Effectiveness of positive psychology interventions on a reduction of mental health complaints and improving well-being in cancer survivors - a systematic review

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Abstract

An ever growing population with unmet needs are cancer survivors. Alone in the Netherlands over 800,000 individuals are cancer survivors with common symptoms being anxiety (specifically fear of cancer recurrence), depression, stress and low well-being. A potentially promising approach to assisting adult cancer survivors in improving both the commonly experienced pathologies as well as enhancing the separate dimension of well-being can be positive psychology. Positive psychology interventions aim to improve well-being by enhancing positive emotions, meaning or accomplishment to complement traditional, pathology-focused therapies. The present systematic review aims to explore and synthesize the current evidence about the effectiveness of positive psychology interventions (PPI) for enhancing well-being and addressing common mental health problems in cancer survivors. The four databases PubMed, Scopus, Web Of Science and PsycINFO were scanned for relevant literature. Only RCT's utilizing PPIs for adult cancer survivors were included. Of the 4487 studies found, 11 studies were included for reviewing. Most participants were breast cancer survivors and the applied therapies have overall improved depressive and anxious complaints while improving posttraumatic growth, mindfulness and improving quality of life. The most effective outcomes in this study have been provided by Acceptance and Commitment Therapy (ACT). ACT has been shown to address depressive and anxious complaints while also improving positive coping styles, potentially being even more effective than their predecessor traditional CBT. This review shows that PPIs have been little studied with cancer survivors and more research is needed to validate the results. Preliminarily, ACT seems to be the most suitable option for clinical practice.

Introduction

Positive psychology is a relatively new field of psychology that aims to promote well-being and good mental health in individuals. It seeks to complement traditional approaches of problem-focused solving and the diminishing of pathologies by enhancing positive emotions, meaning,

accomplishment and positive relationships (Bannink, 2012). Well-being and psychopathology have been shown to be moderately correlated yet independent concepts that need to be treated separately (Chakhssi, Kraiss, Sommers-Spijkerman, & Bohlmeijer, 2018). The two-continua model proposed by Keyes has shown that the absence of mental illness does not necessarily result in well-being and vice versa individuals can have high well-being while suffering from mental problems which underlines the importance of treating these two concepts distinctively (Westerhof & Keyes, 2009).

Well-being has been defined to be three-dimensional: emotional well-being, psychological well-being and social well-being (Franken, Lamers, Klooster, Bohlmeijer, & Westerhof, 2018). Emotional well-being has been defined as the hedonistic perspective on well-being, to maximize pleasure and therefore consists of positive affect and absence of negative affect. Psychological well-being is in line with the eudaimonic perspective on happiness which concerns itself with high functioning and consists of the following six facets: self-acceptance, positive relations with others, autonomy, environmental mastery, personal growth and purpose in life. Social well-being relates to optimal functioning in groups and is composed of five facets: social acceptance, social integration, social contribution, social coherence and social actualization.

Previous research has investigated the importance and impact of well-being. High emotional well-being has been shown to affect recovery and survival rates for physical illnesses (Lamers, Bolier, Westerhof, Smit, & Bohlmeijer, 2011). Positive states of mind (e.g. positive thinking, optimism) are associated with longevity, increased quality of life, better consecutive prognosis and handling of diseases and even improved immune function (Aspinwall & MacNamara, 2005; Cohen, Alper, Doyle, Treanor, & Turner, 2006). Survivors of a traumatic experience often experience positive life changes and an increase in quality of life. 30-90% of people surviving cancer and life-threatening diseases report finding benefit from the experience, a process often called posttraumatic growth (PTG) or benefit finding (Aspinwall & MacNamara, 2005). In a sample of breast cancer survivors, PTG was shown to be correlated with satisfaction with life and generally affect positive states of mind (Mols, Vingerhoets,

Coebergh, & Poll-Franse, 2009). Considering the positive effects of positive states of mind, interventions targeting survivors of serious illnesses should address how to support survivors in experiencing PTG. On the other hand, low levels of well-being have been found to be predictors for mental illness in the future (Keyes, Dhingra, & Simoes, 2010). This underlines the importance of establishing positive coping styles and integrating well-being into therapeutic approaches. It also supports the potential effectiveness of PPIs for clinical but also physically ill populations.

Positive psychology interventions (PPIs) are treatment methods that explicitly “aim to cultivate positive feelings, behaviors, or cognitions” (Sin & Lyubomirsky, 2009). PPIs have been shown to be effective for non-clinical samples in the enhancement of subjective well-being and reduction of depressive symptoms (Bolier et al., 2013) and in a recent systematic review have been shown to also be effective for reducing depressive and anxious symptoms and improving well-being in clinical and somatic populations (Chakhssi et al., 2018). A rapidly growing population with insufficient assistance and unmet needs that could theoretically benefit from PPIs based on their experience and associated problems are cancer survivors.

Cancer is a global health problem that accounted for almost 9,6 million deaths worldwide in 2018 (IARC, 2019). But better treatment, earlier detection and improved testing has resulted in more cancer patients surviving the disease. While in 2000 45% of new cancer patients survived, the survival rate increased to 60% in 2014 (“Cancer Survivorship”, n.d.). Alone in the Netherlands 800,000 individuals are cancer survivors and the number of cancer survivors is steadily growing (IKNL, 2019). The consequences of cancer (and the treatment of it) are pain, high levels of stress and fatigue (Lantheaume, Montagne, & Shankland, 2020) and many survivors experience emotional distress. Research on cancer patients during and after treatment has shown that they experience moderate to severe levels of anxiety and depression (Caminiti, Campione, Sivelli, Diodati, & Passalacqua, 2004; Fradelos et al., 2017) and suicide rates are almost twice as high when compared to a non-cancer population (Du et al., 2020; Lantheaume et al., 2020). Specifically, fear of cancer recurrence (FCR) is a recurrent theme that impacts both cancer survivors and their caretakers (Simard et al., 2013). It remains

stable over the survivorship trajectory and is associated by and reinforced through psychological distress and lower quality of life. FCR has been established to result in (adverse) psychological reactions and functional impairment. The functional impairments of cancer survivors are poor ability to concentrate, memory impairment, declines in functional activity and everyday problem-solving (Grassi, Spiegel, & Riba, 2017). An estimated 25-30% of cancer patients can be diagnosed with a psychopathological condition with the most common diagnoses being stress-related and adjustment disorders, depression-, anxiety-, and sexuality-related disorders (Caruso, Nanni, & Riba, 2017; Mitchell et al., 2011).

