The role of gratitude in the development of social support, stress, and depression: Two longitudinal studies

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Abstract

In two longitudinal studies, the authors examined the direction of the relationships between trait gratitude, perceived social support, stress, and depression during a life transition. Both studies used a full cross-lagged panel design, with participants completing all measures at the start and end of their first semester at college. Structural equation modeling was used to compare models of direct, reverse, and reciprocal models of directionality. Both studies supported a direct model whereby gratitude led to higher levels of perceived social support, and lower levels of stress and depression. In contrast, no variable led to gratitude, and most models of mediation were discounted. Study 2 additionally showed that gratitude leads to the other variables independently of the Big Five factors of personality. Overall gratitude seems to directly foster social support, and to protect people from stress and depression, which has implications for clinical interventions.
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1. Introduction

Dispositional gratitude involves individual differences in how frequently and intensely people experience the emotion of gratitude, as well as individual differences in the range of events which elicit the emotion (McCullough, Emmons, & Tsang, 2002). Dispositional gratitude is related to a more positive and appreciative outlook toward life (Wood, Maltby, Stewart, & Joseph, 2008), and involves a positive bias in interpreting social situations (Wood, Maltby, Stewart, Linley, & Joseph, in press). Gratitude is perhaps the quintessential positive psychological trait, as it involves a life orientation toward the positive in the world. This positive orientation

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can be contrasted, for example, with the depressive orientations toward the negative in the self, world, and future (Beck, 1976).

Historically, gratitude been accorded considerable importance in understanding human functioning (Emmons & Crumpler, 2000; Harpman, 2004). The study of individual differences in gratitude is, however, very recent (McCullough et al., 2002), perhaps due to a more general neglect of research into positive emotions (see Gable & Haidt, 2005; Linley, Joseph, Harrington, & Wood, 2006).

In the last few years gratitude has been shown to be a robust predictor of well-being and social variables (McCullough et al., 2002; McCullough, Tsang, & Emmons, 2004; Wood, Joseph, & Linley, 2007). On the basis of this relationship, gratitude interventions have been developed, and shown to substantially decrease depression and increase social functioning (Emmons & McCullough, 2003; Lyubomirsky, Sheldon, & Schkade, 2005; Seligman, Steen, Park, & Peterson, 2005). Such successes have led to calls for gratitude interventions to become more used in clinical settings (Bono, Emmons, & McCullough, 2004; Seligman, 2005b). These calls are consistent with a more general movement to foster clients strengths in clinical practice (Duckworth, Steen, & Seligman, 2005; Joseph & Linley, 2006).

Despite the recent proliferation of research on gratitude, a basic question that has yet to be addressed by the literature regards how gratitude, stress, depression, and social support influence each other over time. Longitudinal methods can also add valuable complimentary evidence to the existing experimental studies showing that gratitude interventions lead to improved levels of emotional well-being. As well as knowing that therapeutically changing gratitude has a causal effect on well-being, it would be valuable to know whether gratitude naturally leads to improved well-being over time. Knowing whether gratitude leads to lower levels of stress and depression in naturalistic settings such as life transitions is a critical consideration in the implementation of gratitude interventions in clinical settings (Bono et al., 2004; Seligman, 2005a). For example, if gratitude naturally protected people from stress and depression, then this would suggest that increasing gratitude therapeutically may build up a psychological capital which is beneficial during the difficult periods of peoples lives. This would encourage the use of gratitude interventions in clinical, counseling, and coaching settings.

Although social support has a massive research base (see Pierce, Lakey, Sarason, & Sarason, 1997), the role of gratitude in social support has not yet been considered, and gratitude may be expected to be a particularly strong predictor of social support (Wood et al., 2007). In studying social support longitudinal methods are particularly valuable (Cohen & Wills, 1985). The development of social support is a naturally occurring process, with levels of social support changing as people move through different social situations. Personality variables have good predictive value of individual differences in the levels of social support that people develop (Pierce et al., 1997). How social support naturally develops also has applied significance through informing the planning of social support interventions (Hogan, Linden, & Najarian, 2002).

New methods of analyzing longitudinal designs allow the testing of complex models of directionality including direct models (where gratitude leads to social support), reverse models (where social support leads to gratitude), and reciprocal models, where both gratitude and social support lead to each other over time, operating as a positive upward spiral (Zapf, Dormann, & Frese, 1996). Such methods provide particularly rich understanding of directionality between variables.

2. Models of directionality

Several potential models of how gratitude, social support, stress, and depression could relate to each other over time are presented in Table 1 (see also Fig. 1). Model 1 is a stability model, where no variable leads to any other over time, but the variables exhibit a degree of temporal stability (test–retest reliability), and are perhaps correlated at each time point. There are several reasons why there may be cross-sectional but not longitudinal relationships between the variables. First, over a given time span there may be no causality between any variables, either because an inappropriate time span is being studied, or because there is insufficient change in the variables. Second, there may have been causality between the variables in the past, but the relationships may have reached stability (for example, a particularly influential event life event may cause substantial gratitude, leading to permanently increased perceptions of social support). Third, there may be continuity between the variables, where, for example, gratitude actually represents satisfaction with social support. In each of these three cases, there could be a significant cross-sectional relationship between the variables, but over a given

Table 1
Six models of possible longitudinal relationships between gratitude, stress, depression, and social support

Model	Vers.	Description
1. Stability		There is not a longitudinal relationship between gratitude, stress, depress, and social support (but each variable may be stable, and correlated at each time point)
2. Direct		Gratitude leads to stress, depression, and social support
3. Reverse		Stress, depression, and social support lead to gratitude
4. Reciprocal		A positive feedback loop between stress, depression, social support and gratitude
5. Mediation	i	Gratitude → social support → stress and depression
	ii	Gratitude → well-being → social support
	iii	Social support → stress and depression → gratitude
	iv	Social support → gratitude → stress and depression
	v	Stress and depression → social support → gratitude
	vi	Stress and depression → gratitude → social support
6. Third variable		A third variable (such as neuroticism or extraversion) accounts for the relationship between gratitude and stress, depression, and social support

time period no variable would lead to any other when past levels of the variables were controlled (Maruyama, 1997).

In Model 2, gratitude leads to higher levels of social support, and lower levels of stress and depression. This is the model suggested by the previous experimental studies (McCullough et al., 2002; Seligman et al., 2005), which suggest that interventions that increase gratitude have a causal influence on well-being. There are various ways in which gratitude may lead less stress and depression. First, gratitude could operate as a protective variable. Gratitude is associated with making positive attributions (Wood et al., 2008; Wood, Maltby, Stewart, & Linley et al., in press), and these attributions may protect people from becoming stressed and depressed, particularly during turbulent life events. Second, grateful people could change their environments in ways which make them less depressing and less stressful. Third, gratitude could modify or alter the progress of the other variables. For example, gratitude could modify the course of depression, making remission quicker; feeling grateful for the positive aspects of the world would quite likely make a depressive bout more bearable and of shorter duration.

Gratitude may also be particularly influential in developing perceptions of social support. Perceived social support appears to represent an interaction between the amount of objectively helpful aid people receive and individual differences in interpreting social situations (Lakey & Drew, 1997). Perceived social support is correlated with the actual supportive behaviors that people receive at about $r = .30$. The remainder of the variance in perceived social support is accounted for by people's characteristic attributions regarding social situations, and an actual supportive behavior × characteristic attribution interaction (Lakey, McCabe, Fisicaro, & Drew, 1996). When gratitude is expressed to the benefactor, the benefactor is more likely to provide future aid (Bartlett & DeSteno, 2006; Carey, Clicque, Leighton, & Milton, 1976; McCullough, Kilpatrick, Emmons, & Larson, 2001; Rind & Bordia, 1995; Tsang, 2006). As such dispositional gratitude may lead to the development of more supportive environments, represented in conscious awareness as perceived social support. Additionally, gratitude leads to characteristic attributions regarding social situations, with grateful people interpreting the help they receive as more valuable, more costly, and seeing their benefactors intentions as more altruistic (Wood, Maltby, Stewart, & Linley et al., in press). As gratitude is involved in both encouraging actual supportive behaviors and in appraising situations positively, gratitude seems particularly likely to lead to perceived social support.

