




Gratitude across the life span: Age differences and links to subjective well-being

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ABSTRACT

Gratitude has been described as an adaptive evolutionary mechanism that is relevant to healthy psychological and interpersonal outcomes. Questions remain as to whether the presence and benefits of gratitude are consistent from young adulthood to old age; prior research has yielded mixed evidence. We examined the magnitude and direction of age differences in gratitude in three samples (combined $N = 31,206$). We also examined whether gratitude was associated with greater/lesser well-being at different periods in the life course. We found that the experience of gratitude was greatest in older adults and least in middle aged and younger adults. Further, we found that the associations between gratitude and subjective well-being remained relatively constant across the lifespan. Findings are discussed from a developmental perspective.

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Feeling and expressing gratitude is associated with a wide variety of healthy emotional, relational, and health outcomes (Algoe, 2012; Hill, Allemand, & Roberts, 2013; Wood, Froh, & Geraghty, 2010; Wood, Joseph, Lloyd, & Atkins, 2009). One caveat to this body of work is that the vast majority of research on gratitude has been limited to refining its measurement and interventions in college student samples (e.g. Emmons & McCullough, 2003, 2004) and a small number of similar methodological studies in children and adolescents (e.g. Froh et al., 2011; Froh, Sefick, & Emmons, 2008). Questions remain as to whether and how gratitude differs across the life course and if any benefits are age-dependent.

A review of the studies on the association between chronological age and trait gratitude suggests inconsistencies.¹ In one study, Kern and colleagues (2014) examined the frequency of the word 'grateful' in a sample of 74,859 Facebook users' statuses. Older adults tended to use 'grateful' in their Facebook statuses more than younger adults. Other studies have found null associations between age and self-reported trait gratitude (measured via the Gratitude Questionnaire; McCullough, Emmons, & Tsang, 2002) in samples comprised of American college students and community members (Kashdan, Mishra, Breen, & Froh, 2009; Wood, Maltby, Stewart, & Joseph, 2008). These null effects are also found across a variety of self-report measures of gratitude. In one such study, Martínez-Martí and Ruch (2014) found no age differences in a character

strengths-based measure of gratitude but did find reliable age differences in other character strengths in a sample of 945 Swiss adults. Yet another study found a suppressor effect in a combined sample of 1736 Swiss adults, such that the near-zero correlation between age and gratitude became positive after removing the variance attributable to other demographic variables (e.g. gender; Allemand & Hill, 2016).

Does the presence and experience of gratitude differ by a person's chronological age? There is a robust literature documenting higher levels psychological characteristics that are conceptually related to gratitude among older adults compared to younger adults. These psychological characteristics include such traits as forgiveness (Toussaint, Williams, Musick, & Everson, 2001), attachment security (Chopik, Edelstein, & Fraley, 2013), optimism (Chopik, Kim, & Smith, 2015), and other interpersonal character strengths (Isaacowitz, Vaillant, & Seligman, 2003). However, previous research has not been able to definitively answer this question with respect to gratitude. Part of the confusion from past research may be attributable to methodological differences between studies (e.g. linguistic vs. trait measures of gratitude). Other inconsistencies between studies arise from employing small samples with inadequate power and the limited age range of samples rendering it difficult to detect differences. In the current study, we address both of these issues by using three large cross-sectional samples totaling over 30,000 adults ranging in age from 15 to 90.

Theories of evolutionary psychology and adult development suggest that there may be reasons to expect an association between age and gratitude, as gratitude appears to be an adaptive evolutionary mechanism that functions to bind people into dyads and groups (Algoe, 2012; Algoe, Gable, & Maisel, 2010; Watkins, 2004). Gratitude aids in the reciprocal generation of close relationships. For example, in the aftermath of receiving a gift or benefit from another person (i.e. the benefactor), the beneficiary feels grateful, which motivates them to behave in kind, prosocial ways toward other people (in words or actions). When this gratitude is expressed toward the benefactor, this is a pleasure for both parties, reinforcing additional benevolent acts (McCullough, Kilpatrick, Emmons, & Larson, 2001; McCullough, Kimeldorf, & Cohen, 2008).

