The Mediating Role of Positive Emotions, Grateful Mood, and Positive Relations in the Relationship Between Gratitude Exercises and Mental Well-Being: A Randomized Controlled Trial

Faculty of Behavioral Management and Social Sciences
Study Program: Psychology M. Sc.
Department: Positive Psychology and Technology

Alisa Kloppenborg

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1st Supervisor: Marijke Schotanus-Dijkstra
2nd Supervisor: Gert-Jan Prosman

UNIVERSITY OF TWENTE.

Table of Contents

Abstract

Background and Objective. Research on the efficacy of gratitude interventions has increased over the past years. Yet, little is known about the underlying mechanism. Therefore, the main aim of the current study was to examine the mediation role of positive emotions, grateful mood, and positive relations within the efficacy of gratitude exercises on mental well-being.

Methods. In this randomized controlled trial, 169 participants with a mean age of 48.67 (*SD* = 9.42) were perfectly randomized into an experimental gratitude condition, including a six-week gratitude intervention (*n* = 85), and a waitlist control condition (*n* = 84). Main effects were analyzed by performing an ANCOVA comparing the two conditions and testing between-group effect sizes using Cohen's *d*. For testing mediation effects, simple and multiple mediation analyses were conducted for positive emotions, grateful mood, and positive relations by using difference scores.

Results. The analyses showed that the intervention significantly increased mental well-being, positive emotions, grateful mood, and positive relations compared to the waitlist control group. More importantly, positive emotions significantly mediated the effect of the gratitude intervention on mental well-being. For grateful mood and positive relations, however, the mediation analyses were non-significant.

Discussion. Results suggest that positive emotions is an important mechanism for increasing mental well-being in higher educated women. Besides, not finding a mediation effect for grateful mood and positive relations may be explained by the use and duration of gratitude exercises in the current study. Future research may further investigate the mediating role of grateful mood, positive relations, and other potential mediators by using an equal gender distribution.

Keywords: Gratitude Intervention, Mental Well-Being, Mediation, Positive Emotions, Grateful Mood, Positive Relations.

The Mediating Role of Positive Emotions, Grateful Mood, and Positive Relations in the Relationship Between Gratitude Exercises and Mental Well-Being: A Randomized Controlled Trial

Gratitude has received increasing attention in the literature of positive psychology. Generally, it has been demonstrated to play an important role in the lives of humans because it counts as an aspect of positive functioning (Wood, Froh, & Geraghty, 2010). Definitions of gratitude have varied from gratitude as a state to gratitude as a trait. Emmons and McCullough (2003) have defined gratitude as a state on a cognitive-affective level, associated with a feeling of receiving a personal positive benefit, which is not deserved, earned, or sought after, but received due to good actions and intentions of someone else. This grateful feeling has shown to play a unique role in people's mental well-being (Emmons & Stern, 2013; McCullough, Emmons, & Tsang, 2002; McCullough, Tsang, & Emmons, 2004; Park, Peterson, & Seligman, 2004; Wood, Joseph, & Maltby, 2009; Wood, Maltby, Gillett, Linley, & Joseph, 2008). On the other hand, as a trait, gratitude has been described as a general tendency to experience grateful feelings (McCullough, Emmons, & Tsang, 2002). In the current paper, the definition of gratitude as a state will be of relevance.

Gratitude Interventions

In positive psychology, many positive psychological interventions (PPIs), such as gratitude interventions, have been developed with the purpose of increasing mental well-being. For gratitude interventions, the main aim is to increase feelings of gratitude and direct people's attention to what is positive in their lives (Seligman, Steen, Park, & Peterson, 2005). Those interventions can have different forms. Wood, Froh, and Geraghty (2010) have distinguished three main types of gratitude exercises in their review. First, *gratitude lists* simply involve listing things that one is grateful for, e.g., during the day, usually done in the form of a diary. Second, *grateful contemplation* is similar

to gratitude lists with the difference that more general aspects of life that one is grateful for are written down. And third, *behavioral expression* of gratitude asks the person to express gratitude to a specific other, e.g., by writing a letter with words of gratitude. To date, grateful listing and grateful letter writing have mainly been used in research and practice (Davis et al., 2016).

Further, gratitude exercises have multiple benefits. For example, they are relatively easy to administer, since there is not a lot of material or instruction needed, and they can be easily integrated into different kinds of therapies as an additional help to increase patient's mental well-being. Furthermore, in their randomized controlled trial, Geraghty, Wood, and Hyland (2010) found that participants in the gratitude intervention condition maintained practicing the exercises considerably more compared to participants asked to do Automatic Thought Records. Therefore, they argued that people enjoy gratitude exercises more than exercises focusing on negative cognitions. However, even though those benefits relate to all three types of gratitude exercises, it has been suggested that such exercises are done daily rather than only on a weekly basis or once in order to increase their effectiveness (Emmons & McCullough, 2003).

The three main types of gratitude exercises and their effectiveness on various outcomes have been tested by previous studies (Wood, Froh, & Geraghty, 2010). Most importantly, the outcomes of mental well-being and satisfaction with life have been tested frequently, on which gratitude interventions have shown to relate uniquely (Wood, Joseph, & Maltby, 2008). In a meta-analysis, journaling gratitude on a weekly basis showed to have a positive effect on mental well-being and satisfaction with life compared to a control and an active control condition (Emmons & McCullough, 2003). On the other hand, Seligman and his colleagues (2005) found that expressing gratitude to another person showed the highest increase in happiness compared to a placebo control group and four groups practicing other positive psychological exercises, which maintained a week and a month after the intervention. This effectiveness has been confirmed by numerous researchers

(e.g., Boehm, Lyumbormisrky, & Sheldon, 2011; Emmons & Crumpler, 2000; Lyubomirsky, Sheldon, & Schkade, 2005; Rash, Matsuba, & Prkachin, 2011). The effectiveness was, further, not only observed by using self-reports, but was also seen by external observers like friends, family, or partners (Martínez-Martí, Avia, & Hernández-Lloreda, 2010; McCullough, Emmons, & Tsang, 2002). Individuals that have engaged in gratitude exercises were rated as being more optimistic, helpful, trustworthy, and outgoing and having higher well-being compared to individuals that have not engaged in gratitude exercises.

Additionally, the effectiveness of gratitude interventions has also been tested and confirmed in a variety of populations. For instance, the effect on mental well-being is not restricted to any age group, but was found in early adolescents (e.g., Froh, Sefik, & Emmons, 2008), college students (e.g., Renshaw & Rock, 2018), middle-aged adults (e.g., McCullough, Tsang, & Emmons, 2004), and elderly (e.g., Killen & Macaskill, 2015). Also, effectiveness was confirmed in a variety of cultural contexts, such as China (Chan, 2013), Spain (Martínez-Martí, Avia, & Hernández-Lloreda, 2010), Turkey (Işık & Ergüner-Tekinalp, 2017), and Malaysia (Senf & Liau, 2013). Thus, the effects on mental well-being and satisfaction with life are not limited to a specific sample but seem to be universal, which is also the case for other outcomes.

