The practice of gratitude in times of adversity: A 6-week gratitude intervention during the corona pandemic

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Abstract

As the current corona pandemic led to psychological distress and low levels of well-being within the population, appropriate interventions were needed to neutralize these consequences. One suitable intervention to counteract the observed development would be the practice of gratitude. Regarding the ambiguous research results about the efficacy of gratitude interventions, the present study aimed to investigate the effect of a 6-week gratitude application on well-being. Furthermore, potential moderating factors of the intervention: baseline well-being, age, and gender were explored. A total sample of 849 participants was utilized, consisting of individuals from 18 years to 83 years (M = 52.9, SD = 14.5) with a majority of women (79.8%). Participants were randomly assigned to either intervention group or waitlist control group. They were asked to fill out baseline and post-test measurements, assessing demographic features, well-being scores, grateful mood and adherence. Results showed that the gratitude intervention had a significant moderate effect on overall levels of well-being, compared to the waitlist control group. Furthermore, the subscales: subjective, social, and psychological well-being were almost equally affected through the intervention with a small to moderate effect size. Unexpectedly, participants with higher levels of well-being at baseline were affected more by the intervention than participants with lower well-being levels at baseline. Neither age nor gender had an influence on the efficacy of the intervention. Additionally, the present study was the first to investigate the effect of a gratitude intervention in the form of an online application. Considering the significant moderate effect size in the current study, the use of online applications for gratitude interventions should be supported and further investigated. Finally, the present study showed that a 6-week gratitude application is a is a suitable means to increase levels of well-being.

Keywords: Gratitude intervention, Well-being, Positive psychology, online application, pandemic

Introduction

The current corona pandemic is not only a threat to one's physical health but also the current circumstances are perceived as psychologically depressing for a vast majority of the population (Nieuwenhuis & Yerkes, 2021). Current research showed the devastating consequences of the corona pandemic on the population's mental health (Meyer et al., 2021). Since the beginning of the pandemic a notable decrease of the populations well-being has been observed (Schwinger et al., 2020; Kakunje et al., 2020). The decrease of average levels of well-being should be considered carefully since low well-being is a crucial risk factor for the development of psychological diseases (Grant et al., 2013). In order to prevent the development of psychological diseases such as depression or anxiety disorders, it is crucial to counteract these negative consequences by means of appropriate interventions (Büssing et al., 2021). One suitable intervention would be the use of gratitude exercises to increase participants levels of well-being and build their resilience (Rash et al., 2011), as gratitude interventions are proven to affect levels of well-being positively (Dickens, 2017). However, current research is still ambiguous regarding the effect of gratitude exercises on well-being, considering both effect size and influential factors (Davis et al., 2016). Hence, the present study was designed to investigate the effect of gratitude exercises on well-being and potential influential factors of a gratitude intervention such as gender and age.

Already ancient Greek philosophers regarded gratitude as an important virtue, which is part of a virtuous life and increases positive emotions (Kristjánsson, 2013). Furthermore, gratitude is incorporated in virtually every religion, and it is usually manifested in the form of prayer (Kim-Prieto, 2016). As positive psychology became more popular in the late 20th century, the benefits of gratitude interventions have been investigated, and gratitude has become an increasingly important factor for the development of well-being (Zyl & Sr., 2020). Gratitude may have different meanings, depending on the context, gratitude may refer to a state, an attitude, a trait, a virtue, or an emotion (Lambert et al., 2009). In the context of the present study, gratitude is defined as an internal appreciation of goodness and of other people (Sansone & Sansone, 2010). According to this definition, gratitude is not only a response to receiving something but also it includes thankfulness for goodness, in terms of appreciating life or nature itself (Watkins, 2016). The practice of this thankfulness and appreciation for goodness affects both mental health and well-being (Sansone & Sansone, 2010).

Well-being is not only defined as the experience of positive emotions and feeling good about oneself but also it is about having meaning in life, having stable relationships, and contributing value to society (Henderson & Knight, 2012; Ryff, 2017). Well-being is further

divided into three subdomains: 1. Subjective or emotional well-being 2. Social well-being and 3. Psychological well-being (Keyes, 2007). While subjective well-being is about being happy, experiencing pleasure, and having positive emotions, social well-being considers how content people are with their relationships and their social role in life (Kapteyn et al., 2014). Finally, psychological well-being includes factors such as having a purpose in life and experiencing personal growth (Keyes, 2007). For high levels of overall well-being, each subdomain has to be sufficiently cultivated (Zyl & Sr., 2020). High levels of well-being are not only crucial for a higher quality of life, but also high well-being increases resilience and makes individuals less vulnerable to psychological diseases and distress (Fava et al., 2017). Therefore, the development of well-being is a crucial factor for the maintenance of mental health and having a high quality of life (E. Bohlmeijer & Hulsbergen, 2018).

Even though previous research has proven a positive impact of gratitude practice on well-being, findings are ambiguous considering the effect size (Davis et al., 2016; Dickens, 2017). Davis et al. (2016) conducted a meta-analysis and compared the results of 26 randomized controlled studies regarding the effectiveness of gratitude letters and journals. Only a small but significant effect was found for most of the gratitude intervention groups compared to the active and passive control groups. In contrast Bohlmeijer et al. (2020) found a moderate to strong effect size of the gratitude intervention on well-being compared to active and passive control groups. Hence, previous studies indeed found a significant effect of gratitude practice on well-being, but the studies are ambiguous regarding the effect size. Furthermore, the mentioned studies exclusively made use of a conventional intervention design, disregarding the benefits of modern technology.

In previous research, the gratitude interventions were mainly conducted face to face, on pen and paper, or via e-mail instructions (Davis et al., 2016). However, recent research showed that the use of online applications for the implementation of Positive psychological interventions (PPIs) is more efficient than the conventional use of PPIs (Bakker et al., 2016; Shang et al., 2019). PPIs are defined as any kind of intervention that aims to increase positive emotions, positive cognitions or positive behaviour of an individual instead of reducing negative symptoms (Auyeung & Mo, 2018). Hence, a gratitude intervention that aims to increase levels of well-being would also be categorized as a PPI. Interestingly, PPIs that were integrated in online applications did not only lead to greater effect sizes, in terms of higher levels of outcome well-being but also the use of applications increased user's satisfaction and adherence (Josephine et al., 2017). Reasons for the success of PPIs in the form of online applications were the higher user-friendliness, more room for creativity in terms of posting

photos, writing messages, or sharing experiences, and finally the high accessibility (Arean et al., 2016; Luna-Perejon et al., 2019). The development of PPIs in the form of online applications developed quickly over the last years, as the availability of the internet and smartphones increased, making the applications accessible at any time for nearly everyone (Maturo & Moretti, 2020). Furthermore, during the corona pandemic the use of online applications became increasingly important since the possibility for conventional face to face interventions was limited (Pizzoli et al., 2020). Therefore, the corona pandemic may be the starting point for an increased use of PPIs as online applications. Regarding the mentioned benefits of online PPIs over conventional PPIs, the use and the importance of online PPIs will probably become more relevant in the future. Therefore, the present study aimed to investigate the effect of a gratitude intervention in the form of an online application rather than using a conventional gratitude intervention.

Additionally, previous studies considered the impact of gratitude interventions on overall levels of well-being but disregarded the subdomains of well-being: subjective, social, and psychological well-being (Dickens, 2017). The separate subdomains are necessary because each domain measures a fundamentally different aspect of well-being (Keyes, 2008). Even though high levels of one subdomain may compensate for lower levels of another domain, it is intended to find a balance between the separate domains in order to reach the highest psychological benefits (Vescovelli et al., 2018, Gallagher et al., 2009). Accordingly, previous research showed that people with balanced levels of subjective, social, and psychological well-being had better coping mechanisms against psychological distress than people who had unbalanced subscale scores (Goodheart & Carol, 2005; Zyl & Sr., 2020). Interestingly, each subdomain is affected differently by distinctive interventions. While a well-being therapy intervention increased psychological well-being the most (Ruini et al., 2009), another intervention that aimed to expand social support, logically mostly affected the domain of social well-being (Kennedy et al., 2017). Therefore, interventions should be used purposefully in order to reach a balance of the separate subdomains (Gallagher et al., 2009). Finally, it is crucial to investigate the effect of a gratitude intervention on the separate subscales in order to apply the intervention consciously on individuals who are lacking levels on the respective subscale.

Recent research found that most PPIs had the highest effect size on the subscale psychological well-being (Dimitropoulou & Leontopoulou, 2017). A possible reason may be that PPIs mainly aim to give participants a feeling of personal growth and purpose in life, which is covered by the subscale psychological well-being (Auyeung & Mo, 2018). Weiss et al. (2016) conducted a meta-analysis to investigate the effect of 27 PPIs on well-being and its domains.

