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Published version

SUTIPAN, Pitchada, INTARAKAMHANG, Ungsinun and MACASKILL, Ann (2016). The impact of positive psychological interventions on well-being in healthy elderly people. Journal of Happiness Studies.

The impact of Positive Psychological Interventions on well-being in healthy older adults

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Abstract

This systematic review aims to evaluate the impact of Positive Psychological Interventions (PPIs) on well-being in healthy older adults. Systematic review of PPIs obtained from three electronic databases (PsycINFO, Scopus, and Web of Science) was undertaken. Inclusion criteria were: that they were positive psychology intervention, included measurement of well-being, participants were aged over 60 years, and the studies were in English. The Cochrane Collaboration Guidelines dimensions of quality control, randomization, comparability, follow-up rate, dropout, blinding assessors are used to rate the quality of studies by two reviewers independently. The RE-AIM (Reach, Efficacy, Adoption, Implementation, and Maintenance) for evaluation of PPIs effectiveness was also applied. The final review included eight articles, each describing a positive psychological intervention study. The reminiscence interventions were the most prevalent type of PPIs to promote and maintain well-being in later life. Only two studies were rated as high quality, four were of moderate-quality and two were of low-quality. Overall results indicated that efficacy criteria (89%), reach criteria (85%), adoption criteria (73%), implementation criteria (67%), and maintenance criteria (4%) across a variety of RE-AIM dimensions. Directions for future positive psychological research related to RE-AIM, and implications for decision-making, are described.

Keywords: Positive psychological intervention; well-being; older people**;** RE-AIM; Systematic review

The impact of Positive Psychological Interventions on well-being in healthy older adults

Introduction

Globally, the elderly are an increasing proportion of the population (Population Reference Bureau 2014). For instance, the proportion of older adults in Japan is expected to increase from around 23 percent in 2010 to 40 percent in 2060 (National Institute of Population and Social Security Research 2014). However, older people aged 60 years and above are increasingly confronted with decline and loss of physical functions (Baird et al. 2010) and chronic diseases which are closely associated with negative psychological health outcomes (Shtompel et al. 2014; Steptoe et al. 2014). This decline in psychological health although often just below the threshold of clinical diagnosis, leads to a significant risk of impaired well-being and quality of life (Corcoran et al. 2013). On the other hand, previous studies show that positive psychological characteristics (e.g., positive emotions, optimism, positive relationships, and having a purpose in life) were significantly related to better health outcomes (Park et al. 2004). For example, in a longitudinal study of older people in the United States, optimism predicted a lower likelihood of stroke after controlling for chronic illnesses, sociodemographic, and psychological factors (Kim et al. 2011). To summarise, addressing the health needs of the ageing population has become an important issue to address worldwide. Interventions to promote the health and well-being of the elderly and reduce mental illness and slow down decline are necessary for the quality of life of this population as well as to ameliorate health care costs.

Well-being

The concept of well-being is a complex construct that refers to the presence in an individual's life of pleasurable subjective experiences, meaningful activities and social relationships that allow for the fulfilment of his/her human potential (Ryan and Deci 2001). For older adults, the absence of disease (Bookwala et al. 2003) or psychological problems and deficits (Ormel et al. 1998) is not the only method of defining well-being, others include having access to interesting activities (Litwin and Shiovitz-Ezra 2006), financial security (Lusardi and Mitchell 2005), and it has also been defined as an outcome of positive individual resources (Seligman 2002). While there is still debate on the operationalization of the concept of well-being (Biswas-Diener et al. 2009; Sirgy and Wu 2009). One conceptualization of well-being by Ryan, Huta, and Deci (2008) is increasingly accepted. This involves two components, hedonic or subjective well-being and eudemonic well-being. Hedonic well-being includes a cognitive measure of satisfaction with life and affective measures of positive and negative affect, with well-being associated with greater life satisfaction and a higher ratio of positive to negative affective experiences. (Kahneman et al. 1999). Eudaimonic well-being refers to aspects of life that contribute to

the experience of having a meaningful life and human flourishing (e.g., self-realization, positive relations, autonomy, purpose in life; Ryan et al. 2008). An evaluation of well-being measurement revealed a range in multidimensionality, with measures defining well-being as primarily hedonic, eudaimonic, or a combination of both (Huta and Ryan 2010). Previously, most studies measured only hedonic well-being using the satisfaction with life scale (Diener et al.1985), and the positive and negative affect schedule (Watson et al. 1988). The smaller number of studies that measured eudemonic well-being has tended to use the psychological well-being scale (Ryff 1989) and occasionally the values in action inventory of strengths (Peterson and Seligman 2003). Well-being is of major interest in positive psychology. Previous research evaluating positive psychology interventions (e.g. gratitude writing, optimistic thinking and forgiveness therapy etc.) has shown statistically significant outcomes such as enhancements in subjective well-being, psychological well-being, and happiness as well as ameliorating depressive symptoms and negative affect (Oddone et al. 2011; Seligman et al. 2005).

Positive psychological interventions (PPIs)

Over the last decades, research in the field of positive psychology has emerged and is beginning to provide an evidence-based understanding of human flourishing and ways to promote it through positive psychology interventions (PPIs) (Seligman and Csikszentmihalyi 2000). PPIs are defined as being interventions that are designed to cultivate positive emotions, cognitions, and behaviour (Parks and Biswas-Diener 2013; Seligman et al. 2004; Sin and Lyubomirsky 2009). Since the publication of Seligman and Csikszentmihaly's article, the number of PPIs studies has increased rapidly worldwide, it appears that PPIs are effective in enhancing well-being. Many of these studies demonstrated the efficacy of PPIs on well-being such as gratitude (Killen and Macaskill 2014), forgiveness (Reed et al 2006), life review therapy (Preschl et al. 2012), positive reminiscence (Meléndez Moral et al. 2014) and self- management (Frieswijk et al. 2006). There are four factors that appear to enhance the effectiveness of PPIs: 1) the features of the positive activity, 2) the attributes of the individuals participating, 3) the person-activityfit, and 4) the processes of positive activitiesby which they enhance well-being (Lyubomirsky and Layous 2013). Moreover, other studies have shown that PPIs have been useful in inducing happiness, engagement, and a life full of personal meaning in the eudemonic sense (Lyubomirsky et al. 2011; Seligman et al. 2005).