The rising number of survivors has led to scientific interest in different interventions to tackle these issues. A previous systematic review on the effectiveness of psychosocial interventions for the rehabilitation of breast cancer survivors found a significant but short-term effect for Cognitive Behavioral Therapy (CBT) on symptoms of depression, anxiety and improvements in health-related quality of life (HRQL) (Fors et al., 2010). Nevertheless, it has been criticized that the effects were mainly for highly depressed and anxious patients compared to patients with moderate levels (Lantheaume et al., 2020) and recent CBT based self-help tools have been shown to be unhelpful regarding fear of cancer recurrence as one of the major complaints of cancer survivors (Helmondt, Lee, Woezik, Lodder, & Vries, 2019).

Another intervention program is a multidimensional rehabilitation program that combines both physical and psychosocial interventions. The physical component consists of exercise and specific dietary regimes while the psychosocial component comprises counselling and psycho-educational strategies based on CBT. They have been shown to improve physical wellbeing but not mental health. Consequently, uni-dimensional approaches are suggested as superior (Scott et al., 2013).

Traditional approaches such as CBT can both be effective (e.g. Fors et al., 2010) and ineffective (e.g. Helmondt, Lee, Woezik, Lodder, & Vries, 2019; Scott et al., 2013) in dealing with the pathologies (e.g. depression, anxiety and stress) typically related to a diagnosis of cancer whilst lacking the focus on well-being and good mental health that positive psychology interventions do. Many cancer survivors experience a lower quality of life and returning back

to the quality before the cancer is difficult even if the developed pathologies are treated (Zhang, Wang, Hong, Xu, Jiang, & Wei, 2019). PPIs might provide the necessary link between treating pathologies and increasing well-being and this study will elaborate on the current knowledge.

To our knowledge no systematic review, meta-analyses or other forms of reviews have previously been performed on the effect of PPIs for cancer survivors with all cancer forms. Positive psychology has shown multiple benefits for non-clinical and clinical populations in both addressing commonly experienced pathologies but also increasing well-being aspects such as self-compassion, meaning or positive emotions. Therefore, this systematic review will investigate the effectiveness of PPIs on the commonly experienced mental health complaints and improvements in mental health and well-being in cancer survivors of all cancer forms. Mental health complaints will be defined by the most commonly experienced negative symptoms, namely depression, anxiety, stress and fear of cancer recurrence.

Methods

This study was performed according to the preferred reporting items for systematic reviews guidelines (PRISMA) (Moher, 2009).

Search strategy

Electronic literature searches were performed using PsycINFO, Scopus, PubMed and Web of Science. In each database search terms and abbreviations for the following concepts were used to perform the database search: a) positive psychology constructs and positive psychology interventions, b) cancer and cancer survivorship and c) mental health complaints such as depression, anxiety and fatigue. The databases were searched from the 1st April of 2020 until the 30th May of 2020 and publications ranging from 1998 (the start of the positive psychology movement) up until the present were analyzed. When applicable, settings such as “only RCT” or “only English language” were applied.

Study selection criteria

Type of studies

Randomized controlled trials (RCTs) of positive psychology interventions or interventions that explicitly aim to foster positive feelings (e.g. hope, meaning) were selected.

Type of participants

Participants above the age of 18 with a diagnosis of any form of cancer who survived the primary treatment, e.g. chemotherapy, radiotherapy or surgery, were selected.

Types of interventions

There are no guidelines or global agreement which interventions constitute positive psychology. Therefore all interventions that aim to enhance a positive construct such as the positive interventions and therapies as summarized in Casellas-Grau, Font & Vives (2013): positive psychotherapy, hope therapy, well-being therapy, QoL therapy, mindfulness, posttraumatic-growth therapies, strength-centered therapies were selected. In addition to that, positive outcome measures such as meaning-making, hope, resilience, positive relationships, life satisfaction and personal growth were included to not exclude therapies that are in line with positive psychology but are not named equal to the previously mentioned therapies (see Appendix A for a clarification of search terms). Studies were eligible if they included control groups that either received treatment as usual, neutral interventions (e.g. self-help group) or no treatment at all or (wait list condition).

Exclusion criteria

Interventions primarily focusing on meditation or mindfulness were excluded. Mindfulness-based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) have similar concepts and approaches to traditional positive interventions but have been excluded because systematic reviews and meta-analyses already exist (e.g. Xunlin, Lau, & Klainin-Yobas, 2020; Piet, Würtzen, & Zachariae, 2012) and it is yet unclear if mindfulness-based therapies can be considered PPIs. Protocol studies were excluded but the respective authors were included into the literature search to search for published RCTs.

Data extraction

Data were collected on population characteristics, including age, gender, cancer diagnosis, time since first diagnosis and sample size per condition; intervention characteristics, including positive psychology intervention, delivery, number of sessions, duration in weeks, retention rate and level of guidance; and methodological characteristics, such as type of control group, assessment points and outcome measures.

Review method

The four databases were searched through with the relevant search terms (Appendix A). The results were transferred to a reference manager (EndNote) to exclude duplicates. Initially the titles were screened for their relevance to the topic and fulfillment of inclusion criteria. Studies that fulfilled the criteria were then screened for their abstract. When the abstract met inclusion criteria or a definitive failure of meeting the criteria could not be determined the full article was appraised. For both the abstract and full text search the reasons for exclusion criteria were specified for comprehensibility. Full texts of studies meeting the inclusion criteria were chosen for reviewing.

Results

The electronic database search resulted in 4487 records after removing duplicates. After the aforementioned screening eleven studies met the inclusion criteria fully (Figure 1). The references to the final eleven studies can be found in in the Reference section marked with a * at the end. The results of the studies can be seen in Appendix B.