The largest effect was found on the domain psychological well-being with a moderate effect size across studies (Weiss et al., 2016). Considering the large effect size of similar PPIs on the subscale psychological well-being, similar results were expected for the present study.

Furthermore, the influence of baseline well-being on a gratitude intervention is still unclear. Bohlmeijer et al. (2020) claimed that low levels of baseline well-being influence the outcome of a gratitude intervention in terms of higher levels of post-test well-being. However, Bohlmeijer et al. (2020) exclusively chose a sample with participants who had low to moderate levels of well-being at baseline. As Bohlmeijer et al. (2020) found a moderate to strong effect size, low baseline well-being was claimed to increase the efficacy of a gratitude intervention. Nevertheless, the effect of the gratitude intervention could not be compared to a group with high levels of baseline well-being. Thus, the strong effect size that was found in the mentioned study may also be due to another factor such as the longer duration of the gratitude intervention. Therefore, it was necessary to investigate the influence of baseline well-being on a gratitude intervention with a more heterogenous group regarding levels of baseline well-being. In the present study individuals with various levels of well-being were included to explore the influence of baseline well-being on the intervention.

Another unclarity is the influence of age and gender on gratitude interventions. While there exists a vast amount of research regarding the correlational nature between age and gratitude, it has not been investigated yet, whether age may influence the outcome of a gratitude intervention. Gratitude can be experienced at any age and in the most diverse life situations. However, research showed that there are fundamental differences in levels of gratitude over the lifespan (Hill & Allemand, 2011). The experience of gratitude was found to be highest in older adults, it was lowest in middle-aged and younger adults (Chopik et al., 2017). One possible explanation for a higher experience of gratitude in older adults was the appreciation of simple things. While younger adults seemed to take good health, wealth, and safety for granted, older adults tended to appreciate these things more and consequently, they experienced higher levels of gratitude (Chopik et al., 2017). Besides the significant correlation between gratitude and age, experimental research is ambiguous regarding the effect of age on PPIs. While certain PPIs are not affected by age at all (Bailey et al., 2018), Sutipan et al. (2016) found in their systematic review that older adults benefitted more from chosen PPIs than younger adults or adolescents. Therefore, it is not clear whether certain age groups may benefit at all from a gratitude intervention, while other age groups may be strongly affected by the same intervention. Thus, it is crucial to investigate the influence of age on gratitude interventions to avoid unnecessary use of the intervention for a wrong target group.

As with age, a significant correlation between gender and gratitude was thoroughly investigated by previous research but the influence of gender on the outcome of a gratitude intervention has not been explored yet. In a recent study, Skalski and Pochwatko (2020) found that women experienced higher levels of gratitude than men and women tended to express the emotion of gratitude more than men (Froh et al., 2009). Besides the relation between gender and gratitude, research showed that gender may influence the outcome of certain PPIs (Zyl & Sr., 2020). In an intervention regarding the change of health behaviours, gender directly influenced the intervention outcome in terms of a higher change of health behaviours for women than for men (Freijy & Kothe, 2013). Furthermore, a mindfulness-based intervention found an influence by gender on the intervention. Women were found to have benefitted more from the intervention than men regarding the outcome on well-being (Hwang et al., 2019). However, another PPI showed that gender did not influence the PPI regarding the effect size on outcome well-being (Auyeung & Mo, 2018). Hence, the influence of gender on PPIs is ambiguous. Gender seems to influence the outcome of certain PPIs while it does not affect others. Since there has not been any study yet that investigated the influence of gender on a gratitude intervention, the influence was explored in the present paper.

The present study aimed to address the abovementioned unclarities. Firstly, the main purpose of the study was to investigate the effect of a gratitude online application on well-being and the subdomains of well-being. Secondly, the study explored the influence of baseline well-being, age and gender on the effect of the gratitude intervention considering outcome well-being scores. The main research questions for the present study were as follows: Does the 6-week gratitude intervention significantly affect participants' overall levels of well-being and its subdomains? Does baseline well-being, gender and age have an influence on the intervention outcome regarding post-test well-being scores? Accordingly, the following five hypotheses (H) were derived:

H1: The intervention has a significant effect on overall levels of well-being at T1 compared to the control group.

H2: The impact of the intervention is strongest on the subscale psychological well-being compared to the subscales subjective and social well-being.

H3: The effect size on well-being is larger for participants with lower baseline well-being scores than for participants with higher baseline well-being scores.

H4: The effect size on well-being is larger for older participants than for younger ones.

H5: The effect size on well-being is larger for women than for men.

Methods

Design

In the present study, a 6-week randomized controlled trial was applied to test the effectiveness of multiple gratitude exercises, which were integrated into the online application "Zo Erg Nog Niet". The results were compared to a waitlist control group. Participants completed both a baseline assessment (T0) and a post-test assessment (T1). In the present paper, the effectiveness of the intervention on both overall well-being and on the subscales of well-being was investigated. Furthermore, the moderating effect of baseline well-being, gender, and age was explored.

Sample and Procedure

The recruitment and the data collection of the sample was established in advance and the author of the present paper used the data for the present study. The sample was recruited by means of social media of the University of Twente, an online psychology magazine, and by national and regional newspapers. Furthermore, one of the researchers gave interviews for radio stations in order to advertise the study. The study was offered as a free positive psychological intervention, which was claimed to increase levels of well-being during the corona pandemic. The inclusion criteria for the study were a minimum age of 18 years, possession of a smartphone or a tablet, a stable internet connection, a valid email address, and sufficient skills of the Dutch language to understand the questionnaires. Moreover, participants with moderate to severe depressive or anxiety symptoms were excluded from the study. A score ≥ 34 on the Center for Epidemiological Studies Depression (CES-D) questionnaire was used as a cutoff for depressive symptoms (Radloff, 1977), and a score ≥ 15 on the Generalized Anxiety Disorder-7 (GAD-7) questionnaire served as a cutoff for anxiety symptoms (Spitzer et al., 2006).

After completing the baseline questionnaire, participants were randomly assigned to either the waitlist control group or to the intervention group by means of the platform randomizer.org. Participants were not stratified by gender or nationality and participants with any level of well-being were included. The final sample consisted of 849 participants with 425 in the waitlist control group and 424 in the intervention group. While participants in the 6-week gratitude intervention, actively participated in gratitude exercises, the control condition was asked to wait for 6-weeks to take part in the gratitude intervention. Both the control group and intervention group participated in a baseline assessment, exploring demographic features and baseline levels of well-being. After 6-weeks, another assessment was filled out by participants of both conditions, investigating levels of well-being after the intervention.

Materials and Measurements

The current research is part of a bigger study. The outcome measures were well-being, stress, rumination, ability to adapt, coping, gratitude, anxiety, and depressive symptoms. However, for the present paper, only the outcome measures Well-being at baseline(T0) and post-test (T1), grateful mood at T0 and T1, app-engagement and the demographic features were investigated.

Well-being

For the assessment of mental well-being, the 14-item Mental Health Continuum-Short Form (MHC-SF) was used (Keyes, 2008). The MHC-SF explored both overall levels of well-being and the subscales: subjective-, social- and psychological well-being. The items were scored on a scale from 0 (never) to 5 (every day). 3 items gave an indication about subjective well-being, e.g. “During the past month, how often did you feel happy?”. Social well-being was measured by 5 items with the following example: “During the past month how often did you feel that you belonged to a community (like a social group, or your neighborhood)?” (Keyes, 2008). Finally, 6 items assessed psychological well-being of participants, e.g. “During the past month, how often did you feel that your life has a sense of direction or meaning to it?” (Keyes, 2008). A higher average score indicated higher levels of well-being. Finally, the well-being scores of the sample were compared to normative scores of the Dutch population (Lamers et al., 2011). The reliability of the total MHC-SF scale was very good at T0 (α = .89) and for the subscales subjective, social and psychological well-being the reliability was good to very good (α = 0.70 - 0.82).

Grateful mood

Grateful mood was assessed using four items, which could be answered on a scale from 1 (totally disagree) to 7 (totally agree) (McCullough et al., 2004). The items aimed to assess the experience of gratitude in the last 24 hours, for example: “In the last 24 hours, I felt grateful for what others do and have done for me in my life.” High mean scores implied higher levels of grateful mood. The reliability for the scale was very good (α = .87).

App-engagement

App-engagement was measured by means of two items, measuring the average frequency of app-use per week: “On average, how many days a week did you use the app Zo Erg Nog Niet?” and per day: “On average, how much time did you spend on an exercise per

day?". Regarding the first item, participants could answer on a scale from 0 (less than one day per week) to 7 (7 days per week). The second item regarding daily engagement was measured on a scale from 0 (less than 5 minutes per day) to 5 (More than 20 minutes per day). An engagement of 10 minutes per day on five days per week was expected from the participants based on the criteria by Bohlmeijer et al. (2020).

