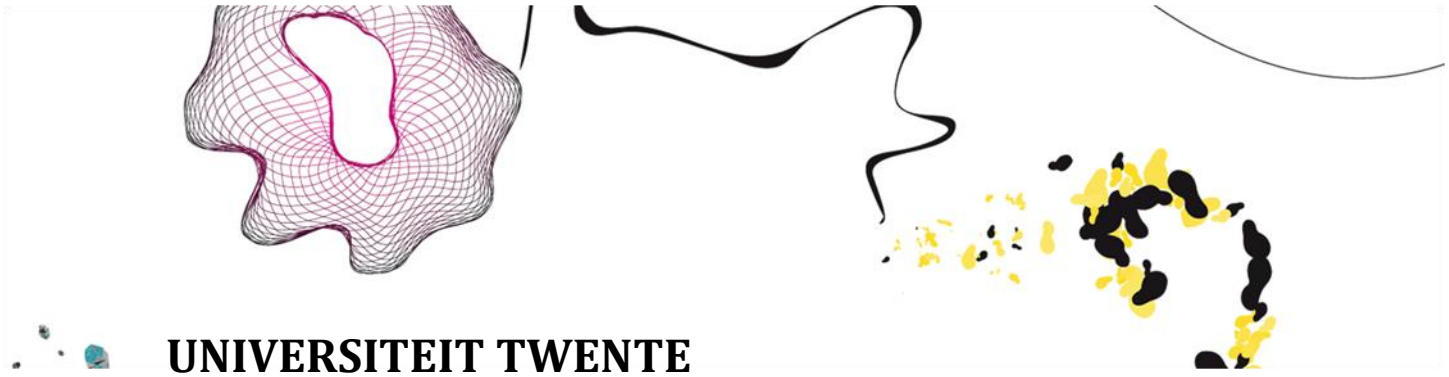

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A meta-analysis of randomized controlled interventions aimed at improving psychological well-being.

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27 november 2012

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Abstract English

In this meta-analysis it is examined what the mean effect is of interventions aimed at improving psychological well-being as conceptualized by Ryff and measured by 'Ryff's psychological well-being scale' (Ryff's PWBS). The four databases Pubmed, Psycinfo, The Cochrane Library and Embase were searched for studies in which the effect of an intervention was measured by Ryff's PWBS or the 'mental health continuum – short form' (MHC-SF) and in which the research design was a randomized controlled trial. Analysis of the data showed the mean effect size Cohen's *d* = 0.47, which implies a medium effect of the interventions on psychological well-being. Psychological well-being is part of the complete measure of positive mental health which also includes emotional and social well-being. In this article it is argued that it is important that outcome measures of intervention research cover both mental illness and positive mental health. When this is the case, as the two-continua model of mental health implies, a more complete image of mental health can be formed.

Abstract Dutch

In deze meta-analyse wordt onderzocht wat het gemiddelde effect is van interventies die zich richten op het verbeteren van psychologisch welbevinden, zoals bedacht door Ryff en gemeten met haar 'Ryffs psychological well-being scale' (Ryff's PWBS). De vier databases Pubmed, Psycinfo, The Cochrane Library en Embase werden doorzocht voor geschikte studies. Deze werden geïncludeerd wanneer het effect van een interventie werd gemeten met Ryffs PWBS of 'mental health continuüm – short form' (MHC-SF) en het onderzoeksdesign een gerandomiseerde en gecontroleerde test was. Een data-analyse liet een gemiddeld effectmaat Cohens *d* zien van 0.47, wat duidt op een medium effect van de interventies op psychologisch welbevinden. Psychologisch welbevinden is deel van de complete meetschaal van positieve geestelijke gezondheid, welke wordt gemeten met de MHC-SF. In dit artikel wordt besproken dat het belangrijk is om uitkomstmaten van interventieonderzoek te richten op zowel mentale klachten en positieve geestelijke gezondheid. Dan kan er, zoals het twee-continua model van geestelijke gezondheid impliceert, een completer beeld van de geestelijke gezondheid worden gevormd.