Over the past decade, the number of systematic reviews that collate all empirical evidence in primary studies relating to the methodological criteria published annually has greatly increased. Systematic reviews of PPIs are fraught with challenges due to the complex designs and multi-component interventions used. Although most of the systematic reviews can provide understanding of the impacts of PPIs on well-being for the general

population or patients with certain diseases, there are some gaps in the research. For example, there is no review of intervention effectiveness for the healthy elderly despite this being a growing section of the community globally. The utilization of PPIs targeted specifically at older adults is unclear as no systematic review of this age group has been published. Therefore, there is a need for systematic review that summarizes the findings of empirical studies examining the effects of PPIs in adults aged 60 and older.

The aim was to synthesize the current evidence on the effectiveness of PPIs at promoting and maintaining well-being in older people from a systematic review of the literature and to evaluate interventions to assess their context and external validity. Well-being was the outcome measure. This study will add to the existing literature by 1) classifying intervention studies, as randomized controlled studies, non-randomized controlled trials with or without matching and/or stratification, 2) taking the methodological quality of the primary studies into account, 3) including the most recent studies (2004 – 2014), 4) analysing pre and post intervention measures of well-being assessment, and 5) applying clear inclusion criteria for the type of interventions and study design.

Methods

Population

Healthy older adults living in the community were selected, and where participants' age was 60 years or older**.** This age was chosen as it was used in the United Nations Aging Population Survey (United Nations, Department of Economic and Social Affairs, Population Division (2013)) as the age for defining older adults and has until very recently been applied widely as the normal retirement age so its likely to be relevant to the samples since the studies examined here. Studies in which the participants had been recruited specifically on the basis of a clinical diagnosis of any pathological, physical or any major mental health condition or major cognitive impairment were excluded.

Search strategy

Studies were located through computer searches of three databases: PsycINFO, Scopus, and Web of Science. PsycINFO was selected as it is the major source for psychological studies, Scopus is the largest database and includes all the PubMed journals from 1996 onwards hence its inclusion and the Web of Science was selected as it is particularly good at identifying inter-disciplinary studies which could be relevant here **(**Falagas et al. 2008). The search strategy was initially developed for PsycINFO and was then adapted as necessary to make it appropriate to the other databases. Data were collected from studies reporting the effect of positive psychology

interventions on aspects of well-being in older adults. Key terms used in these searches focused on global and specific psychological terms such as well-being, life satisfaction, and happiness. Terms used to locate older participants were old age, elderly, and older adults. Key terms for positive psychology were positive psychology intervention. All English-language studies that could be located were included.

Quality assessment

The quality of included studies was informed by two authors utilizing a standardized quality assessment tool, the Cochrane Handbook for Systematic Reviews of Interventions (Higgins and Green 2008). This tool includes seven components which can be rated as "high", "moderate", or "low":1) quality control: whether the intervention is standardized by using a manual, guidelines, and/ or published trials, 2) randomization: whether the method of randomization was adequate, 3) comparability: whether baseline characteristics of the intervention and control groups were similar, 4) follow-up rates: whether the percentage of follow-up was complete, 5) dropout: whether the dropout rate was described and acceptable, 6) blinding assessor: whether assessment was conducted by independent interviewers blinded to group or objective outcomes, and 7) analysis: whether intention-to-treat analysis was applied. This tool was designed to assess clinical interventions and it became apparent that the components of blinding the assessor and the intention to treat analyses were not found to be applicable to PPIs conducted on healthy elderly participants. The included studies all involved self-assessment of well-being using psychometric measures, reflecting the view that subjective assessment of well-being is appropriate (Sandvik 2009) so blind assessment of the intervention effectiveness was not applicable. The estimation of the global rating was based on the 5 dimensions judged to be relevant to PPIs. The quality of each included study was assessed by one reviewer and checked independently by a second reviewer. The tool required the code to indicate "Yes or one point" if the criterion was reported and "No or zero points" if it was not reported. Initial inter-rater reliability (Cohen's kappa) was 0.95 with aspects of disagreement further discussed between the two reviewers until agreement was reached. After full agreement of both reviewers, studies were evaluated based on a summary score of the criteria in the article. For example, the quality of a study was assessed as high quality when all the five criteria were met, and the follow-up rate was over 90 per cent, moderate quality when at least three items of the criteria were met, and low quality was when fewer than three criteria were met.

Evaluating the effectiveness of positive psychological interventions

To evaluate the effectiveness of the interventions, the RE-AIM framework was used in this review. This consists of five criteria; Reach, Effectiveness, Adoption, Implementation, and Maintenance (Glasgow et al.

1999). The eight studies were evaluated on the 5 following criteria: 1) reach which measures participation at the individual level (e.g., participation rate and representativeness of individuals), 2) efficacy refers to the impact on selected outcomes (e.g., whether outcomes were compared to a standard goal and whether adverse effects were reported), 3) adoption measures the proportion and representativeness of settings and staff members adopting a given program (e.g., participation rate and representativeness of settings), 4) implementation is the extent to which a program is delivered as intended (e.g., staff expertise or training, consistency of delivery), and 5) maintenance refers to the long-term change at both the individual level and the setting level (e.g., which components are institutionalized or modified over time after the end of the intervention). Again this system was designed to assess interventions with clinical populations delivered within health care settings and the organisational criteria in particular were not relevant to PPIs delivered to healthy community dwelling general population volunteers. For this reason, the characteristics of both participants and non-participants, intent-to-treat analysis, inclusion/exclusion setting criteria, adoption rate, characteristics of adopting sites compared to non-adopting sites, maintenance and cost of maintaining the intervention were not found to be applicable to PPIs conducted on healthy older participants. They are more applicable to clinical interventions in health care settings. Using the remaining items under the four criteria of Reach (recruitment method, inclusion/exclusion criteria, participation rate), Efficacy (outcome measures, negative outcomes reported, attrition rates) Adoption (intervention location, description of staff delivering it, method of identifying the delivery agent, level of expertise of the delivery agent), Implementation (type and intensity of intervention, extent intervention delivered as intended, intervention type and intensity of activity) initial inter-rater reliability (Cohen's kappa) was 0.95. The percentage of studies that used the respective external validity criteria was reported.