Although there is some confusion about *whether* age differences in gratitude exist, theories of aging and adult development suggest that there may be reasons to expect an association between age and gratitude due to the identified link between gratitude and the maintenance of social relationships (Algoe, 2012; Algoe et al., 2010; Watkins, 2004). For example, Socioemotional Selectivity Theory suggests that as people age, they become increasingly aware that time is limited (Carstensen, Isaacowitz, & Charles, 1999). This perception of a finite time horizon leads individuals to prioritize personally meaningful events above motives for novelty, growth, and curiosity (Carstensen, 2006). One of the ways that older individuals express these preferences is by investing in social interactions with close, significant others and striving to maintain intimate, healthy relationships. Individuals with a limited time perspective choose to spend more time with close relationship partners and less time with acquaintances (Fung, Carstensen, & Lutz, 1999). Socioemotional Selectivity Theory is often employed as an explanation for why older adults tend to provide more positive evaluations of their lives and emotional states (Isaacowitz, Wadlinger, Goren, & Wilson, 2006). This positivity effect – that older adults pay more attention to and remember more positively valenced stimuli compared to younger adults – would also support the observation that older adults are investing more in social relationships that afford and maintain greater well-being (Carstensen & Mikels, 2005; Mather & Carstensen, 2005; Reed & Carstensen, 2012). The downstream consequences of these socio-emotional processes on social relationships and well-being are readily apparent, affecting emotion regulation, cognitive and functional decline, memory, attention, happiness, health, and mortality across the lifespan (see Charles & Carstensen, 2010, for a review).

Expressing gratitude is a large contributor to the maintenance of close intimate bonds (Algoe, 2012; Kashdan et al., 2017), suggesting that it may reflect similar age-related processes that enhance well-being. Phenomena

such as those outlined are thought to be the mechanisms driving any observed differences between younger and older adults with respect to gratitude (for more thorough reviews, see: Allemand & Hill, 2016; Kern et al., 2014). Beyond mean-level differences, gratitude may be more important in predicting well-being among older adults during a time of life in which they are particularly invested in close relationships and well-being. From the perspective of Socioemotional Selectivity Theory, dispositional tendencies that make it easier to form and maintain close relationships may enhance well-being to a greater degree in late life (Chopik, Edelstein, & Grimm, 2017). Gratitude could be one of these dispositions that facilitate the socio-emotional mechanisms that lead to higher levels of well-being across the lifespan. Alternatively, gratitude could be so closely tied to socio-emotional processes and well-being across the lifespan that age does not moderate the association between gratitude and well-being. Thus, gratitude and well-being might be co-developing together in a parallel fashion. This perspective would lead to the prediction that gratitude is an age-invariant predictor of well-being, such that higher levels of gratitude are ‘always a good thing’ with respect to enhancing well-being. Research examining life course changes in the benefits of gratitude has yielded mixed results: gratitude predicts physical health more so among older adults compared to younger adults (Hill et al., 2013), although links between gratitude and well-being may be invariant across the lifespan (Hill & Allemand, 2011). Worth noting, these two studies use the same dataset. To our knowledge, other published studies have failed to explore the moderating effect of age on the associations between gratitude and well-being; for this reason, we did not make explicit hypotheses.

Present research program

Given that gratitude is about acknowledging the importance of and strengthening close relationships (Algoe, 2012; Algoe et al., 2010; Algoe & Stanton, 2012; Gordon, Impett, Kogan, Oveis, & Keltner, 2012) and older adults’ have an amplified motivation for maintaining meaningful social relationships (Carstensen et al., 1999), we hypothesized that gratitude would be highest among older adults and lower among middle-aged and younger adults. To date, only a few studies have confirmed this hypothesis by finding a positive association between age and gratitude (Allemand & Hill, 2016; Kern et al., 2014), with the majority of studies finding a null association between age and gratitude (Kashdan et al., 2009; Martínez-Martí & Ruch, 2014; Wood, Maltby, Stewart, & Joseph, 2008). In this research program, we also tested whether associations between gratitude and well-being vary across age. Because the little evidence examining this possibility is so mixed, we

did not make explicit hypotheses about whether gratitude-well-being associations differ by age.

Method

Participants

Sample 1

Participants for Sample 1 were 1255 individuals ranging in age from 34 to 84 ($M_{\text{age}} = 54.52$, $SD = 11.71$; 57% female) from the Midlife Development in the United States (MIDUS II): Biomarker Project (Ryff, Seeman, & Weinstein, 2013). Each age group was well-represented (34–39 years old: $n = 125$; 40–49 years old: $n = 349$; 50–59 years old: $n = 376$; 60–69: $n = 258$; 70+ years old: $n = 147$). The median level of education was an associate degree. The racial breakdown of the sample was 94% white, 3% Black/African American, and 3% mixed/other races and ethnicities. All individuals were from the United States.