Introduction

The concept of mental health has changed. Nowadays, mental health is often perceived as more than the absence of mental illness (Keyes, 1998, 2002, 2007). This is in line with the World Health Organization's (WHO, 2005) definition of *health* as "… a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (p. XVIII) and *mental health*, which is defined as:

> "… a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2005, p. XVIII)

In accordance with their definition of mental health, the research and recommendations of the World Health Organization do not only concern the absence of illness, but regard positive mental health as well. The two continua model of mental health shows that positive mental health and mental illness are not opposite ends of a single continuum but rather correlated distinct dimensions (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011; Keyes, 2005; Keyes et al., 2008; Westerhof & Keyes, 2009). This means that someone can be mentally ill and (moderately) well at the same time. When describing or measuring a complete image of mental health, positive mental health has to be taken into account in addition to mental illness. In psychological literature it is argued that positive mental health consists of three factors and is best measured with measures of emotional, psychological and social well-being (Keyes, 1998, 2002). These three factors fit the classic philosophical tradition in its heydays when the difference was described between a hedonic and eudemonic inclination of a well lived life (among others Ryff, 1989; Ryff & Singer, 2008). The hedonic tradition refers to short term feelings or moods of happiness (emotional well-being) and the eudemonic tradition concerns optimal functioning in individual and social life (psychological and social well-being). This meta-analysis is solely about outcome measures of individual psychological well-being as was conceptualized by Ryff (1989, 1995). It is important to measure psychological well-being for evaluating psychological interventions, because it does not focus exclusively on happiness or illness, but examines whether the individual functioning has been influenced. Ryff's concept of psychological well-being consists of six dimensions: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life and personal growth (for explanation see table 1). The six-factor model (Ryff, 1989, 1995) and scale (Ryff, 1989, 1995; Ryff, Keyes & Hughes, 2003) of psychological well-being have been validated in large and various samples of American adults. Ryff (1989) began her search for a model that covers a complete spectrum of psychological well-being by first studying the philosophical eudemonic tradition. She was inspired by Aristotle's central point of view concerning eudemonia that "the ultimate aim in life is to strive to realize one's true potential" (Ryff & Singer, 2008, p.18). This central point was accompanied by the merits outlined as "finding the middle ground between excess and deficiency" (Ryff & Singer, 2008, p.18) and "making the most of one's talents and capacities" (Ryff & Singer, 2008, p.18). Ryff was educated as a life span developmental psychologist and had a humanistic interest. She completed the six-factor model by

Table 1

Definitions of the six dimensions of psychological well-being

Self-Acceptance	A psychological well person has a positive attitude toward the self; acknowledges and accepts multiple aspects of the self, including good and bad qualities; feels positive about past life.
Positive Relations With Others	A psychological well person has warm, satisfying, and trusting relationships with others; is concerned about the welfare of others; capable of strong empathy, affection, and intimacy; understands give and take of human relationships.
Autonomy	A psychological well person is self-determining and independent, able to resist social pressures to think and act in certain ways, regulates behavior from within, evaluates self by personal standards.
Environmental Mastery	A psychological well person has a sense of mastery and competence in managing the environment, controls complex array of external activities, makes effective use of surrounding opportunities, able to choose or create contexts suitable to personal needs and values.
Purpose in Life	A psychological well person has goals in life and a sense of directedness, feels there is meaning to present and past life, holds beliefs that give life purpose, has aims and objectives for living.
Personal Growth	A psychological well person has a feeling of continued development, sees self as growing and expanding, is open to new experiences, has sense of realizing his or her potential, sees improvement in self and behavior over time, is changing in ways that reflect more self-knowledge and effectiveness.

Note. The definitions are cited from Ryff (1989, p. 1072). For readability "High scorer:" is replaced with "A psychological well person".

including ideas about human growth and development in different life stages from the works of psychologists such as Bühler, Erikson, Neugarten, Rogers, Frankl, Maslow, and Jung.