Model 3 specifies that high levels of social support and low levels of depression and stress lead to gratitude. This model is highly plausible, as the other variables could be exactly the aspects of life for which grateful people feel gratitude. People could be grateful for their high levels of well-being and supportive social environments. Phrased alternatively, people could feel that they have little to be grateful for if they have poor social support, and are very stressed and depressed. This could operate as part of a depressive bias (e.g. Beck, 1976; Evans et al., 2005), or through depressed people having objectively worse life events (Monroe, Harkness, Simons, & Thase, 2001), which could lead to low feelings of gratitude. Additionally, there is evidence that depressed people seek information that confirms their negative world views (Giesler, Josephs, & Swann,
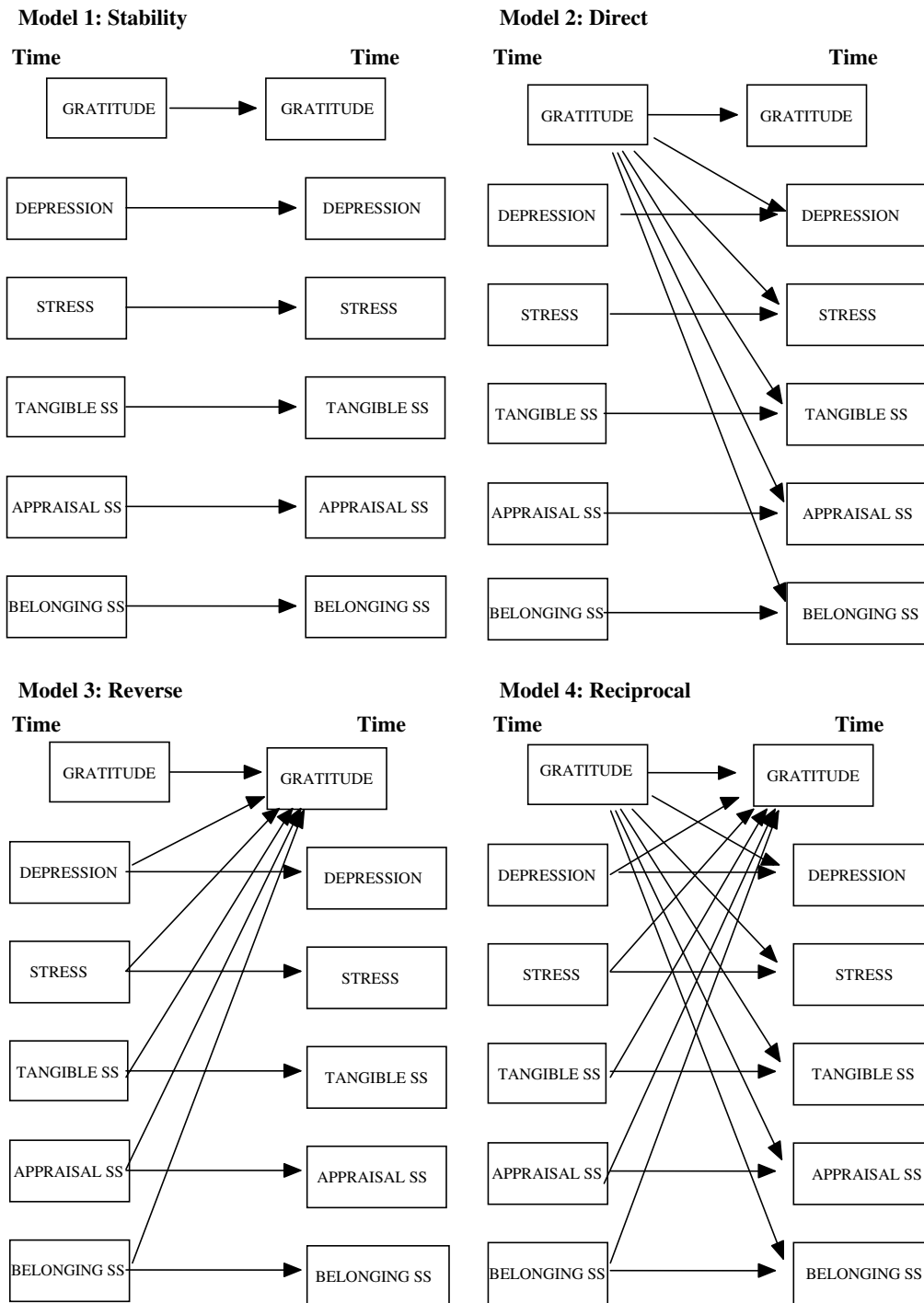
Fig. 1. Models 1 to 4. SS = perceived social support. For clarity, in this diagram the intercorrelations between the variables at each wave and the error variances of endogenous variables have been omitted.

1996; Swann, Wenzlaff, Krull, & Pelham, 1992), which could perhaps lead to the impression that there is not much in the world for which to be grateful.

Model 4 suggests a reciprocal relationship between gratitude and the other variables. Fredrickson's (2001) broaden-and-build theory of positive emotions supports this model. The theory suggests that positive emo-

tions cause cognitive and behavioral engagement in activities which build resources which will be adaptive in the future. The activities lead to further positive emotions, perpetuating an upward spiral. There is a growing body of evidence to support this theory with regard to positive emotions in general (e.g. Fredrickson & Joiner, 2002; Fredrickson, Tugade, Waugh, & Larkin, 2003; Sheldon & Houser-Marko, 2001), and Fredrickson (2004) has suggested that gratitude operates in a broaden-and-build fashion.

Model 5 is actually six different mediational models, proposing all permutations of causal chains between gratitude, stress, depression, and social support. Each of these models provides a reasonable explanation. For example, there is both evidence that in some circumstances low social support leads to stress and depression (Barnett & Gotlib, 1988; Monroe, Connell, Bromet, & Steiner, 1986), and in others stress and depression leads to social support (Coyne, 1976; Joiner, Alfano, & Metalsky, 1993). Combined with not currently knowing whether gratitude should be conceptualized as a predictor or outcome variable, each of the mediational models remains plausible.

Model 6 specifies that the relationships between gratitude and stress and depression, and social support can be accounted for by third variables. Gratitude has been shown to be correlated with other broad personality variables (such as extraversion or neuroticism), which could account for any apparent relationship between the variables.

Each of these six models of directionality (see Table 1) provide a plausible account of the relationships over time between gratitude and social support, stress, and depression. These models have not been tested. Establishing which of the models best accounts for the relationships will allow better interpretation of the previous correlational findings, and elucidate the role of gratitude and well-being. If gratitude is shown to lead to perceived social support, then this will be suggest a potential role for gratitude in social support interventions (see Hogan et al., 2002). Additionally, whether gratitude naturally leads to decreases in stress and depression is of central importance in considering promoting the use of gratitude interventions.

3. Study 1

Study 1 directly tested Models 1 to 5 of the directionality between gratitude, depression, stress, and social support. In order to allow conclusions about directionality between the variables, the study used a full cross-lagged panel design, where each participant completed the same measures at two time points.

Various methods of testing models of directionality with longitudinal data have been developed (see the extensive discussions in Finkel, 1995; Zapf et al., 1996), including hierarchical regression based approaches, cross-lagged panel correlations (CLPC), and structural equation modeling (SEM) (see Maruyama, 1997; Schumacker & Lomax, 2004). Of these approaches, SEM is to be preferred, as CLPC is unable to deal satisfactorily with the stability of variables (Feldman, 1975), regression based approaches are very susceptible to factors that occur on the day of testing, and only SEM can test the reciprocal causality suggested by Model 4 (Zapf et al., 1996).