Besides the effects on mental well-being and satisfaction with life, gratitude interventions have shown to have a variety of other positive effects. Positive emotions, for example, have found to be affected positively by gratitude interventions (Wood, Froh, & Geraghty, 2010). Fredrickson (2013) has identified the ten most common positive emotions, namely joy, interest, hope, serenity, inspiration, love, amusement, pride, awe, and gratitude. Previous studies have found that those positive emotions are increased by practicing gratitude (e.g., Dickens, 2017; Emmons & McCullough, 2003). Beyond the outcome of positive emotions, gratitude alone has also been a focus point for research. Emotions such as gratitude can be conceptualized as a state or a trait

(Rosenberg, 1998). As a state, emotions can either have the form of an affect – on a temporary level – or the form of a mood – on a longer-term level. For the aim of the current study, gratitude as a mood is of primary interest, i.e., the longer-term level of state gratitude, which has shown to have a great potential to be increased by gratitude interventions (Dickens, 2017). However, to date, most research about the effects of gratitude interventions has focused on gratitude as a trait (e.g., Harbaugh & Vasey, 2014; Toepfer & Walker, 2009). This means that research on the effects of gratitude interventions on gratitude as a mood is rare, and there is a considerable gap in research here.

Moreover, another outcome that has been studied in this context is positive relations. Positive relations – i.e., the experience of being in a trusting and satisfying relationship with another person, including empathy, affection, and intimacy – is an important aspect of psychological well-being (Ryff & Keyes, 1995). Gratitude exercises have shown to be effective in increasing the sense of being connected to others (Emmons & McCullough, 2003), strengthening existing relationships and form new ones (Bono, Krakauer, & Froh, 2015), and increasing satisfaction with existing relationships (O'Connell, O'Shea, & Gallagher, 2016). Expressing gratitude to one's romantic partner has also shown to increase connection and satisfaction with the relationship for both the person that expressed gratitude and for the one that received that expression (Algoe, Gable, & Maisel, 2010). Accordingly, overall, gratitude interventions have shown to be a useful way to promote social functioning. Despite the basis of existing research on a variety of outcomes, effect sizes in those studies have been mostly small. Prior studies have also mainly focused on single gratitude exercises, so it is still relatively unclear whether a comprehensive intervention affects those outcomes. Also, it is not yet known how gratitude interventions are effective.

Underlying Mechanisms

As Wood, Joseph, and Linley (2007) suggest, the positive effect of gratitude interventions on mental well-being is not direct but influenced by underlying aspects that mediate this relationship. It is useful to examine mediating mechanisms in the effectiveness of gratitude interventions on mental well-being in order to gain new insights into how to successfully promote mental well-being (Alkozei, Smith, & Killgore, 2018; O'Connell, O'Shea, & Gallagher, 2018). Knowledge about potential mediators can help to understand changes during early treatments (Kazdin, 2009). This, in turn, can be valuable in compiling interventions and treatments that are as effective as possible (Kraemer, Wilson, Fairburn, & Agras, 2002). However, which working mechanisms impact the effect of gratitude interventions on mental well-being is still relatively unresearched since there is a considerable lack of mediation analyses until now.

Still, there are existing mediating analyses about gratitude interventions on other related outcomes. One mentionable mediation analysis was done by Emmons and McCullough (2003), in which they compared a gratitude condition to a control group with no treatment. The study demonstrated that keeping gratitude lists significantly increased positive affect and that feelings of gratitude completely mediated this effect. In another recent mediation study that was conducted by Wong and his colleagues (2018), a gratitude condition was compared to an expressive writing condition, testing whether a specific use of words in the writing may underlie the effects of gratitude interventions. This study revealed that lower proportions of using words of negative emotions in gratitude writing mediated the positive influence of the gratitude intervention on mental health. Thus, using less expressions of negative emotions while writing a gratitude letter has shown to underlie the effect of gratitude exercising on mental health. Despite those findings, research is needed that examines how gratitude interventions affect mental well-being.

Related to this lack of research, studies focusing on underlying mechanisms in the relationship between other positive psychological interventions, such as multicomponent positive psychological interventions, and mental well-being may give some direction. In a current mediation analysis, positive emotions was examined as a possible underlying mechanism in the relationship between a multicomponent positive psychological intervention, including gratitude exercises, and mental well-being (Hendriks, Schontanus-Dijkstra, Graafsma, Bohlmeijer, & de Jong, 2020). Even though the effect was small, positive emotions has shown to mediate the effectiveness of the intervention on mental well-being in that study.

In addition, positive relations has also been described as an underlying mechanism in the relationship between multicomponent positive psychological interventions and mental well-being. A recent mediation study examined the effect of a multicomponent positive psychological intervention, which also included gratitude exercises, on mental well-being (Schontanus-Dijkstra, Pieterse, Drossaert, Walburg, & Bohlmeijer, 2019). Here, several processes, including positive emotions and positive relations, were described as possible mediators. Although there is existing research about mediators like positive emotions and positive relations in the efficacy of multicomponent positive psychological interventions that include practicing gratitude, underlying mechanisms in the effect of gratitude exercises in particular on mental well-being are still unknown. Therefore, the current study focuses on the potential mediating factors positive emotions and positive relations, while including the underexamined mechanism grateful mood as an additional possible mediator.

Current Study

The current study mainly aims to examine the mediating role of positive emotions, grateful mood, and positive relations in the positive relationship between gratitude interventions and mental

well-being. To replicate studies about the main relationship between gratitude exercises and mental well-being (see, e.g., Emmons & McCullough, 2003), it is hypothesized that practicing gratitude exercises is more effective in improving mental well-being compared to a waitlist control group. Additionally, it is expected that positive emotions, grateful mood, and positive relations positively mediate the effects of practicing gratitude on mental well-being.

Methods

Design

The design of the study was a two-armed randomized controlled trial conducted in the Netherlands. The current study was part of a larger investigation, including different positive psychological interventions and five experimental conditions in total. The current study focused on two conditions, namely a six-week gratitude intervention condition versus a waitlist control condition. From six points of measurement, four were considered in the current study, namely baseline (T0), after two weeks (T1) and four weeks (T2) of practicing gratitude for testing mediation effects, and the post-test after the six-week intervention (T3). These measurements took place from the 22nd of September 2017 until the 17th of November 2017. The methodology was approved by the BMS ethics committee of the University of Twente (request-no. BCE17240).