Influence by pandemic

As the present study was conducted during the corona pandemic, the baseline questionnaire included multiple questions about the influence of corona on the sample. For the present study the following question was investigated: "To what extent is the corona crisis currently having a negative impact on your well-being?". The question could be answered on a scale from 1 (absolutely not) to 5 (a lot).

Intervention

The abovementioned online application "Zo Erg Nog Niet" was developed within the Department of Psychology, Health and Technology at the University of Twente by Bohlmeijer et al. (2020). The application consisted of 6 "modules". All the modules are evidence-based gratitude exercises, as displayed in Table 1. Even though all the modules were about the expression of gratitude, each module had a different focus. For example, in Module 1 participants were asked to write down three good things they are grateful for, while Module 3 was about the expression of gratitude to someone. Each module should be completed in one week so that the intervention would be completed after 6 weeks.

Participants received instructions for every module each week. The instructions did not only include a description of the exercise as illustrated in table 1 but also sample responses were generally provided, and the averagely needed time for the exercise was mentioned. Moreover, participants could click on an info button in order to get a clarification of the module. Furthermore, participants were asked to engage creatively in the application by posting photos that would represent their experience of gratitude. To increase app adherence and app engagement, daily reminders for the completion of modules, posting of pictures, or quotes were sent automatically to the participants. Finally, in case participants needed help with the modules, the app integrated a tutorial and provided an e-mail address to ask questions regarding the proper app use.

Table 1

Gratitude exercises and instructions of the online application "Zo Erg Nog Niet". The exercises are divided into 6 modules, one module per week (Bohlmeijer et al., 2020).

Week	Exercise	Instructions
1	Gratitude diary	Write each day (or at least on 5 days) about 15 min about three good things of that day. Describe the event, but also why you felt grateful
2	Take another perspective	Write each day 10 to 15 min about one aspect in your daily life. Imagine that this aspect isn't there anymore, for example clean water from the tap, a pet, a beloved one or the washing machine. What would it be like if this aspect in your daily life is absent? What does this aspect mean to you? What do you feel grateful for?
3	Express gratitude	On every day this week, think about a person who did something nice for you in the past weeks or months. Write this person a gratitude letter. What did this person do for you and what does he or she mean to you? You can also send an email or postcard to this person wherein you express your gratitude. You can express your gratitude to this person when you meet him or her. Or take the gratitude letter with you and read this letter aloud to the person
4	Appreciate the good things in life: Grateful memories	Write every day 15 to 30 min about how grateful you are about the people or aspects in your life. Try to describe the things that you feel grateful for as detailed and specific as possible. Also describe what someone or something meant for you
5	Gratitude and misfortune	Write each day (or at least on 5 days) about a difficult life-event which could have happened recently or a long time ago. Try to answer the following questions: (1) Can you identify—retrospectively—positive outcomes of the event? (2) Did you learn or discover something about life that you might have not learnt without having experienced the event? (3) Did you change as a person? What positive changes do you notice? (4) Can you experience gratefulness for the positive consequences of the difficult event?
6	Gratitude attitude in life	First, try to remember yourself every morning during 5 min about your intention to have a grateful attitude in life. Can you feel grateful for being awake? What will your day look like? How will you remember yourself on your intention today? Second, try to notice and appreciate the normal things in life as much as possible during the day

Data analysis

For the data analysis IBM SPSS Statistics (Version 26) was used and an alpha level of $p < 0.05$ was determined. The effect size was assessed through the Partial eta squared score, which was interpreted as follows: $\eta^2 > .01$ = small effect, $\eta^2 > .05$= moderate effect, $\eta^2 > 0.13$ = large effect (Pallant, 2020). Furthermore, for all the following parametric tests, preliminary checks were done to ensure normal distribution and homogeneity of variances.

Initially, descriptive statistics were conducted to obtain demographic variables, T0 and T1 well-being scores for both overall well-being and subscales. Then, a dropout analysis was conducted to test for statistical differences between dropouts and completers, considering the concepts: well-being at T0, grateful mood at T0, age and gender. An independent t-test was conducted using the two groups (dropouts, completers) as the independent variable and well-being at T0, grateful mood at T0, age and gender as dependent variables. Furthermore, the group of dropouts was investigated further by testing for statistical differences between dropouts in the intervention group and control group. First, a Chi-Square was used to test for substantial differences regarding the number of dropouts between intervention group and control group. To test for differences of well-being at T0, grateful mood at T0, age and gender between the groups, an independent t-test was conducted, using the condition as the independent variable and the mentioned concepts as dependent variables.

Before the hypotheses were tested, a manipulation check was conducted. The impact of the intervention on grateful mood was investigated to assure that grateful mood actually increased through the intervention. An ANCOVA analysis was conducted, using the condition as independent variable, grateful mood at T1 as dependent variable and grateful mood at T0 as a covariate.

To test the first hypothesis (H1): “The intervention has a significant effect on overall levels of well-being at T1 compared to the control group”, a one-way between-groups analysis of covariance (ANCOVA) was conducted. The independent variable was the condition (intervention group and control group), while overall well-being at T1 served as the dependent variable. Well-being at T0 was used as the covariate in the analysis.

Subsequently, the effect of the intervention on the respective subscales was analyzed by applying another three separate ANCOVA analyses, testing H2: “The impact of the intervention is strongest on the subscale psychological well-being compared to the subscales subjective and social well-being”. The separate subscales were entered as dependent variables, the condition as independent variable, and baseline well-being of the respective subscale was controlled, by determining it as a covariate

To test H3: “The effect size on well-being is larger for participants with lower baseline well-being scores than for participants with higher baseline well-being scores.”, two separate ANCOVA analyses were conducted. Initially, participants were divided into two equal-numbered groups based on their baseline well-being scores (Group 1: Well-being total mean score <2.8, Group 2: Well-being total mean score ≥ 2.8). Then, a one-way ANCOVA was applied for each group, using the condition as the independent variable, T1 overall well-being scores as the dependent variable and the respective group of well-being at T0 as a covariate. The effect size of the intervention on the two groups was investigated and compared.

Subsequently, a two-way ANOVA was conducted to explore H4: “The effect size on well-being is larger for older participants than younger ones”. Participants were divided into three equal numbered groups by means of visual binning (Group 1: 18-48 years, Group 2: 48-61 years, Group 3: 62 years and above). Both age groups and condition were determined as independent variables, while well-being at T1 was used as the dependent variable. Both main effects and interaction effects were considered. Post-hoc comparisons were conducted using the Tukey HSD test in order to test for potential differences in mean scores between separate groups.

Another two-way ANOVA was conducted to investigate H5: “The effect size on well-being is larger for women than for men”, using the condition and gender as independent variables and well-being at T1 as dependent variable. The main effect of gender and the interaction effect of gender and the intervention was explored.

Results

Participant characteristics

As displayed in Table 2, the participants mainly consisted of females. The mean age was 52.9 years with a minimum age of 18 years and a maximum age of 83 years. The participants lived mainly in the Netherlands or in Belgium. Furthermore, a majority of the participants had a university degree, and more than half the sample was married. No apparent differences were found between the groups regarding baseline characteristics.

Table 2

Baseline characteristics n = 847

	Total (%)	**Control group**	**Intervention group**
Age *M*,(*SD*)	52.9 (14.5)	52.4 (14.3)	53.2 (14.6)
Gender *n* (%)			
Male	168 (19.8)	76 (17.9)	92 (21.7)
Female	676 (79.8)	345 (81.4)	331 (78.3)
Residence			
Netherlands	665 (78.5)	316 (74.5)	349 (82.5)
Belgium	171 (20.2)	106 (25.0)	65 (15.4)
Other	11 (1.3)	2 (0.5)	9 (2.1)
Marital Status			
Married	482 (56.9)	254 (59.9)	228 (53.9)
Not married	365 (43.1)	170 (40.1)	195 (46.1)
Education level			
University degree	652 (76.9)	317 (74.8)	335 (79.2)
No University degree	195 (23.1)	107 (25.2)	88 (20.8)

Dropout analysis

As illustrated in Figure 1 a total of 721 (85.1%) participants completed both T0 and T1 measurements, implying a total dropout of 123 participants. Comparing the well-being mean scores at T0, no statistical differences were found between the completers (M = 2.71, SD = 0.79) and the dropouts (M = 2.69, SD = 0.84); t (845) = 0.37, p = 0.70. A statistical difference regarding the age of participants between completers (M = 53.57, SD =14.21) and dropouts (M = 48.79, SD = 15.44) was found; t (845) = 3.45, $p < 0.01$. Thus, dropouts consisted of significantly younger participants compared to the completers. Finally, no statistical difference