The current analysis takes a SEM approach to data analysis. The approach taken in this paper seeks to improve on many SEM analysis, which have sometimes been controversial (for reviews see Fassinger, 1987; MacCallum & Austin, 2000; Tomarken & Waller, 2005). Much of this criticism has focused on how the variables in the SEM path diagram can be rearranged in another order, and yet still provide a good (often identical) model fit (Lee & Hershberger, 1990; MacCallum, Wegener, Uchino, & Fabrigar, 1993; Tomarken & Waller, 2003). In this paper we address these criticisms by (a) ruling out many models through the introduction of a temporal element and (b) making tests between all the likely models that remain a fundamental focus of the analysis and paper. This approach of testing rival *a priori* models implements recent advice for improving the quality of published SEM research (Hoyle & Panter, 1995; MacCallum, Roznowski, & Necowitz, 1992; Tomarken & Waller, 2003).

3.1. Method

3.1.1. Participants and procedure

The participants were 156 first year undergraduate students (76 male and 80 female), who completed all measures at two time points. All participants were aged between 18 and 19 years old, and predominantly reported their ethnicity as White (78.8%), or Indian (12.8%).

The first questionnaire was given to participants at the start of lectures during their first few weeks at the university (T1), and a second questionnaire at the end of the semester (T2), approximately three months later. All measures were given at both time points, and the order in which the measures were presented was counterbalanced.

As the participants had just started university, they would have had little time to develop perceptions of social support. The participants perception's of support could be expected to be in a state of change during the two time periods, as the participants met new people during this life transition.

This population was chosen as it fulfilled Cohen and Wills's (1985) criteria for the optimum conditions for studying social support at more than one time point. Cohen and Wills's (1985) suggested using (1) a sample that has a wide range of mental health (rather than a slanted clinical sample), (2) a life event where participants are undergoing changes in levels of mental health and social support, and (3) time points that are not too far apart to miss the developmental essence of the phenomena. Students starting university for the first time are particularly suited to this criteria as they (1) have a wide range of mental health, (2) have little or no social support networks, and (3) generally exhibit considerable changes in levels of mental health during the first term, with many people finding the experience rewarding and pleasing and others highly stressful and depressing (e.g. Brissette, Scheier, & Carver, 2002; Segrin & Flora, 2000). The three month interval was selected as this captures the key time when students social networks are changing, and as Cohen and Wills (1985) specifically recommend using periods of less than a year when studying social support in students. Using the students first semester at university appeared particularly relevant in this regard.

3.1.2. Measures
3.1.2.1. Gratitude.
The Gratitude Questionnaire-6 (GQ-6: McCullough et al., 2002) was used to assess gratitude. Participants responded to six items (two reverse coded) on a 1 (strongly disagree) to 7 (strongly agree) scale. Items asked about how frequently and intensely participants experience gratitude (e.g. "I feel thankful for what I have received in life", and "long amounts of time can go by before I feel grateful to something or someone"). The scale has strong correlations with well-being and social variables, good peer rated validity, and independence from other related constructs (McCullough et al., 2002).

3.1.2.2. Social support.
Perceived social support was measured using the belonging, tangible, and appraisal sub-scales of the college student version of the Interpersonal Support Evaluation List (Cohen & Hoberman, 1983). *Belonging* refers to shared social activities, *tangible* regards the provision of practical assistance, and *appraisal* involves advice, listening to problems, and emotional support. Participants respond to three sub-scales, each of which contain 12 statements (6 reverse coded) about the availability of people to provide belonging, tangible, or appraisal functions, and indicated whether they perceived the statement to be 'probably true' or 'probably false'. These scales thus measure perceptions of social support rather than the objective social situation (cf. Lakey et al., 1996). Slight changes were made to the directions, specifying that the items referred to social support provided in the campus or in the local town. As such, the majority of participants moving into a new social environment would experience an increase in social support over the course of the study. The scale has strong predictive validity for stress, depression, physical health, and health behavior change (Cohen, Mermelstein, Kamarck, & Hoberman, 1985), and is widely used in research (e.g. Brissette et al., 2002). The sub-scales have a 4-week test–retest reliability of between $r = .80$ and $.87$, and the low intercorrelations between the sub-scales support their discriminate validity (Cohen et al., 1985).

3.1.2.3. Depression.
The Centre for Epidemiologic Studies Depression scale (CES-D: Radloff, 1977) was used to measure depression. Participants rate how frequently during the past month they have experienced depressed affect, positive affect (reverse coded), and somatic and retarded activity. Twenty items are rated on a four point scale ($0 =$ rarely or none of the time, $1 =$ some or a little of the time, $2 =$ occasionally or a moderate amount of time, and $3 =$ most or all of the time). The CES-D was designed for measuring depressive symptoms in the general population, and is one of the most frequently used depression measures in psychological research (Shaver & Brennan, 1990). Validity has been demonstrated by several studies showing the accuracy of the CES-D in correctly identifying people known to be depressed (McDowell & Kristjansson, 1996).

3.1.2.4. Stress. Perceived stress was measured using the Perceived Stress Scale (PSS: Cohen & Williamson, 1988). Ten items measure the extent to which during the last month participants have found their lives unpredictable, uncontrollable, and overwhelming. The 10 items (six recoded) are rated on a 0 (never) to 4 (very often) scale. The scale shows good convergent and predictive validity with life events, depression, use of health services, and health behaviors (Cohen, Kamarck, & Mermelstein, 1983; Cohen & Williamson, 1988), and has been used highly in previous research.

3.1.3. Data analysis

The data was analyzed with covariance structural equation modelling. Initially, Models 1 to 4 (see Table 1) were tested, followed by testing for mediation (Model 5).

3.1.3.1. Testing Models 1 to 4. Models 1 to 4 are presented in Fig. 1. In each of the models all variables within each wave were allowed to correlate.

In Model 1 (stability model), each T1 variable lead to its T2 counterpart, but no T1 variable led to any other T2 variable. Essentially, this model specifies that there is no longitudinal relationship between the variables, but each variable exhibits a degree of temporal stability (test–retest reliability). The remaining three models were tested against Model 1, to see whether including additional paths improved model fit. Note that the remaining models (Models 2, 3, and 4) also incorporate the stability model, so prior levels of each of the variables are controlled.

In Model 2, paths were included from gratitude to each T2 variable, representing a model whereby gratitude leads to stress, depression and social support. In Model 3, paths were added from each of the T1 well-being and social support variables to T2 gratitude. This model specifies that well-being and social support leads to gratitude. Finally, in Model 4, paths were added from T1 gratitude to T2 well-being and social support, and from T1 well-being and social support to T2 gratitude. This model represents a positive feedback loop where gratitude is reciprocally related to well-being and social support.

For the purposes of model comparison, we examined differences in fit between the models using the changes in the chi squared test of fit and Akaike Information Criterion (AIC). As the models are nested, the difference in fit between any two models can be directly compared by examining the difference in the values of chi squared statistics. The difference in values is itself chi squared distributed, with number of degrees of freedom equal to the difference between the degrees of freedom of the competing models (Schumacker & Lomax, 2004). Significant difference in model fit indicate that the model with the smaller chi square value is to be preferred. This direct approach is preferable to comparing the fit indices of the various models (Hoyle & Panter, 1995) because models with lower numbers of parameters ordinarily exhibit greater fit.

Models were also compared using the AIC, a measure of model fit adjusted for parsimony. Burnham and Anderson (2002) demonstrate that the absolute size of the AIC is uninterruptible because of confounding with the constant and sample size. However differences in the AIC between models provide a reliable indication of the best fitting model, with the model having the lowest AIC to be preferred. Burnham and Anderson suggest that AIC differences of 0–2 show little difference between the competing models, whereas differences of 4–7 show considerably more support for the model with the lowest AIC.

The fit of the final model was tested with the standardized root mean square residual (SRMR), and the comparative fit index (CFI). Hu and Bentler's (1999), Monte Carlo analysis suggested that of all the common fit criteria they tested, Type I and II errors were minimalized when using a combination of SRMR < .09, and CFI > .95. These criteria are to be preferred to relying on the chi squared test, which is over sensitive to sample size (see also Hu & Bentler, 1998).

3.1.3.2. Testing Model 5. The tests between Models 1 to 4 compared different models of the relationship of gratitude with stress, depression *and* social support. This leaves several questions unanswered, such as whether stress, depression leads to social support or vice versa, and whether these are part of the six possible mediational chains shown in Model 5.