Later, Keyes (1998) created a model and measure of social well-being that fit the eudemonic tradition and the WHO's definition of optimal functioning in the community or social life. Inspired by earlier research into emotional well-being or happiness, he developed a model of the full range of positive mental health which comprises emotional (life satisfaction and positive affect), psychological (realizing one's potential and individual functioning) and social (the circumstances of and functioning in society) well-being (Keyes 2002; Keyes 2005; Keyes, 2006). Positive mental health can be measured with the 'mental health continuum – short form' (MHC-SF), which has been validated by large samples of different cultures, amongst them Dutch adults (Lamers, Glas, Westerhof, & Bohlmeijer, 2012; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011), French physically active old adults (Salama-Younes & Ismaïl, 2011) and Setswana speaking South-Africans (Keyes et al., 2008). In the MHC-SF, the subscale of psychological well-being is based on the six dimensions of

Ryff's PWBS and is comprised of one question per dimension instead of the multiple items which were used in the original and short version. Since the six items in the MHC-SF measure psychological well-being as a whole construct, we included this subscale in our meta-analysis as this study does not examine the six dimensions separately.

In the last fifteen years, positive mental health has received more attention in scientific research (Westerhof & Bohlmeijer, 2010, p. 35) and the medical model of mental health, which focuses on the absence of psychological complaints or mental illness, did not seem completely appropriate (Keyes, 2002, 2005; World health organization, 2005). A meta-analysis by Sin & Lyubomirsky (2009) on positive psychology interventions showed that there are effective positive psychology interventions in various forms (for example engaging in enjoyable events and replaying positive events) that enhance well-being and decrease depressive symptoms. Well-being was measured by various scales, all based on different foundations or philosophies of the concept of 'well being'. Most of the scales focus on emotional well-being, happiness, hope or satisfaction with life. The effectiveness of the positive psychology interventions was also determined by the extent that depression was decreased. Though the meta-analysis of Sin and Lyubomirsky (2009) evaluated the effectiveness of positive psychology interventions, they did not specifically look into positive mental health or psychological well-being as conceptualized above. Ever since evidence based psychology interventions became the norm, effectiveness has been determined by the decrease of mental illness (Snyder & Lopez, 2009) or vague measures of 'well-being' (Slade, 2010). When the focus of mental health care and scientific research into mental health shifts from decreasing illness to increasing well-being as well, a stable measurement that incorporates the complete spectrum of positive mental health is needed (Slade, 2010). Complete mental health signifies the absence of illness and the presence of positive mental health and is associated with many benefits, for example better functioning at work, better psychosocial functioning and a lower risk of cardiovascular disease (Keyes, 2007). Countless studies evaluated the decrease of mental illness after an intervention. The question that remains is whether positive mental health is also influenced by interventions. In this meta-analysis the mean effect size of interventions aimed at improving psychological well-being as measured by Ryff's PWBS was studied. We focused on Ryff's PWBS, because it has been used more frequently in the last decade than the complete measure of positive mental health, the MHC-SF, which has been recently developed and validated. Included studies had to be a randomized controlled intervention that was evaluated by Ryff's PWBS or MHC-SF as a primary of secondary outcome measure.

Method

Search strategy

A main criterion for including studies was the use of outcome measure Ryff's PWBS or MHC-SF in which all six dimensions of psychological well-being were measured and subscales were not used exclusively. Furthermore, studies were eligible if an intervention was evaluated and the research design was an RCT. There was no restriction for specific participant samples or interventions. Books, non-English articles and dissertations were not included after thorough consideration.

For this meta-analysis we searched through four databases, respectively Pubmed, Psycinfo, The Cochrane Library and Embase in March and April 2012. Keywords were entered into the database according to its instructions. In all texts we used keywords that screened for 'psychological well-being', 'eudemonic well-being', or 'Mental Health Continuum' in all its orthographies. We combined these all-text-keywords with keywords that only searched in titles with boolean operator 'and'. In the titles we searched for all orthographies or possible additions to the terms 'intervention', 'therapy', 'program', 'treatment', 'project' or 'effect'. Table 2 displays the exact search strings and screened hits per database. Along with the database search, the reference list of the meta-analysis of Sin and Lyubomirsky (2009) was screened for articles that measured with Ryff's PWBS or MHC-SF.