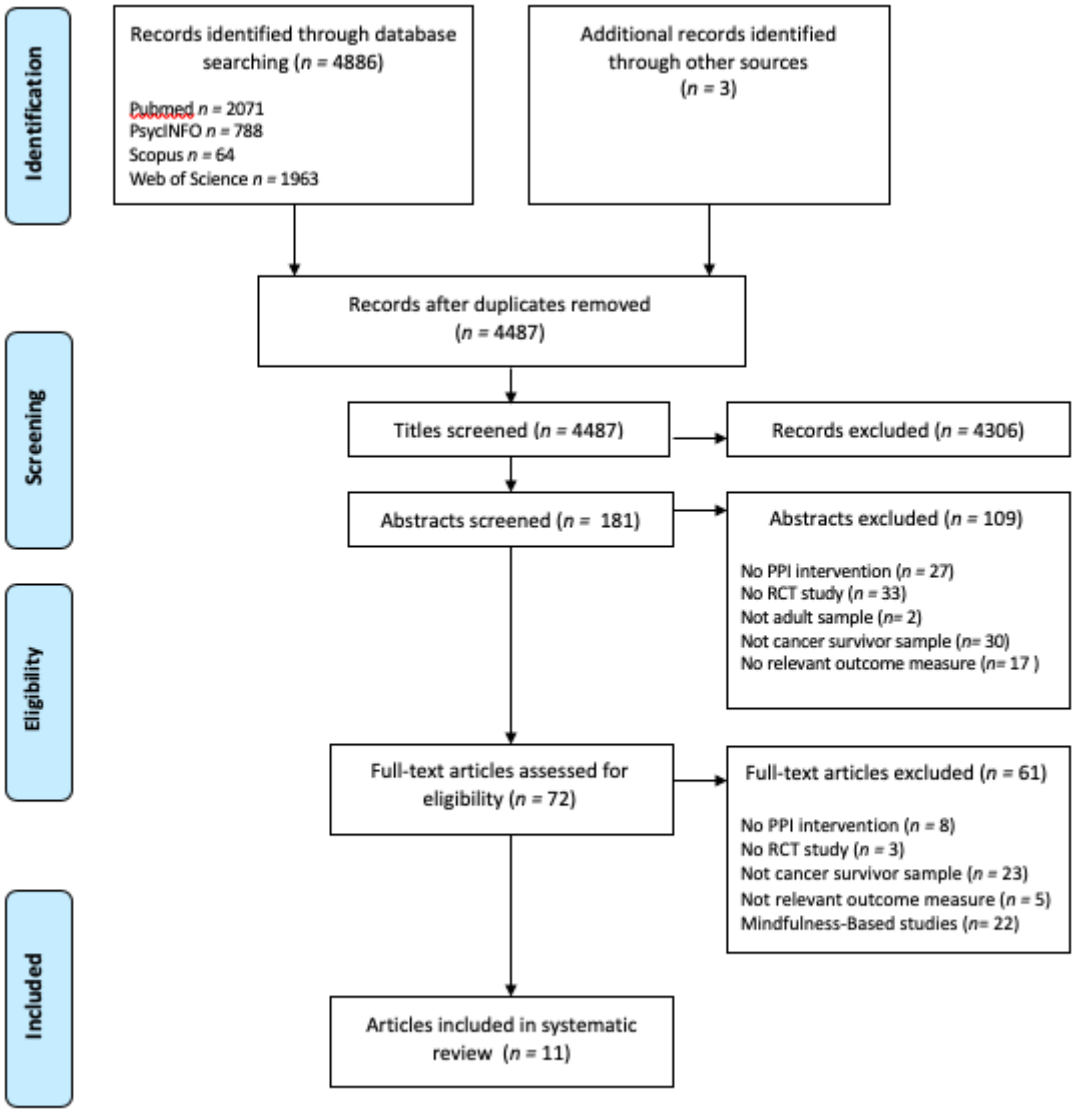

Figure 1. Flowchart of study exclusion and selection according to PRISMA guidelines.

Study characteristics

Eleven studies were included (Table 1). Six studies [1-3, 5, 8, 11] reported samples from 33 to 92 participants, four studies [6, 7, 9, 10] between 126 and 170 and one study [4] a large sample of 410 participants. The mean age ranged from 48.8 to 66.3 with the majority of studies having populations aged between 50 and 59 [1-3, 5, 7, 8, 10, 11]. Ten of the eleven studies had populations of either only breast cancer survivors or predominantly breast cancer survivors with smaller parts of the sample being composed of lung, colon, colorectal, gynecological, Hodgkin's lymphoma and non-Hodgkin, myelogenous leukemia, rectum and other, non-specified cancer forms survivors. Only one study [4] had a sample of only colorectal cancer

survivors. Consequently, the majority of participants were female and only Hawkes *et al.* [4] study had an evenly distributed sample of male and female participants (46% female). Eight of the eleven studies reported the average time since the first diagnosis of cancer [1, 3-5, 7, 8- 10] which ranged from 1.45 to 10.89 years. In total 39 different outcome measures were used of which many tested equal or similar concepts. The most prevalent concepts tested were anxiety and depression, mindfulness, hope and hopelessness, acceptance and action, posttraumatic growth and quality of life (Table 2).

Table 1

Demographic characteristics of final studies

First Author (Year)	Disorder (%)	% female (*n* total)	Mean age (SD)	Time since first diagnosis in years (SD)
Johns (2020)	Breast Cancer (100)	100 (91)	58.70 (10.65)	5.34 (4.72)
Fernández-Rodríguez (2020)	Breast Cancer (87) Lung Cancer (4.3) Other (8.7)	93.5 (66)	51.49 (6.88)	/*
Dodds (2015)	Breast Cancer (100)	100 (33)	54.7 (12.1)	4.8 (3.2)
Hawkes (2014)	Colorectal Cancer (100)	46 (410)	66.3 (10.1)	6.0 (2.3)
Gonzalez-Hernandez (2018)	Breast Cancer (100)	100 (56)	52.13 (6.96)	10.89 (2.17)
Ho (2016)	Breast Cancer (100)	100 (157)	48.8 (6.2)	/*

Van der Spek (2017)	Breast Cancer (53) Colon Cancer (26) Other (21)	82.6 (170)	57.13 (10.23)	1.55 (/*)
Otto (2016)	Breast Cancer (100)	100 (67)	56.89 (10.20)	4.02 (1.70)
Ochoa (2016)	Breast Cancer (83) Uterine corpus (4.1) Colon (2.7) Myelogenous leukemia (2.7) Ovary/Fallopian tube (2.7) Rectum (1.7) Hodgkin's lymphoma (1.4) Non-Hodgkin’s (1.4)	/* (126)	48.93 (9.48)	1.45 (1.07)
Ochoa-Arnedo (2020)	Breast Cancer (81.9) Gynecological (5.6) Colorectal (2.8) Others (9.7)	/* (140)	50.81 (9.49)	1.5 (1.27)
Gonzaléz-Fernandéz (2018)	Breast Cancer (88.2) Other (11.8%)	92.3 (66)	51.66 (6.76)	/*

Note. *no data provided.

