

# Who benefits from psychosocial interventions in oncology? A systematic review of psychological moderators of treatment outcome

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**Abstract** Medical and demographic characteristics and psychological morbidity of individuals with cancer prior to a psychosocial intervention can influence the efficacy of interventions. However, little is known about the moderating role of patients' psychosocial characteristics on intervention effects. This review sought to identify and synthesize the impacts of psychosocial moderators of the effect of psychosocial interventions on the psychological well-being of cancer patients. A systematic review of the published literature was conducted. Databases searched included PsycINFO, PubMed, MEDLINE, Scopus, CINAHL, Web of Science, and Psychology and Behavioural Sciences Collection. Randomized controlled studies examining a moderator effect of patients' psychosocial characteristics other than baseline depression and anxiety levels were included. Of 199 potential papers, a total of 20 studies, involving 3,340 heterogeneous cancer patients are included. Of the 17 potential psychosocial moderators examined in this review, 14 significantly moderated the effects of interventions. Moderators were categorized into

personality traits, mental and physical quality of life, social environment, and self-efficacy. Patients with poorer quality of life, interpersonal relationships and sense of control benefitted more from interventions than those who already had adequate resources. Patients with low levels of optimism and neuroticism, high levels of emotional expressiveness, interpersonal sensitivity, and dispositional hypnotizability also showed greater benefits from various interventions. This review adds to the growing literature aimed at personalizing psychosocial cancer treatment by identifying who benefits from which psychosocial interventions.

**Keywords** Cancer · Psychosocial intervention · Personality · Social support · Self-efficacy · Quality of life

## Introduction

Individuals diagnosed with cancer can experience persistent distress due to the impact of cancer on multiple facets of their lives. These disruptions may include physical and cognitive dysfunctions resulting from cancer treatment (Gore et al., 2010; Minisini et al., 2004), psychological morbidity related to anxiety and depression (Grassi et al., 2009; Reich et al., 2008), disrupted social and familial relationships (Pitceathly & Maguire, 2003) fatigue and sleep disturbances (Escalante, 2003; Savard et al., 2001). Given the diverse range of difficulties, the need for psychosocial interventions to improve patients' quality of life has been well documented (Carlson et al., 2004; Zabora et al., 1997). It is also important to recognize that due to improvements in treatment and diagnostic tools, a large number of patients continue to live with cancer following their surgical and other adjuvant treatments. For example,

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in Canada, approximately 87% of 20,000 women diagnosed with breast cancer each year survive more than 5 years following active treatment (Canadian Cancer Society, 2011). This is paralleled in many other tumor groups resulting in a large cohort of long-term survivors. Consequently, it is essential to provide interventions that produce long-term benefits in patients' adjustment and coping.

Currently, a wide range of psychosocial interventions are available. Most of these psychosocial interventions belong to one of the types indicated in Table 1, while others combine two or more modalities. While various psychosocial interventions exist and hundreds of studies have been conducted, overall the efficacy of interventions in promoting patients' psychological well-being is positive but inconsistent (Newell et al., 2002; Ross et al., 2002; Sheard & Maguire, 1999; Williams & Dale, 2006). For example, a recent systematic review of 14 previously published reviews on the effects of psychosocial interventions among cancer patients between 1995 and 2007 reported that only six of the 14 reviews fully support the efficacy of interventions for alleviating anxiety, while seven reviews support the usefulness of interventions for alleviating depression (Jacobsen & Jim, 2008). Thus, while the evidence continues to be debated, it is clear that not everyone who participates in a psychosocial intervention will benefit. Determining why this occurs is an important component of intervention research that has not received much attention in the literature.

One way to understand the variability in the outcomes of psychosocial intervention is to identify moderators.

Statistically, a moderator is a variable (e.g., trait anxiety or gender) with varied levels (e.g., high or low, male or female), that influences the relationship between independent variables and dependent variables (Baron & Kenny, 1986). In intervention studies, identifying moderators can inform researchers about who will benefit from the intervention under particular circumstances. This parallels the movement in medical oncology for personalized treatment, in which the particular chemotherapy or immunotherapy a patient receives will be determined by individual pre-existing characteristics (Gonzalez-Angulo et al., 2010). In psychosocial oncology, four major characteristics have been identified as potential moderators, including demographics (e.g., age, gender, socioeconomic status) (Cunningham et al., 1993; Taylor et al., 2003), medical variables (e.g., duration since diagnosis, comorbid chronic conditions) (Doorenbos et al., 2006; Low et al., 2010; Scheier et al., 2007), intervention variables (e.g., type and duration of treatment) (Naaman et al., 2009) and psychosocial characteristics (e.g., personality, social environment) (Antoni et al., 2001; Manne et al., 2007).

Although the moderating ability of patients' psychosocial characteristics in general is relatively new to research, considerable evidence exists for the impact of baseline depression or anxiety levels on intervention efficacy. Literature suggests that individuals who present with high levels of anxiety and depression gain greater benefit than those who show little psychological morbidity at the time of study entry (Naaman et al., 2009; Ross et al., 2002; Schneider et al., 2010; Sheard & Maguire, 1999). This improvement in psychological well-being has been

**Table 1** Common types of psychosocial interventions for cancer patients

| Type of intervention                | Definitions*  |
|-------------------------------------|---|
| Cognitive-behavioral therapy        | Psychotherapy that aims to recognize and change maladaptive thinking and behaviors in order to reduce negative affect and assist behavioural adjustment                   |
| Communication skills training       | A set of techniques taught to improve verbal and non-verbal interactions for the purpose of reducing interpersonal conflict and increasing effective information exchange |
| Counseling                          | A principled relationship to facilitate growth of self-knowledge, emotional acceptance, and personal resources  |
| Education/Psychoeducation           | Provision of information regarding cancer-related knowledge and coping for the purpose of reducing uncertainty and facilitating better adaptation with illness            |
| Expressive writing                  | Writing about deepest emotions and thoughts surrounding cancer experience and other personal events   |
| Guided imagery                      | Structured activity using mental imagery to induce sensory and affective experiences for the purpose of facilitating relaxation, pain relief, feelings of empowerment     |
| Relaxation training                 | A set of techniques practiced to reduce muscle and mental tension   |
| Stress management training          | A set of techniques practiced to manage stress. Often includes various modalities such as relaxation, breathing, and internal monologues.                                 |
| Support group                       | Meetings at which cancer patients (with or without a professional facilitator) discuss common issues  |
| Supportive-expressive group therapy | Psychotherapy that encourages expression of emotions and thoughts in a supportive group setting to promote psychological adjustment                                       |

\* Sources of definitions were derived from Canadian Counselling and Psychotherapy Association (2011), Jacobsen and Jim (2008), National Comprehensive Cancer Network, (1999), Roffe et al. (2005)

attributed to a greater opportunity for improvement relative to those who entered the study with better psychological function. Not surprisingly, studies targeting or pre-selecting patients with greater baseline psychological morbidity demonstrate more positive changes (Schneider et al., 2010).

