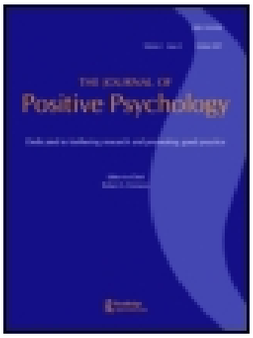

The Journal of Positive Psychology

Dedicated to furthering research and promoting good practice

ISSN: 1743-9760 (Print) 1743-9779 (Online) Journal homepage: http://www.tandfonline.com/loi/rpos20

Possible mechanisms in a multicomponent email guided positive psychology intervention to improve mental well-being, anxiety and depression: A multiple mediation model

Marijke Schotanus-Dijkstra, Marcel E. Pieterse, Constance H. C. Drossaert, Jan A. Walburg & Ernst T. Bohlmeijer

To cite this article: Marijke Schotanus-Dijkstra, Marcel E. Pieterse, Constance H. C. Drossaert, Jan A. Walburg & Ernst T. Bohlmeijer (2017): Possible mechanisms in a multicomponent email guided positive psychology intervention to improve mental well-being, anxiety and depression: A multiple mediation model, The Journal of Positive Psychology, DOI: 10.1080/17439760.2017.1388430

To link to this article: http://dx.doi.org/10.1080/17439760.2017.1388430

THE JOURNAL OF POSITIVE PSYCHOLOGY, 2017
https://doi.org/10.1080/17439760.2017.1388430

Routledge
Taylor & Francis Group

Possible mechanisms in a multicomponent email guided positive psychology intervention to improve mental well-being, anxiety and depression: A multiple mediation model

Marijke Schotanus-Dijkstra[a,b], Marcel E. Pieterse[a], Constance H. C. Drossaert[a], Jan A. Walburg[a] and Ernst T. Bohlmeijer[a‡]

[a]Centre for eHealth and Well-being Research, Department of Psychology, Health and Technology, University of Twente, Enschede, The Netherlands; [b]Faculty BMS, Department of Psychology, Health and Technology, University of Twente, Enschede, The Netherlands

ABSTRACT

The efficacy of several multicomponent positive psychology interventions (PPIs) have been demonstrated, but little is known about its possible mechanisms of change. We examined (1) the efficacy of an email guided self-help PPI on six core well-being processes (positive emotion, use of strengths, optimism, self-compassion, resilience and positive relations) and (2) the mediating role of these processes on mental well-being, anxiety and depressive symptoms. Adults ≥ 18 years were recruited in the general population and randomized into the intervention (n = 137) or wait-list control group (n = 138). Repeated measures analyses showed that the intervention group improved significantly more than the control group on all six processes. Improvement (t0–t1) on each process statistically mediated improvement (t0–t2) on mental well-being, anxiety and depressive symptoms. Simple-mediation analyses revealed small to moderate effect sizes. Multiple-mediation analyses revealed most pronounced results for positive relations and self-compassion, suggesting that these processes might be key mechanisms in promoting well-being.

ARTICLE HISTORY
Received 19 July 2016
Accepted 20 September 2017

KEYWORDS
Mental well-being; anxiety; depression; mediation analyses; positive psychology; self-help

Introduction

There is a rapidly growing interest for well-being as an important aspect of mental health and an important outcome of treatment (Forsman et al., 2015; Jeste, Palmer, Rettew, & Boardman, 2015; Kobau et al., 2011; Wood & Tarrier, 2010). Mental well-being is a complex and multidimensional phenomenon that encompasses various emotional, psychological and social dimensions. Each of these dimensions can be cultivated through positive psychological interventions (PPIs), which consists of exercises aimed at promoting thriving individuals and optimal functioning (Pawelski, 2016; Schueller & Parks, 2014; Seligman & Csikszentmihalyi, 2000). Examples of such exercises are savoring, expressing gratitude, doing acts of kindness and meditation practices. Both standalone exercises and multicomponent interventions – programs wherein various exercises on different well-being processes are integrated – have shown beneficial effects on mental well-being and depressive symptoms (e.g. Bolier, Haverman, Kramer et al., 2013; Bolier, Haverman, Westerhof et al., 2013; Page & Vella-Brodrick, 2012; Parks & Szanto, 2013; Rashid, 2014; Ruini, Albieri, & Vescovelli, 2014; Sin & Lyubomirsky, 2009). However, it is yet unknown how and through which mechanisms such PPIs work (Schueller & Parks, 2014). What makes these types of interventions successful? And which core well-being processes are vital for achieving improved mental health?

Mediation analyses can be used to help us understand possible mechanisms of change during early treatment (Kazdin, 2009; Preacher & Hayes, 2008) because this helps us to select the active ingredients to be used in well-being interventions (Kraemer, Wilson, Fairburn, & Agras, 2002). For instance, Fredrickson, Cohn, Coffey, Pek, and Finkel (2008) demonstrated that loving-kindness meditation improved daily positive emotions, which in turn influenced life-satisfaction and depressive symptoms. Another study revealed that self-efficacy, positive thinking, altruism and goal setting were the possible mechanisms of change during a multicomponent resilience program (Yu, Lam, Liu, & Stewart, 2015). Also, self-compassion and mindfulness have been found to mediate the effects of frequently meditating in everyday life and happiness (Campos et al., 2016). In addition, doing acts of kindness with autonomy support (Nelson et al., 2015) or doing acts of kindness

CONTACT Marijke Schotanus-Dijkstra m.schotanus@utwente.nl
‡Optentia Research Focus Area, North-West University (VTC), Vanderbijlpark, South Africa
Supplemental data for this article can be accessed at https://doi.org/10.1080/17439760.2017.1388430.

related to others or humanity rather than related to the self (Nelson, Layous, Cole, & Lyubomirsky, 2016), showed both beneficial effects on mental well-being which was mediated through psychological need satisfaction (Nelson et al., 2015) and positive emotions (Nelson et al., 2016). Still, less is known about possible mechanisms of change in PPIs, especially in multicomponent PPIs.

In this paper, we present a planned follow-up study of a multicomponent self-help PPI which has been shown (cost-)effective in ameliorating mental well-being, anxiety and depressive symptoms in people with suboptimal levels of mental well-being (Schotanus-Dijkstra, Drossaert, Pieterse, Boon et al., 2017; Schotanus-Dijkstra, Drossaert, Pieterse, Smit et al., Submitted). This intervention consists of a self-help book targeting six core well-being processes in eight chapters: positive emotion, use of strengths, optimism, self-compassion, resilience and positive relations. These key processes were chosen from overarching theories of psychological well-being (Ryff, 1989) and flourishing mental health respectively (Keyes, 2002; Seligman, 2011). Each of these processes was targeted by a combination of psycho-education and positive psychological exercises derived from empirical evidence. To be more precise: (1) positive emotion is derived from the broaden-and-build theory which has been empirically supported (e.g. Fredrickson, 2001). Several evidence-based positive psychological interventions to promote positive emotions have been developed such as savoring exercises (Bryant & Veroff, 2007) and gratitude exercises (Lyubomirsky & Layous, 2013; Schueller & Parks, 2014); (2) discovering and using strengths seems similar to competence according to the self-determination theory (Deci & Ryan, 2000) and to accomplishment according to the PERMA model of Seligman (Seligman, 2011), and its importance is underlined by empirical research of strengths based coaching (Linley & Biswas-Diener, 2010) and identifying character strengths (McGrath, 2014; Park, Peterson, & Seligman, 2006). The effectiveness of interventions enhancing the use one's strengths in innovative ways has been demonstrated (e.g. Seligman, Steen, Park, & Peterson, 2005); (3) optimism and hope stem from theoretical and empirical research about learned optimism (Seligman, 2006) and the pursuit of goals derived from expectancy value theories (Carver, Scheier, & Segerstrom, 2010). These constructs relate to finding meaning and purpose in life (Schueller & Parks, 2014). There is growing evidence for interventions such as the 'imagine your best possible self' exercise (Meevissen, Peters, & Alberts, 2011; Peters, Flink, Boersma, & Linton, 2010; Peters, Meevissen, & Hanssen, 2013); (4) self-compassion (Neff, 2003a) is related to self-acceptance, an important component in the theory of psychological well-being (Ryff, 1989). Self-compassion is a positive, warm and kind attitude in times of difficulty which promotes mental well-being (Neff, Rude, & Kirkpatrick, 2007; Zessin, Dickhäuser, & Garbade, 2015) and includes exercises such as loving-kindness meditation (Fredrickson et al., 2008) and minfdulness and developing compassionate images (Gilbert, 2010; Neff & Germer, 2013); (5) resilience refers to the ability to transform difficult or traumatic experiences into personal growth (Joseph, 2011; Seligman, 2011; Tedeschi & Calhoun, 2004) and includes expressive writing exercises (Pennebaker, 1997) active coping and discovering new meaning (Joseph, 2011) and finally; (6) positive relations is embedded in different mental well-being theories (Deci & Ryan, 2000; Ryff, 1989; Seligman, 2011), and different positive psychology exercises can (also) improve positive relations such as loving-kindness mediation, doing acts of kindness and active-constructive responding (O'Connell, O'Shea, & Gallagher, 2016; Reis & Gable, 2003; Schueller & Parks, 2014).

