiness: Theories and evidence on whether happiness can change* (pp. 37−55). Amsterdam: Academic Press.

Ding, F., & Zhao, H. (2018). Is the individual subjective well-being of gratitude stronger? A meta-analysis. *Advances in Psychological Science, 26*(10), 1749−1764. https://doi.org/10.3724/SP.J.1042.2018.01749

Ducasse, D., Dassa, D., Courtet, P., Brand-Arpon, V., Walter, A., Guillaume, S., … Olié, E. (2019). Gratitude diary for the management of suicidal inpatients: A randomized controlled trial. *Depression and Anxiety, 36*(5), 400−411. https://doi.org/10.1002/da.22877

Eid, M., & Larsen, R. J. (Eds.). (2008). Gratitude, subjective well-being, and the brain. *In The science of subjective well-being* (pp. 476−477). New York: Guilford Press.

Emmons, R. A., & McCullough, M. E. (Eds.). (2004). *The psychology of gratitude*. New York: Oxford University Press.

Emmons, R. A., & Shelton, C. M. (2002). Gratitude and the science of positive psychology. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 459-471). New York: Oxford University Press.

Faul, F., Erdfelder, E., Lang, A.G., & Buchner, A. (2007). G*Power 3:

A flexible statistical power. analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175−191. https://doi.org/10.3758/BF03193146

Fredrickson, B. L. (2004). Gratitude, like other positive emotions, broadens and builds. In R. A. Emmons & M. E. McCullough (Eds.), *The psychology of gratitude* (pp. 145−166). New York: Oxford University Press.

Froh, J. J., Bono, G., & Emmons, R. (2010). Being grateful is beyond good manners: Gratitude and motivation to contribute to society among early adolescents. *Motivation and Emotion, 34*(2), 144−157. https://doi.org/10.1007/s11031-010-9163-z

Gallagher, M. W., Lopez, S. J., & Preacher, K. J. (2009). The hierarchical structure of well-being. *Journal of Personality, 77*(4), 1025−1050. https://doi.org/10.1111/j.1467-6494.2009.00573.x

Garg, N., Katiyar, N., & Mehak. (2021). Gratitude questionnaire (GQ-6)—Exploring psychometric properties in India. *Journal of Religion and Health, 60*(5), 3716−3731. https://doi.org/10.1007/s10943-021-01419-y

Gouveia, V. V., Ribeiro, M. G. C., de Aquino, T. A. A., Loureto, G. D. L., Nascimento, B. S., &. Rezende, A. T. (2021). Gratitude questionnaire (GQ-6): Evidence of construct validity in Brazil. *Current Psychology, 40*(5), 2481−2489. https://doi.org/10.1007/s12144-019-00197-x

Gunthert, K. C., & Wenze, S. J. (2011). Daily diary methods. In M. R. Mehl, & T. A. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 144−159). New York, NY: Guilford Press.

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*(4), 424−453. https://doi.org/10.1037/1082-989X.3.4.424

Huta, V., & Waterman, A. S. (2014). Eudaimonia and its distinction from hedonia: Developing a classification and terminology for understanding conceptual and operational definitions. *Journal of Happiness Studies, 15*(6), 1425−1456. https://doi.org/10.1007/s10902-013-9485-0

Jans-Beken, L., Lataster, J., Peels, D., Lechner, L., & Jacobs, N. (2018). Gratitude, psychopathology and subjective well-being: Results from a 7.5-month prospective general population study. *Journal of Happiness Studies, 19*(6), 1673−1689. https://doi.org/10.1007/s10902-017-9893-7

Joshanloo, M., Sirgy, M. J., & Park, J. (2018). Directionality of the relationship between social well-being and subjective well-being: Evidence from a 20-year longitudinal study. *Quality of Life Research, 27*(8), 2137−2145. https://doi.org/10.1007/s11136-018-1865-9

Keyes, C. L. M. (1998). Social well-being. *Social Psychology Quarterly, 61*(2), 121−140. https://doi.org/10.2307/2787065

Keyes, C. L. M. (2007). Promoting and protecting mental health as flourishing: A complementary strategy for improving national mental health. *American Psychologist, 62*(2), 95−108. https://doi.org/10.1037/0003-066X.62.2.95