Table 2

Intervention descriptions of final studies

Author	PPI name (*n*)	Format (guidance)	Duration in weeks (*n* sessions)	Control group (*n*)	Retention rate posttreatment		Follow up in weeks	Outcome measure
					PPI	Control		
Johns (2020)	ACT (33)	Group (yes)	6 (6)	EUC (26)	87%	97%	4 / 24	FCRI-SF CAAQ IES-R GAD PHQ IES-R PROMIS
Fernández-Rodríguez (2020)	ACT (17)	Group (yes)	12 (12)	WL (27)	71%	85%	12	HADS BDI-IA EROS AAQ-II BADS
Dodds (2015)	CBCT (12)	Group (yes)	8 (8)	WL (16)	75%	94%		PSS-4 CES-D-10 FCRI IES-R R-UCLA SF-12 CAMS-R 10 GQ-6
Hawkes (2014)	ACT (205)	Telephone-delivered (yes)	24 (11)	UC (205)	83%	85%	24	PTGI FACIT-Sp AAQ-II MAAS

								BSI-18 FACT-C
Gonzalez-Hernandez (2018)	CBCT (28)	Group (yes)	8 (8)	TAU (28)	89%	89%	24	FACT-B+4 BSI-18 FCRI SCS-SF CS FFMQ-SF
Ho (2016)	Body-Mind-Spirit Intervention (51)	Group (yes)	8 (8)	SHG (57)	98%	89%	24	C-CECS C-PSS C-HADS C-GHQ
Van der Spek (2017)	MCGP-CS (57)	Group (yes)	8 (8)	CAU (57)	87%	82%	12 / 24	PMP SPWB PGI MAC LOT-R BHS HADS
Otto (2016)	Gratitude intervention (34)	Online Survey (no)	6 (6)	Online (Control) Survey (33)	76%	93%	4 / 12	Gratitude Positive affect Goal pursuit CARS
Ochoa (2016)	PPC (73)	Group (yes)	12 (12)	WL (53) / later TAU for follow up period (43)	73%	81%	12 / 52	HADS PCL-C PTGI ELEI
Ochoa-Arnedo (2020)	PPC (67)	Group (yes)	12 (12)	CBSM (73)	80%	76%	12 / 52	PCL-C HADS

								PTGI ELEI
Gonzaléz-Fernandéz (2018)	ACT (17)	Group (yes)	12 (12)	WL (27)	70%	85%	/	HADS EROS AAQ-II BADS

Abbreviations. ***PPI names:*** ACT, Acceptance and Commitment Theory; CBCT, Cognitively-Based Compassion Training; MCGPS-CS, Meaning-Centered Group Therapy for Cancer Survivors; PPC, Positive Psychotherapy for Cancer Survivors. ***Control groups:*** EUC, Enhanced Usual Care; WL, Waitlist; TAU, Treatment as Usual; SHG, Self-Help Group; CBSM, Cognitively-Based Stress Management. ***Outcome measures:*** FCRI-SF, Fear of Cancer Recurrence Inventory-Short Form; CAAQ, Cancer Acceptance and Action Questionnaire; GAD, Generalized Anxiety Disorder Scale; PHQ, Patient Health Questionnaire; IES-R, Impact of Event Scale-Revised; PROMIS, Patient-Reported Outcomes Measurement Information System Global Health Scale; HADS, Hospital Anxiety and Depression Scale; BDI-IA, Short form of Beck Depression Inventory; EROS, Environmental Reward Observation Scale; AAQ-II, Acceptance and Action Questionnaire-II; BADS, Behavioral Activation for Depression Scale; PSS-4, Perceived Stress Scale; CES-D-10, Brief Center for Epidemiologic Studies-Depression questionnaire; R-UCLA, Revised UCLA Loneliness Scale, SF-12, Medical Outcomes Study Short Form 12-Item Health Survey; CAMS-R 10, Cognitive and Affective Mindfulness Scale; GQ-6, Gratitude Questionnaire; PTGI, Posttraumatic Growth Inventory; FACIT-Sp, Functional Assessment of Chronic Illness Therapy-Spiritual Well-being; MAAS, Mindfulness Attention Awareness Scale; BSI-18, Brief Symptom Inventory, FACT-C, Functional Assessment of Cancer Therapy-Colorectal; FACT-B+4, Functional Assessment of Cancer Therapy-Breast Cancer; SCS-SF, Self-Compassion Scale-Short Form; CS, Compassion Scale; FFMQ-SF, Five Facets of Mindfulness Questionnaire-Short Form; C-CECS, Chinese Courtauld Emotional Control Scale; C-PSS, Chinese Perceived Stress Scale; C-HADS, Chinese Hospital Anxiety and Depression Scale; C-GHQ, Chinese General Health Questionnaire; PMP, Personal Meaning Profile; SPWB, Ryff's Scale of Psychological Well-Being; PGI, Posttraumatic Growth Inventory; MAC, Mental Adjustment to Cancer; LOT-R, Life Orientation Test-Revised; BHS, Beck's Hopelessness Scale; CARS, Concerns about Recurrence Scale; PCL-C, Posttraumatic Stress Disorder Checklist-Civilian Version; ELEI, Extreme Life Events Inventory.

Study contents

Four studies [1, 2, 4, 11] made use of the Acceptance and Commitment Therapy. Two studies applied Positive Psychotherapy for Cancer Survivors [9, 10] and Cognitively-Based Compassion Training [3, 5]. Ho *et al.* [6] performed a Body-Mind-Spirit Intervention that focuses on enhancing resilience, self-acceptance and spirituality when faced with suffering from cancer. Otto *et al.* [8] applied a gratitude intervention and van der Spek *et al.* [7] focused on enhancing meaning making with a Meaning-Centered Group Therapy for Cancer Survivors.

Acceptance and Commitment Therapy (ACT)

Of the four studies using ACT three conducted either 6 [1] or 12 [2, 11] weekly guided group sessions. Hawkes *et al.* [4] employed eleven telephone-delivered coaching sessions over six months based on ACT processes as part of a multiple health behavior change intervention including motivational postcards, a participant handbook and a pedometer.

