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Conceptualizing gratitude and appreciation as a unitary personality trait

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Abstract

Gratitude and appreciation are currently measured using three self-report instruments, the GQ6 (1 scale), the Appreciation Scale (8 scales), and the GRAT (3 scales). Two studies were conducted to test how these three instruments are interrelated, whether they exist under the same higher order factor or factors, and whether gratitude and appreciation is a single or multi-factorial construct. In Study 1 ($N = 206$) all 12 scales were subjected to an exploratory factor analysis. Both parallel analysis and the minimum average partial method indicated a clear one-factor solution. In Study 2 ($N = 389$) multigroup confirmatory factor analysis supported the one-factor structure, demonstrated the invariance of this structure across gender, and ruled out the confounding effect of socially desirable responding. We conclude gratitude and appreciation are a single-factor personality trait. We suggest integration of gratitude and appreciation literatures and provide a clearer conceptualization of gratitude.

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1. Introduction

Gratitude has historically been a cornerstone of philosophical and theological accounts of human functioning and social life (Harpman, 2004). Within psychology, however, the study of gratitude has only attracted focused attention within the last five years (Emmons & Crumpler, 2000; Wood, Joseph, & Linley, 2007a), with research showing gratitude to be strongly related to well-being (e.g., Adler & Fagley, 2005; McCullough, Emmons, & Tsang, 2002; McCullough, Tsang, & Emmons, 2004; Watkins, Woodward, Stone, & Kolts, 2003; Wood, Joseph, & Linley, 2007b).

Three measures of gratitude and appreciation have been developed: the unidimensional GQ6 (McCullough et al., 2002), the multidimensional Appreciation Scale (Adler & Fagley, 2005), and the multidimensional GRAT (Watkins et al., 2003). The GQ6 focuses on the emotional experience of gratitude, assessed according to the how frequently and intensely gratitude is

Table 1
Description of the scales with characteristic items

| Instrument | Scale | No. of items | Brief description | Characteristic item |
|--------------------|------------------------|--------------|--|---|
| GG-6 | n/a | 6 | Assesses gratitude as a single factor, based on the frequency, intensity, and density of grateful affect | I have so much in life to be thankful for |
| Appreciation Scale | “Have” focus | 10 | A focus on the positive tangible and intangible assets that a person possesses | I reflect on how fortunate I am to have basic things in life like food, clothing, and shelter |
| | Awe | 6 | Frequency of feelings of awe | When I see natural beauty like Niagara Falls, I feel like a child who is awestruck |
| | Ritual | 6 | Performing regular behaviors to express gratitude | I use personal or religious rituals to remind myself to be thankful for things |
| | Present moment | 7 | Regularly focusing positive aspects in a given moment | I stop and enjoy my life as it is |
| | Self/social comparison | 5 | Positive feelings arising for appreciation of how life could be worse | When I see someone less fortunate than myself, I realize how lucky I am |
| | Gratitude | 10 | Behaviors designed to express gratitude | I say “please and “thank you” to indicate my appreciation |
| | Loss/adversity | 8 | Appreciation arising from the understanding nothing is permanent | Thinking about dying reminds me to live every day to the fullest |
| | Interpersonal | 5 | Gratitude towards other people | I reflect on how important my friends are to me |
| GRAT | Appreciation of others | 11 | Gratitude towards other people | I’m really thankful for friends and family |
| | Simple appreciation | 14 | Gratitude towards non-social sources | I think it’s really important to “stop and smell the roses” |
| | Sense of abundance | 17 | The absence of feelings of deprivation | I think life has handed me a short stick (reverse coded) |

experienced, as well as the range of events which elicit the emotion. The Appreciation Scale assesses eight dimensions: (1) appreciation of people, (2) possessions, (3) the present moment, (4) rituals, (5) feeling of awe, (6) social comparisons, (7) existential concerns, and (8) behavior which expresses gratitude. In the GRAT conception, gratitude involves: (1) appreciation of people, (2) appreciation of life, and (3) the absence of feelings of deprivation. Together these amount to 12 theoretically diverse conceptions of gratitude (see Table 1).