Analysis was carried out to attempt to disprove the mediation suggested by Model 5, using Cole and Maxwell's (2003) longitudinal adaptation of Baron and Kenny's (1986) procedures. A key issue in establishing mediation involves showing that the causal chain is correctly arranged, so that the mediator is genuinely

downstream of the predictor, and the outcome is genuinely downstream of the mediator (Frazier, Tix, & Barron, 2004; Tomarken & Waller, 2003). With non-experimental methods, this chain can only truly be demonstrated with three-wave longitudinal designs (Collins, Graham, & Flaherty, 1998). However, Cole and Maxwell (2003) demonstrate that mediation can be *ruled out* if (a) the T1 predictor does not lead to the T2 mediator, controlling for T1 levels of the predictor and (b) the T1 mediator does not leads to the T2 outcome, controlling for T1 levels of the outcome. In such a case there can be no mediated causal chain. Note that if the stages were met, this does not actually demonstrate mediation as the results could occur if the predictor and mediator had separate effects on the outcome. However, this disconfirmation approach is preferable to trying to establish mediation with cross-sectional methods, due to concerns about whether the causal chain is correctly arranged (Cole & Maxwell, 2003; Tomarken & Waller, 2003).

3.1.3.3. Overview of data analysis. Models 1 to 4 were tested by setting up rival SEM models, and comparing model fit. Each of the mediational possibilities suggested in Model 5 were tested with Cole and Maxwell's (2003) longitudinal tests of mediation.

3.2. Results

3.2.1. Preliminary analysis

Table 2 shows descriptive statistics, and intercorrelations between each of the scales. Each scale exhibited a three month test–retest validity between .53 and .84.

3.2.2. Model comparisons

Comparisons between the chi squared fit of each of the models are provided in Table 3. The first three comparisons compared the stability model with the direct, reverse, and reciprocal models. In the first comparison, a model whereby gratitude led to stress, depression, and social support (Model 2) provided a better fit than the stability model (Model 1). Model 2 is presented in Fig. 2, where it can be seen that T1 gratitude significantly led to T2 stress, depression, belonging social support, and appraisal social support, but not tangible social support. In contrast, the reverse model, where stress, depression, and social support led to gratitude (Model 3) did not provide a better fit than the stability model. Additionally, none of the paths from T1 stress, depression, or social support significantly lead to T2 gratitude (largest $\beta = .07$, $p > .37$). The reciprocal model also did not significantly improve fit over the stability model.

In the fourth and fifth comparisons, the reciprocal model was compared with the direct and reverse models. The reciprocal model (Model 4) did provide a better fit than the reverse model (presumably because the reciprocal model included paths from gratitude to stress, depression, and social support). However, the reciprocal

Table 2
Descriptive statistics and intercorrelations between Study 1 variables

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
Time 1														
1. Gratitude	28.97	8.26	—											
2. Depression	33.29	15.16	−.10	—										
3. Stress	11.16	7.50	−.11	.76**	—									
4. Tangible SS	7.47	3.81	.06	−.33**	−.43**	—								
5. Belonging SS	6.54	3.79	.10	−.15	−.30**	.45**	—							
6. Appraisal SS	6.31	3.13	.02	−.20**	−.35**	.17*	.17*	—						
Time 2														
7. Gratitude	29.57	8.71	.59**	−.04	−.06	.09	.13	.01	—					
8. Depression	17.38	16.30	−.24**	.53**	.55**	−.27**	−.16*	−.16	−.15	—				
9. Stress	11.31	8.66	−.24**	.55**	.65**	−.34*	−.29**	−.18*	−.13	.80**	—			
10. Tangible SS	7.94	2.95	.07	−.31**	−.37**	.83**	.40**	.25*	.06	−.32**	−.40**	—		
11. Belonging SS	7.77	3.66	.17*	−.20*	−.33**	.39**	.84**	.09	.13	−.32**	−.46**	.38**	—	
12. Appraisal SS	7.65	3.12	.17*	−.17*	−.28**	.27**	.28**	.68**	.17*	−.29**	−.42**	.35**	.25**	—

Note: $n = 156$; *$p < .05$, **$p < .01$.

Table 3
Comparisons between Models 1 to 4, in Study 1

Model fit				Model comparisons				
Model	χ^2	$\Delta d.f.$	AIC	Comparison	$\Delta\chi^2$	$\Delta d.f.$	p	ΔAIC
M1. Stability	66.2**	31	160.2					
M2. Direct	52.2**	26	156.2	1. Stability vs. direct	14.0	5	.02	4.0
M3. Reverse	65.0**	26	169.0	2. Stability vs. reverse	1.2	5	.95	8.8
M4. Reciprocal	51.0**	21	165.0	3. Stability vs. reciprocal	15.2	10	.12	4.8
				4. Direct vs. reciprocal	1.2	5	.95	8.8
				5. Reverse vs. reciprocal	14.0	5	.01	4.0

Note: Direct (gratitude → stress, depression, and social support), reverse (stress, depression, and social support → gratitude), and reciprocal (positive feedback loop); see also Table 1. **$p < .01$.
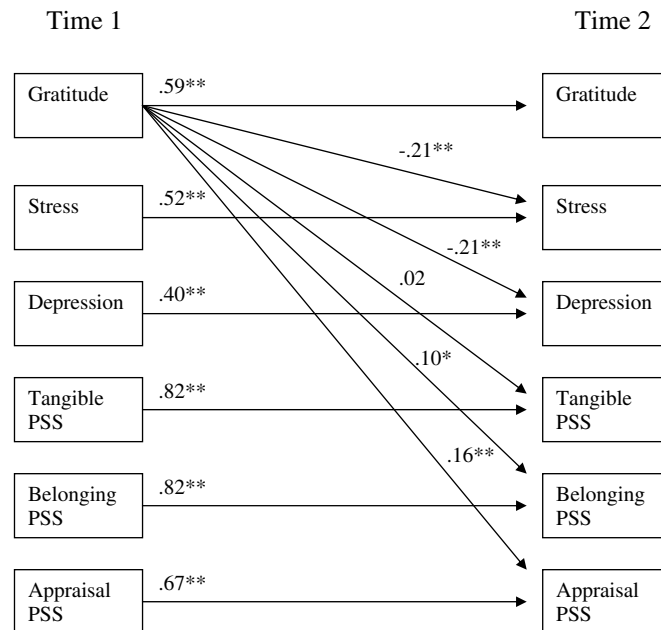

Fig. 2. The results of the structural equation analysis for Model 1 in Study 2. For clarity, in this diagram the intercorrelations between the variables at each wave and the error variances of endogenous variables have been omitted. *$p < .05$, **$p < .01$.

model did not indicate an improvement in fit over the direct model, suggesting that on the basis of parsimony, the direct model provides the best fit for the data.

Examination of the AIC provided results consistent with the chi squared comparisons. The AIC indicated that the reverse and reciprocal models were considerably inferior to the stability model, presumably because of low parsimony. The reciprocal model was a considerably superior to the reverse model, presumably because the reciprocal model included paths from gratitude to social support and well-being. The direct model was considerably superior to both the stability and reciprocal models. These results suggest that on the basis of parsimony, the direct model is to be preferred to any other model.

The results clearly indicated that a model whereby gratitude leads to social support and well-being (the direct model) is better supported by the data than (a) a model were well-being and social support lead to gratitude (the reverse model), or (b) a model were gratitude is reciprocally related to well-being and social support in a positive feedback loop (the reciprocal model). The direct model also provided a good fit to the data (SRMR = .06; CFI = .97).

3.2.3. Mediational models

Table 1 shows six mediation models which could explain the relationships between gratitude, social support and well-being. The four models where gratitude acts as either an outcome or a mediator can be ruled out, as

the results of the model comparisons show that neither social support, stress, or depression, lead to gratitude (so gratitude cannot be downstream of any other variable). However, it remained possible that social support mediated the relationship between gratitude and well-being (Mediational Model 1), or well-being mediated the relationship between gratitude and social support (Mediational Model 2).