Our selection of key-processes is also in agreement with a recent study conducted by Hone, Jarden, Schofield, and Duncan (2014). They compared aspects of different theoretical frameworks of flourishing mental health and showed that positive emotions, competence, optimism, self-acceptance and positive relations seem necessary aspects of high levels of mental well-being.

The purpose of this study was to gain insight into possible mechanisms of change in a multicomponent PPI. Therefore, we examined (1) whether the self-help book with email support was effective in enhancing the six core well-being processes positive emotion, use of strengths, optimism, self-compassion, resilience and positive relations during treatment lasting up to 6 and 12 months follow-up, and (2) whether the change in these six processes during treatment individually and simultaneously mediated the efficacy of the guided self-help intervention on overall mental well-being, anxiety and depressive symptoms at 6 months.

Methods

Participants and procedure

Dutch participants aged ≥18 years with suboptimal mental health were recruited in The Netherlands in January 2014 via advertisements in national newspapers and in an online newsletter of a popular psychology magazine. Within three weeks, 518 eligible participants had registered for participating in the study and 455 of them had completed online informed consent and a screening questionnaire via an email notification (Figure 1). Participants were motivated to work on their mental well-being and resilience and they were willing to invest approximately 4 h per week in the intervention program. At screening, 180 participants were excluded because they (1) were

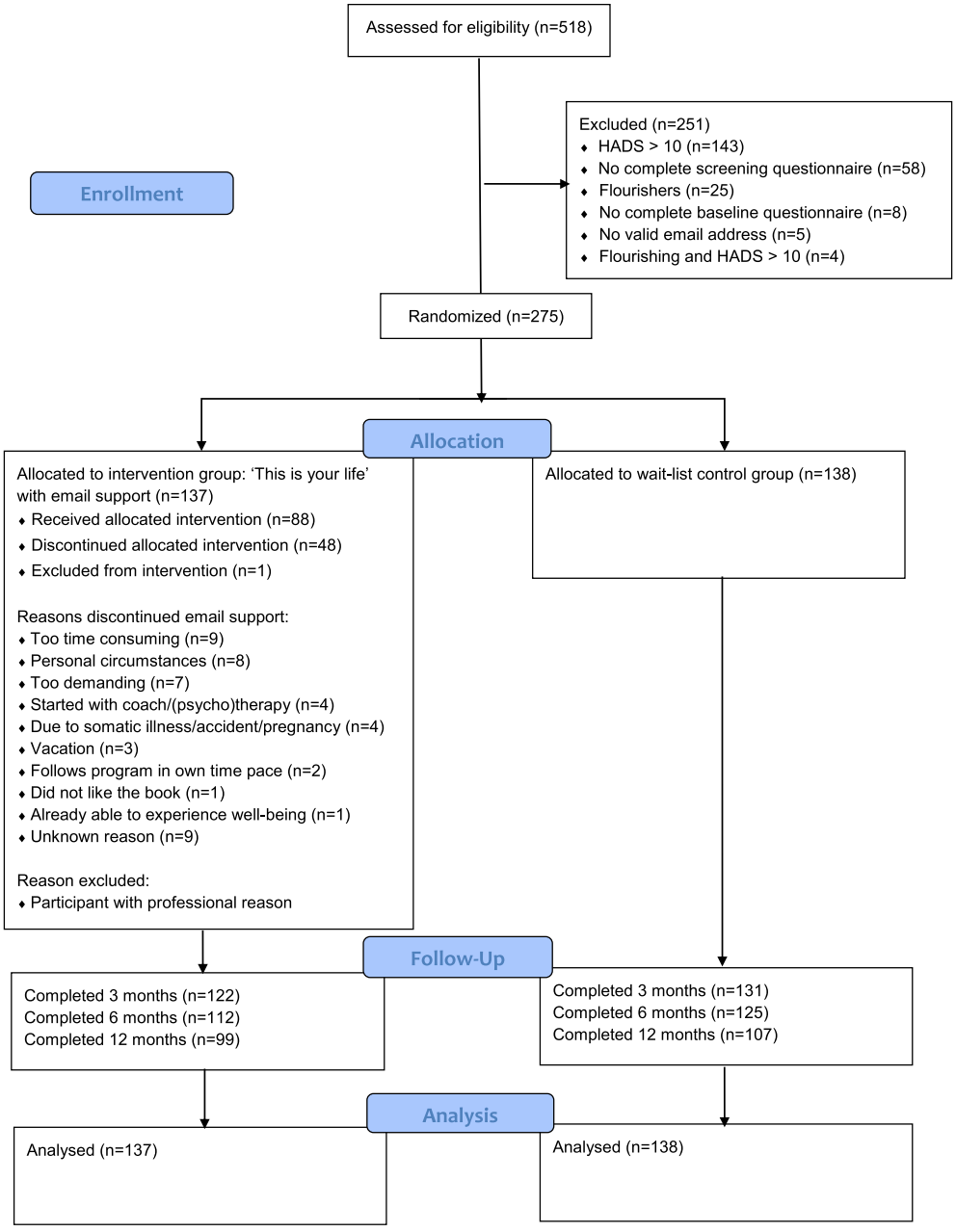

Figure 1. CONSORT Flow-chart of participants.

classified as having already flourishing mental health, (2) possessed moderate to severe anxiety or depressive symptoms or (3) had an incomplete baseline assessment. Flourishing mental health is defined as having high levels of both hedonic well-being (subjective well-being) and eudaimonic well-being (social and psychological well-being) (Hone et al., 2014; Keyes, 2002; Keyes et al., 2008) and was assessed with the Mental Health Continuum-Short Form (MHC-SF). Anxiety and depressive symptoms were measured with the Hospital Anxiety and Depression Scale (HADS) (see outcome measures for details of the questionnaires). The randomization procedure (stratified by gender and education) allocated the total sample of 275 participants to either the intervention condition or the wait-list control condition. Participants had a mean age of 48 years (SD = 10.9 years), were predominantly female (85.8%), higher educated (74.5% attended post-secondary education), in paid employment (68.4%) and of Dutch nationality (90.9%). Questionnaires were assessed at baseline (t0), at 3 months (post-intervention, t1) and at 6 months (t2). Questionnaires were also assessed 12 months after baseline, but only in the intervention group because the control condition received the intervention after t2.

Intervention

Participants in the intervention condition received the self-help book 'This is your life' (Bohlmeijer & Hulsbergen, 2013) in combination with email support. The book contains eight modules about six core processes derived from both overarching (Ryff, 1989; Seligman, 2011) and specific psychological and social theories (e.g. Neff, 2003a; see for full details Schotanus-Dijkstra, Drossaert, Pieterse, Walburg, & Bohlmeijer, 2015). The six core processes are positive emotion, discovering and using strengths (including flow), optimism and hope, self-compassion, resilience and positive relations. Each module (chapter) starts with a theoretical background and psycho-education. Then, 3–10 positive psychological exercises are provided per module. Alongside the book, participants also received a time-schedule of reading one module per week and practicing at least 2–3 recommended exercises of that module per week. Examples of included activities are 'three good things' (Seligman et al., 2005), 'imagining a best possible self' (Peters et al., 2010), 'writing a gratitude letter' (Seligman et al., 2005) and 'active-constructive responding' (Gable, Reis, Impett, & Asher, 2004). Module 2 was spread out over 2 weeks because all five exercises were recommended and one of these exercises required feedback from their social network. Due to possible holidays and personal circumstances, the 9-week program could be extended up to a maximum of 12 weeks. A complete overview of the weekly program and recommended activities can be found in the Supplemental Table.

To increase adherence, email support was added to the intervention. Participants in the intervention condition were encouraged to send one email per week to their personal counselor wherein they could write about their experiences with the topic and exercises of that week. It was also allowed to ask questions. Counselors were five senior positive psychology students of the University of Twente and the first author, all supervised by the author of the book and a clinical psychologist. The counselors were instructed to paraphrase upon participants' individual experiences and to use positive reinforcement, empathy and stimulating questions ('Could it be helpful for you to practice this exercise more regularly?') to keep the participants motivated for doing the weekly assignments according to the time schedule.

Participants allocated to the control group were placed on a wait-list for 6 months. After they completed the 6-months assessment, they received the self-help book 'This is your life' by regular mail. Email support was not provided to this group. Participants in both conditions were allowed to use other health care services (usual care).

Outcome measures

Mental well-being was the primary outcome and measured with the 14-item MHC-SF (Keyes et al., 2008). This scale assesses emotional well-being (e.g. 'In the past month, how often did you feel satisfied'), social well-being (e.g. 'In the past month, how often did you feel that you had something important to contribute to society') and psychological well-being (e.g. 'In the past month, how often did you feel good at managing the responsibilities of your daily life'). On a continuous scale that runs from 0 (never) to 5 (almost always), higher total mean scores indicate higher levels of mental well-being. Participants were excluded from the current intervention when they were classified as having flourishing mental health. We used the conventional cut-off values for flourishing as proposed by Keyes et al. (2008) in accordance with prior studies (e.g. Bohlmeijer, Lamers, & Fledderus, 2015), yielding scores of 4 or 5 on at least one emotional well-being item (i.e. hedonic well-being) and at least 6 social and psychological well-being items (i.e. eudaimonic well-being). The MHC-SF showed good psychometric properties ($\alpha = 0.88$) analogous to prior studies, including a validation study in the general Dutch population (Lamers, Westerhof, Bohlmeijer, Klooster, & Keyes, 2011).