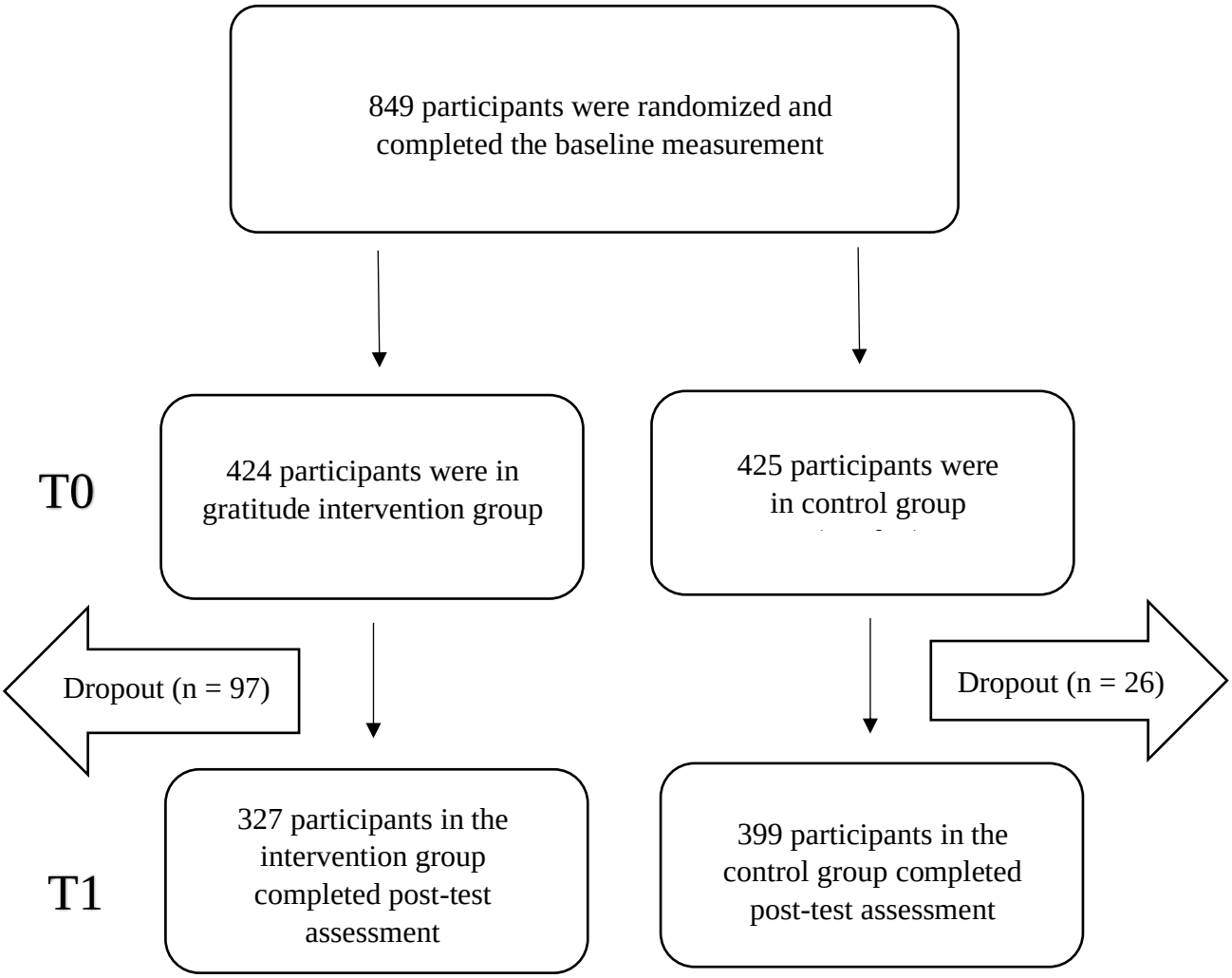
was found between completers and dropouts, considering grateful mood at T0 and gender; t (845) = 0.23, p = 0.81, t (845) = 1.54, p = 0.12, respectively

The difference between the dropouts of the intervention group (n = 97) and the dropouts of the control group (n = 26) was significant X^2 (1) = 36.7, $p < 0.05$. However, the difference in mean scores of well-being at T0 between intervention group dropouts (M = 2.70 SD = 0.92) and control group dropouts (M = 2.70 SD = 0.78) was not significant, F (1,124) = 1.2, p = 0.99. Finally, no substantial differences were found between intervention and control group dropouts for the scale grateful mood at T0, age and gender, t (124) = 0.86, p = 0.39, t (124) = 0.93, p = 0.35, t (124) = 1.4, p = 0.16, respectively.

Finally, besides a significant difference in age between dropouts and completers, no substantial differences were found between dropouts and completers.

Figure 1

Flow of participants



App-engagement

The app-engagement during the current study was satisfactory. As displayed in table 3, more than half the participants used the application for more than 10 minutes per day on at least 5 days per week as instructed.

Table 3

App-engagement in days per week and minutes per day, n= 317

Frequency of app use per week	**< one day**	**1-3 days**	**4-6 days**	**7 days**
***n* (%)**	37 (11.7)	69 (21.7)	147 (46.4)	64 (20.2)
Frequency of app use (in minutes per day)	**< 5 minutes**	**~ 5 minutes**	**10-15 minutes**	**20-20+ minutes**
***n* (%)**	42 (13.2)	54 (17.0)	184 (58.0)	37 (23.9)

Well-being scores at T0, influence on well-being by corona pandemic

The majority of the sample (79.2%) indicated that the current corona crisis had a moderate impact on their well-being. 16.6% of the sample stated that the corona crisis affected their well-being a lot and only 1.7% indicated that the crisis did not affect their well-being at all. As displayed in Table 4, both overall scores of well-being, as well as the subscale scores were lower in the present sample at T0 compared to normative scores of the Dutch population. At T0 no substantial differences were found between the intervention and control group regarding both overall well-being scores, t (845) = 1.8, p = .07, and subscales t (845) = 1.7, p = .08; t (845) = 1.5, p = .14; t (845) = 1.5, p = .12.

Table 4

Well-being at baseline and T1, Mean and standard deviation of MHC-SF scores for the control group, intervention group, and normative scores

		Total *M* (*SD*)	Control group	Intervention group	Normative scores
	Well-being total	**2.7 (0.8)**	**2.8 (0.8)**	**2.7 (0.8)**	**3.0 (0.8)**
	Subjective well-being	3.1 (0.9)	3.1 (0.9)	3.0 (0.9)	3.6 (1.0)
T0	Social well-being	2.24 (0.9)	2.3 (0.9)	2.2 (0.9)	2.3 (0.9)
	Psychological well-being	2.9 (0.9)	3.0 (0.9)	3.0 (0.9)	3.2 (0.9)
	Well-being total	**2.8 (0.8)**	**2.8(0.8)**	**3.1 (0.8)**	**3.0 (0.8)**
	Subjective well-being	3.3 (1.0)	3.2 (0.9)	3.5 (0.9)	3.6 (1.0)
T1	Social well-being	2.5 (0.9)	2.4 (0.9)	2.6 (0.9)	2.3 (0.9)
	Psychological well-being	3.1 (0.9)	3.0 (0.9)	3.2 (0.9)	3.2 (0.9)

Intervention effect on grateful mood – Manipulation check

Through the conducted ANCOVA a difference on grateful mood scores was found between intervention and control group. Participants in the intervention group had higher grateful mood scores at T1 than participants in the control group, F (1,711) = 30.6, p = <.05, partial eta squared = .04. The effect size was small but significant.

Intervention effect on well-being

As displayed in Table 5, a one-way between-groups analysis of covariance was conducted to compare the effectiveness of the 6-week gratitude intervention on both overall levels of well-being and subscales of well-being. The effect of the intervention on both overall levels of well-being and subscales of well-being was significant ($p < 0.01$). The effect-size on overall levels of well-being was moderate (η^2 = .07), and on the subscales: subjective, social, and psychological well-being (η^2 = .04, 0.4, 0.5, respectively) was small to moderate. Hence, H1 "The 6-week gratitude intervention has a significant effect on well-being" was accepted. The effect size on overall well-being and psychological well-being was moderate, while the effect size on subjective- and social well-being was small. Therefore H2 "The impact of the intervention is strongest on the subscale psychological well-being compared to the subscales subjective and social well-being" was accepted.