The designers of the three instruments used strong theoretical grounds to develop an *a priori* conception of gratitude and appreciation, and decided on the number of scales needed to assess the construct prior to factor analysis. A combination of exploratory and confirmatory factor analysis was then used to show that the items successfully grouped together into the previously designed scales. These scales have shown an excellent ability to predict well-being, and have been highly instrumental in the fast growth of gratitude research.

Implicitly, the 12 scales are conceptualized as lower order facets of a higher order gratitude construct. However, although both the Appreciation Scale and the GRAT used multiple scales to assess theoretically diverse conceptions of gratitude, neither showed that the scales assessed the same high order construct. Additionally, it is not clear whether this higher order construct is being assessed by both the Appreciation Scale, GRAT and GQ6. Indeed, to date no studies have tested for correlations between the three instruments, leaving open the question of whether the 12 scales are measuring multiple orthogonal higher order constructs. Knowing whether the 12 scales are assessing the same construct is important for theoretical and practical reasons.

There are clearly similarities between the conceptions, with both the GRAT and Appreciation Scale including two scales assessing gratitude towards people and appreciation of life, a conception that is also represented in the items of the GQ6. However, the Appreciation Scale considerably widens the conception of gratitude, including dimensions not represented in either instrument. Each of the 12 conceptions could be seen to be measuring the same latent concept, namely a grateful and appreciative outlook on life. If such a unifactorial model was supported, then this would encourage a new consensus in the field regarding what composes gratitude.

This paper reports two studies which examine the relationships between the 12 conceptions of gratitude and how many factors underlie the different conceptions. Study 1 reports correlations between the measures and an exploratory factor analysis (EFA). Study 2 reports a confirmatory factor analysis (CFA) to test the factor structure indicated in Study 1, and tests whether the factor structure is invariant across gender.

2. Study 1

2.1. *Participants and procedure*

Participants (123 female, 83 male) were aged between 18 and 82 ($M = 26.07$, $SD = 16.19$), and were predominantly of White ethnicity (87.4%), with the next most frequently represented ethnic groups being Chinese (3.4%) and Indian (3.4%). Participants were either recruited during an undergraduate class on research methods, or were recruited from the local community by one of three research assistants. All participants completed paper-and-pencil measures in small groups not greater than 20 people. Participation was voluntary and all participants were debriefed.

2.2. Measures

2.2.1. GQ6

The GQ6 (McCullough et al., 2002) contains six items measuring an unifactorial conception of gratitude. Items were designed to assess emotional *intensity*, *frequency*, and *density*. Items are rated on a 1 (“strongly agree”) to 7 (“strongly disagree”) scale. Psychometric development included demonstrating item-level factor structure (through EFA, CFA, and three CFA replications), convergent validity peer reports, unique correlations with well-being (controlling for social desirability), and discriminate validity from related traits.

2.2.2. Appreciation Scale

The Appreciation Scale (Adler & Fagley, 2005) contains 57 items, and eight scales (for descriptions and sample items, see Table 1). Questions are either answered on a 1 (“more than once a day”) to 7 (“never”) frequency scale, or a 1 (“strongly agree”) to 7 (“strongly disagree”) attitude scale. Psychometric development included item-level principal component analysis (PCA), correlations with well-being, known group validity (religious vs. non-religious), and through a structural equation model of a nomological net of appreciation and other variables.

2.2.3. GRAT

The GRAT (Watkins et al., 2003) contains 44 items, and three scales (for descriptions and sample items, see Table 1). Items are rated on a 1 (“strongly agree”) to 5 (“strongly disagree”) scale. Psychometric development included item-level component structure (through PCA), correlations with well-being (with several replications), and high test–retest reliability (over 2-weeks to 2-months).

2.3. Results

2.3.1. Preliminary analysis

Table 2 shows internal consistencies and intercorrelations between each of the scales. Each of the scales showed good internal consistency. With the exception of the Sense of Abundance scale, all the scales were intercorrelated (range $r = .21$ – $.72$). The Sense of Abundance scale showed low and/or non-significant correlations with several of the other scales. Consistent with previous work (e.g., Linley et al., 2007), gratitude was not substantially related to age. Gratitude was, however, significantly related to gender, with females having higher mean levels of each of the 12 conceptions.

