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Effects on mental well-being and depressive symptoms of online positive psychology interventions: a meta-analysis

N. El Menshawy

Master Thesis

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Supervisors:
M Sc. M. Sommers-Spijkerman (Marion)
Dr. M. Schotanus - Dijkstra (Marijke)

Positive Psychology and Technology
Faculty of Behavioural, Management and Social sciences
University of Twente
P.O. Box 217
7500 AE Enschede
The Netherlands

Abstract

Background: Positive psychology interventions are increasingly being delivered through the Internet and less is known about the efficacy, while many of such interventions have been developed in recent years. A meta-analysis has been conducted on the effects on mental well-being and depressive symptoms of online positive psychology interventions (OPPIs).

Methods: A systematic literature search was conducted using PsychINFO and Scopus. A random effects model was used for pooled effect sizes. The presence of heterogeneity has been examined by the indicators: Q-statistic and I^2-statistic. Publication bias has been addressed using the indices: funnel plots and fail-safe number.

Results: The inclusion criteria resulted in nine studies were included in this study, comprising 17 and 15 comparisons with well-being and depressive symptoms outcome measures respectively. OPPIs were all self-help interventions. Results showed a small but significant positive effect for both outcomes (well-being g=.18 and for depressive symptoms g=.14). Heterogeneity was rather high. For mental wellbeing, interventions were more effective if they were of longer duration. For depressive symptoms, indications for publication bias were found.

Conclusions: The results of this meta-analysis show that OPPIs can be effective for enhancing well-being, as well as for reducing depressive symptoms. Additional high-quality peer-reviewed studies in diverse (clinical) populations are needed to strengthen the evidence-base for OPPIs.

Content

1. Introduction

1.1 Well-being

Mental health has long been defined as the absence of mental illness (Westerhof & Keyes, 2008). Keyes (2005) investigated whether well-being and psychopathology are two independent dimensions. Research showed that they are separate but correlated dimensions. People who thrive and are not mentally ill function better than people with a lower mental health and/or mental illness. They are physically healthier, make less use of health care and are more productive in their work. (Keyes, 2002, Keyes, 2005a, Westerhof & Keyes, 2008). High levels of well-being protects against psychopathology (Schotanus-Dijkstra, ten Have, Lamers, de Graaf & Bohlmeijer, 2017; Trompetter, de Kleine, & Bohlmeijer, 2017). Thus, psychopathology and overall well-being do not function as exact opposites and must be seen as separate indicators of positive mental health. This makes overall well-being in itself a significant end-point of scientific study and intervention.

Overall well-being can be distinguished in emotional well-being, psychological well-being and social well-being (Bohlmeijer, Westerhof, Bolier, Steeneveld, Geurts, Walburg, 2013). Emotional well-being involves life satisfaction and positive feelings such as happiness, interest and pleasure in life (Diener, 1984). Psychological well-being focuses on optimal personal functioning and includes aspects such as autonomy and self-acceptance (Ryff, 1989). Social well-being focuses on optimal functioning in society, such as social contribution and integration (Keyes, 1998).

According to Seligman (2002), psychology is not only the study of disease and weakness, but also the study of strength and virtue. People with mental disorders, can be happy by coping well with their illness and enjoy a satisfactory quality of life (Bergsma, ten Have, Veenhoven, & de

Graaf, 2011). Around the turn of the 21th century, a new and ever-growing movement was created by Seligman, in particular by means of which well-being is given more attention and which focuses on enhancing well-being: positive psychology (Seligman, 2002). Positive psychology can be defined as the scientific study of well-being and optimal human functioning (Seligman & Csikszentmihalyi, 2000). Themes within positive psychology are for example compassion, strengths, resilience, gratitude, happiness, self-acceptance, and optimism (Bohlmeijer, Bolier, & Westerhof, 2015). One way to increase people's well-being is with positive psychological interventions addressing these themes.

1.2 Positive Psychological Interventions

Positive psychological interventions (PPIs) are aimed at increasing positive feelings, positive emotions, positive cognitions and positive behaviors (Sin & Lyubomirsky, 2009). An example of a PPI is the three good things exercise, which strengthens positive emotions and increases happiness (Seligman, Steen, Park & Peterson, 2005). In this exercise you have to think about three good things that happened on the given day every week for one week, and to write them down. The three good things exercise shows sustained progress of happiness (Seligman et al., 2005).

In a meta-analysis by Sin and Lyubomirsky (2009), the effects of PPIs on well-being and depressive symptoms were investigated in non-clinical samples. PPIs were found to have a positive effect on improving well-being (r =.29) and depressive symptoms (r = .31) in mostly non-clinical populations. Similar results emerge from a more recent meta-analysis of Bolier, Haverman, Westerhof, Riper, Smit and Bohlmeijer (2013) examining the effects on subjective well-being, psychological well-being and depression of PPIs in the general public and in people with psychosocial problems. They compared the results of 39 evaluation studies of PPIs, including self-help interventions, group training and individual therapy. The standardized mean

difference were 0.34 for subjective well-being, 0.20 for psychological well-being and 0.23 for depressive symptoms indicating small effects for PPIs.