Keyes, C. L. M., Wissing, M., Potgieter, J. P., Temane, M., Kruger, A., & van Rooy, S. (2008). Evaluation of the mental health continuum−short form (MHC−SF) in setswana-speaking South Africans. *Clinical Psychology & Psychotherapy, 15*(3), 181−192. https://doi.org/10.1002/cpp.572

Khanna, P., & Singh, K. (2021). Stress management training and gratitude journaling in the classroom: An initial investigation in Indian context. *Current Psychology, 40*(11), 5737−5748. https://doi.org/10.1007/s12144-020-01242-w

Kong, F., You, X., & Zhao, J. (2017). Evaluation of the gratitude questionnaire in a Chinese sample of adults: Factorial validity, criterion-related validity, and measurement invariance across sex. *Frontiers in Psychology, 8*, 1498. https://doi.org/10.3389/fpsyg.2017.01498

Kong, F., Zhao, J., You, X., & Xiang, Y. (2020). Gratitude and the brain: Trait gratitude mediates the association between structural varia-

tions in the medial prefrontal cortex and life satisfaction. *Emotion, 20*(6), 917−926. https://doi.org/10.1037/emo0000617

Kreitzer, M. J., Telke, S., Hanson, L., Leininger, B., & Evans, R. (2019). Outcomes of a gratitude practice in an online community of caring. *The Journal of Alternative and Complementary Medicine, 25*(4), 385−391. https://doi.org/10.1089/acm.2018.0460

Lambert, N. M., & Fincham, F. D. (2011). Expressing gratitude to a partner leads to more relationship maintenance behavior. *Emotion, 11*(1), 52−60. https://doi.org/10.1037/a0021557

Lee, L.N., Tong, E. M. W., & Sim, D. (2015). The dual upward spirals of gratitude and basic psychological needs. *Motivation Science, 1*(2), 87−97. https://doi.org/10.1037/mot0000018

Liang, H., Chen, C., Li, F., Wu, S., Wang, L., Zheng, X., & Zeng, B. (2020). Mediating effects of peace of mind and rumination on the relationship between gratitude and depression among Chinese university students. *Current Psychology, 39*(4), 1430−1437. https://doi.org/10.1007/s12144-018-9847-1

Lin, C.C., & Yeh, Y. (2014). How gratitude influences well-being: A structural equation modeling approach. *Social Indicators Research, 118*(1), 205−217. https://doi.org/10.1007/s11205-013-0424-6

Mason, H. D. (2019). Gratitude, well-being and psychological distress among South African university students. *Journal of Psychology in Africa, 29*(4), 354−360. https://doi.org/10.1080/14330237.2019.1647492

McCullough, M. E., Emmons, R. A., & Tsang, J.A. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology, 82*(1), 112−127. https://doi.org/10.1037/0022-3514.82.1.112

McCullough, M. E., Kilpatrick, S. D., Emmons, R. A., & Larson, D. B. (2001). Is gratitude a moral affect? *Psychological Bulletin, 127*(2), 249−266. https://doi.org/10.1037/0033-2909.127.2.249

Mendonça, S. E., Merçon-Vargas, E. A., Payir, A., & Tudge, J. R. H. (2018). The development of gratitude in seven societies: Cross-cultural highlights. *Cross-Cultural Research, 52*(1), 135−150. https://doi.org/10.1177/1069397117737245

Miao, Y. J., Chen, H., & Bai, S. Y. (2008). A new viewing angle on well-being—A description of social well-being. *Science of Social Psychology, 23*(2), 145−149. https://doi.org/CNKI:SUN:SHXL.0.2008-02-005

Newman, D. B., Sachs, M. E., Stone, A. A., & Schwarz, N. (2020). Nostalgia and well-being in daily life: An ecological validity perspective. *Journal of Personality and Social Psychology, 118*(2), 325−347. https://doi.org/10.1037/pspp0000236

Nezlek, J. B., Krejtz, I., Rusanowska, M., & Holas, P. (2019). Within-person relationships among daily gratitude, well-being, stress, and positive experiences. *Journal of Happiness Studies, 20*(3), 883−898. https://doi.org/10.1007/s10902-018-9979-x