Results

General selected study characteristics

The search result is shown in Figure 1. In total 1048 titles were retrieved from three databases using the selected key words (well-being, life satisfaction, happiness, old age, elderly, older adults and positive psychology intervention).

After the abstracts and titles were examined, 199 papers were deemed relevant to the search. The 849 papers that were excluded were either due to duplication of papers between databases or they were correlational studies not interventions. From the 199 papers initially deemed relevant scrutiny of the full papers indicated that 135 did not measure outcomes, had no inclusion or exclusion criteria or English language versions could not be located. This left 64 articles to be assessed for eligibility. From this, 56 articles were excluded as they did not

measure any well-being outcomes, or used clinical populations or participants with a mean age less than 60 years. The remaining 8 articles met the criteria and were included in the current analysis.

- Figure 1 here -

Of the eight articles four used quasi-experimental designs and four randomized controlled trials design. Four studies included follow-up measures with the varied time scales, two completing the follow up after 1 month (Killen and Macaskill 2014; Chiang et al. 2008), one at 3 months (Preschl et al. 2012), and one at 6 months (Frieswijk et al. 2006). Due to the variations in the well-being measures utilized, the study designs (including only four RCTs), intervention content and behaviours targeted, it was not possible to conduct a thorough meta-analysis on the data. Thus, a narrative synthesis of the results is presented. The eight articles were conducted in five different countries, including Spain (n = 2), United Kingdom (n = 1), Hong Kong (n = 1), Taiwan (n = 1), and the Netherlands (n = 1). Two articles involved more than one country. Sixty-three percent of studies in this review were published after 2012 (Ho et al. 2014; Killen and Macaskill 2014; Meléndez Moral et al. 2014; Meléndez Moral et al. 2013; Preschl et al. 2012; Ramírez et al. 2014).

Characteristics of Participants

Most intervention targeted healthy older people. The sample sizes in the included studies varied from 34 (Meléndez Moral et al. 2014) to 193 participants (Frieswijk et al. 2006), with a mean sample size of 68. In relation to demographic characteristic, the majority of the studies had participants with the age range from 71 to 76 years.

Well-being Measurement

All the reviewed studies include measures of well-being as outcomes and all were self-assessed. Overall the studies used 16 different measurement tools to measure a range of well-being outcomes. The most frequently reported way of assessing well-being was with measures of satisfaction with life, while psychological well-being, flourishing, subjective well-being, positive and negative experience, mastery were reported in less than half of the studies. Measurement of life satisfaction used the Life Satisfaction Index-A (Neugarten et al. 1961), the Satisfaction with Life Scale (Diener et al. 1985), and the Philadelphia Geriatric Center Morale Scale (Lawton 1972). The Life Satisfaction Index-A and the Satisfaction with Life Scale were the most frequently used tools in these studies. The Life Satisfaction Index-A was used by three of the studies (Chiang et al. 2008; Meléndez Moral et al. 2014; Preschl et al. 2012). The Life Satisfaction Scale was used in three of the reviewed studies (Ho et al. 2014; Killen and Macaskill 2014; Ramírez et al. 2014). The Philadelphia Geriatric Center Morale Scale was used in Meléndez et al's studies.

The majority of studies reported a range of comparators including: three studies with waiting list control groups (Chiang et al. 2008; Meléndez Moral et al. 2014; Preschl et al. 2012), two studies compared an intervention group with a control group (Frieswijk et al. 2006; Meléndez Moral et al. 2013), one study with a placebo group (Ramírez et al. 2014), and one study with another active intervention group (Killen and Macaskill 2014).

Intervention characteristics of studies reviewed

The interventions in the studies targeted healthy older adults. Four of the studies (50 percent) consisted of reminiscence interventions such as positive reminiscence and life review therapy (Meléndez Moral et al. 2013; Meléndez Moral et al. 2014; Preschl et al. 2012; Chiang et al. 2008). Enhancement of well-being through multicomponent interventions such as gratitude, forgiveness, optimism, savouring, curiosity, courage, altruism and meaning of life was the focus of two studies (25 percent) (Ramírez et al. 2014; Ho et al. 2014). Finally, only one study used three good things in life gratitude intervention to increase well-being. Frieswijk et al. (2006) used a self-management positive bibliotherapy that was explicitly focused on preventing a decline in well-being. Intervention durations varied from one session to nine sessions. The characteristics of included studies are summarized in Table 1.

- Table 1 here -

Four articles contained various forms of life review and positive reminiscence which were classified as reminiscence interventions**.** Positive reminiscence has been described in two articles (Meléndez Moral et al. 2013; Meléndez Moral et al. 2014). The first study was completed by Meléndez Moral et al. (2013). Their study was done to assess the effects of a reminiscence program on life satisfaction, self-esteem, psychological well-being and depressive symptoms in institutionalized elderly adults. The reminiscence program had a significant positive impact on life satisfaction, self-esteem, and psychological well-being whereas depression decreased significantly. Another reminiscence study, Meléndez Moral et al.'s (2014) study was focused on the effect of integrative reminiscence therapy on life satisfaction, self-esteem, and psychological well-being. On the other hand, life review therapy was focused on a therapeutic technique to retrieve and organize participants' memories and was based on positive memories of specific events from their past. Two studies administered life review therapy within their intervention, utilising very different intervention modes: counselling with computer supplements (Preschl et al. 2012) and a group program (Chiang et al. 2008). Compared with the control group, life satisfaction and self-esteem in the older adults increased significantly over the life review group program. The effect of the life review on well-being still existed after one month. However, the effect of life review

therapy with computer supplements significantly increased general well-being with follow-up periods of up to three months.