1.3 Online Positive Psychological Interventions

PPIs have increasingly been offered online in recent years, so called online positive psychological interventions (OPPIs) (Mohr, Siddique, Jin, & Fokuo, 2010). Online interventions are interventions that are performed on technical devices such as a computer, laptop or tablet with internet connection. The data is stored and processed online (van Gemert-Pijnen, Peters, & Ossebaard, 2013). There are significant advantages of online interventions against face-to-face interventions. Online interventions offer the possibility to freely determine time and place for execution. OPPIs might be an alternative to the long waiting times in clinical settings to get a place in therapy (Allam, Kostova, Nakamoto, & Schulz, 2015). Another advantage is that reminders for making exercises can also be used, such as an alarm or text message, so that people are better engaged in making the exercises (Bolier & Abello, 2014). But also, online intervention are easily accessible and might be less costly (Cuijpers et al., 2009). Although there is growing interest in online formats, little is known about its effects. The studies that are available show promising results.

In a review of Mitchell, Vella-Brodrick, and Klein (2010) which explored the relation between positive psychology and internet interventions there were five studies available which examined the efficacy of OPPIs as a means of enhancing well-being. The OPPIs were self-administered interventions, and themes in these OPPIs were: using your strengths, three good things, gratitude visit, self-compassion and optimism. It was found that in three of the five included studies well-being was significantly increased compared to a control group. In the three studies, where participants had mild to moderate depression symptoms at baseline, the OPPIs had a significant impact on depression symptom reduction (Mitchell, Vella-Brodrick, and Klein, 2010). The review of Mitchell et al. (2010) was limited by a small number of studies

currently available, and in the meta-analysis on the effect of PPIs of Bolier et al. (2013) there were only two OPPIs included.

1.4 The present study

The aim of this study was to examine the effects of OPPIs on well-being and depressive symptoms. The secondary objective of this study was to examine the moderating impact of intervention duration on the effectiveness of OPPIs.

2. Method

2.1. Search strategy

A systematic literature search was conducted in two databases: PsycINFO and Scopus. Studies that could provide an answer to the research question were systematically searched from the first available date until 9 April 2018. The search consisted of terms that are related to 'well-being' and 'positive psychology', in combination with terms that are related to 'interventions, 'effect', and 'online'. In Table 1 the search strategy is shown in detail. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement of Moher et al. (2009) for systematic reviews was used to report the meta-analysis.

Table 1. *Search strategy for the databases PsycINFO and Scopus.*

	Search string
#1	well-being OR wellbeing OR well being OR happiness OR happy OR life-satisfaction OR satisfaction with life OR positive psych* OR flourishing
#2	positive emotion* OR positive feeling* OR positive cognition* OR positive behavio* OR positive communic* OR savoring OR optimism OR hope OR gratitude OR kindness OR forgiveness OR strengths OR flow OR compassion OR self-acceptance OR master* OR engagement OR positive relation* OR positive affect OR personal growth OR autonomy OR purpose in life
#3	intervention OR therap* OR treatment OR training* OR program* OR exercise OR ppi OR oppi

#4	effect* OR effic* OR outcome* OR evaluat* OR random* OR RCT OR control* OR experim*
#5	internet OR online OR eHealth OR mHealth OR email OR computer OR smartphone OR mobile OR app OR application OR web-based
#6	#1 AND #2 AND #3 AND #4 AND #5
Filters PsychINFO	academic journals, adults, English
Filters Scopus	English, article

2.2. Selection of studies and data extraction

After removing the duplicates in EndNote, the remaining articles were screened by title. Articles with titles that do not concern positive psychology were removed. In addition, the articles that did not contain any forms of intervention were removed. Then, the abstracts of the remaining articles were screened. the full-texts were selected for eligibility. During the selection of the studies, the following inclusion criteria were used: 1) the study employed an online positive psychological intervention, which is aimed at increasing positive feelings, positive emotions, positive cognitions, or positive behaviors (Sin & Lyubomirsky, 2009); 2) the study contained a control group; 3) the target group of the study was adults, which means older than 18 years; 4) the study used valid outcome measures of at least one for overall well-being or depressive symptoms, and (5) the study contained sufficient statistical info to compose an effect size.

2.3. Data extraction

For each study, the following data were extracted: 1) study characteristics such as first author, year of publication; 2) population characteristics such as gender and age; 3) intervention characteristics such as intervention type (e.g. website, application), number of sessions and duration (in weeks); 4) methodological characteristics such as type of control group, measurement moments (pre, post, follow-up), and outcome measures.