Anxiety and depressive symptoms were measured with the two subscales of the HADS, the HADS-A and HADS-D respectively (Zigmond & Snaith, 1983). Each subscale contains 7 items (e.g. 'Worrying thoughts go through my mind' and 'I can laugh and see the funny side of things') with in each case different answer options, but all answered on a 4-point scale (0–3). Higher total summed scores on each subscale indicate higher levels of symptomatology. On this 0–21 scale, participants in the current study were excluded when they scored above 10 at baseline screening, indicating moderate to severe anxiety or depressive symptoms. The HADS yielded good psychometric properties in general population samples and clinical samples, including the general Dutch population (Spinhoven et al., 1997) with a Cronbach's alpha of 0.76 for each subscale in the current study.

Mediator measures

Positive emotional states were measured with 8 items of the 16-item modified Differential Emotions Scale (m-DES) (Schaefer, Nils, Sanchez, & Philippot, 2010). The other 8 items measure negative emotional states which were not included in the current study. Participants indicated how each group of three positive emotions (e.g. 'interested, concentrated, alert' or 'joyful, amused, happy') they experienced at the present moment on a 7-point scale (1 = not at all, 7 = very intense). Higher total

mean scores indicate higher levels of positive emotional states. A slightly different version of this scale has been developed by Fredrickson, Tugade, Waugh, and Larkin (2003) showing good internal reliability, although the scale showed modest reliability in the current study ($\alpha = 0.56$).

Use of strengths was assessed with the Strengths Use Scale (SUS), a 14-item scale with scores ranging from 1 (strongly disagree) to 7 (strongly agree) (Govindji & Linley, 2007). Higher total summed scores indicate more use of strengths in a variety of settings. The scale demonstrated good internal and test-retest reliability (Wood, Linley, Maltby, Kashdan, & Hurling, 2011) and the current study yielded an alpha of 0.95.

The Life Orientation Test-Revised (LOT-R) was used to measure state optimism, which consists of 3 optimism items, 3 pessimism items and 4 filler items (Scheier, Carver, & Bridges, 1994). Item scores ranged from 0 (strongly disagree) to 4 (strongly agree). The total summed score is based on the optimism items and inversely coded pessimism items, which has been shown a reliable measure compared to only using the 3 optimistic items (Glaesmer et al., 2012). The reliability in the current sample was also good ($\alpha = 0.74$). Higher scores indicate more optimistic expectations about the future.

Self-compassion was measured with the 12-item Self-Compassion Scale-Short Form (SCS-SF) with scores that range from 1 (rarely or never) to 7 (almost always). Higher total summed scores indicate higher levels of self-compassion. The short-form version has demonstrated good psychometric properties in the current study ($\alpha = 0.85$) and in prior research (Raes, Pommier, Neff, & Gucht, 2011), similar to the original version (Neff, 2003b).

The Brief Resilience Scale (BRS) assessed the level of resilience after stress and adversity, with higher scores indicating higher levels of resilience. The 6 items are scored on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Mean scores are calculated to obtain the total score. The scale yielded good psychometric properties in the current study ($\alpha = 0.83$) and in prior research (Smith et al., 2008).

Finally, positive relations was assessed with Ryff's Subscale of Positive Relations (SPR) (van Dierendonck, 2011; Ryff, 1989). We used the 9-item version of this scale, although 3-, 14- and 20-item versions are also available. Each item was scored on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree). Higher total summed scores indicate higher levels of positive relations with others. The 9-item version has shown similar high internal reliability compared to the 14-item version and substantive higher reliability than the 3-item version (van Dierendonck, 2004) and was also good in the current study ($\alpha = 0.82$).

Sample size

A sample size of 99 participants per condition was required to provide a statistical power of 80% and a two-sided 5% significance to detect a standardized effect size of at least $d = 0.40$ on mental well-being. The assumed effect size was based on previous meta-analyses of positive psychological interventions (Bolier, Haverman, Westerhof et al., 2013; Sin & Lyubomirsky, 2009). A drop-out rate of 25% was anticipated, resulting in a required sample size of 132 participants per condition. No interim analyses were performed during the recruitment process. Inclusion of the data stopped because we almost reached the scheduled date of closure, wherein we were able to include the required sample size for two groups. Without extra funding for additional advertisements in public media we were not able to recruit the required sample size for the planned third group, even when we had extended the scheduled date of disclosure with a few more weeks.

Statistical analyses

Missing data on 3, 6 and 12 months were imputed using the expectation maximization (EM) algorithm (Dempster, Laird, & Rubin, 1977), to fulfill intention-to-treat criteria. Pearson correlation coefficients were used to examine the strength of the relationships between well-being processes and outcome measures at baseline. Between-group differences were calculated up to 6 months follow-up because the control group received part of the intervention after this assessment. ANOVA-tests were used to examine the interaction effects of condition by time (2×3) on each outcome. *Post-hoc* bonferroni tests were used to reveal significant patterns of time. Cohen's *d* between group effect sizes and corresponding 95% confidence intervals (CI's) from t0–t1 and t0–t2 were calculated using SPSS scripts (Wuensch, 2012). Version 22.0 of SPSS (IBM, Chicago, Ill., USA) was used in all statistical analyses described here. In the intervention group, within-group differences between t1 and t3 were analyzed to examine whether the post-test results were maintained.

Mediation analyses were performed using the PROCESS tool (version 2.15) in SPSS, of which its macro was developed by Hayes (2012). Both simple and multiple mediation analyses were performed, including one mediator (simple) or all six mediators simultaneously (multiple). In our analyses, X is the condition (coded 1 for the intervention group and 0 for the control group), Y is the t2–t0 change in outcome measures (mental well-being, anxiety symptoms or depressive symptoms) and M is the t1–t0 mediator measures (positive emotion, use of strengths, optimism, self-compassion, resilience and/or positive relations). Using this timeline provides us some insight in mediating possible sustainable effects of the intervention, but it is likely that changes in all variables have occurred between t0

and t1. Hence, this study does not meet the timeline criteria as proposed by Kazdin (2009). We performed analyses with the t0 outcome measure and t0 mediator measure(s) as covariates, to control for baseline variance in mental well-being, anxiety or depression as well as for the baseline variance in well-being processes. We had no reason to include other covariates because our prior study revealed no consistent moderator patterns of gender, age, education, positive and negative life-events and personality traits (Schotanus-Dijkstra, Drossaert, Pieterse, Boon et al., 2017).

Unstandardized regression coefficients were calculated for each path in the mediation model using the PROCESS tool. Path *a* represents the effect of X on M, path *b* represents the effect of M on Y while statistically controlling for X, and path *c* represents the total effect of X on Y. The direct effect of X on Y while partialling out the effect of M is denoted as path *c'*. Then, the indirect effect of X on Y through M is calculated as the product of a and b (*ab*) of which the bias-corrected (BC) 95% CI's were based on 10,000 bootstrapped resamples (Hayes, 2013). When zero is not included in a BC 95% CI, it can be concluded that in 95% of the bootstrapped samples the effect of the intervention on the outcome measure is mediated through the included core well-being processes. In simple mediation, only one indirect effect is calculated. In multiple mediation, specific indirect effects are calculated for each individual mediator, taken the correlation with the other mediators into account. The relative magnitude between the six mediators were examined with pairwise contrasts of the specific indirect effects. Evidence for a difference in strength between two specific contrasts is found when zero is not included in a BC 95% CI.

Results

Table 1 displays the bivariate correlations between the well-being processes and the outcome measures mental well-being, anxiety and depressive symptoms, as well as with the emotional, social and psychological well-being subscales of the MHC-SF. Most correlations were moderate to strong, with the highest overlap between mediator and outcome for the psychological well-being subscale and use of strengths ($r = 0.60$). The correlations between the different mental well-being measures and anxiety and depression were small to moderate.

Repeated measures ANOVA showed significant time x group interaction effects on all six well-being processes (Table 2). These results indicate that the levels of positive emotion, use of strengths, optimism, self-compassion, resilience and positive relations were more increased in the intervention group compared to the wait-list group directly after the intervention and at follow-up. The *post hoc* bonferonni tests demonstrated significant results for these measures between baseline and post-intervention and between baseline and follow-up, but not between post-intervention and follow-up. The latter non-significant relation indicates that the post-intervention results were maintained up to 6 months. An exception was found for resilience, of which all time-improvements (t0–t1, t0–t2 and t1–t2) were significant, indicating that the level of resilience seems to have continuously increased. Cohen's *d* effect sizes were small to medium, except for self-compassion which showed large-sized effects between t0 and t1 ($d = 0.82$, 95% CI = 0.58–1.07) and between t0 and t2 ($d = 0.92$, 95% CI = 0.67–1.17). Within the intervention group, the effects at post-test were maintained up to 12 months or even further significantly improved on use of strengths [$t(136) = -3.33$, $p = 0.001$], self-compassion [$t(136) = -3.26$, $p = 0.001$] and resilience [$t(136) = -2.05$, $p = 0.043$].

