

Direct and Indirect Effects of Trait and State Gratitude on Health-Related Quality of Life in a Prospective Design

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ABSTRACT

Gratitude has been consistently linked to well-being, but its influence on health-related functioning is not well understood. Furthermore, research suggests the need to differentiate between-person and within-person effects of personality characteristics, and research on gratitude and health has not typically done so. This prospective study aimed to (1) differentiate the unique effects of trait and state gratitude on health-related quality of life (HRQoL) and (2) test state gratitude as a mediator between baseline trait gratitude and subsequent HRQoL. Undergraduate participants ($N = 141$) completed a trait gratitude measure at baseline and then repeated measures of weekly state gratitude and HRQoL over eight weeks. Multilevel models examined baseline trait gratitude, state gratitude averaged across the study (person aggregate) as between-person individual differences, and within-person variability in state gratitude (person-centered) as predictors of HRQoL, as well as the indirect effect of trait gratitude on HRQoL via state gratitude. Greater aggregate and person-centered state gratitude each predicted higher HRQoL. Baseline trait gratitude did not have a significant direct effect but prospectively predicted higher HRQoL via higher weekly state gratitude. Results suggest that understanding effects of gratitude on health-related perceptions requires accounting for both between-person individual differences and within-person fluctuation in state gratitude.

KEYWORDS

Gratitude, health-related quality of life, mental and physical health, mental health, positive psychology, prospective design, quality of life

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Introduction

Health-related quality of life (HRQoL) encompasses perceptions of physical, mental, and social well-being, as well as perceived impairment caused by poor health (Andresen & Meyers, 2000). In addition to reflecting a broader view of health than the absence of illness, HRQoL has relevance for health outcomes and adherence to recommended treatment (Zyoud et al., 2013). One domain of HRQoL—self-rated health—has been linked to mortality above and beyond objective measures of health (Idler & Benyamini, 1997), suggesting that subjective perceptions of health are important in their own right. Gratitude may represent a relevant and meaningful process to positively influence HRQoL, given its links with multiple indicators of mental and physical well-being (Wood, Froh, & Geraghty, 2010). However, the impact of gratitude on HRQoL has received scant attention, particularly the unique and joint contributions of trait and state gratitude. Psychological traits are known to demonstrate situational within-person variability, such that behavioral markers of a given trait can differ across contexts. As such, one-time trait measures of gratitude may confound between- and within-person variance. Because repeated state-level measures can capture such within-person variability while also measuring stable indicators of between-person differences, prospective studies that use multiple measurements of gratitude are necessary to parse out the distinct trait and state effects of HRQoL. Furthermore, despite theories of affective processes that posit trait and state emotions are highly correlated (Rosenberg, 1998), and the widespread use of gratitude interventions to impact well-being by eliciting state gratitude (Davis et al., 2016), we are unaware of any studies that have tested state gratitude as a potential mediator between trait gratitude and HRQoL. Therefore, the purpose of this prospective study is to clarify how trait and state gratitude (including between- and within-person variability) predict HRQoL, which may have implications for understanding the effects of positive personality-relevant characteristics on health-related functioning, as well as potentially informing efforts to effectively utilize gratitude to impact perceived HRQoL.

Trait and State Gratitude

Gratitude reflects both a trait *and* state-level emotion. Trait gratitude refers to the predisposition to be aware of situations in which one receives benefits others and represents between-person differences in the threshold to experience gratitude, without reference to context (McCullough, Emmons, & Tsang, 2002). Separately, gratitude as a state-level emotion is a discrete experience that occurs when one perceives themselves as the recipient of a positive outcome, triggering a subsequent desire to reciprocate or otherwise engage in prosocial behavior (Emmons, McCullough, & Tsang, 2003; McCullough, Kilpatrick, Emmons, & Larson, 2001). State gratitude is context-based, experienced during specific events or short periods of time (e.g., day, week), and influenced by situational factors (Wood, Maltby, Stewart, Linley, & Joseph, 2008). Thus, levels of state gratitude can differ between people and also fluctuate within each

person across time, depending on the context in which it occurs (i.e., within-person variability; Fleeson, 2004). Because of the potential for between- and within-person differences to shape perceptions such as perceived HRQoL, assessing trait gratitude as well as between- and within-person variability in state gratitude would most fully delineate the relationship of gratitude with HRQoL. Between-person differences in repeated measures of state gratitude may also offer additional information beyond trait gratitude given that person-mean differences are an aggregated index posited to be a more reliable estimate of one's trait than a one-time measure (Epstein, 1980; Fleeson, 2001). Further, several studies have found trait gratitude is associated with experiencing state gratitude more frequently and intensely (McCullough, Tsang, & Emmons, 2004; Wood et al., 2008). However, few studies have tested whether positive associations between trait gratitude and desirable outcomes are mediated by state gratitude in a prospective design, which could clarify *how* trait and state gratitude jointly influence well-being in naturalistic contexts.

