

# Gratefulness and Subjective Well-Being: Social Connectedness and Presence of Meaning as Mediators

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The association between gratefulness and well-being is well established; however, few studies have examined the mechanisms that underlie this association. The broaden-and-build theory (Fredrickson, 1998, 2001) posits that positive emotions broaden individuals' momentary thought-action repertoires, which serve to build personal resources that can be drawn upon during future stressful encounters. Based on this theory, the current study examined whether gratefulness, a positive emotion, would build social and cognitive resources in terms of social connectedness and presence of meaning in life (i.e., mediators), which subsequently contribute to subjective well-being (SWB). A total of 232 students participated in an online survey at 2 different time points (3 months apart). The mediational hypothesis was tested by latent change score analyses using structural equation modeling techniques. The results showed that changes in gratefulness predicted changes in social connectedness and presence of meaning in life, which, in turn, predicted changes in SWB. The study's findings provided further support for the broaden-and-build theory and suggested that gratefulness is an important positive emotion that contributes to SWB through increased social connectedness and a greater presence of meaning in life.

## Public Significance Statement

This study aimed to explore how gratefulness is linked to well-being. Our findings suggest that gratefulness increases a sense of social connectedness as well as presence of meaning in life, which, in turn, are associated with greater well-being.

**Keywords:** gratefulness, mediators, latent change scores, structural equation modeling, subjective well-being

**Supplemental materials:** <http://dx.doi.org/10.1037/cou0000271.supp>

Gratefulness has been described as a positive emotion that is preceded by the perception that one has benefited from the intentional, voluntary, and altruistic action of another person (McCullough, Kimeldorf, & Cohen, 2008). However, the current view on gratefulness posits that it involves more than being appreciative of the helpful actions of others (Wood, Joseph, & Maltby, 2008). For example, gratefulness is described as a felt sense of wonder, thankfulness, and appreciation for life (Emmons & Shelton, 2002, p. 460). Similarly, a new framework for gratefulness conceptualizes it as a positive emotion that orients people "towards noticing and appreciating the positive in life" (Wood, Froh, & Geraghty, 2010, p. 891). These views suggest

that gratefulness can be an emotional response toward nonsocial resources (e.g., nature, God), which does not involve receiving aid. The association between gratefulness and well-being is well documented (e.g., Emmons & McCullough, 2003; McCullough, Tsang, & Emmons, 2004; Wood et al., 2010). It is important to note that the current study examines gratitude as an emotion or gratefulness, which differs from acts of gratitude (e.g., writing a thank-you letter).

*Subjective well-being* (SWB) is defined as "a person's cognitive and affective evaluations of his or her life" (Diener, Lucas, & Oishi, 2002, p. 63). It is assessed with life satisfaction, positive affect, and happiness in the current study. *Life satisfaction* refers to cognitive judgment about one's life as satisfying (Diener, Emmons, Larsen, & Griffin, 1985). Positive affect assesses the affective component of SWB. Accordingly, life satisfaction and positive affect correspond to the two major components of SWB. Diener (1994) indicated that broader measures of well-being are useful because they tap into more global psychological well-being phenomena. A global happiness assessment that reflects both cognitive and affective components of well-being has been designed (Lyubomirsky & Lepper, 1999). Diener (1984) delineated that three hallmarks of SWB measures include subjectivity, positive experience, and a global assessment of one's life. The happiness

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This study was presented at the 125th Annual Convention of the American Psychological Association, Washington, DC.

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construct meets these criteria and is thus included as an additional component of SWB in the current study.

Wood et al. (2010) called for more research to establish the underlying mechanisms of the gratefulness-well-being association in their review on gratitude. According to the broaden-and-build theory (Fredrickson, 1998, 2001), positive emotions *broaden* the individuals' scope of attention as well as momentary repertoires of thoughts and behaviors, prompting them to pursue a wide range of actions and thoughts. Over time, the thought-action repertoires of positive emotions *build* personal resources that may help individuals cope with subsequent stressful encounters (Fredrickson, 2004). Gratefulness is described as a positive emotion that would serve the broaden-and-build function (Fredrickson, 2004). This longitudinal study responds to Wood et al.'s call for further research about the gratefulness/well-being association by examining whether gratefulness contributes to the development of the social and cognitive resources in terms of social connectedness and presence of meaning, which are subsequently associated with SWB.

### Social Connectedness as a Mediator

Social connectedness is defined as an aspect of the self that reflects "subjective awareness of being in close relationship with the social world in toto" (Lee & Robbins, 1998, p. 338). The aggregate of the individuals' proximal and distal relationships are incorporated into their sense of connectedness with the social world (Lee, Draper, & Lee, 2001). Individuals with high levels of social connectedness are likely to feel close to others, perceive others as friendly, and are motivated to be involved in social groups and activities (Lee et al., 2001). The association between social connectedness and well-being indicators such as SWB, self-reported mental health, and happiness, has been well documented (e.g., Brown, Hoyer, & Nicholson, 2012; Satici, Uysal, & Deniz, 2016).

Social connectedness is viewed as a global aspect of the self and differs from other social engagement constructs such as social support and belongingness, which are more specific constructs (K. L. Williams & Galliher, 2006). Belongingness represents a human drive to form and maintain a minimum quantity of interpersonal relationships (Baumeister & Leary, 1995). It is dependent on or defined by group membership or peer affiliation (Lee & Robbins, 1995). Perceived social support relates to the perception that assistance from significant others would be available when needed (Thoits, 2010). It is also affected by specific relationships (Lee & Robbins, 1995). Accordingly, social support and belongingness are considered temporary, group-specific forms of belonging (Lee & Robbins, 1998). In contrast, social connectedness refers to the perception of being part of the social world and not just with specific groups. It reflects internal beliefs about the self in relation to others (Lee et al., 2001) and is thus not susceptible to temporal changes in relationships or social interactions.