In contrast, however, other studies have found that not all patients with high levels of depressive symptoms (including at clinical levels) benefit the most from psychosocial interventions (Doorenbos et al., 2006; Rodin et al., 2007). Potentially, psychosocial moderators, other than patients' baseline depression and anxiety levels, may explain these inconsistent findings. Moreover, there is preliminary evidence to suggest that psychosocial characteristics, such as self-esteem and perceived social support, may be more informative than baseline depression levels in understanding which individuals will benefit from a given intervention (Helgeson et al., 2000, 2006).

Given the relative lack of attention to the role of other potential moderating variables, this systematic review adds to the growing literature aimed at identifying who benefits more from psychosocial interventions among cancer patients. It examines the role of psychosocial moderators, other than depression and anxiety levels which have already been reviewed in the past (Naaman et al., 2009; Ross et al., 2002; Schneider et al., 2010; Sheard & Maguire, 1999). Considering the impacts of cancer on multiple aspects of patients' life, patients enter the intervention with varied levels of psychosocial background and functioning. Such individual variability prior to the intervention could influence the intervention outcomes. While several reviews have investigated the moderating role of baseline depression and anxiety, no prior work has synthesized the moderating role of other psychosocial characteristics for intervention efficacy. This review included only randomized controlled trials (RCT) in order to determine whether a moderator differentiated the effects of a given intervention relative to a control condition.

## Methods

### Search strategy

Studies were identified by searching eight electronic databases including PsycINFO (1806–March, 2011), PubMed (1966–March, 2011), MEDLINE (1948–March, 2011), Scopus (1960–March, 2011), Web of Science (1900–March, 2011), CINAHL (1982–March, 2011), EBM (Evidence-Based Medicine) Reviews (1991–March, 2011), Psychology and Behavioral Sciences Collection (1965–March, 2011). The primary search was performed

with PsycINFO and PubMed. Additional studies were sought using the other six databases. A Health Information Network Calgary librarian assisted with the search of the additional databases. Reference lists of one meta-analysis (Schneider et al., 2010) were searched to identify further relevant studies. The following search terms were used: neoplasms, cancer, psychosocial intervention, psychoeducation, mind–body intervention, personality traits, psychosocial outcomes.

### Study selection

Following the database search, potential citations were refined by applying three criteria including age of participants (18+), human studies, and English language. Screening was performed by title and abstract, and the remaining relevant studies were further evaluated for eligibility by full-text assessment.

### Inclusion criteria

Each study was evaluated against the following criteria for inclusion in this review:

*Participants:* Adults aged over 18 years old, with a current or previous cancer diagnosis at any stage of the disease.

*Interventions:* Psychosocial, psychoeducational and mind–body interventions which aimed to facilitate psychosocial well-being of cancer patients.

*Outcome measures:* Psychosocial outcomes reflecting participants' psychological well-being.

*Study design and report:* Studies utilized a RCT design, and examined a moderating role of participants' pre-existing psychosocial characteristics on the outcomes of the trial. Pre-existing psychosocial characteristics include personality traits, mental and physical functioning, quality of life, social environment, cancer-related self-esteem and locus of control. Studies reported in English were included and no restrictions were placed on publication dates of the study.

### Exclusion criteria

Studies were excluded if interventions included solely non-psychological (e.g., energy-based), pharmacological, health behaviour change (e.g., exercise) or assessed only biological or health behaviour outcomes. Interventions requiring spousal or family participation were also excluded. Studies

that assessed only demographic and medical variables as a moderator or baseline anxiety and depression levels as a moderator were excluded. In addition, studies that assessed a moderating role of other indices of clinical distress such as post-traumatic stress disorder were excluded from this review.

#### Data extraction process

A data extraction sheet was developed and the following data items were extracted from each study: (1) participant characteristics (age, gender, type and stage of cancer); (2) the study's inclusion or screening criteria if applicable; (3) type of intervention and comparison control conditions (dose, duration); (4) data collection points (follow-up assessments); (5) moderator variables; (6) outcome variables; (7) trial results of effects of moderators on outcome variables.

#### Assessment of risk of bias

To ascertain the validity of eligible randomized trials, each study was assessed for the following five components based on the Cochrane risk of bias tools and the PRISMA guidelines (Higgins & Altman, 2008; Liberati et al., 2009): (1) generation of random allocation sequence; (2) concealment of allocation; (3) blinding of participants and healthcare providers, (4) incomplete outcome data; (5) selective outcome reporting.

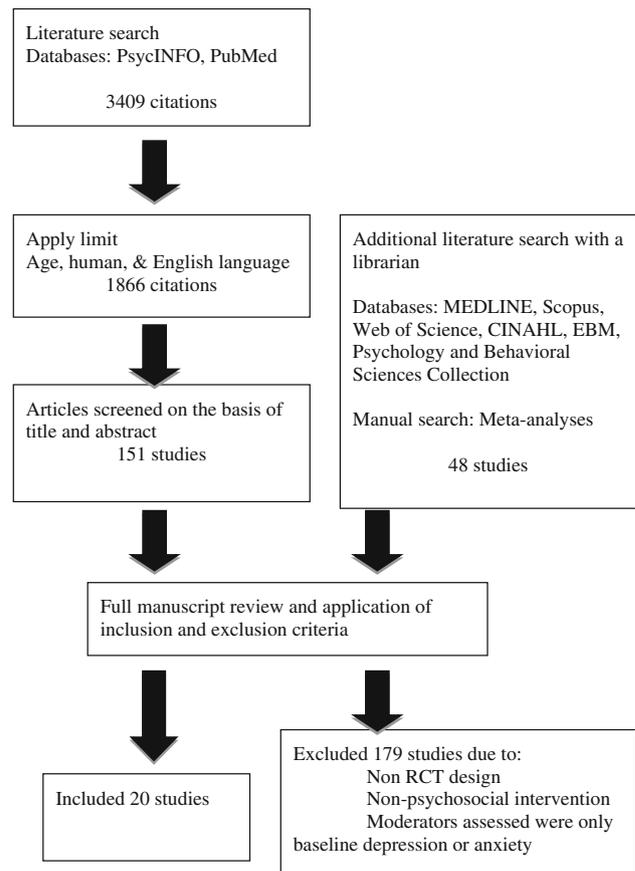
#### Categorizing moderators

The range of psychosocial moderators was large across studies. Therefore, moderators were grouped into four types: personality traits, mental and physical quality of life, social support, and self-esteem. Results are presented on the impact these moderators had on study outcomes.

