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To cite this article: Brenda H. O'Connell & Mary Killeen-Byrt (2018) Psychosocial health mediates the gratitude-physical health link, *Psychology, Health & Medicine*, 23:9, 1145-1150, DOI: [10.1080/13548506.2018.1469782](https://doi.org/10.1080/13548506.2018.1469782)

To link to this article: <https://doi.org/10.1080/13548506.2018.1469782>



Published online: 29 Apr 2018.



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Psychosocial health mediates the gratitude-physical health link

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ABSTRACT

There is now a growing body of research demonstrating the physical health benefits of being grateful. However, research has only just begun to explore the mechanisms accounting for this gratitude-health relationship. This study examines the relationship between dispositional gratitude and self-reported physical health symptoms, and explores whether this relationship is explained through reduced levels of perceived loneliness and stress. This study employed a cross-sectional design with a sample of 607 healthy adults. Serial mediation analysis revealed that the positive effect of gratitude on physical health was significantly mediated by lower reported levels of perceived loneliness and stress. These findings are important given evidence that gratitude can be cultivated, and may serve to buffer against stress and loneliness and improve somatic health symptoms in the general population.

ARTICLE HISTORY

Received 30 January 2018
Accepted 23 April 2018

KEYWORDS

Gratitude; self-reported physical health; stress; loneliness; mediation

Gratitude is foundational to wellbeing across the lifespan and a grateful response to life circumstances is considered a crucial mechanism through which daily events are positively interpreted by people (Emmons & McCullough, 2003; Wood, Froh, & Geraghty, 2010). Cross-sectional, longitudinal, and experimental research consistently demonstrate that gratitude is linked to better psychological and relational health, however, more recently, studies are demonstrating that gratitude serves a protective and predictive role in self-reported physical health (Hill, Allemand, & Roberts, 2013; O'Connell, O'Shea, & Gallagher, 2016; Redwine et al., 2016). An important next step is to establish the causal and theoretically-grounded mechanisms explaining this gratitude-health relationship. With research establishing *if* gratitude is linked to physical health, much work is also needed to determine *how* they are linked. As recommended in previous research (Hill et al., 2013; O'Connell, O'Shea, & Gallagher, 2017; Wood et al., 2010) examining whether psychosocial health serves as an underlying mechanism through which positive psychological constructs, such as gratitude in this instance, are related to physical health is a fruitful line of inquiry. This study seeks to respond to these calls for research by examining whether perceptions of loneliness and stress play a mediating role in the relationship between gratitude and physical health, drawing on

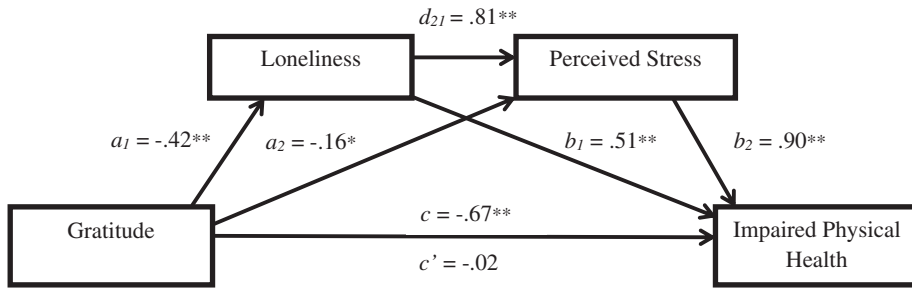


Figure 1. Serial mediation model showing the sequential mediation effects of loneliness and perceived stress on the association between gratitude and physical health. Unstandardized coefficients (B) are presented. * = $p < .001$, ** = $p < .0001$.

insights and premises from the broaden and build theory (Fredrickson, 1998, 2001) and the find-remind-and-bind theory of gratitude (Algoe, 2012; Algoe, Haidt, & Gable, 2008).

The hypotheses were as follows:

- (1) Gratitude will be significantly negatively related to self-reported impaired physical health
- (2) This relationship will be serially mediated by perceptions of loneliness and perceived stress.

Methods

Participants and procedure

A convenience sample of 790 people responded to this online cross-sectional study. Participants (61.1% females; final sample size $n = 607$) ages ranged from 18 to 60 years ($M = 25.15$, $SD = 9.50$) and 84.5% were Irish (9.9% non-Irish European). The majority of participants were students (88%) and 51.7% identified as being employed.

Participants were recruited to take part in the study through the host University student and staff email system and Facebook. Participants were given a link to the study generated using Qualtrics online survey software. Online consent was provided before proceeding. Ethical approval for the study was given by the host university's Research Ethics Committee. Remuneration was not offered to any participant.