2.3.2. Factor analysis

The 12 scales of gratitude were submitted to a maximum likelihood EFA. Bartlett’s test suggested that the data were suitable for an EFA ($\chi^2 [66] = 1352.35$, $p < .001$). There was a participant to variable ratio of 17:1 and the Kaiser–Meyer–Olkin (KMO) measure indicated that there was an adequate N (KMO = .891). The eigenvalues were 5.99, 1.32, .84, .80, .70, .54, .43, .38, .32, .25, .23, .19, and respectively accounted for 49.93%, 11.01%, 7.01%, 6.63%, 5.90%, 4.50%, 3.60%, 3.14%, 2.69%, 2.08%, 1.93% and 1.58% of the variance.

Table 2
Internal consistencies and intercorrelations in Study 1 (above diagonal) and Study 2 (below diagonal), with correlations corrected for unreliability in brackets

| | S1 α | S2 α | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|-------------|-------------|------------------|----------------|------------------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|------------------|-----------------|-----------------|-----------------|-----------------|
| 1. Gender | n/a | n/a | – | .06 (.06) | .20** (.24) | .21** (.25) | .17* (.20) | .22** (.25) | .19** (.21) | .26*** (.27) | .29*** (.32) | .24*** (.29) | –.07 (–.08) | .39*** (.42) | .18** (.20) | .15* (.16) |
| 2. Age | n/a | n/a | .11* (.11) | – | .09 (.11) | .13 (.15) | –.04 (–.05) | .21** (.24) | .08 (.09) | .01 (.01) | .17* (.19) | –.12 (–.15) | .16* (.17) | .20** (.21) | –.17 (–.18) | .09 (.10) |
| 3. Appreciation Scale – Have focus | .83 | .71 | .01 (.01) | –.02 (–.02) | – | .65*** (.91) | .54*** (.76) | .64*** (.87) | .64*** (.85) | .48*** (.58) | .65*** (.86) | .59*** (.85) | .34*** (.44) | .53*** (.67) | .50*** (.63) | .63*** (.82) |
| 4. Appreciation Scale – Awe | .73 | .72 | .05 (.06) | .01 (.01) | .72*** (1.00) | – | .60*** (.84) | .69*** (.93) | .57*** (.76) | .34*** (.41) | .56*** (.74) | .39*** (.56) | .13 (.17) | .68*** (.86) | .42*** (.53) | .46*** (.60) |
| 5. Appreciation Scale – Ritual | .81 | .71 | .10* (.12) | .05 (.06) | .64*** (.09) | .56*** (.78) | – | .47*** (.64) | .42*** (.56) | .34*** (.41) | .41*** (.54) | .37*** (.53) | .11 (.14) | .49*** (.62) | .50*** (.63) | .35*** (.46) |
| 6. Appreciation Scale – Present moment | .76 | .77 | .09 (.10) | .01 (.01) | .75*** (1.00) | .73*** (.98) | .61*** (.83) | – | .52*** (.67) | .39*** (.46) | .60*** (.76) | .36*** (.50) | .32*** (.39) | .72*** (.88) | .42*** (.51) | .48*** (.60) |
| 7. Appreciation Scale – Downward | .66 | .79 | (–.08) (–.09) | –.01 (–.01) | .76*** (1.00) | .64*** (.85) | .66*** (.88) | .68*** (.87) | – | .34*** (.39) | .67*** (.84) | .38*** (.52) | .03 (.04) | .45*** (.54) | .36*** (.43) | .40*** (.49) |
| 8. Appreciation Scale – Gratitude | .73 | .95 | .04 (.04) | .04 (.04) | .74*** (.90) | .60*** (.73) | .69*** (.84) | .69*** (.81) | .76*** (.88) | – | .41*** (.47) | .28*** (.35) | .33*** (.37) | .46*** (.51) | .53*** (.58) | .52*** (.59) |
| 9. Appreciation Scale – Loss/ adversity | .78 | .80 | –.05 (–.06) | .00 (.00) | .70*** (.93) | .56*** (.74) | .65*** (.86) | .63*** (.80) | .78*** (.98) | .73*** (.84) | – | .37*** (.50) | .10 (.12) | .53*** (.64) | .42*** (.50) | .44*** (.54) |
| 10. Appreciation Scale – Interpersonal | .72 | .68 | –.07 (–.08) | .01 (.01) | .69*** (.99) | .61*** (.87) | .60*** (.86) | .66*** (.91) | .70*** (.96) | .71*** (.88) | .66*** (.89) | – | .10 (.13) | .35*** (.46) | .34*** (.44) | .40*** (.53) |
| 11. GRAT – Sense of abundance | .93 | .86 | .03 (.03) | .00 (.00) | .81*** (1.00) | .76*** (.97) | .72*** (.92) | .81*** (1.00) | .78*** (.95) | .81*** (.90) | .73*** (.88) | .70*** (.92) | – | .21*** (.24) | .26*** (.30) | .51*** (.60) |
| 12. GRAT – Simple appreciation | .78 | .87 | –.10 (–.11) | –.40 (–.43) | .75*** (.95) | .63*** (.80) | .78*** (.99) | .69*** (.84) | .76*** (.92) | .84*** (.92) | .73*** (.88) | .68*** (.88) | .82*** (.95) | – | .55*** (.63) | .44*** (.52) |
| 13. GRAT – Appreciation of others | .79 | .88 | –.02 (.02) | .01 (.01) | .76*** (.96) | .66*** (.83) | .64*** (.81) | .72*** (.87) | .80*** (.96) | .82*** (.90) | .74*** (.88) | .78*** (1.00) | .80*** (.92) | .79*** (.90) | – | .49*** (.57) |
| 14. Gratitude questionnaire-6 | .70 | .83 | –.09 (–.10) | .01 (.01) | .45*** (.59) | .36*** (.47) | .38*** (.50) | .37*** (.46) | .48*** (.59) | .56*** (.63) | .39*** (.48) | .43*** (.57) | .47*** (.56) | .53*** (.62) | .57*** (.67) | – |
| 15. Social desirability | n/a | .92 | –.01 (–.01) | .10 (.10) | .01 (.01) | .00 (.00) | .01 (.07) | .06 (.07) | .02 (.02) | .03 (.03) | .01 (.01) | .07 (.09) | .00 (.00) | .04 (.04) | .06 (.07) | .06 (.07) |