Gratefulness is likely to be associated with social connectedness, which predicts SWB. Based on the broaden-and-build theory (Fredrickson, 2001), as a positive emotion, gratefulness is likely to broaden an individual's scope of attention as well as momentary thought-action repertoires to build one's internal sense of belonging to the world (i.e., social connectedness). For instance, gratefulness can draw people's attention to the benevolence of others,

which will make people feel loved and cared for by others and facilitate a sense of connection (McCullough, Kilpatrick, Emmons, & Larson, 2001). Additionally, gratefulness has been found to motivate prosocial repertoires such as increased willingness to offer emotional support to others (Emmons & McCullough, 2003). Over time, these repertoires can build the individuals' resource of social connectedness (Emmons & Shelton, 2002). Other studies also showed that gratefulness is associated with relationship formation (Algoe, Haidt, & Gable, 2008) as well as relationship connection and satisfaction (Algoe, Gable, & Maisel, 2010). Thus, both theory and empirical evidences suggest that gratefulness is likely to benefit new and ongoing social relationships and engender a greater sense of social connectedness, which is associated with SWB.

### Presence of Meaning in Life as a Mediator

Meaning in life is positively related to many well-being indices (e.g., Shin & Steger, 2014; Steger & Frazier, 2005). It is defined as "the sense made of, and significance felt regarding, the nature of one's being and existence" (Steger, Frazier, Oishi, & Kaler, 2006, p. 81). Several scholars (e.g., Abeyta, Routledge, Juhl, & Robinson, 2015; King, Heintzelman, & Ward, 2016) have indicated that it is important to understand the predictors of meaning in life. Some of the identified predictors include religious faith (Hicks & King, 2008), financial resources (e.g., Ward & King, 2016), and positive affect (King, Hicks, Krull, & Del Gaiso, 2006). We are aware of only one cross-sectional study (Datu & Mateo, 2015) that examined gratitude as a predictor of meaning in life. Therefore, the current study aims to advance the literature on the association between gratefulness and meaning in life using a longitudinal design.

Steger (2009) maintained that there are two facets of meaning in life, namely, presence of meaning and searching for meaning. The former refers to the subjective sense that one's life is meaningful (i.e., life is experienced as meaningful), and the latter is defined as the drive toward finding meaning in one's life (Steger et al., 2006). These two facets are two separate constructs and have distinct patterns of correlates, such that they are only weakly and inconsistently related to one another (Steger & Kashdan, 2007). For example, although presence of meaning in life has been found to be positively associated with well-being outcomes such as life satisfaction and positive emotions, searching for meaning is positively associated with negative outcomes such as negative affect, depressive mood, and neuroticism (Steger et al., 2006). The negative effects of searching for meaning in life can be attributed to the absence of or deficit in meaning, which, in turn, activates the process to seek meaning (Steger & Kashdan, 2007).

Presence of meaning in life may be the underlying mechanism between gratefulness and SWB. Consistent with the broaden-and-build theory, gratefulness may help broaden one's appreciation and attention to positive and meaningful things in life, which, in turn, enhances the perception of life as significant. Watkins, Woodward, Stone, and Kolts (2003) suggested that gratefulness is likely to enhance the experience of positive events and the encoding and retrieval of positive events, both of which may be associated with increased appreciation of life and its meaning. The current conceptualization of gratefulness as an emotion that orients one toward "noticing and appreciating the positive in life" (Wood et al.,

2010, p. 891) indicates that when people feel grateful, they may be likely to appreciate the positive things they possess but also their existence. Indeed, when people are grateful, they positively frame events and circumstances (e.g., Lambert, Fincham, & Stillman, 2012). This suggests that gratefulness may help people notice that life has value, worth, and importance. This realization makes life more meaningful and enhances well-being (Datu & Mateo, 2015).

Empirical evidence has linked gratefulness to other components that also define meaning in life. For example, the emotional experience of gratitude is associated with purpose in life (Wood et al., 2008) as well as a sense of coherence (Lambert, Graham, Fincham, & Stillman, 2009), which refers to the beliefs that life is manageable and comprehensible (Antonovsky, 1993). These findings suggest gratefulness is likely to cultivate the feeling that life is meaningful, which predicts SWB. Thus, both the conceptualization of gratefulness and empirical findings support presence of meaning in life as a potential mediator in the gratefulness–SWB link. On the other hand, when people are grateful and experience their life as meaningful, they are not likely to view their lives as lacking in meaning and, in turn, engage in a search for meaning. There is also no research evidence that supports searching for meaning would mediate between gratefulness and well-being (Datu & Mateo, 2015). Thus, only presence of meaning was hypothesized as a mediator.

Datu and Mateo (2015) showed that presence of meaning in life (but not searching for meaning) was a mediator between gratitude and life satisfaction among Filipino adolescents. The current study differs from Datu and Mateo's study in several ways. First, their study was cross-sectional in nature, which allows inferences only based on interindividual differences, whereas the current study employed a longitudinal design, which has the advantage of identifying intraindividual changes and their interrelationships (Schaie, 2005). Second, Datu and Mateo's study used manifest variables that may be contaminated by measurement errors, and the Sobel (1982) test for examining the indirect effects, which tends to be underpowered because of potential violation of the normality assumption (e.g., Beasley, 2014; Hayes, 2009; Preacher & Hayes, 2008). The current study instead used structural equation modeling (SEM) with latent variables to account for measurement errors, and conducted the more powerful bootstrap test of mediation, which does not rely on distributional assumption. Third, participants in Datu and Mateo's study consisted of Filipino adolescents, whereas the majority of the participants in the current study were European American college students.

