Master Thesis

Effects of a gratitude intervention on mental well-being: The mediating role of stress

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Abstract

As only 37 % of the Dutch population experiences high mental well-being it is important to investigate whether positive psychology interventions are a meaningful resource for well-being. Within this study, the effectiveness of a brief self-help gratitude intervention in enhancing total, emotional, social, and psychological well-being, as well as in decreasing stress was examined. Moreover, the mediating role of stress on the effect of a gratitude intervention on well-being was explored. A sample of 118 participants of the general population (mean age = 50.43, 90.7 % female) were randomly allocated to a gratitude intervention (n = 51) or wait-list control condition (n = 67). Participants completed self-report questionnaires including the Mental Health Continuum-Short Form and the Perceived Stress Scale at baseline, after six weeks and after twelve weeks. Mixed ANOVAs revealed significant improvements of total (η^2 = .23), emotional (η^2 = .10), social (η^2 = .17), and psychological well-being (η^2 = .20) after six weeks, and further significant improvements of total (η^2 = .10), social (η^2 = .05), and psychological well-being (η^2 = .13), and reductions of stress (η^2 = .06) after twelve weeks in the gratitude intervention condition compared to the wait-list control condition. The effects on total and psychological well-being were maintained. Mediation analyses demonstrated a significant mediating role of stress on the effect of the intervention on psychological well-being, but not on total, emotional and social well-being. Consequently, gratitude interventions appeared to be an important resource for mental well-being and can thus be implemented as public intervention in the Dutch population.

Keywords: Gratitude, Intervention, Mental Well-being, Stress

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Introduction

Gratitude as a resource for mental well-being

In recent years gratitude received increasing attention in the research of psychology (Wood, Froh, & Geraghty, 2010) as it has been recognized to be an essential fundamental attribute of human beings (Emmons, & McCullough, 2004). Gratitude is an individual's tendency to positively recognize and appreciate a gift that can either be a helpful action provided by another individual, or positive aspects of the own life or the world as such (Breen, Kashdan, Lenser, & Fincham, 2010; Bryan, Young, Lucas, & Quist, 2016; Wood, Froh, & Geraghty, 2010). These positive aspects can include beneficial individual abilities, valuable life experiences, precious moments, or the natural beauty of non-social sources (Emmons, & McCullough, 2004; Wood, Froh, & Geraghty, 2010). With gratitude, individuals "*perceive and acknowledge the goodness in their lives*" (Harvard Health Publishing, 2018, p. 1). Hence, gratitude is often referred to a positive emotional state that is characterized by a sense of thankfulness and joy (Emmons, & McCullough, 2004; Göcen, 2015, Wood, Froh, & Geraghty, 2010). Emmons and McCullough (2004) further suggest that gratitude can be considered as an important resource for mental well-being.

The World Health Organisation (WHO) defines mental well-being as "*a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community*." (WHO, 2004, p. 12). Hence, it is essential for a good quality of life (WHO, 2004; Schotanus-Dijkstra, ten Have, Lamers, de Graaf, & Bohlmeijer, 2016). Mental well-being is composed of three different dimensions: emotional, social, and psychological well-being (Keyes, 2007). Emotional well-being refers to the presence of life satisfaction and positive emotions, like happiness and peacefulness (Joshanloo, 2017; Keyes, 2007; Hadavi, 2017). Social well-being focuses on the quality of interrelationships and the sense of belonging (Keyes, 1998; Joshanloo, 2017). Psychological well-being is mainly referred to the optimal functioning of an individual that addresses the pursuit of personal growth, self-acceptance, and autonomy (Ryff, 1989). Furthermore, this dimension acknowledges purpose in life, positive relations with others, and environmental mastery (Ryff, 1989). Emotional, social, and psychological well-being are essential for experiencing high mental well-being. Schotanus-Dijkstra, Pieterse, Drossaert, Westerhof, de Graaf, ten Have, Walburg, & Bohlmeijer (2015), however, reported that only 37 % of the Dutch adult population reaches high mental well-being. Therefore, it is important to explore the resources of it.

Previous research demonstrates that gratitude is positively correlated to mental well-being (Kaczmarek, Kashdan, Kleiman, Baczkowski, Enko, Siebers, Säefer, Król, & Baran, 2013; Emmons, & McCullough, 2004; Göcen, 2015; Wood, Froh, & Geraghty, 2010). According to Wood, Froh, and Geraghty (2010) gratitude serves as a way to experience emotional warmth, and hence, strengthens emotional well-being. Grateful individuals are more open to their feelings, and they appreciate positive feelings more intensively (Wood, Froh, & Geraghty, 2010). Thus, gratitude improves an individual's mood and leads to a comfortable, pleasing emotional state and to a positive valence towards oneself (Emmons, & McCullough, 2004). Accordingly, more recent studies prove that gratitude is strongly associated with greater happiness and emotional well-being (Göcen, 2015; Kaczmarek et al., 2013). Wood, Froh, and Geraghty (2010) further emphasized that gratitude promotes social functioning, and contributes to the improvement of social well-being. Since grateful individuals are more motivated to express sensitivity and concern towards others (DeWall, Lambert, Pond, Jr, Kashdan, & Fincham, 2012), it is evidently stated that gratitude facilitates healthy social relationships (DeWall et al., 2012; Algoe, Gable & Maisel, 2010; Kaczmarek et al., 2013; Wood, Joseph, & Linley, 2007a). Moreover, Wood, Froh, and Geraghty (2010) found that gratitude leads to more meaningful activities, and therefore, also enhances psychological well-being. With gratitude, individuals reinterpret experiences and situations positively which makes them realize that their life-situation is more meaningful, valuable, and fulfilling (Emmons, & McCullough, 2004; Göcen, 2015; Kaczmarek et al., 2013; Wood, Froh, & Geraghty, 2010).