2.4. Analysis

Comprehensive Meta-Analysis (CMA, version 2.2.064) was used to conduct the analyses. A separate meta-analysis was performed for (1) well-being and (2) depressive symptoms. To examine the effects the average score on mental well-being and depressive symptoms were taken as the primary outcome. This was conducted on the basis of validated measuring instruments for mental well-being and depressive symptoms. Effects that has been found in the studies were converted into standardized mean difference effect sizes. Hedges' *g* was used since it is more accurate when the sample size of the study is small (Cuijpers, 2016). For each outcome a pooled effect size was calculated using a random effects model. Effect sizes were calculated using means and standard deviations by the mean differences between pre- and post-scores divided by the pooled standard deviation (SMD = mean difference / SD_{pooled}). For each included study, the effect size is assessed in small (0 - .32), medium (.33 - .55), and large (.56 – 1.20) effects (Hedges & Olkin, 1985).

The presence of heterogeneity has been examined by the indicators: Q-statistic and I^2-statistic. A significant Q rejects the null-hypothesis of homogeneity and indicates that the true effect size probably does vary from study to study. I^2 is a percentage indicating the study-to-study dispersion due to real differences, over and above random sampling error. A value of 0% indicates an absence of dispersion, and larger values show increasing levels of heterogeneity where 25% can be considered as low, 50% as moderate and 75% as a high level of heterogeneity (Cuijpers, 2016).

Because of the variety of comparisons, no subgroup analyses were performed. There was too much variability in follow-up periods, therefore no longer-term follow-up effects were calculated. The moderating effect of the duration of the OPPIs on effect sizes for both well-being and depressive symptoms was assessed using meta-regression analyses, according to the mixed effects model. The problem that not all the studies that are conducted in this

certain area are actually published and that may bias the results (*publication bias*), has been addressed using the indices: funnel plots and the fail-safe number. A funnel plot is a graph of effect size plotted against study size. When publication bias is absent, the observed studies are expected to be distributed symmetrically around the pooled effect size. The fail-safe number indicates the number of non-significant unpublished studies needed to reduce the overall significant effect to non-significance (Cuijpers, 2016). The effect size can be considered to be robust if the number of studies required to reduce the overall effect size to a non-significant level exceeds 5 K + 10, where K is the number of comparisons included (Rosenberg, 2005).

3. Results

3.1 Selection of studies

The flowchart of the selection process can be found in Figure 1. In total, search in the databases generated 576 studies. First, the duplicates were removed (n = 21) and then the studies were screened by title (n = 555). After that, the 208 remaining studies were reviewed on the abstract. 78 were selected for further examination. Full-text versions of these 78 articles were obtained and assessed for eligibility. This resulted in nine studies that were included in this study. There were two studies with multiple intervention groups (Gander et al., 2014; Proyer et al., 2016), resulting in 17 comparisons.

3.2 Characteristics of the included studies

Two of the studies were from the United States, two from Ireland, two from Switzerland and one each from The Netherlands, United Kingdom, and Australia. The characteristics of the studies are presented in Table 1.