### Current Study

This study hypothesized that changes in gratefulness would predict changes in social connectedness and presence of meaning, which, in turn, would predict changes in SWB (see Figure 1). We also tested one alternative model. Based on the broaden-and-build theory (Fredrickson, 2001), SWB could be conceptualized as a positive emotion that helps build resources, which, in turn, predict increased gratefulness. Although the extant literature provides more support for the causal direction from gratefulness to SWB (Emmons & McCullough, 2003; Wood, Maltby, Gillett, Linley, & Joseph, 2008), this alternative model tests whether change in SWB predicts change in social connectedness and presence of meaning, which, in turn, predicts change in gratefulness.

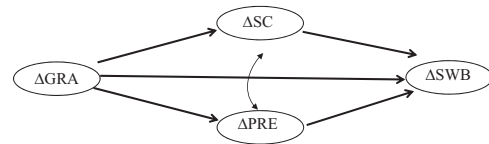


Figure 1. Hypothesized mediation model concerning the dynamics among multiple change processes. An ellipse with  $\Delta$  in it denotes latent change. GRA = gratefulness; SC = social connectedness; PRE = presence of meaning in life; SWB = subjective well-being.

In essence, this study examines whether changes in gratefulness would predict changes in social connectedness and presence of meaning in life, which, in turn, predict changes in SWB. Cross-sectional designs and/or oversimplified longitudinal analysis are inadequate for drawing inferences about change processes that occur within individuals. For example, some studies have analyzed longitudinal data in a static fashion and used individual differences in predictor levels at baseline to explain individual differences in the levels of mediator and outcome at follow-up, without explicitly modeling intraindividual change processes. Only when the interrelations are established between changes in predictors and changes in mediators and outcomes may the interventions to change the predictors and/or mediators be duly justified (Reuter et al., 2010; Scholz, Nagy, Göhner, Luszczynska, & Kliegel, 2009; Steyer, Eid, & Schwenkmezger, 1997).

With at least three waves of panel data, one can employ latent growth curves to portray intraindividual change over time by estimating two growth parameters (i.e., initial level and rate of change), and then use growth parameters of the predictor variable to predict those of the outcome variable (Lorenz, Wickrama, & Conger, 2004). However, response rates to online surveys are typically lower, and the problem of biased sample selection due to dropout is even more problematic for longitudinal data collection (Kraut et al., 2004). Too much “missingness” could also result in nonconvergence of solution and/or lack of identification of key parameters, even with the aid of full information maximum likelihood (FIML) estimator under certain assumptions (King, King, et al., 2006). As a tradeoff between assessing change and mitigating selection bias, this study collected data repeatedly from the same sample across two time points.

Although a simple difference score is still commonly applied to two waves of panel data (e.g., R. H. Williams & Zimmerman, 1996; Zumbo, 1999), latent change score (LCS)<sup>1</sup> modeling offers an advantage over traditional change score analysis by producing an optimally reliable latent change score across measurement occasions and enhancing the power of change analysis. Instead of calculating the change score using simple subtraction, the LCS modeling specifies change in a latent variable framework to mimic the difference between the levels of error-free scores (Hawley, Ho, Zuroff, & Blatt, 2006; McArdle, 2001, 2009). LCS is considered to be more flexible than growth curve models, which often require at least three time points, and more capable of capturing change

<sup>1</sup> We follow Ferrer and McArdle (2010) to use the label of “latent change score” instead of “latent difference score,” in that the latter typically refers to differences across individuals in contrast with the intended intraindividual changes, which is the focus of the current study.

patterns than cross-lagged analysis, which does not explicitly model a change score (Li, Fay, Frese, Harms, & Gao, 2014). Recent work has provided support for the reliability and validity of LCS approach (e.g., Hawley et al., 2006; McArdle, Hamagami, Meredith, & Bradway, 2000; see Ferrer & McArdle, 2010, for a review). Thus, we also utilized LCS within the framework of SEM to explore whether changes in gratefulness predict changes in the mediators and outcome.

## Method

### Participants and Procedure

An e-mail invitation was sent to students ( $N = 1,102$ ). The e-mail addresses were obtained at the beginning of the fall semester from the Office of Institutional Research at a Midwestern university. At Time 1, participants were informed that the purpose of the research was to study gratitude and well-being, and that they would complete an online survey at two different time points. When the participants clicked on the web link, they were directed to an informed consent page. Next, the respondents completed demographic information and the study measures, which were the same for Time 1 and Time 2. The measures were randomly ordered in the survey. Participants could enter a raffle drawing for one of three \$20 gift cards by clicking a separate survey link. Two follow-up e-mail reminders were sent at Time 1.

At Time 1, 272 (25% response rate; 272 of 1,102) agreed on the informed consent. Among these, five individuals responded only to the demographic questions and were omitted from the data. In addition, 14 people were removed because they missed more than 20% of the total items. There were 21 people who answered incorrectly on two validity questions (i.e., "Please answer 2 for this item") and were removed. Thus, the total sample was 232 participants. Of these participants, 213 (81%) had complete data at the item level.

At Time 2 (3 months after Time 1), the 232 participants were contacted again and asked to complete the Time 2 survey. Two reminder e-mails were sent. A total of 142 participants responded to the survey, and six people were omitted from the data set because they missed more than 20% of the total items. In addition, seven people answered the two validity questions incorrectly. Thus, the total sample was 129. The response rate for Time 2 was 56% (129 of 232), and 114 (89%) had complete data at the item level.