## Results

#### Selection of studies

A summary of the study selection process is illustrated in Fig. 1. A total of 3409 potentially relevant citations were identified through a primary search using PsycINFO and PubMed. Applying the search limit for adults, human studies, and the English language resulted in 1866 citations, and those were screened by title and abstract. Of these, 151 were identified as relevant. Additional searches within six other databases and a manual reference search identified an additional 48 studies, which were not duplicated in the 151



**Fig. 1** Flow diagram of study selection process

studies already identified. A combined total of 199 studies were examined for eligibility by full-text assessment. 179 studies did not meet the inclusion criteria as described, mostly due to non-RCT design, non-psychosocial intervention and moderators limited to baseline depression and anxiety. A total of 20 studies were identified as eligible in this review. Table 2 shows characteristics of the 20 studies.

#### Study characteristics

##### *Study and participants type*

All 20 studies were randomized controlled trials published in English. Thirteen studies were two-arm design and seven studies were three-arm design including more than two active intervention conditions. Of the 13 studies with a two-arm design, three utilized an active control condition such as a condensed version of the experimental condition, rather than usual care. The included studies involved 3340 participants. The number of participants in each study ranged from 60 to 558. Of the 20 studies, 12 (65.0%) included mainly female participants with breast cancer (10 studies, 50.0%) (Antoni et al., 2001; Butler et al., 2009;

**Table 2** List of included studies

| Authors (year)          | Participants mean age                                    | Intervention (s) (Intv)  | Control (Cotl)  | Data points                                   | Moderator  | Outcome variables  | Results post  | Results follow-up (FP)  |
|-------------------------|--|--|-----------------|---|--|--|---|---|
| Antoni et al. (2001)    | 100 early stage (I to II) breast cancer 50 years         | CBSM 10 weeks, 2 h/week in group of 8  | 1 day CBSM      | Baseline post, 3, 9 month, 1 year             | <i>Optimism</i>  | Distress (POMS: anger, depress, anxiety), depression (CES-D) Intrusion, avoidance (IES) Benefit finding (BF), optimism   | Caseness of moderate depression (CES > 16) decreased more in Intv than Cotl for less optimistic women. Optimism increased among low optimistic women after Intv   | Low optimistic women had less BF than highly optimistic women at baseline, but increased at post, and maintained during FP. Highly optimistic women increased BF after Intv than Cotl, but did not last during FP |
| Butler et al. (2009)    | 124 metastatic breast cancer, 52 year                    | SET + hypnosis + Education (Ed) in group of 3–9, 90 min/week over 1 year                             | Education (Ed)  | Baseline, 4, 8, 12 month                      | <i>Trait hypnotizability</i>                                     | Pain, suffering, frequency, usefulness and experience using hypnosis   |   | Within Intv group, highly hypnotizable women reported greater benefits, more usage of hypnosis for other than pain symptoms (stress, anxiety) than less hypnotizable women. No moderation effect on pain          |
| Creswell et al. (2007)  | 63 stage I and II breast cancer 49 year                  | 1. 4× Emotion writing, 2. Benefit writing over 3 weeks, 20 min each time                             | 3. Fact writing | Baseline, post, 1, 3 month                    | <i>Life satisfaction, mood</i>                                   | Doctor visit, life satisfaction, moods (POMS), Physical symptoms   |   | Baseline life satisfaction or mood did not moderate the outcomes of expressive writing  |
| de Moor et al. (2008)   | 64 breast cancer 53 years Screening: less than 30 on BDI | 4xEmotion writing over 7 days at home  | Neutral writing | Baseline, 3 days before 2 weeks after surgery | <i>Social constraints</i>  | Sleep, symptoms (BSI), stress (PSS), intrusion and avoidant thoughts (IES), coping, pain and interference (BPI)          |   | High social constrain group lessened pain-related life interference following emotional writing than non-emotional writing, while low constrain group increased pain after emotional writing                      |
| Doorenbos et al. (2006) | 237 (26% male) breast, lung, other cancers 60 years      | Nurse led CBT-guided problem solving 10 contact in 18 weeks  | Usual care (uc) | Baseline, 10, 20, 32 weeks                    | <i>Health condition, symptom limitation, depressive symptoms</i> | Physical function (SF36), Symptom limitations, depression (CES-D), chronic conditions                                    |   | At week 20, individuals with high baseline symptom limitations, more chronic conditions, but with less depressive symptoms benefit more from the Intv than Cotl.  |
| Edgar et al. (1992)     | 205 (25.3% male) newly diagnosed patients 56 years       | 1 Early 2 Late start coping skills group interventions (4 months)                                    |                 | Pre, post, 8 12 month                         | <i>Ego strength self health rating</i>                           | Depression (CES-D), anxiety, intrusion (IES), personal control (perceived)   |   | Patients rated greater health limitations at baseline experienced loweedr distress and greater control at 8 months FP, if they were in Intv2, than Intv1.   |
| Helgeson et al. (2000)  | 230 newly diagnosed breast cancer (I to III) 48 years    | 1 Emotion-focused peer discussion, 2 Ed-focused group 60 min × 8 week meeting, + 45 min home session | Control         | Pre post                                      | <i>Social Support (SS) Personal resource</i>                     | Mental QoL (role limitation, social functioning, vitality), physical QoL (role limitation due to physical problems) SF36 | Benefits from Intv2 for people with difficulties (less support, personal resource) than those with less difficulty. Intv1 was helpful for those with more difficulties, but not for those with high support |   |