Two of the reviewed studies showed that the effective intervention should incorporate the concept of positive psychology into the program. Ho et al.'s study (2014) incorporated positive subjective experiences, positive individual traits, and positive civic virtues and institutions into the intervention. Their interventions led to an enhancement in gratitude as well as life satisfaction, and happiness while depressive symptoms were relieved in their sample. Ramírez et al. (2014) applied a positive psychology intervention, based on autobiographical memory, forgiveness and gratitude, to improve the quality of life and subjective well-being in older adults as compared to a placebo group. Of interest is that, both studies reported that the intervention had a positive effect on overall well-being.

Killen and Macaskill (2014) was the only study to utilise the intervention, called "Three good things in life gratitude intervention". It was shown to enhance hedonic and eudemonic well-being while reducing stress levels. The three good things in life gratitude intervention significantly increased psychological well-being as measured by flourishing at the post-test and the increases remained at the 30-day follow-ups**.** The results however, did not show any significant differencesat the end of the study between participants completing an online or traditional paper based intervention. This is argued to be beneficial as online interventions are less costly to deliver.

Finally, Frieswijk et al. (2006) administered a bibliotherapy to enhance the ability of self-management and used mastery and well-being as secondary outcomes among older people over a 10-week period. This intervention resulted in a statistically significant increase in self-management ability and subjective well-being for older people who received the bibliotherapy.

Study quality

Overall the methodological quality of the included studies was moderate, using The Cochrane Collaboration Guidelines. Even though the included studies were all published in peer-reviewed journals, none of the studies fulfilled all the stipulated quality criteria, based on what could be interpreted from the information in the articles. Only two studies were rated as high quality, four were of moderate-quality and two were of low-quality. The minimum score was 2 and the maximum was 5. For example, three out of the eight studies included lacked the method of randomization. Four studies fulfilled the follow-up rate criterion, with the exception of the remaining four articles. However, all the studies clearly reported the quality control and only one did not fulfil the group comparability criterion.

RE-AIM reporting

The evaluations of the effective interventions used five criteria from the RE-AIM framework. Overall results indicated that efficacy criteria (89%), reach criteria (85%), and adoption criteria (73%) were frequently reported across the eight included articles. Implementation criteria were reported 67%. Maintenance criteria were rarely reported (4%). The average RE-AIM criteria scored across all 8 of included articles was 64% of RE-AIM criteria. The highest reporting scores across these studies came from the gratitude intervention (Killen and Macaskill 2014) which reported 73% of RE-AIM criteria. The lowest scoring study reported 47% of RE-AIM criteria (Chiang al. 2012). Most studies scored over 50% on RE-AIM.

Reach

On the whole, mean scores for each of the reach criteria were well reported with an overall figure of 85%. Typical information associated with internal validity was high. All studies provided the method for identifying the target population (100%), as was reporting of specific inclusion criteria. However, the exclusion criteria were reported less frequently (75%). Considering components that align with external validity and impact generalization, participation rates were reported by 33% of the included studies, while comparisons of the characteristics of individuals who participated compared with this who did not were not reported.

Efficacy/effectiveness

Efficacy at 89% was the highest reported proportion of the five RE-AIM dimensions across all the studies. All studies reported at least one follow-up assessment of key outcome measures of positive variables reflecting our review inclusion criteria, while 88% included measures capable of detecting negative effects. Attrition rates were reported by 88% of the included studies. Efficacy reporting was let down by the lack of Intent-to-Treat analyses, indicating a lack of statistical rigour.

Adoption

The mean score of reporting across the adoption components was 73%. The most reported adoption was the descriptions of the delivery agent/s (83%), location (75%), and details of delivery agent (71%). In contrast, due to a lack of multi-site PPI effectiveness trials among the included studies, three out of the seven criteria making up the adoption dimension were coded ‘not applicable’ throughout our review.

Implementation

The mean score of reporting for the implementation dimension across all studies was 67%. Type and intensity of interventions and methods to assess fidelity of implementation were reported in all studies (100%). None

reported any details of intervention costs. That is, if all studies had reported on implementation costs, the mean Implementation score would have been 100%.

Maintenance

Among the RE-AIM dimensions, the maintenance dimension was reported least frequently, with a mean score of only 4%. Few studies reported on long-term effects of intervention (13%), while none reported maintenance costs and details of the current intervention or programme status.

Discussion

This systematic review summarizes findings of the PPIs effectiveness for older adults on well-being outcomes, using a vote counting technique. Vote counting is one of the basic techniques to draw conclusions of results (Sutton et al. 1998). Meta-analysis requires homogeneity in both intervention and outcomes. But the implementations are so diverse that an effect estimate cannot be interpreted in any specific context (Higgins and Green 2008). Thus, the meta-analysis in the context of this review was considered inappropriate.

Overall, the number of studies involved was small. Over the past decade, eight studies using rigorous study designs (four quasi-experimental and four RCTs) have examined the effectiveness of PPIs as individual and group formats for delivering PPIs to older adults. For well-being however, both in studies of quasi-experimental and randomized controlled design, improvements were more consistent. In future research, only RCTs should be used to evaluate the effectiveness of PPIs in order to minimize potential confounding effects (Ho et al. 2014). Moreover, mixed-method studies are recommended for the future as both forms of research are invaluable for obtaining key information, such as those involving large samples or population databases and interviews or focus groups (Tobin and Begley 2004). The majority of these studies were published in the past 2 years and it is expected that the number of trials will continue to grow exponentially.