The FIML estimation in Mplus Version 7 (Muthén & Muthén, 1998–2012) was used to handle variable-level missing data, which has been shown to produce unbiased parameter estimates and standard errors under MAR (missing at random) and MCAR (missing completely at random). Instead of imputing missing values, FIML estimates directly model parameters and standard errors by using all available data for each case or observation and maximizing the accumulated case-wise likelihood functions (Enders, 2001; Enders & Bandalos, 2001).

The final sample was 232 participants, with 54 males (23%) and 176 (76%) females (one person was transgender and one person responded "other"). About 79% participants identified as Caucasian/White, 12% as African American, 3% as Asian American, 2% as Latino/a American, 1% as Multiracial American, and 1% of people responded "other." Regarding socioeconomic status (SES),

13% of participants reported "lower" SES, 34% reported "lower middle" SES, 37% reported "middle" SES, 13% indicated "upper middle" SES, 2% indicated "upper" SES, and 2% reported "other." Participants' age ranged from 18 to 57 years old ( $M = 28.4$ ,  $SD = 9.30$ ). Nearly 43% of the participants were in a dating relationship, about 33% were single, and 23% of the participants were married. There were 148 undergraduate students (64%), 76 graduate students (33%), and the remaining eight participants responded "other."

### Measures

**Gratefulness.** The Gratitude Adjectives Checklist (GAC; McCullough, Emmons, & Tsang, 2002) consists of three adjectives: *grateful*, *thankful*, and *appreciative*. Participants rated the items from 1 (*inaccurate*) to 9 (*accurate*) to indicate how accurately the items described them since yesterday. The Cronbach's alpha for GAC was .85 among a sample of undergraduate students (Nezlek, Newman, & Thrash, 2017), and .92 and .95 at Time 1 and Time 2, respectively, in the current study. Convergent validity was evidenced by positive correlations with positive affect and life satisfaction among a predominantly White sample (McCullough et al., 2002).

**Social connectedness.** The 20-item Social Connectedness Scale (Lee et al., 2001) measures the degree of emotional closeness between an individual and their social world. Participants responded to the items (e.g., I feel disconnected from the world around me) on a Likert scale from 1 (*strongly agree*) to 6 (*strongly disagree*). Higher scores indicate greater sense of social connectedness. The Cronbach's alpha was .91 in a sample of a predominantly White college students (Lee & Robbins, 1995), and .95 and .94 at Time 1 and Time 2, respectively, in the current study. Construct validity of the scale was evidenced by negative associations with loneliness and social avoidance among a predominantly White college sample (Lee et al., 2001).

**Presence of meaning in life.** The five-item Presence of Meaning subscale from the Meaning in Life Questionnaire (Steger et al., 2006) assesses the extent to which one perceives meaning to be present in one's life. An example of the item is "I have a good sense of what makes my life meaningful." Items are rated on a 1 (*absolutely untrue*) to 7 (*absolutely true*) Likert scale. Higher scores represent greater presence of meaning. Cronbach's alpha of the subscale was .82 in a sample of mostly White college students (Steger et al., 2006), and .92 both at Time 1 and Time 2 in the current study. Convergent validity of the subscale was supported by positive correlation with the scores on Purpose in Life Test scale (Steger et al., 2006).

**Life satisfaction.** The five-item Satisfaction with Life Scale (Diener et al., 1985) measures the cognitive domain of SWB. Items are rated from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicate greater satisfaction with life. Cronbach's alpha was .87 in a college sample (Diener et al., 1985), and .87 and .89 at Time 1 and Time 2, respectively, in the current study. Construct validity was demonstrated through a negative correlation with negative affect in a sample of mostly White college students (Larsen, Diener, & Emmons, 1985).

**Positive affect.** The 10-item Positive Affect Subscale comes from the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). Items are rated from 1 (*very slightly or not at all*)



to 5 (*extremely*). Higher scores indicated greater positive affect. Cronbach's alpha was .87 in a predominantly European American college sample (Hardin, Weigold, Robitschek, & Nixon, 2007), and .92 and .93 at Time 1 and Time 2, respectively, in this study. Construct validity was evidenced by negative correlation with scores on a distress scale in a predominantly European American undergraduate sample (Hardin et al., 2007).

**Happiness.** The four-item Subjective Happiness Scale (Lyubomirsky & Lepper, 1999) was used to measure happiness. Items are rated from 1 (*very unhappy*) to 7 (*very happy*). Higher score indicate higher levels of happiness. Cronbach's alpha for the scale was .88 among a large U.S. college sample (Lyubomirsky & Lepper, 1999), and .88 and .85 at Time 1 and Time 2, respectively, in the current study. Convergent validity was evidenced through positive association with optimism scores in an undergraduate sample (Lyubomirsky & Lepper, 1999).

**Latent variables.** Latent variables for each construct were created to account for measurement error. The three items from the GAC served as indicators of the gratefulness latent variable. For social connectedness and presence of meaning, based on the recommendations of Russell, Kahn, Spoth, and Altmaier (1998), we created three parcels of items as indicators for each of these latent variables. Item parceling can cancel out random and systematic error by aggregating across these errors, thereby improving model fit (Bagozzi & Edwards, 1998; Bagozzi & Heatherton, 1994). We conducted an exploratory factor analysis with a forced one-factor solution for each construct to create the parcels. That is, the items on the social connectedness and presence of meaning scales were rank ordered based on the magnitude of their factor loadings. Next, a pair of two items with the highest and the lowest factor loadings were assigned successively to each parcel to equalize the average loadings across parcels. Lastly, Satisfaction With Life, Positive Affect, and Happiness scales served as indicators of the SWB latent variable (see Table 1 in supplemental material for parcel descriptive statistics and correlations).