Effects of gratitude interventions on mental well-being

In the field of the positive psychology movement, different interventions including gratitude interventions are implemented to enhance well-being by raising positive feelings, cognitions, and behavior (Bolier, Haverman, Westerhof, Riper, Smit, & Bohlmeijer, 2013a). Wood, Froh, and Geraghty (2010) established three types of classical gratitude interventions that help to promote gratitude. "*Gratitude list*" asks a participant to daily list (three) things someone is grateful for. The description of these things is meant to be on a regular basis. "*Grateful contemplation*" asks a participant to list and think about things someone is grateful for in a more global fashion. "*Behavioural expressions of gratitude*" ask a participant to write and read a letter to a helpful other person someone is grateful for (Wood, Froh, & Geraghty, 2010).

Previous research indicates that these gratitude interventions have the potential to improve an individual's gratitude which in turn positively influences the total mental well-being (Seligman, Steen, Park, & Peterson, 2005; Emmons, & Crumpler, 2000; Killen, & Macaskill, 2015). It was shown that gratitude interventions lead to greater satisfaction with life, more pleasant future expectations (Emmons, & McCullough, 2003), and more positive mood and happiness (Killen, & Macaskill, 2015, Watkins, Woodward, Stone, & Kolts, 2003). Watkins et al. (2003) demonstrated that gratitude interventions have a positive effect on emotional well-being. Despite promising findings for gratitude interventions, less is known about the endurance of this effect, and about the effect of gratitude interventions on psychological well-being and on social well-being. Moreover, the working mechanisms of gratitude interventions are still unknown (Wood, Joseph, & Linley, 2007b).

The mediating influence of stress

Wood, Joseph, and Linley (2007b) suggest that mental well-being is not directly affected by gratitude interventions. They rather assume that underlying working mechanisms influence the effects on mental well-being. Furthermore, they state that gratitude interventions also facilitate the reduction of stress. Given that lower levels of stress further improve mental well-being (Wood, Joseph, & Linley, 2007b), the current study, therefore, concerns stress as potential mediator.

Stress arises when external situations are perceived as threatening and demands from these situations exceed an individual's coping capacities (Lazarus, & Folkman, 1984; Selye, 1973). Hence, the individual experiences pressure which overshadows everyday activities and predominates a worthy life in a negative way (Lucini, Solaro, Lesma, Gillet, & Pagani, 2011). Therefore, life seems to be unpredictable, uncontrollable, and overwhelming (Wood, Josepf, & Linley, 2007b). In the long run, stress leads to an overall physical arousal and facilitates the development of mental health problems (Misra, & Castillo, 2004; Lee, Kim, Bae, Kim, Shin, Yoon, & Kim, 2018; Suzuki, & Iko, 2013). Likewise, stress results in emotional exhaustion (Lee et al., 2018) and negative affect (Folkman, 2013). As a result, stress can cause frustration and dissatisfaction (Misra, & Castillo, 2004). Research indicates that stress is inversely related to mental well-being, suggesting that it leads to poor mental well-being (WHO, 2004; Teh, Archer, Chang, & Chen, 2013).

Emmons (2010) stated that grateful individuals are more stress-resistant and recover more quickly from a stressful event. Based on Fredrickson's broaden and build theory (1998) it is assumed that positive emotions such as gratitude broaden the engagement of cognitive

and behavioral activities. These activities can build resources and capacities that can be applied in future stressful and threatening situations (Fredrickson, 1998; Wood, Froh, & Geraghty, 2010). According to Lee et al. (2018), gratitude interventions facilitate the positive reinterpretation of stressful situations and the acceptance of social support after stressful situations. Likewise, gratitude interventions might be helpful in dealing with stress (Lee et al., 2018). Hence, it can be assumed that gratitude interventions reduce levels of stress which can further lead to higher mental well-being (Kaczmarek et al., 2013; Wood, Froh, & Geraghty, 2010; Bolier, Haverman, Kramer, Westerhof, Riper, Walburg, Boon, & Bohlmeijer, 2013b).

The current study

The purpose of the current study was to replicate the effects of a gratitude intervention on total and emotional well-being in comparison with a wait-list control condition (Watkins et al., 2003); and further to examine the effects of a gratitude intervention on social, and psychological well-being, and on stress. An additional purpose was to test the possible mediating role of stress on the effect of a gratitude intervention on well-being. Therefore, two hypotheses were tested:

(1) It was hypothesized that a brief self-help gratitude intervention leads to significantly higher total, emotional, social, and psychological well-being and to significantly lower levels of stress compared to a wait-list control condition, after six weeks and after twelve weeks.

(2) It was hypothesized that reductions in stress over the course of the intervention mediate the effects of the brief self-help gratitude intervention on total, emotional, social, and psychological well-being compared to a wait-list control condition, after twelve weeks.

Method

Design

The study utilized a single-blind randomized controlled trial design with five conditions. The current study used two of these conditions, namely a gratitude intervention condition and a wait-list control condition. In total, the study lasted 12 months in which five assessment moments with online self-report questionnaires took place. The assessment moments that were included in the current study were obtained at baseline (T0), six weeks after baseline (T1), and twelve weeks after baseline (T2). Participation could be stopped at any time without giving reasons. The study was approved by the ethical committee of the University of Twente.

Participants and Procedure

In September 2017, an advertisement was placed in various Dutch newspapers (eg. Tubantia, Volkskrant, or Metro), online newsletters of Psychology magazines and social media to recruit individuals who are motivated to work with *"happiness exercises for a more pleasant, committed, and meaningful life*". Interested individuals were directed to the website of the study that provided more information about the research and the enrolment procedure. After filling in a contact form that was available on the website, the potential participant received a link with the secure online informed consent. With this informed consent he or she had to accept several rules by ticking in the field "*yes*". When "*no*" was ticked, a participation was no longer possible. After accepting the informed consent, an online screening procedure was conducted to assess age, gender, education level and the overall mental state. The participants had to be at least 18 years old and fluent in Dutch. They needed good internet-access and an email address. Moreover, they had to agree taking part in a 6 week program. The main exclusion criteria was an indication of serious symptoms of anxiety (score > 15 on the Generalized Anxiety Disorder 7 items (GAD-7); Spitzer, Kroenke, Williams, & Löwe, 2006) or depression (score > 34 on the Centre for Epidemiological Studies Depression Scale (CES-D); Radloff, 1977).