Sample 2

Participants for Sample 2 were 23,334 individuals (72% female) ranging in age from 18 to 65+ years who completed an online survey (at www.authentic happiness.com). Participants self-reported their age by selecting one of the seven discrete age groups (i.e. 18–20 years old: $n = 1499$; 21–24 years old: $n = 2346$; 25–34 years old: $n = 4836$; 35–44 years old: $n = 5609$; 45–54 years old: $n = 5987$; 55–64 years old: $n = 2573$; 65+ years old: $n = 484$; $Mdn_{\text{age category}} = 35\text{--}44$ years old). The median level of education was a bachelor's degree. Race/ethnicity data were unavailable. Participants received personalized feedback from each survey they completed on the website. All individuals were from the United States.

Sample 3

Participants for Sample 3 were 7617 individuals ranging in age from 15 to 90 ($M_{\text{age}} = 33.54$, $SD = 14.17$; 79% female) from the International Wellbeing Study (IWBS; <http://www.wellbeingstudy.com/>), which was conducted by a consortium of international scientists from 40 different countries. The IWBS was administered entirely online and participants were asked to complete follow-up assessments over a one-year period. Full sampling and methodological details can be found elsewhere (Disabato, Goodman, Kashdan, Short, & Jarden, 2016; Sheldon, Jose, Kashdan, & Jarden, 2015). Each age group was well-represented (15–19 years old: $n = 1312$; 20–29 years old: $n = 2342$; 30–39 years old: $n = 1597$; 40–49: $n = 1185$; 50–59 years old: $n = 781$; 60–69 years old: $n = 299$; 70+ years old: $n = 101$). Sample 3 recruited participants from 109 different countries, a factor we took into account when analyzing these data.

Measures

Gratitude²

Sample 1. In Sample 1, gratitude was measured with two items from the Gratitude Questionnaire (McCullough et al., 2002). Participants responded to two items ('I have so much in life to be thankful for,' and 'I am grateful to a wide variety of people.') on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses from the two items were averaged to yield a composite of gratitude ($\alpha = 0.71$; $M = 6.26$, $SD = 0.84$).

Sample 2. In Sample 2, gratitude was measured using the 10-item gratitude subscale of the Values in Action Inventory of Strengths (VIA-IS). The VIA-IS is a proprietary measure administered by the VIA Institute on Character; for a copy of the scale, please contact the first author. Participants responded to each item on a 5-point scale ranging from 1 (*very much unlike me*) to 5 (*very much like me*). Responses to the ten items were averaged to yield a composite of gratitude ($\alpha = 0.88$; $M = 3.94$, $SD = 0.62$).

Sample 3. In Sample 3, gratitude was measured using the full, six-item measure from which the two items from Sample 1 were drawn (McCullough et al., 2002). Participants responded to six items on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses from the six items were averaged to yield a composite of gratitude ($\alpha = 0.83$; $M = 5.84$, $SD = 0.98$).

Subjective well-being

Samples 1 and 2

In Samples 1 and 2, subjective well-being was measured with the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985). Participants responded to five items (e.g. 'In most ways my life is close to ideal.') on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses from the five items were averaged to yield a composite of subjective well-being (Sample 1: $\alpha = 0.88$, $M = 4.78$, $SD = 1.31$; Sample 2: $\alpha = 0.90$, $M = 4.27$, $SD = 1.51$). Only a subsample of participants from Sample 2 (63%; $N = 14,703$ participants) completed the subjective well-being measure; this was because participants could complete measures of their choice, and only 63% of participants who completed the gratitude questionnaire also completed the subjective well-being questionnaire. With respect to gratitude, those who chose to complete the subjective well-being questionnaire did not differ from those who chose not to complete the subjective well-being questionnaire, $t(23,332) = 0.218$, $p = 0.827$.