## Results

### Preliminary Analyses

Analyses of variance (ANOVAs) were conducted for each of the three dependent variables (life satisfaction, happiness, and positive affect) to examine whether they varied as a function of the categorical demographic variables (i.e., race/ethnicity, sex, SES, relationship status, academic major). Bonferroni adjustment ( $p$  value =  $.05/15 = .003$ ) was used to keep the familywise alpha value at .05. There were no significant findings from the ANOVA analyses. Correlation analyses were conducted for the continuous demographic variables (i.e., age, level of education). Age was positively associated with happiness at  $T_1$  ( $r = .14, p = .040$ ). Level of education was positively correlated with satisfaction in life at  $T_1$  ( $r = .22, p = .002$ ) and at  $T_2$  ( $r = .24, p = .002$ ), and happiness at  $T_1$  ( $r = .14, p = .038$ ) and at  $T_2$  ( $r = .20, p = .020$ ).

### Data Analytic Strategy

We used LCS with multiple indicators to test the hypothesized model (McArdle, 2001; McArdle & Hamagami, 2004; Selig & Preacher, 2009). The analyses proceeded in four steps. First, a

confirmatory factor analysis (CFA) of the measurement model was fit to examine how well the latent variables were defined by their corresponding indicators (Anderson & Gerbing, 1988). Second, a univariate LCS model with multiple indicators was fit to derive the latent change score for each of the four major constructs. Third, building on the four univariate LCS models, we estimated and assessed the hypothesized mediation model. Finally, an alternative model was fit and compared with the hypothesized model. Analyses were performed with Mplus Version 7 (Muthén & Muthén, 1998-2012). A bootstrapping method was used to test the significance level of the indirect effects (Shrout & Bolger, 2002).

### CFA of the Measurement Model

The measurement model was first estimated by correlating all eight latent variables (four distinct constructs measured repeatedly across two time points). Three fit indices were examined to assess the goodness of fit for the model (Hu & Bentler, 1999): the comparative fit index (CFI; values  $\geq .95$  indicate that the model adequately fits the data), the root mean square error approximation (RMSEA; values  $\leq .06$  indicate that the model adequately fits the data), and the standardized root mean square residual (SRMR; values  $\leq .08$  indicate that the model adequately fits the data). For the measurement model,  $\chi^2(220, N = 232) = 368.72, p < .001$ , CFI = .96, RMSEA = .05, 90% confidence interval (CI) [.04, .06], SRMR = .06. These values indicate that the model provided a good fit to the data. The completely standardized loadings of the 24 indicators on the latent variables (see Table 2 in the online supplemental materials) were mainly greater than .6 (except for two), and all were statistically significant at  $p < .001$ , suggesting that the latent variables were defined well by the measured variables. The correlations among the latent variables are presented in Table 3 in the online supplemental materials.

### Univariate LCS Model With Multiple Indicators

LCS models comprise a general modeling approach to accommodating various specifications for change in one or multiple variables (Ferrer & McArdle, 2010; McArdle, 2001). Again, LCS models do not calculate the true change score directly. Instead, fixed parameters and hypothesized latent variables are used to represent dynamic change in terms of the difference between adjacent waves. In order to make sure that the variance in latent change score is not confounded by measurement errors, we relied on multiple measurements of the same construct at each point in time. Using multiple indicators at each occasion provides several advantages. In addition to adding validity and reliability to each assessment, correlating measurement residuals can account for method variance among repeated measurements of each indicator. Multiple indicators can also correct for the potentially inflated variance estimate of each construct as a result of measurement error, thus improving the precision of the change scores (Newsom, 2015).

Take *gratefulness* for example (as shown in Figure 2, and the same steps were followed for the other three latent constructs). The same three items (grateful, thankful, appreciative) were used as indicators of the latent construct of gratefulness at each of the two time points. The  $T_1$  (denoted by  $\eta_{11}$ ) and  $T_2$  (denoted by  $\eta_{12}$ ) level constructs of gratefulness, respectively, were identified with the