After baseline, 423 participants were randomly allocated to the conditions. Randomization was stratified by gender and educational level (low, medium, high). Relevant for the current study were the 169 participants of the gratitude intervention condition (GI, n = 85) and wait-list control condition (WLC, n = 84). Of these 169 participants, 118 completed all measurement moments (GI, n = 51; WLC, n = 67) and were further considered as study sample. The flow of the participants is shown in Figure 1.

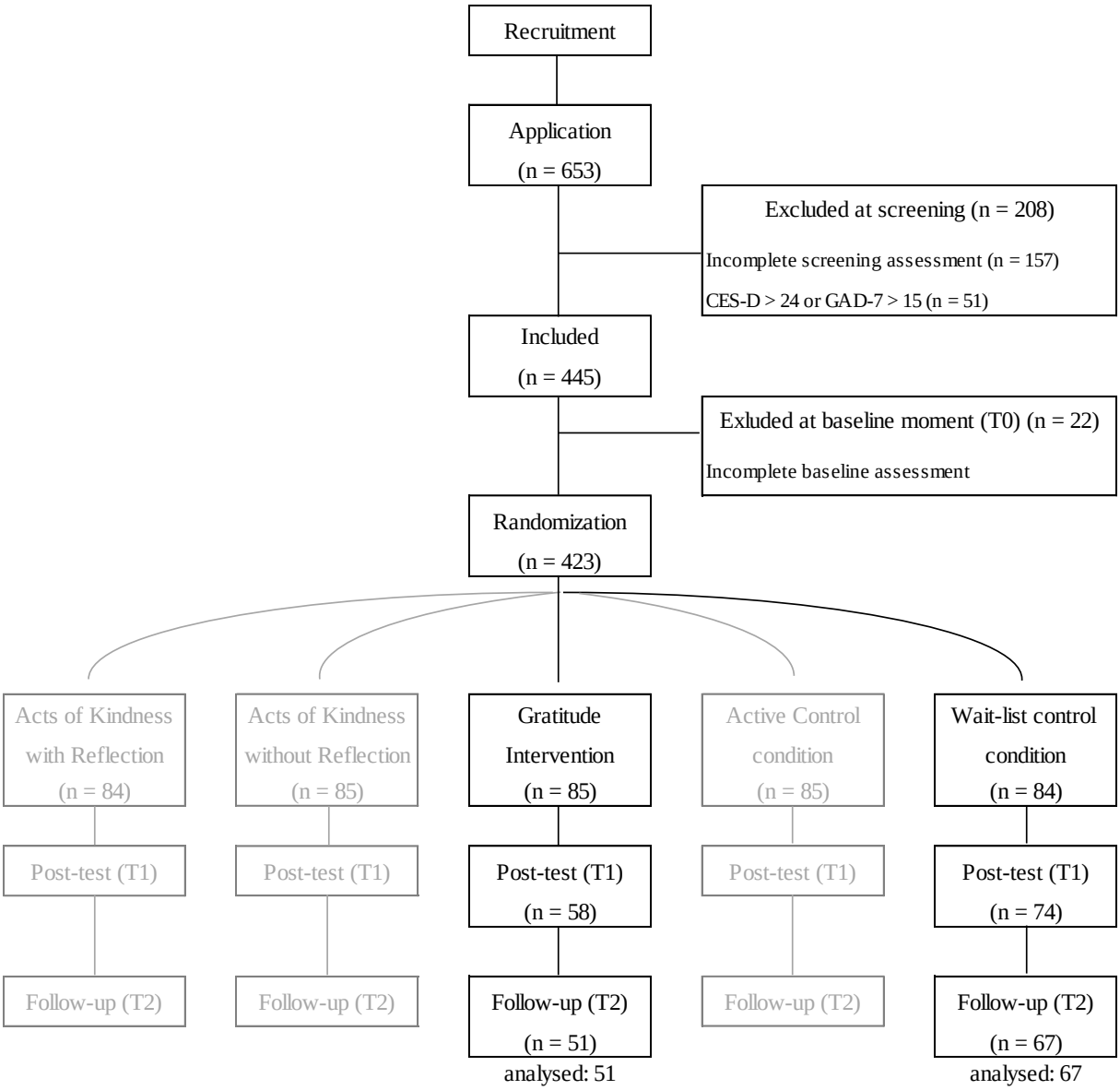

Figure 1. Flow-chart of participants.

Statistical power

The statistical power of the study sample used to be 80 % with a two-sided 5 % significance. For reaching this amount, more than 78 participants per condition should have completed the study. Due to the 51 dropouts (30.2 %), the statistical power was reduced to 19.1 % for well-being as dependent variable and 12.7 % for stress as dependent variable.

Gratitude intervention condition

The participants allocated to the intervention condition worked through a six week gratitude intervention that contained six exercises. The exercises were aimed at improving gratitude. On Sundays, the participants received emails with an exercise or activity they had

to follow during the upcoming week (Table 1). Each Saturday, they had to complete a happiness diary in which they wrote down things they were grateful for and experiences with the exercise of the week. The participants could decide when and where they wanted to carry out the exercises.

Table 1. *Content of the gratitude exercises.*

Week	Exercise	Description
1	Gratitude diary	Each evening of the following week, take 15 minutes to think about and write down three good things/ events that happened to you during the day. Also write down why you felt grateful for these things or events.
2	See with other eyes	Each day, write about an aspect of your everyday life. The aspects can also be small things you usually take for granted. Imagine that this aspect is no longer present.
3	Express gratitude	Each day, think about a person who did something good to you in the last weeks. Write a gratitude letter to this person in which you describe what the other person did and what this meant to you.
4	Grateful memories	During the week, think about past things, events, or persons you are grateful for. Write down these things in the evening.
5	Gratitude and misfortune	Each day, write about difficult life events. You can reconsider these events with several questions, like "*While looking back, can you also recognize positive consequences of that event?"* or "*Did you change due to that event? Herewith, what is your positive change/ development?".*
6	Gratitude as life view	This exercise is two-fold. In the morning, take five minutes to remember to be grateful. Then, appreciate things that could not be taken for granted during the day.

Wait-list control condition

The participants of the wait-list control condition did not directly receive an intervention, but could choose one out of three offered happiness interventions twelve weeks after the start of the study. This condition was used to check whether the effects could be attributed to the intervention.