Benefits of Gratitude on HRQoL Domains

Past work has highlighted the potential for gratitude to shape health-related functioning given that it positively predicts domains of well-being. Most notably, trait and state gratitude are robustly associated with desirable mental health outcomes such as higher positive affect and lower negative affect, depression, and anxiety (Harbaugh & Vasey, 2014; Hill & Allemand, 2011; Kashdan, Uswatte, & Julian, 2006; Wood et al., 2010). Fewer studies have examined the relation between gratitude and physical well-being, which has been identified as an important area for future research (Wood et al., 2010). Trait gratitude has been linked to perceptions of health (Hill, Allemand, & Roberts, 2013) and health behavior adherence (Millstein et al., 2016). Furthermore, primary care patients enrolled in a gratitude intervention reported increases in physical health and functioning from baseline to six-month follow-up, showing causal effects (Lambert D'raven, Moliver, & Thompson, 2015). However, not all studies have supported this link, such as when trait gratitude failed to prospectively predict physical HRQoL and functioning in a sample of cardiac patients (Millstein et al., 2016). Inconsistent findings may be due to the fact that most studies were cross-sectional or limited to assessing trait gratitude at two time points (e.g., baseline and follow-up), which lacks information about within-person variability and between-person differences found in state gratitude. Therefore, the impact of gratitude on perceptions of mental *and* physical well-being is not well understood and further research is needed to parse out the effects of trait and state gratitude over time. Considering that gratitude interventions target state gratitude to improve well-being, examination of HRQoL also needs to assess whether effects of trait gratitude on HRQoL are mediated by state levels of gratitude experienced in daily life to further inform practical applications.

Current Study

The present study aims to (1) understand how trait and weekly state gratitude uniquely predict HRQoL, and (2) test state gratitude as a mediator between trait gratitude and HRQoL using a multilevel mediation model with a prospective design. Given that state gratitude is a context-based experience that can vary between and within persons over time, this study examined state gratitude at two levels: (1) an aggregate score of weekly state gratitude (i.e., person-mean across all time points) to represent between-person differences in state-level experiences, and (2) person-centered weekly state gratitude (i.e., participants' deviations above/below their aggregated score) to represent within-person differences. Baseline trait

gratitude and aggregate state gratitude both represent between-person differences, but they differ in that trait gratitude is assessed without context (i.e., participants' perception of general threshold to experience gratitude), whereas aggregate state gratitude represents an indicator of between-person differences in the extent one typically experiences state gratitude. Therefore, including between- and within-person variability of state gratitude will allow for the full examination of its role when experienced in daily life with consideration of trait gratitude.

First, we hypothesized that higher trait gratitude at baseline would predict higher weekly HRQoL when accounting for demographic characteristics. Next, we hypothesized that higher trait gratitude would predict higher weekly state gratitude. We also hypothesized that higher average levels of weekly state gratitude (i.e., aggregate state gratitude) and person-centered state gratitude would uniquely predict higher weekly HRQoL above and beyond the effects of baseline trait gratitude and demographic characteristics. Lastly, we hypothesized a significant positive indirect effect of baseline trait gratitude on weekly HRQoL via aggregated state gratitude (see Figure 1).