The 2.324 hits from the database search were screened by two researchers, a graduate student and a PhD student in psychology. At first, it was determined whether a study would be

Table 2

Database search

Database	Hits	Search string
Pubmed	63	((psychological well being?) OR (psychological well-being) OR (eudaimonic well-being) OR (eudemonic well-being) OR (eudaemonic well-being) OR (Ryff) OR (Mental Health Continuum)) AND ((intervention$) OR (RCT) OR (therap$) OR (program$) OR treatment OR project OR effectiv$))[Title]
Psycinfo	543	TX All Text: psychological well being/ OR psychological well-being OR eud?monic well-being OR Ryff OR Mental Health Continuum TI Title: intervention$ OR RCT OR therap$ OR program$ OR treatment OR project OR effectiv$
The Cochrane Library	699	Search All text: psychological well being/ OR psychological well-being OR eud?monic well-being OR Ryff OR Mental Health Continuum Record Title: intervention$ OR RCT OR therap$ OR program$ OR treatment OR project OR effectiv$
Embase	1019	((psychological well being/ OR psychological well-being OR eud?monic well-being OR Ryff OR Mental Health Continuum).mp) AND ((intervention$ OR RCT OR therap$ OR program$ OR treatment OR project OR effectiv$).ti)

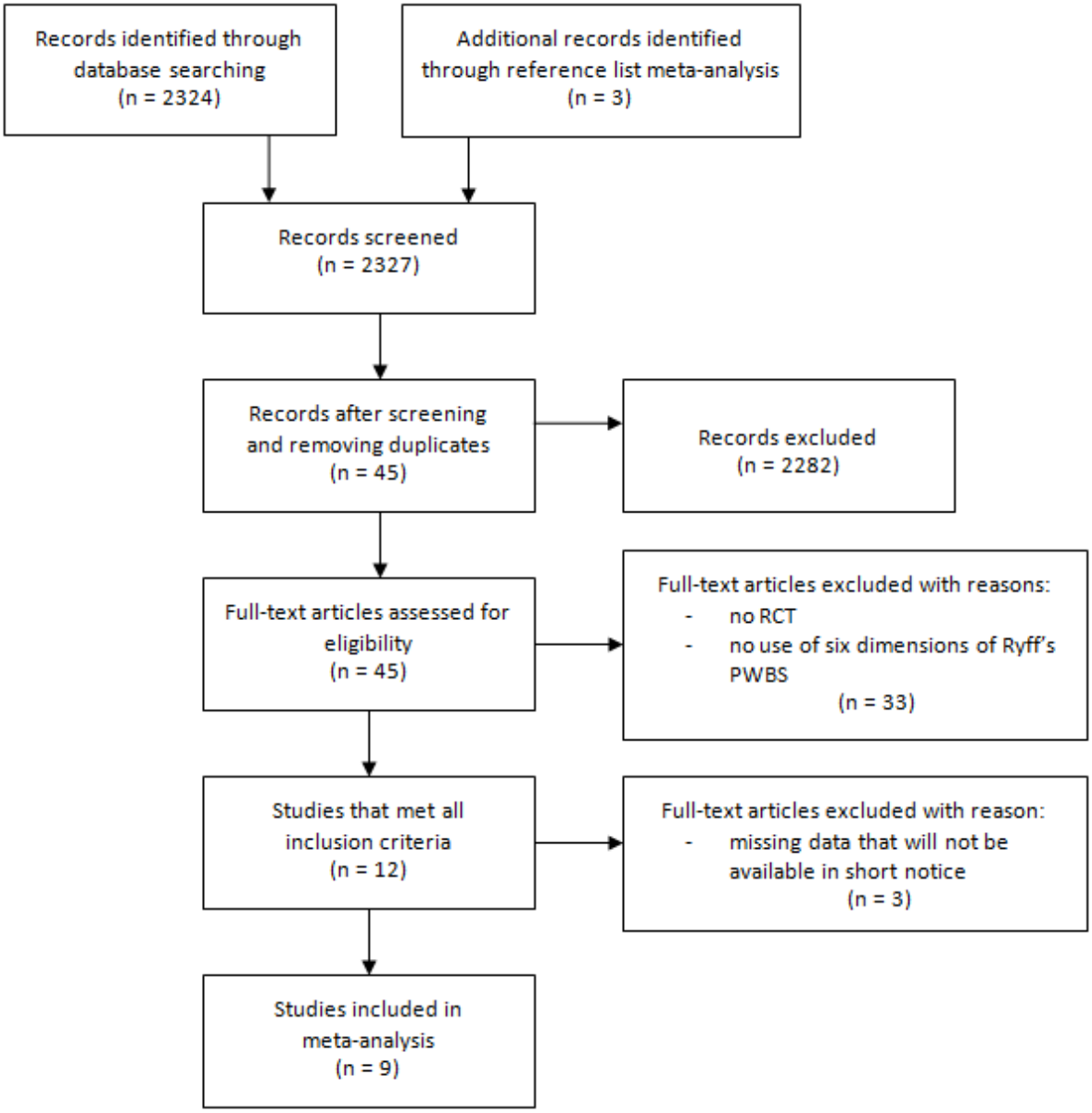
included if it contained an intervention measured with Ryff's PWBS or MHC-SF by screening the title and abstract. Since the researchers divided parts of the screening, they at first both screened the Pubmed hits for an inter-rater reliability check. After disagreements were solved their second screening of Psycinfo hits also failed good consistency. After solving disagreements again, the third inter-rater reliability check had a good match and the researchers continued their screening of the database hits independently.