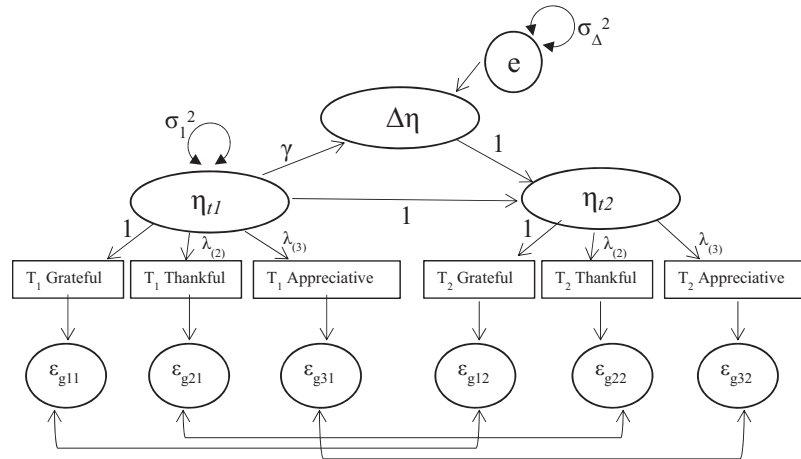


Figure 2. Model specification for the univariate LCS model for gratefulness.  $\Delta\eta$  represents the latent change for the latent construct of gratefulness from  $T_1$  ( $\eta_{t1}$ ) to  $T_2$  ( $\eta_{t2}$ ), each of which was measured by the same set of three indicators. Although the factor loading associated with the referent indicator (i.e., both  $T_1$  and  $T_2$  Grateful) was fixed at the value of 1, the remainder factor loadings were freely estimated but constrained to be equal for repeated indicators to account for measurement invariance (i.e.,  $\lambda_{(2)}$  for both  $T_1$  and  $T_2$  Thankful and  $\lambda_{(3)}$  for both  $T_1$  and  $T_2$  Appreciative), and all measurement residuals associated with repeated indicators were correlated with each other to account for stable specific variance and improve model fit. By including a set of fixed-unit-valued coefficients (i.e., 1),  $\eta_{t2}$  was specified as the sum of  $\eta_{t1}$  and  $\Delta\eta$ . In turn,  $\Delta\eta$  was predicted by  $\eta_{t1}$  with the regression coefficient being freely estimated as  $\gamma$ . The variances (or residual variances) were also freely estimated for  $\eta_{t1}$  (i.e.,  $\sigma_{12}$ ) and  $\Delta\eta$  (i.e.,  $\sigma_{\Delta 2}$ ).

same referent indicator (e.g., grateful), and measurement invariance was established by imposing equality constraints on factor loadings for each repeated indicator. All measurement residuals associated with repeated indicators were allowed to correlate to account for stable specific variance and improve model fit (Newson, 2015; Selig & Preacher, 2009).

By including a set of fixed unit-valued coefficients (i.e., 1), furthermore, the  $T_2$  level construct (i.e.,  $\eta_{t2}$ ) was specified as the sum of  $T_1$  level construct (i.e.,  $\eta_{t1}$ ), and the latent change score (i.e.,  $\Delta\eta$ ), such that

$$\eta_{t2} = (1)\eta_{t1} + (1)\Delta\eta.$$

As a result, the latent change score was defined as “the part of the score of  $\eta_{t2}$  that is not identical to  $\eta_{t1}$ ” (McArdle, 2009, p. 583). In turn, latent score  $\Delta\eta$  was predicted by  $\eta_{t1}$  to remove “the part of individual change that is related to the initial level” (McArdle, 2009, p. 583), such that

$$\Delta\eta = \gamma \cdot \eta_{t1} + e.$$

The coefficient  $\gamma$  was freely estimated, representing the autoregressive effect of the initial level on the latent change score. Likewise, the variances (or residual variances) were freely estimated for the  $T_1$  level construct (i.e.,  $\sigma_{12}$ ) and the latent change score (i.e.,  $\sigma_{\Delta 2}$ ), and if they were significantly different from 0, the  $T_1$  level construct and the latent change score associated with gratefulness could further predict or be predicted by the  $T_1$  level constructs and/or the latent change scores associated with other variables. Results (not shown) indicated that the variances (or residual variances) of the  $T_1$  level construct and the latent change score were all significantly different from zero for the four constructs of major interest in this study.

## Mediation in LCS Model

Building on the four univariate LCS models, this study hypothesized that, first, the association between the true change in gratefulness and that in SWB is both direct and indirect, as mediated by the true change in social connectedness as well as presence of meaning (see Figure 1). Of less importance, second, the cross-sectional  $T_1$  level constructs were hypothesized to be associated in a similar way, such that the true initial status of gratefulness was related to that of SWB, both directly and indirectly through the true initial status of social connectedness as well as presence of meaning. Given that the outcome was significantly correlated with age and level of education, the latter two were included as covariates that were specified to be correlated with exogenous constructs (i.e., the  $T_1$  level construct and the latent change score associated with gratefulness) and predictive of endogenous constructs (i.e., the  $T_1$  level constructs and the latent change scores associated with social connectedness, presence of meaning, and SWB).

Results (not shown) indicated that all the hypothesized paths were significant, except for  $\Delta\text{gratefulness} \rightarrow \Delta\text{SWB}$  ( $b = .135, p = 1.550$ ), and modification indices suggested no other potentially significant paths that could improve the model fit. Trimming the nonsignificant path ( $\Delta\text{gratefulness} \rightarrow \Delta\text{SWB}$ ) from the hypothesized model did not significantly increase the model chi square with the addition of one degree of freedom ( $\chi^2_{(1)} = 2.297, p = .130$ ). Based on the principle of parsimony, the final model was determined by removing the nonsignificant path (see Figure 3), which fit the data adequately,  $\chi^2 (N = 232) = 431.171, p < .001$ , CFI = .961, RMSEA = .052, 90% CI [.043, .061], SRMR = .061.