Mediation Models 1 and 2 were sequentially tested using the Cole and Maxwell (2003) procedure. There was no support for Model 1, as the mediators (T1 tangible, belonging, and appraisal social support) did not lead to the T2 outcome (T2 stress, and depression) (largest $\beta = -.09$, $p = .25$) with the T1 values of the outcome controlled, failing to meet Step b. There was also no support for Model 2, as the mediators (T1 stress and depression) again did not lead to the T2 outcome (T2 tangible, belonging, and appraisal social support) (largest $\beta = .08$, $p = .30$), with T1 levels of the outcome controlled. The results ruled out the possibility of each of the mediational models, suggesting that there was a direct relationship between gratitude, and social support, stress, and depression, which is not mediated by any other variable.

3.3. Brief discussion

In Study 1, over time gratitude was shown to lead to higher levels of appraisal and belonging social support, and lower stress and depression (controlling for past values of all of the variables). No variable led to gratitude over time. Comparison of five models of directionality using structural equation modeling showed that the direct model better represented the data than reverse, reciprocal, or mediational models (see Table 1).

This is the first study to show that (a) gratitude leads to the development of social support during a life transition and (b) gratitude naturally leads to improved levels of stress and depression, which complements the existing experimental findings that therapeutically increasing gratitude causes decreases in depression. However, it was not clear from Study 1 whether the observed relationships between gratitude, social support, stress, and depression could be explained by other personality variables. This was examined in Study 2.

4. Study 2

4.1. Introduction

Study 2 had two primary aims. First, the study aimed to replicate the results of Study 1. Several models were tested, and it is possible that the outcome capitalized on chance. Confidence in the robustness of the findings would be increased through replication with a second sample from the same population. Second, Study 2 aimed to test the Big Five personality traits as a potential third variable explanations of the relationship between gratitude, social support, and well-being (Model 6 in Table 1).

Study 1 showed that gratitude lead to improving levels of social support, stress, and depression over time. It is however possible that these relationships are simply a reflection of the higher order personality traits to which gratitude is related. This would not change the interpretation of Study 1, as the direction of the relationship between gratitude and social support, stress, and depression would remain the same. However, gratitude may only led to social support, stress, and depression due the effect of higher order personality traits, rather than playing a unique role in social support and well-being. This finding would question the value of studying gratitude in relation to these variables, when a large literature already exists regarding the relationship between high order personality traits and social support, stress, and depression (Barnett & Gotlib, 1988; Costa & McCrae, 1980; Roberts & Gotlib, 1997).

It is quite possible that higher order personality traits could explain the findings of Study 1. There is general agreement that the Big Five personality traits of extraversion, neuroticism, openness to experience, conscientiousness, and agreeableness represent most (but not necessarily all) of personality at the highest level of abstraction (Goldberg, 1993; McCrae & Costa, 1987, 1999). McCullough et al. (2002) showed that gratitude was correlated with each of the Big Five traits, which have themselves been linked to well-being (Barnett & Gotlib, 1988; Costa & McCrae, 1980). For example, Neuroticism has been shown to lead to both depression and perceived social support (Roberts & Gotlib, 1997). It is possible that gratitude only leads to social support and well-being due to its shared variance with one of more Big Five traits.

4.2. Method

4.2.1. Participants and procedure

Eighty seven (75 female, 12 male) first year undergraduate students completed measures at two time points. Participants were aged between 18 and 30 years old (with 94.2% of participants aged below 21), and predominantly reported their ethnicity as White (81.6%), or Indian (9.2%).

Participants again completed measures at the start and end of the first semester, approximately three months apart, and followed the same procedure as Study 1. All participants completed all measures at both time points, with the exception of the Big Five, which was only assessed at T1.

4.2.2. Measures

4.2.2.1. Measures from Study 1. Participants completed the GQ6 (McCullough et al., 2002), Belonging, Appraisal, and Tangible social support scales of the ISSEL (Cohen et al., 1983), CES-D (Radloff, 1977), and Perceived Stress Scale (Cohen & Williamson, 1988), as in Study 2.

4.2.2.2. Depression. In addition to the CES-D the study also used the SDHS (Joseph, Linley, Harwood, Lewis, & McCollam, 2004), as a second measure of depression. Six items (three reverse coded) measure depressive states (e.g. "I felt my life was meaningless"), and the absence of positive states. Participants rate how frequently they feel the way described in the item on a four point scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often). The SDHS has excellent convergent validity with other measures of depression (Joseph et al., 2004).

4.2.2.3. Big Five. The Big Five personality traits (extraversion, agreeableness, neuroticism, openness to experience, and conscientiousness) were measured with the 48-item Big Five Inventory (BFI: John & Srivastava, 1999). Each trait is measured with between 8 to 10 positively and negatively worded statements, with which participants rate themselves on a 1 ("strongly disagree") to 5 ("strongly agree") scale. Each of the sub-scales has a Cronbach's alpha and test–retest reliability ranging from .79 to .90, and has very high convergent validity with other measures of the Big Five. After correcting for unreliability, each of the sub-scales correlates with the corresponding scales of the NEO PI-R (see Costa & McCrae, 1995) and Trait Descriptive Adjectives (TDA; Goldberg, 1992) at between $r = .83$ and $r = .99$ (mean $r = .94$) (John & Srivastava, 1999). The BFI has become one of the most frequently used measures of the Big Five.

4.2.3. Data analysis

The data analysis strategy followed Study 2, additionally covarying the effect of the Big Five. In each of the models paths were included from each of the T1 Big Five variables to every T2 variable. Any relationship observed between T1 and T2 variables would therefore exist independently of the effect of the Big Five personality traits.

4.3. Results

4.3.1. Preliminary analysis

Table 4 shows descriptive statistics and intercorrelations between each of the variables. Each scale had a three month test–retest validity between .58 and .73. In the current sample, at both time points gratitude correlated with social support, stress, and depression. At T1 gratitude was also correlated with extraversion and agreeableness, and negatively correlated with neuroticism.

4.3.2. Model comparisons

Comparisons between the fit of each of the models are provided in Table 5. In each of these models the effect of the Big Five is covaried. As in Study 1, the models were first compared with nested comparisons of chi squared values, and additionally examined with the AIC.

In the first comparison, the direct model provided a better fit than the stability model. T1 gratitude significantly led to lower levels of T2 stress, depression (measured with the CES-D), and higher levels of tangible

Table 4
Descriptive statistics and intercorrelations between Study 2 variables

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
T1																					
1. Gratitude	35.13	4.40	—																		
2. CES-D	12.22	9.49	−.48**	—																	
3. Stress	16.07	6.58	−.30**	.70**	—																
4. SDHS	20.47	2.97	−.60**	.83**	.57**	—															
5. Tangible PSS	10.06	1.76	.39**	−.45**	−.33**	−.49**	—														
6. Belonging PSS	9.18	2.67	.58**	−.61**	−.44**	−.66**	.50**	—													
7. Appraisal PSS	9.52	2.67	.29**	−.60**	−.45**	−.47**	.43**	.38**	—												
8. Extraversion	22.63	4.98	.31**	−.44**	−.28**	−.44**	.37**	.25*	.25*	—											
9. Agreeableness	33.94	4.17	.49**	−.28**	−.22*	−.30**	.26*	.27*	.14	.21	—										
10. Cons.	29.83	4.89	.10	−.24*	−.24*	−.05	.10	.18	.16	.15	.11	—									
11. Neuroticism	24.10	5.69	−.28**	.58**	.64**	.51**	−.30**	−.34**	−.25*	−.36**	−.35**	−.01	—								
12. Openness	33.60	5.05	.12	−.08	−.01	−.07	−.08	.01	.04	.09	.19	.08	−.12	—							
T2																					
13. Gratitude	36.59	3.94	.73**	−.47**	−.28**	−.53**	.41**	.48**	.23*	.33**	.50**	.17	−.28**	.07	—						
14. CES-D	11.44	8.11	−.48**	.65**	.49**	.63**	−.44**	−.46**	−.34**	−.39**	−.31**	−.20	.41**	.03	−.54**	—					
15. Stress	15.15	5.93	−.42**	.56**	.68**	.51**	−.39**	−.34**	−.32**	−.28**	−.32**	−.17	.60**	−.01	−.48**	.69**	—				
16. SDHS	20.55	2.57	.51**	−.60**	−.43**	.65**	.39**	.47**	.36**	.32**	.35**	.10	−.44**	.03	.57**	−.75**	−.61**	—			
17. Tangible PSS	10.14	1.36	.39**	−.45**	−.33**	−.54**	.61**	.40**	.48**	.22*	.20	.03	−.27*	−.04	.33**	−.45**	−.35**	.34**	—		
18.Belonging PSS	9.16	2.13	.45**	−.53**	−.34**	−.58**	.49**	.63**	.34**	.34**	.31**	.14	−.38*	−.10	.47**	−.61**	−.37**	.52**	.33**	—	
19. Appraisal PSS	10.52	2.32	.38**	−.54**	−.38**	−.48**	.42**	.39**	.58**	.30**	.11	.15	−.20	−.17	.32**	−.57**	−.24*	.49**	.45**	.59**	—

Note: $n = 87$; $^*p < .05$; $^{**}p < .01$; T1, Time 1; T2, Time 2; PSS, Perceived Social Support.