Participants and Procedure

In this study, 169 participants were included (Figure 1). Participation was entirely voluntary without any compensation for collaboration. Participants were recruited by advertisements in the regional and national newspapers Tubantia, Volkskrant, and Gelderlander, in the online newsletter Psychology Magazine, and on Facebook. Online, 653 participants applied and received a link to a screening questionnaire, which started with an online informed consent. Then, participants were

asked for their age, gender, and educational level and filled out the Center for Epidemiological Studies Depression Scale (CES-D) and the Generalized Anxiety Disorder 7 scale (GAD-7) for testing their eligibility. The CES-D and GAD-7, used for testing whether serious depressive or anxiety symptoms are present, had shown good psychometric properties in the past (Bohannon, Maljanian, & Goethe, 2003; Jordan, Shedden-Mora, & Löwe, 2017). The inclusion criteria were that participants had to be above 18 years old, experience a low or moderate level of well-being, have a sufficient internet connection and an email address, speak Dutch and follow the self-help intervention independently, and give informed consent for participation. Exclusion criteria were the presence of serious depressive or anxiety symptoms, meaning that the score on the CES-D was 24 or higher, or the score on the GAD-7 was 15 or higher. In the case of exclusion, reasons were explained to the participants after filling out the screening questionnaire. After completing the screening questionnaire, 445 participants were rated as eligible. The remaining participants then filled out the baseline questionnaire (T0; n = 423) and were randomly assigned to one out of five conditions by using randomizer.org.

Conditions

Gratitude Intervention

For six weeks, participants in the gratitude condition received a variety of gratitude exercises. On Sundays, participants obtained a new exercise for the upcoming week based on the three main types of gratitude exercises discussed by Wood, Froh, and Geraghty (2010), namely gratitude lists, grateful contemplation, and behavioral expression of gratitude. Since a new gratitude exercise was introduced each week, participants received six different exercises in total (Table 1). Participants had the freedom to decide when and where to complete the exercises as long

as they completed these at least five days a week. Overall, practicing those exercises took approximately 45-60 minutes a week and 270-360 minutes in total over the six weeks, respectively.

Waitlist Control

During the six weeks from baseline to post-test, participants in the control condition received the same questionnaires as the gratitude condition at all assessment moments. Concurrently, they were put on a waiting list and did not receive an exercise until the six-week follow-up questionnaires. At the end of this survey, they had the possibility to start with a positive psychological intervention of their choice.

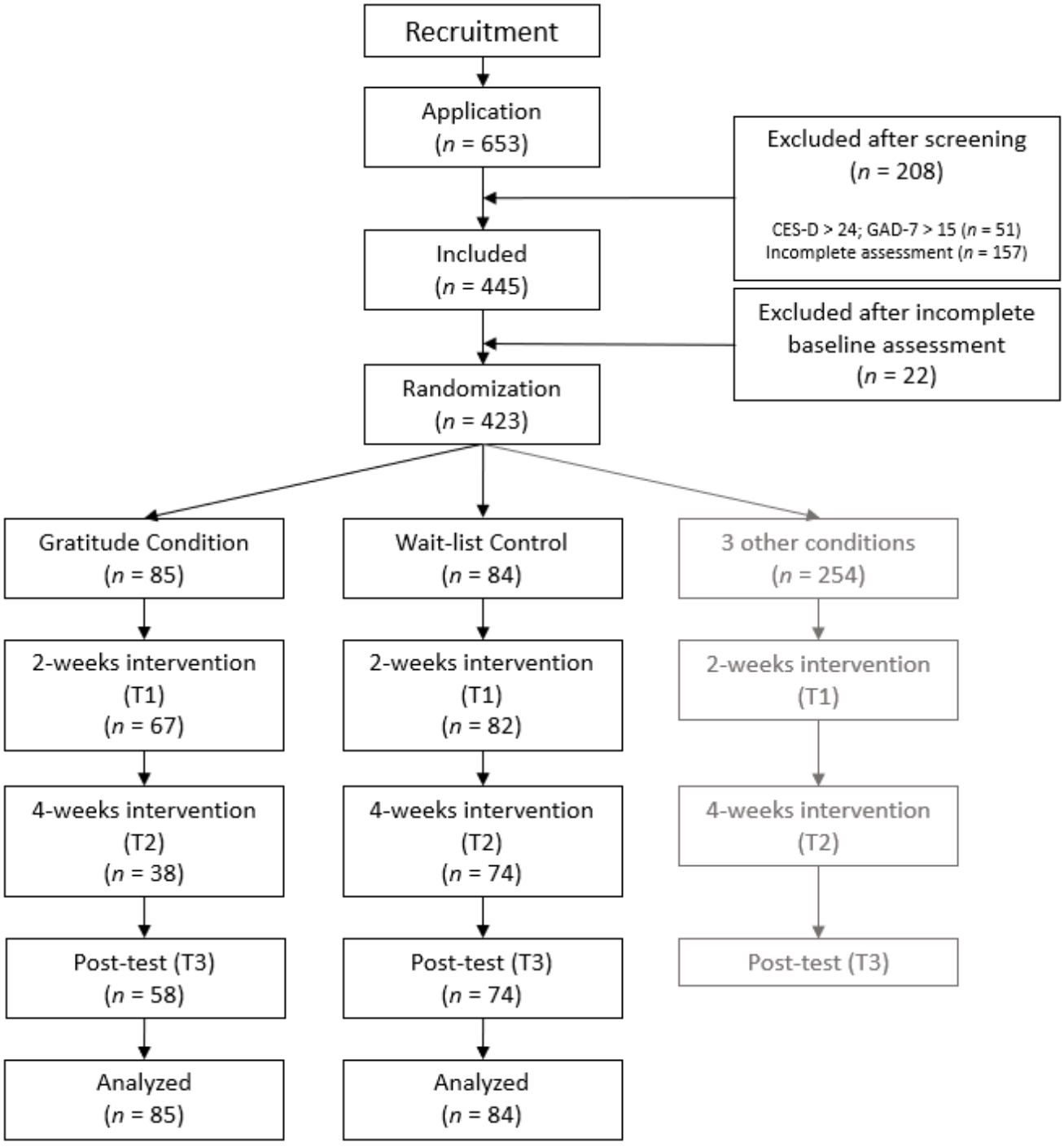

Figure 1. Participant flow-chart.

Table 1

Gratitude exercises and descriptions.

Week	Exercise	Explanation
1	Gratitude lists	Each evening, participants wrote down three things that they were grateful for during the day and an explanation for why they were grateful.
2	Changing the view	Each day, participants wrote about one aspect of their everyday life they usually take for granted and imagine that this aspect was no longer present.
3	Behavioral expression of gratitude	Each day, participants wrote a gratitude letter to a person that did something good for them during the last weeks with a description of what the person did and what it meant.
4	Grateful memory	Each evening, participants thought and wrote about past experiences (things, events, persons) that they were grateful for.
5	Grateful reconsidering	Each day, participants wrote about difficult experiences of their life and tried to reconsider them using questions, e.g., asking for positive consequences.
6	Grateful living	Each morning, participants took a few minutes to remember to be grateful. Then, during the day, participants tried to appreciate small aspects of their life.