ACT has been shown to significantly decrease depressive [2, 11] and anxious [2, 11] symptoms. These improvements were sustained at both follow-ups of three and six months. Johns *et al.* [1] study found no significant effects on depression and anxiety from pre- to post treatment with the effectiveness remarkably becoming very significant at the six months follow up. The levels of acceptance and action (and resulting reduction of avoidance behaviors) have been shown to increase significantly in all four studies [1, 2, 4, 11] with sustained effects at follow-ups in two of them [1, 2]. Johns *et al*. [1] study focused primarily on establishing the relationship of ACT reducing fear of cancer recurrence (FCR) and have shown clinically significant improvements on FCR and most of its subdimensions such as anxiety, the perceived impact of the event and distress, with significant follow up effects. No effects have been found on the subscales ‘improved coping strategies’ or ‘reassurance seeking’. Hawkes *et al.* [4] found that surprisingly there was no significant effect on mindfulness and that significant effects on posttraumatic growth (PTG), spirituality and subscales of acceptance

were not sustained at their follow ups at twelve months suggesting that interventions might need to be repeated for sustained long-term effects. Concerning quality of life, Johns *et al.* [1] found significant differences in quality of life (physical and mental) compared to both the control condition and the survivorship education group therapy while Hawkes *et al.* [4] found no improvements in cancer-related quality of life except for the physical well-being sub dimension.

In sum, ACT has proven to be effective in reducing depressive, anxious and mixed results on FCR symptoms while improving physical and mental quality of life.

Positive Psychotherapy for Cancer Survivors (PPC)

Both Positive Psychotherapy for Cancer Survivors (PPC) studies performed 12 weekly 90-minute long sessions [9, 10]. PPC has been shown to significantly lower anxious and depressive symptoms, an effect which was sustained at follow-up [9]. Ochoa *et al*. [9] found that PPC has resulted in significant increases in PTG which were sustained albeit not clinically significant anymore at follow-up. Ochoa-Arnedo *et al.* [10] found no significant effect on PTG for both PPC and their second intervention Mindfulness-Based Stress Reduction (MBSR). Additionally, PPC has been shown to significantly reduce stress and distress which is sustained at follow-up [10] with more significant improvements than MBSR.

In sum, PPC has a significant effect on anxiety, depression and stress while showing mixed results concerning its effectiveness for increasing PTG.

Cognitively-Based Compassion Training (CBCT)

Both studies performing Cognitively-Based Compassion Training performed 8 weekly 2-hour sessions with the participants [3, 5]. While Dodds *et al.* [3] found significant reductions in depressive symptoms, Gonzaléz-Hernandéz *et al.* [5] only found significant within-group differences from pre- to post treatment measurements. Both studies found significant increases in mindfulness [3, 5] and Gonzaléz-Hernandéz *et al.* [5] found CBCT to be additionally effective for increasing self-kindness, a sense of common humanity and self-compassion. The researchers did not find significant effects on health-related quality of life,

general compassion and fear of cancer recurrence besides the 'psychological stress reduction' sub dimension [5]. Dodds *et al.* [3] have also found that CBCT has no effect on general FCR but significance on the subscale 'functional impairment due to fear of cancer recurrence'. CBCT had a significant effect on vitality but not pain and mental and physical well-being [3]. Additionally, no effect has been found for improving loneliness, gratitude levels and the perceived impact of the traumatic event except for a reduction in avoidance (behavior).

In sum, CBCT shows various improvements in dimensions of well-being such as self-kindness, common humanity or mindfulness while not addressing others such as gratitude or general compassion but presents inconclusive effects concerning depression, quality of life and fear of cancer recurrence.

Body-Mind-Spirit Intervention (BMS)

The one study employed the intervention in 8 weekly two-hour group sessions [6]. In addition to the social support self-help control group another intervention was employed to be compared to BMS, namely a Support-Expressive Group therapy (SEG). None of the three groups displayed significant changes in anxiety and depression. Only BMS had a significant effect on perceived stress.

In sum, BMS showed no effect on reducing depression and anxiety but some effect on perceived stress.

Gratitude Intervention

The gratitude intervention showed no significant effect on fear of recurrence but a significant effect on the sub dimension 'death worry' [8]. Additionally, no positive effect on positive affect has been found but the participants in the control condition significantly worsened on positive affect which the participants in the gratitude intervention did not, suggesting that the intervention might have prevented the naturally occurring decline.

In sum, the gratitude intervention shows no significant effect on fear of cancer recurrence besides death worry. No information has been presented concerning changes in gratitude.

Meaning-Centered Group Psychotherapy for Cancer Survivors (MCGT-CS)

Van der Spek *et al.* [7] employed the Meaning-Centered Group Psychotherapy for Cancer Survivors in 8 weekly two-hour sessions. Supportive Group Therapy (SGP) was additionally employed to be compared to next to the control condition. MCGT-CS has been found to be significantly effective in increasing personal meaning, goal-orientedness, psychological well-being, positive relations, adjustment to cancer and reducing depressive symptoms and psychological distress. All three conditions had no significant effect on PTG, optimism, quality of life or reducing hopelessness. MCGT-CS and SGP were similar in their results slightly favoring MCGT-CS regarding personal growth and environmental mastery. A follow-up study was performed by Holtmaat et al. (2019) and showed that the significant effects on personal meaning, goal-orientedness, positive relations and purpose in life have stayed stable at the two year follow up. The significant difference to SGP had also been sustained.

In sum, MCGT-CS showed significant effects on reducing depression and overall psychological distress while improving various mental well-being dimensions, namely personal meaning, goal-orientedness, positive relations or personal growth. It is noteworthy that these effects have stayed stable at the two-year follow up.

Summary of results

Five of the eleven studies found significant effects of PPIs on depression [2, 3, 7, 9, 11]. Three studies revealed significant effects on anxiety [2, 9, 11]. Stress was addressed by two studies [8, 10]. Only one study found significant effects on fear of cancer recurrence [1]. Physical and emotional quality of life was increased in two studies [1, 4]. Levels of acceptance and action have been increased in four studies [1, 2, 4, 11]. Various elements of well-being have been increased: mindfulness [3, 5], PTG [4, 9], spirituality [4], self-kindness [5], common humanity [5], self-compassion [5], personal meaning [7], goal-orientedness [7], positive relations [7], personal growth [7] and environmental mastery [7].