Table 5
Comparisons between Models 1 to 4 (with the effect of the Big Five covaried), in Study 2

Model fit				Comparison	Model comparisons			
Model	χ^2	$\Delta d.f.$	AIC		$\Delta \chi^2$	$\Delta d.f.$	p	ΔAIC
M1. Stability	62.1**	42	358.1					
M2. Direct	44.6**	36	352.6	1. Stability vs. direct	17.5	6	<.01	5.5
M3. Reverse	58.1**	36	366.1	2. Stability vs. reverse	4.0	6	.40	8.0
M4. Reciprocal	40.6**	30	360.6	3. Stability vs. reciprocal	21.5	12	.04	2.5
				4. Direct vs. reciprocal	4.0	6	.40	8.0
				5. Reverse vs. reciprocal	17.5	6	<.01	5.5

Note: Direct (gratitude → stress, depression, and social support), reverse (stress, depression, and social support → gratitude), and reciprocal (positive feedback loop); see also Table 1. ** $p < .01$.

and appraisal social support (However, gratitude did not lead to belonging social support, $\beta = .08$, $p > .47$, and the relationship between T1 gratitude and the SHDS failed to meet conventional levels of significance, $\beta = -.18$, $p = .09$). These significant results are illustrated in Fig. 3. In contrast, the reverse model did not provide a better fit than the stability model. None of the paths from T1 stress, depression, or social support significantly lead to T2 gratitude (largest $\beta = .18$, $p > .23$). The reciprocal model did improve fit over both the stability model and the reverse model, presumably as the reciprocal model included paths from gratitude to social support and well-being. However, the reciprocal model did not provide a better fit than the direct model, suggesting that on the basis of parsimony, the direct model provides the best fit for the data.

Examination of the AIC provided results that mirrored Study 1, and were consistent with the chi squared comparisons. The AIC indicated that the reverse and reciprocal models were considerably inferior to the stability model, presumably because of low parsimony. The reciprocal model was a considerably superior to the reverse model, presumably because the reciprocal model included paths from gratitude to social support and well-being. The direct model was considerably superior to both the stability and reciprocal models. These results suggest that on the basis of parsimony, the direct model is to be preferred to any other model.

Both the nested chi squared comparison and the AIC indicated that the direct model best represented the data. The overall fit of the direct model was also very good (CFI = .99, SRMR = .03).
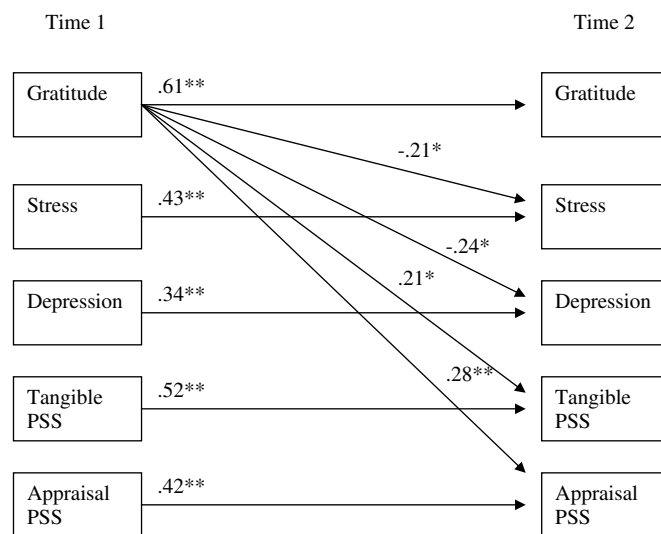

Fig. 3. The results of the structural equation analysis for Model 1 in Study 3. For clarity, in this diagram the intercorrelations between the variables at each wave, the error variances of endogenous variables, and non-significant pathways have been omitted. * $p < .05$, ** $p < .01$.

4.3.3. Mediational models

The six mediational models in Table 1 were again tested with Cole and Maxwell's (2003) longitudinal adaptation of Baron and Kenny's (1986) procedure. As in Study 1, the four models where gratitude acts as either an outcome or a mediator can be ruled out, as the results of the model comparisons show that neither stress, CES-D, or social support lead to gratitude. The remaining models, where social support mediated the relationship between gratitude and stress and CES-D (Mediational Model 5i), or stress and CES-D mediated the relationship between gratitude and social support (Mediational 5ii), remained possible.

Mediation Models 5i and 5ii were sequentially tested using the Cole and Maxwell (2003) procedure. Model 5i could also be ruled out, as the potential mediators (T1 tangible or appraisal social support), did not lead to the T2 outcome (T2 stress or depression) with the T1 values of the outcome controlled (largest $\beta = -.13$, $p > .13$).

In Model 5ii, stress could be ruled out as a mediator between gratitude and social support, as T1 stress did not lead to T2 tangible or appraisal social support (largest $\beta = -.03$, $p > .82$). However, mediation by depression could not be ruled out, as depression significantly lead to both appraisal social support ($\beta = -.31$, $p = .02$) and tangible social support ($\beta = -.29$, $p > .03$). To see whether these effects were attributable to the Big Five, we also ran the analysis without the Big Five represented in the model. The results were nearly identical with or without the Big Five covaried.

4.4. Discussion

Study 2 largely replicated the results of Study 1, additionally showing that gratitude lead to stress, depression, tangible and appraisal social support above the effect of the Big Five. As in the earlier study gratitude lead to other variables, but no other variable lead to gratitude. Direct comparison of the direct, reverse, and reciprocal models showed that the direct model best fit the data. Additionally, five out of six of the mediational models were ruled out, although depression mediating the relationship between gratitude and social support remains a possibility.

The finding that gratitude leads to well-being and social support above the effect of Big Five is important, as it suggests a unique role for gratitude in well-being and social life, as suggested by McCullough et al. (2002). The study of gratitude seems able to provide information about peoples lives above what can be explained by superordinate personality traits.

5. General discussion

Two studies investigated the role of gratitude in social support, stress, and depression. Both studies provided direct tests between six equally plausible models of the direction of the relationships between gratitude and other variables. A consistent picture emerged: over time gratitude leads to social support, stress, and depression, and there is no evidence for reverse or reciprocal relationships. To our knowledge, these are the first longitudinal studies of gratitude to suggest how gratitude operates during a life transition, and to consider how gratitude is related to social support.

5.1. Implications

We see the study as having four key implications, including aiding the interpretation of cross-sectional findings, supporting gratitude interventions, suggesting the unique importance of gratitude, and more generally in demonstrating the utility of SEM in analyzing longitudinal designs.

First, showing the direction of the relationship between gratitude, stress, depression and social support allows better interpretation of previous cross-sectional findings regarding the role of gratitude in well-being and social life (McCullough et al., 2002). Some (e.g. Lyubomirsky et al., 2005) have speculated that the grateful personality leads to emotional benefits, and this research provides empirical verification of this view.