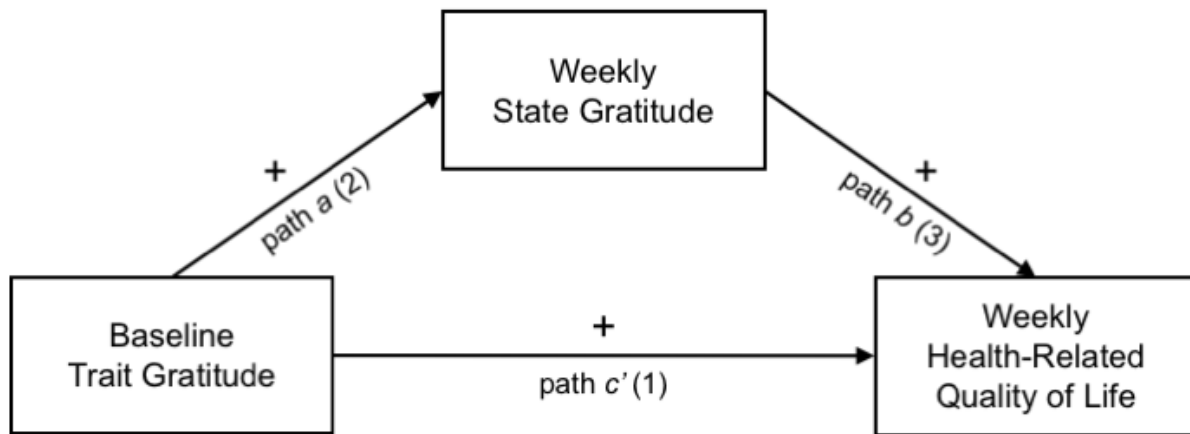


Figure 1. Hypothesized mediation model. The models used to calculate each path (i.e., *a*, *b*, *c'*) are included in parentheses and correspond to model numbers in Table 2.

Method

Participants

Participants included 141 undergraduates recruited from introductory psychology courses at a private university (72.3% women; $M_{\text{age}} = 19.30$, $SD = 1.66$). Participants self-identified as White (69.5%), Asian (17.7%), Hispanic/Latino/a (5.7%), African American (3.5%), Middle Eastern (1.4%), or Other (2.2%). Participants provided informed consent and received course credit for participation. The local Institutional Review Board approved all study procedures.

Procedure

Participants completed weekly assessments over eight weeks through an Internet survey program. Baseline (week 1) measures assessed demographics and trait gratitude. The remaining seven weekly surveys included repeated assessments of state gratitude and HRQoL pertaining to the past week. Participants received an email with a link to the survey each week, for completion within 36 hours.

Measures

The demographic questionnaire included age, gender, and ethnicity. Gender was coded as male (0) and female (1). Minority status was coded as white (0) and minority (1 = those reporting Hispanic ethnicity or African American, Asian, Middle Eastern, or other race).

The Gratitude Questionnaire-6 (GQ-6; McCullough et al., 2002) is a six-item measure of trait gratitude. Participants rated each item on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*) with total scores ranging from 6 to 42. Responses to the GQ-6 demonstrated internal consistency in previous studies ($\alpha = .82$; McCullough et al., 2002) and in this sample ($\alpha = .78$).

A brief index comprised of three adjectives (*grateful*, *thankful*, and *appreciative*; Emmons & McCullough, 2003) assessed state gratitude experienced during the past week. Each item was rated on a scale from 1 (*very slightly or not at all*) to 5 (*extremely*) and responses were summed for a total score ranging from 3 to 15. This measure demonstrated construct validity and internal consistency in past research (α ranging from .86 to .92; Emmons & McCullough, 2003).

The present study assessed HRQoL with the 4-item Centers for Disease Control Health-Related Quality of Life Core Module (CDC HRQOL-4; Moriarty, Zack, & Kobau, 2003). We modified the time-frame from the past month to the past week. The first item is a rating of general health from 1 (*excellent*) to 5 (*poor*). The other items ask the participant to recall the number of days in the past week they experienced impaired physical and mental health, and how many days that poor health led to impairment in usual activities. Given that item one is rated on a different scale (1-5) than the remaining items (days: 1-7), a global rating of HRQoL was calculated by converting each item to a z-score and averaging all four items (Horner-Johnson, Krahn, Andresen, & Hall, 2009). We reversed the sign such that higher scores reflect greater HRQoL. The CDC HRQOL-4 demonstrated construct validity (Hennessy, Moriarty, Zack, Scherr, & Brackbill, 1994), and internal consistency in previous studies ($\alpha = .72$; Horner-Johnson et al., 2009).