Simple mediation models

The unique contribution of each core well-being process on the efficacy of the intervention was analyzed in simple

Table 1. Bivariate correlations between potential mediators and outcome measures at baseline.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) MHC-SF	Mental well-being	1										
(2) MHC-SF EMO	Emotional well-being subscale	0.80***	1									
(3) MHC-SF SOC	Social well-being subscale	0.88***	0.56***	1								
(4) MHC-SF PSY	Psychological well-being subscale	0.92***	0.66***	0.68***	1							
(5) HADS-A	Anxiety symptoms	−0.27***	−0.22***	−0.28***	−0.22***	1						
(6) HADS-D	Depressive symptoms	−0.49***	−0.52***	−36***	−0.44***	0.34***	1					
(7) mDES	Positive emotions	0.22***	0.20**	0.13*	0.25***	−0.05	−0.27***	1				
(8) SUS	Use of strenghts	0.58***	0.39***	0.47***	0.60***	−0.13*	−0.27***	0.19***	1			
(9) LOT-R	Optimism	0.50***	0.43***	0.42***	0.46***	−0.24***	−0.30***	0.15*	0.39***	1		
(10) SCS-SF	Self-compassion	0.58***	0.48***	0.48***	0.54***	−0.36***	−0.31***	0.08	0.42***	0.46***	1	
(11) BRS	Resilience	0.31***	0.31***	0.18**	0.33***	−0.15*	−0.22***	0.10	0.33***	0.36***	0.46***	1
(12) SPR	Positive relations	0.48***	0.32***	0.44***	0.47***	−0.12*	−0.28***	0.08	0.29***	0.32***	0.30***	0.11

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 2. Means and standard deviations for all well-being variables and results of the repeated measures analysis of variance and Cohen's *d* for between group effect sizes (email guided self-help intervention 'This is your life' versus wait-list control), intention-to-treat analysis.

	Guided self-help (*n* = 137)	Wait-list control (*n* = 138)	Interaction		Effect size t0–t1/t0–t2
	M (SD)	*M* (SD)	*F*	*p*	*d* (95% CI)
Positive emotions(mDES)					
Baseline	3.56 (0.74)	3.61 (0.72)			
3 months	3.88 (0.72)	3.60 (0.71)			0.37 (0.13–0.61)
6 months	4.03 (0.91)	3.67 (0.81)	7.37	0.001	0.40 (0.16–0.64)
12 months	3.82 (0.80)				
Use of strengths (SUS)					
Baseline	62.42 (14.69)	63.12 (13.81)			
3 months	69.47 (13.99)	65.86 (14.56)			0.38 (0.14–0.62)
6 months	69.70 (13.70)	66.14 (14.65)	7.15	0.001	0.37 (0.13–0.60)
12 months	72.20 (12.77)[a]				
Optimism (LOT-R)					
Baseline	13.86 (3.47)	13.78 (3.43)			
3 months	15.14 (3.41)	14.14 (3.24)			0.32 (0.09–0.56)
6 months	15.37 (3.77)	14.00 (3.57)	8.25	<0.001	0.44 (0.20–0.68)
12 months	15.30 (3.60)				
Self-compassion (SCS-SF)					
Baseline	45.47 (10.05)	47.32 (10.08)			
3 months	52.82 (10.32)	47.92 (10.80)			0.82 (0.58–1.07)
6 months	54.06 (11.30)	47.93 (10.11)	42.01	<0.001	0.92 (0.67–1.17)
12 months	55.03 (11.26)[a]				
Resilience (BRS)					
Baseline	2.84 (0.63)	2.89 (0.64)			
3 months	3.18 (0.68)	2.89 (0.67)			0.67 (0.43–0.92)
6 months	3.26 (0.72)	2.99 (0.71)	19.59	<0.001	0.57 (0.33–0.81)
12 months	3.26 (0.71)[a]				
Positive relations (SPR)					
Baseline	37.19 (7.18)	37.41 (6.96)			
3 months	40.37 (6.92)	37.58 (7.82)			0.72 (0.47–0.96)
6 months	40.22 (7.11)	37.15 (7.37)	27.05	<0.001	0.72 (0.48–0.97)
12 months	40.61 (7.48)				

[a]Significant within-group difference between t1 and t3 ($p < 0.05$).

Table 3. Simple mediation of the effects of the email guided self-help intervention ('This is your life') versus wait-list control on t2–t0 mental well-being (MHC-SF), mediated by its working mechanisms (t1–t0) and controlled for baseline levels of outcome and mediator (t0).

Mediators t1		*a*	*b*	Total effect *c*	Direct effect *c'*	Indirect effect *a* × *b* (95% CI)[a]
mDES	Positive emotions	0.29***	0.13**	0.50***	0.46***	0.04 (0.01, 0.09)
SUS	Use of strengths	4.12**	0.02***	0.50***	0.43***	0.07 (0.03, 0.13)
LOT-R	Optimism	0.98**	0.08***	0.49***	0.42***	0.08 (0.03, 0.14)
SCS-SF	Self-compassion	6.15***	0.02***	0.50***	0.35***	0.15 (0.09, 0.22)
BRS	Resilience	0.32***	0.28***	0.50***	0.41***	0.09 (0.04, 0.15)
SPR	Positive relations	3.00***	0.05***	0.50***	0.34***	0.16 (0.11, 0.23)

[a]Bias corrected bootstrap results for the indirect effect, number of resamples is 10,000.
$^{**}p < 0.01$; $^{***}p < 0.001$.

mediation models. Table 3 shows the unstandardized regression coefficients on the change in mental well-being, and Table 4 shows these coefficients on the change in anxiety and depressive symptoms. All coefficients of the *a*-paths, *b*-paths and *c*-paths were significant. The coefficients for the direct effects (*c'*-path) of the intervention on the change in depressive symptoms from t0 to t2 became non-significant when the improvement from t0 to t1 in self-compassion or positive relations was held constant (Table 4). More importantly, the BC 95% CIs of the indirect effects did not contain zero in any model, indicating that the effects of the intervention versus wait-list on mental well-being, anxiety and depressive symptoms were uniquely mediated through positive emotions, use of strengths, optimism, self-compassion, resilience and positive relations.

Multiple mediation models

In additional multiple mediation analyses, the core well-being processes were simultaneously entered in the regression models. Figure 2 shows the model for mental well-being. The a-paths were all significant, the b-paths were only significant for optimism and positive relationships, and the total and direct effects were significant. The total model explained 45% of the variance in mental

Table 4. Simple mediation of the effects of the email guided self-help intervention ('This is your life') versus wait-list control on t2–t0 anxiety (HADS-A) and depression (HADS-D), mediated by its working mechanisms (t1–t0) and controlled for baseline levels of outcome and mediator (t0).

Mediators t1		*a*	*b*	Total effect *c*	Direct effect *c'*	Indirect effect *a* × *b* (95% CI)[a]
Anxiety						
mDES	Positive emotions	0.27**	−0.96***	−1.78***	−1.52***	−0.26 (−0.54, −0.08)
SUS	Use of strengths	4.01**	−0.08***	−1.80***	−1.49***	−0.31 (−0.64, −0.12)
LOT-R	Optimism	0.90**	−0.41***	−1.78***	−1.41***	−0.37 (−0.69, −0.13)
SCS-SF	Self-compassion	5.95***	−0.16***	−1.93***	−1.01**	−0.93 (−1.33, −0.59)
BRS	Resilience	0.32***	−1.62***	−1.83***	−1.31***	0.52 (−0.86, −0.26)
SPR	Positive relations	2.93***	−0.22***	−1.78***	−1.14**	−0.65 (−1.04, −0.37)
Depression						
mDES	Positive emotions	0.28***	−1.28***	−1.54***	−1.18**	−0.36 (−0.75, −0.13)
SUS	Use of strengths	4.06**	−0.12***	−1.55***	−1.07**	−0.47 (−0.86, −0.19)
LOT-R	Optimism	0.94**	−0.48***	−1.53***	−1.08**	−0.45 (−0.81, −0.19)
SCS-SF	Self-compassion	6.18***	−0.17***	1.57***	−0.51	−1.06 (−1.60, −0.65)
BRS	Resilience	0.32***	−1.57***	−1.55***	−1.04*	−0.51 (−0.94, −0.20)
SPR	Positive relations	2.97***	−0.31***	−1.56***	−0.63	−0.92 (−1.44, −0.55)

[a]Bias corrected bootstrap results for the indirect effect, number of resamples is 10,000.
$^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

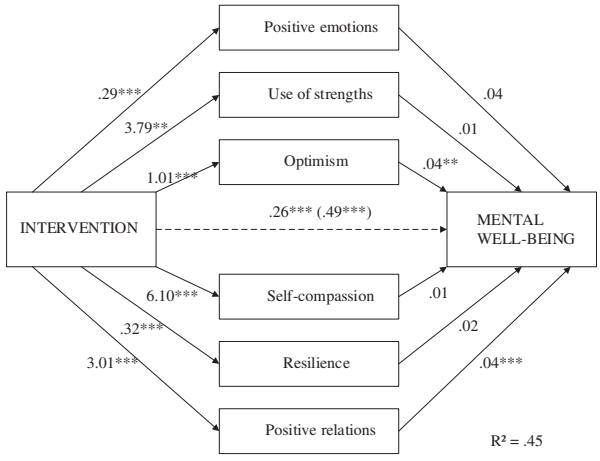

Figure 2. Multiple mediation of different well-being processes as mediators (t1–t0) of the intervention group versus wait-list group on mental well-being (t2–t0), controlled for baseline levels of mediators and mental well-being. Total effect (c-path) is given in parentheses.
Notes: $^{**}p < 0.01$; $^{***}p < 0.001$.