Second, the results also support calls for the use of gratitude interventions in clinical practice (Bono et al., 2004; Seligman, 2005a). Previously, experimental evidence had shown the short term efficacy of

increasing gratitude to reduce depression and increase happiness (Duckworth et al., 2005; Emmons & McCullough, 2003). Showing that gratitude naturally leads to improved social support and well-being during a life transition suggests that the interventions may have longer term effect, and that increasing gratitude is a legitimate goal of therapy. Potentially, giving people the skills to increase their gratitude may be as beneficial as such cognitive behavioral life skills as challenging negative beliefs (Beck, 1976; Hawton, Salkovskis, Kirk, & Clark, 1989). Indeed, such approaches may be complimentary; there are increasing calls for therapies to consider focusing on the positive alongside the negative (Duckworth et al., 2005; Joseph & Linley, 2006).

Third, Study 2 suggests a unique role of gratitude in well-being. McCullough et al. (2002) showed that the cross-sectional relationship between gratitude and well-being was independent of the Big Five. The current results provide the complimentary finding that over time gratitude leads to lower stress and depression and higher levels of social support above the effect of the Big Five. These findings help support McCullough et al.'s position that gratitude is uniquely important to well-being and social life.

Fourth, the results demonstrate the use of SEM to analyze longitudinal designs. Cross-lagged panel designs have a long history in personality and social psychology (Finkel, 1995), and SEM analysis are becoming increasingly common (MacCallum & Austin, 2000), but only rarely are these analysis used together as discussed in Sections 3.1 and 4.2, SEM provides a particularly versatile analytic method for cross-lagged panels, overcoming limitations with other methods, and allowing the testing of reciprocal models of directionality. Zapf et al. (1996) argues convincingly for the utility of this approach, although it is only seen very rarely (e.g. de Jonge et al., 2001). The essential approach of comparing different models of directionality can be beneficially applied to a large number of questions in personality and social psychology, and hopefully this paper will provide an illustration of the utility of this approach.

5.2. Limitations

There are a number of limitations to the present study. First, the sample sizes were relatively small. However, militating against this was the consistent replication across the studies, and the statistical significance of almost all key paths.

Second, the study used only one population undergoing a particular life transition over a relatively brief time period. The generalizability of the findings would be improved through replication in other diverse populations. However, college students adapting to university are arguably an important population in their own right (cf. Brissette et al., 2002), and this population and time frame has been described as ideal for capturing the developmental essence of social support (Cohen & Wills, 1985).

Third, longitudinal studies cannot strictly be used to infer causality, as there will always be possible third variables which could account for the results (although some authors have argued that the present cross-lagged design can strongly infer causality, e.g. Zapf et al., 1996). Ruling out the Big Five as third variables was valuable as these variables have been shown to be correlated with both gratitude (McCullough et al., 2002), and social support and well-being (Barnett & Gotlib, 1988; Costa & McCrae, 1980; Roberts & Gotlib, 1997). Additionally, as these traits represent personality at the highest level of abstraction, if only a limited number of traits could be included in the study these seemed a logical place to start. Having ruled out the effect of the Big Five, future research may wish to alternatively consider removing the effect of lower order variables (e.g. empathy or spirituality), or the individual domains of the Big Five (e.g. operationalized through the NEO, Costa & McCrae, 1995). However, the purpose of the present studies was not concerned with establishing causality, but aimed to test the direction between gratitude and other variables, and the direction of these relationships are unlikely to be affected by possible third variables. Given that longitudinal designs can conclusively show directionality but not causality, we consider the results to be complimentary with the previous experimental studies (Emmons & McCullough, 2003; Seligman et al., 2005). The present study adds to the knowledge provided by the experimental studies by investigating reverse and reciprocal causality, investigating the role of gratitude in social support, and through showing how gratitude naturally operates during a life transition. Only combined with the previous studies does to be a picture begin to appear where gratitude plays a causal role in social life and well-being.

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References

Barnett, P. A., & Gotlib, I. H. (1988). Psychosocial functioning and depression—distinguishing among antecedents, concomitants, and consequences. *Psychological Bulletin, 104*, 97–126.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and prosocial behavior: Helping when it costs you. *Psychological Science, 17*, 319–325.

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. Oxford, England: International Universities Press.

Bono, G., Emmons, R. A., & McCullough, M. E. (2004). Gratitude in practice and the practice of gratitude. In P. A. Linley & S. Joseph (Eds.), *Positive psychology in practice* (pp. 464–481). Hoboken, NJ, US: John Wiley & Sons, Inc.

Brissette, I., Scheier, M. F., & Carver, C. S. (2002). The role of optimism in social network development, coping, and psychological adjustment during a life transition. *Journal of Personality and Social Psychology, 82*, 102–111.

Burnham, K. P., & Anderson, D. R. (2002). *Model selection and multimodel inference: A practical information-theoretic approach* (Second ed.). New York: Springer-Verlag.

Carey, J. R., Clicque, S. H., Leighton, B. A., & Milton, F. (1976). Test of positive reinforcement of customers. *Journal of Marketing, 40*, 98–100.

Cohen, S., & Hoberman, H. (1983). Positive events and social supports as buffers of life change stress. *Journal of Applied Social Psychology, 13*, 99–125.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 385–396.

Cohen, S., Mermelstein, R., Kamarck, T., & Hoberman, H. (1985). Measuring the functional components of social support. In I. G. Sarason & B. R. Sarason (Eds.). *Social support: Theory, research and application* (pp. 74–94). The Hague, Holland: Martinus Nijhoff.

Cohen, S., & Williamson, G. (1988). Perceived stress in a probability sample of the united states. In S. Spacapam & S. Oskamp (Eds.), *The social psychology of health*. Newbury Park, CA: Sage.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*, 310–357.

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology, 112*, 558–577.

Collins, L. M., Graham, J. W., & Flaherty, B. P. (1998). An alternative framework for defining mediation. *Multivariate Behavioral Research, 33*, 295–312.

Costa, P. T., & McCrae, R. R. (1980). Influence of extraversion and neuroticism on subjective well-being—happy and unhappy people. *Journal of Personality and Social Psychology, 38*, 668–678.

Costa, P. T., & McCrae, R. R. (1995). Domains and facets: Hierarchical personality assessment using the revised NEO personality inventory. *Journal of Personality Assessment, 64*, 21–50.

Coyne, J. C. (1976). Toward an interactional description of depression. *Psychiatry—Interpersonal and Biological Processes, 39*, 28–40.

de Jonge, J., Dormann, C., Janssen, P. P. M., Dollard, M. F., Landeweerd, J. A., & Nijhuis, F. J. N. (2001). Testing reciprocal relationships between job characteristics and psychological well-being: A cross-lagged structural equation model. *Journal of Occupational and Organizational Psychology, 74*, 29–46.

Duckworth, A. L., Steen, T. A., & Seligman, M. E. P. (2005). Positive psychology in clinical practice. *Annual Review of Clinical Psychology, 1*, 629–651.

Emmons, R. A., & Crumpler, C. A. (2000). Gratitude as a human strength: Appraising the evidence. *Journal of Social and Clinical Psychology, 19*, 56–69.

Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology, 84*, 377–389.

Evans, J. et al. ALSPAC Study Team. (2005). Negative self-schemas and the onset of depression in women: Longitudinal study. *British Journal of Psychiatry, 186*, 302–307.

Fassinger, R. E. (1987). Use of structural equation modeling in counseling psychology research. *Journal of Counseling Psychology, 34*, 425–436.

Feldman, J. (1975). Considerations in use of casual correlational techniques in applied-psychology. *Journal of Applied Psychology, 60*, 663–670.

Finkel, S. E. (1995). *Causal analysis with panel data*. Thousand Oaks, CA: Sage Publications.

Frazier, P. A., Tix, A. P., & Barron, K. E. (2004). Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology, 51*, 115–134.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology—the broaden-and-build theory of positive emotions. *American Psychologist, 56*, 218–226.

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.

Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychological Science, 13*, 172–175.

Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crises? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology, 84*, 365–376.

Gable, S. L., & Haidt, J. (2005). What (and why) is positive psychology?. *Review of General Psychology 9*, 103–110.

Giesler, R. B., Josephs, R. A., & Swann, W. B. (1996). Self-verification in clinical depression: The desire for negative evaluation. *Journal of Abnormal Psychology, 105*, 358–368.