Measures

Total, emotional, social, and psychological well-being were considered as the outcome variables. For examining levels well-being, the "*Mental Health Continuum-Short Form (MHC-SF)*" of Keyes (2002) was used. This validated questionnaire consists of 14 items assessing emotional well-being (3 items; eg. *"During the past month, how often did you feel happy?"*), social well-being (5 items; eg. *"During the past month, how often did you feel that you had something important to contribute to society?"*), and psychological well-being (6 items; eg. *"During the past month, how often did you feel that your life has a sense of direction or meaning to it?"*) (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). Participants were asked to reflect the frequency of feelings during the last four weeks. The answer options were given on a continuous 6 point Ranging Scale that runs from "*never*" (0) to *"every day*" (5). A higher total mean score indicates a greater level of mental well-being. In the present study, the scores were calculated for the total scale as well as for the three subscales. In accordance with prior research demonstrating good psychometric properties for the MHC-SF (Lamers et al., 2011), the current study showed good Cronbach's Alpha for the total scale ($\alpha = .92$) and for each subscale (emotional well-being: $\alpha = .85$; social well-being: $\alpha = .75$; psychological well-being: $\alpha = .85$).

The level of stress was assessed with the 10-item "*Perceived stress scale (PSS)"* by Cohen, Kamarck, and Mermelstein (1983). The items ask the participants how often they experience several thoughts and feelings related to stress (eg. "*In the last month, how often have you felt nervous and stressed?"*). The items are rated on a continuous 5 point Likert Scale that runs from "*never*" (0) to "*very often*" (4). The total scores range from 0 to 40. Higher scores refer to a higher level of stress (Cohen, Kamarck, & Mermelstein, 1983). In the current study, the PSS yielded adequate psychometric properties ($\alpha = .79$) which is consistent with prior research (Roberti, Harrington, & Storch, 2011).

Data analysis

The data of the current study were analysed using SPSS 22 (Statistical Package for Social Sciences; IBM, USA, 2015). Dropouts with incomplete data were detected per assessment moment. Little's *Missing completely at random test* (MCAR test) was performed to display whether the missing data are randomly distributed or not. As the MCAR test was not significant ($\chi^2 = 97.21$ (97), $p = .475$), the missing data of the sample were completely at random (Little, 1988). In total, 51 (30.2 %) dropouts were detected and removed from the dataset by listwise deletion (Garson, 2015).

In order to identify possible baseline differences in demographic characteristics between both conditions of completers and between both conditions of dropouts, *Independent sample t-test* for the continuous variable of age and the *Chi square analyses* for all other demographic characteristics were conducted. Further, the *Independent sample t-test* and the *Chi square analyses* were carried out to compare the demographic characteristics of completers with the ones of dropouts. The baseline mean scores of the two scales were compared between both conditions of completers and between completers and dropouts. Therefore, the *Independent sample t-test* was conducted per scale. Non-significant differences in demographic background and baseline mean score indicate whether the randomization was successful. Moreover, the adherence of the participants of the gratitude intervention was determined. For this purpose, the proportion of participants that completed each week's exercise was analysed.

To examine the effects of the gratitude intervention on well-being and on stress, *mixed ANOVAs* were performed. A 2 x 3 design was used with the mean scores of the three assessments (T0, T1, and T2) of well-being and stress as within-subject variables and the gratitude intervention versus wait-list control condition as the between-subject factor. Hence, the changes in well-being and stress between the three assessments could be displayed per condition. The effect sizes given as partial eta squared were interpreted with regard to Cohen (1988): $\eta^2 < .01$ (small effect), $\eta^2 < .06$ (medium effect), and $\eta^2 < .14$ (large effect).

The mediating role of stress on the effect of the gratitude intervention on well-being was analysed with the tool PROCESS (version 3.0) (Hayes, 2017). For each of the variables: total, emotional, social, and psychological well-being; a separate *simple mediation analysis* was conducted. PROCESS estimates the direct and indirect effect of mediation models by a regression based analytical framework. Figure 2 shows the mediation model of the present study. Path c represents the direct effect of the independent variable "*condition*" (X: coded 1 for the gratitude intervention and 0 for the wait-list control condition) on the dependent variable "*well-being*" (Y: mean score of the MHC-SF and the three subscales at follow-up assessment (T2)). Path c' displays the indirect effect of X on Y which is mediated by the mediator "*stress*" (M: mean score of the PSS at post assessment (T1)). For controlling the baseline variance in total, emotional, social, and psychological well-being, as well as in stress, the analyses were carried out with the baseline score (T0) of the total MHC-SF, of the three subscales of the MHC-SF, and of the PSS as covariates. Based on 5000 bootstrapping samples the bias corrected (BC) 95 % Confidence Intervals (CI) were estimated. When a BC 95 % CI

of the indirect effect of X on Y did not include zero, this indirect effect was considered as being significant. The chosen level of significance was $p < 0.05$ for all analyses.