Data Analysis

Preliminary data screening indicated normality and no evidence of nonlinear associations between variables. The original data set consisted of 161 participants, though 20 were excluded for not completing the GQ-6 ($n = 3$) or completing less than half of the weekly surveys ($n = 17$). We used IBM SPSS Version 25 to conduct multilevel models, an optimal method for repeated measures data that handles unbalanced and missing data, avoids the assumption of independence, models between and within-person variability, and permits random effects (allowing intercepts and slopes to vary across individuals). We specified an autoregressive (AR1) covariance structure given the prospective data collection, which assumes that individuals' scores at one time point often correlate strongly with scores at nearest time points.

Before testing the proposed models, we conducted preliminary tests of unconditional models to assess the reliability of repeated measures. We used a three-level structure that included individual items for state gratitude and HRQoL (level 1) nested within each measure's total score for a given week (level 2), nested within each person (level 3). Reliability estimates were then calculated with consideration of variance at the item-, week-, and person-levels, which provides a reliability estimate similar to a Cronbach's alpha that is corrected for differences in weeks and persons. This method of reliability analysis is recommended for multilevel designs with data that violate the assumption of independence (Bonito, Ruppel, & Keyton, 2012; Nezlek, 2017)—in this case, longitudinal data with repeated measures. Results from reliability analyses are presented in Table 1.

Tests of unconditional effects also showed significant between-person variability in intercepts and significant variability in slopes for weekly gratitude predicting HRQoL. Therefore, models included random intercepts and slopes. We calculated restricted maximum likelihood estimates (REML) given their accuracy in smaller samples and appropriateness when not comparing the fit of nested models. Trait gratitude was grand-mean-centered so effects reflected between-person differences. For weekly state gratitude, we calculated aggregate scores and person-centered scores of state gratitude as previously noted.

To test state gratitude as a mediator of the effects of trait gratitude on weekly HRQoL, we first examined whether trait gratitude predicted weekly HRQoL (when controlling for demographic covariates; Model 1) and weekly state gratitude (Model 2). Next, we tested whether aggregate state gratitude and person-centered state gratitude predicted weekly HRQoL when controlling for the effects of grand-mean-centered trait gratitude and demographic covariates (Model 3). We tested mediation by conducting Monte Carlo method tests of indirect effects (Selig & Preacher, 2008) to generate 95% confidence intervals (CIs; significant indirect effects indicated when CIs do not contain zero). Although some analytic strategies for testing mediation require a significant direct effect (c' path; Model 1), this method remains overly conservative, and indirect effects can be tested directly, providing a more sensitive test with lower risk of Type II error (Selig & Preacher, 2008; Shrout & Bolger, 2002). Therefore, interpretation of a meaningful indirect effect was not contingent on a significant association between trait gratitude and weekly HRQoL. In multilevel models, Zhang, Zypher, and Preacher (2009) noted state mediator variables confound between- and within-person variability when the predictor represents individual differences (i.e., baseline trait gratitude), and tests of indirect effects must include the aggregate score as the mediator while controlling for the person-centered version; thus, we adopted this strategy.

Results

In the final sample ($N = 141$), 92% of all values in the dataset were complete. On average, participants completed six of seven weekly assessments. Descriptive statistics and reliability estimates for repeated measures are presented in Table 1. Trait gratitude measured by the GQ-6 ($M = 36.42$, $SD = 5.36$) and aggregate state gratitude ($M = 10.67$, $SD = 2.47$) demonstrated a moderate, significant correlation ($r = .41$, $p \leq .001$).

Table 1. Descriptive Statistics

Measure	Mean	Range	Variance		Percent Within	Reliability
			Between	Within		
Weekly State Gratitude	10.67	3 – 15	5.50	4.02	42%	.79
CDC HRQoL-4 ^a	0.00	-3.45 – 0.85	0.29	0.31	52%	.93

Note. CDC HRQoL-4 = Center for Disease Control Health-Related Quality of Life Core Module. ^aTotal scores for the CDC HRQoL-4 were calculated by averaging the z-scores for all four items.

First, we tested the effect of baseline trait gratitude on weekly HRQoL (Model 1). Contrary to hypotheses, there was no direct effect of trait gratitude on subsequent weekly HRQoL (see Table 2). Next, we tested the relationship between trait gratitude and weekly state

gratitude (Model 2). As expected, greater baseline trait gratitude significantly predicted higher levels of state gratitude in subsequent weeks.