Table 5

ANCOVA, mean scores, standard deviation of total well-being scores and subscales at T1 for intervention and control group, p-values and effect sizes of the intervention on overall-well-being and subscales, n=723

	Control group			**Intervention group**			**Mean difference**	***df***	***F***	***p***	**Partial eta squared**
	n	***M***	***SD***	***n***	***M***	***SD***					
Overall well-being	395	2.8	0.8	326	3.1	0.8	-0.3	677	52.3	**<0.01**	**.07**
subjective well-being	396	3.2	0.9	327	3.5	0.9	-0.3	671	31.9	**<0.01**	**.04**
social well-being	395	2.4	0.9	326	2.6	0.9	-0.2	686	31.5	**<0.01**	**.04**
psychological well-being	395	3.0	0.9	326	3.2	0.9	-0.2	689	37.9	**<0.01**	**.05**

Moderation by baseline well-being

To investigate the influence of baseline well-being scores on the intervention, a one-way ANCOVA was conducted for each group with both high and low levels of baseline well-being. For the group with low levels of baseline well-being (< 2.8), a significant effect was found: F (1, 386) = 20.3, $p < .05$, partial eta squared = .05, indicating a small to moderate effect size. The group with high levels of baseline well-being (≥ 2.8), also displayed a significant effect: F (1, 360) = 34.5 , $p < .05$, partial eta squared = .09, indicating a moderate effect size. Therefore, the effect size of the intervention was stronger for participants with high levels of well-being at T0 than for participants with low levels of well-being at T0. Thus, H3 "The effect size on well-being is larger for participants with lower baseline well-being scores than for participants with higher baseline well-being scores" was rejected.

Moderation by age and gender

The interaction effect between the intervention and age group was not statistically significant, F (5, 715) = .11, p = .89, partial eta squared = .00. Moreover, the main effect of age on overall well-being scores was not significant either, F (5, 715) = .72, p = .48, partial eta squared = .00. Post-hoc comparisons using the Tukey HSD test indicated that the mean score of overall well-being for the 18-49 years age group (M = 40.7 SD = 8.3) was neither significantly different from the 49-61 years age group (M = 41.8, SD = 8.5) nor from the 62 above years age group (M = 41.1, SD = 8.6). Hence, H4: "The effect size on well-being is larger for older participants than for younger ones" was rejected

Another two-way ANOVA was conducted to investigate the interaction effect between the intervention and gender. Neither the main effect of gender: F (4, 716) = .66, p = .52, nor the interaction effect: F (4, 716) = .15 , p = .70, were significant, implying a rejection of H5: "The effect size on well-being is larger for women than for men".

Discussion

The purpose of the present study was to investigate the effect of a 6-week gratitude intervention on both overall levels of well-being and on the well-being subdomains: subjective well-being, social well-being and psychological well-being. Furthermore, age, gender, and baseline well-being were explored as potential moderating factors of the gratitude intervention. As expected, the intervention had a moderate effect on overall well-being scores and a small to moderate effect on the well-being subscales. Unexpectedly, participants with higher levels of well-being at baseline measurement experienced a larger increase of overall well-being through the gratitude intervention than participants with lower levels of well-being at baseline. Furthermore, against expectations neither gender nor age influenced the effect of the gratitude intervention.

Intervention effect on well-being

In line with the first hypothesis, the present study demonstrated that the gratitude intervention was effective regarding the increase of well-being compared to the waitlist control condition. The moderate effect on overall well-being in the present study was larger compared to previous studies that mainly found a small effect size (Davis et al., 2016). One explanation for the distinctive outcome may be the use of an online application in the present study rather than the use of a conventional intervention design (Bakker et al., 2016). The present study was the first that investigated the effect of a gratitude intervention by means of an online application. The reason for the superiority of applications is the higher user-friendliness, more room for creativity, and better user support (Proctor, 2018; Lee et al., 2021). Through the application, participants were able to become creative, by posting pictures, which is shown to increase both app satisfaction and efficacy of an intervention (Lee et al., 2021; Macias et al., 2015). Furthermore, in the app, participants had a clear overview of the modules and their progress, which was found to increase motivation and engagement (Szinay et al., 2020). Previous research showed that the abovementioned factors make a variety of PPIs more effective in terms of a higher increase in well-being scores (Shang et al., 2019). Thus, the use of an online

application in the current study may be one of the reasons for a higher effect size on well-being compared to previous studies.

Besides the use of an online application, other factors may have contributed to the stronger effect size on well-being. First, the modules in the present study consisted of a variety of gratitude exercises, which is shown to be advantageous over the repetitive use of a single gratitude exercise as it was usually done in previous studies (Sheldon & Lyubomirsky, 2012). Moreover, app engagement and app adherence were increased by the use of daily reminders, which contributed to a higher intervention engagement compared to previous studies in the domain (Davis et al., 2016).

Another potential reason for the larger effect of the present intervention on well-being may be the longer intervention duration of the present study. Most of the previous studies that investigated the effect of gratitude interventions on well-being usually had a duration of 1-2 weeks (Dickens, 2017). In contrast, Bohlmeijer et al. (2020) conducted a six-week gratitude intervention and found a moderate to strong effect on overall well-being. Likewise, the present study had an intervention duration of 6-weeks and found a moderate effect size. However, future research should further investigate the relation between intervention duration and effect size to find an optimal duration for gratitude interventions and other PPIs, as Lyubomirsky & Layous (2013) argue that the duration of an intervention is crucial for the outcome. Concludingly, besides the use of an online application, the variety of gratitude exercises, and the long intervention duration may all be factors that may have contributed to a stronger effect size on well-being in the present study, compared to previously studied interventions.

Intervention effect on the subscales of well-being

In addition to the intervention effect on overall levels of well-being, the effect on the subscales of well-being was investigated as well. As expected, the effect was strongest on the subscale psychological well-being. While the effect size on the subscale psychological well-being was moderate, the effect size on subjective and social well-being was small. However, the difference in effect size between the separate subscales within the present study was small, whereas previous studies that used similar PPIs usually found a strong effect size on psychological well-being and merely a small effect size on the subscales subjective and social well-being (Fazia et al., 2020; Dimitropoulou & Leontopoulou, 2017). The present study was the first to test the effect of a gratitude intervention on the subscales of well-being. It can be concluded that the gratitude intervention affected the three subscales almost equally, favoring slightly the subscale psychological well-being. Consequently, as a balance of the well-being

subscales is important (Vescovelli et al., 2018), gratitude interventions are not designed to increase a subscale of well-being in particular but rather to increase all three subscales equally.

Influence of baseline well-being on intervention effect

The third hypothesis was rejected since a stronger effect size on outcome well-being was found for participants with higher levels of baseline well-being than for participants with lower baseline well-being. This result was unexpected, as it was opposite to previous findings, which suggested that low levels of baseline well-being would lead to a higher effect size on well-being through a gratitude intervention (Bohlmeijer et al., 2020). A possible reason for the contradictory results may be the difference in the sample characteristics between the mentioned study and the present one. Bohlmeijer et al. (2020) chose a sample exclusively with participants who had low to moderate levels of well-being at baseline in order to prevent a potential ceiling effect, implying that participants may not increase their levels of well-being because their initial levels of well-being would be too high (Heller, 2018). In contrast, the present study included participants with any level of baseline well-being so that the comparison of individuals with different baseline well-being scores was possible. As Bohlmeijer et al. (2020) found a strong effect size in their study, the low level of baseline well-being was inferred to be a decisive factor for the strong effect size. However, in the present study, the efficacy of the gratitude intervention could be compared between the participants with either high or low levels of well-being at baseline. Not in line with previous findings, the present study found that participants with higher levels of well-being at baseline seemed to benefit more from a gratitude intervention than participants with lower well-being at baseline.

Influence on the intervention by age and gender

Unexpectedly, participants in any age group experienced the same benefits on well-being through the intervention. Previous research is ambiguous regarding the moderation of age on PPIs. While certain studies showed that older adults benefitted more from PPIs in terms of well-being increase (Sutipan et al., 2016), other studies found that there was no influence by age on the intervention outcome (Bailey et al., 2018). A possible reason for the outcome may be the study design. While younger participants may feel as motivated as older participants to engage in an online application, younger participants may adhere less to a conventional intervention, which is less engaging (Sill et al., 2018). Consequently, it seems as if age is an influential factor for certain PPIs with a specific design (Sutipan et al., 2016), while in other

studies such as the present one age does not have an influence on the intervention outcome regarding the increase of well-being.

Finally, the fifth hypothesis was rejected since gender did not influence the outcome of the intervention on well-being. As previous research found that women do not only experience higher levels of gratitude but also express gratitude more often (Froh et al., 2009), it was expected that women would benefit more from a gratitude intervention then men in terms of a higher effect size on well-being. Furthermore, previous studies showed that gender may influence the outcome of other PPIs. For example, Hwang et al., 2019 showed that a mindfulness-based intervention affected the well-being scores of women more than the well-being scores of men. However, previous research demonstrated that gender may influence the outcome of certain interventions, while other PPIs were not affected by gender (Hwang et al., 2019; Auyeung & Mo, 2018). The present study was the first to investigate the influence of gender on a gratitude intervention, considering the effect size on well-being. The results showed that gender did not affect the outcome of the gratitude intervention, implying that men and women benefited equally from the intervention in terms of well-being increase.