Sample 3

In Sample 3, participants completed the Temporal Satisfaction with Life Scale to assess a participant's current life satisfaction (e.g. 'I am satisfied with my current life'), past life satisfaction (e.g. 'I am satisfied with my life in the past'), and perceptions about their future life satisfaction (e.g. 'I will be satisfied with my life in the future.') (Pavot, Diener, & Suh, 1998). In the current report, we focus our analyses on the current life satisfaction measure to maintain consistency across samples. Participants responded to the five items on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Responses from the five items were averaged to yield a composite of subjective well-being (Sample 3: $\alpha = 0.90$, $M = 4.44$, $SD = 1.50$).

Results

Does gratitude differ by age?

Previous research examining age differences in psychological characteristics generally model both linear and curvilinear effects of age (i.e. third-order terms; Chopik & Edelstein, 2014; Chopik et al., 2013). However, this same research suggests that the most meaningful age patterns that can be interpreted involve cubic patterns, so we limited our examination to these cubic terms (age^3) and did not test for more complicated models. Women often report higher gratitude compared to men (Kashdan et al., 2009); thus, gender ($-1 = \text{male}$, $1 = \text{female}$) was included as a control variable and moderator of any age-gratitude associations in the analyses reported below.

Sample 1

To examine age differences in gratitude, we ran a polynomial regression predicting gratitude from age and gender. We centered age within Sample 1 before computing the quadratic (age^2) and cubic (age^3) effects of age. In the first step, the linear effect of age, gender, and the interaction between age and gender were entered as predictors of gratitude. In the second step, the effect of age^2 and the interaction between age^2 and gender were entered. In the third step, the effect of age^3 and the interaction between age^3 and gender were entered. However, the best fitting model was the linear effect of age. The addition of the quadratic ($p = 0.78$) and cubic ($p = 0.22$) effects of age were not significant. As seen in the first panel of Table 1 and in Figure 1(a), gratitude was higher among older adults compared to middle-aged adults. Women were higher in gratitude but this effect was not moderated by age.

Sample 2

Because participants self-selected into discrete age groups, age could not be modeled in the same mean-centering, continuous way as in Samples 1 and 3. We employed orthogonal polynomial contrasts to model the linear, quadratic, and cubic effects of age. Orthogonal polynomial contrasts were chosen because the groups were ordered in a meaningful way (i.e. increases in the ordinal nature of the variable translated to increases in age) and polynomial (i.e. linear, quadratic, and cubic) effects could be modeled in a sequential, model-fitting way for which a dummy coding approach is not appropriate (Carey, 2003; Cohen, Cohen, West, & Aiken, 2003; Kaufman & Sweet, 1974). The uneven

Table 1. Regressions and multi-level models predicting gratitude.

	<i>b</i>	SE	β	<i>t</i>	<i>p</i>	95% CI		
						LB	UB	
Sample 1								
Intercept	6.24	0.02		262.43	<0.001	6.20	6.29	
Age	0.01	0.002	0.09	3.23	0.001	0.003	0.01	
Gender	0.11	0.02	0.13	4.65	<0.001	0.06	0.16	
Age \times Gender	-0.002	0.002	-0.02	-0.78	0.44	-0.01	0.002	
Sample 2								
Intercept	3.92	0.01		706.12	<0.001	3.91	3.93	F_{change}
Age	0.06	0.003	0.14	19.23	<0.001	0.05	0.07	369.63
Gender	0.14	0.01	0.20	25.45	<0.001	0.13	0.15	647.70
Age \times Gender	0.01	0.003	0.03	4.04	<0.001	0.01	0.02	16.30
Age ²	0.02	0.002	0.08	11.59	<0.001	0.02	0.02	134.39
Age ² \times Gender	-0.01	0.002	-0.03	-2.85	0.004	-0.01	-0.002	8.13
Sample 3								
Intercept	5.73	0.05		125.60	<0.001	5.64	5.82	
Age	0.01	0.001	0.16	9.48	<0.001	0.01	0.01	
Gender	0.18	0.02	0.18	8.80	<0.001	0.14	0.22	
Age \times Gender	-0.002	0.001	-0.03	-1.57	0.12	-0.005	0.001	
Age ²	0.00001	0.0001	0.003	0.11	0.91	-0.0002	0.0002	
Age ² \times Gender	-0.00002	0.0001	-0.004	-0.17	0.86	-0.0002	0.0002	
Age ³	-0.000005	0.000003	-0.06	-1.95	0.051	-0.00001	0.00000002	
Age ³ \times Gender	0.000002	0.000002	0.02	0.84	0.40	-0.000003	0.00001	

Note: Gender: $-1 = \text{Men}$; $1 = \text{Women}$.