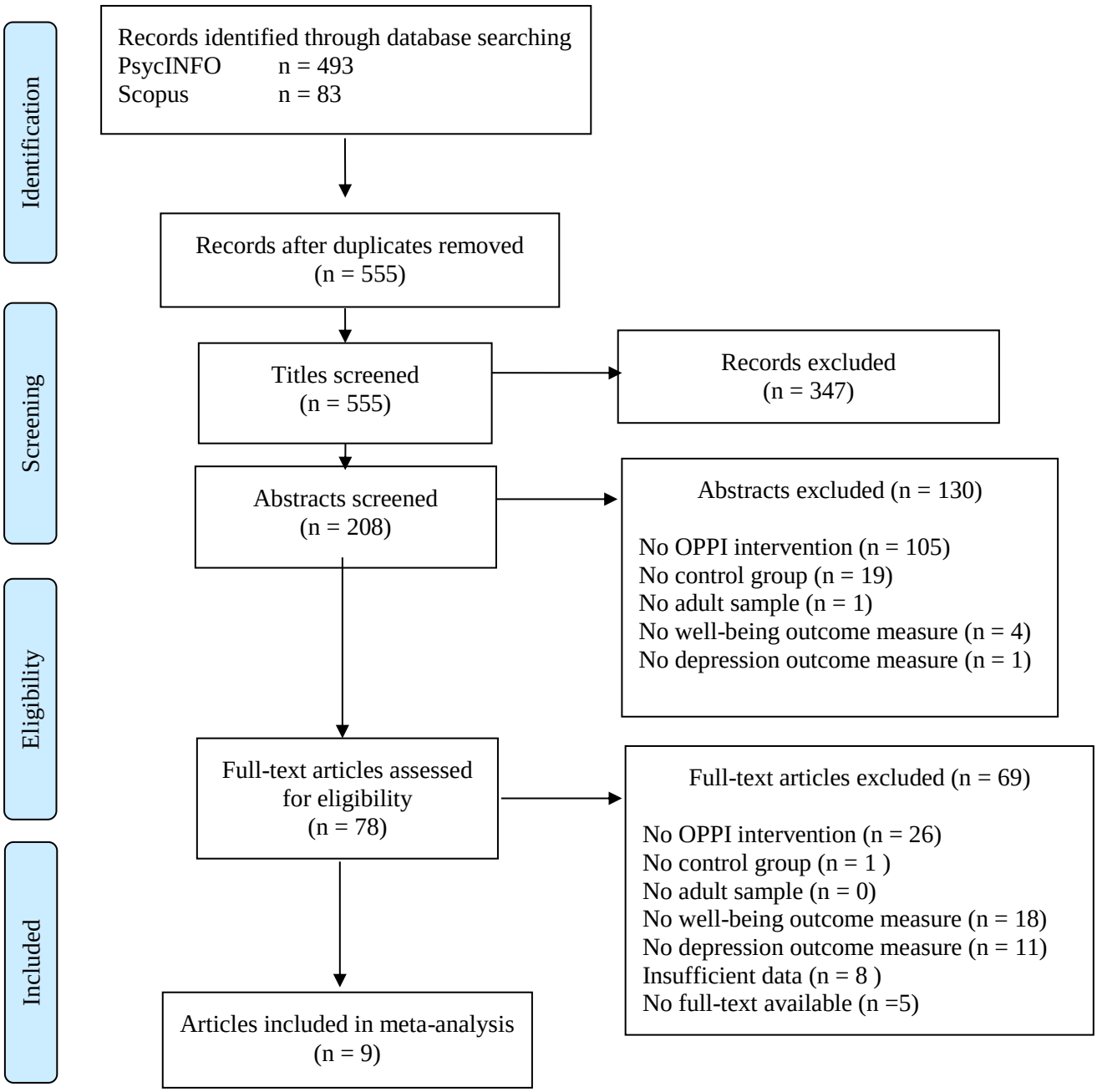

Figure 1. Flowchart of the selection process using PRISMA-statement (Moher et al., 2009).

Table 1. *Characteristics of studies included in the meta-analysis*

First author (Year)	Population, country	% female	Mean age (SD)	PPI description (*n*)	Delivery mode	Duration in weeks (n sessions)	Control group (*n*)	Outcome measure	
								WB	**DEP**
Dyrbye et al. (2016)	Practicing physicians, US	35.6	unknown	Strengths-based program (145)	Website	10 (-)	No intervention (145)	PJSS	PRIME-MD
Gander et al. (2016)	German speaking adults, Switzerland	79.2	46.13 (11.74)	- Pleasure (123) - Engagement (122) - Positive relationships (149) - Meaning (117) - Accomplishment (127) - Mix of above themes (125)	Website	1 (7)	Remembering early memories (132)	AHI	CES-D
Howels et al. (2016)	Adults, UK	85.6	40.7 (10.6)	Strengths-based with mindfulness practice (57)	Smartphone application	10 (U)	List-making app (64)	SWLS	CES-D
Matvienko-Sikar et al. (2017)	Women between 10-22 weeks pregnant, Ireland	100	33.87 (3.04)	Mindfulness and gratitude intervention (24)	Website	3 (12)	Prenatal care as usual (12)	SWLS	EPDS
Mitchell et al. (2009)	Adults, Australia	83	37 (11.2)	Strengths-based program (48)	Website	3 (3)	Problem solving (54)	PWI-A	DASS-21

Table 1. *Characteristics of studies included in the meta-analysis (continued)*

First author (Year)	Population, country	% female	Mean age (SD)	PPI description (*n*)	Delivery mode	Duration in weeks (n sessions)	Control group (*n*)	Outcome measure	
								WB	DEP
O'Leary et al. (2015)	Women, Ireland	100	28.35 (6.65)	Gratitude intervention (15)	Website	3 (12)	Waitlist (7)	SHS	EDS
Ouweneel et al. (2013)	Employees, The Netherlands	58.1	46.8 (10.0)	Strengths-based program (86)	Website	8 (25)	No intervention (225)	JAWS	-
Proyer et al. (2014)	Adults aged 50-79, Switzerland	100	55.58 (5.16)	- Gratitude intervention (30) - 3 good things (44) - 3 funny things (20) - Strengths-based program (35)	Website	1 (7)	Remembering early memories (132)	AHI	CES-D
Sergeant et al. (2014)	English speaking adults, US	65	32.75 (12.23)	Building optimism skills (253)	Website	3 (12)	Active (213)	OTH	CES-D

Note. AHI, Authentic Happiness Inventory; CES-D, Center for Epidemiologic Studies Depression Scale; DASS-21, Depression Anxiety Stress Scales Short Form; DEP, Depression; EDS, Edinburgh Depression Scale; EPDS, Edinburgh Postnatal Depression Scale; FU, follow-up; JAWS, Job-related Affective Well-being Scale; OTH, Orientations to Happiness; PJSS, Physician Job Satisfaction Scale; PRIME MD, Primary Care Evaluation of Mental Disorders; PWI-A, Personal Well-being Index – Adult; SHS, Subjective Happiness Scale; SWLS, Satisfaction with Life Scale; UK, United Kingdom; US, United States; WB, Well-being.