When the database hits were screened for possible inclusion into this study, duplicates were removed and full articles were assessed for eligibility by research design. It was first decided that foreign articles were included, though most had an English copy published and were thus removed as a duplicate. Most dissertations were not available as full-text versions (anymore), so unfortunately these were excluded from the meta-analysis. Eventually, twelve studies met all inclusion criteria. In this study only nine articles were actually used in the statistical analysis, because of missing data that hopefully will be provided by the authors we contacted, but will not be available in the near future. Figure 1 summarizes the database hits, exclusion and final inclusion in a flow diagram.

Statistical analysis

In this meta-analysis only the post-test effects were analyzed, because most studies did not have a follow-up. For the statistical analysis the guidelines of Lipsey and Wilson (2000) were applied for manually meta-analyzing the post-test effect sizes. First, the standardized mean difference Cohen's *d* was computed from the intervention and control group post-test means and standard deviations. Secondly, for each *d* an SE was computed in order to calculate the fixed weight w_k, that affects the effect a single study has on the overall mean standardized mean effect size. A fixed effect assumes that all variability between the effect sizes is due to sampling error. It is possible that the variability between the effect sizes follows a certain distribution that is not measured or taken into account in the analysis. To find out whether this is the case, a homogeneity test was done. This test showed that heterogeneity is present, $Q(9) = 29.44$, $p < .001$, which means that the variability of the effect sizes of the included studies is more than expected on the basis of sampling error alone. Therefore, a random effects weight w_{k*} was also calculated. This random effects weight is based on the degree of heterogeneity, which suggests that moderator variables across the included studies may have an influence on the treatment effects. Ultimately, the fixed and random mean standardized effect sizes *d* were computed. The random effect was regarded as the principal outcome for interpretation, because of the possibility that moderator variables account for sample error and the fixed effect analysis did not calculate that. For interpretation Cohen's rule-of-thump was used: an effect size of 0.2 is small, 0.5 is medium and 0.8 is large.

Figure 1. Flow chart



Some analyzed studies did not include a total score of Ryff's PWBS, but only used the six subscale scores separately. For these studies a small fixed effects meta-analysis of the standardized mean differences of the six separate subscales was done.

The risk of publication bias was estimated using a funnel plot and a fail-safe N test. The best way to do a funnel plot is with a standard error on the vertical axis and treatment effect on the horizontal axis (Sperne & Egger, 2001). When studies are scattered symmetrically around the 95% confidence interval funnel plot, publication bias is absent. If the distribution is skewed, this difference may be due to publication bias, low methodological quality of smaller studies or heterogeneity in treatment effects. A fail-safe N addresses the file drawer problem, which concerns

the bias that positive results are more likely to be published than null-findings. Rosenberg's classic fail-safe N "…indicates the number of nonsignificant, unpublished (or missing) studies that would need to be added to a meta-analysis to reduce an overall statistically significant observed result to nonsignificance" (Rosenberg, 2005, p. 464). When this number of studies is large compared to the included studies, the mean effect size can be interpreted rather safely.