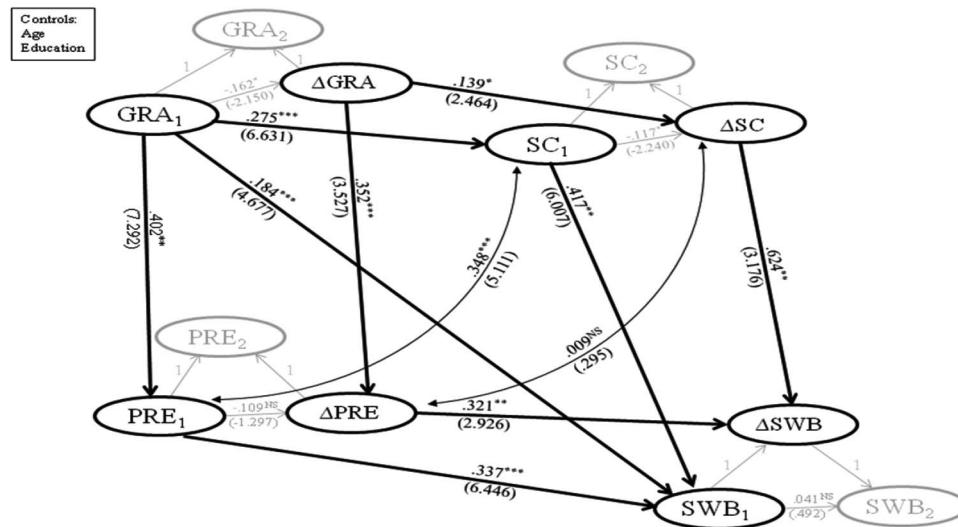


Figure 3. Final mediation model. An ellipse without  $\Delta$  in it denotes  $T_1$  level construct. An ellipse with  $\Delta$  in it denotes latent change. Paths and  $T_2$  level constructs in light gray were necessary for specifying the univariate latent change score for each variable (as shown in Figure 2) but less relevant for testing the overall mediation model. Age and level of education were included as covariates. All path coefficients were unstandardized with asymptotic  $z$  values in the parentheses. Model  $\chi^2_{(264)} = 428.874$ , RMSEA = .052, CFI = .961, BIC = 12853.309. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . GRA = gratitude; SC = social connectedness; PRE = presence of meaning in life; SWB = subjective well-being.

#### Test of mediation and significance levels of indirect effects.

Using the bootstrap procedure (Shrout & Bolger, 2002), we generated 5,000 bootstrap samples to compute bias-corrected 95% confidence intervals (BC 95% CI) for the indirect effects based on the trimmed mediation model (see Figure 3). An indirect effect is statistically significant at the .05 level if its CI does not include zero (Shrout & Bolger, 2002). In terms of the true initial status, the indirect effects of the  $T_1$  level of gratitude on the  $T_1$  level of SWB were significant through either the  $T_1$  level of social connectedness ( $b = .275 \times .417 = .114$ , BC 95% CI [.063, .187]) or the  $T_1$  level of presence of meaning ( $b = .402 \times .337 = .136$ , BC 95% CI [.079, .212]). Notably, these significant cross-sectional indirect effects reflected a snapshot of interindividual variability in the initial levels of related variables. In terms of the true change across two points in time, first, the indirect effect from gratitude to social connectedness to SWB ( $b = .139 \times .624 = .087$ , BC 95% CI [.005, .314]) was significant; and second, the indirect effect from gratitude to presence of meaning to SWB ( $b = .352 \times .321 = .113$ , BC 95% CI [.004, .512]) was significant.  $R^2$  was .92 for the initial level of SWB and .549 for the change in SWB. Therefore, our mediation model received substantial support from the data.

**Test of the alternative mediation model.** The alternative model consisted of true initial-level/latent-change regarding SWB predicting true initial-level/latent-change regarding social connectedness and presence of meaning, both of which in turn predicted true initial-level/latent-change regarding gratitude. The model was also a good fit to the data,  $\chi^2_{(232)} = 429.247$ ,  $p < .001$ , CFI = .961, RMSEA = .052, 90% CI [.043, .061], SRMR = .062. Because the models to be compared were not nested, the Bayesian information criterion (BIC) was used instead of the chi-square difference test, with smaller values indicating a better fit (Burnham

& Anderson, 2002). In essence, the trimmed hypothesized model had smaller BIC (12,850.16) compared with this alternative model with BIC of 12,853.68, and the BIC difference greater than 2 suggests “positive” evidence for one model being preferable to the other (Raftery, 1995). Moreover, the alternative model showed that not only did the indirect effects in terms of static associations fail to reach statistical significance for both  $T_1$  SWB  $\rightarrow$   $T_1$  social connectedness  $\rightarrow$   $T_1$  gratitude (95% BC CI [-3.916, .028]) and  $T_1$  SWB  $\rightarrow$   $T_1$  presence of meaning  $\rightarrow$   $T_1$  gratitude (95% BC CI [-5.446, .148])—the indirect effects in terms of interrelated changes were not significant for both  $\Delta$ SWB  $\rightarrow$   $\Delta$ social connectedness  $\rightarrow$   $\Delta$ gratitude (95% BC CI [-1.053, 4.675]) or  $\Delta$ SWB  $\rightarrow$   $\Delta$ presence of meaning  $\rightarrow$   $\Delta$ gratitude (95% BC CI [-.327, 8.70]). Thus, from a dynamic perspective, intraindividual change in social connectedness and presence of meaning may not mediate the effect of intraindividual change in SWB on intraindividual change in gratitude. Our data provided greater support for the hypothesized model (see Figure 1).<sup>2</sup>

<sup>2</sup> A supplemental analysis was conducted to include searching for meaning, both initial level and latent change score, in the hypothesized model as an additional mediator, and the result showed that both the indirect effects of  $T_1$  gratitude  $\rightarrow$   $T_1$  searching for meaning  $\rightarrow$   $T_1$  SWB ( $b = -.001$ , 95% BC CI [-.02, .003]) and  $\Delta$ gratitude  $\rightarrow$   $\Delta$ searching for meaning  $\rightarrow$   $\Delta$ SWB ( $b = .002$ , 95% BC CI [-.01, .04]) failed to reach significance, whereas the rest of the supplemental model closely resembled the hypothesized model. Consistent with previous research (Datu & Mateo, 2015), this study found no evidence that searching for meaning would mediate between gratitude and SWB, either from a static or a dynamic point of view.