**Table 2** continued

| Authors (year)         | Participants mean age   | Intervention (s) (Intv)  | Control (Cotl) | Data points              | Moderator  | Outcome variables  | Results post  | Results follow-up (FP)  |
|------------------------|---|--|----------------|--------------------------|--|--|---|---|
| Helgeson et al. (2006) | 250 prostate cancer   | 1. Ed, 1 h × 6 week 2. Ed + 45 min discussion group  | 3. uc          | Pre 2 weeks, 6, 12 month | <i>Self-esteem self-efficacy depressive symptoms</i>                               | QoL Physical and mental (SF36) Prostate-specific QoL   |   | Men with low self-esteem, efficacy and high depression at baseline benefited the most, those men in control reported poorer physical and mental functions, depression, prostate specific functions. Depression did not moderate mental functions. The greatest benefits for low self-esteem men   |
| Low et al. (2010)      | 62 stage IV metastatic breast cancer 53 year  | Emotional writing 4 × 20 min over 3 weeks at home  | Fact writing   | Pre 3 month              | <i>SS</i>  | Intrusions (IES), somatic symptoms, sleep, depression (CES-D)  | Intrusive thoughts reduced in those with low support after Intv, but not Cotl. No difference among people with high support.                  |   |
| Manne et al. (2007)    | 353 Women with gynecological cancer 50 years  | 1. Coping, communication, 6 individual 1 h session + phone 2. 6 × individual supportive counseling + phone | 3. uc          | Pre, 3, 6 9 month        | <i>Dispositional positive emotional expression</i>                                 | Depressive symptoms (BDI) cancer-related distress (IES), self reported physical symptoms, treatment expectancy |   | Women with more baseline symptoms and emotion expression reduced depression after Intv2 than UC relative to those with less symptoms and less expressive. Emotion expressiveness or baseline physical symptoms did not moderate the effects of Intv1.   |
| Molton et al. (2008)   | 101 men recovering from radical prostatectomy Prostate (I or II) 60 year Screening: over 45 years | 10 week CBSM in group, 2 h/week  | 1 day CBSM     | Pre, post                | <i>Interpersonal sensitivity</i>   | Sexual functioning and concerns  | Males with high sensitivity made more improvements in sexual functioning after CBSM than Ctrl. No difference emerged among low sensitive men. |   |
| Scheier et al. (2007)  | 252 breast cancer Screening: Younger than 51 years  | 1. Ed psychoeducation 2. nutrition psychoeducation 4 × 2 h   | 3. control     | Pre, post, 9 month       | <i>Psychosocial resources (optimism, social environment negative interactions)</i> | Depression (CES-D), Mental functioning, physical functioning (SF36)  |   | Psychosocial factors moderated the effects of Intv2. Those with few personal resources benefited more than those with greater personal resources. Comorbidity moderated the effects of Intv 1 and 2. Intv 1 lowered depression among those with high negative interaction, pessimistic, and those with high in unmitigated communications |

Table 2 continued

| Authors (year)           | Participants mean age  | Intervention (s) (Intv)   | Control (Cotl)      | Data points        | Moderator   | Outcome variables  | Results post | Results follow-up (FP)   |
|--------------------------|--|---|---------------------|--------------------|---|--|--------------|--|
| Stanton et al. (2002)    | 60 early breast cancer 49 yr   | 1. Emotion writing<br>2. Benefit Finding writing<br>4 × 20 min                              | 3. Fact writing     | Pre, 1, 3 month    | <i>Cancer-related avoidance</i>                             | Cancer-related doctor visits, somatic symptoms, distress, (POMS), QoL (FACT)   |              | Intv 1 was effective in reducing distress for those with low avoidance, while distress increased for those with high avoidance. Intv 2 was effective for high avoidant people. No difference in Cotl.  |
| Stanton et al. (2005)    | 558 newly diagnosed breast cancer (I or II) 58 year                      | 1. print material + peer video<br>2. condition 1 + individual phone and meeting + workbook  | 3. print material   | Pre, 6 12 month    | <i>Perceived preparedness</i>                               | Energy, fatigue (SF36), cancer specific distress (IES), depression (CES-D), Post-traumatic growth (PTGI)               |              | Less prepared women improved vitality than mod/highly prepared women after Intv 1. Less prepared women declined vitality in Cotl. Intv 2 improved distress for highly prepared women relative to Cotl at 6 month. Less prepared women did not have much benefit from Intv2.            |
| Stiegelis et al. (2004)  | 209 (34.4% male) newly diagnosed cancer 60 year                          | Self-management booklet including patients story  | uc                  | Pre 3 month        | <i>Illness uncertainty control</i>                          | Mood disturbance (POMS)  |              | People with low control improved moods after Intv, but worsened in Cotl. Those with high uncertainty showed greater mood disturbance than low uncertainty people in Cotl.  |
| Taylor et al. (2007)     | 134 prostate cancer 69 year. Those who do regular exercise were excluded | 1 Life style coping program +exercise<br>2 Ed + support both 21 × 1.5 h (6 months) homework | 3. uc + Ed material | Pre, post, 6 month | <i>Psychosocial functioning, SS</i>                         | QoL (physical functioning, emotional wellbeing, and Vitality from SF36, mental composite score), CES-D, STAI, SS, Pain |              | Both interventions benefited (SS, CES-D) men with low SS and mental health (high STAI and CES-D) at baseline relative to uc. UC participants with low SS continued to show low SS during FP. For those with high pain, Intv2 was most beneficial at 12 month. 12 month lasting effects |
| Taylor et al. (2003)     | 73 African American women with non-metastatic breast cancer 54 year      | Psychosocial intervention in group, 2 h × 8 weeks   | uc                  | Pre 1 year         | <i>Cancer-related psychosocial and physical functioning</i> | POMS, Mental Health Inventory (MHI) for distress and wellbeing, IES, cancer knowledge                                  |              | Women with poor psychosocial functioning worsened their wellbeing (MHI) in Cotl but not after Intv. IES improved for women with poorer QoL after Intv, but not Cotl. Physical function was not a moderator.  |
| Vodermaier et al. (2011) | 111 newly diagnosed breast cancer, (I–III) 55 year                       | 20 min Decision aid for treatment   | uc                  | Pre 1 year         | <i>Health locus of control</i>                              | Decisional conflict HADS, QoL (FACT)   |              | Patients with high locus of control reported decreased decisional conflict than people with low locus of control following Intv. No difference emerged in Cotl.  |