In the context of a systematic review, the quality assessment of studies is an imperative stage for researchers as it is used to judge the credibility of primary studies, the strength of evidence, and appropriateness of recommendations for implementation (Armijo-Olivo et al. 2010). Currently, there are several different instruments used in methodological quality assessment. For this study, the Cochrane's tool was chosen for assessing the methodological quality of included studies. It was developed by the Cochrane Collaboration to assess the methodological quality among Cochrane review groups. It focuses on only the internal validity and aspects of the study design that refer to characteristics of the study that might be related to selection bias, performance bias, attrition bias, and detection bias (Lundh and Gotzsche 2008). However, Shadish, Cook, and Campbell (2002) suggested that the four key criteria of the methodological quality are statistical conclusion

validity, internal validity, construct validity and external validity. At this time, there is limited assessment on the validity of their research. Therefore, the domain-based evaluation of the quality of research should use other tools which fit in the areas that it has been applied to.

An interesting finding in the current study is that the average quality using this assessment tool is moderate according to the Cochrane quality criteria. A number of studies lack blind assessment and intention-to-treat analysis. This is consistent with research by You et al. (2012), which found that information about blind assessment and intention-to-treat analysis was commonly missing in most studies. However, in some of the included studies with healthy volunteers from the general population, where measures were all self-assessed, these criteria were not applicable. The Cochrane criteria are designed for clinical trials in health care settings so it may be that further work is required to refine the quality criteria to make them more applicable to non-clinical community dwelling samples. Moreover, study quality appears to be associated with significant results, as those with moderate quality were most likely to significantly improve and maintain the well-being of the community dwelling well elderly than those of poorer quality. This is similar to other areas of psychology and points to the necessity of conducting more carefully designed RCTs in the future (Schrank et al. 2014). For future research, poor quality studies should be excluded for a meta-analysis due to the quality of individual study influences the confidence intervals around the effect size (Boland et al. 2011).

With respect to the interventions selected, this review illustrated that the interventions based on positive psychology were very dissimilar in many respects. It is noteworthy that this systematic review reveals that the main PPIs proposed by Butler (1963), Emmons and McCullough (2003), Seligman et al. (2000), Steverink et al. (2003) have been little studied in older people. In particular, reminiscence interventions were the most prevalent type of PPIs which not only promote well-being but also treat depression in later life. These findings support Erikson's assumption that reminiscence intervention assists older adults to establish and maintain personal identity (Erikson 1997). Furthermore, reminiscence may help these people to develop a more balanced view of their lives, to cope with emotions better and to become reconciled with how life has been and that this helps to meaning in life, a sense of coherence, continuity, and mastery (Westerhof et al. 2006). Previous research has suggested that reminiscence intervention requires minimal resources and is a low-cost intervention (Comana et al. 1998). Other theorists have proposed that reminiscence intervention was an effective emotion regulation strategy in increasing positive experience especially among elderly individuals by generating fun and enjoyment (Pasupathi and Carstensen 2003). For example, people who tended to reflect on the positive moments of their life reported increased ability to savour life and had higher levels of positive

emotions (Bryant et al. 2005). Reminiscence interventions in this review are presented in three formats: simple reminiscence (unstructured), life review (more structured and integrative, focusing on the whole lifespan) and life-review therapy (adopting life review for the treatment of mental disorder) (Webster et al. 2010). It is the primary form by which human experience is made meaningful (Sherman 1991). The finding would suggest that reminiscence interventions are appropriate to boost well-being in older adults. TheWatt and Cappeliez (2000) suggest that reminiscence interventions are readily available anytime and anywhere for older adults and they do not have to learn a new vocabulary or framework to participate.

The intervention studies measured diverse well-being outcomes including improving and maintaining life satisfaction, happiness, flourishing, positive emotions and alleviating in negative emotions and depressive symptoms. Consistent with both Sin and Lyubomirsky's (2009) and Bolier et al.'s (2013) meta-analysis, this finding demonstrates that PPIs are associated with significant improvements in well-being and alleviate depressive symptoms among all age group compared with control conditions. However, not everyone is responsive to these interventions, which suggest that PPIs are not universally effective, but they are capable of triggering positive responses in those older people who have the potential to develop them.

With regard to the PPIs effectiveness using the RE-AIM framework, it is clear from this review that the gratitude intervention was maximally effective in promoting durable well-being for healthy elderly people because of its simplicity in recording three good things that occurred in a diary every day and in this way cultivating positive emotions and living a more satisfying life (Seligman 2005). There is evidence showing empirically that this relationship between feeling gratitude and well-being is causal (Emmons and Shelton 2002; Horder et al. 2013; Ramirea et al. 2014). For instance, Rash et al. (2011) found that gratitude interventions contributed most to all the aspects of well-being of an individual. Moreover, gratitude emerges from recognizing the positive in situations in life (McCullough et al. 2001). While there are a growing number of studies demonstrating the overall efficacy of gratitude interventions, the success of performing the intervention depend on the individual's ability to recognise events as being positive (Lyubomirsky et al. 2005). Although, some key factors, such as individual characteristics, motivation, frequency and timing of the intervention have been shown to possibly influence gains in well-being from intervention (Sin and Lyubomirsky 2009), the role of the person-activity fit factor is identified as being optimal for the pursuit of well-being. For example, an optimist faced with adversity will quickly come to conceptualise the situation more positively than a pessimist, with the former reporting cognitions to the effect that the situation could be worse (Park et al. 2004). Therefore,

person-activity fit influences the intervention's potency in increasing well-being and for whom (Lyubomirsky et al. 2005; Lyubomirsky and Layous 2013; Sheldon and Lyubomirsky 2007).

The most frequently reported RE-AIM criteria across these studies concerned intervention type and intensity. PPIs have been effectively delivered in a variety of formats including individualised or group exercise sessions, self-help, face-to-face instruction and via computer supplements. Indeed, self-help would be suited to the goals of positive psychology very well with minimal cost or practitioner contact and may be appropriate for a large group of people who may not fully adhere to the intervention but still benefit (Bolier et al. 2013).