We also assessed the relationship between state gratitude and weekly HRQoL (Model 3). Consistent with hypotheses, aggregate and person-centered state gratitude each uniquely predicted higher weekly HRQoL while accounting for grand-mean-centered trait gratitude and demographic characteristics. Therefore, individuals with chronically higher gratitude endorsed higher HRQoL and deviations above participants' own average level of weekly state gratitude predicted higher HRQoL. These effects were present even controlling for female gender, which predicted lower weekly HRQoL.

Lastly, as hypothesized, we detected a significant indirect effect of baseline trait gratitude on weekly HRQoL via higher aggregate state gratitude (95% CI = 0.007, 0.025).

Table 2. Multilevel Models Testing Direct and Indirect Effects of Trait and State Gratitude on HRQoL

Model	<i>B</i>	<i>SE</i>	95% CI		<i>pr</i>	<i>p</i>
			LL	UL		
1 Age → HRQoL	-0.14	0.03	-0.07	0.05	.04	.642
Gender → HRQoL	-0.20	0.11	-0.42	0.03	.15	.085
Minority status → HRQoL	0.15	0.11	-0.07	0.36	.12	.174
Trait gratitude → HRQoL	0.01	0.01	-0.01	0.03	.07	.338
2 Trait gratitude → State gratitude	0.19	0.04	0.12	0.26	.41	<.001
3 Age → HRQoL	-0.03	0.03	-0.09	0.03	.08	.329
Gender → HRQoL	-0.25	0.11	-0.46	-0.03	.19	.025
Minority status → HRQoL	0.12	0.10	-0.08	0.33	.11	.219
Person-centered state gratitude → HRQoL	0.04	0.01	0.02	0.06	.35	.001
Aggregate state gratitude → HRQoL	0.08	0.02	0.04	0.12	.32	<.001
Trait gratitude → HRQoL	-0.01	0.01	-0.03	0.01	.06	.488

Note. HRQoL = Health-related quality of life. Trait gratitude was assessed at baseline (week 1), whereas state gratitude and HRQoL were assessed weekly (weeks 2-8); *pr* = partial correlation.

Discussion

This prospective study examined the unique effects of trait and state gratitude on HRQoL. By assessing state gratitude as a mediator, findings also shed light on a mechanism whereby trait gratitude relates to HRQoL.

Trait Gratitude

First, trait gratitude alone was not associated with HRQoL, similar to the nonsignificant results of Millstein and colleagues (2016), who examined physical well-being. However, this finding is inconsistent with other studies that demonstrated significant associations of trait gratitude with mental well-being (Wood et al., 2010) and physical well-being (Hill et al., 2013; Krause, Emmons, & Ironson, 2015). Key differences in this study include a nonclinical, young adult sample compared to older adults and clinical samples; age and clinical status may moderate this link and future research should consider sampling a wider age range. These findings suggest that high trait gratitude alone, as measured by a one-time trait assessment, may not be sufficient to positively shape one's perception of both physical and mental well-being captured in HRQoL.

However, trait gratitude predicted higher state gratitude, consistent with hypotheses and previous studies (McCullough et al., 2004; Wood et al., 2008).

State Gratitude

Aggregate and person-centered state gratitude each uniquely predicted significantly higher weekly HRQoL beyond the effects of trait gratitude and demographics, consistent with hypotheses and past work that found a link between state gratitude and mental HRQoL (Harbaugh & Vasey, 2014; Kashdan et al., 2006). These results also fit with previous findings that gratitude exercises (i.e., assumed to elicit elevated levels of state gratitude) increased self-reported physical health and functioning (Lambert D'raven et al., 2015). Whereas most intervention studies reported between-group differences or changes in measures at post-intervention, our study offers a novel contribution by testing both aggregate and person-centered state gratitude, thus disentangling the unique effects of between-person variability and within-person differences for state gratitude in a prospective design.

Effects for aggregate scores indicate those with high chronic levels of gratitude reported greater weekly HRQoL, similar to the significant effects for between-person differences as measured by trait gratitude in previous studies. However, baseline trait gratitude was not a significant predictor of HRQoL in this sample. Given that trait and aggregate gratitude correlated in zero-order associations, and past work suggests aggregate measures are typically more reliable (Epstein, 1980), the aggregate of repeated state gratitude may yield more accurate estimates of the effects of between-person differences in the tendency to experience state gratitude on HRQoL. Regarding gratitude research in general, these results could suggest that future studies aiming to examine trait-level gratitude should also consider incorporating aggregate scores of repeated state-level measures, when feasible. Separately, person-centered state gratitude was a significant unique predictor of weekly HRQoL, which indicates that participants experienced higher HRQoL on weeks that they endorsed state gratitude above their own average levels. This finding implies a potential dose-response effect for state gratitude and HRQoL, in that regardless of one's average level of state gratitude, cultivating more gratitude in a given week may foster higher HRQoL than usual. Also, it should be noted that gender was significant in Model 3, such that women reported poorer weekly HRQoL when accounting for trait and state gratitude. Future studies should assess whether gender moderates these relationships with a larger sample size.