**Table 2** continued

| Authors (year)         | Participants mean age   | Intervention (s) (Intv)                                       | Control (Cotl) | Data points         | Moderator  | Outcome variables                  | Results post | Results follow-up (FP)   |
|------------------------|---|---|----------------|---------------------|--|------------------------------------|--------------|--|
| Zakowski et al. (2011) | 88 Gynaecological cancer, (I–IV) 58 years                       | 3 consecutive 20 min × Emotional writing about cancer at home | Fact writing   | Pre 1 week, 6 month | <i>Neuroticism, extraversion</i>                 | Distress (BSI) IES, POMS avoidance |              | Neuroticism but not extraversion was a moderator. People with low neuroticism lessened distress relative to those with high neuroticism. Highly neurotic patients increased avoidance relative to less neurotic patients after Intv. No difference between high and low neuroticism in Cotl. |
| Zakowski et al. (2004) | 104 (48%male) prostate and gynaecological cancer (I–IV) 59 year | 3 consecutive 20 min × Emotional writing about cancer at home | Fact writing   | Pre 6 month         | <i>Social constraint from partner and others</i> | Distress (GSI part of BSD) IES     |              | Patients with high constraints improved distress following Intv (comparable to less constraint people) but they increased distress in Cotl. Patients with high constraints reported greater avoidance than patients with less constraint in Cotl.  |

Creswell et al., 2007; de Moor et al., 2008; Low et al., 2010; Scheier et al., 2007; Stanton et al., 2002, 2005; Taylor et al., 2003; Vodermaier et al., 2011). Three (15.0%) included mainly male participants with prostate cancer (Helgeson et al., 2006; Molton et al., 2008; Taylor et al., 2007), and the remaining four (20.0%) included both males and females (Doorenbos et al., 2006; Edgar et al., 1992; Stiegelis et al., 2004; Zakowski et al., 2004). Mean age of participants ranged from 48 to 69 years old. Participants were predominantly Caucasian (up to 97.7% of participants in a given study), except for one study (Taylor et al., 2003) which included only African American women.

### Intervention

The types of interventions were as follows (active control conditions included): Cognitive-Behavioral Stress Management (CBSM) (two studies) (Antoni et al., 2001; Molton et al., 2008), Cognitive Behavioral Therapy (CBT) (one study) (Doorenbos et al., 2006), Expressive writing (six studies, two included an additional condition of benefit finding writing) (Creswell et al., 2007; Low et al., 2010; Stanton et al., 2002; Stanton et al., 2005; Zakowski et al., 2011; Zakowski et al., 2004), support group alone (one study) (Helgeson et al., 2000), psychoeducation (four

studies) (Butler et al., 2009; Helgeson et al., 2000; Helgeson et al., 2006; Schneider et al., 2010), support group (e.g., Supportive Expressive Group Therapy (SET)) plus psychoeducation (three studies) (Helgeson et al., 2006; Molton et al., 2008; Taylor et al., 2007), psychoeducation and life style and coping training (five studies) (Edgar et al., 1992; Manne et al., 2007; Scheier et al., 2007; Taylor et al., 2003, 2007), individual supportive counseling (one study) (Manne et al., 2007), a booklet including self-management skills and stories of other patients' experiences (and individual therapy) (two studies) (Stanton et al., 2005; Stiegelis et al., 2004), and a booklet for treatment decision making (one study) (Vodermaier et al., 2011). All studies included baseline assessment. Three studies included only pre- and post-intervention assessments (de Moor et al., 2008; Helgeson et al., 2000; Molton et al., 2008), while all others included further follow-up assessments. The longest duration of follow-up assessment varied from 3 months (four studies) (Creswell et al., 2007; Low et al., 2010; Stanton et al., 2002, Stiegelis et al., 2004), 6 months (three studies) (Taylor et al., 2007; Zakowski et al., 2004, 2011), 8 months (one study) (Doorenbos et al., 2006), 9 months (two studies) (Manne et al., 2007; Scheier et al., 2007) to 12 months (eight studies) (Antoni et al., 2001; Butler et al., 2009; Edgar et al., 1992; Helgeson et al., 2006; Stanton et al., 2005; Taylor et al., 2003; Vodermaier et al., 2011).

**Table 3** Assessment of risk of bias

|                          | Sequence allocation | Concealment | Blinding | Incomplete outcome, attrition | Selective reporting |
|--------------------------|---------------------|-------------|----------|-------------------------------|---------------------|
| Antoni et al. (2001)     | +                   | U           | –        | +                             | –                   |
| Butler et al. (2009)     | +                   | U           | –        | –                             | –                   |
| Creswell et al. (2007)   | –                   | –           | –        | –                             | –                   |
| de Moor et al. (2008)    | +                   | +           | U        | +                             | +                   |
| Doorenbos et al. (2006)  | +                   | U           | +        | +                             | –                   |
| Edgar et al. (1992)      | U                   | U           | U        | U                             | +                   |
| Helgeson et al. (2000)   | +                   | U           | +        | –                             | –                   |
| Helgeson et al. (2006)   | U                   | U           | –        | –                             | –                   |
| Low et al. (2010)        | –                   | –           | –        | –                             | –                   |
| Manne et al. (2007)      | U                   | +           | +        | +                             | –                   |
| Molton et al. (2008)     | –                   | U           | U        | U                             | –                   |
| Scheier et al. (2007)    | U                   | U           | U        | –                             | +                   |
| Stanton et al. (2002)    | –                   | –           | –        | –                             | –                   |
| Stanton et al. (2005)    | –                   | U           | U        | +                             | –                   |
| Stiegelis et al. (2004)  | U                   | U           | U        | U                             | –                   |
| Taylor et al. (2003)     | U                   | U           | U        | –                             | +                   |
| Taylor et al. (2007)     | +                   | U           | –        | –                             | +                   |
| Vodermaier et al. (2011) | U                   | –           | +        | +                             | –                   |
| Zakowski et al. (2004)   | U                   | U           | +        | –                             | –                   |
| Zakowski et al. (2011)   | U                   | U           | +        | +                             | –                   |
| High risk, n (%)         | 6 (30.0)            | 2 (10.0)    | 6 (30.0) | 7 (35.0)                      | 5 (25.0)            |
| Unreported, n (%)        | 9 (45.0)            | 14 (70.0)   | 7 (35.0) | 3 (15.0)                      | 0 (0)               |
| Low risk, n (%)          | 5 (25.0)            | 4 (20.0)    | 7 (35.0) | 10 (50.0)                     | 16 (75.0)           |

‘–’ represents low risk for bias, and ‘+’ represents high risk for bias. ‘U’ indicates the information was unreported

### Outcome variables

The majority of included studies reported patients’ self-report on psychological and physical well-being, such as general and cancer-specific quality of life, physical and mental function, depressive symptoms, anxiety and intrusive and avoidant thoughts. Several other studies also examined patients’ self-reported benefit finding, optimism, social support, and usefulness of the intervention.