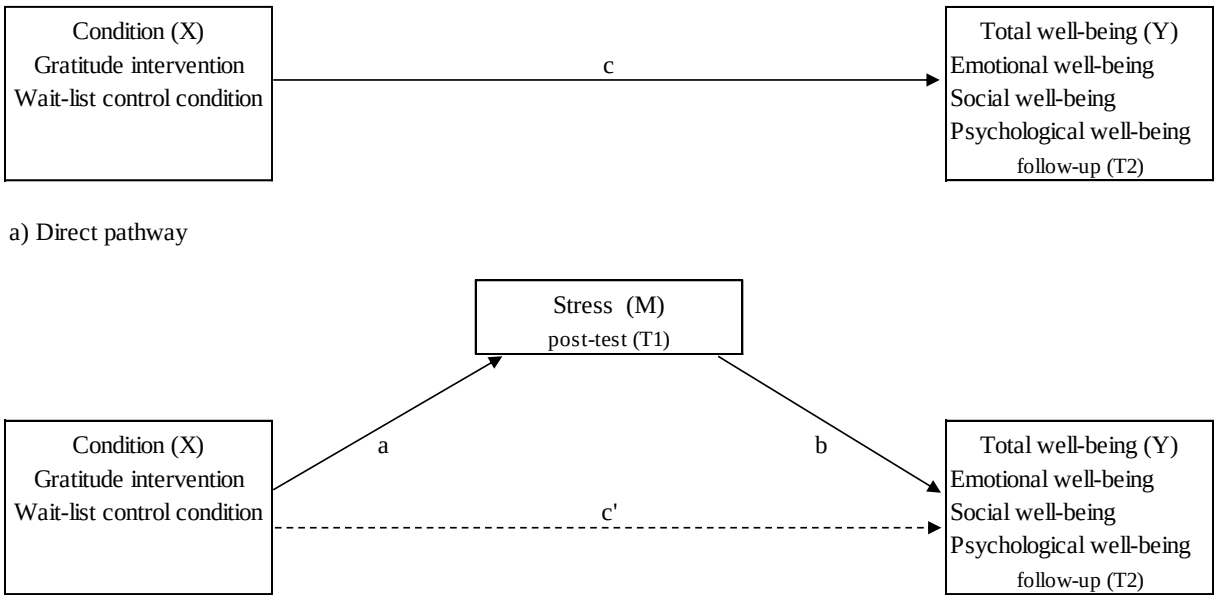

Figure 2. Mediation model considering stress as mediator (T1) for the effect of the gratitude intervention on well-being (T2) compared to the wait-list control condition, with baseline scores of stress and well-being as covariates (T0).

Results

Study sample

The majority of the study sample consisted of women (90.7 %) with a mean age of 50.43 years (SD = 8.34). The participants were predominantly Dutch (95.8 %) and had a higher educated background (77.2 %). Further characteristics of these participants are shown in Table 2. At baseline, no significant differences between the gratitude intervention and the wait-list control condition were found for the demographic characteristics ($p \geq .056$). Further, the results showed that the baseline mean scores on the MHC-SF and the PSS did not significantly differ between both conditions ($p \geq .079$) (Table 2).

Dropouts

Of the 169 participants that were included in the current study, 37 participants had missing data sets at post assessment, and an additional Number of 14 participants had missing data at follow-up assessment. In total, 51 participants were considered dropouts (30.2 %), of which 34 were due to the gratitude intervention condition and 17 due to the wait-list control condition. No significant differences of the demographic characteristics between dropouts of

the gratitude intervention and dropouts of the wait-list control condition could be found ($p \geq .199$). The comparison between dropouts and completers indicated only a significant difference of the age of the participants ($t = 3.85$ (167), $p = .000$). With a mean age of 44.59 ($SD = 10.54$), the dropouts were 5.84 years younger than the completers. Furthermore, the mean scores on the MHC-SF and the PSS did not significantly differ between dropouts and completers (MHC-SF, $t = -.68$ (167), $p = .499$; PSS, $t = .138$ (167), $p = .891$).

Adherence

Over the course of the intervention the adherence varied between 72.5 % and 100 %. All participants of the gratitude intervention ($n = 51$, 100 %) followed the exercise of the first week. Considering the nonadherence, there were no statistical significant differences between adherers and non-adherers in the demographic characteristics ($p \geq .272$).

Table 2. *Baseline demographic characteristics and baseline mean scores of the study sample*.

	Total (n = 118)	GI (n = 51)		WLC (n = 67)					
	n (%)	*n* (%)	*M (SD)*	*n* (%)	*M (SD)*	*χ2(df)*	*p*	*t(df)*	*p*
Age								.22 (116)	.826
Mean, years (*SD*)	50.43 (8.3)		50.63 (6.59)		50.28 (9.50)				
Range	23-64		32-64		23-64				
Gender						1.26 (1)	.262		
Male	11 (9.3)	3 (5.9)		8 (11.9)					
Female	107 (90.7)	48 (94.1)		59 (88.1)					
Ethnicity						2.43 (2)	.296		
Dutch	113 (95.8)	48 (94.1)		65 (97.0)					
Others	5 (4.2)	3 (5.9)		2 (3.0)					
Marital status						2.51 (3)	.473		
Married, relationship	68 (57.6)	33 (64.7)		35 (52.2)					
Single	50 (42.4)	18 (35.3)		32 (47.8)					
Living situation						10.75 (5)	.056		
Alone	26 (22.0)	7 (13.7)		19 (28.4)					
With family/ others	92 (88.0)	44 (86.3)		48 (71.6)					
Education						5.42 (4)	.247		
Lower education	5 (4.2)	2 (3.9)		3 (4.5)					
Medium education	22 (18.6)	10 (19.6)		12 (18.0)					
Higher education	91 (77.2)	39 (76.5)		52 (77.5)					
Work situation						10.51 (8)	.231		
Paid work	83 (70.4)	35 (68.6)		48 (71.6)					
Unpaid/ no work	35 (29.6)	16 (31.4)		19 (28.4)					

Table 2. (continued)

	Total (n = 118)	GI (n = 51)		WLC (n = 67)					
	n (%)	*n* (%)	*M (SD)*	*n* (%)	*M (SD)*	*χ2(df)*	*p*	*t(df)*	*p*
Baseline scores									
Mental well-being			2.61 (.74)		2.76 (.68)			1.09 (116)	.278
Emotional well-being			2.84 (.85)		2.88 (.85)			.238 (116)	.812
Social well-being			2.47 (.75)		2.54 (.72)			.514 (116)	.606
Psychological well-being			2.62 (.80)		2.88 (.76)			1.775 (116)	.079
Stress			2.00 (.61)		1.92 (.54)			-.814 (116)	.417

Notes: GI Gratitude intervention condition*, WLC* Wait-list control condition, *M* Mean, *SD* Standard Deviation, χ^2*(df)* Chi square analyses, *t(df)* Independent sample t-test.