Palhares, F., Freitas, L. B. L., Merçon-Vargas, E. A., & Tudge, J. R. H. (2018). The development of gratitude in Brazilian children and adolescents. *Cross-Cultural Research, 52*(1), 31−43. https://doi.org/10.1177/1069397117736749

Portocarrero, F. F., Gonzalez, K., & Ekema-Agbaw, M. (2020). A meta-analytic review of the relationship between dispositional gratitude and well-being. *Personality and Individual Differences, 164*, 110−121. https://doi.org/10.1016/j.paid.2020.110101

Sherman, A. C., Simonton-Atchley, S., O'Brien, C. E., Campbell, D., Reddy, R. M., Guinee, B., … Anderson, P. J. (2020). Longitudinal associations between gratitude and depression 1 year later among adult cystic fibrosis patients. *Journal of Behavioral Medicine, 43*(4), 596−604. https://doi.org/10.1007/s10865-019-00071-y

Son, J., & Wilson, J. (2012). Volunteer work and hedonic, eudemonic, and social well-being: Volunteer work and well-being. *Sociological Forum, 27*(3), 658−681. https://doi.org/10.1111/j.1573-7861.2012.01340.x

Sood, S. (2012). A study of gratitude and well being among adolescents.

IOSR Journal of Humanities and Social Science, 3(5), 35−38. https://doi.org/10.9790/0837-0353538

Tong, E. M. W., & Oh, V. Y. S. (2021). Gratitude and adaptive coping among Chinese Singaporeans during the beginning of the COVID-19 pandemic. *Frontiers in Psychiatry, 11*, 628937. https://doi.org/10.3389/fpsyt.2020.628937

Wang, D., Chen, X., Zhai, S., & Fan, F. (2022). Gratitude and internalizing/externalizing symptoms among adolescents after the Wenchuan earthquake: Mediating roles of social support and resilience. *Journal of Adolescence, 94*(6), 867−879. https://doi.org/10.1002/ jad.12070

Wang, D., Wang, Y. C., & Tudge, J. R. H. (2015). Expressions of gratitude in children and adolescents: Insights from China and the United States. *Journal of Cross-Cultural Psychology, 46*(8), 1039− 1058. https://doi.org/10.1177/0022022115594140

Watkins, P. C. (2013). *Gratitude and the good life: Toward a psychology of appreciation*. New York: Springer Berlin Heidelberg.

Wood, A. M., Froh, J. J., & Geraghty, A. W. A. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical Psychology Review, 30*(7), 890−905. https://doi.org/10.1016/j.cpr.2010.03.005

Yang, K., Yan, W., Jia, N., Wang, Q., & Kong, F. (2021). Longitudinal relationship between trait gratitude and subjective well-being in adolescents: Evidence from the bi-factor model. *The Journal of Positive Psychology, 16*(6), 802−810. https://doi.org/10.1080/ 17439760.2020.1818812

Yin, K. L., & He, J. M. (2012). Reliability and validity of the mental health continuum short form in adults. *Chinese Mental Health Journal, 26*(5), 388−392. https://doi.org/10.3969/j.issn.1000-6729. 2012.05.015

Yu, G., Li, S., & Zhao, F. (2020). Childhood maltreatment and prosocial behavior among Chinese adolescents: Roles of empathy and gratitude. *Child Abuse & Neglect, 101*, 104319. https://doi.org/10.1016/j. chiabu.2019.104319

Yu, Y., Zhao, Y., Li, D., Zhang, J., & Li, J. (2021). The relationship between big five personality and social well-being of Chinese residents: The mediating effect of social support. *Frontiers in Psychology, 11*, 613659. https://doi.org/10.3389/fpsyg.2020.613659

Zhang, L., Lei, L., & Guo, B. L. (2003). *Applied multilevel data analysis*. Beijing: Educational Science Publishing House.

Zhang, L., Li, W., Ye, Y., Yang, K., Jia, N., & Kong, F. (2022). Being grateful every day will pay off: A daily diary investigation on relationships between gratitude and well-being in Chinese young adults. *The Journal of Positive Psychology,* 1−13. https://doi.org/10. 1080/17439760.2022.2131606

Zhou, H., & Long, L. (2004). Statistical remedies for common method biases. *Advances in Psychological Science, 12*(6), 942−950.