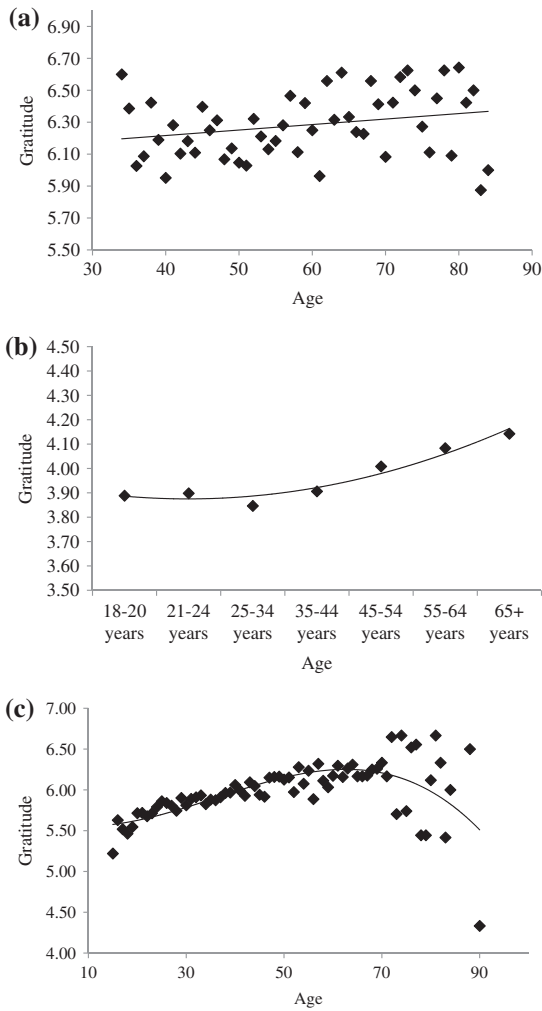


Figure 1. Age differences in gratitude in Samples 1 (a), 2 (b), and 3 (c).

spacing of age brackets (e.g. 18–20, 35–44) is a limitation of the current sample, making even the orthogonal polynomial contrasts an imperfect approach. Worth noting, applying a dummy coding approach (using the 18–20 age bracket as a reference) led to similar results; the results did not substantively change when a different reference group was chosen.

Because the sample size was large, many effects were likely to be statistically significant but of little practical significance. Thus, we followed the conservative approach of retaining models in which higher order terms improved the overall model fit at $F_{\text{change}} > 25$ (see Chopik et al., 2013; Chopik & Giasson, 2017; Srivastava, John, Gosling, & Potter, 2003). F_{change} statistics for every estimate are also reported in the second panel of Table 2. We also limited our discussion to individual estimates that surpassed this threshold.

The best fitting model involved the quadratic effects of age, as the addition of the cubic effects did not improve the model ($F_{\text{change}} = 7.51, \Delta R^2 = 0.001$). As seen in the second panel of Table 1 and in Figure 1(b), gratitude was higher among older adults compared to middle-aged and younger adults. The age differences comparing young and middle-aged adults to older adults were particularly large. Women were higher in gratitude but the Age \times Gender interaction effects did not surpass our F_{change} threshold.

Sample 3

Because participants in Study 3 were recruited from different countries, there is a degree of non-independence in the data. To account for this, we created a multi-level random-coefficient model using the SPSS MIXED procedure (Peugh & Enders, 2005). Participant age, age², age³, gender,

Table 2. Regressions and multi-level models predicting subjective well-being.