The effects of the gratitude intervention on well-being

The results of the *mixed ANOVAs* are displayed in Table 3. They demonstrated that the participants of the gratitude intervention, as compared to the ones of the wait-list control condition, had a stronger increase in total, emotional, social, and psychological well-being at T1 and at T2. The main effect of time on total, emotional, social, and psychological well-being was significant from T0 to T1, and from T0 to T2 compared to the wait-list control condition ($p \leq .002$). The main effect of group was not significant for any of the outcome variables ($p \geq .164$). Notably, the time x group interaction effect on total, emotional, social, and psychological well-being was statistically significant for the period from T0 to T1. The effect sizes were in the moderate and large range ($\eta^2 = .10$ to $.23$). Pertaining the period from T0 to T2, the time x group interaction effect was significant for total, social, and psychological well-being. For emotional well-being, however, the interaction effect was only marginally significant from T0 to T2. The effect sizes were in the small and moderate range ($\eta^2 = .03$ to $.13$). Furthermore, the time x group interaction effect was not significant for total, emotional and psychological well-being between T1 and T2, ($p > .076$), indicating that the increase of these outcome variables was maintained up to T2. Given that the time x group interaction effect on social well-being was well significant between T1 and T2 ($p = .040$), it can be suggested that there was a significant change. Figure 3 displays that the effect on social well-being decreased from T1 to T2.

The effects of the gratitude intervention on stress

The results further revealed that the level of stress was reduced in the gratitude intervention condition at T1 and at T2 compared to the wait-list control condition (Table 3). However, figure 4 shows that the participants of the wait-list control condition also had a general decreasing trend. The main effect of time on stress was significant from T0 to T1, and from T0 to T2 compared to the wait-list control condition ($p \leq .000$), but the main effect of group was not significant for stress ($p \geq .742$). More importantly, the time x group interaction effect on stress was only marginally significant for the period from T0 to T1 with small effect size ($\eta^2 = .03$). Considering the period from T0 to T2, the time x group interaction effect on stress was well significant. The effect size was moderate ($\eta^2 = .60$). Further, the time x group interaction effect was not significant between T1 and T2 ($p = .287$) which indicates that the reduction of stress due to the gratitude intervention was maintained up to T2.

Table 3. *Estimated means and effects of the gratitude intervention on total, emotional, social, and psychological well-being, and on stress at baseline (T0), post assessment (T1), and follow-up assessment (T2).*

		GI (n = 51)	WLC (n = 67)	Time * Group		
Variable	Time	*M (SD)*	*M (SD)*	*F*	*p*	η^2
Total well-being						
	T0	2.61 (.74)	2.76 (.68)			
	T1	3.18 (.73)	2.80 (.68)	34.20	.000	.23
	T2	3.09 (.67)	2.86 (.67)	12.22	.001	.10
Emotional well-being						
	T0	2.84 (.85)	2.88 (.85)			
	T1	3.32 (.80)	2.96 (.84)	13.23	.000	.10
	T2	3.18 (.73)	2.99 (.87)	3.04	.084	.03
Social Well-being						
	T0	2.47 (.76)	2.54 (.72)			
	T1	2.99 (.72)	2.58 (.71)	23.50	.000	.17
	T2	2.88 (.74)	2.67 (.67)	5.80	.018	.05
Psychological well-being						
	T0	2.62 (.80)	2.88 (.76)			
	T1	3.25 (.84)	2.91 (.76)	29.63	.000	.20
	T2	3.21 (.73)	2.96 (.75)	17.97	.000	.13
Stress						
	T0	1.99 (.51)	1.92 (.54)			
	T1	1.67 (.53)	1.74 (.54)	3.58	.061	.03
	T2	1.55 (.52)	1.70 (.58)	7.30	.008	.06

Notes: GI Gratitude intervention condition, *WLC* Wait-list control condition, *M* Mean score, *SD* Standard deviation, η^2 effect size per partial eta quadrat.

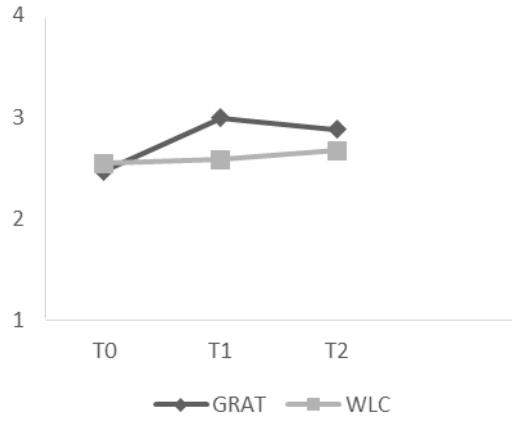

Figure 3. The time x group interaction effect on social well-being at baseline (T0), post assessment (T1), and follow-up assessment (T2).

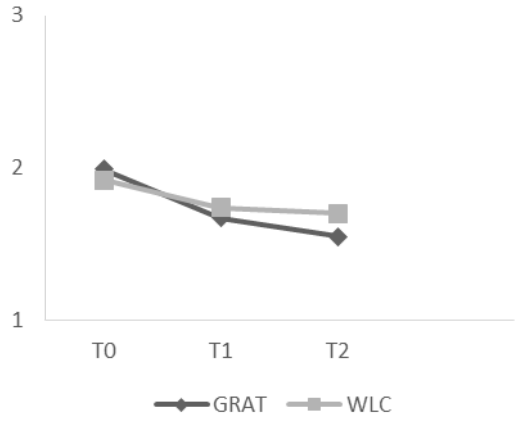

Figure 4. The time x group interaction effect on stress at baseline (T0), post assessment (T1), and follow-up assessment (T2).

The mediating role of stress on total, emotional, social, and psychological well-being

The results of the *mediation analyses* are shown in Table 4. They demonstrated that the gratitude intervention, as compared to the wait-list control condition, was significantly effective in improving total, emotional, social, and psychological well-being (c-path). Taking into account the mediator, this effect remained stable for total, social and psychological well-being (c'-path). The results further showed that, compared to the wait-list control condition, the gratitude intervention significantly reduced levels of stress, but only under consideration of psychological well-being (a-path). Moreover, stress was a predictor for all outcome variables of well-being (b-path). The BC 95 % CI of the indirect effect of the gratitude intervention on psychological well-being did not contain zero, indicating that reductions in stress significantly mediated the effect of the gratitude intervention on psychological well-being. The confidence intervals for the indirect effects of the other outcomes were not significant which suggests that stress did not mediate the effect of the gratitude intervention on total, emotional, and social well-being.