Practical implications

The present study did not only contribute novel empirical data to the effect of gratitude interventions on well-being but also provided multiple practical implications. First, the study showed that the use of a long-term gratitude intervention is a valuable means to increase levels of well-being. Considering that higher levels of well-being provide a stronger resilience and a higher quality of life (Fava et al., 2017), gratitude interventions should be made accessible for the general population. Accordingly, gratitude interventions may act as preventive measures to avoid psychological diseases, symptoms, and distress (E. Bohlmeijer & Hulsbergen, 2018, Watkins, 2016). Especially during the current pandemic, as psychological diseases are increasing and levels of well-being in the population are decreasing (Büssing et al., 2021), gratitude interventions could serve to counteract this destructive development. Furthermore, previous research showed that the prevention of psychological diseases is eminently less complicated than the cure of psychological diseases (Fava & Ruini, 2016). Considering the high costs for the mental health care system during 2020 (Melnyk, 2020), preventive measures would not only contribute to a better mental health within the population but also would save an immense amount of money. Consequently, the present study demonstrated, that the use of gratitude interventions should be supported and advertised to the general population in order to increase mental health and prevent psychological diseases (Kern et al., 2018; Leech et al., 2021).

Furthermore, the study displayed that gratitude interventions in the form of online applications seem to be more effective compared to conventional (face to face/pen and paper/ email) interventions. The use of online applications is both more engaging for participants and more accessible, as the majority of adolescents and adults have access to the internet and are in the possession of a smartphone (Bakker et al., 2016; Tsetsi & Rains, 2017). Previous research showed that the amount of mental health online applications increased during the last years (Kern et al., 2018). Nevertheless, a systematic review of the most frequently used mental health applications displayed that most of these online applications lack quality and merely a small number of the tested online applications were evidence based (Leech et al., 2021). Therefore, the need for qualitative online applications in the mental health care sector is immense and should be supported in the future. Finally, the present study demonstrated that PPIs should be embedded more in online applications as they are not only more effective and more appealing but also more accessible to the population than conventional interventions.

Additionally, as the balance of the well-being subscales is important, the present study showed that gratitude interventions increase all the subscales of well-being in an equal manner, making it advisable to use the application as a means of increasing the subscales of well-being equally (Vescovelli et al., 2018). Moreover, the study showed that both people with low levels and high levels of well-being benefit from gratitude interventions. Therefore, gratitude interventions should not only be applied by patients who have low levels of well-being but also gratitude interventions should be recommended for high well-being individuals or even flourishers. Furthermore, gratitude interventions are advisable for any age group and for both men and women, as there are no differences regarding the effect of the intervention on the distinctive groups. Finally, gratitude interventions are suitable to increase levels of well-being regardless of age, gender or baseline well-being.

Strengths, limitations, and recommendations for future research

The present study displayed multiple strengths that contributed to valid and reliable results. First, the present study had a large sample size compared to previous studies (Davis et al., 2016), contributing to a more precise estimate of the intervention effect. Additionally, the study was the first to test the effectiveness of a gratitude intervention in the form of an online application, as previous studies generally conducted gratitude interventions via e-mail or pen and paper instructions (Davis et al., 2016). Furthermore, the present study had high levels of intervention engagement and adherence compared to previous gratitude interventions (Dickens, 2017). The high engagement rate may be due to the use of an appealing application, as

applications are experienced as more captivating than conventional intervention designs (Bakker et al., 2016). Furthermore, the gratitude intervention of the present study lasted 6-weeks, which is considered a long duration, as previous studies generally investigated 1–2-week intervention (Davis et al., 2016). Through the long duration, higher efficacy of the intervention could be achieved, as PPIs of a longer duration seem to be more effective (Lyubomirsky & Layous, 2013).

Besides the strengths, some limitations of the current study should be considered. First, the study merely consisted of an intervention group and a control group, limiting the possibility to compare the outcomes to an active control group. Consequently, it could not be excluded that participants' well-being in the intervention group increased due to a placebo effect (Fazia et al., 2020). Therefore, future studies might investigate a similar study design, using both a waitlist and an active control group, similarly to Bohlmeijer et al. (2020). Since generalizability of a study requires a diverse sample (Lakes, 2013), the outcomes of the study should be generalized carefully to the general population. The sample of the present study overrepresented highly educated older women, which restricts the generalizability of the study to this target group. Furthermore, the number of young men in the sample may have been too low to provide a reliable and authentic representation of this group. Consequently, the lack of young men in the sample might have influenced the results regarding the moderation by gender and age on well-being because the number of young men may have been too low to represent this target group. Therefore, future research should investigate the effect of a gratitude intervention in a more equally distributed sample to make the results generalizable for the general population. Additionally, the current study merely included one post-test measurement of well-being after 6-weeks, disregarding the long-term effects of the intervention. Hence, future research should explore long-term effects of a gratitude intervention by applying multiple post-test measurements for multiple weeks and months after the intervention (Bohlmeijer et al., 2020).

Besides the abovementioned adjustments that should be made for upcoming studies, future research should also focus on the following aspects. First, upcoming studies should investigate the tools and features of gratitude interventions that are embedded in online applications. Even though gratitude interventions as online applications are more successful than conventional gratitude interventions (Gemert-Pijnen et al., 2018), the reasons for the success are not completely clear yet. Consequently, the features of these online applications should be investigated in order to make the applications as efficient and user-friendly as possible. Different functions of the applications such as daily reminders, user feedback, gamification, rewards through points are all shown to increase the app-satisfaction of users

(Bakker et al., 2016). Future studies should consider the influence of app-satisfaction, user friendliness etc. on the outcome of a gratitude intervention in terms of greater increase of well-being. Accordingly, online applications could be adjusted in order to provide the best possible outcome for any gratitude intervention.

Furthermore, the effect of gratitude interventions on other concepts than well-being should be further investigated. The positive effect of gratitude practice on well-being has been thoroughly investigated by previous research (Dickens, 2017). However, the effect of gratitude interventions on other relevant concepts and strengths such as stress reduction, self-regulation, adaptive coping etc. has barely been considered by previous studies. Similar PPIs show to have more benefits on participants than a mere increase of well-being. For example, a mindfulness-based intervention showed to not only have a positive effect on well-being but also on stress reduction and an increase of adaptive coping mechanisms (Ciarrochi, 2013). Hence, future studies should explore the effect of gratitude interventions on a variety of concepts and strengths in order to clarify the range of advantages gratitude interventions may provide.

Conclusion

The present study demonstrated the effectiveness of a long-term gratitude intervention. Not only did the study show that gratitude practice positively affects levels of well-being but also it highlighted the advantages of embedding a gratitude intervention in an online application. Furthermore, the study showed that the outcome of a gratitude intervention is not determined by age, gender nor baseline well-being, making gratitude interventions useful for a variety of individuals. Nevertheless, limitations of the study should be considered as the sample of the study mainly represented highly educated older women. Finally, gratitude interventions are a suitable means to increase levels of well-being, promoting a healthy and joyful life.

References

Allemand, M., & Hill, P. L. (2014). Gratitude From Early Adulthood to Old Age. *Journal of Personality*, *84*(1), 21–35. https://doi.org/10.1111/jopy.12134

Arean, P. A., Hallgren, K. A., Jordan, J. T., Gazzaley, A., Atkins, D. C., Heagerty, P. J., & Anguera, J. A. (2016). The Use and Effectiveness of Mobile Apps for Depression: Results From a Fully Remote Clinical Trial. *Journal of Medical Internet Research*, *18*(12), e330. https://doi.org/10.2196/jmir.6482

Auyeung, L., & Mo, P. K. H. (2018). The Efficacy and Mechanism of Online Positive Psychological Intervention (PPI) on Improving Well-Being Among Chinese University Students: A Pilot Study of the Best Possible Self (BPS) Intervention. *Journal of Happiness Studies*, *20*(8), 2525–2550. https://doi.org/10.1007/s10902-018-0054-4

Bakker, D., Kazantzis, N., Rickwood, D., & Rickard, N. (2016). Mental Health Smartphone Apps: Review and Evidence-Based Recommendations for Future Developments. *JMIR Mental Health*, *3*(1), e7. https://doi.org/10.2196/mental.4984

Bailey, N. W., Nguyen, J., Bialylew, E., Corin, S. E., Gilbertson, T., Chambers, R., & Fitzgerald, P. B. (2018). Effect on Well-Being from an Online Mindfulness Intervention: "Mindful in May." *Mindfulness*, *9*(5), 1637–1647. https://doi.org/10.1007/s12671-018-0910-7

Bohlmeijer, E., & Hulsbergen, M. (2018). *Using Positive Psychology Every Day: Learning How to Flourish*. Routledge.