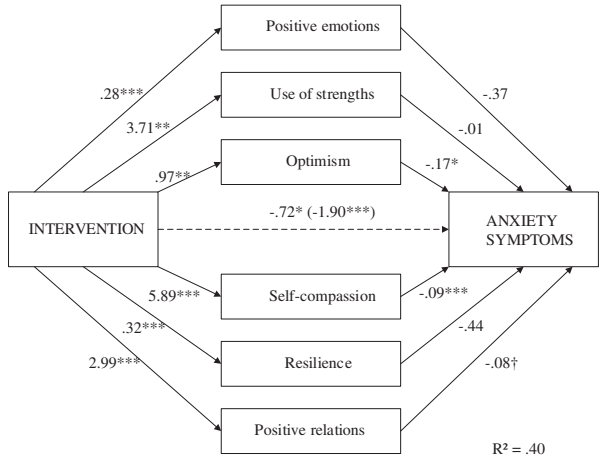

Figure 3. Multiple mediation of different well-being processes as mediators (t1–t0) of the intervention group versus wait-list group on anxiety symptoms (t2–t0), controlled for baseline levels of mediators and anxiety symptoms. Total effect (c-path) is given in parentheses.
Notes: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; $^{\dagger}p < 0.10$.

well-being at 6 months. The BC 95% CI of the specific indirect effect of optimism (*ab* = 0.04, BC 95% CI = 0.01 to 0.10) and positive relations did not contain zero (*ab* = 0.11, BC 95% CI = 0.06 to 0.18), indicating that the intervention had led to improved levels of mental well-being at 6 months through its effects on increasing optimism and positive relations at 3 months. The BC 95% CIs of the pairwise contrasts between the specific indirect effects revealed that positive relations was a stronger mediator than positive emotions (*ab* = −0.10, BC 95% CI = −0.17 to −0.04), use of strengths (*ab* = −0.09, BC 95% CI = −0.16 to −0.03), optimism (*ab* = −0.07, BC 95% CI = −0.14 to −0.00) and resilience (*ab* = −0.11, BC 95% CI = −0.19 to −0.04). Positive relations was not stronger or weaker than the effect of self-compassion.

In the multiple mediation model of anxiety symptoms (Figure 3, R^2 = 0.40), the BC 95% CIs for optimism (*ab* = −0.17, BC 95% CI = −0.42 to −0.04), self-compassion (*ab* = −0.51, BC 95% CI = −0.90 to −0.23) and positive relations (*ab* = −0.24, BC 95% CI = −0.54 to −0.01) did not contain zero, indicating that the significant reduction in anxiety symptoms in the intervention group versus wait-list group was statistically mediated through optimism, self-compassion and positive relations. Pairwise contrasts revealed no difference between self-compassion and positive relations, but did reveal stronger effects for self-compassion when compared to positive emotions (*ab* = 0.40, BC 95% CI = 0.07 to 0.81), use of strengths (*ab* = 0.48, BC 95% CI = −0.97 to −0.12), optimism (*ab* = 0.34, BC 95% CI = 0.01 to 0.72) and resilience (*ab* = −0.36, BC 95% CI = −0.77 to −0.01).

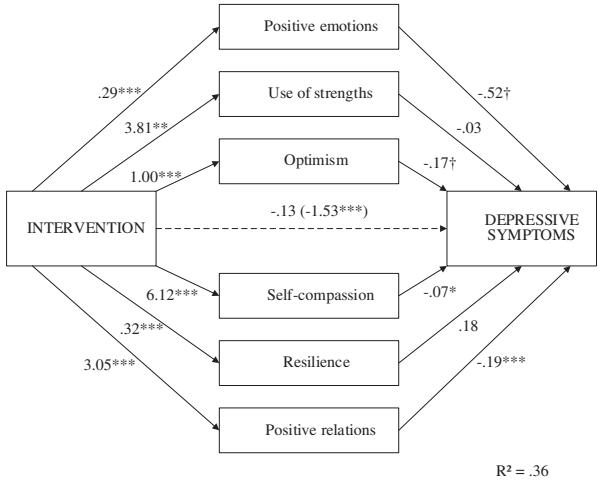

Figure 4. Multiple mediation of different well-being processes as mediators (t1–t0) of the intervention group versus wait-list group on depressive symptoms (t2–t0), controlled for baseline levels of mediators and depressive symptoms. Total effect (c path) is given in parentheses.
Notes: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; $^{\dagger}p < 0.10$.

Likewise, the model for depression (Figure 4, $R^2 = 0.45$) also revealed optimism (*ab* = −0.17, BC 95% CI = −0.42 to −0.01), self-compassion (*ab* = −0.45, BC 95% CI = −0.92 to −0.05) and positive relations (*ab* = −0.57, BC 95% CI = −1.01 to −0.24) as mediators. Pairwise contrasts indicated stronger effects for positive relations when compared to use of strengths (*ab* = 0.44, BC 95% CI = 0.07 to 0.88). In this model, the three mediators seemed to have contributed equally to the effect of the intervention on depressive symptoms at 6 months.

Discussion

This is one of the first studies that investigated possible mechanisms of change of a multicomponent PPI. The email guided self-help PPI has previously shown to be effective on mental well-being, anxiety and depressive symptoms (Schotanus-Dijkstra, Drossaert, Pieterse, Boon et al., 2017), which was in line with earlier studies demonstrating the efficacy of guided self-help programs on psychopathology and mental well-being (Cavanagh, Strauss, Forder, & Jones, 2014; Fledderus, Bohlmeijer, Pieterse, & Schreurs, 2012). The aim of the present study was to examine whether the email guided PPI was also effective in enhancing six core well-being processes (positive emotions, use of strengths, optimism, self-compassion, resilience and positive relations) and whether these processes mediated the effects on mental well-being, anxiety and depression.

Repeated measures analyses demonstrated that respondents from the intervention group improved significantly more on all these core well-being processes than the wait-list control group from baseline to 3 and 6 months. These effects were maintained or further improved within the intervention group up to 12 months. Large effect sizes were found for self-compassion, while the other well-being processes revealed small or moderate to large sized effects. Prior intervention studies have also revealed beneficial effects on these core well-being processes (e.g. Fredrickson et al., 2008; Neff & Germer, 2013; Peters et al., 2010; Yu et al., 2015), although not all processes have been measured in one intervention study.

Results from series of simple mediation analyses demonstrated that all processes emerged as possible mechanisms of change for establishing improvements on mental well-being, anxiety and depressive symptoms. When the six processes were included simultaneously in multiple mediation models, the mediating role of positive relations and self-compassion were mainly stronger compared to the other well-being processes. More specifically, the efficacy of the intervention on mental well-being was uniquely mediated through optimism and positive relations of which positive relations was stronger than optimism, the efficacy of the intervention on anxiety symptoms was mediated through optimism, self-compassion and positive relations of which self-compassion was stronger than optimism, and the efficacy of the intervention on depressive symptoms was mediated through optimism, self-compassion and positive relations of which none was stronger than the other.

The differences in results between the simple and multiple mediation analyses might reasonably be explained by intercorrelations between the six core well-being processes (Hayes, 2013). Therefore, a tenable conclusion seems to be that all six key-processes of the email guided self-help intervention statistically mediated its efficacy on mental well-being, anxiety and depressive symptoms, but that positive relations and self-compassion did matter most. The role of these two processes in well-being interventions deserves some further discussion.

The importance of positive relationships for mental well-being has been underscored by different theoretical frameworks such as 'the need to belong' (Baumeister & Leary, 1995) and the self-determination theory (Deci & Ryan, 2000). From an evolutionary perspective, people with strong social bonds and secure, loving and caring relationships survived and reproduced (Baumeister & Leary, 1995). However, the influence of positive relations on mental well-being has received little attention in scientific literature, while the influence of social support in times of negative life-events or the influence of dysfunctional relations on psychopathology is abundantly studied. Several empirical studies have shown that positive interrelationships function independently from negative interrelationships (Reis & Gable, 2003). To guide researchers interested in building positive relations, Reis and

Gable (2003) proposed three main topics: intimacy, affection and shared fun. The prominent role of positive relations in the current study might be explained by the fact that these three topics were (almost) weekly targeted by specific and more transcendent exercises such as active-constructive responding to positive events, active listening, doing acts of kindness, keeping a diary of pleasant emotions and describe what happened with whom and visualizing your best possible self in the relational domain. Such activities might have strengthened specific social skills which may be a prerequisite for creating enduring positive relationships. Taken together, the role of positive relations seem of utmost importance in multicomponent PPIs and suggests that it is fruitful to strengthen it in various ways.