The weakness of these intervention studies concerns maintenance, specifically intervention maintenance and costs, known to be a key factor in determining whether an intervention is adopted, and processes of implementation (Glasgow et al. 1999). These interventions also varied in length, duration, and the number of sessions. The shortest intervention lasted 2 weeks and the longest was 10 years. Interventions in the included studies with a short duration displayed a positive effect on well-being among older people. However, Sin and Lyubomirksy (2009) found that PPIs of longer duration were relatively more likely to produce greater gains in well-being. The amount of time spent on each trial of an activity may relate to the efficacy of the PPIs. Due to individual differences, a particular intervention will not be effective for every person. Thus, person-activity fit factors (i.e., the interaction of individual differences and intentional activities) need to be considered if the efficacy of PPIs is to be improved (Lyubomirsky et al. 2005). Concerning the length of follow-up, at follow-up from one to six months was quite short to detect a difference. It is possible that effects of the PPIs interventions were partly sustained over time (Bolier et al. 2013). One of the weaknesses found when comparing these studies concerns the different scales used to measure life satisfaction. Life satisfaction is a valid variable to predict health and mortality for older adults controlling for the other variable (Diener and Chan 2011; Wiest et al. 2011). However, in these studies there was generally a lack of rationalisation for the choice of psychometric tools, but also the use of different tools made it difficult to compare the studies (Hone et al 2014).

Limitations

A number of limitations exist in the current review. The lack of detailed reporting of the intervention content in some cases meant that the specific techniques that were most effective could not be identified. The exclusion of non-peer-reviewed articles, and grey literature could have led to bias, and possibly also to publication bias. The search strategy was selected as it was considered that it provided some control over the quality of articles and also enabled a large sample of readers to examine the basis for the review. Moreover, the Cochrane's tool has

not been tested for validity and reliability in non-clinical areas. There are very limited data on the validity and reliability of this tool to assess methodological quality. Finally, the number of studies was small, with eight articles. However, the samples were highly homogenous, all being 60 years of age and above, healthy people, and without any severe physical or psychosocial problems during the study, making them relevant to the large growing population of community dwelling healthy elderly that need to be supported to maintain their well-being.

Summary

In conclusion, the aims of the present review were to synthesize the empirical evidence about the impact of positive psychological intervention utilized with older adults. Systematic comparison would potentially enable the relationship between positive psychological interventions and well-being to be clarified. All of the interventions included in the review used positive psychology techniques and the results suggested that they provided promising tools for enhancing well-being, happiness, life satisfaction and alleviating depressive symptoms in older people. What is now required is an examination of how the consistency with which PPIs are applied to maximize their efficacy can be improved and further work on how to specify the applicability of specific interventions for individuals with particular characteristics. PPIs can prove useful for individuals striving for fulfilling, happy lives.

Practice implication

The findings of this review support the efficacy of delivering positive psychological interventions to older adults. The choice of intervention may depend on the population of interest. Practitioners can tailor their treatment strategy to the specific needs and preferences of older adults (Lyubomirsky et al. 2011). This review should be helpful to anyone developing future interventions to improve levels of overall well-being, providing support for a strength-based and positive model of successful ageing and providing quality assessment guidelines to assist in the development of interventions.

Acknowledgements

This study was financially supported by the Thailand Research Fund through the Royal Golden Jubilee Ph.D. Program (Grant No. PHD/0002/2556)**.**

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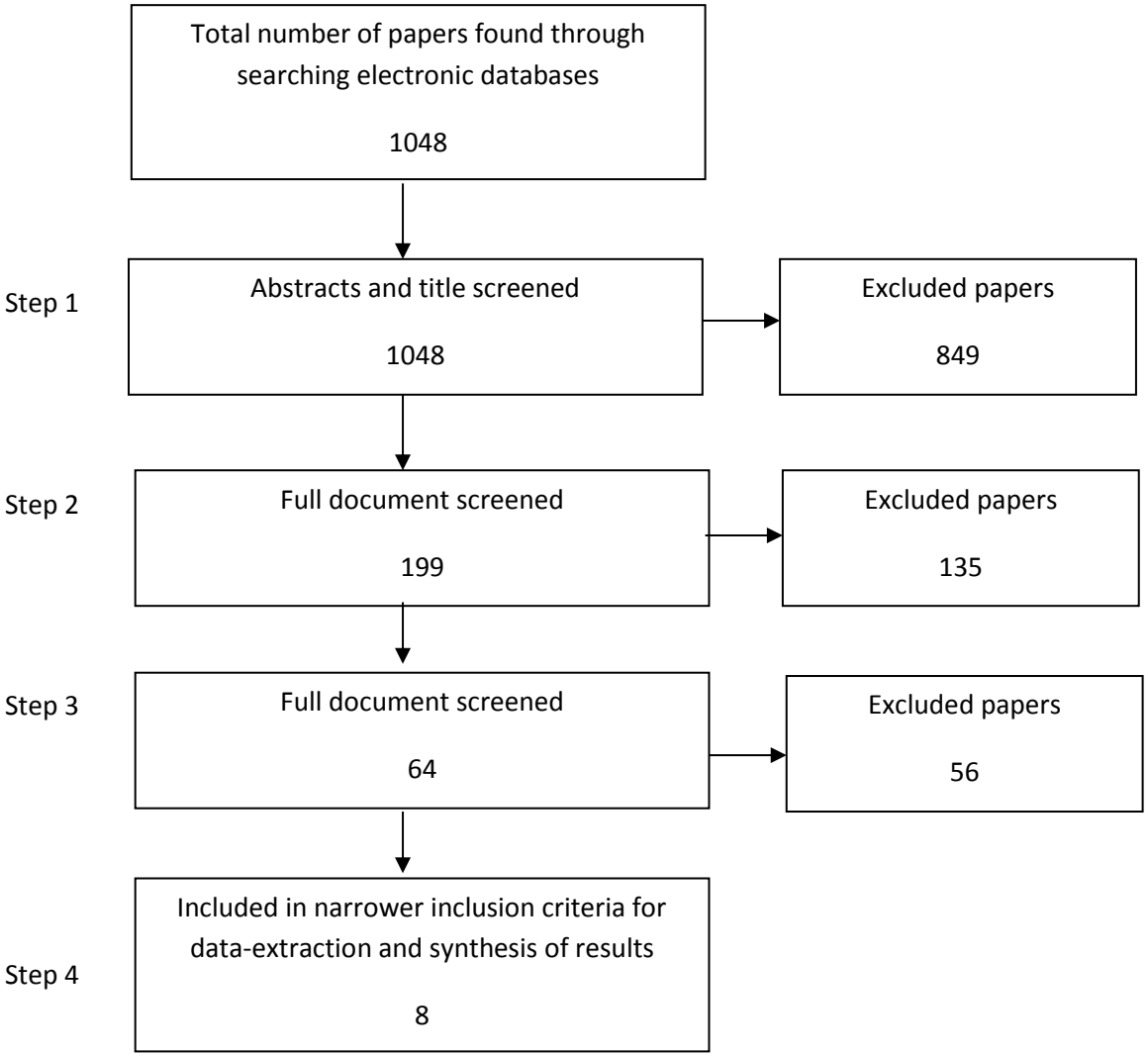