## Discussion

The current study sought to test the broaden-and-build theory (Fredrickson, 1998, 2001) in the context of gratitude and SWB association. Our results supported this theory and suggested that the positive emotion of gratitude helps build the social and cognitive resources in terms of social connectedness and presence of meaning in life, which are effective in increasing SWB. The aim of this study responds to Wood et al.'s (2010) proposed research direction for gratitude, and our results demonstrated two mechanisms that could at least partially, if not fully, explain the association between gratitude and SWB.

The study's first hypothesis that change in gratitude would predict change in social connectedness, which, in turn, predicted change in SWB was supported. Our results coincide with the broaden-and-build theory and suggest that gratitude may help broaden students' thought-action repertoire in ways that strengthen their connection with others and sense of belonging to the social world. That is, perhaps cognitively, gratitude draws individuals' attention to new positive qualities in others (Algoe & Haidt, 2009) and increases perceived quality of relationship with others (Algoe et al., 2008). Behaviorally, perhaps gratitude broadens the scope of action through motivating individuals to participate in activities that strengthen relationship (Algoe & Haidt, 2009). These relationship-enhancing thought-action repertoires are likely to build the individuals' resource of social connectedness, which is linked to SWB.

The second hypothesis that change in gratitude would predict change in presence of meaning, which would predict change in SWB, was also supported. This finding also supports the broaden-and-build theory (Fredrickson, 2001). King, Hicks, et al. (2006) posited that positive affect helps broaden peoples' mind-sets, wherein they become more capable of connecting their personal meaning systems to current life experiences. Following this, it may be that gratitude also broadens one's mind and assists the person to more readily derive meaning from his or her current life experiences and to become more sensitive to meaning when it is present (King et al., 2006), all of which are associated with greater SWB. Alternatively, as an emotion that orients people toward noticing the positives in life (Wood et al., 2010), gratitude is likely to help individuals appreciate the positive aspects of existence. This may help people see the significance of their lives, and hence experience presence of meaning, which is associated with SWB. Our study's results are also congruent with and strengthen Datu and Mateo's (2015) findings with improved methodology and statistical analysis (the LCS approach).

The current study contributes to the literature in several ways. First, this study fills the gap in the literature regarding the underlying mechanisms of gratitude. Second, scholars have advocated for more research to examine the predictors of meaning in life (King et al., 2016). Our findings suggest that cultivating gratitude can be a starting point at which students become aware that there is meaning in their life. Third, our research utilized LCS to evaluate interrelationships among various constructs along with changes in those constructs over time, thus justifying the interventions to change predictors and/or mediators in clinical practices. Fourth, it has been noted that counseling psychologists and trainees lack training in specific behavioral skills and interventions drawn from positive psychological principles (Gerstein, 2006; Magyar-Moe, Owens, & Conoley, 2015).

Our results suggest there is a need for counseling psychology program to integrate in its training curricula positive psychological interventions that help cultivate positive emotional states such as gratitude.

## Clinical Implications, Limitations, and Future Directions

Interventions that cultivate gratitude include gratitude journals (Emmons & McCullough, 2003) and grateful contemplation (e.g., Koo, Algoe, Wilson, & Gilbert, 2008). Future studies should examine whether these interventions can lead to increased gratitude, which, in turn, increases social connectedness and presence of meaning. If the current results are replicated with clinical samples, counselors may include these low-cost and simple interventions that increase gratitude as part of homework assignments outside the clinical sessions. Furthermore, our study's findings suggest that clients with low social connectedness who feel interpersonally distant from others and have difficulty relating with the social world may benefit from being more grateful. In addition, counselors can help clients be aware of the benefits of gratitude on presence of meaning in life. Presence of meaning is associated with other indices of well-being (e.g., Zika & Chamberlain, 1992). Given the importance of meaning to human functioning, counselors can assist clients in cultivating this by helping them be more grateful.

LCS models are useful in identifying interrelations between processes over time, which, however, is not equivalent to causal inferences (Ferrer & McArdle, 2010). Future research could utilize experimental design or try to collect at least three waves of panel data to create temporal sequence between predictors, mediators, and outcomes (e.g., Selig & Preacher, 2009). The study's sample consisted of college students, and the majority of the sample was European American. Therefore, the results may not be generalizable to community samples, older or other ethnic minority individuals, or adults with different education levels. The study employed a monomethod of gathering data, which could be a potential source of bias. Furthermore, participants were informed that the study was about gratitude and well-being. Demand characteristics might have shaped their responses.

Gratitude may build other resources such as mindfulness, cognitive reappraisal, and self-compassion, which can be examined as additional mediators in future research. Moreover, gratitude could be related to different outcomes (e.g., perceived stress, depression) through different mechanisms (Wood, Joseph, & Linley, 2007). Thus, other outcomes merit attention in addition to SWB. Kleiman, Adams, Kashdan, and Riskind (2013) showed that gratitude predicted decreases in suicidal ideation by increasing meaning in life. In addition, a sense of belonging (i.e., social connectedness) is negatively associated with suicidal ideation (e.g., Joiner, 2005). Future studies can investigate whether gratitude can predict decreased suicidal ideation by increasing presence of meaning and social connectedness. Moreover, gratitude is associated with health symptoms, subjective stress, and sleep (Krause, 2006; Wood, Joseph, Lloyd, & Atkins, 2009). Future study can examine whether the positive effect of gratitude, social connectedness, and presence of meaning can be replicated with a wider variety of health outcomes.



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Received June 6, 2017

Revision received October 27, 2017

Accepted October 30, 2017 ■