Lastly, as hypothesized, aggregate state gratitude mediated the relation between baseline trait gratitude and weekly HRQoL. Therefore, despite no direct effect, baseline trait gratitude prospectively predicted higher weekly HRQoL via higher chronic levels of state gratitude. Although trait and state gratitude are assumed to be related by definition, to the authors' knowledge, this is the first study to examine the specific roles of these distinct gratitude constructs and their combined impact (i.e., indirect effect) on HRQoL. Therefore, this study offers a novel contribution by modeling how trait and state gratitude, together, shape weekly HRQoL. Namely, a greater global tendency to experience state gratitude following relevant situations (trait gratitude) may be important for HRQoL insofar as it increases the likelihood of higher grateful states, which appears to play a more key role in shaping weekly quality of life.

Implications and Future Directions

One potential framework for understanding the benefits of state gratitude could be the broaden-and-build theory of positive emotions, which posits that experiences of positive emotions expand cognitive and behavioral resources (Fredrickson, 2001). Thus, experiencing more state gratitude could be related to a cognitive shift in attention toward positive aspects of

one's life. This may serve as an antidote to low HRQoL, which is characterized by distress and awareness of functional limitations due to poor physical and mental health (i.e., attention is restricted to negative stimuli). Additionally, state gratitude could be considered an activating emotion because it triggers strong motivation to engage in prosocial behavior (Algoe & Haidt, 2009; Bartlett & DeSteno, 2006). Higher state gratitude may translate to greater social engagement, thereby decreasing the perception that one's functioning and well-being is limited due to health concerns. Future studies should test these ideas directly.

Additionally, these findings are important in the study of HRQoL because they indicate gratitude might improve one's perception of overall health and functioning. Contrary to past work suggesting gratitude may take several months before it can influence perceived impairment (e.g., Lies, Mellor, & Hong, 2014), this study indicates incremental effects of gratitude in a shorter period of time (week to week). Thus, our results implicate the possibility for gratitude exercises to shape HRQoL. For example, practicing gratitude exercises, such as "counting blessings" (Emmons & McCullough, 2003) or writing a gratitude letter (Toepfer & Walker, 2009), are associated with higher state gratitude and increased levels of trait gratitude over time (Davis et al., 2016; Wood et al., 2010). These low-cost, low-burden exercises might provide a feasible and productive way to increase HRQoL.

Limitations and Future Research

Despite the strengths of a prospective design, multiple forms of gratitude measurement, and a novel indirect effect, our findings should be interpreted in the context of the following limitations. Given our nonclinical student sample, it remains unknown whether our findings translate to older or clinical samples for whom increased HRQoL is a salient and important outcome. Future studies should aim to include a more diverse sample to determine whether age or clinical complexity are moderators of this relationship. Although repeated state gratitude measurement over the past week allowed for a more comprehensive examination of between- and within-person variability, further situational variability could exist within a given week that may not be captured by weekly assessments. Because HRQoL and state gratitude were assessed at the same time point each week, there is also a risk for common method variance such that responses for one measure could be influenced or confounded by completing the other measure. Therefore, future studies may consider using experience sampling methods to replicate these findings with additional points of measurement that could capture emotional responses to multiple specific events throughout daily life, and could potentially assess HRQoL and state gratitude at slightly independent time points. Additionally, although the prospective design and temporal precedence of baseline trait gratitude strengthens inference, the nonexperimental design reduces our ability to infer causal relationships.

Conclusions

The present study expands the body of inquiry on how gratitude shapes well-being, demonstrating that between- and within-person differences in state gratitude are linked to higher HRQoL, and that trait gratitude is associated with HRQoL as it operates indirectly through state gratitude. Our findings provide further justification for examination of gratitude interventions aiming to cultivate feelings of state gratitude in daily life and thereby positively impact perceptions of health and quality of life.

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