Note: $N = 224$; Downward is downward comparison; $S1 \alpha =$ Cronbach's Alpha (Study 1); $S2 \alpha =$ Cronbach's Alpha (Study 2); * $p < .05$; ** $p < .01$; *** $p < .001$; gender is dummy coded 0 (male) and 1 (female). Values in brackets are correlations corrected for attenuation due to unreliability.

The decision on the number of factors to extract was based on both parallel analysis and the minimum average partial method (MAP). Monte Carlo analyses by Velicer, Eaton, and Fava (2000) and Zwick and Velicer (1986) have shown that of all of the criteria for deciding on the number of factors to extract (e.g. scree plot, Kaiser criterion), parallel analysis and MAP provide the most accurate results. Consistent results from both approaches would increase confidence that the correct number of factors had been extracted. As neither procedure is currently represented in the common statistical packages, we used the SPSS syntax developed by O'Connor (2000).

Parallel analysis involves identifying how many factors have eigenvalues higher than values which may be expected to occur through chance. Ten thousand random datasets were created, each of which had 206 cases and 12 variables. In 95% of the randomly generated datasets, the first five eigenvalues were respectively equal or less than 1.52, 1.37, 1.27, 1.19, and 1.12. Only the eigenvalue of the first factor in the real dataset exceeded these chance values, suggesting that one factor underlies the measures of gratitude.

The MAP involves separating common and unique variance, and only retaining factors comprised of common variance (see O'Connor, 2000). The MAP revealed average squared partial correlations of .215 with no components extracted, .036 with one component extracted, .041 with two extracted, and .050 with three extracted. The smallest ASPC was associated with the first component, again suggesting a one-factor solution.