Materials

Well-Being

To measure well-being, the Dutch Mental Health Continuum Short Form (MHC-SF) was used (Keyes et al., 2008). The scale consists of 14 items asking to what extend the participants felt in certain ways, measuring emotional well-being with three items, e.g. "happy", psychological well-being with six items, e.g., "That you like most parts of your personality", and social well-being with five items, e.g., "That people are basically good". Answers were rated on a 6-point Likert-scale from 0 (= *never*) to 5 (= *almost always*). A higher mean score indicated a higher level

of well-being. The scale was filled out by the participants at baseline and post-test. Psychometric properties of the MHC-SF were good in previous studies with good validity and internal reliability (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). In the current study, the Cronbach's alphas were $\alpha = 0.85$ at baseline and $\alpha = 0.86$ at post-test for the emotional well-being subscale, $\alpha = 0.85$ at baseline and $\alpha = 0.86$ at post-test for the psychological well-being subscale, and $\alpha = 0.76$ at baseline and post-test for the social well-being subscale, indicating sufficient to good internal reliability for all subscales.

Positive Emotions

Positive Emotions was tested by using a Dutch version of the modified Differential Emotions Scale (mDES; Schaefer, Nils, Sanchez, & Phillippot, 2010). Here, participants were asked to indicate to what extent they felt in certain ways in the past 24 hours, e.g., amused/fun-loving/silly. The answers ranged from 0 (= *not at all*) to 7 (= *very intense*). The scale consists of 16 items, from which eight items assess positive, and eight items assess negative emotions. For the current study, only the positive emotions subscale was of interest, for which a mean score of the eight items was computed to create an overall subscale score. A higher mean score on that subscale indicated a higher level of positive emotions. In the current study, this scale was filled out by the participants at all measurement points. The Cronbach's alpha of the positive emotions subscale was $\alpha = 0.59$ at baseline and $\alpha = 0.87$ at post-test, indicating a questionable to good reliability.

Grateful Mood

For testing grateful mood, a Dutch version of a scale with four questions was used (McCullough et al., 2004). These questions asked to what extend the participants felt in certain ways in the last 24 hours, namely (1) "…I felt grateful.", (2) "…I was consciously aware that life

is good for me.", (3) "…I appreciated the simple things in life.", and (4) "…I felt grateful for what others do and have done for me in my life.". The answers ranged from 1 (= *totally disagree*) to 7 (= *totally agree*). The higher the mean score of the scale, the higher the level of grateful mood. This scale was also filled out at all measurement points. The Cronbach's alpha in the current study was as high as $\alpha = 0.83$ at baseline and $\alpha = 0.90$ at post-test, which indicated a good to excellent reliability.

Positive Relations

For positive relations, the Dutch version of Ryff's Subscale of Positive Relations (SPR) was used consisting of 9 items, such as "I enjoy personal and mutual conversations with family members or friends" (Dierendonck, 2011; Ryff, 1989). From those, five items were worded negatively and had to be reverse coded for the analyses. Answers could range from 1 (= *disagree strongly*) to 6 (= *agree strongly*), while a higher total mean score indicated higher levels of positive relations. Again, the scale was filled out at all measurement points. In the current study, the Cronbach's alpha of $\alpha = 0.82$ at both baseline and post-test implied good reliability.

Data Analysis

To analyze the data, IBM SPSS Statistics Software Version 24 was used. Throughout the statistical analyses, a *p*-value below 0.05 was assumed to be significant. From 169 participants at T0, there were 20 drop-outs at T1 and 21 drop-outs at T3, meaning that those participants did not fill in all questionnaires. Missing data of those participants was imputed using the expectation maximization (EM) algorithm (Dempster, Laird, & Rubin, 1977). Imputation was done separately for each of the two conditions by first splitting and then again merging the data file. Characteristics of the participants of the gratitude condition and the waitlist control condition were analyzed in

order to ensure comparability of the conditions by conducting independent sample t-tests and chi-square tests, and independent sample t-tests were conducted to examine possible differences in mental well-being, positive emotions, grateful mood, and positive relations between groups at baseline. In addition, the same analyses were conducted comparing drop-outs with non-dropouts to test whether there were significant differences between those two groups. Insignificant results indicated that there were no significant differences between those groups.

To examine the efficacy of the gratitude exercises on all outcome variables, an ANCOVA was performed comparing the experimental and the control condition using the scores on all outcomes at baseline and post-test. The assumptions required for ANCOVA were met for each outcome. Using SPSS scripts, Cohen's *d* and the corresponding confidence intervals (CIs) of 95% were calculated by testing the between-group effect sizes of the experimental and the control group at each time point (Wuensch, 2012). This was done by subtracting the mean score of mental well-being at post-test of the gratitude condition from the mean score of the waitlist control condition and dividing the results by the pooled standard deviation

$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_1 - 1)s_2^2}{n_1 + n_2 - 2}}$$

(Cohen, 1988). For Cohen's *d*, a score of $d \approx 0.2$ indicates that the effect is small, $d \approx 0.5$ indicates an effect that is medium, and $d \approx 0.8$ indicates that the effect is large (Cohen, 1988).

In order to test the mediation effects, simple and multiple mediation analyses were conducted by using the PROCESS macro tool in SPSS (Hayes, 2012). Based on the simple mediation model by Hayes (2012), an adjusted mediation model was developed (Figure 2). Here, the independent variable (*X)* was the gratitude intervention coded as 1 versus the control condition coded as 0, the dependent variable (*Y*) was the mental well-being change score (T3-T0), and the

mediating variables (*M*) were the change scores of positive emotions, grateful mood, and positive relations ([T1+T2/2]-T0). In the analysis, mean scores of the mediating variables at T0 were incorporated as covariates in order to control for the variation in outcome scores. Pathways a_1, a_2, a_3 represented the effects of the gratitude intervention versus the control condition on the mediating variables and pathways b_1, b_2, b_3 represented the effects of the mediating variables on mental well-being. Pathway *c* is the direct effect of the gratitude intervention versus the control condition on mental well-being, and the effect of the gratitude intervention versus control condition on mental well-being with the effects of the mediating variables partialled out is labeled *c*'. For each path, unstandardized regression coefficients were calculated with the PROCESS tool. For each mediating variable, a simple mediation analysis was conducted. The mediating effects were computed by a combination of indirect pathways *a* and *b* (i.e., *a*b*). Then, a multiple mediation analysis was conducted, in which all three mediators were entered together.