### Risk of bias within studies

Table 3 summarizes the assessment of risk of bias. Each component was rated either ‘–’ low risk for bias, ‘+’ high risk for bias, or ‘U’ unreported. Three out of 20 studies provided sufficient information for all five components (Creswell et al., 2007; Low et al., 2010; Stanton et al., 2002), and were determined as a low risk for potential biases. Many studies poorly handled or ignored reporting generation of random allocation sequence (15 studies, 75.0%), allocation concealment (16 studies, 80.0%), and

blinding of participants and healthcare providers (13 studies, 65.0%).

### Moderator variables

1. Personality traits: Optimism, neuroticism, extraversion, ego strength, emotional expressiveness, interpersonal sensitivity, hypnotizability (Antoni et al., 2001; Edgar et al., 1992; Manne et al., 2007; Molton et al., 2008; Scheier et al., 2007)
2. Mental and physical quality of life: Life satisfaction, quality of life, limitation due to symptoms (Creswell et al., 2007; Doorenbos et al., 2006; Taylor et al., 2003, 2007).
3. Social support: Social constraints, support from partner and oncologists (de Moor et al., 2008; Helgeson et al., 2000; Low et al., 2010; Scheier et al., 2007; Taylor et al., 2007; Zakowski et al., 2004)
4. Self-efficacy: Self-esteem, illness-related perceptions of control, preparedness for survivorship, avoidance, uncertainty (Helgeson et al., 2000, 2006; Stanton et al., 2002, 2005; Stiegelis et al., 2004; Vodermaier et al., 2011)

The included studies examined 17 potential moderators, and found a total of 14 significant moderators. Extraversion, ego strength, and life satisfaction were not significant moderators.

Effects of moderators on the outcomes of psychosocial interventions

Table 4 summarizes the moderators, impacted outcomes and interventions used.

Personality traits

**Optimism** Optimism can be described as a dispositional tendency to have positive expectations for the future (Scheier & Carver, 1985). Two studies examined optimism, and both

studies found a moderating impact of optimism. A greater decrease in the prevalence of clinical depression caseness, increased levels of optimism and greater benefits from the experience of cancer was found following a 10-week CBSM program relative to the control condition among women with low baseline optimism (Antoni et al., 2001). Women who showed low levels of optimism prior to the intervention reported enhanced optimism and greater benefits from their experience of cancer relative to those who had higher levels of optimism prior to the study. Similarly, lower depressive symptoms were found for low optimism participants following a nutrition-focused psychoeducation program relative to two other control conditions (Scheier et al., 2007). In contrast, no difference in depression was found for high optimistic women in either study. Optimism was not a moderator for cancer-related avoidance and intrusive

**Table 4** Summary of moderators, outcomes, and interventions of studies

| Moderator domain                                | Moderators for positive outcomes                | Impacted outcomes  | Intervention  |
|---|---|--|---|
| Personality traits (5 studies)                  | Low optimism                                    | Clinical depression, depressive symptoms, optimism, benefit finding                          | CBSM, nutrition-focused psychoeducation   |
|   | Low neuroticism                                 | Distress, cancer-related avoidance   | Expressive writing  |
|   | High emotional expressiveness                   | Depressive symptoms  | Individual supportive counseling  |
|   | High interpersonal sensitivity                  | Sexual function and concerns   | CBSM  |
|   | High hypnotizability                            | Usefulness of hypnosis alleviating anxiety, stress, pain                                     | SET + hypnosis  |
| Mental and physical quality of life (4 studies) | High symptom limitation                         | Quality of life in physical function, anxiety  | CBT-based intervention, life style and coping program, psychoeducation + support program  |
|   | Low quality of life                             | Cancer-related avoidant and intrusive thoughts, psychological well-being                     | Psychosocial group intervention   |
| Social support (6 studies)                      | High social constraint                          | Pain-related interference, cancer-related avoidant thoughts, distress                        | Expressive writing  |
|   | Low social support from partner and oncologists | Cancer-related intrusive thoughts, quality of life in physical function, depressive symptoms | Expressive writing, nutrition-focused psychoeducation, support group, psychoeducation, life style coping program, education + support program |
| Self-efficacy (6 studies)                       | Low preparedness to survivorship                | Vitality   | Psychoeducation + survivors' story videos   |
|   | High preparedness to survivorship               | Avoidant and intrusive thoughts  | Individual support therapies + psychoeducation + videos   |
|   | Low sense of control and high uncertainty       | Mood disturbance, physical function  | Psychoeducation booklet + survivors' story, psychoeducation + support group   |
|   | Low self-esteem                                 | Prostate-cancer specific body function, physical function                                    | Information-based education and support group   |
|   | Low avoidance                                   | Mood disturbance   | Expressive writing  |
|   | High avoidance                                  | Mood disturbance   | Benefit writing   |
|   | High health locus of control                    | Information support, uncertainty   | Information booklet   |

CBSM cognitive behavioral stress management, SET supportive-expressive group therapy, CBT cognitive behavioral therapy

thoughts, moods (Antoni et al., 2001) or mental and physical functioning (Scheier et al., 2007).

**Neuroticism and extraversion** Neuroticism, a dispositional tendency to experience negative emotions (Watson & Clark, 1984), was identified as a moderator in a study using the expressive writing paradigm (Zakowski et al., 2011). Women with low neuroticism reported lower distress and cancer-related avoidance relative to women with high neuroticism following the emotional writing task, but not the control task. In contrast, extraversion, a personality characteristic of being active, energetic and outgoing (Costa & McCrae, 1980) was not found as a moderator in the same writing disclosure study (Zakowski et al., 2011). Self-reported distress, avoidance, intrusions, and moods following the disclosure intervention were similar regardless of the levels of extraversion prior to the study participation.

**Emotional expressiveness** Expression of positive emotions was a significant moderator in a group of gynecological patients. Women with high levels of emotional expressiveness reported a greater reduction of depressive symptoms following individual supportive counseling relative to individual coping-focused counseling, or usual care. This difference was not found among women with lower levels of emotional expression (Manne et al., 2007).

**Interpersonal sensitivity** Interpersonal sensitivity is a personal trait characterized as problematic interpersonal interaction styles (Pilkonis et al., 1996). Individuals who are high on interpersonal sensitivity tend to be critical of others and chronically perceive rejection and abandonment from others (Pilkonis et al., 1996). This personality dimension was a moderator for the effect of CBSM among men with prostate cancer. Men with high interpersonal sensitivity reported greater improvement in their sexual functions and concerns following CBSM relative to a control condition. This difference did not emerge for men with low interpersonal sensitivity (Molton et al., 2008).