Results

See Table 3 for descriptives of the twelve included studies. In this meta-analysis it is examined what the mean effect is of interventions aimed at improving psychological well-being. See Table 4 for the values of Cohen's *d* of the analyzed studies, the SE, and the fixed and random effect weights w_k and w_{k*}. The mean fixed effect size of all analyzed studies was $d = 0.34$, $p < .001$, SE = 0.074, 95% CI [0.20, 0.49], the random effect size analysis gave $d = 0.47$, $p = .001$, SE = 0.14, 95% CI [0.19, 0.74]. These results indicate that there is an effect of the interventions in a fixed effect meta-analysis that is between small and medium and a close to medium effect for the random effect analysis.

The studies that were initially included in the meta-analysis but lacked significant data for the final analysis reported different effects of the interventions on psychological well-being or positive mental health. The study of Giannopoulos and Vella-Brodrick (2010) compared five different interventions with a control group. The interventions had a between small and medium ($d = -0.379$, $d = -0.441$), medium ($d = -0.572$), or large ($d = -0.855$) negative or an insignificant ($d = 0.024$) effect on positive mental health as measured by the MHC-SF. Like Korte et al. (2011), who also measured with the MHC-SF, no separate data for the psychological well-being subscale was given. It should be noted that the intervention that was evaluated by Korte et al. (2011) had a positive effect size $d = 0.29$, which implies a between small and medium positive effect of the intervention on positive mental health. Goldstein (2007) reported large pre-post test standardized effect sizes in the intervention group ($d = 1.695$) and control group ($d = 2.217$) on Ryff's PWBS, but did not report means exclusively and thus the intervention and control effects cannot be statistically compared.

To check for publication bias a funnel plot was made and a fail-safe N was calculated. The funnel plot showed a skewed distribution. That means that publication bias was likely, which had to be taken into account by interpreting the results. Rosenberg's classic fail-safe N revealed that a number of 17.1 missing studies is needed for the meta-analysis' effect size to become non-significant ($\alpha < .05$). Our meta-analysis included nine studies and this implies that the results of the meta-analysis could be discussed with some more confidence, also when considering the skewed funnel plot.

Table 3

Descriptives of the included studies for a meta-analysis of interventions measures with outcome measure psychological well-being

Study name	Outcome Measure	N	Participants	Intervention	Control group	Intervention duration[a]	Intervention duration[b]
Fava et al. (1998)	Ryff's PWBS	20	Former diagnosed and treated affective disorders with residual symptoms	WBT	CBT	5⅓	16
Fava et al. (2005)	Ryff's PWBS	20	Diagnosed with generalized anxiety disorder	CBT + WBT	CBT	5⅓	16
Fledderus et al. (2010)	MHC-SF subscale PWB	93	Mild to moderate psychological distress	ACT+ mindfulness	Waitlist	16	9
Giannopoulos and Vella-Brodrick (2010)	MHC-SF subscale PWB	218	Self-selected online community sample	Developing attention to pleasure, engagement or meaning or a combination in daily events	Daily events without specific focus and a waitlist	N/A	1
Goldstein (2007)	Ryff's PWBS	73	Non-flourishing volunteers	Instruction to cultivate sacred moments	EW	N/A	3
Green et al. (2006)	Ryff's PWBS	56	Adults without psychopathology	Cognitive behavioral solution-focused coaching	Waitlist	c. 16	10
Hickson et al. (2007)	Ryff's PWBS	178	Older adults with mild or moderate hearing impairment	ACE program	Placebo social program	10	5
Korte et al. (2011)	MHC-SF subscale PWB	202	55* with moderate depressive symptoms	Life review therapy	CAU	16	13.5
Lee and Bang (2010)	Ryff's PWBS	75	Woman with depressive mood	MBCT + self compassion	Waitlist	20	8
Ruini et al. (2006)	Ryff's PWBS	111	High school students	WBT	CBT	8	8
Spence and Grant (2007, study 1)	Ryff's PWBS	37	Adults without psychopathology	Professional cognitive behavioral solution-focused coaching	Waitlist	6⅔	10
Spence and Grant (2007, study 2)	Ryff's PWBS	37	Adults without psychopathology	Peer coaching sessions	Waitlist	6⅔	10
Tomba et al. (2010)	Ryff's PWBS	162	High school students	WBT	Anxiety-management Protocol	12	6

Note. Ryff's PWBS = Ryff's psychological well-being scale; MHC-SF subscale PWB = mental health continuum – short form subscale psychological well-being; WBT = well-being therapy; CBT = cognitive behavioural therapy; ACT = acceptance and commitment therapy; ACE program = active communication education program; MBCT = mindfulness-based cognitive therapy; EW = emotional writing; CAU = care as usual.