The resampling bootstrapping method was used to obtain confidence levels for the mediation effects (Preacher & Hayes, 2008). Estimation took place with bias-corrected 95% confidence intervals (CI) based on 5,000 bootstrapped resamples. Mediation was considered as being significant when a confidence interval did not include zero.

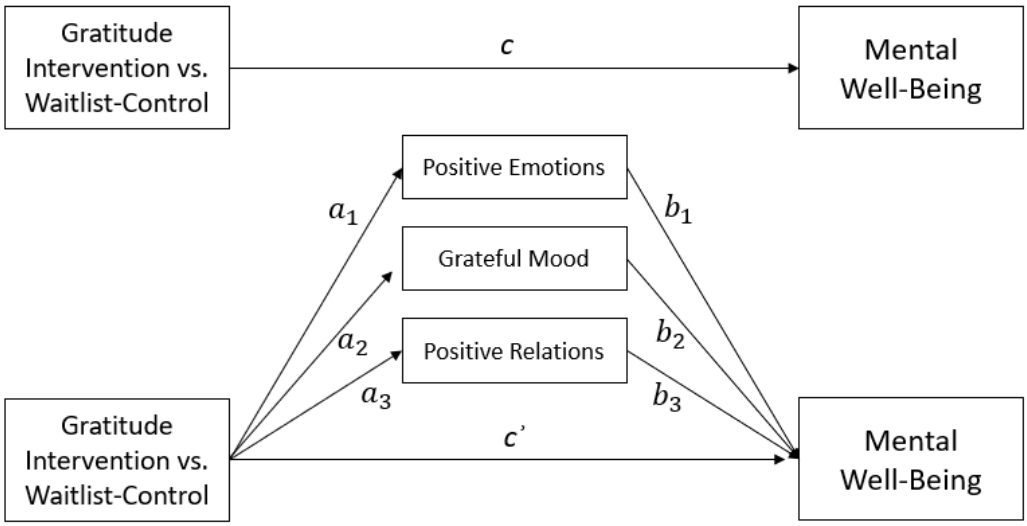

Figure 2. The simple mediation model with the mediators positive emotions, grateful mood, and positive relations (based on Hayes, 2012).

Results

Participant Characteristics and Drop-outs

In Table 2, the baseline characteristics of the participants are shown. The age ranged from 23 to 64, with a mean of 48.67 (*SD* = 9.42). Considering the distribution of ethnicity, 95.9% were Dutch and 4.1% from other countries. Further, 89.9% were female, and 10.1% were male. Lastly, 21.9% had a low or middle educational level, and 78.1% had a high educational level.

Chi-square and independent samples t-tests showed no significant differences between the two conditions on any demographics or outcome measures, which indicates that randomization was successful, and an appropriate prerequisite for a comparison of those two groups was given (Table 2). Further, chi-square analyses showed no significant differences between drop-outs and completers on any baseline characteristics ($p > 0.155$). Also, the independent t-tests showed no differences in mental well-being, positive emotions, grateful mood, or positive relations at baseline between drop-outs and completers ($p > 0.182$).

Table 2

Baseline Characteristics of Participants, Differences Between Groups Were Tested Using Chi-square and Independent Sample T-Tests.

	Gratitude Condition (n = 85)	Waitlist Control (n = 84)	Total (n = 169)	p-Value
Age, *M (SD)*	47.68 (9.45)	49.67 (9.34)	48.67 (9.42)	0.283
Gender, *n* (%)				0.778
Female	77 (90.6)	75 (89.3)	152 (89.9)	
Male	8 (9.4)	9 (10.7)	17 (10.1)	
Education, *n* (%)				0.884
Low/Intermediate	19 (22.4)	18 (21.4)	37 (21.9)	
High	66 (77.6)	66 (78.6)	132 (78.1)	
Nationality, *n* (%)				0.436
Dutch	81 (95.3)	81 (96.4)	162 (95.9)	
Other	4 (4.7)	3 (3.6)	7 (4.1)	
Marital status, *n* (%)				0.750
Married	46 (54.1)	46 (54.8)	92 (54.4)	
Divorced	16 (18.8)	16 (19.0)	32 (18.9)	
Widowed	1 (1.2)	3 (3.6)	4 (2.4)	
Not married	22 (25.9)	19 (22.6)	41 (24.3)	
Well-being Scores, *M (SD)*				
Emotional well-being	2.91 (0.82)	2.95 (0.84)	2.93 (0.83)	0.964
Psychological well-being	2.66 (0.80)	2.91 (0.75)	2.78 (0.78)	0.650
Social well-being	2.48 (0.77)	2.55 (0.72)	2.52 (0.74)	0.321
Overall well-being	2.65 (0.74)	2.79 (0.68)	2.72 (0.71)	0.239
Positive Emotions, *M (SD)*	3.66 (0.86)	3.66 (0.73)	3.66 (0.79)	0.273
Grateful Mood, *M (SD)*	4.81 (1.17)	4.57 (1.23)	4.69 (1.20)	0.554
Positive Relations, *M (SD)*	4.21 (0.77)	4.18 (0.71)	4.20 (0.74)	0.504

Main Effects

The ANCOVA analysis showed significant Time *x* Group interaction effects on all outcome variables ($p > 0.006$; Table 3). This means that the levels of total mental well-being, emotional well-being, social well-being, psychological well-being, positive emotions, grateful mood, and positive relations were significantly more increased after completing the gratitude exercises compared to the waitlist control condition at post-test. Additionally, large effect sizes were found for total well-being, psychological well-being, and social well-being ($d > 0.87$). Medium effect sizes were found for emotional well-being, positive emotions, and grateful mood ($d > 0.50$). A small effect size was found for positive relations ($d = 0.38$).

Table 3

Means and standard deviations of well-being scores and summary of ANCOVA and Cohen's d for between-group effect comparison (gratitude condition versus waitlist control condition).