	b	SE	β	t	p	95% CI		F_{change}
						LB	UB	
Sample 1								
Intercept	4.79	0.03		147.88	<0.001	4.72	4.85	
Age	0.01	0.003	0.12	4.85	<0.001	0.01	0.02	
Gender	-0.07	0.03	-0.05	-2.10	0.04	-0.13	-0.004	
Gratitude	0.76	0.04	0.49	19.56	<0.001	0.69	0.84	
Age \times Gratitude	0.002	0.003	0.02	0.59	0.56	-0.01	0.01	
Sample 2								
Intercept	4.31	0.01		345.66	<0.001	4.28	4.33	
Age	-0.06	0.01	-0.05	-6.95	<0.001	-0.07	-0.04	48.28
Gender	-0.07	0.01	-0.04	-5.45	<0.001	-0.09	-0.04	29.69
Gratitude	1.08	0.02	0.45	58.99	<0.001	1.04	1.11	3479.80
Age \times Gratitude	0.003	0.01	0.002	0.24	0.81	-0.02	0.03	0.06
Sample 3								
Intercept	4.52	0.05		91.17	<0.001	4.42	4.62	
Age	-0.003	0.001	-0.04	-2.19	0.03	-0.01	-0.0003	
Gender	-0.06	0.02	-0.06	-3.32	0.001	-0.10	-0.03	
Gratitude	0.67	0.02	0.65	40.15	<0.001	0.63	0.70	
Age \times Gratitude	0.002	0.001	0.03	2.25	0.02	0.0003	0.005	

Note: Gender: -1 = Men; 1 = Women.

and age-gender interactions were treated as predictors of respondent-level scores of gratitude. Participants were nested within country and age was centered prior to computing the higher-order terms. The final model can be seen in the third panel of Table 1 and Figure 1(c). The quadratic effect of age was not significant, but the cubic effect of age was marginally significant. Consistent with the previous two samples, gratitude was lower among younger and middle-aged adults, and higher among older adults. However, gratitude reached a plateau among older adults and was lower among the oldest old. This particular effect should be interpreted with caution, given that the cubic effect of age was marginally significant and we had a relatively small sample of participants aged 70–90 ($n = 101$). Women were higher in gratitude compared to men, and gender did not moderate any of the associations between age and gratitude.

Summary

Across the three samples, gratitude was highest among older adults and lower among middle-aged and younger adults. The age differences from these three samples are consistent with age differences found in text-based measures of gratitude (Kern et al., 2014). In Sample 3, there was some preliminary evidence for gratitude being lower among the oldest old. This pattern of late life age differences is consistent with similar work documenting late life declines in related personal characteristics (e.g. optimism and subjective well-being; Chopik et al., 2015; Gerstorf et al., 2010).

Is the association between gratitude and subjective well-being moderated by age?

Sample 1

To examine whether the effect of gratitude on subjective well-being was moderated by age, we ran a linear regression predicting subjective well-being from centered age, gender, centered gratitude, and the interaction between age and gratitude. The results from this regression are presented in the first panel of Table 2. The association between gratitude and subjective well-being was invariant across ages ($p = 0.56$). Interactions with age² ($p = 0.99$) and age³ ($p = 0.78$) were also not significant.

Sample 2

To examine whether the effect of gratitude on subjective well-being was moderated by age, we ran a linear regression predicting subjective well-being from linear effect age, gender, (centered) gratitude, and the interaction between age and gratitude. The results from this regression are presented in the second panel of Table 2. The association between gratitude and subjective well-being was

invariant across ages ($p = 0.81$). Interactions with quadratic ($p = 0.77$) and cubic effects of age ($p = 0.37$) were also not significant.

Sample 3

To examine whether the effect of gratitude on subjective well-being was moderated by age, we again created a multi-level random-coefficient model using the SPSS MIXED procedure (Peugh & Enders, 2005). Participants were nested within country. Participant (centered) age, gender, (centered) gratitude, and the interaction between age and gratitude were treated as predictors of respondent-level subjective well-being. The results from this multi-level model can be seen in the third panel of Table 2. The interaction between age and gratitude predicting subjective well-being was significant, $\beta = 0.03$, $p = 0.02$. Among younger (-1 SD) participants, the association between gratitude and subjective well-being was positive and significant, $b = 0.63$, $p < 0.001$. Among older ($+1$ SD) participants, the association between gratitude and subjective well-being was also positive and significant, but slightly stronger, $b = 0.70$, $p < 0.001$. Interactions with age² ($p = 0.76$) and age³ ($p = 0.70$) were not significant.

Mini meta-analysis

To reconcile the discrepant findings, we conducted a mini meta-analysis on the estimates of the age \times gratitude moderation effect predicting well-being (Goh, Hall, & Rosenthal, 2016). To this end, we converted the interaction estimates into a common effect size metric for Studies 1 ($r = 0.017$; $n = 1,255$), 2 ($r = 0.002$; $n = 14,703$), and 3 ($r = 0.026$; $n = 7,617$). The meta-analysis yielded a weighted mean of $r = 0.01$, $Z = 1.80$, $p = 0.07$. Although the meta-analytic estimate is marginally significant, the effect size of the interaction is extremely small, such that it is practically zero (Cohen, 1988; Evans, 1996). This suggests that the association between age and gratitude is largely invariant across age.