Discussion

To our knowledge this is the first study to assess the effectiveness of positive psychology interventions for cancer survivors of all cancer forms. The literature review revealed eleven studies which fulfilled all selection criteria.

This systematic review suggests that PPIs can adequately address depressive complaints in cancer survivors. Out of the five studies with significant effects four showed significant follow-up effects. Three studies showed significant effects for anxiety while four studies displayed significant follow-up effects. The fact that more studies had significant follow-up effects than post treatment effects for anxiety is explained by Johns et al. (2019) study applying Acceptance and Commitment Therapy that found only significant improvements at the follow-ups for both depression and anxiety. This surprising finding suggests that PPIs, specifically ACT, might need time that extends the intervention duration to realize its proposed effects. Stress was addressed by two studies with one study presenting significant follow-up effects and one study had significant changes in fear of cancer recurrence both in posttreatment and follow-up. These findings suggest that PPIs might be more effective for mood-impaired populations than populations with anxious complaints. Concerning the well-being of cancer survivors PPIs have shown to address several dimensions of well-being. Acceptance of the adverse experience of suffering from cancer was addressed by four studies with two studies showing significant follow-up effects. Several studies increased posttraumatic growth, mindfulness, self-kindness and personal growth among others.

The findings of this study are different to Casellas-Grau, Font and Vives' (2013) review on positive psychology interventions in current breast cancer patients. They did not include changes in pathological symptoms evoked through the positive therapies but focused purely on the changes in well-being. They found enhancements of quality of life, well-being, PTG, hope, meaning, happiness, optimism, life satisfaction and benefit finding. While this study also found PPIs to enhance quality of life and PTG there is no overlap in the fostered positive feelings and behaviors. One major difference that might explain the differing findings between the present and their study is the inclusion of mindfulness-based studies. The majority of their

found studies utilized the Mindfulness-Based Stress Reduction program (MBSR) but surprisingly found no clear evidence for improved mindfulness while this review has two studies with significant increases in mindfulness. These two studies both performed the Cognitively-Based Compassion Training which did not find significant effects on compassion. Future studies should critically reflect the proposed and actual effects of positive interventions.

The most researched therapy with the best results in this review is ACT. ACT has shown to adequately address depressive and anxious complaints while improving the quality of life and acceptance of the cancer experience in cancer survivors. Other studies have replicated the findings with cancer patients (Feros, Lane, Ciarrochi, & Blackledge, 2011) and patients with somatic and mental disorders (A-Tjak et al., 2015), all improving depression, anxiety and acceptance. These studies have found ACT as a third-wave cognitive behavioral therapy not to be superior to traditional CBT but to have similar results. On the other hand, a meta-analysis of studies comparing the effectiveness of ACT and CBT in diverse problems (somatic, psychological) has significantly favored ACT over CBT (Jiménez, 2012). Whilst the effect on depression and anxiety is similar between those two therapies, ACT is superior to CBT regarding improving quality of life and has been shown to work through its proposed "processes of change". This refers to ACTs approach of acceptance, increasing cognitive diffusion and reducing experiential avoidance. CBT mostly failed to promote its proposed processes of change, namely reduction of the frequency of automatic (negative) thoughts and changes in dysfunctional attitudes. This suggests that ACT might at least be equally as effective if not more effective than its predecessor CBT with cancer survivors and be a suitable option for application with cancer survivors.

This review highlights the need for improved research methodology and reporting within scientific studies of PPI. This critique has previously been formed by multiple other systematic reviews (e.g. Casselas-Grau, Font & Vives, 2013; Chakhssi, Kraiss, Sommers-Spijkerman & Bohlmeijer, 2018). They have found their studies to be of low to medium quality, often having too few participants, no follow-ups and failing to perform or report critically important elements such as blinding of assessors or using intention-to-treat principles. A limitation of this study is

that due to time constraints no quality assessment of studies has been performed and no statements about the quality of studies can be made. Nevertheless, what became apparent during the analysis of the studies was that multiple studies had an insufficient presentation of results. Either tables with the statistical data were missing, results were only presented in text form without statistical information (e.g. “The strongest reduction of PCL and HADS scores in the PPC group indicate less negative mood and stress in T1 among those participants receiving PPC compared to those in the waiting list”, Ochoa et al., 2016) or primarily within-group effects were displayed (e.g. “Within-group comparisons showed significant pre- post and and pre-to-follow-up changes for psychological stress in the CBCT group [...]”, Gonzalez-Hernandez et al., 2018). This made synthesizing and verifying the results difficult. Positive psychology research needs more structure and universal guidelines on methodological and reporting standards.

In line with the previous critique there seems to be a discrepancy between the theoretical idea of positive psychology and its application. Positive psychology arose to complement the traditional, pathology-focused approach to health. With the recent recognition by studies that well-being has a substantial effect on recovery and survival rate (Lamers, Bolier, Westerhof, Smit, & Bohlmeijer, 2011), results in overall beneficial effects and well-being and psychological distress have been shown to be two separate constructs that need individual attention (Chakhssi, Kraiss, Sommers-Spijkerman, & Bohlmeijer, 2018) the importance of positive psychology has been established. Nevertheless, the found studies in this review primarily focused on the effectiveness of PPIs on pathological complaints. PPIs are treatment methods that explicitly aim to cultivate positive feelings and interventions that target pathologies are, in the strictest sense, not positive interventions even when utilizing so-called positive psychology interventions. Besides the studies by Gonzalez-Herandez et al. (2018) and van der Spek et al. (2017) no intervention explicitly and extensively aimed to test changes in positive coping styles. Most studies would focus on only establishing the effect of the intervention on the two dimensions posttraumatic growth and mindfulness. The fact that most positive concepts have only been tested (and found significant) in one of the studies makes it

difficult to make substantial claims about the effectiveness of the PPIs on positive functioning. Nevertheless, the findings of this review and also previous reviews (e.g. Chakhssi, Kraiss, Sommers-Spijkerman & Bohlmeijer, 2018) show that PPIs have the capability to address both pathologies and well-being. This raises the question whether the strict definition of PPIs reflects the scientific evidence of how positive interventions work. Even though pathology and well-being are distinctive concepts, they are moderately correlated and seemingly PPIs are able to address both simultaneously. A possible compromise would be to include both the treatment of pathologies and improving well-being in the definition of positive psychology interventions that have elements that explicitly focus on enhancing positive coping styles. We suggest that future research critically reflects on what constitutes a positive psychological intervention and a universal classification of PPIs is established for more valid and coherent research.