	Gratitude Condition (*n*=85)	Waitlist Condition (*n*=84)	Time *x* Group		
	M (*SD*)	*M* (*SD*)	F	*p*	*d*
Total Well-Being					
Baseline	2.65 (0.74)	2.79 (0.68)			
Posttest	3.14 (0.71)	2.85 (0.68)	37.789	<0.001	0.96
Emotional Well-Being					
Baseline	2.91 (0.82)	2.95 (0.84)			
Posttest	3.29 (0.81)	3.03 (0.83)	11.633	0.001	0.50
Psychological Well-Being					
Baseline	2.66 (0.80)	2.91 (0.75)			
Posttest	3.21 (0.80)	2.98 (0.76)	26.413	<0.001	0.87

Social Well-Being					
Baseline	2.48 (0.77)	2.55 (0.72)			
Posttest	2.97 (0.67)	2.59 (0.71)	37.029	<0.001	0.89
Positive Emotions					
Baseline	3.66 (0.86)	3.66 (0.73)			
2-weeks	3.87 (0.91)	3.61 (0.77)			0.34
4-weeks	3.87 (0.69)	3.66 (0.75)			0.29
Posttest	4.55 (0.97)	4.02 (1.01)	16.173	<0.001	0.59
Grateful Mood					
Baseline	4.81 (1.17)	4.57 (1.23)			
2-weeks	5.33 (1.09)	5.01 (1.05)			0.08
4-weeks	5.80 (1.01)	4.08 (1.21)			0.64
Posttest	5.60 (0.98)	4.74 (1.29)	30.528	<0.001	0.68
Positive Relations					
Baseline	4.21 (0.77)	4.18 (0.71)			
2-weeks	4.41 (0.75)	4.38 (0.75)			-0.01
4-weeks	4.44 (0.74)	4.41 (0.74)			0.00
Posttest	4.51 (0.67)	4.32 (0.75)	7.617	0.006	0.38

Simple Mediation Analyses

In Table 4, the results of the simple mediation analyses are presented. On the *a*-paths, the results showed significant positive effects of the intervention condition on positive emotions (p = 0.033) and grateful mood (p = 0.012), but not on positive relations (p = 0.916). Moreover, for the *b*-paths, positive emotions ($p < 0.001$) and positive relations (p = 0.001) showed a significant positive effect on mental well-being, which was not the case for grateful mood (p = 0.070).

The results also showed a significant total effect (c) of the gratitude intervention on mental well-being ($p < 0.001$), which remained for the direct effects considering the mediating variables (c'). Considering the indirect effects, the confidence interval for positive emotions did not include

zero. This means that positive emotions significantly mediated the relationship between the gratitude condition versus the control condition and mental well-being. For grateful mood and positive relations, the indirect effects were not significant, indicating that these variables did not mediate the effects of practicing gratitude on mental well-being.

Table 4

Simple mediation analysis of the effects of the gratitude intervention versus waitlist control on T2-T0 mental well-being (MHC-SF), mediated by three working mechanisms ([T1+T2]/2-T0) and controlled for baseline levels of outcome and mediator (T0).

Mediators (T1)	*a*	*b*	Total Effect *c*	Direct Effect *c`*	Indirect effect *a x b* (95% CI) [a]
Positive Emotions	0.23*	0.19**	0.43**	0.39**	0.04 (0.01, 0.09)
Grateful Mood	0.39*	0.06	0.43**	0.40**	0.02 (-0.01, 0.07)
Positive Relations	-0.01	0.31**	0.43**	0.43**	-0.00 (-0.04, 0.03)

[a]Bias corrected bootstrap results for the indirect effects (5,000 resamples).

*$p < 0.05$; **$p < 0.01$.

Multiple Mediation Analysis

Figure 3 shows the model of the additional multiple mediation analysis. In the analysis, the significance of the *a*-paths and the *b*-paths were similar to the simple mediation analysis. When all variables were entered together in the model, the BC 95% CI of the indirect effect of positive emotions (*ab* = 0.04, BC 95% CI = 0.00 to 0.08) still did not contain zero, indicating a significant mediation effect. Again, the 95% confidence intervals of grateful mood (*ab* = 0.01, BC 95% CI = -0.02 to 0.04) and positive relations (*ab* = -0.00, BC 95% CI = -0.03 to 0.03) did include zero, indicating that there were no significant mediation effects for these variables.

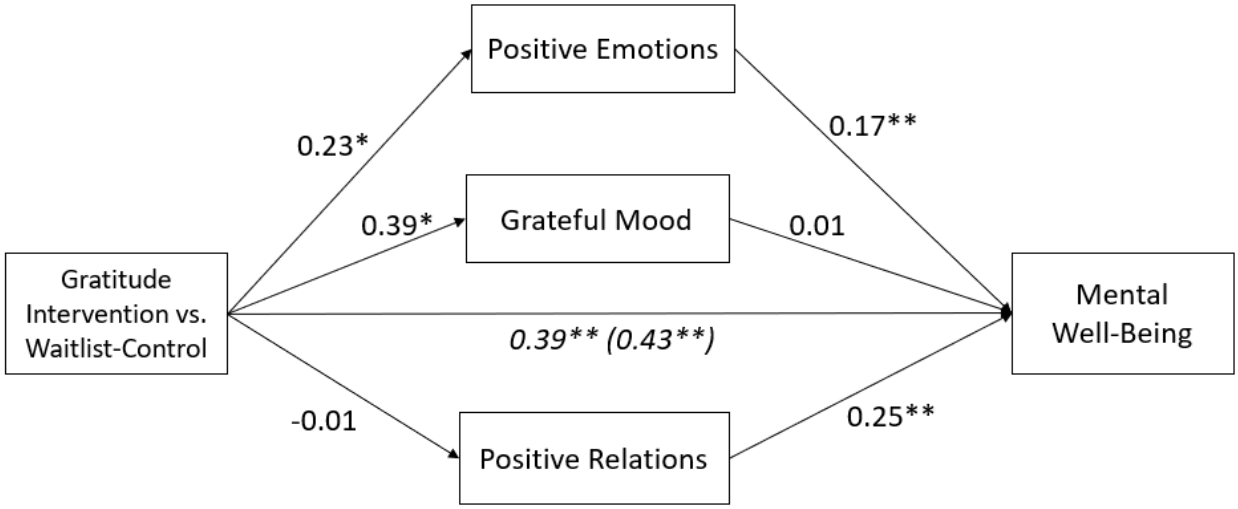

Figure 3. Multiple mediation analysis of the effects of the gratitude intervention versus waitlist control on T2-T0 mental well-being (MHC-SF), mediated by three working mechanisms ([T1+T2]/2-T0) and controlled for baseline levels of outcome and mediator (T0). The total effect (*c*-path) is given in parentheses.

Note. $*p < 0.05$; $**p < 0.01$.

Discussion

The aim of this study was to examine the effectiveness of a six-week gratitude intervention on mental well-being compared to a waitlist control group and to investigate the mediating role of positive emotions, grateful mood, and positive relations. Results showed significantly higher increases on all outcomes, i.e., mental well-being on all subscales, positive emotions, grateful mood, and positive relations, for practicing gratitude exercises compared to being assigned to the waitlist control group without practicing gratitude exercises. Those findings are in line with findings of prior studies considering mental well-being (e.g., Boehm, Lyumbormisrky, & Sheldon, 2011; Emmons & Crumpler, 2000; Lyubomirsky, Sheldon, & Schkade, 2005; Rash, Matsuba, & Prkachin, 2011; Wood, Joseph, & Maltby, 2008), positive emotions (e.g., Dickens, 2017; Emmons

& McCullough, 2003), and positive relations (e.g., Emmons & McCullough, 2003; O'Connell, O'Shea, & Gallagher, 2016). Additionally, the current study expanded prior knowledge by showing that gratitude exercises significantly increased grateful mood, since most research about the effects of gratitude interventions focused on gratitude as a trait (e.g., Harbaugh & Vasey, 2014; Toepfer & Walker, 2009) and research on the effects of grateful mood is rare. Research focusing on gratitude as a trait has shown positive effects of gratitude interventions on trait gratitude (e.g., Froh, Sefik, & Emmons, 2008; Işık & Ergüner-Tekinalp, 2017). Similar findings were expected for gratitude as a mood and are thus in line with existing research. Furthermore, the results of both simple and multiple mediation analyses showed that only positive emotions mediated the effect of practicing gratitude on mental well-being.