Self-compassion is the ability to be kind and non-judgmental to oneself and about others, especially when confronted with feelings or experiences of inadequacy, failure or suffering (Neff, 2003a, 2003b). The present study corroborates evidence about the strong positive relationship between self-compassion and well-being (Trompetter, de Kleine, & Bohlmeijer, 2016; Zessin, Dickhäuser, & Garbade, 2015) and the strong negative relationship between self-compassion and psychopathology (MacBeth & Gumley, 2012; Trompetter et al., 2016). Our findings also corroborated earlier intervention studies that found support for the mediating role of self-compassion in mindfulness-based stress reduction (Keng, Smoski, Robins, Ekblad, & Brantley, 2012) and the value of self-compassion training in general (Fredrickson et al., 2008; Galante, Galante, Bekkers, & Gallacher, 2014; Jazaieri et al., 2012; Neff & Germer, 2013). A recent systematic review about compassion-focused therapy showed promising results on improving self-compassion and reducing depressive complaints, albeit very few RCT studies have yet been conducted (Leaviss & Uttley, 2015). The current findings suggest that self-compassion can be effectively cultivated when incorporated in a multicomponent email guided self-help intervention. Therefore, our study provides further support for the importance of fostering self-compassion in well-being interventions as a strategy to prevent mental disorders and promote optimal mental well-being.

Mental health care is confronted with increased burden of disease owing to depression and anxiety (Whiteford et al., 2013). A new strategy for the prevention of these mental disorders is to promote mental well-being (Forsman et al., 2015; Keyes, Dhingra, & Simoes, 2010; Kobau et al., 2011). A growing number of studies found that mental well-being may protect against the onset of mental disorders (Grant, Guille, & Sen, 2013; Keyes et al., 2010; Lamers, Westerhof, Glas, & Bohlmeijer, 2015; Schotanus-Dijkstra, ten Have, Lamers, de Graaf, & Bohlmeijer, 2017; Wood & Joseph, 2010). PPIs can be helpful by taking up social and societal roles again, for being kind to oneself and others and in strengthening those aspects that are needed for a fulfilling life. The present study underscores the importance of well-being interventions in the general population. Future research may examine whether this intervention is also effective in a more clinical population, for example in people with moderate or severe anxiety or depressive symptoms. Recent studies have demonstrated the potential of (multicomponent) PPIs for clinical settings (Chaves, Lopez-Gomez, Hervas, & Vazquez, 2016; Huffman et al., 2014). A 10-session group PPI was found equally effective compared to a CBT-program on decreasing depressive symptoms in people with a diagnosed mood disorder (Chaves et al., 2016). In addition, positive psychology exercises have been found feasible and effective on hopelessness and optimism in suicidal inpatients of which the majority was diagnosed with a major depression (Huffman et al., 2014).

Strengths and limitations

This study is the first to examine the mediating role of six core well-being processes in a multicomponent PPI. Although the well-being processes were moderately or strongly related to emotional, social and psychological well-being which might indicate overlap in mediator and outcome constructs, the mediation analyses showed similar results when not mental well-being but anxiety or depression were the outcome of interest. Another strength was that the mediation analyses were performed within the context of a parallel RCT design (i.e. a longitudinal study) rather than the bulk of correlational mediation analyses. Other strengths of the study were the large sample size for RCT-research and low attrition rate. Also, the statistical procedures used in the current study were based on the latest developments in the field of mediation analyses (Hayes, 2009; Kraemer et al., 2002; Preacher & Hayes, 2008), which contrasts to prior popular but insufficient techniques (Baron & Kenny, 1986). A final strength of the study was the exclusion of people who already possessed flourishing mental health. Such an exclusion criteria is rarely used in positive psychology research while it is common in psychology research to include only the target group of an intervention (e.g. people with no depressive symptoms are excluded in interventions that focus on reducing depressive symptoms).

Some limitations also apply to the current study, which should be considered when interpreting the results. First, the results emerged from a self-selected sample of mainly middle-aged and higher educated women who were motivated to work on their well-being and resilience. Therefore, our findings are not generalizable to the general population, but seems representative for the implementation of this intervention in public mental health in The Netherlands. Future research should endeavor different

recruitment strategies to attract more men and lower educated participants.

Second, the control group consisted of a wait-list control group rather than an active control group. This might have overestimated the results (Cunningham, Kypri, & McCambridge, 2013), possibly due to different expectations or motivation of participants in each intervention group (Boot, Simons, Stothart, & Stutts, 2013).

Third, an important limitation of our study is that we cannot rule out the possibility that confounding occurred in the multiple mediation analyses. All mediators were addressed by the self-help book, simultaneously measured and all mediators showed a significant improvement from baseline to 3 and 6 months. Therefore, it is unknown which processes might have been decisive in mediating the effects on mental well-being, anxiety and depression. For example, it might be that one or two mediators had improved strongly at the beginning of the intervention and, in turn, have influenced the other mediators as well as the outcome variables. The current study was primarily designed to examine the efficacy of the comprehensive approach. A next step is to determine the mechanisms of change in multicomponent PPIs. Therefore, it is necessary that future studies use a more complex design, for example by using at least a 6-armed trial wherein one component is added to each intervention arm (from one component to all six components; additive design) or wherein each component is examined in isolation and compared to the comprehensive intervention (dismantling design) (Bell, Marcus, & Goodlad, 2013).

Fourth, we cannot exclude the possibility that one or more unknown third variables have affected the six well-being processes as well as mental well-being, anxiety and depression. A next direction for research may be to include other known important processes and assess these early in treatment, such as mindfulness, hope, goal-setting, expressive writing, basic psychological need satisfaction, catastrophizing, coping strategies, intrinsic motivation and mastery.

Fifth, experimental manipulation of potential mediators reveal strong evidence for causality testing. However, the present study could not examine the temporal pathways because we measured all mediator and outcome measures before and after the intervention period and not during the intervention, the timeframe wherein changes in well-being processes have likely occurred. Our data revealed significant improvements in both mediator and outcome measures at 3, 6 and 12 months. Hence, it remains unknown whether the change in well-being processes preceded the change in mental health outcomes or vice versa, or that a more bidirectional relation exist. At least, this study shows that the well-being processes covary with the outcome measures, indicating that these processes are important and might operate as mechanisms of change. To test the causal and temporal pathways more critically, more frequent assessment of possible mediators are needed (Kraemer et al., 2002), for example by using experience sampling methods.

Finally, the robust impact of positive relations in the current study might have been partially caused by the study design. Indeed, participants received email support from a personal counselor which could have directly influenced the assessment of positive relations. However, the SPR scale encompass items about family, friends and intimate relationships (e.g. 'Most people see me as loving and affectionate', 'I enjoy personal and mutual conversations with family members or friends') and the effect on positive relations was maintained up to 9 months after termination of the email correspondence with the counselor, indicating that it is unlikely that the answers on such questions have been affected by sole communication with a counselor. Furthermore, the topic of positive relations was mainly addressed in the final two chapters of the book, thus, participants who managed to complete these chapters could typify as fully adhered participants. Nevertheless, we have a strong reason to believe that this was not the case because our prior study found no significant dose-response relationship of adherence on mental well-being, anxiety and depressive symptoms (Schotanus-Dijkstra, Drossaert, Pieterse, Boon et al., 2017).

We conclude that core well-being processes can be successfully promoted with a multicomponent PPI for people with suboptimal levels of mental well-being up to 12 months follow-up. Mediation analyses revealed that the intervention seemed to have worked most effectively through improved positive relations and self-compassion. This implies that it seems fruitful and cost-effective to strengthen at least these two well-being processes in future self-help interventions aimed at improving mental well-being and preventing anxiety and depression. However, replication is necessary and the temporary pathways of the six well-being processes and other possible mechanisms of change should be unraveled in more complex studies in the future.

Acknowledgements

This study was approved by the Ethics Committee of the University of Twente (no. 13212) and registered in The Netherlands Trial Register (NTR4297).

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Marcel E. Pieterse http://orcid.org/0000-0002-6900-3088
Ernst T. Bohlmeijer http://orcid.org/0000-0002-7861-1245

References

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173.

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497.

Bell, E. C., Marcus, D. K., & Goodlad, J. K. (2013). Are the parts as good as the whole? A meta-analysis of component treatment studies. *Journal of Consulting and Clinical Psychology, 81*(4), 722–736. doi:10.1037/a0033004

Bohlmeijer, E., & Hulsbergen, M. (2013). *Dit is jouw leven. Ervaar de effecten van de positieve psychologie* [This is your life. Exerpience the effects of positive psychology]. Amsterdam: Uitgeverij Boom.

Bohlmeijer, E. T., Lamers, S. M. A., & Fledderus, M. (2015). Flourishing in people with depressive symptomatology increases with acceptance and commitment therapy. *Post-hoc* analyses of a randomized controlled trial. *Behaviour Research and Therapy, 65*, 101–106. doi:10.1016/j.brat.2014.12.014

Bolier, L., Haverman, M., Kramer, J., Westerhof, G. J., Riper, H., Walburg, J. A., … Bohlmeijer, E. (2013). An Internet-based intervention to promote mental fitness for mildly depressed adults: Randomized controlled trial. *Journal of Medical Internet Research, 15*(9), e200. doi:10.2196/jmir.2603

Bolier, L., Haverman, M., Westerhof, G. J., Riper, H., Smit, F., & Bohlmeijer, E. (2013). Positive psychology interventions: A meta-analysis of randomized controlled studies. *BMC Public Health, 13*, 83. doi:10.1186/1471-2458-13-119

Boot, W. R., Simons, D. J., Stothart, C., & Stutts, C. (2013). The pervasive problem with placebos in psychology. *Perspectives on Psychological Science, 8*(4), 445–454. doi:10.1177/1745691613491271

Bryant, F. B., & Veroff, J. (2007). *Savoring, a new model of positive experience*. Mahwah, NJ: Lawrence Erlbaum Associates.