Population characteristics

The total number of participants was 2504, of which 1520 in the intervention groups, and 984 in the control groups. The age range of the total population sample was 18-79 years. There were three studies in which the sample consisted of only females (Matvienk o-Sikar et al., 2017, O'Leary et al., 2015, and Proyer et al., 2013). In the remaining studies, the majority of the sample was female, except for one study (Dyerbye et al., 2016). All of the studies used non-clinical, adult and healthy population samples. Most of the studies involved representative samples and 4 studies used a specific population (e.g. employees, pregnant women).

Intervention characteristics

Three central themes emerged in the interventions, namely strengths, gratitude and optimism. Five of the comparisons were strengths-based interventions, one was a combination of strengths-based and mindfulness exercises, one was a gratitude intervention, one was a combination of a gratitude intervention and mindfulness exercises, and one was focusing on building optimism skills. The majority of the OPPIs were aimed at a specific target group, such as females (n = 3) or employees (n = 3). The OPPIs for employees differed from the other studies by having concrete goal-setting assignments next to positive psychology assignments. The duration of the intervention varied from one week to ten weeks, with seven to 25 sessions. There were two studies with sessions on daily base, four studies with three to four sessions a week, one study with a session a week, and for two studies (with a duration of ten weeks) the number of sessions was unknown. All of the OPPIs were offered as self-help interventions. In all of the studies, the delivery mode was a website in which participants have their own account in which they can log in every time, except for one study, hereby the delivery mode was a phone application (Howels et al., 2016).

Methodological characteristics

In the 9 studies, there were 17 comparisons with well-being outcome measures and 15 comparisons with depressive symptoms outcome measures. Outcome measures for well-being were all emotional well-being e.g. in terms of life satisfaction, positive affect, and happiness measurements, psychological and social well-being were not represented. For depression almost all were specific depression scales (k=14) and one general mental disorders scale e.g. Primary Care Evaluation of Mental Disorders (PRIME MD). Two studies had more than one intervention groups (Gander et al., 2014; Proyer et al., 2014). All of the studies executed intention-to-treat analyses. Five studies used an active control group, in which participants received a neutral intervention, instead of a positive psychology intervention, e.g. remembering early memories. In two studies, the control group was not offered an intervention, one study used a waitlist control group, and one study had a treatment as usual control group.

3.3 Effects of OPPIs on well-being compared to control conditions

Based on 17 comparisons, OPPIs were found to have a small but significant positive effect on well-being as compared to the control groups (g = .18, 95% CI: .06 to .29, p < .001). Heterogeneity was moderate with Q (16) = 44.45 (p < .001) and I^2 = 64.00%, and no outliers were identified. The effect sizes at post-test on well-being of the individual studies and the pooled effect size are plotted in Figure 2.

Model	Study name	Statistics for each study						
		Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
	Dyrbye et al. (2016)	0,94	0,12	0,02	0,70	1,18	7,59	0,00
	Howels et al. (2016)	0,09	0,18	0,03	-0,26	0,45	0,52	0,60
	Matvienko-Sikar et al. (2017)	0,10	0,35	0,12	-0,58	0,77	0,28	0,78
	Mitchell et al. (2009)	0,05	0,20	0,04	-0,33	0,44	0,27	0,78
	O'Leary et al. (2015)	0,26	0,44	0,20	-0,61	1,12	0,58	0,56
	Ouweneel et al. (2013)	0,21	0,13	0,02	-0,04	0,46	1,67	0,10
	Proyer et al. (2014) gratitude	0,02	0,25	0,06	-0,46	0,51	0,09	0,93
	Proyer et al. (2014) 3 good things	0,29	0,23	0,05	-0,15	0,74	1,28	0,20
	Proyer et al. (2014) 3 funny things	0,01	0,28	0,08	-0,53	0,56	0,05	0,96
	Proyer et al. (2014) Signature strenghts	0,26	0,24	0,06	-0,21	0,73	1,09	0,28
	Gander et al. (2016) Pleasure	0,12	0,10	0,01	-0,07	0,32	1,23	0,22
	Gander et al. (2016) Engagement	0,14	0,10	0,01	-0,06	0,34	1,39	0,17
	Gander et al. (2016) Pos. Relationships	0,10	0,10	0,01	-0,09	0,30	1,04	0,30
	Gander et al. (2016) Meaning	0,11	0,10	0,01	-0,09	0,31	1,07	0,29
	Gander et al. (2016) Accomplishment	0,12	0,10	0,01	-0,08	0,32	1,19	0,23
	Gander et al. (2016) PERMA	0,09	0,10	0,01	-0,11	0,30	0,90	0,37
	Sergeant et al. (2014)	0,03	0,09	0,01	-0,15	0,22	0,38	0,71
Random		0,18	0,06	0,00	0,06	0,29	3,04	0,00