Positive emotions showing to play a mediating role in the current study supports part of the second hypothesis. In line with the significant effect of the gratitude exercises on positive emotions, a variety of previous studies has also found that positive emotions are positively affected by gratitude interventions (e.g., Dickens, 2017; Emmons & McCullough, 2003; Wood, Froh, & Geraghty, 2010). Related to the significant effect of positive emotions on mental well-being, the broaden and build theory of positive emotions proposes that positive emotions both broaden people's thought-action repertoire in the short-term and build personal resources – i.e., physical, social, and intellectual resources – in the long-term (Fredrickson, 1998). As a consequence, an upward spiral is initiated that increases both well-being and mental health (Fredrickson & Joiner, 2002). This theoretical framework is in line with the current findings. Also, this link between positive emotions and mental well-being has shown to be unique and has been confirmed by previous studies (e.g., Datu & King, 2016; Fredrickson, 2013). The mediating role of positive emotions in the effectiveness of gratitude interventions is also in line with previous mediation studies focusing on the effectiveness of other positive psychological interventions. Nelson, Layous,

Cole, and Lyubomirsky (2016), for example, demonstrated that a six-week acts of kindness intervention significantly increased mental well-being, which was mediated by positive emotions. Also, in a randomized field study, a loving-kindness meditation was effective in increasing the participant's positive emotions, which then again effectively increased their satisfaction with life (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). In addition, Hendriks, Schontanus-Dijkstra, Graafsma, Bohlmeijer, and de Jong (2020) have confirmed the mediating role of positive emotions in the effectiveness of a multicomponent positive psychological intervention, which included gratitude exercises, on mental well-being in their mediation analysis. Thus, the current significant mediation effect of positive emotions is in line with previous comparable findings.

The results did not show a significant mediation effect of grateful mood or positive relations, which is in contrast to the hypothesis. For grateful mood, not finding a significant effect on mental well-being in the current mediation analyses is not in line with previous research (McCullough et al., 2004). Besides, research focusing on gratitude as a trait has revealed that gratitude positively affects mental well-being, which may be comparable to the effects of grateful mood (e.g., McCullough, Emmons, & Tsang, 2002; Wood, Joseph, & Maltby, 2008). Also, in a recent mediation study on the effectiveness of gratitude interventions, the positive effect of sharing gratitude with other people on mental well-being has shown to be increased by enhanced trait gratitude in a Chinese prisoner sample (Deng, Xiang, Zhu, Li, Yu, & Liu, 2019). Furthermore, not finding a significant effect of the gratitude intervention on positive relations is also not in line with previous research (e.g., Algoe, Gable, & Maisel, 2010; Bono, Krakauer, & Froh, 2015; Emmons & McCullough, 2003; Wood, Froh, & Geraghty, 2010). A potential explanation for the differences of the current non-significant findings to earlier findings is the lengths and the use of gratitude exercises for the experimental condition. In the current study, participants were asked to practice gratitude exercises each day for six weeks. In comparison, Emmons and McCullough (2003) chose

their intervention program to last for ten weeks, and participants only had to practice gratitude once a week. They instructed their participants with the same kind of exercise each week, which also differs from the weekly change in instructions for the participants in the current study. In their meta-analysis, Koydemir, Sökmez, and Schütz (2020) discussed that a longer duration of positive psychological interventions, including gratitude exercises, is more effective in having a strong immediate effect on well-being. Therefore, asking the participants to practice six different gratitude interventions that each last for one week may not have been a sufficient duration for testing the mediation effects. Generally, the current study is one of the first to test the effectiveness of gratitude exercises by using such a comprehensive gratitude intervention. Also, using a Dutch sample, which is not restricted to undergraduate students, is exclusive, meaning that the current results may differ from the results of previous studies on the effectiveness of gratitude interventions (e.g., Emmons & McCullough, 2003; McCullough, Emmons, & Tsang, 2002; Wood, Joseph, & Maltby, 2008).

Furthermore, specifically considering the non-significant mediation effect of positive relations in the current study, only one of the six exercises clearly incorporated the gratitude directed towards another person, although gratitude has been described as being usually related to or directed at other people (Davis et al., 2016; Emmons & McCullough, 2003). Therefore, participants might have only enhanced their positive relations with one of those exercises, i.e., writing a letter to another person, and may not have directed their gratitude towards another person during the other exercises. Additionally, the non-significant effect of the gratitude intervention on positive relations in the current mediation analyses is not in accordance with the significant effect on positive relations in the current main effect analysis. However, the effect size of the gratitude intervention on positive relations in the main effect analysis of the current study was relatively small. Still, this variation in results may be explained by using difference scores to compute the mediating variables in the mediation analyses. As Edwards (1995) explained, using difference

scores may not be as reliable as their component measures. This means that using the separate components for the current main effect analysis may have given a more reliable result of the effect of the gratitude intervention on positive relations than using the difference score of the baseline measures and the two in-between measures in the mediation analyses of this study. Therefore, the non-significant effect of the intervention on positive relations in the mediation analyses should be interpreted with caution since another measurement procedure may have given different results. On the other hand, the significant effect of positive relations on mental well-being in the mediation analyses is conforming with the previous finding that flourishing on an interpersonal level is a crucial part of an individual's quality of living (Ryff & Singer, 2000). Considering these findings and possible explanations, grateful mood and positive relations may still be considered as potential mediators in future research about the relationship between gratitude exercises and mental well-being.

Strengths and Limitations

Considering the strengths, this study was a randomized controlled trial and is one of the few studies that tested the effects of gratitude interventions focusing on multiple outcomes, including grateful mood. Also, it was the first to test the mediating role of positive emotions, grateful mood, and positive relations on mental well-being by using a comprehensive gratitude intervention with multiple exercises. Further, the participants of the study were perfectly randomized into the two groups without any considerable demographic differences or considerable differences in well-being, positive emotions, grateful mood, or positive relations before the start of the intervention. The comparison of the experimental condition to a waitlist control condition is prominent compared to the usual use of active comparison groups in other studies (Wood, Froh, &

Geraghty, 2010), and using a Dutch sample contributes to existing research since most studies on positive psychological interventions were conducted in American samples (Hendriks et al., 2019).