Campos, D., Cebolla, A., Quero, S., Bretón-López, J., Botella, C., Soler, J., … Baños, R. M. (2016). Meditation and happiness: Mindfulness and self-compassion may mediate the meditation-happiness relationship. *Personality and Individual Differences, 93*, 80–85. doi:10.1016/j.paid.2015.08.040

Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. *Clinical Psychology Review, 30*(7), 879–889. doi:10.1016/j.cpr.2010.01.006

Cavanagh, K., Strauss, C., Forder, L., & Jones, F. (2014). Can mindfulness and acceptance be learnt by self-help? A systematic review and meta-analysis of mindfulness and acceptance-based self-help interventions. *Clinical Psychology Review, 34*(2), 118–129. doi:10.1016/j.cpr.2014.01.001

Chaves, C., Lopez-Gomez, I., Hervas, G., & Vazquez, C. (2016). A comparative study on the efficacy of a positive psychology intervention and a cognitive behavioral therapy for clinical depression. *Cognitive Therapy and Research,* 1–17. doi:10.1007/s10608-016-9778-9

Cunningham, J. A., Kypri, K., & McCambridge, J. (2013). Exploratory randomized controlled trial evaluating the impact of a waiting list control design. *BMC Medical Research Methodology, 13*, 1. doi:10.1186/1471-2288-13-150

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268.

Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum likelihood from incomplete data via the em algorithm. *Journal of the Royal Statistical Society. Series B (Methodological),* 1–38.

Fledderus, M., Bohlmeijer, E. T., Pieterse, M. E., & Schreurs, K. M. (2012). Acceptance and commitment therapy as guided self-help for psychological distress and positive mental health: A randomized controlled trial. *Psychological Medicine, 42*(3), 485–495. doi:10.1017/S0033291711001206

Forsman, A. K., Wahlbeck, K., Aaro, L. E., Alonso, J., Barry, M. M., Brunn, M., … Varnik, A. (2015). Research priorities for public mental health in Europe: Recommendations of the ROAMER project. *The European Journal of Public Health, 25*(2), 249–254. doi:10.1093/eurpub/cku232

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*(3), 218–226. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3122271/

Fredrickson, B. L., Cohn, M. A., Coffey, K. A., Pek, J., & Finkel, S. M. (2008). Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources. *Journal of Personality and Social Psychology, 95*(5), 1045–1062. doi:10.1037/a0013262

Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology, 84*(2), 365–376. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2755263/

Gable, S. L., Reis, H. T., Impett, E. A., & Asher, E. R. (2004). What do you do when things go right? The intrapersonal and interpersonal benefits of sharing positive events. *Journal of Personality and Social Psychology, 87*(2), 228–245. doi:10.1037/0022-3514.87.2.228

Galante, J., Galante, I., Bekkers, M. J., & Gallacher, J. (2014). Effect of kindness-based meditation on health and well-being: A systematic review and meta-analysis. *Journal of Consulting and Clinical Psychology, 82*(6), 1101–1114. doi:10.1037.a0037249

Gilbert, P. (2010). *The compassionate mind. How to use compassion to develop happiness, self-acceptance and well-being*. London: Constable.

Glaesmer, H., Rief, W., Martin, A., Mewes, R., Brähler, E., Zenger, M., & Hinz, A. (2012). Psychometric properties and population-based norms of the Life Orientation Test Revised (LOT-R). *British Journal of Health Psychology, 17*(2), 432–445.

Govindji, R., & Linley, P. A. (2007). Strengths use, self-concordance and well-being: Implications for strengths coaching and coaching psychologists. *International Coaching Psychology Review, 2*(2), 143–153.

Grant, F., Guille, C., & Sen, S. (2013). Well-being and the risk of depression under stress. *PLoS ONE, 8*(7), e67395. doi:10.1371/journal.pone.0067395

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs, 76*(4), 408–420.

Hayes, A. F. (2012). *Process: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling*. Retrieved from http://www.afhayes.com/public/process2012.pdf

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis. A regression-based approach*. New York, NY: Guilford Press.

Hone, L. C., Jarden, A., Schofield, G. M., & Duncan, S. (2014). Measuring flourishing: The impact of operational definitions on the prevalence of high levels of wellbeing. *International Journal of Wellbeing, 4*(1), 62–90.

Huffman, J. C., DuBois, C. M., Healy, B. C., Boehm, J. K., Kashdan, T. B., Celano, C. M., … Lyubomirsky, S. (2014). Feasibility and utility of positive psychology exercises for suicidal inpatients. *General Hospital Psychiatry, 36*(1), 88–94.

Jazaieri, H., Jinpa, G. T., McGonigal, K., Rosenberg, E. L., Finkelstein, J., Simon-Thomas, E., … Goldin, P. R. (2012). Enhancing compassion: A randomized controlled trial of a compassion cultivation training program. *Journal of Happiness Studies, 14*(4), 1113–1126. doi:10.1007/s10902-012-9373-z

Jeste, D. V., Palmer, B. W., Rettew, D. C., & Boardman, S. (2015). Positive psychiatry. *The Journal of Clinical Psychiatry, 76*(6), 675–683. doi:10.4088/JCP.14nr09599

Joseph, S. (2011). *What doesn't kill us. The new psychology of post-traumatic growth*. London: Piatkus.

Kazdin, A. E. (2009). Understanding how and why psychotherapy leads to change. *Psychotherapy Research, 19*(4–5), 418–428. doi:10.1080/10503300802448899

Keng, S.-L., Smoski, M. J., Robins, C. J., Ekblad, A. G., & Brantley, J. G. (2012). Mechanisms of change in mindfulness-based stress reduction: Self-compassion and mindfulness as mediators of intervention outcomes. *Journal of Cognitive Psychotherapy, 26*(3), 270–280. doi:10.1891/0889-8391.26.3.270

Keyes, C. L. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior, 43*(2), 207–222.

Keyes, C. L. M., Dhingra, S. S., & Simoes, E. J. (2010). Change in level of positive mental health as a predictor of future risk of mental illness. *American Journal of Public Health, 100*(12), 2366–2371. doi:10.2105/AJPH.2010.192245

Keyes, C. L., 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. doi:10.1002/cpp.572

Kobau, R., Seligman, M. E., Peterson, C., Diener, E., Zack, M. M., Chapman, D., & Thompson, W. (2011). Mental health promotion in public health: Perspectives and strategies from positive psychology. *American Journal of Public Health, 101*(8), e1–e9. doi:10.2105/AJPH.2010.300083

Kraemer, H. C., Wilson, G. T., Fairburn, C. G., & Agras, W. S. (2002). Mediators and moderators of treatment effects in randomized clinical trials. *Archives of General Psychiatry, 59*(10), 877–883.

Lamers, S. M., Westerhof, G. J., Bohlmeijer, E. T., Klooster, P. M., & Keyes, C. L. (2011). Evaluating the psychometric properties of the mental health continuum-short form (MHC-SF). *Journal of Clinical Psychology, 67*, 99–110. doi:10.1002/jclp.20741

Lamers, S. M. A., Westerhof, G. J., Glas, C. A. W., & Bohlmeijer, E. T. (2015). The bidirectional relation between positive mental health and psychopathology in a longitudinal representative panel study. *The Journal of Positive Psychology, 10*(6), 553–560. doi:10.1080/17439760.2015.1015156

Leaviss, J., & Uttley, L. (2015). Psychotherapeutic benefits of compassion-focused therapy: An early systematic review. *Psychological Medicine, 45*(5), 927–945. doi:10.1017/s0033291714002141

Linley, P. A., & Biswas-Diener, R. (2010). *The strengths book: Be confident, be successful, and enjoy better relationships by realising the best of you*. Coventry: CAPP Press.

Lyubomirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being? *Current Directions in Psychological Science, 22*(1), 57–62. doi:10.1177/0963721412469809

MacBeth, A., & Gumley, A. (2012). Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review, 32*(6), 545–552. doi:10.1016/j.cpr.2012.06.003

McGrath, R. E. (2014). Character strengths in 75 nations: An update. *The Journal of Positive Psychology, 10*(1), 41–52. doi:10.1080/17439760.2014.888580

Meevissen, Y. M., Peters, M. L., & Alberts, H. J. (2011). Become more optimistic by imagining a best possible self: Effects of a two week intervention. *Journal of Behavior Therapy and Experimental Psychiatry, 42*(3), 371–378. doi:10.1016/j.jbtep.2011.02.012

Neff, K. (2003a). Self-compassion: An alternative conceptualization of a healthy attitude toward oneself. *Self and Identity, 2*(2), 85–101.

Neff, K. D. (2003b). The development and validation of a scale to measure self-compassion. *Self and Identity, 2*(3), 223–250.