Figure 1 Study selection process.

Table 1 Studies characteristics included in the systematic review

Reference	Study design	Intervention: session (number), duration	Sample	Group comparison	Outcome measures	Results	Quality assessment
Ho et al. (2014)	One group pretest posttest design	A positive intervention(happiness, gratitude, optimism, savouring, curiosity, courage, Altruism, Meaning of life)**:** 9, 9 weeks	N=74, mean age 78.0 years (SD=7.0)	the pre-test and post-test scores for each of the dependent variables	• Grateful: GQ-6 • Subjective happiness: Subjective happiness scale • Life satisfaction: LSS • Geriatric depression: Geriatric depression scale	• The intervention reduced the number of depressive symptoms and increased the levels of life satisfaction, gratitude, and happiness.	Low quality studies
Killen and Macaskil (2014)	QE. Pre-posttest design. 30-day follow up	A gratitude The 'three good things in life' intervention: 1, 14 day	N=88, Online group (N=48): paper group (N=40): mean age 70.8 years (SD=7.5)	Online group versus paper group	• Grateful dispositions: GQ-6 • Psychological needs: FS • Life satisfaction: SWLS • Negative and positive experiences and feelings: SPANE • Perceived Stress: PSS10 Physical and mental health over the past thirty days: CDC and HRQOL–14	• Flourishing increased significantly from baseline to day 45. • Intervention decreased perceived stress from day 1 to day 15**.**	Moderate quality studies
Meléndez Moral et al. (2014)	QE, Pre-post-test design with a control group.	Integrative reminiscence intervention: 8, 8 weeks	N=34, treatment group (N=17): waiting list (N=17): mean age 73.9 years (SD=9.8)	treatment group versus waiting list	• Cognitive level: MMSE • Depressive symptoms: GDS-30 • Self-esteem: RSE • Life Integration: LIS • Life satisfaction: LSI-A • Psychological Well-Being: the Ryff Psychological Well-Being Scales	An integrative reminiscence therapy significantly reduced in depression symptoms and a significantly improved in self-esteem, integrity, life satisfaction, and psychological well-being.	Low quality studies
Ramírez et al.	RCT, A	The MAPEG	N=46,	experimental	• Anxiety: STAI	Depression and anxiety	High quality

Reference	Study design	Intervention: session (number), duration	Sample	Group comparison	Outcome measures	Results	Quality assessment
(2014)	mixed factorial design	(forgiveness, gratitude and life-review therapy)**:** 9, 12 weeks	experimental group (N=26): placebo (N=20): mean age 71.2 years (SD=7.1)	group versus placebo	• Depression: BDI • Happiness: Subjective Happiness Scale • life satisfaction: LSS • Autobiographical Memory: AMT • Cognitive level: MEC	decreased, but levels of happiness and life satisfaction have increased in experimental group, compared with the placebo group.	studies
Meléndez et al. (2013)	QE, Pre-post-test design with a control group.	A reminiscence program: 8, 8 weeks	N=34, treatment group (N=17) mean age 79.8 years (SD=9.3): control group (N=17) mean age 79.8years (SD=8.1)	treatment group versus control group	• Cognitive level: MMSE • Depressive symptoms: GDS-8 • Self-esteem: RSE • Life satisfaction: the Philadelphia Geriatric Center Morale Scale • Psychological Well-Being: the Ryff Psychological Well-Being Scales	Significant results were obtained, including a drop in depressive symptoms and improved Self-esteem, satisfaction, and psychological well-being.	Moderate quality studies
Preschl et al. (2012)	RCT, Pre-post-test design with a control group.	Life-review therapy**:**6, 6 weeks	N=36, intervention group (N=20): waiting list (N=16): mean age 70.0 years	Intervention group versus waiting list	• Depressive symptoms: BDI-II • Self-esteem: RSES • Life satisfaction: LSI-A • Well-Being: WHO-Five Well-being Index • Reminiscence: RQ	Depressive symptoms decreased significantly over time until the three-month follow-up in the intervention group compared to the control group and an increase in well-being and a decrease	Moderate quality studies