Materials

Gratitude was measured using the Gratitude Questionnaire-Six-Item Form (GQ-6) (McCullough, Emmons, & Tsang, 2002). Scores range from 6 to 42, where higher scores reflect higher levels of gratitude. This study shows good reliability ($\alpha = .81$).

Perceived loneliness was measured using the National Institute of Health Toolbox Adult Social Relationship Loneliness Scale. This five item self-report scale measures feelings of loneliness portrayed as the perception that an individual is lonely and disconnected from others (Cyranowski et al., 2013). Scores ranged from 5 to 25 with lower scores indicating lower levels of loneliness. This study shows excellent reliability ($\alpha = .94$).

Table 1. Bivariate correlations and descriptive statistics.

	1	2	3	4	5	6	7	8	9	<i>M</i> (<i>SD</i>)
1. Gratitude	–	–.44**	–.38**	–.30**	.18**	.19**	–.01	.19**	–.12**	33.5 (5.9)
2. Loneliness	–.44**	–	.64**	.49**	.03	–.25**	–.05	–.22**	.09**	13.3 (5.3)
3. Stress	–.38**	.64**	–	.60**	.15**	–.19	–.07	–.20**	.06	20.6 (7.4)
4. Physical Health	–.30**	.49**	.60**	–	.15**	–.18**	–.03	–.12**	.02	44.7 (14.2)
5. Sex	.18**	.03	.15**	.14**	–	.02	.04	.08	–.06	–
6. Age	.19**	–.25**	–.19**	–.18**	.02	–	.16**	.41**	–.21**	24.8 (9.1)
7. Nationality	–.01	–.05	–.07	–.03	.04	.16**	–	.14**	.09**	–
8. Student	.19**	–.22**	–.20**	–.12**	.08	–.41**	.14**	–	–.31**	–
9. Employed	–.12**	.09*	.06	.02	–.06	–.21**	–.09**	–.31**	–	–

Note: Listwise deletion was applied to correlations, $n = 584$; * $p < .05$, ** $p < .01$.

The Perceived Stress Scale (PSS-10) (Cohen, Kamarck, & Mermelstein, 1983) was used to measure perceived stress levels. This is the most widely used self-reported measure of global perceived stress in relation to health related outcomes (Neff & Germer, 2013). This study shows good reliability ($\alpha = .89$).

The 14-item Physical Health Questionnaire (PHQ; Schat, Kelloway, & Desmarais, 2005) measured subjective physical health symptoms experienced in the previous two weeks. This self-reported scale measures four somatic symptoms, including sleep disruption, headaches, gastro-intestinal difficulties and respiratory infections. Scores range from 14 to 98 with higher scores demonstrating higher levels of self-reported somatic symptoms or impaired physical health. Research has shown that the PHQ correctly predicts actual physical health (Arnold & Dupré, 2012). This study shows good reliability ($\alpha = .85$).

Statistical analysis

A serial multiple mediation model predicting that the impact of gratitude on physical health would be mediated by loneliness and perceived stress was conducted using PROCESS (version 2.16) for IBM SPSS Statistics 23 (Hayes, 2013). Results are reported for bootstrap significance tests using a bias-corrected and accelerated (BCa) 95% confidence interval (CI) and 5000 bootstrap samples. The software employs listwise deletion based on each variable in the model, the final sample size was $n = 607$. Given that the data had sufficient power (0.80) and missing data was completely at random (Little's MCAR test; $\chi^2(56) = 63.89$, $p = .219$) this was deemed an appropriate approach.

Results

Preliminary analysis

Descriptives and intercorrelations are presented in Table 1. All self-report measures were significantly correlated with small-moderate associations according to Cohen's d effect size. None of the model variables exceeded the recommended intercorrelation value of > 0.80 (Katz, 2011), tolerance values were all > 0.1 and VIF values < 10 , signifying a low risk of multicollinearity in the data (Field, 2013).

Table 2. Parameter estimates of the model examining the mediating role of loneliness and perceived stress in the relationship between gratitude on physical health.