Neff, K. D., & Germer, C. K. (2013). A pilot study and randomized controlled trial of the mindful self-compassion program. *Journal of Clinical Psychology, 69*(1), 28–44. Retrieved from http://onlinelibrary.wiley.com/o/cochrane/clcentral/articles/407/CN-00906407/frame.html. doi:10.1002/jclp.21923

Neff, K. D., Rude, S. S., & Kirkpatrick, K. L. (2007). An examination of self-compassion in relation to positive psychological functioning and personality traits. *Journal of Research in Personality, 41*(4), 908–916. doi:10.1016/j.jrp.2006.08.002

Nelson, S. K., Della Porta, M. D., Jacobs Bao, K., Lee, H. C., Choi, I., & Lyubomirsky, S. (2015). 'It's up to you': Experimentally manipulated autonomy support for prosocial behavior improves well-being in two cultures over six weeks. *The Journal of Positive Psychology, 10*(5), 463–476. doi:10.1080/17439760.2014.983959

Nelson, S. K., Layous, K., Cole, S. W., & Lyubomirsky, S. (2016). Do unto others or treat yourself? The effects of prosocial and self-focused behavior on psychological flourishing. *Emotion, 16*(6), 850–861. doi:10.1037/emo0000178

O'Connell, B. H., O'Shea, D., & Gallagher, S. (2016). Enhancing social relationships through positive psychology activities: A randomised controlled trial. *The Journal of Positive Psychology, 11*(2), 149–162. Retrieved from http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=psyc12&AN=2016-01558-005

Page, K. M., & Vella-Brodrick, D. A. (2012). The working for wellness program: Rct of an employee well-being intervention. *Journal of Happiness Studies, 14*(3), 1007–1031. doi:10.1007/s10902-012-9366-y

Park, N., Peterson, C., & Seligman, M. E. (2006). Character strengths in fifty-four nations and the fifty US states. *The Journal of Positive Psychology, 1*(3), 118–129.

Parks, A. C., & Szanto, R. K. (2013). Assessing the efficacy and effectiveness of a positive psychology-based self-help book. *Terapia psicológica, 31*, 141–149. Retrieved from http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-48082013000100013&nrm=iso

Pawelski, J. O. (2016). Defining the 'positive' in positive psychology: Part i. A descriptive analysis. *The Journal of Positive Psychology,* 1–18. doi:10.1080/17439760.2015.1137627

Pennebaker, J. W. (1997). Writing about emotional experiences as a therapeutic process. *Psychological Science, 8*(3), 162–166.

Peters, M. L., Flink, I. K., Boersma, K., & Linton, S. J. (2010). Manipulating optimism: Can imagining a best possible self be used to increase positive future expectancies? *The Journal of Positive Psychology, 5*(3), 204–211. doi:10.1080/17439761003790963

Peters, M. L., Meevissen, Y. M. C., & Hanssen, M. M. (2013). Specificity of the best possible self intervention for increasing optimism: Comparison with a gratitude intervention. *Terapia psicológica, 31*(1), 93–100. Retrieved from https://www.scopus.com/inward/record.uri?eid=2-s2.0-84876540505&partnerID=40&md5=d25f8f03936f90b6950c8a7d5026608b

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879–891. doi:10.3758/brm.40.3.879

Raes, F., Pommier, E., Neff, K. D., & Gucht, D. (2011). Construction and factorial validation of a short form of the self-compassion scale. *Clinical Psychology & Psychotherapy, 18*, 250–255. doi:10.1002/cpp.702

Rashid, T. (2014). Positive psychotherapy: A strength-based approach. *The Journal of Positive Psychology, 10*(1), 25–40. doi:10.1080/17439760.2014.920411

Reis, H. T., & Gable, S. L. (2003). Toward a positive psychology of relationships. In C. L. M. Keyes & J. Haidt (Eds.), *Flourishing: Positive psychology and the life well-lived* (pp. 129–159). Washington, DC: American Psychological Association.

Ruini, C., Albieri, E., & Vescovelli, F. (2014). Well-being therapy: State of the art and clinical exemplifications. *Journal of Contemporary Psychotherapy, 45*(2), 129–136. doi:10.1007/s10879-014-9290-z

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*(6), 1069.

Schaefer, A., Nils, F., Sanchez, X., & Philippot, P. (2010). Assessing the effectiveness of a large database of emotion-eliciting films: A new tool for emotion researchers. *Cognition and Emotion, 24*(7), 1153–1172.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67*(6), 1063–1078.

Schotanus-Dijkstra, M., Drossaert, C. H. C., Pieterse, M. E., Boon, B., Walburg, J. A., & Bohlmeijer, E. T. (2017). An early intervention to promote well-being and flourishing and reduce anxiety and depression: A randomized controlled trial. *Internet Interventions, 9*, 15–20.

Schotanus-Dijkstra, M., Drossaert, C. H. C., Pieterse, M. E., Smit, F., Walburg, J. A., & Bohlmeijer, E. T. (Submitted). Cost-effectiveness of an early intervention to promote flourishing and prevent anxiety and depression: An email guided self-help intervention versus usual care.

Schotanus-Dijkstra, M., Drossaert, C. H. C., Pieterse, M. E., Walburg, J. A., & Bohlmeijer, E. T. (2015). Efficacy of a multicomponent positive psychology self-help intervention: Study protocol of a randomized controlled trial. *Journal of Medical Internet Research, Research Protocols, 4*(3), e105. doi:10.2196/resprot.4162

Schotanus-Dijkstra, M., ten Have, M., Lamers, S. M. A., de Graaf, R., & Bohlmeijer, E. T.(2017). The longitudinal relationship between flourishing mental health and incident mood, anxiety and substance use disorders. *European Journal of Public Health, 27* (3), 563–568. doi:10.1093/eurpub/ckw202

Schueller, S. M., & Parks, A. C. (2014). The science of self-help. *European Psychologist, 19*(2), 145–155. doi:10.1027/1016-9040/a000181

Seligman, M. E. P. (2006). *Learned optimism: How to change your mind and your life*. New York, NY: Vintage.

Seligman, M. E. P. (2011). *Flourish: A visionary understanding of happiness and well-being*. New York, NY: Free Press.

Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology. An introduction. *American Psychologist, 55*(1), 5–14.

Seligman, M. E., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist, 60*(5), 410–421. doi:10.1037/0003-066X.60.5.410

Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology, 65*(5), 467–487. doi:10.1002/jclp.20593

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine, 15*(3), 194–200.

Spinhoven, P., Ormel, J., Sloekers, P. P., Kempen, G. I., Speckens, A. E., & Hemert, A. M. (1997). A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. *Psychological Medicine, 27*(2), 363–370.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15*(1), 1–18.

Trompetter, H. R., de Kleine, E., & Bohlmeijer, E. T. (2016). Why does positive mental health buffer against psychopathology? An exploratory study on self-compassion as a resilience mechanism and adaptive emotion regulation strategy. *Cognitive Therapy and Research,* 1–10. doi:10.1007/s10608-016-9774-0

van Dierendonck, D. (2004). The construct validity of Ryff's scales of psychological well-being and its extension with spiritual well-being. *Personality and Individual Differences, 36*(3), 629–643.

van Dierendonck, D. (2011). *Handleiding positive geestelijke gezondheids schaal (pggs) versie 05*. Amsterdam: University of Amsterdam.

Whiteford, H. A., Degenhardt, L., Rehm, J., Baxter, A. J., Ferrari, A. J., Erskine, H. E., … Vos, T. (2013). Global burden of disease attributable to mental and substance use disorders: Findings from the Global Burden of Disease Study 2010. *The Lancet, 382*(9904), 1575–1586. doi:10.1016/s0140-6736(13)61611-6

Wood, A. M., & Joseph, S. (2010). The absence of positive psychological (eudemonic) well-being as a risk factor for depression: A ten year cohort study. *Journal of Affective Disorders, 122*(3), 213–217. doi:10.1016/j.jad.2009.06.032

Wood, A. M., Linley, P. A., Maltby, J., Kashdan, T. B., & Hurling, R. (2011). Using personal and psychological strengths leads to increases in well-being over time: A longitudinal study and the development of the strengths use questionnaire. *Personality and Individual Differences, 50*(1), 15–19. doi:10.1016/j.paid.2010.08.004

Wood, A. M., & Tarrier, N. (2010). Positive clinical psychology: A new vision and strategy for integrated research and practice. *Clinical Psychology Review, 30*(7), 819–829. doi:10.1016/j.cpr.2010.06.003

Wuensch, K. L. (2012). *Using spss to obtain a confidence interval for cohen's d*. Retrieved from http://core.ecu.edu/psyc/wuenschk/SPSS/CI-d-SPSS.pdf

Yu, N. X., Lam, T. H., Liu, I. K. F., & Stewart, S. M. (2015, November). Mediation of short and longer term effects of an intervention program to enhance resilience in immigrants from mainland china to hong kong. *Frontiers in Psychology, 6*. doi:10.3389/fpsyg.2015.01769

Zessin, U., Dickhäuser, O., & Garbade, S. (2015). The relationship between self-compassion and well-being: A meta-analysis. *Applied Psychology: Health and Well-Being, 7*(3), 340–364. doi:10.1111/aphw.12051

Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica, 67*(6), 361–370.