However, there are also limitations that need to be mentioned. Considering the sample, mainly higher educated women were recruited, which is a common limitation in positive psychological intervention research (see, e.g., Emmons & McCullough, 2003; Martínez-Martí, Avia, & Hernández-Lloreda, 2010). Therefore, generalizability of the current findings should be handled with caution. As explained by Kashdan, Mishra, Breen, and Froh (2009), expressing gratitude is evaluated more positively by women compared to men, and women experience less associated costs when they receive gifts. Also, for women, expressing gratitude is much less challenging, and they are able to experience that gratitude more intensely in everyday life (Kashdan, Mishra, Breen, & Froh, 2009). Due to those gender differences, findings of the current study may not be completely generalizable. Further research is needed with a more balanced sample considering the participant's characteristics.

Furthermore, although using multiple types of gratitude exercises to test the effectiveness of practicing gratitude was useful, the single exercises were not tested separately but only in combination. Since the types of gratitude exercises may differ in their efficacy (Seligman, Steen, Park, & Peterson, 2005), it is not known which exercise was most effective. Future research may incorporate multiple measurement points after each type of exercise in order to be able to compare their effectiveness. Lastly, the reliability of the mDES testing the participants' positive emotions was questionable at baseline, which may indicate a lower measurement accuracy (Field, 2013). Also, the psychometric properties of the translated version of the mDES have not yet been tested. Therefore, the results should be handled with caution. However, at post-test, the reliability of the mDES was good.

Recommendations

Considering the higher willingness of higher educated women to participate in studies of positive psychological interventions, it is recommended to consciously recruit participants in a way that male and lower educated participants are as represented in the sample as higher educated female participants in future positive psychological intervention studies. As Choi et al. (2017) discussed, the content of the advertisement, with which participants are recruited, affects the characteristics, rates, and engagement of the recruitment. Thus, it is suggested that in order to recruit more male participants, aspects like *strength* and *happiness* should be included in the advertisement. For the recruitment of lower educated participants, it may be useful to use language that is easily understandable and to not include technical terms in the advertisement. Also, educational status has shown to influence the meaningful use and access of information received from the media (Wei & Hindman, 2011). Therefore, other recruitment strategies should be considered in addition to approaching participants via media, such as directly asking participants in person or sending letters.

Moreover, in addition to including multiple points of measurement to test the effectiveness of each single exercise, the content of the exercises that the participants give may be of interest. Research has shown that people show differences when it comes to the size of the things that they are grateful for (Wood, Brown, & Maltby, 2011). Therefore, a mixed-method study may be useful as well, in which the effectiveness of each gratitude exercise is tested quantitatively, and additional qualitative data is collected to examine what people are grateful for during those exercises. For collecting the qualitative data, the participants may hand in what they have written down in a gratitude diary, so that the content of that can be analyzed. The content can then be coded considering the size of the gift, such as being grateful for small gestures versus being grateful for lifelong support, and could be compared with the effects of the gratitude exercise found in the

quantitative data. The duration of the intervention may be increased additionally, so that participants practice each exercise for a longer period of time, and effectiveness can be better tested.

Third, the current study did not support the hypotheses of grateful mood and positive relations to mediate the relationship between gratitude exercises and mental well-being. There may be other important mediating mechanisms that play a role in this relationship. Wood, Joseph, and Linley (2007) have stated that the effects of gratitude exercises on well-being are mediated by underlying mechanisms. Those mechanisms are still relatively unknown, and research on mediation effects is limited (O'Connell, O'Shea, & Gallagher, 2018). In addition to positive emotions, Lyubomirsky and Layous (2013) suggest that the effect of engaging in positive activities, such as practicing gratitude, on well-being is mediated by positive thoughts, positive behaviors, and need satisfaction. Therefore, future studies are needed, in which those possible mediating mechanisms are tested considering the efficacy of gratitude exercises, to receive a better understanding of how mental well-being is influenced by gratitude interventions. Another suggestion for future mediation studies may be the focus on decreases in negative emotions in contrast to the mediating role of positive emotions. Since negative emotions have shown to be decreased by the use of gratitude intervention (e.g., Watkins, Woodward, Stone, & Kolts, 2003), testing the mediating role of that may be useful.

Moreover, it may be interesting to have a closer look at the individual level of the effects of gratitude exercises. Research has shown that not every person will benefit from each positive psychological intervention in the same way and that different people may be differently responsive to the kind of intervention (Lyubomirsky, 2007 as cited in Dickens, 2017). Whether a positive psychological intervention fits an individual and how it affects the individual highly depends on the predispositions of the individuals – such as motives, goals, traits, strengths, and needs – which

has been called the *Person-Activity Fit* in previous research (Lyubomirsky, Sheldon, & Schkade, 2005). This means that for some individuals, gratitude exercises are perfectly suitable in order to make use of its benefits, but for other individuals, other positive psychological interventions are more useful than gratitude interventions. In addition, existing research has shown that gratitude exercises can be effectively combined with other positive psychological interventions in order to improve well-being, such as mindfulness exercises (Hendriks, Schotanus-Dijkstra, Hassankhan, de Jong, & Bohlmeijer, 2020; O' Leary & Dockray, 2015). Combining single interventions could also make an intervention program more fitting to an individual since combinations of exercises can tailor the intervention to the individual's specific needs. Therefore, future research testing the effectiveness of combinations of positive psychological interventions and testing, which interventions are most useful for what kind of personalities, may help individuals benefit the most from positive psychological interventions.

Lastly, the results of the current study suggest that using gratitude exercises to increase mental well-being of higher educated women is efficient. However, this was only tested for a non-clinical sample, i.e., participants without serious depressive or anxiety symptoms. For clinical practice, incorporating gratitude exercises in the treatment of higher educated women may, however, be useful as well. Previous research has shown that gratitude interventions are effective, for example, in decreasing depressive symptoms (e.g., Dickens, 2017; Seligman, Steen, Park, & Peterson, 2005). More research on the effectiveness of gratitude interventions in the clinical population is needed in order to be able to incorporate gratitude exercises in therapy sufficiently.

Conclusion

This study demonstrated that practicing gratitude over six weeks has a positive impact on improving mental well-being, positive emotions, grateful mood, and positive relations. However, only positive emotions has shown to mediate the relationship between gratitude exercises and mental well-being. The results of the current study did not show grateful mood and positive relations to be mediating mechanisms, which could be explained by the choice and use of the gratitude exercises of the current study or by the chosen measurements and data analysis. Therefore, future research should further investigate the mediating role of grateful mood, positive relations, and other potential mediators in the relationship between gratitude interventions and mental well-being, while including multiple measurement points for effectiveness and a sample with an equal distribution of gender.

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