Based on the parallel analysis and the MAP, one factor was extracted. Table 3 shows factor loadings. All scales loaded at above .30. Sense of Abundance had the lowest loading (.35), and all other scales loaded highly (range .53–.84).

2.4. Discussion

Study 1 presented intercorrelations between the 12 conceptions of gratitude, and suggested that all of the conceptions appear to exist under a single higher order gratitude factor. With the excep-

Table 3
Factor loadings for Study 1 and 2

| | Study 1 | Study 2 | |
|--|---------|---------|--------|
| | All | Male | Female |
| Appreciation Scale – Have focus | .84 | .88 | .84 |
| Appreciation Scale – Present moment | .80 | .85 | .79 |
| Appreciation Scale – Awe | .78 | .78 | .72 |
| GRAT – Simple appreciation | .75 | .89 | .89 |
| Appreciation Scale – Loss/adversity | .72 | .81 | .84 |
| Gratitude questionnaire-6 | .67 | .56 | .53 |
| Appreciation Scale – Downward comparison | .66 | .89 | .86 |
| Appreciation Scale – Ritual | .64 | .78 | .77 |
| GRAT – Appreciation of others | .62 | .89 | .91 |
| Appreciation Scale – Gratitude | .56 | .88 | .90 |
| Appreciation Scale – Interpersonal | .53 | .83 | .77 |
| GRAT – Sense of abundance | .35 | .94 | .89 |

Note: Study 1, Maximum Likelihood Factor Analysis, $N = 206$; Study 2, CFA, Female $n = 194$, Male $n = 195$.

tion of the Sense of Abundance scale, the conceptions of gratitude were significantly intercorrelated, and the size of the correlations were predominantly medium or large. The EFA revealed a clear single factor solution, as revealed through both parallel analysis and the MAP. Again with the exception of the Sense of Abundance scale, each of the measures of gratitude loaded highly on the single factor.

Taken together, with high intercorrelations between the scales, a strong indication of a one-factor structure and high factor loadings, Study 1 presents good preliminary evidence that each of the measures of gratitude are assessing a single unifactorial latent construct.

3. Study 2

3.1. Introduction

The first aim of Study 2 was to use multigroup CFA to test the fit and gender invariance of the one-factor structure suggested by Study 1. In Study 1 gender was correlated with each of the 12 conceptions of gratitude, raising the possibility that the factor structure of gratitude may be different for men and women. Multigroup CFA has the advantage of replicating the CFA across groups, demonstrating the reliability of the factor structure. The multigroup CFA also tested whether the factor structure and the factor loadings were invariant across gender, to show whether a one-factor model of gratitude was appropriate for both men and women.

The second aim of Study 2 was to test whether social desirability had confounded the one-factor solution. In a recent paper using hierarchical factor analysis, Backstrom (2007) showed that a single factor existed above the Big Five personality traits. However, this latent factor had almost completely overlapping variance with a latent social desirability factor ($r = .98$). This demonstrates that where too many higher order factors are extracted, the highest order factor can sometimes represent only social desirability (or methodological issues such as response set). In Study 1 we extracted a clear single factor. In Study 2 we aimed to demonstrate that this factor did not simply represent socially desirable responding.

3.2. Method

3.2.1. Participants and procedure

Participants (194 female, 195 male) were aged between 18 and 55 ($M = 31.60$, $SD = 8.15$), and were predominantly of White ethnicity (73.5%), with the next most frequently represented ethnic groups being Black African (5.4%), Black Caribbean (4.9%), and Indian (4.9%). There was an approximately equal proportion of people from minorities in each gender (24% of males, 29% of females; $\chi^2 [df = 1] = .262$, $p = .61$). There were only small age differences between the genders, with females on average 1.83 years older ($SE = .82$, $t [387] = 2.235$, $p = .26$, $d = .22$). It does not appear that gender was confounded with either ethnicity or age.

Participants were recruited from a local college specializing in short, part-time, 'life long learning' educational courses. All participants completed measures in small groups not greater than 20 people. Participation was voluntary and all participants were debriefed.