Table 4. *Outcomes of simple mediation analyses assessing indirect effects of the gratitude intervention on total, emotional, social, and psychological well-being compared to the wait-list control condition.*

	c-path		c'-path		a-path		b-path		Bootstrap results for indirect effect (a x b) (95 % CI)*		
Variable	*ß*	*p*	*ß*	*p*	*ß*	*p*	*ß*	*p*	*ß*	*LL*	*UL*
Total well-being	.32	.001	.26	.005	-.13	.080	-.45	.000	.06	-.004	.145
Emotional well-being	.23	.049	.17	.128	-.12	.098	-.48	.001	.06	-.009	.153
Social well-being	.26	.012	.21	.036	-.12	.094	-.42	.001	.05	-.007	.132
Psychological well-being	.40	.000	.33	.002	-.15	.042	-.48	.000	.07	.003	.170

Notes: ß Unstandardized regression coefficients, *LL* Lower Limit, *UL* Upper Limit, * Bias corrected bootstraps results for the indirect effect, based on 5000 bootstrapping samples.

Discussion

The purpose of this study was to examine the effects of a gratitude intervention on total, emotional, social, and psychological well-being, and on stress in comparison with a wait-list control condition. Moreover, the study was proposed to investigate the mediating role of stress on the effect of a gratitude intervention on well-being.

The effects of the gratitude intervention on well-being

In support with the first hypothesis, the findings revealed that participating in a brief self-help gratitude intervention, as compared to a wait-list control condition, results in

significantly greater total, emotional, social, and psychological well-being after six weeks, and in significantly improved total, social and psychological well-being after twelve weeks. Furthermore, the findings showed that the effects on total and psychological well-being are significantly maintained at follow-up.

The gratitude intervention, as compared to the wait-list control condition, was found to be effective in improving and maintaining total well-being. Generally, positive psychology interventions are developed to strengthen an individual's mental well-being and to further prevent mental disorder (Bolier et al., 2013a). Indeed, the gratitude intervention of the current study helped individuals to appreciate positive feelings and good aspects in life (Wood, Froh, & Geraghty, 2010). These aspects are important for experiencing mental well-being (Keyes, 2007). Hence, it can be suggested that the gratitude intervention had potential to contribute to total well-being, and along with that to the three dimensions of well-being: emotional, social, and psychological well-being. These dimensions are referred to different personal and public functions (Keyes, 2002) and depend on various external events (Joshanloo, 2017). Likewise, the current intervention affected each of these dimensions differently, which becomes clear by the fact that the effect sizes and maintenance of the effects differed between the dimensions.

The gratitude intervention showed to largely improve and further maintain psychological well-being compared to the wait-list control condition. Gratitude serves a way to perceive life as being meaningful (Göcen, 2015) and supports personal growth by positive reinterpretation (Wood, Joseph, Linley, 2007b). The current gratitude intervention included one exercise that helped to learn from difficult life events (Table 1). The participants were asked to reflect about their positive change or development resulting from such a difficult event. This sort of positive reinterpretation could have promoted the experience of psychological well-being. Hence, purpose in life, personal growth or self-acceptance, for instance, could have been increased due to the intervention. Since psychological well-being has a high degree of stability (Joshanloo, 2018), gains in it could be maintained over time.

Although, the gratitude intervention was found to improve social well-being compared to the wait-list control condition, this effect was not maintained at follow-up. In fact, the effect size was decreased from large to small. Commonly, gratitude is other-directed and includes the appreciation of other individuals in one's life; it can even support interpersonal relationships (Emmons, & McCullough, 2004). More specific, the current intervention contained exercises that were aimed at thinking about people someone is thankful for and at expressing gratitude towards others (Table 1). This could have supported social closeness and bonding with others. Participants could have become more interested in expressing gratitude

and sensitivity towards others (DeWall et al., 2012). However, prosocial behaviour can be costly to oneself (DeWall et al., 2012). This could explain the decrease after the intervention. In order to recognize that interpersonal relationships are worth investing in and to strengthen social well-being over time, it may be necessary to continue practicing gratitude exercises.

Further, in comparison with the wait-list control condition, the gratitude intervention had a medium effect on emotional well-being at post assessment which is in line with earlier findings (Watkins et al., 2003). However, this effect was only marginally at follow-up. Emotions are dynamic and can be influenced by various external and internal events (Houben, Van Den Noortgate, & Kuppens, 2015). During the gratitude intervention, individuals had to actively think about and practice gratitude (Emmons, & McCullough, 2003), and along with that, they could have focused and reflected more on their positive emotions (Houben, Van Den Noortgate, & Kuppens, 2015). Hence, their emotional state could increase in the short run (Watkins et al., 2003). However, after the gratitude intervention, individuals were no longer actively involved in thinking about gratitude and emotions. Therefore, the focus on emotions and the perception of positive emotions could have decreased. For experiencing higher emotional well-being over time, individuals may need to keep exercising.

The effects of the gratitude intervention on stress

Supporting the first hypothesis, the findings demonstrated that a brief self-help gratitude intervention reduces stress after a period of time. The effects of the current gratitude intervention on stress were marginally at post assessment, but significantly medium at follow-up compared to the wait-list control condition. Stress affects personal, social, and functional domains of an individual (Lucini et al., 2011) and, in the long run, threatening stress can lead to emotional exhaustion (Lee et al., 2018). Grateful individuals can cope with stress and negative emotions better, because they focus more on gifts and positive aspects in life (Wood, Joseph, & Linley, 2007b, Bryan, et al., 2016). With respect to Fredrickson's broaden and build theory (1988), they can thus build resources and capacities that might be helpful in future stressful situations (Fredrickson, 1998; Wood, Froh, & Geraghty, 2010; Wood, Joseph, & Linley, 2007b). A gratitude intervention can help an individual to be more stress-resistant (Emmons, 2010). This can prevent emotional exhaustion. However, individuals first have to learn how to recognize gifts, and they have to build the capacities. This could explain the delayed effects on stress.