**Hypnotizability** A study comparing a combined SET and hypnosis intervention and a psychoeducation program found trait hypnotizability, an individual's proneness to be hypnotized, as a moderator (Butler et al., 2009). Over a 1 year follow-up period, women who were highly prone to be hypnotized reported greater usage and benefits of hypnosis for alleviating their pain, stress, and anxiety following the combined intervention relative to women who were less prone to be hypnotized.

**Ego strength** Ego strength, defined as an individual's disposition to cope and gain control across different situations, was not found as a moderator (Edgar et al., 1992). Following participating in a coping skills-focused group intervention, participants reported similar levels of depression, anxiety, intrusive thoughts, and perceived personal control regardless of the initial levels of ego strength. Hence, low levels of optimism, neuroticism, and high levels of emotional expressiveness, interpersonal sensitivity, and hypnotizability were associated with greater benefits from psychosocial interventions.

#### *Mental and physical quality of life*

**Physical quality of life** Two studies found perceived limitations due to physical symptoms as a moderator of the effects of an 18-week CBT-based intervention (Doorenbos et al., 2006), a 6-months life style and coping program and a psychoeducation and support program (Taylor et al., 2007). At five (Doorenbos et al., 2006) and 12 month (Taylor et al., 2007) follow-ups, patients with greater perceived limitations and pain at baseline improved their quality of life in physical function relative to those who had less physical limitations at baseline.

**Psychological quality of life** Self-reported quality of life in psychosocial domain was reported as a moderator in a study which examined the effects of an 8-week psychosocial group intervention among African American women. Women with poorer quality of life at baseline reported reduced cancer-related avoidant and intrusive thoughts following the intervention, while those women with low quality of life in the control condition showed worsened quality of life and no change in cancer-related distress (Taylor et al., 2003). In contrast, however, no moderating impact of life satisfaction was found in the study which utilized the writing disclosure paradigm for women with breast cancer (Creswell et al., 2007). Thus, patients with poorer quality of life improved their well-being following the interventions relative to those with better quality of life prior to the interventions.

#### *Social support*

**Social constraints** Two studies using the expressive writing paradigm investigated a moderating role of perceived social constraints. Social constraints is defined as perceived inadequacy in social support, which often results in increased reluctance to express emotions and thoughts towards own support members (Lepore & Helgeson, 1998). Patients with high levels of perceived social constraints at baseline reported reduced pain-related interference in their

life (de Moor et al., 2008) along with reduced distress and avoidant thoughts following the emotional writing task (Zakowski et al., 2004). Those with high social constraints in the control condition reported increased distress and avoidant thoughts relative to those with low social constraints (Zakowski et al., 2004).

*Support from family and oncologists* Across five studies, various interventions benefited women and men with low levels of social support as indicated by low levels of emotional and information support from their partner and oncologist and high levels of negative interaction with their partner. Patients with low social support lessened their intrusive thoughts following expressive writing (Low et al., 2010), improved quality of life in physical function following psychoeducation group intervention (Helgeson et al., 2000), reduced depressive symptoms following a nutrition-focused psychoeducation (Scheier et al., 2007), and increased perceived social support following a life style and coping program, and a combined education and support program (Taylor et al., 2007). Those patients with less social support reported worsened physical function and social support if they were in the control condition (Helgeson et al., 2000; Taylor et al., 2007). Conversely, women with high levels of social support at baseline reported worsened quality of life following participation in an emotion-focused support group (Helgeson et al., 2000) or were relatively unaffected by the intervention (Scheier et al., 2007). Hence, psychosocial interventions were more beneficial for patients who had inadequate and poor social support prior to the interventions.

### *Self-efficacy*

*Cancer-related sense of control* Individuals' perceived preparedness for their survivorship phase was a moderator for the outcome of the intervention which utilized psychoeducational material and videos of other survivors' stories (Stanton et al., 2005). Relative to highly or moderately prepared women, less prepared women improved their vitality after participating in the intervention. Less prepared women in a control condition declined in their vitality over a one year follow-up period. Highly prepared women, on the other hand, lessened cancer-specific intrusive and avoidant thoughts following another intervention, which included individual support therapies in addition to psychoeducational material and videos.

Similarly, patients' sense of control and uncertainty about their illness (Helgeson et al., 2000; Stiegelis et al., 2004), self-efficacy (Helgeson et al., 2006), and health locus of control (Vodermaier et al., 2011) were found to be a moderator. Patients with less sense of control,

self-esteem, self-efficacy and high levels of uncertainty about their illness reported improved moods (Stiegelis et al., 2004), physical function (Helgeson et al., 2000; Helgeson et al., 2006) and prostate cancer-related body functions (Helgeson et al., 2006) following a range of interventions. Specifically, provision of a self-management booklet including other patients' stories (Stiegelis et al., 2004) as well as a psychoeducation and support group (Helgeson et al., 2000; Helgeson et al., 2006) were more beneficial than usual care. Patients with high uncertainty and low self-esteem showed poorer moods (Stiegelis et al., 2004), physical and mental functions, prostate-cancer related body functions and depressive symptoms (Helgeson et al., 2006) relative to patients with low uncertainty or high self-esteem in the control condition. The moderating impact of health locus of control was in contrast to other self-efficacy factors mentioned above. Patients with high health locus of control reduced uncertainty and increased informational support relative to those with low health locus of control following the intervention (Vodermaier et al., 2011).

*Avoidance* Cancer-related avoidance was examined in the expressive writing paradigm (Stanton et al., 2002). Following the emotional writing task, mood disturbances decreased among women with low cancer-related avoidance, while mood disturbances worsened among women with high avoidance. However, women with high avoidance improved their moods following the benefit-finding writing. No difference emerged between those women following the control writing task. Overall, patients who initially reported low levels of self-efficacy benefit more from psychosocial interventions. However, in some interventions patients with high levels of health locus of control and low levels of cancer-related avoidance, also gain benefits.

## **Discussion**

Of the 17 psychosocial factors examined as potential moderators in the 20 studies, 14 variables were found to significantly moderate the effects of psychosocial interventions among cancer patients. These moderators were spread across four broad categories: personality traits, mental and physical quality of life, social environment, and self-efficacy. This review suggests that patient psychosocial characteristics may contribute to differential impacts of an intervention. Thus, the varied efficacy in the literature (Jacobsen & Jim, 2008; Newell et al., 2002; Ross et al., 2002; Sheard & Maguire, 1999; Williams & Dale, 2006) may be explained by study participants' psychosocial characteristics. These results add to the growing knowledge of which cancer patients benefit from psychosocial interventions.