This review reveals that there is only a very limited number of research on positive psychology interventions and cancer survivors. When looking at the demographics of the found studies, ten out of eleven studies had populations consisting of either purely or primarily breast cancer survivors which in turn results in the majority of participants being female. That shows that in addition to being rarely studied the only survivor group with dedicated research are breast cancer survivors. Only Hawkes et al. (2014) study had an equal distribution of male and female survivors of colorectal cancer. This can undoubtly be explained by the fact that the most prevalent cancer form for women is breast cancer and better treatment has increased the survival rate to almost 90% (U.S. Cancer Statistics Working Group, 2020). These demographics are not inherent to only positive psychology research but are similar throughout cancer patients and survivors research. Systematic reviews for the application of CBT (Johnson et al., 2016) and Mindfulness-based Stress Reduction Therapy (Xie et al., 2020) both show that breast cancer survivors are the primary demographic and consequently the majority of participants are female. Nevertheless, more diversity in cancer forms has been found in these reviews compared to this review. The MBSR review for example found several studies purely consisting of lung cancer survivors, a population that has not been tested at all with

PPIs. These findings imply several recommendations for future research: More research has to be done on non-breast cancer survivors to find out overall effectiveness for cancer survivors. Additionally, the findings of this systematic review should be generalized to cancer survivors in general with caution because about 90% of the participants are breast cancer survivors. Generalizability of PPIs (and therapies in general) on all cancer forms might be more difficult than expected because every type of malignant disease has unique ramifications. A previous study by Krebber et al. (2013) showed that while 31% of digestive cancer survivors experience depression only 2% of lung cancer survivors show depressive symptoms. This finding needs to be replicated and the associated factors need to be established but this potentially has serious implications for researching therapies for cancer survivors.

Recommendation and conclusion

In conclusion, this systematic review shows that PPIs are effective in dealing with commonly experienced psychological symptoms such as depression, anxiety and stress. In addition, several positive coping styles have been improved by various positive interventions. So far the most promising PPI to address both pathologies and well-being in cancer survivors seems to be the third-wave cognitive behavioral therapy Acceptance and Commitment Therapy and multiple studies suggest ist efficacy for cancer patients and survivors. Future research should focus on creating universal guidelines for what constitutes a positive psychology intervention and synthesize current scientific evidence into the definition and research guidelines of positive psychology. More large-scale, methodologically high-quality studies are needed to further establish the potential of PPIs.

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Appendix

Appendix A

PICO-Model for search terms

P: (“cancer survivor*” OR cancer* OR neoplasm* OR carcinoma* OR malignant* OR tumor*)
I: (“positive psychology” OR “post-traumatic growth” OR satisfaction* OR mindfulness* OR happiness* OR “positive coping” OR resilience OR positivity OR “positive emotion*” OR humor OR gratitude OR kindness OR meaning* OR “positive relationship*” OR “well-being therapy” OR “hope therapy” OR “strength-centered therapy” OR “positive psychotherapy” OR “meaningful life therapy” OR “mindfulness-based cognitive therapy” OR “acceptance and commitment therapy”)
C: (“randomized controlled trial*”)
O: (depression OR anxiety OR fatigue OR stress OR “well-being” OR “quality of life” OR “health-related quality of life”)

Appendix B

Table 3

Statistical results of all studies on psychological health and well-being parameters.

Article	Outcome measure	Results* a = at post-treatment b = at follow-up
	ACT Therapy	
	Psychological Health	
Fernandéz-Rodriguéz et al. (2020)	Anxiety (HADS-A)	ACT > WL a. p = .001 b. p = .001
	Depression (HADS-D /	ACT > WL a. p = .05 b. p = .001
	BDI-IA-SCA)	ACT > WL a. p = .001 b. p = .001
Johns et al. (2020)	Anxiety (GADS)	ACT > SE a. NS b. p = .001
		ACT > EUC a. NS b. p = .001
	Depression (PHQ-8)	ACT > SE a. NS b. p = .05

		ACT > EUC a. NS b. p = .05
Gonzaléz-Fernandéz et al. (2018)**	Anxiety (HADS-A)	ACT > CG T1-T2: p = .001
	Depression (HADS-D)	ACT > CG T1-T2: p = .005
Hawkes et al. (2014)	Distress (BSI-18)	ACT = UC a. NS b. NS
Psychological well-being outcomes		
Hawkes et al. (2014)	Posttraumatic growth (PTGI)	ACT > UC a. p= .001 b. p= .05
	Spirituality (FACIT-Sp)	ACT > UC a. p= .05 b. NS
	Mindfulness (MAAS)	ACT = UC a. NS b. NS
Gonzaléz-Fernandéz et al. (2018)	Environmental Reward (EROS)	ACT > CG ACT1-ACT2: p = .001
Fernandéz-Rodriguéz et al. (2020)	Environmental Reward (EROS)	ACT > WL a. p= .012 b. p= .001
Fear of Cancer Recurrence (FCR)		
Johns et al. (2020)	Presence and severity of FCR-associated thoughts and images (FCR-SF)	ACT > SE a. p= .05 b. p= .001
		ACT > EUC a. NS b. p= .01
	Psychological Distress experienced through FCR (FCRI)	ACT > SE a. NS b. p= .001
		ACT > EUC a. p= .05 b. p= .01
Outcomes specific for ACT		
Fernandéz-Rodriguéz et al. (2020)	Acceptance and Action (AAQ-II)	ACT > WL a. p= .005 b. p= .001
Johns et al. (2019)	Acceptance and Action: cancer-related avoidant coping strategies (CAAQ)	ACT > SE a. p= .05 b. p= .001
		ACT > EUC a. p= .05 b. p= .001
Hawkes et al. (2014)	Acceptance and Action (AAQ-II)	ACT > UC a. p= 0.01 b. NS
Gonzaléz-Fernandéz et al. (2018)	AAQ-II	ACT > CG ACT1-ACT2: p = .001