Bohlmeijer, E. T., Kraiss, J. T., Watkins, P., & Schotanus-Dijkstra, M. (2020). Promoting Gratitude as a Resource for Sustainable Mental Health: Results of a 3-Armed Randomized Controlled Trial up to 6 Months Follow-up. *Journal of Happiness Studies*, 104. https://doi.org/10.1007/s10902-020-00261-5

Büssing, A., Rodrigues Recchia, D., Dienberg, T., Surzykiewicz, J., & Baumann, K. (2021). Awe/Gratitude as an Experiential Aspect of Spirituality and Its Association to Perceived Positive Changes During the COVID-19 Pandemic. *Frontiers in Psychiatry*, *12*. https://doi.org/10.3389/fpsyt.2021.642716

Chopik, W. J., Newton, N. J., Ryan, L. H., Kashdan, T. B., & Jarden, A. J. (2017). Gratitude across the life span: Age differences and links to subjective well-being. *The Journal of Positive Psychology*, *14*(3), 292–302. https://doi.org/10.1080/17439760.2017.1414296

Ciarrochi, J. (2013). *Mindfulness, Acceptance and Positive Psychology: The Seven Foundations of Well-Being (Mindfulness & Acceptance Practica)* (New ed.). New Harbinger.

Davis, D. E., Choe, E., Meyers, J., Wade, N., Varjas, K., Gifford, A., Quinn, A., Hook, J. N., Van Tongeren, D. R., Griffin, B. J., & Worthington, E. L. (2016). Thankful for the little things: A meta-analysis of gratitude interventions. *Journal of Counseling Psychology*, *63*(1), 20–31. https://doi.org/10.1037/cou0000107

de Villiers, B., Lionetti, F., & Pluess, M. (2018). Vantage sensitivity: a framework for individual differences in response to psychological intervention. *Social Psychiatry and Psychiatric Epidemiology*, *53*(6), 545–554. https://doi.org/10.1007/s00127-017-1471-0

Dickens, L. R. (2017). Using Gratitude to Promote Positive Change: A Series of Meta-Analyses Investigating the Effectiveness of Gratitude Interventions. *Basic and Applied Social Psychology*, *39*(4), 193–208. https://doi.org/10.1080/01973533.2017.1323638

Dimitropoulou, C., & Leontopoulou, S. (2017). A positive psychological intervention to promote well-being in a multicultural school setting in greece. *The European Journal of Counselling Psychology*, *6*(1), 113–137. https://doi.org/10.5964/ejcop.v6i1.141 *Clinical Psychology*, *69*(8), 846–855. https://doi.org/10.1002/jclp.22020

Fazia, T., Bubbico, F., Salvato, G., Berzuini, G., Bruno, S., Bottini, G., & Bernardinelli, L. (2020). Boosting Psychological Well-Being through a Social Mindfulness-Based Intervention in the General Population. *International Journal of Environmental Research and Public Health*, *17*(22), 8404. https://doi.org/10.3390/ijerph17228404

Fava, G. A., Cosci, F., Guidi, J., & Tomba, E. (2017). Well-being therapy in depression: New insights into the role of psychological well-being in the clinical process. *Depression and Anxiety*, *34*(9), 801–808. https://doi.org/10.1002/da.22629

Fava, G. A., & Ruini, C. (2016). *Increasing Psychological Well-being in Clinical and Educational Settings: Interventions and Cultural Contexts (Cross-Cultural Advancements in Positive Psychology, Band 8)* (Softcover reprint of the original 1st ed. 2014 ed.). Springer.

Freijy, T., & Kothe, E. J. (2013). Dissonance-based interventions for health behaviour change: A systematic review. *British Journal of Health Psychology*, *18*(2), 310–337. https://doi.org/10.1111/bjhp.12035

Froh, J. J., Yurkewicz, C., & Kashdan, T. B. (2009). Gratitude and subjective well-being in early adolescence: Examining gender differences. *Journal of Adolescence*, *32*(3), 633–650. https://doi.org/10.1016/j.adolescence.2008.06.006

Gallagher, M. W., Lopez, S. J., & Preacher, K. J. (2009). The Hierarchical Structure of Well-Being. *Journal of Personality*, *77*(4), 1025–1050. https://doi.org/10.1111/j.1467-6494.2009.00573.x

Gemert-Pijnen, V. L., Kelders, S. M., Hanneke, K., & Sanderman, R. (2018). *eHealth Research, Theory and Development: A Multi-Disciplinary Approach* (1st ed.). Taylor & Francis Ltd.

Goodheart, Carol D. (Clinical Supervisor, Department of Psychology, Clinical Supervisor, Department of Psychology, Rutgers University). (2005). *Handbook of Girls' and*

Women's Psychological Health (OXFORD SERIES IN CLINICAL PSYCHOLOGY) (Illustrated ed.). Oxford University Press Inc.

Grant, F., Guille, C., & Sen, S. (2013). Well-Being and the Risk of Depression under Stress. *PLoS ONE*, *8*(7), e67395. https://doi.org/10.1371/journal.pone.0067395

Heller, M. (2018). Ceiling Effect Is Not the Only Effect. *Annals of Emergency Medicine*, *71*(2), 265. https://doi.org/10.1016/j.annemergmed.2017.09.025

Henderson, L., & Knight, T. (2012). Integrating the hedonic and eudaimonic perspectives to more comprehensively understand wellbeing and pathways to wellbeing. *International Journal of Wellbeing*, *2*(3), 196–221. https://doi.org/10.5502/ijw.v2i3.3

Hill, P. L., & Allemand, M. (2011). Gratitude, forgivingness, and well-being in adulthood: Tests of moderation and incremental prediction. *The Journal of Positive Psychology*, *6*(5), 397–407. https://doi.org/10.1080/17439760.2011.602099

Hwang, Y. S., Goldstein, H., Medvedev, O. N., Singh, N. N., Noh, J. E., & Hand, K. (2019). Mindfulness-Based Intervention for Educators: Effects of a School-Based Cluster Randomized Controlled Study. *Mindfulness*, *10*(7), 1417–1436. https://doi.org/10.1007/s12671-019-01147-1

Josephine, K., Josefine, L., Philipp, D., David, E., & Harald, B. (2017). Internet- and mobile-based depression interventions for people with diagnosed depression: A systematic review and meta-analysis. *Journal of Affective Disorders*, *223*, 28–40. https://doi.org/10.1016/j.jad.2017.07.021

Kakunje, A., Mithur, R., & Kishor, M. (2020). Emotional well-being, mental health awareness, and prevention of suicide: Covid-19 pandemic and digital psychiatry. *Archives of Medicine and Health Sciences*, *8*(1), 147. https://doi.org/10.4103/amhs.amhs_98_20

Kapteyn, A., Lee, J., Tassot, C., Vonkova, H., & Zamarro, G. (2014). Dimensions of Subjective Well-Being. *Social Indicators Research*, *123*(3), 625–660. https://doi.org/10.1007/s11205-014-0753-0

Kennedy, B., Levine, M., Goldman, M. L., Abhyankar, L., & Konopasek, L. (2017). Social Support Network Outreach: A No-Cost Intervention to Improve Resident Well-Being. *Journal of Graduate Medical Education*, *9*(3), 390–391. https://doi.org/10.4300/jgme-d-17-00241.1

Kern, A., Hong, V., Song, J., Lipson, S. K., & Eisenberg, D. (2018). Mental health apps in a college setting: openness, usage, and attitudes. *MHealth*, *4*, 20. https://doi.org/10.21037/mhealth.2018.06.01

Keyes, C. L. M. (2007). Promoting and protecting mental health as flourishing: A complementary strategy for improving national mental health. *American Psychologist*, *62*(2), 95–108. https://doi.org/10.1037/0003-066x.62.2.95

Keyes, C. L. M., Wissing, M., Potgieter, J. P., Temane, M., Kruger, A., & van Rooy, S. (2008). Evaluation of the mental health continuum–short form (MHC–SF) in setswana-speaking South Africans. *Clinical Psychology & Psychotherapy*, *15*(3), 181–192. https://doi.org/10.1002/cpp.572

Kim-Prieto, C. (2016). *Religion and Spirituality Across Cultures (Cross-Cultural Advancements in Positive Psychology, Band 9)* (Softcover reprint of the original 1st ed. 2014 ed.). Springer.

Kristjánsson, K. (2013). An Aristotelian Virtue of Gratitude. *Topoi*, *34*(2), 499–511. https://doi.org/10.1007/s11245-013-9213-8

Lakes, K. D. (2013). Restricted sample variance reduces generalizability. *Psychological Assessment*, *25*(2), 643–650. https://doi.org/10.1037/a0030912

Lambert, N. M., Graham, S. M., & Fincham, F. D. (2009). A Prototype Analysis of Gratitude: Varieties of Gratitude Experiences. *Personality and Social Psychology Bulletin*, *35*(9), 1193–1207. https://doi.org/10.1177/0146167209338071

Lamers, S.M.A., Westerhof, G.J., Bohlmeijer, E.T., ten Klooster, P.M., & Keyes, C.L.M. (2011). Evaluating the psychometric properties of the Mental Health Continuum-Short Form (MHC-SF). *Journal of Clinical Psychology*, *67*(1), 99-110.