[a]in hours.

[b]in weeks.

Table 4

Standardized mean differences and accompanying statistics of the nine individual studies and meta-analysis

Study name	*d*	SE	w_k	w_k^*
Fava et al. (1998)	0.329	0.450	4.933	3.112
Fava et al. (2005)	1.344	0.554	3.264	2.353
Fledderus et al. (2010)	0.530	0.221	22.422	6.127
Green et al. (2006)	0.657	0.290	11.862	4.929
Hickson et al. (2007)	0.220	0.152	43.290	7.057
Lee and Bang (2010)	1.341	0.286	12.240	4.993
Ruini et al. (2006)	-0.227	0.189	27.933	6.477
Spence and Grant (2007, study 1)	0.598	0.337	8.795	4.305
Spence and Grant (2007, study 2)	0.567	0.336	8.834	4.314
Tomba et al. (2010)	0.164	0.157	40.323	6.974

Note. *d* = Cohen' *d*; SE = standard error; w_k = fixed effect weight; w_k^* random effect weight.

Discussion

Outcomes

This meta-analysis is carried out to examine the mean effect of interventions aimed at psychological well-being as measured by Ryff's PWBS. The interventions of the analyzed studies showed a medium effect on psychological well-being. The interventions that confirmed a positive effect diverged from well-being therapy (Fava et al., 1998; Fava et al., 2005; Tomba et al., 2010) to mindfulness and acceptance based therapies (Fledderus et al., 2010; Lee & Bang, 2010), a form of cognitive behavioral coaching (Green et al., 2006; Spence & Grant, 2007), and a specific program directed at active communication (Hickson et al., 2007). Of the analyzed interventions with positive effect on the overall analysis, most were not primarily directed to increasing psychological well-being or positive mental health, but were used as a secondary outcome measure in addition to measures of psychological complaints or psychopathology. Exceptions were the research of Fava et al. (1998), Fava et al. (2005), and Tomba et al. (2010), which primarily aimed to enhance psychological well-being in addition to the decrease of psychological complaints or psychopathology, and Hickson et al. (2007) where the intervention was directed to improve coping with hearing and communication impairments. The researched populations were very different in all studies, but most of them were receptive for an intervention and reported a higher rate of psychological well-being. These were elderly people with depressive symptoms (Korte et al., 2011) or mild to moderate hearing impairment (Hickson et al., 2007), adults with anxiety or depression symptoms (Fledderus et al., 2010; Lee & Bang, 2010) or psychopathology (Fava et al., 1998; Fava et al., 2005), adults without psychopathology (Green et al., 2006; Spence & Grant, 2007) or high school students (Tomba et al.,

2010). One study included in the meta-analysis reported a small negative effect on psychological well-being (Ruini et al., 2006). This study used an intervention close to the research of Fava et al. (1998), Fava et al. (2005), and Tomba et al. (2010), which was used by Ruini's et al. (2006) as well. The aforementioned studies exclusively aimed to improve psychological well-being, but Ruini's et al. (2006) did not report positive outcomes on the Ryff's PWBS in comparison to the control group contrary to the results of the other studies with a similar intervention design. Both the well-being therapy intervention from the experimental group and the cognitive behavioral control group reported a significant pre-post test effect. A cause for this outcome could be the preliminary design of this study for an intervention aimed at high school students. The subsequent study of Tomba et al. (2006) that was aimed at high school students as well did show a small positive effect of the well-being intervention in comparison to a cognitive behavioral intervention.