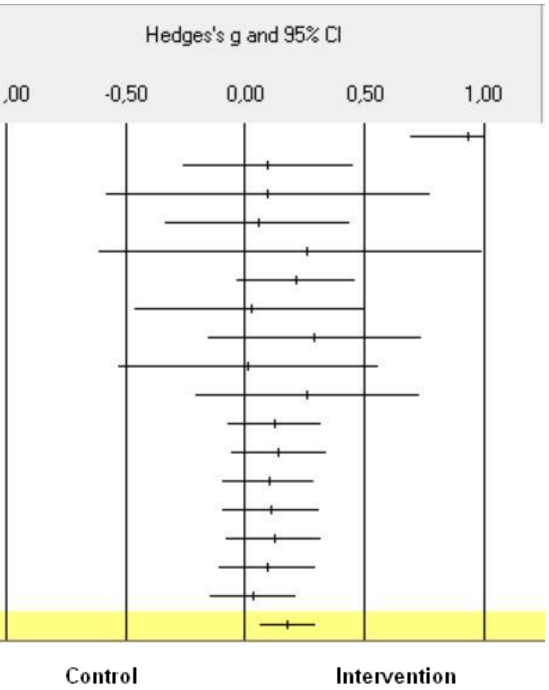

Figure 2. Post-intervention effects of OPPIs relative to control conditions on well-being.

3.4 Effects of OPPIs on depressive symptoms compared to control conditions

Random effect model results for the depressive symptoms outcome are presented in Figure 3. The pooled Hedges' *g* effect size on depressive symptoms of all 15 comparisons was .14 (95% CI=.07 to .21, $p<.001$) compared to the control groups, which indicates a significant small positive effect. There was no heterogeneity with Q(15)=13.18 ($p = .51$) and $I^2 = 0\%$.

3.6 Meta-regression analysis: moderating effects on effect sizes

As shown in Figure 4, there was a small, positive slope for the association between the duration of the OPPI and effect sizes for well-being (slope: 0.04, Z=3.25, $p<.001$). In other words, as the OPPI lasts longer in weeks, well-being increases slightly more. For depressive symptoms, no evidence was found that the effect sizes were moderated by the duration of the OPPI (slope: 0.02, Z=.83, $p=0.41$).

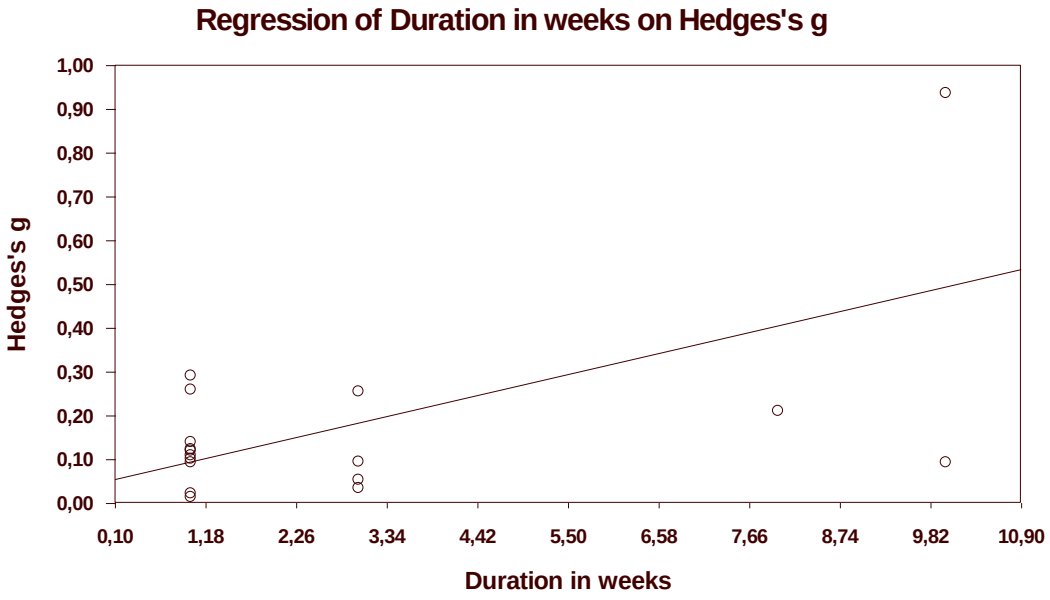

Figure 4. Meta-regression analysis of duration in weeks as predictor of the effect size in studies examining well-being.