Reference	Study design	Intervention: session (number), duration	Sample	Group comparison	Outcome measures	Results	Quality assessment
			(SD=4.4)			in obsessive reminiscence among the participants in the intervention group from pre-treatment to follow-up	
Chiang et al. (2008)	RCT, Pre-post-test design with a control group. Six-months follow up	a Life Review Group Program (LRGP)**:**8, 12 weeks	N=75, experimental group (N=36): control group (N=39) mean age 78.1 years (SD=3.7)	experimental group versus waiting list control groups	• Self-esteem: RSES • Life satisfaction: LSI-A	The LRGP can potentially improve the self-affirmation, confidence, and self-esteem of the elderly and promote short-term life satisfaction.	Moderate quality studies
Frieswijk et al. (2006)	RCT, Pre-post-test design with a control group. Six-months follow up	Self-management positive bibliotherapy: 5, 10 weeks	N=165, experimental group (N=79) mean age 72.9 years (SD=6.2): control group (N=86): mean age 73.7 years (SD=6.2)	experimental group versus control group	• Frailty: the Groningen Frailty Indicator • self-management ability: the Self-Management Ability Scale • Mastery: MS • Subjective well-being: SPF-IL	SMA, mastery and well-being of older people who received the bibliotherapy were significantly improved; specifically, SMA still existed 6 months after the intervention.	High quality studies

QE, quasi-experimental; RCT, randomized controlled trial; GQ-6, The Gratitude Questionnaire; FS, The Flourishing Scale; SWLS, The Satisfaction with Life Scale; SPANE, The Scale of Positive and Negative Experience; PSS10, The Perceived Stress Scale; CDC, The Centre for Disease Control and Prevention; HRQOL–14, Health Related Quality of Life; MMSE, the Mini-Mental State Examination; GDS-30, the Geriatric Depression Scale; RSES, the Rosenberg Self-esteem Scale; LIS, The Life Integration Scale; LSI-A, the Life Satisfaction Index-A; STAI, State and Trait Anxiety Inventory; BDI, Beck Depression Inventory; AMT, Autobiographical Memory Test; MEC, Mini-Cognitive Exam (Mini-Examine Cognoscitive);LSS, Life Satisfaction Scale;SF-36v2, Version 2 of the 36-Item Short-Form Health Survey; CES-D, The Center for Epidemiologic Studies Depression Scale; LSI-Z, the Life Satisfaction Index-Z; BDI-II, the Beck Depression Inventory-II, RQ, Reminiscence Questionnaire; MMI, the Maastricht Metacognition Inventory; MQ, The Memory Quotient; ESQ, The Executive functioning and Speed Quotient; PWQ, The Psychological Well-being Quotient; MS, the mastery scale; SPF-IL, the Social Production Function-Index Level Scale

Appendix

The evaluation of selected studies reporting on RE-AIM framework

RE-AIM framework criteria		Killen &Macaskil (2014)	Meléndez Moral, et al. (2014)	Ramírez, et al. (2014)	Ho, et al. (2014)	Meléndez Moral, et al. (2013)	Preschl, et al. (2012)	Chiang, et al. (2012)	Frieswijk, et al., (2006)	Total
Reach	Method to identify and recruit target population	1	1	1	1	1	1	1	1	100
	Inclusion criteria	1	1	1	1	1	1	1	1	100
	Exclusion criteria	1	1	0	1	1	1	1	0	75
	Participation rate (number participating/number eligible)	?	?	?	?	0	?	0	1	13
	Characteristics of both participants and non-participants	?	?	?	?	0	?	?	?	0
	Total	**100**	**100**	**67**	**100**	**60**	**100**	**75**	**75**	**85**
Efficacy	Outcome measures for at least post test	1	1	1	1	1	1	1	1	100
	The use of Intent to treat analysis comprising all participants successfully randomly assigned to the experimental condition	?	?	?	?	?	?	?	0	0
	Negative outcomes	1	1	1	1	1	1	0	1	88
	Attrition rates (The degree of participant (post test) attrition from the trial)	1	0	1	1	1	1	1	1	88
	Total	**100**	**67**	**100**	**100**	**100**	**100**	**67**	**75**	**89**
Ad opti	Description of intervention location	1	1	1	0	1	0	1	1	75
	Description of staff delivering the	1	1	?	1	1	1	0	?	83

RE-AIM framework criteria		Killen &Macaskil (2014)	Meléndez Moral, et al. (2014)	Ramírez, et al. (2014)	Ho, et al. (2014)	Meléndez Moral, et al. (2013)	Preschl, et al. (2012)	Chiang, et al. (2012)	Frieswijk, et al., (2006)	Total
	intervention									
	Method to identify delivery agent	1	1	0	1	1	1	0	?	71
	Level of expertise of delivery agent	1	0	0	1	1	1	0	?	57
	Inclusion/exclusion setting criteria	?	?	?	?	?	?	?	?	0
	Adoption rate (the number of participating sites as a proportion of all sites offered the intervention)	?	?	?	?	?	?	?	?	0
	Characteristics of adopting sites compared to non-adopting sites	?	?	?	?	?	?	?	?	0
	Total	**100**	**75**	**33**	**75**	**100**	**75**	**25**	**100**	**73**
Implementation	Intervention type and intensity level of activity	1	1	1	1	1	1	1	1	1
	Extent intervention was delivered as intended	1	1	1	1	1	1	1	1	1
	Measures of intervention cost	0	0	0	0	0	0	0	0	0
	Intervention type and intensity level of activity	1	1	1	1	1	1	1	1	1
	Total	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**	**67**
Maintenance	Individual behaviour was assessed 6 months following completion of intervention	0	0	0	0	0	0	0	1	13
	Is the programme still in place? (the current status of programme for example, whether it is still running or has been discontinued)	0	0	0	0	0	0	0	0	0
	Measures of the cost of maintaining	0	0	0	0	0	0	0	0	0

RE-AIM framework criteria		Killen &Macaskil (2014)	Meléndez Moral, et al. (2014)	Ramírez, et al. (2014)	Ho, et al. (2014)	Meléndez Moral, et al. (2013)	Preschl, et al. (2012)	Chiang, et al. (2012)	Frieswijk, et al., (2006)	Total
	the intervention									
	Total	0	0	0	0	0	0	0	33	4
Over all		**73**	**62**	**53**	**68**	**65**	**68**	**47**	**70**	**63**