Summary

Across Samples 1 and 2, the association between gratitude and subjective well-being was similar in magnitude across age. In Sample 3, the association between gratitude and subjective well-being was slightly higher among older adults compared to younger adults. Our follow-up meta-analysis revealed that the interaction effect was not significant at $p = 0.05$ and that the magnitude of the effect was very small.

Discussion

Across three large samples, age was positively associated with gratitude, such that gratitude was higher among

older adults and lower among middle age and younger adults. We also found that associations between gratitude and subjective well-being did not vary substantially across the adult lifespan, replicating previous research (Hill & Allemand, 2011). In other words, gratitude is associated with higher subjective well-being at all ages, to a similar degree. Our findings help clarify the existence and magnitude of the association between age and gratitude that has been only occasionally found in previous research (Allemand & Hill, 2016; Kashdan et al., 2009; Kern et al., 2014; Martínez-Martí & Ruch, 2014; Wood, Maltby, Stewart, & Joseph, 2008).

Although the current study was a stronger test of whether age is associated with gratitude, it is unclear why the two are associated. There are many theoretical models suggesting that positive emotions are more frequent and enhanced as individuals age (Carstensen, 2006; Carstensen, Fung, & Charles, 2003; Reed & Carstensen, 2012). However, we were unable to test whether perceiving time as more limited explains the association between age and gratitude. Studies that experimentally manipulate time perspective show that individuals with a shorter time horizon select interactions with close others over acquaintances (Fung et al., 1999). However, whether a shorter time perspective causes individuals to express more gratitude about their existing close relationships is unclear, and future research is needed to experimentally test this hypothesis. Many of the mechanisms linking perceived time horizon to emotional experiences are likely to unfold across the lifespan. Unfortunately, we were limited to the use of cross-sectional samples in the current investigation.³ Longitudinal data are needed to formally model these explanatory processes, and could reduce the likelihood that age-gratitude associations are attributable to differences between birth cohorts rather than developmental change (Konrath, Chopik, Hsing, & O'Brien, 2014). Future studies can examine how changes in gratitude and changes in perceptions about the future are coordinated over long periods of life.

An important finding from the current study is that age did not moderate the association between gratitude and well-being (i.e., had a near-zero effect size). This null finding is informative for lifespan positive psychology in that it helps quantify the contribution of psychological characteristics to well-being across the lifespan. Because gratitude is associated with well-being to a similar degree across the lifespan, it begs a number of questions for how gratitude and well-being are connected across development that can be examined in future research. For example, are gratitude and well-being coordinated across the lifespan, such that gains (or losses) in gratitude might correspond with concurrent changes in well-being (see Allemand & Martin, 2016; Chopik et al., 2015; for discussions of

correlated changes in psychological characteristics)? Are interventions to spur increases in gratitude effective for improving well-being for individuals of different ages (Emmons & McCullough, 2003)? Because our studies were all cross-sectional, we are unable to formally test these possibilities. However, the fact that age did not moderate gratitude-well-being associations raises the possibility that individuals across all ages could benefit from gratitude's enhancing effect on well-being.

Across the studies, the measures for both gratitude and subjective well-being were different. For subjective well-being, the measures used in the three studies were similar; for gratitude, we investigated how these measures overlapped. The gratitude measures showed a high degree of correspondence, suggesting that the associations with age transcend minor differences in assessment approaches. Likewise, studies that have employed multiple gratitude measures, like the Gratitude Adjective Checklist (McCullough et al., 2002) and the Gratitude Resentment and Appreciation Test (Watkins, Woodward, Stone, & Kolts, 2003) have also found similar results to the gratitude measures employed in the three samples we used (Froh et al., 2011). Nevertheless, future studies can examine whether other gratitude inventories, both self-report and behavioral (Kern et al., 2014; Tsang, 2007), show similar findings with respect to age.