Model	Study name	Statistics for each study						
		Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
	Howels et al. (2016)	0,33	0,18	0,03	-0,03	0,69	1,81	0,07
	Matvienko-Sikar et al. (2017)	0,25	0,35	0,12	-0,43	0,93	0,73	0,46
	Mitchell et al. (2009)	0,06	0,20	0,04	-0,32	0,45	0,32	0,75
	O'Leary et al. (2015)	0,24	0,44	0,20	-0,62	1,11	0,55	0,58
	Proyer et al. (2014) gratitude	0,03	0,25	0,06	-0,46	0,51	0,12	0,90
	Proyer et al. (2014) 3 good things	0,24	0,23	0,05	-0,21	0,68	1,04	0,30
	Proyer et al. (2014) 3 funny things	0,95	0,29	0,09	0,38	1,52	3,25	0,00
	Proyer et al. (2014) Signature strenghts	0,49	0,24	0,06	0,02	0,97	2,04	0,04
	Gander et al. (2016) Pleasure	0,11	0,10	0,01	-0,08	0,31	1,14	0,25
	Gander et al. (2016) Engagement	0,16	0,10	0,01	-0,03	0,36	1,63	0,10
	Gander et al. (2016) Pos. Relationships	0,11	0,10	0,01	-0,08	0,31	1,15	0,25
	Gander et al. (2016) Meaning	0,05	0,10	0,01	-0,16	0,25	0,45	0,66
	Gander et al. (2016) Accomplishment	0,16	0,10	0,01	-0,04	0,36	1,57	0,12
	Gander et al. (2016) PERMA	0,07	0,10	0,01	-0,13	0,27	0,68	0,49
	Sergeant et al. (2014)	0,11	0,09	0,01	-0,07	0,29	1,17	0,24
Random		0,14	0,03	0,00	0,07	0,21	4,08	0,00

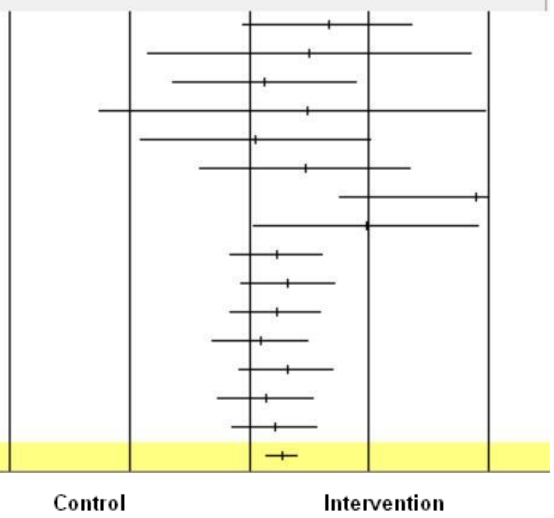

Figure 3. Post-intervention effects of OPPIs relative to control conditions on depressive symptoms.

3.7 Publication bias

Funnel plots were symmetrically distributed for well-being as well as depressive symptoms. The fail-safe *N* indicated that the findings for well-being (fail-safe N = 94, p <.001), can be considered as almost robust (5 × 17 comparisons + 10 = 95). However, The fail-safe N indicated that the findings for depressive symptoms (fail-safe N = 67, *p* <.001), can be considered as not robust (5 × 15 comparisons + 10 = 85).

4. Discussion

4.1 Main findings

This is the first meta-analysis that examines the effects of OPPIs on mental well-being and depressive symptoms. Results showed that OPPIs significantly enhance well-being and reduce depressive symptoms. Effect sizes were small (.18 for well-being, and .14 for depressive symptoms). Compared to the findings of a prior meta-analysis on PPIs (Bolier et al. (2013), effect sizes in current study were lower for emotional well-being and depressive symptoms. The included studies in this current study mainly measured changes in emotional well-being (happiness, positive emotions, life satisfaction). Possible reasons why the effects in this meta-analysis are lower are the number of studies included in the analysis and delivery mode of the PPIs (online versus face-to-face interventions).

The difference between online and face-to-face might be explained by adherence. According to Kelders et al. (2012) adherence is lower for web-based interventions compared to face-to-face interventions. Also, adherence seems to be low in self-help interventions (Schueller, 2010). Therefore, enhancing adherence could be an important factor in improving effectiveness. Self- help often takes a ‘one size fits all’ approach, which may not be appropriate

for a large sample who are not fully adhere to the OPPI. In this study, we cannot rule out that adherence played a role in the findings because it has not been addressed in this study, which could be an explanation for the lower effect sizes compared to previous meta-analysis on the effect of PPIs.

The effects were possible also underestimated because of the number of included studies was small in this study (9 studies, 17 comparisons for well-being, 15 comparisons for depressive symptoms). The publication bias were also not completely robust which ended up in may not a reliable number of comparisons in this study. The main difference in effects was the delivery mode, even if the OPPIs showed smaller effects than the PPIs, they could be valuable because of the wide reach.