Overall, benefits of psychosocial interventions are more salient for patients who reported poorer psychological and physical quality of life and fewer resources in their social environment, as well as lower personal sense of control at baseline. These findings are consistent with previous work reporting that patients with greater psychological morbidity gain the most from interventions (Naaman et al., 2009; Ross et al., 2002; Schneider et al., 2010; Sheard & Maguire, 1999). This review further suggests that psychosocial interventions are useful for patients who exhibit difficulties in their mental and physical functions, social environment and personal sense of control, in addition to psychological morbidity.

Relative to the three domains of moderators (psychological and physical quality of life, social environment, and self-efficacy), the effects of personality moderators on the intervention outcomes were less consistent. This may be because the three moderator types can be understood to lie on the dimension ranging from adequate to inadequate, and psychosocial interventions are particularly useful in aiding inadequate aspects in patients' lives. For instance, individuals initially with little self-efficacy may improve their sense of control about their illness after the intervention. On the other hand, personality traits cannot be understood in this same spectrum of adequate versus inadequate, or better versus worse. Furthermore, fostering a certain personality dimension does not necessarily lead to better adjustment to cancer. For those reasons, findings for personality moderators are varied and complex. Nevertheless, certain personality types were associated with improved psychological well-being following interventions. Patients who were characterized with low levels of optimism and high levels of interpersonal sensitivity at baseline showed decreased depressive symptoms, improved sexual functions and cancer-related bodily concerns, increased levels of optimism, and perceived greater benefits from the cancer experience following the intervention (Antoni et al., 2001; Molton et al., 2008; Scheier et al., 2007). On the other hand, people with more extroverted characteristics, such as low levels of neuroticism and high levels of emotional expressiveness, also decreased their distress following the interventions (Manne et al., 2007; Zakowski et al., 2011). However, personality dimensions of extraversion versus introversion did not correlate with the clusters of personality traits associated with salutary effects of interventions.

A more sensible approach to understand why certain personality traits are associated with positive outcomes may be to examine them in relation to trait-congruency. That is, the match between personality traits and the characteristics of a given intervention (Zakowski et al., 2011). For example, patients with high neuroticism demonstrated greater cancer-related avoidance following expressive writing relative to those with low neuroticism.

Asking highly neurotic patients to express their deepest emotions potentially contradicts their natural tendency to avoid their concerns. For those individuals, expressive writing might act as another reminder of aversive experience and fuel negative affect (Zakowski et al., 2011), which may limit its effectiveness with this population group. The match between personality traits and therapeutic components seem to be important in understanding the moderator role of personality traits.

While this review depicted those who benefit most from interventions, it is equally important to understand characteristics of those who were negatively affected by an intervention. In addition to the personality trait of neuroticism, levels of social support prior to the intervention distinguished whether or not some interventions benefited the individuals. Patients with high levels of social support reported worsened quality of life following participating in an emotion-focused support group (Helgeson et al., 2000). During support group discussion, members exchange their opinions as they begin to know each other's situations. Such discussions could shift participants' way of evaluating their own social network and life situations (Helgeson et al., 2000). Those negative impacts cannot be underestimated, and more research is needed to understand the conditions under which an intervention brings about favorable and unfavorable outcomes, and for whom.

Several clinical implications can be drawn from this review. The type of intervention given to individuals should be determined by matching patients' personality traits and intervention components where possible. Caution may be needed regarding the type of intervention given to those who are already satisfied with their social support and those who have dispositional tendency towards negative affectivity and avoidant coping. Assessment of potentially moderating psychosocial characteristics prior to an intervention may allow for better treatment provision and improve overall patient outcomes. Examples of matching from this literature review may include the suggestion that individuals with high symptom burden and low quality of life would likely benefit from psychoeducational and cognitive-behavioral interventions. Similarly, people with low social support or high social restraint who are not avoidant or highly neurotic may benefit from expressive writing interventions. For those with a feeling of loss of control and uncertainty about the future as cancer survivors, hearing concrete stories about other survivors and structured psychoeducation may be helpful. However, all of these possibilities are only hinted at in the current literature and further investigation is warranted.

Determining the degree of the importance of the four domains of psychosocial moderators identified in this review is an integral next step. Baseline psychological morbidity, medical, demographic and intervention

characteristics are known to influence the overall efficacy of psychosocial interventions (Naaman et al., 2009; Ross et al., 2002; Schneider et al., 2010; Sheard & Maguire, 1999). However, only a few studies have explored the contribution of psychosocial moderators, such as social support and self-esteem, relative to medical and demographic moderators (Scheier et al., 2007) and baseline depression levels (Helgeson et al., 2000; Helgeson et al., 2006). Further research into these characteristics is encouraged to establish more firmly their moderating roles, and enable the selection of patients for interventions based on these characteristics.

Several limitations of this review should also be noted. Patients' psychosocial characteristics moderated the effects of several types of interventions for limited types of outcomes. For this reason, generalizability is limited for a wider range of psychosocial interventions and outcome types. There was an over-representation of breast cancer patients and white, Caucasian patients. Therefore, generalizability may be limited to more rarely diagnosed types of cancer and other ethnic groups. There were also a small number of studies in each moderator category. More research is necessary in order to generalize the moderating impacts of these psychosocial characteristics across various cancer groups. Based on our assessment, the majority of studies included in this review were at elevated risk of bias because of failure to report random allocation sequence, allocation concealment and blinding. Hence, whether recommended methodology was followed is impossible to determine due to lack of inclusion of these methodological details in published reports. Future researchers in this area should consult CONSORT guidelines (Boutron et al., 2008) to ensure that they report the required information for RCTs.

## Conclusions

This review identified four domains of psychosocial moderators for the effect of psychosocial interventions among cancer patients. The impacts of psychosocial interventions on patients' well-being varied depending on patients' personality traits, psychological and physical quality of life, social environment and self-efficacy prior to their entry to an intervention. Across various types of interventions, a greater improvement of well-being was achieved by patients with poor perceived quality of life, difficult social relationships, and poor sense of control over their illness and those whose personality traits were suited with therapeutic components of an intervention. These findings can help clinicians know to whom they can offer a particular modality of intervention. Considering the small number of studies available for review, we are unable to recommend

decisively for whom particular types of interventions are most effective. In order to accomplish this, future research will need to replicate the moderator roles of these psychosocial factors across various types of interventions. Only then we can begin to specifically match psychosocial characteristics and the therapeutic components of various interventions. Furthering this knowledge is also valuable for patients to receive an intervention that potentially delivers the most benefit.

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