Lee, J. A., Efstratiou, C., Siriaraya, P., Sharma, D., & Ang, C. S. (2021). SnapAppy: A positive psychology intervention using smartphone photography to improve emotional well-being. *Pervasive and Mobile Computing*, *73*, 101369. https://doi.org/10.1016/j.pmcj.2021.101369

Leech, T., Dorstyn, D., Taylor, A., & Li, W. (2021). Mental health apps for adolescents and young adults: A systematic review of randomised controlled trials. *Children and Youth Services Review*, *127*, 106073. https://doi.org/10.1016/j.childyouth.2021.106073

Luna-Perejon, F., Malwade, S., Styliadis, C., Civit, J., Cascado-Caballero, D., Konstantinidis, E., Abdul, S. S., Bamidis, P. D., Civit, A., & Li, Y.-C. J. (2019). Evaluation of user satisfaction and usability of a mobile app for smoking cessation. *Computer Methods and Programs in Biomedicine*, *182*, 105042. https://doi.org/10.1016/j.cmpb.2019.105042

Lyubomirsky, S., Dickerhoof, R., Boehm, J. K., & Sheldon, K. M. (2011). Becoming happier takes both a will and a proper way: An experimental longitudinal intervention to boost well-being. *Emotion*, *11*(2), 391–402. https://doi.org/10.1037/a0022575

Lyubomirsky, S., & Layous, K. (2013). How Do Simple Positive Activities Increase Well-Being? *Current Directions in Psychological Science*, *22*(1), 57–62. https://doi.org/10.1177/0963721412469809

Macias, C., Panch, T., Hicks, Y. M., Scolnick, J. S., Weene, D. L., Öngür, D., & Cohen, B. M. (2015). Using Smartphone Apps to Promote Psychiatric and Physical Well-Being. *Psychiatric Quarterly*, *86*(4), 505–519. https://doi.org/10.1007/s11126-015-9337-7

Maturo, A., & Moretti, V. (2020). *Digital Health and the Gamification of Life: How Apps Can Promote a Positive Medicalization*. EMERALD GROUP PUB.

Melnyk, B. M. (2020). Reducing Healthcare Costs for Mental Health Hospitalizations With the Evidence-based COPE Program for Child and Adolescent Depression and Anxiety: A Cost Analysis. *Journal of Pediatric Health Care*, *34*(2), 117–121. https://doi.org/10.1016/j.pedhc.2019.08.002

Meyer, B., Zill, A., Dilba, D., Gerlach, R., & Schumann, S. (2021). Employee psychological well-being during the COVID -19 pandemic in Germany: A longitudinal study of demands, resources, and exhaustion. *International Journal of Psychology*, 84. https://doi.org/10.1002/ijop.12743

McCullough, M. E., Tsang, J.-A., & Emmons, R. A. (2004). Gratitude in Intermediate Affective Terrain: Links of Grateful Moods to Individual Differences and Daily Emotional Experience. *Journal of Personality and Social Psychology*, *86*(2), 295–309. https://doi.org/10.1037/0022-3514.86.2.295

Nieuwenhuis, R., & Yerkes, M. A. (2021). Workers' well-being in the context of the first year of the COVID-19 pandemic. *Community, Work & Family*, *24*(2), 226–235. https://doi.org/10.1080/13668803.2021.1880049

Pallant, J. P. (2020). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS* (7. ed.). Open University Press.

Pizzoli, S. F. M., Marzorati, C., Mazzoni, D., & Pravettoni, G. (2020). Web-Based Relaxation Intervention for Stress During Social Isolation: Randomized Controlled Trial. *JMIR Mental Health*, *7*(12), e22757. https://doi.org/10.2196/22757

Proctor, C. (2018). *Positive Psychology Interventions in Practice* (Softcover reprint of the original 1st ed. 2017 ed.). Springer.

Radloff, L. S. (1977). The CES-D Scale. *Applied Psychological Measurement*, *1*(3), 385–401. https://doi.org/10.1177/014662167700100306

Rash, J. A., Matsuba, M. K., & Prkachin, K. M. (2011). Gratitude and Well-Being: Who Benefits the Most from a Gratitude Intervention? *Applied Psychology: Health and Well-Being*, *3*(3), 350–369. https://doi.org/10.1111/j.1758-0854.2011.01058.x

Ruini, C., Ottolini, F., Tomba, E., Belaise, C., Albieri, E., Visani, D., Offidani, E., Caffo, E., & Fava, G. A. (2009). School intervention for promoting psychological well-being in adolescence. *Journal of Behavior Therapy and Experimental Psychiatry*, *40*(4), 522–532. https://doi.org/10.1016/j.jbtep.2009.07.002

Ryff, C. D. (2017). Eudaimonic well-being, inequality, and health: Recent findings and future directions. *International Review of Economics*, *64*(2), 159–178.

Sansone R. A., Sansone L. A. Gratitude and well being: the benefits of appreciation. *Psychiatry*. 2010;7(11):18–22.

Schwinger, M., Trautner, M., Kärchner, H., & Otterpohl, N. (2020). Psychological Impact of Corona Lockdown in Germany: Changes in Need Satisfaction, Well-Being, Anxiety, and Depression. *International Journal of Environmental Research and Public Health*, *17*(23), 9083. https://doi.org/10.3390/ijerph17239083

Shang, J., Wei, S., Jin, J., & Zhang, P. (2019). Mental Health Apps in China: Analysis and Quality Assessment. *JMIR MHealth and UHealth*, *7*(11), e13236. https://doi.org/10.2196/13236

Sheldon, K. M., & Lyubomirsky, S. (2012). The Challenge of Staying Happier. *Personality and Social Psychology Bulletin*, *38*(5), 670–680. https://doi.org/10.1177/0146167212436400

Sill, J., Steenbock, B., Helmer, S., Zeeb, H., & Pischke, C. R. (2018). Apps zur Förderung von körperlicher Aktivität – Nutzung und Einstellungen bei Erwachsenen im Alter von 50 Jahren und älter. *Prävention Und Gesundheitsförderung*, *14*(2), 109–118. https://doi.org/10.1007/s11553-018-0674-x

Skalski, S., & Pochwatko, G. (2020). Gratitude is female. Biological sex, socio-cultural gender versus gratitude and positive orientation. *Current Issues in Personality Psychology*, *8*(1), 1–9. https://doi.org/10.5114/cipp.2020.93624

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A Brief Measure for Assessing Generalized Anxiety Disorder. *Archives of Internal Medicine*, *166*(10), 1092. https://doi.org/10.1001/archinte.166.10.1092

Sutipan, P., Intarakamhang, U., & Macaskill, A. (2016). The Impact of Positive Psychological Interventions on Well-Being in Healthy Elderly People. *Journal of Happiness Studies*, *18*(1), 269–291. https://doi.org/10.1007/s10902-015-9711-z

Szinay, D., Jones, A., Chadborn, T., Brown, J., & Naughton, F. (2020). Influences on the Uptake of and Engagement With Health and Well-Being Smartphone Apps: Systematic Review. *Journal of Medical Internet Research*, *22*(5), e17572. https://doi.org/10.2196/17572

Tsetsi, E., & Rains, S. A. (2017). Smartphone Internet access and use: Extending the digital divide and usage gap. *Mobile Media & Communication*, *5*(3), 239–255. https://doi.org/10.1177/2050157917708329

https://doi.org/10.1007/s12232-017-0277-4

Vescovelli, F., Sarti, D., & Ruini, C. (2018). Subjective and psychological well-being in Parkinson's Disease: A systematic review. *Acta Neurologica Scandinavica*, *138*(1), 12–23. https://doi.org/10.1111/ane.12946

Watkins, P. C., Uhder, J., & Pichinevskiy, S. (2014). Grateful recounting enhances subjective well-being: The importance of grateful processing. *The Journal of Positive Psychology*, *10*(2), 91–98. https://doi.org/10.1080/17439760.2014.927909

Watkins, P. C. C. (2016). *Gratitude and the Good Life: Toward a Psychology of Appreciation* (Softcover reprint of the original 1st ed. 2014 ed.). Springer.

Weiss, L. A., Westerhof, G. J., & Bohlmeijer, E. T. (2016). Can We Increase Psychological Well-Being? The Effects of Interventions on Psychological Well-Being: A Meta-Analysis of Randomized Controlled Trials. *PLOS ONE*, *11*(6), e0158092. https://doi.org/10.1371/journal.pone.0158092

Zyl, V. L. E., & Sr., R. S. (2020). *Evidence-Based Positive Psychological Interventions in Multi-Cultural Contexts* (1st ed. 2019 ed.). Springer.