Model	Estimate	SE	<i>p</i>	BCa 95% CI (lower)	BCa 95% CI (upper)
<i>Model without Mediators</i>					
Intercept	67.17	3.25	<0.0001	60.78	73.56
Gratitude → PH(<i>c</i>)	-.67	.10	<0.0001	-.86	-.49
R ² (<i>y,x</i>)	.08		<0.0001		
<i>Model 1: Loneliness as outcome</i>					
Intercept	27.30	1.14	<0.0001	25.07	29.53
Gratitude → Loneliness (<i>a</i> ₁)	-.42	.03	<0.0001	-.48	-.35
<i>Model 2: Stress as outcome</i>					
Intercept	15.06	1.89	<0.0001	11.34	18.77
Loneliness → Stress (<i>d</i> ₂₁)	.81	.05	<0.0001	.71	.90
Gratitude → Stress (<i>a</i> ₂)	-.16	.04	.0005	-.24	-.07
<i>Model 3: PH as outcome</i>					
Intercept	19.89	3.93	<0.0001	12.16	27.61
Loneliness → PH (<i>b</i> ₁)	.51	.12	<0.0001	.28	.73
Stress → PH (<i>b</i> ₂)	.90	.80	<0.0001	.74	1.06
Gratitude → PH (<i>c'</i>)	-.02	.09	.82	-.19	.15
R ² (<i>x,m1,m2,y</i>)	.38		<0.0001		
<i>Indirect Effects</i>					
<i>a</i> ₁ <i>b</i> ₁	-.21	.06	-	-.32	-.11
<i>a</i> ₁ <i>d</i> ₂₁ <i>b</i> ₂	-.30	.04	-	-.39	-.23
<i>a</i> ₂ <i>b</i> ₂	-.14	.04	-	-.23	-.06

Notes: PH = physical health symptoms; *ab* = total indirect effect; *a*₁*b*₁ = specific indirect effect through loneliness; *a*₁*d*₂₁*b*₂ = specific indirect effect through loneliness and perceived stress in serial; *a*₂*b*₂ = specific indirect effect through perceived stress, BCa 95% CI = bias-corrected and accelerated 95% confidence interval with a resample procedure of 5000 bootstrap samples.

Serial mediation model: the effect of gratitude on physical health as mediated by loneliness and perceived stress

A serial multiple mediation analysis was conducted to examine whether the effect of gratitude on physical health was mediated by loneliness and perceived stress. The analysis was first conducted including five potential confounds (age, sex, nationality, student status, employment status) as covariates as three of these were associated with key measures. Results indicated minimal changes in parameter estimates and none of the covariates was significant in the model. As such, the more parsimonious model is presented here. There was a significant total effect of gratitude on physical health (*c*). Both loneliness (while controlling for perceived stress; *a*₁*b*₁) and perceived stress (while controlling for loneliness; *a*₂*b*₂) respectively mediated the relationship between gratitude and physical health. As predicted, the effect of gratitude on physical health was mediated by loneliness and perceived stress in serial, as evidenced by a significant sequentially mediated indirect effect (*a*₁*d*₂₁*b*₂). After controlling for the mediators, there was no evidence of a significant direct effect (*c'*) of gratitude on physical health. Overall, this model significantly accounted for 37.8% of the variance in physical health, $F(3, 603) = 121.9, p = .0001$. See Table 2.

Discussion

The aim of this study was to address *if* gratitude predicts physical health and, if so, *how*, by exploring psychosocial mechanisms underlying this association. The findings affirm and add to existing evidence that gratitude is significantly related to better self-reported physical

health (Hill et al., 2013; O'Connell et al., 2016; Redwine et al., 2016), specifically perceived somatic symptoms, in an adult sample. This study offers novel preliminary evidence that gratitude predicts enhanced self-reported physical health through reducing subjective perceptions of loneliness and perceived stress. The effect of gratitude on physical health was no longer present when loneliness and stress levels were controlled for statistically, which suggest that gratitude directly influences levels of loneliness and stress, which then influences somatic symptoms. As such, loneliness and stress served as serial mediators of the relationship between gratitude and physical health. This is the first study to examine subjective perceptions of loneliness and stress as potential serial mediators accounting for the gratitude-health link. The study findings are limited by the sample and the cross-sectional design, therefore lacks immediate clinical and practical implications. Although limitations of data collection method should not limit the statistical tools utilized in understanding the underlying processes which may be manifest in the data (Hayes, 2013), the design impedes any conclusive causal interpretation. It is possible that the relationship between gratitude and physical health may be bi-directional in nature. Nonetheless this study follows the expected directionality between dispositions and physical health (Adler & Matthews, 1994) and previous theoretical and empirical evidence also assumes this direction (Fredrickson, 2004; Hill et al., 2013; Ong, Uchino, & Wethington, 2016). Further studies incorporating experimental and longitudinal designs are recommended to determine cause and effect. In terms of sample, this study could have benefited from details of chronic conditions and objective measures of health, in addition to self-report. These findings support evidence advocating that gratitude be cultivated, and provides preliminary evidence that gratitude may be a beneficial psychological resource to include in health interventions that target social relationships and stress. The most common interventions for promoting gratitude include listing things for which one is grateful, journaling, or expressing one's gratitude to the person to whom one is grateful, and show evidence for efficacy (Davis et al., 2016). Given the nascent state of research examining how gratitude may promote physical health, this study provides much needed insight, evidencing that subjective psychosocial health, in the form of loneliness and perceived stress, serves as an underlying mechanism through which gratitude predicts physical health symptoms.

Disclosure statement

No potential conflict of interest was reported by the authors.

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