The findings from this study are in line with previous studies that showed that PPIs strengthen well-being, although in other studies well-being was more defined in terms of e.g. positive affect and life satisfaction (Peterson, Flink, Boersma & Linton, 2010; Sheldon & Lyubomirsky, 2006; Seligman, Rashid & Parks, 2006), whereas in this study the outcome measure was in most included studies emotional well-being.

The findings that there are (small) effects found on well-being as well as on depressive symptoms showed that OPPIs fit with the two continua model of Keyes (2005) suggesting that psychopathology and overall well-being do not function as exact opposites. Positive mental health (e.g. well-being) and psychopathology (e.g. depressive symptoms) can be seen as two separated factors. Treatment of symptoms does not necessarily result in improved well-being (Trompetter, Lamers, Westerhof, Fledderus & Bohlmeijer, 2017). Based on the findings of this study, it is recommended to further examine the effects of well-being enhancing approaches including OPPIs.

The findings of the meta-regression analysis OPPIs indicate that larger effects on well-being were found in OPPIs with a longer duration, suggesting that it is recommended to deliver

interventions over a long period. The intervention duration varied considerably per OPPI, ranging between 1 and 10 weeks. Previous research indicates that PPIs with a longer duration are likely to yield greater gains in well-being (Sin & Lyubomyrsky, 2009; Bolier et al., 2013). Again, adherence might be an important factor that has to be addressed. It is a challenge to keep people following an OPPI. According to Sin & Lyubomyrsky (2009) this finding may be attributed to the fact that a longer intervention duration gives participants the opportunity to integrate the learned positive activities into daily life and to convert them into habits.

4.2 Limitations

The results of the current study should be interpreted carefully due to a number of limitations. Firstly, a limited number of studies were included in this meta-analysis, namely nine, with 17 and 15 comparisons for well-being and depression, respectively. There was a variety in the subgroups as regards population, duration of the intervention and recruitment method.

Secondly, this additional systematic literature review was carried out by one person. Due to a lack of a second evaluator there is a chance that relevant studies are not included in the selection process of the studies that could provide some added value to this research and that there may have been subjectivity in assessing the eligibility of the studies. The results should therefore be interpreted with some caution.

Thirdly, there was too much variability in follow-up periods, therefore no effect sizes of the change between pre-test and (longer-term) follow-up were calculated. This made it impossible to conduct follow-up analysis for the longer-term effects.

4.3 Recommendations

To further establish the effectiveness of OPPIs, more randomized-controlled trials are needed with larger and representative samples. Firstly, it is important to identify effects on all dimensions of well-being, and not only emotional well-being. The outcome measures for well-

being were all emotional well-being e.g. in terms of life satisfaction, positive affect, and happiness measurements. Reasons for this may be that existing questionnaires that measure the various domains of well-being are long (e.g. WHOQOL-100), do not measure social well-being or only contain items that measure psychopathology. Therefore it was not possible to examine the effects for the three dimensions of well-being separately, but this study gives an insight on enhancing emotional well-being using OPPIs. In follow-up research into OPPIs, it is recommended to take validated instruments that separate well-being down into emotional, psychological and social well-being, such as the questionnaire Mental Health Continuum-Short Form (MHC- SF) (Keyes, 2009).

Secondly, it is recommended that follow-up measurements be carried out after examination to verify whether effects are still present after intervention. This can be done on the basis of follow-up assessments and provide important information about to which extend the effects of interventions are maintained in the long term (Weiner, Schinka & Velicer, 2012). A minimum follow-up period of one year is recommended, although two to three years after the end of treatment appears to be a good guideline for the long-term effects of a psychological intervention (Weiner, Schinka & Velicer, 2012).

Thirdly, it is recommended to also publish studies that has non-significant findings. This way the publication bias will be reduced in this study area. The interest in interventions in the online positive psychological field is growing. However, more scientific studies are needed on general and clinical populations to determine the added value of OPPIs compared to PPIs. This could be done by RCTs with one group receiving an OPPI, one group with PPI with the same themes and intervention, and one control group.

Fourthly, standards for reporting studies should also be given more attention, for example by reporting and following randomized controlled trials according to the CONSORT statement (Altman, 1996). In the CONSORT statement recommendations were made with

regard to the reliability of the sample in a RCT. It states that prior to a study the size of a sample must be calculated and the conditions that this sample must meet must be determined. The CONSORT criteria are important because it increases the quality of studies and it makes studies comparable (Cuijpers, 2016).

4.3. Conclusion

This is the first meta-analysis in the field of psychology that examines the effect of OPPIs on well-being and depressive symptoms in non-clinical samples. It provides evidence that OPPIs are effective in enhancing well-being and reducing depressive symptoms. The findings of this study an important step towards more research in this area.

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