Whether different measurement approaches to gratitude yield similar findings is an orthogonal question to that of whether researchers are appropriately conceptualizing a construct across developmental periods (Freund & Isaacowitz, 2013). Indeed, some preliminary work has shown that both the factor structure and nomological network of gratitude scales are similar among children, adolescents, and young adults (Froh et al., 2011, 2008; Froh, Yurkewicz, & Kashdan, 2009). Less is known about the functions of gratitude among older adults and whether measures developed on younger samples fully capture the experience of gratitude in late life. Examining how gratitude and other individual differences affect adaptation to life events across the life course – especially older adulthood – is still an unanswered question (Anusic, Yap, & Lucas, 2014; Ryan, Newton, Chauhan, & Chopik, 2017; Specht et al., 2014; Specht, Egloff, & Schmukle, 2011; Yap, Anusic, & Lucas, 2012).

We found preliminary evidence that gratitude might reach a plateau among older adults (i.e. a marginally significant age³ effect in Study 3). Does gratitude predict individual differences in adaptation to life events or do higher levels of gratitude reflect successful adaptation among older adults? Gratitude allows individuals to focus on and appreciate the positive aspects of life, even in the context of great loss and difficulty (Büssing et al., 2014; Griffin et al., 2016). Many researchers consider the process of aging as

a delicate balance of managing losses while maintaining optimal functioning (Baltes, 1997; Lachman, 2015). Indeed, older adulthood is rife with many losses, both personal (e.g. health and cognition) and interpersonal (e.g. friend and spousal bereavement); the question of how older adults can maintain a level of appreciation for life and others in the face of such losses should thus be a central one for future research.

Providing descriptive evidence about the association between age and gratitude is an important first step in situating the study of gratitude within a lifespan developmental framework (Allemand & Hill, 2016; Hill et al., 2013). Our hope is that future research can more formally model the mechanisms underlying intra-individual changes in gratitude across the lifespan and critically examine the measurement of gratitude across developmental periods.

Notes

1. There is a large literature distinguishing between *trait* gratitude – an enduring disposition on which an individual can vary – and *state* gratitude – a momentary affective response that occurs after one person helps another (Watkins, Van Gelder, & Frias, 2009; Wood, Maltby, Stewart, Linley, & Joseph, 2008). Trait gratitude is most often measured with self-report instruments and is assumed to be relatively stable over short intervals (Wood, Maltby, Stewart, & Joseph, 2008). State gratitude is most often an emotional experience that is meant to foster reciprocity between people and can be induced experimentally (Emmons & McCullough, 2003; Tsang, 2006, 2007). There have also been studies in which the correspondence between trait and state gratitude are examined (Wood, Maltby, Stewart, Linley, et al. 2008). In the current investigation, we limit our discussion to age differences in trait gratitude but encourage future research to examine age differences in state expressions of gratitude.
2. Because each sample used a different gratitude measure, it was important to examine the extent to which each measure tapped into the construct of gratitude. We operationalized this construct validity by examining the correlational overlap of the scales. To this end, we conducted a separate study on Amazon's Mechanical Turk (Buhrmester, Kwang, & Gosling, 2011; Paolacci, Chandler, & Ipeirotis, 2010). A sample of 498 adults ranging in age from 18 to 75 ($M_{\text{age}} = 32.69$, $SD = 10.58$; 40% female; 78% white) completed the abbreviated, two-item gratitude measure from MIDUS ($\alpha = 0.87$, $M = 5.51$, $SD = 1.28$), the 10-item VIA-IS gratitude measure ($\alpha = 0.89$, $M = 3.71$, $SD = 0.68$), and the full 6-item measure from the IWBS ($\alpha = 0.90$, $M = 5.51$, $SD = 1.28$) using the same response choices reported below. The order of the measures was randomized across participants. The abbreviated MIDUS measure correlated strongly with the full measure from the IWBS ($r = 0.91$, $p < 0.001$). The VIA-IS gratitude measure correlated strongly with both the abbreviated MIDUS measure ($r = 0.78$, $p < 0.001$) and the full IWBS measure ($r = 0.77$, $p < 0.001$). The high interrelations between gratitude measures suggest that they are measuring a similar construct.
3. In the current research program, we focused on cross-sectional age differences in gratitude. Some longitudinal data were available for Study 3 – multiple assessments of gratitude over a one-year period. However, there were not enough longitudinal data to provide a strong test of age moderation of gratitude changes over a one-year period (Sheldon et al., 2015).

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