The mediating role of stress on total, emotional, social, and psychological well-being

The findings revealed that reductions in stress are a working mechanism for the effect of the gratitude intervention on psychological well-being, but not for the effect on total, emotional, and social well-being. Hence, the second hypothesis could only be supported for psychological well-being. A possible explanation why the mediating effect of stress reduction could not be found for total, emotional, and social well-being could be that grateful individuals are more likely to seek out emotional and social support (Wood, Joseph, & Linley, 2007b). Thus, they can build resources that may become useful in future stressful situations (Fredrickson, 1998; Wood, Joseph, & Linley, 2007b). Therefore, these two dimensions of well-being need to be enhanced before changes in the level of stress can occur. Subsequently, a mediation with stress as mediator would not be useful.

Given that stress reduction mediated the effect on psychological well-being, it can be suggested that stress plays a more important role for psychological well-being. When stress is perceived as challenge, it can raise motivation (Crum, Salovey, & Achor, 2013). Individuals narrow their focus on relevant resources and take action. This can boost their performance (Crum, Salovey, & Achor, 2013). However, when stress is perceived as threat, it can make an individual inactive (Lucini et al., 2011) and can inhibit the normal functioning (Mendelson, 2013; Suzuki, & Iko, 2013). As a result, psychological well-being can be impaired and the individual can get problems finding purpose in life or personal growth. For this reason, threatening stress needs to be reduced. When experiencing less stress, individuals can function more efficiently (Emmons, & McCullough, 2004) which can further lead to higher psychological well-being. Emmons (2010) highlighted the protecting role of gratitude against stress. Regarding the current study, it can be concluded that the reduction of threatening stress is a possible key mechanism for the effect of the gratitude intervention on psychological well-being.

Strength and limitations

A major strength of the study is the RCT design which could display the effectiveness of a gratitude intervention in comparison with a wait-list control condition (American Psychological Association, 2006). Further, the scales MHC-SF and PSS were comprehensive and reliable, and the randomization could be seen as successful. Moreover, the adherence of the study sample varied between 72.5 % and 100 % which could be considered to be satisfactory (Bolier et al., 2013b).

There are also limitations of the study which should be considered in the interpretation of the results. Firstly, a selection bias led to a sample of mainly middle-aged and higher-educated women. This sample was not representative for the general population. Secondly, the assessment moments were not suitable for examining change processes and effects on the variables during the intervention. The scales were measured before and after the gratitude intervention. Hence, evidence for temporary effectiveness of the intervention could not have been explored, as well as the actual working mechanism and mediating role of stress on well-being during the intervention. Thirdly, the follow-up period used in the current study was too short for an accurate evaluation of the effect maintenance, especially for emotional, and social well-being, and for stress. Later assessment moments, like one year follow-up, would have been useful for assessing the maintenance in the long run.

Implications and future research

The current study has shown that a brief self-help gratitude intervention is effective in improving and maintaining well-being, as well as in decreasing levels of stress after a period of time. Moreover, the reduction of threatening stress is an essential mechanism for the effect of a gratitude intervention on psychological well-being. Encouraging individuals for being more grateful and expressing gratitude can thus contribute to a more positive mood, better social relationships, and a more purposeful life. In order to gain better understanding of personal experiences with gratitude, future research can focus on qualitative research (Flick, 2014). Qualitative research explores different perspectives of participants (Flick, 2014) which can, for instance, give insight in different things and concepts participants are grateful for, or in individual change processes due to a gratitude intervention.

Watkins et al. (2003) state that the working mechanisms of gratitude interventions are unknown. Acknowledging the insignificance of most of the current mediation analyses, future research can further study other possible mediators. For example, challenging stress may be considered as mediator. This form of stress can stimulate an individual to function optimally (Crum, Salovey, & Achor, 2013). Grateful individuals may recognize the goodness of challenging stress which may further leads to greater psychological well-being. Thus, the different roles of stress could be defined more precisely. Further examples for mediators may be emotional and social well-being. In the current study, emotional and social well-being were enhanced in the short run, whereas reductions in stress occurred only after a period of time. It can be suggested that emotional and social well-being build resources that may be helpful in stressful situations (Fredrickson, 1998; Wood, Joseph, & Linley, 2007b). Hence, emotional

and social well-being may function as mediators for the effect of gratitude interventions on threatening stress. The possible mediators should be measured temporally to detect and understand processes and mechanisms that take place during a gratitude intervention.

The adherence of the study sample was sufficient, indicating that the gratitude intervention appealed to the sample and that the use was understandable. Hence, such a gratitude intervention seems to fit to middle-aged and higher-educated women. For enabling a wider reach of these interventions, future research need to focus on other target groups, like young adults. Younger individuals may have less interest in working on their well-being (Cameron, 1975). In fact, the dropouts of the current study showed to be younger indicating that the intervention was less accepted by younger individuals. Therefore, future research can examine the effects of gratitude interventions on this sample, and further, can explore things younger individuals are grateful for. Subsequently, adaptations can be applied to make gratitude interventions more interesting and suitable for young adults.

In order to adapt gratitude interventions to young adults, it may be relevant to establish social support (Matthews, Win, Oinas-Kukkonen, & Freeman, 2016). Interactivity with other participants and health service professionals encourages individuals in taking responsibility for their own well-being (Ludden, Van Rompay, Kelders, & Van Gemert-Pijnen, 2015) and in retaining gratitude exercises (Matthews et al., 2016). It may be further inspiring when participants can interchange the things they are grateful for. Future research should examine whether social support truly enhances the effectiveness and adherence of the intervention for young adults (Ludden et al., 2015). New findings can help optimizing gratitude interventions, which is essential for successfully integrating the interventions in households, academic settings, politics, or clinics. As a consequence, a greater amount of the Dutch population could experience and maintain higher mental well-being. In the long run, mental disease would be prevented and the public health service would be relieved (Ludden et al., 2015).

Conclusion

This study is one of the first exploring the effects and the underlying working mechanisms of a gratitude intervention. Findings demonstrated that brief self-help gratitude interventions improve total, emotional, social, and psychological well-being, and maintain higher total and psychological well-being. Moreover, they reduce levels of stress after a period of time. Lower levels of stress further appeared to have a mediating role for the positive effect of gratitude interventions on psychological well-being. In conclusion, gratitude interventions can function as an important resource for mental well-being.

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