	(Health-related/ Cancer-specific) Quality of life	
Johns et al. (2019)	Physical and mental quality of life (QOL) (PROMIS)	ACT > SE a. p= .001 b. p= .01 ACT > EUC a. p= .01 b. p= .01
Hawkes et al. (2014)	Cancer-related QOL (FACT-C)	ACT = UC a. NS b. NS
	Subscale physical well-being	a. p= .05 b. p= .05
	Positive Psychotherapy	
	Psychological Health	
Ochoa et al. (2017)***	Anxiety (HADS-A) Depression (HADS-D)	a. p= .001 a. p= .001
Ochoa-Arnedo et al. (2020)***	Psychological Distress (HADS)	PPC = CBSM, but p= .07 (almost significant)
	Posttraumatic Effects	
Ochoa et al. (2017)	Posttraumatic Stress Disorder (PCL-C) Intrusions Avoidance Hyperarousal	PPC > CG a. p= .005 a. p= .001 a. p= .001
Ochoa-Arnedo et al. (2020)	PCL-C	PPC > CBSM a. p= .001
	Psychological well-being outcomes	
Ochoa et al. (2017)	Posttraumatic Growth (PTGI) Authenticity of PTG (ICC) PTG score patient and significant others before intervention comparison PTG score patient and significant others after intervention comparison	PPC > CG, but ALL subscales non-significant. p= .042 p= .115; NS (patients had higher scores than significant others)
Ochoa-Arnedo et al. (2020)	PTGI	PPC > CBSM a. p= .001
	Cognitively-Based Compassion Training (CBCT)	
	Psychological Health	
Dodds et al. (2015)	Stress (PSS-4) Depression (CES-D-10) Loneliness (R-UCLA) Impact of (traumatic) Event (IES-R) But Subscale "Avoidance"	CBCT > WL a. NS a. p= .01 a. NS a. NS a. p= .05
Gonzalez-Hernandez et al. (2018)****	Depression (BSI-18)	CBCT = TAU a. NS b. NS
	Fear of Cancer Recurrence	
Dodds et al. (2015)	FCR (FCRI)	a. NS

	Subscale "Functioning impairment"	a. p= .05
Gonzalez-Hernandez et al. (2018)	FCR (FCRI) Subscale "FCR psychological distress"	a. NS a. p= .001 b. p= .05
Psychological well-being outcomes		
Dodds et al. (2015)	Mindfulness (CAMS-R 10)	CBCT > WL a. p= .05
	Gratitude (GQ-6)	a. NS
Gonzalez-Hernandez et al. (2018)	Self-compassion (SC-SF)	CBCT > TAU a. p= .01
	Self-kindness	a. p= .01 b. p= .05
	Common humanity	a. p= .01 b. NS
	Mindfulness (FFMQ-SF) Observing	a. p= .05 b. p= .05
	Awareness	a. p= .05 b. p= .05
	Compassion	NS
Pain and vitality		
Dodds et al. (2015)	Vitality (SF-12)	a. p= .01
	Pain (SF-12)	a. NS
	Physical and mental well-being	a. NS
(Health-related) Quality of life		
Gonzalez-Hernandez et al. (2018)	Health-related QOL in breast cancers (FACT-B+4)	CBCT a. NS
	Emotional quality of life	a. p= .01 b. NS
	General quality of life	a. p= .05 b. NS

Body-Mind-Spirit Intervention (BMS)

Psychological Health		
Ho et al. (2016) – within-group effects	Anxiety (C-HADS)	BMS T1-T2: NS
	Depression (C-HADS)	T1-T2: NS
	Perceived Stress (C-PSS)	T1-T2: p= .05
	Emotional suppression (C-CECS)	T1-T2: p= .05
Ho et al. (2016) – between-group effects	Anxiety (C-HADS)	BMS > CG a. NS
	Depression (C-HADS)	a. NS
	Perceived Stress (C-PSS)	a. p= .058, marginal significance
	Emotional suppression (C-CECS)	a. p= .05

Gratitude Intervention (GI)

Psychological well-being outcomes		
Otto et al. (2016)	Gratitude (three item-weekly gratitude survey)	Not reported.
	Positive affect (PANAS/weekly survey)	GI > CG a. p= .009, but NOT for increase but CG strongly decreased, GI stayed stable.
	Intervention effect on Goal pursuit	p= .011
Fear of Cancer Recurrence		
Otto et al. (2016)	Fear of Cancer Recurrence (CARS)	GI = CG a. NS

	Death Worry (subscale CARS)	GI > CG a. p= .011
	Meaning-Centered Group Psychotherapy for Cancer Survivors (MCGP-CS)	
	Psychological well-being outcomes	
Van der Spek et al. (2017)		MCGP-CS > SGP/CAU
	Personal meaning (PMP-DV)	a. and b. p= .019
	Goal-orientedness (subscale PMP-DV)	a. and b. p= .001
	Psychological well-being (Ryff's SPWB)	
	Positive relations	a. and b. p= .036
	Autonomy	a. and b. NS
	Environmental mastery	a. and b. p= .012
	Personal growth	a. and b. p= .032
	Purpose in life	a. and b. p= .007
	Self-acceptance	a. and b. NS
	Spiritual well-being	a. and b. NS
	PTGI	a. and b. NS
	Life Orientation – Optimism (LOT-R)	a. and b. NS
	Psychological Health	
Van der Spek et al. (2017)	HADS Total Score	a. and b. p= .025
	Anxiety (HADS-A)	a. and b. NS
	Depression (HADS-D)	a. and b. p= .025
	Mental Adjustment to Cancer (MAC)	
	Fighting spirit	a. and b. p= .001
	Helpless/hopeless	a. and b. p= .005
	Anxious preoccupation	a. and b. NS
	Fatalism	a. and b. NS
	Avoidance	a. and b. NS
	Hopelessness (BHS)	a. and b. NS

* > indicates "significantly better than",
= indicates "not significantly better than",
NS indicates "no significant effect".
p= 0.05 is the point of significance (and below).
** Gonzaléz-Fernandéz et al. (2018) did not report between-group effect statistically, only numerically and then written in text (e.g. "In both cases, the differences between pre- and post-measures were significantly larger for the experimental groups than for the control group.").
*** both Ochoa et al. (2017) and Ochoa-Arnedo et al. (2020) did not provide comprehensive statistical information or just partial information.
**** sometimes statistical comparison of experimental and control groups, at other times only within-group effects presented. when only within-group results are presented the effects are considered to be non-significant between the groups.