Goldberg, L. R. (1992). The development of markers for the big-five factor structure. *Psychological Assessment, 4*, 26–42.

Goldberg, L. R. (1993). The structure of phenotypic personality-traits. *American Psychologist, 48*, 26–34.

Harpman, E. J. (2004). Gratitude in the history of ideas. In R. A. Emmons & M. E. McCullough (Eds.), *The psychology of gratitude* (pp. 19–36). New York: Oxford University Press.

Hawton, K., Salkovskis, P. M., Kirk, J., & Clark, D. M. (1989). *Cognitive behaviour therapy for psychiatric problems: A practical guide*. New York: Oxford University Press.

Hogan, B. E., Linden, W., & Najarian, B. (2002). Social support interventions—do they work? *Clinical Psychology Review, 22*, 381–440.

Hoyle, R. H., & Panter, A. T. (1995). Writing about structural equation modeling. In R. H. Hoyle (Ed.). *Structural equation modeling: Concepts, issues, and applications* (pp. 158–176). Thousand Oaks, CA: Sage Publications.

Hu, L. T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods, 3*, 424–453.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.

John, O. P., & Srivastava, S. (1999). The big five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.) (Handbook of personality: Theory and research. second ed., pp. 102–138). New York, NY: Guilford Press.

Joiner, T. E., Alfano, M. S., & Metalsky, G. I. (1993). Caught in the crossfire—depression, self-consistency, self-enhancement, and the response of others. *Journal of Social and Clinical Psychology, 12*, 113–134.

Joseph, S., & Linley, P. A. (2006). *Positive therapy: A meta-theory for positive psychological practice*. New York: Routledge.

Joseph, S., Linley, P. A., Harwood, J., Lewis, C. A., & McCollam, P. (2004). Rapid assessment of well-being: The short depression-happiness scale. *Psychology and Psychotherapy: Theory, Research, and Practice, 77*, 1–14.

Lakey, B., & Drew, J. B. (1997). A social-cognitive perspective on social support. In G. R. Pierce, B. Lakey, I. G. Sarason, & B. R. Sarason (Eds.), *Sourcebook of social support and personality* (pp. 107–140). New York: Plemum Press.

Lakey, B., McCabe, K. M., Fisicaro, S. A., & Drew, J. B. (1996). Environmental and personal determinants of support perceptions: Three generalizability studies. *Journal of Personality and Social Psychology, 70*, 1270–1280.

Lee, S., & Hershberger, S. (1990). A simple rule for generating equivalent models in covariance structure modeling. *Multivariate Behavioral Research, 25*, 313–334.

Linley, P. A., Joseph, S., Harrington, S., & Wood, A. M. (2006). Positive psychology: Past, present, and (possible) future. *The Journal of Positive Psychology, 1*, 3–16.

Lyubomirsky, S., Sheldon, K. M., & Schkade, D. (2005). Pursuing happiness: The architecture of sustainable change. *Review of General Psychology, 9*, 111–131.

MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology, 51*, 201–226.

MacCallum, R. C., Roznowski, M., & Necowitz, L. B. (1992). Model modifications in covariance structure-analysis—the problem of capitalization on chance. *Psychological Bulletin, 111*, 490–504.

MacCallum, R. C., Wegener, D. T., Uchino, B. N., & Fabrigar, L. R. (1993). The problem of equivalent models in applications of covariance structure-analysis. *Psychological Bulletin, 114*, 185–199.

Maruyama, G. (1997). *Basics of structural equation modeling*. Thousand Oaks, CA: Sage Publications.

McCrae, R. R., & Costa, P. T. (1987). Validation of the 5-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*, 81–90.

McCrae, R. R., & Costa, P. T. (1999). A five-factor theory of personality. In L. A. Pervin & O. P. E. John (Eds.) (Handbook of personality: Theory and research second ed., pp. 139–154). New York: Guilford Press.

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*, 112–127.

McCullough, M. E., Kilpatrick, S. D., Emmons, R. A., & Larson, D. B. (2001). Is gratitude a moral affect? *Psychological Bulletin, 127*, 249–266.

McCullough, M. E., Tsang, J.-A., & Emmons, R. A. (2004). Gratitude in intermediate affective terrain: Links of grateful moods to individual differences and daily emotional experience. *Journal of Personality and Social Psychology, 86*, 295–309.

McDowell, I., & Kristjansson, E. (1996). Depression. In I. McDowell & C. Newell (Eds.), *Measuring health: A guide to rating scales and questionnaires* (2nd ed., pp. 238–286). Oxford: Oxford University Press.

Monroe, S. M., Connell, M. M., Bromet, E. J., & Steiner, S. C. (1986). Social support, life events, and depressive symptoms—a 1-year prospective-study. *Journal of Consulting and Clinical Psychology, 54*, 424–431.

Monroe, S. M., Harkness, K., Simons, A. D., & Thase, M. E. (2001). Life stress and the symptoms of major depression. *Journal of Nervous and Mental Disease, 189*, 168–175.

Pierce, G. R., Lakey, B., Sarason, I. G., & Sarason, B. R. (Eds.). (1997). *Sourcebook of social support and personality*. New York: Plemum Press.

Radloff, L. S. (1977). The ces-d scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385–401.

Rind, B., & Bordia, P. (1995). Effect of servers thank-you and personalization on restaurant tipping. *Journal of Applied Social Psychology, 25*, 745–751.

Roberts, J. E., & Gotlib, I. H. (1997). Social support and personality in depression: Implications from quantitative genetics. In G. R. Pierce, B. Lakey, I. G. Sarason, & B. R. Sarason (Eds.), *Sourcebook of social support and personality* (pp. 187–214). New York: Plemum Press.

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling* (second ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Segrin, C., & Flora, J. (2000). Poor social skills are a vulnerability factor in the development of psychosocial problems. *Human Communication Research, 26*, 489–514.

Seligman, M. E. P. (2005a). Positive interventions. In *Paper presented at the fourth international positive psychology summit*, Washington, DC.

Seligman, M. E. P. (2005b). Positive interventions. In *Paper presented at the fourth international positive psychology summit*.

Seligman, M. E. P., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist, 60*, 410–421.

Shaver, P. R., & Brennan, K. (1990). Measures of depression and loneliness. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes. Measures of social psychological attitudes* (vol. 1, pp. 195–290). London: Academic Press.

Sheldon, K. M., & Houser-Marko, L. (2001). Self-concordance, goal attainment, and the pursuit of happiness: Can there be an upward spiral? *Journal of Personality and Social Psychology, 80*, 152–165.

Swann, W. B., Wenzlaff, R. M., Krull, D. S., & Pelham, B. W. (1992). Allure of negative feedback—self-verification strivings among depressed persons. *Journal of Abnormal Psychology, 101*, 293–306.

Tomarken, A. J., & Waller, N. G. (2003). Potential problems with "Well fitting" models. *Journal of Abnormal Psychology, 112*, 578–598.

Tomarken, A. J., & Waller, N. G. (2005). Structural equation modeling: Strengths, limitations, and misconceptions. *Annual Review of Clinical Psychology, 1*, 31–65.

Tsang, J.-A. (2006). Gratitude and prosocial behaviour: An experimental test of gratitude. *Cognition & Emotion, 20*, 138–148.

Wood, A. M., Joseph, S., & Linley, P. A. (2007). Coping style as a psychological resource of grateful people. *Journal of Social and Clinical Psychology, 26*, 1108–1125.

Wood, A. M., Maltby, J., Stewart, N., & Joseph, S. (2008). Conceptualizing gratitude and appreciation as a unitary personality trait. *Personality and Individual Differences, 44*, 619–630.

Wood, A.M., Maltby, J., Stewart, N., Linley, P.A., & Joseph, S. (in press). A social-cognitive model of trait and state levels of gratitude. Emotion.

Zapf, D., Dormann, C., & Frese, M. (1996). Longitudinal studies in organizational stress research: A review of the literature with reference to methodological issues. *Journal of Occupational Health Psychology, 1*, 145–169.