3.2.2. Measures

3.2.2.1. *From Study 1.* All participants completed the Appreciation Scale, GRAT, and GQ6, as in Study 1.

3.2.2.2. *Socially desirable responding.* The Social Desirability Scale-17 (SDS-17; Stöber, 2001) was used to measure socially desirable responding. Participants rate 16 items (seven reverse coded) on a ‘true’ or ‘false’ response scale. Each of the items provide a statement which most people would like to agree with, but are unlikely to be able to (e.g. “I always accept other’s opinions, even when they don’t agree with my own”). Higher scores indicate more socially desirable responding. The SDS-17 was developed due to concerns that items in older social desirability scales were no longer socially desirable. The scale shows good convergent validity with other measures of social desirability, high sensitivity to desirability provoking instructions (job applications), and all of the items have been recently rated as highly socially desirable (Stöber, 2001).

3.3. Results

3.3.1. Preliminary analysis

Table 2 shows internal consistencies and intercorrelations between each of the scales. Each of the scales showed good internal consistency. Each of the scales were significantly correlated (range $r = .36-.81$).

3.3.2. Multigroup CFA

A maximum likelihood multigroup CFA was performed with covariance structural equation modeling using AMOS. A model was tested where one latent factor was defined by item parcels for each of the 12 gratitude scales, and error variances were not allowed to covary. The normalized Mardia’s Coefficient showed that the data exhibited multivariate normality, fulfilling the assumptions of maximum likelihood CFA (coefficient = 1.57, $p = .12$). Multigroup CFA was performed using the two-step approach outlined by Byrne (2004).

In the first step, separate CFAs are performed for each group (males and females). The fit of the model was tested with the chi squared test, the standardized root-mean-square residual (SRMR) and the comparative fit index (CFI). Hu and Bentler’s (1999) Monte Carlo analysis demonstrated that the combinational use of the SRMR and the CFI leads to the lowest sum of Type I and Type II error. Conventional values suggest that good fit is indicated by SRMR values below .10 and CFI values above .90; very good fit is indicated by SRMR < .08 and CFI > .95 (Hu & Bentler, 1999). The one-factor model provided a good fit for both females ($\chi^2 [df = 54] = 223.84$; CFI = .92; SRMR = .04), and males ($\chi^2 [df = 54] = 196.28$; CFI = .94; SRMR = .04). Factor loadings are presented in Table 3. Visual comparison of the loadings show considerable similarities for both men and women, and for both genders all loadings are high (ranging from .53 to .94). It appears that a one factor model of gratitude is viable when males and females are considered separately.

In the second step, invariance between gender was tested directly. The chi squared fit indices from both CFAs are added together to provide the fit of an ‘unconstrained model’, where factor loadings are free to assume different values in each group. A further CFA is performed where factor loadings are constrained to be equal across groups (the ‘constrained model’). If the fit of the