The non-analyzed studies reported different effects on psychological well-being or positive mental health. The study of Giannopoulos and Vella-Brodrick (2010) reported small, medium and large negative effects on the MHC-SF after the interventions in comparison to the control group without intervention. This negative effect could be due to inadequate sampling, because the pretest and posttest scores of the MHC-SF showed differences in the interventions and control groups. The control group scored higher on the MHC-SF both before and after the intervention. Korte's et al. (2011) study reported a positive effect of the intervention on the MHC-SF, which is in line with the result of the meta-analysis on psychological well-being. The study of Goldstein (2007) showed very large effects in the results of Ryff's PWBS in the experimental group and in the control group. It seems that the intervention Goldstein (2007) chose as the experimental one was as effective as the control group intervention. Her results even showed a higher effect size in the control group than in the experimental group.

Hence, most studies included in the meta-analysis showed a positive effect on psychological well-being and the one that did not only had a small negative effect which could be due to a justified reason. Results from the studies that were not analyzed showed different results. One was in line with the meta-analysis results. The two studies that could probably have a negative influence on the mean effect size when included in the analysis are likely to have a mediocre study design or off target selection of intervention in the control group.

Limitations

There are several limitations that are worth paying attention to while interpreting the results. Firstly, there are critics of the six-factor model of psychological well-being that reject the multidimensionality of Ryff's PWBS, because of high factor correlations (Springer and Hauser 2005; Springer, Hauser & Freese, 2006). Ryff and Singer (2006) pleaded that the model of psychological well-being does have six-factors because the separate dimensions correlated highly with similar

psychological, sociodemographic and biological concepts. They thought that the criticism on their methodology was valuable but not significant enough to question the six-factor model. Secondly, it has to be noted that despite of the relatively high number of studies that is necessary to make the mean effect size nonsignificant, the results of the study should still be interpreted carefully. It is very likely to miss studies in a database search due to omitted keywords and inadequate search strategies. Dissertations were not included and the possibility of unpublished null-findings is present. Also, the funnel plot showed a skewed distribution that suggests possible publication bias, low methodological quality of smaller studies or heterogeneity in treatment effects. Results of the heterogeneity test indeed pointed to a very present heterogeneity which means moderator variables may have an influence on the treatment effects. Thirdly, there is the lack of a moderator analysis and, fourthly, the absence of a quality of study assessment. A moderator analysis gives more information about factors that may have an influence on the effect of the intervention which could be clinically useful and could possibly reduce heterogeneity, for example, the duration of the intervention, the sort of intervention, the kind of control group and the type of participants could have a substantial part in the heterogeneity and could decrease or increase an intervention effect. In addition, the quality of the study could be a moderator in de meta-analysis. Inefficient studies could have less statistical power that enhance the risk of bias. Fifthly, there is no analysis of the follow-up data. A meta-analysis of the follow-up scores could have given more information about the durability of the mean intervention effect.

Conclusion

The medium effect size of this meta-analysis of interventions aimed at improving psychological well-being contributes to the research of psychological well-being and positive mental health. It shows that various interventions affect psychological well-being. For health care providers it is a good sign that different kinds of interventions are able to influence psychological well-being, which is a component of positive mental health. This is important, as the two-continua model of mental health implies that positive mental health has to be taken into account in addition to mental illness (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011; Keyes, 2005; Keyes et al., 2008; Westerhof & Keyes, 2009).

Future intervention research and prospective meta-analyses should examine the influence of an intervention by measuring mental illness and positive mental health (which psychological well-being is a part of). It will then be possible to see whether the intervention contributes to positive mental health as well. When the intervention does not contribute, it should be adjusted until an effect on positive mental health is discernible, since positive mental health changes predict changes in psychopathology later in time (Lamers, Westerhof, Glas, & Bohlmeijer, 2012). Also emotional well-being (being a part of positive mental health) is beneficial for recovery and survival of psychically ill

patients (Lamers, Bolier, Westerhof, Smit, & Bohlmeijer, 2011). As was mentioned in the introduction, complete mental health, which comprises absence of mental illness and presence of positive mental health, has many benefits for the individual functioning and mental and physical health (Keyes, 2007). Through this study it is shown that psychological interventions have a significant effect on psychological well-being. It is important that more research is aimed at outcome measures of both mental illness and positive mental health. A complete image of the mental health can then be formed, which will result in a flourishing individual and will have fortunate consequences for psychopathology and psychical illness.

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Studies preceded by an asterisk were included in the meta-analysis.

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