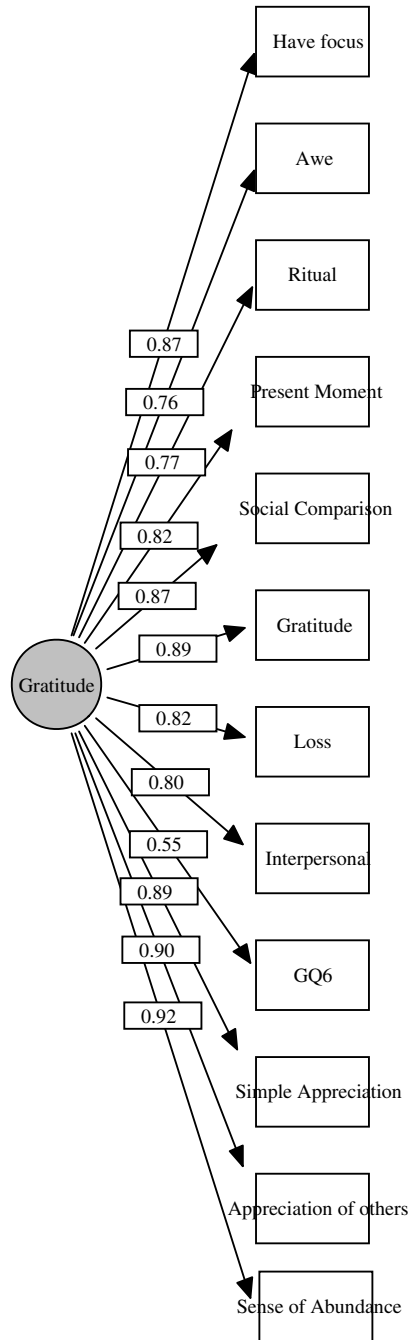


Fig. 1. CFA using all Study 2 participants ($N = 389$). All values are standardized. Error variances omitted for clarity.

constrained model is not significantly worse than the unconstrained model, then factor invariance across groups is indicated.

The unconstrained model, where factor loadings are allowed to vary between men and women, provided a good fit ($\chi^2 [df = 108] = 419.66$, CFI = .93, SRMR = .04). The constrained model, where factor loadings are constrained to be equal for both men and women, also provided a good fit ($\chi^2 [df = 119] = 463.77$, CFI = .93, SRMR = .05). The fit of the constrained model was not significantly worse than the unconstrained model ($\Delta\chi^2 = 17.11$, $\Delta df = 11$, $p = .11$). These set of analyses support a model where the 12 measures of gratitude assess the same latent gratitude construct, and show that this model is invariant across gender. Fig. 1 presents loadings based on the full sample (including both men and women).

3.3.3. Social desirability

In order to test whether the latent gratitude factor represented socially desirable responding we used the methodology of Backstrom (2007). A latent social desirability factor was identified with each of the items of the SDS-17. This latent factor was correlated with the latent gratitude factor, which was defined by the 12 measures of gratitude as in the previous analysis. The latent variables were not significantly correlated for either females ($r < .01$, $p = .97$) or males ($r = .07$, $p = .37$). The fit of this two latent variable model was also very good for both females ($\chi^2 [df = 349] = 603.61$, CFI = .93, SRMR = .05) and males ($\chi^2 [df = 349] = 540.87$, CFI = .95, SRMR = .05). There was no support for the alternative hypothesis that the latent gratitude factor represented socially desirable responding.

4. General discussion

Two studies showed that the 12 scales from the GRAT, Appreciation Scale, and GQ6 are strongly intercorrelated, and that each scale is an indicator of the same latent gratitude construct. In Study 1 both parallel analysis and the minimum average partial method suggested that there was a single factor underlying the 12 measures of gratitude and appreciation. In Study 2 confirmatory factor analysis supported the factor structure and showed that the factor structure was invariant across gender. Additionally, Study 2 showed that the higher order gratitude factor was not confounded with socially desirable responding. This is the first study to show correlations between each 12 scales, and to suggest a higher order factor structure of gratitude and appreciation.

The results suggest an integration of the theoretical basis of the GQ6, Appreciation Scale, and the GRAT. As noted in the introduction, each of the scales was developed from different conceptions of gratitude. Through showing that each of the scales in Table 1 are indicators of the same latent construct, Table 1 can be used as an integrated definition of gratitude, which may be of use in planning future studies into gratitude.

Practically, establishing whether the 12 scales are measuring the same latent construct is necessary to accurately prepare literature reviews. The current trend appears to be to summarize research from the GQ6 and GRAT together (e.g., Watkins, Scheer, Ovnicek, & Kolts, 2006; Wood et al., 2007b), whilst the Appreciation Scale appears to be developing a separate literature, with the original development paper (Adler & Fagley, 2005) not citing either the GQ6 or the GRAT, and subsequent work using the GQ6 and the GRAT not citing the Appreciation Scale. The results support the integration of literature using the GQ6, the GRAT, and the Appreciation

Scale. The results are subject to two caveats. First, the demonstration of the gender invariance of the one-factor model should be qualified by considerations of power. Multigroup CFA involves showing that factor loadings do not significantly differ between groups. Non-significance could represent either genuine invariance or a lack of power to detect the effect. However, although there is currently no accepted method of estimating power in multigroup modeling, there is indication that individually the CFAs were very stable for both men and women, (per group samples sizes greater than 194, participant to variable ratios greater than 16:1 and very high communalities). If the individual CFAs are stable, and visual examination confirms only very small differences in the loading patterns of men and women, whilst we cannot rule out any differences between men and women in the one-factor solution, such differences should be very small and not of theoretical importance.

The second caveat regards the loadings of the GQ6 and the Sense of Abundance scale on the higher order gratitude factor. It is curious that the GQ6 only loaded moderately, when it was designed to be a unifactorial measure, and probably had the strongest psychometric development of any of the measures. It may be that as the focus of the GQ6 is on the emotional experience of gratitude it does not fully measure the attitude aspect of gratitude, as defined by the Appreciation Scale. The Sense of Abundance scale behaved inconsistently across the two studies, loading very poorly in Study 1. There may be problems in the conceptualization of this aspect of gratitude, involving the absence of feeling of deprivation. Perhaps the inconsistency of this scale is due to problems inherent in defining a construct by what it is not. Alternatively, this conception may not truly be an indicator of gratitude. The scale is occasionally referred to by Watkins et al. (2003) as ‘resentment’ (reverse coded), and more research is needed into the relation between resentment and gratitude, i.e. whether these represent two separate constructs, or opposite ends of a bipolar continuum.

Our research is not designed to indicate that any one of the measures is psychometrically superior. Rather, the present study suggests that future research would benefit from considering each of the scales as indicators of a higher order gratitude construct, and through integrating their conceptual and theoretical positions.

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References

- Adler, M. G., & Fagley, N. S. (2005). Appreciation: Individual differences in finding value and meaning as a unique predictor of subjective well-being. *Journal of Personality*, 73, 79–114.
- Backstrom, M. (2007). Higher-order factors in a five-factor personality inventory and its relation to social desirability. *European Journal of Psychological Assessment*, 23, 63–70.
- Byrne, B. M. (2004). Testing for multigroup invariance using AMOS graphics: A road less traveled. *Structural Equation Modeling*, 11, 272–300.

- Emmons, R. A., & Crumpler, C. A. (2000). Gratitude as a human strength: Appraising the evidence. *Journal of Social and Clinical Psychology, 19*, 56–69.
- 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.
- 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.
- Linley, P. A., Maltby, J., Wood, A. M., Joseph, S., Harrington, S., Peterson, C., et al. (2007). Character strengths in the United Kingdom: The VIA inventory of strengths. *Personality and Individual Differences, 43*, 341–351.
- 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., 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.
- O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instrumentation, and Computers, 32*, 396–402.
- Stöber, J. (2001). The social desirability scale-17 (SDS-17): Convergent validity, discriminant validity, and relationship with age. *European Journal of Psychological Assessment, 17*, 222–232.
- Velicer, W. F., Eaton, C. A., & Fava, J. L. (2000). Construct explication through factor or component analysis: A review and evaluation of alternative procedures for determining the number of factors or components. In R. D. Goffin & E. Helmes (Eds.), *Problems and solutions in human assessment: Honoring Douglas n. Jackson at seventy*. Norwell, MA: Kluwer Academic.
- Watkins, P. C., Scheer, J., Ovnicek, M., & Kolts, R. (2006). The debt of gratitude: Dissociating gratitude and indebtedness. *Cognition and Emotion, 20*, 217–241.
- Watkins, P. C., Woodward, K., Stone, T., & Kolts, R. L. (2003). Gratitude and happiness: Development of a measure of gratitude, and relationships with subjective well-being. *Social Behavior and Personality, 31*, 431–451.
- Wood, A. M., Joseph, S., & Linley, P. A. (2007a). Gratitude: The parent of all virtues. *The Psychologist, 20*, 18–21.
- Wood, A. M., Joseph, S., & Linley, P. A. (2007b). Coping style as a psychological resource of grateful people. *Journal of Social and Clinical Psychology, 26*, 1108–1125.
- Zwick, W. R., & Velicer, W. F. (1986). Comparison of five rules for determining the number of components to retain. *Psychological Bulletin, 99*, 432–442.