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REVIEW

Psychological and clinical correlates of posttraumatic growth in cancer: A systematic and critical review

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Abstract

Objective: The objective of this study is to describe major findings on posttraumatic growth (PTG) in cancer, by analyzing its various definitions, assessment tools, and examining its main psychological and clinical correlates.

Methods: A search in relevant databases (PsycINFO, Pubmed, ProQuest, Scopus, and Web of Science) was performed using descriptors related to the positive reactions in cancer. Articles were screened by title, abstract, and full text.

Results: Seventy-two met the inclusion criteria. Most articles (46%) focused on breast cancer, used the PTG inventory (76%), and had a cross-sectional design (68%). The PTG resulted inversely associated with depressive and anxious symptoms and directly related to hope, optimism, spirituality, and meaning. Illness-related variables have been poorly investigated compared to psychological ones. Articles found no relationship between cancer site, cancer surgery, cancer recurrence, and PTG. Some correlations emerged with the elapsed time since diagnosis, type of oncological treatment received, and cancer stage. Only few studies differentiated illness-related–life-threatening stressors from other forms of trauma, and the potentially different mechanisms connected with PTG outcome in cancer patients.

Conclusions: The evaluation of PTG in cancer patients is worthy, because it may promote a better adaption to the illness. However, many investigations do not explicitly refer to the medical nature of the trauma, and they may have not completely captured the full spectrum of positive reactions in cancer patients. Future research should better investigate issues such as health attitudes; the risks of future recurrences; and the type, quality, and efficacy of medical treatments received and their influence on PTG in cancer patients.

KEYWORDS

assessment tool, benefit finding, cancer, oncology, posttraumatic growth, review

1 | INTRODUCTION

Cancer has been considered a potentially traumatic event by the DSM-IV. Authors have begun to investigate cancer-related posttraumatic stress disorder (PTSD) symptoms and other adjustment issues, together with possible positive consequences associated with the cancer diagnosis. The oncological illness could be perceived as traumatic because the diagnosis itself has a seismic nature in patient's life and the course of the illness activates a sense of vulnerability and mortality awareness that are indeed the core characteristics of any traumatic events.

Tedeschi and Calhoun pioneered the study of possible positive consequences deriving from traumatic events and suggested that the shattering of basic assumptions in life and the awareness of own vulnerabilities could trigger a process of self-maturation labeled as posttraumatic growth (PTG). The PTG results out of a struggle in the aftermath of a trauma, which generates a cognitive recognition of improvements in individuals' personal strengths and spirituality, in their relationships with others, and in the appreciation of their own life. The Tedeschi and Calhoun[1] model has been the dominant one in trauma research, and its related assessment tool has been used to evaluate the coexistance of PTG and PTSD in trauma survivors. Recent meta-analyses on this issue[2] described an inverted U shape relationship between PTG and PTSD, where a balanced level of distress may trigger PTG, but at greater PTSD severity, PTG decreases. This pattern

characterized most of traumatized population, with the exception of survivors of medical illnesses, where this quadratic association was weak.[2] This finding introduces the question whether PTG might be the best model to capture positive reactions following medical-related trauma, and their beneficial consequences in mental health.

However, other definitions have been suggested to identify such positive responses, but they seem to present some relevant conceptual differences that need to be taken into account.

The concept of positive psychological changes was used to describe benefits reported by traumatized individuals who feel that they can communicate more openly with others, can experience fewer fears, are less preoccupied with life's difficulties, and rearrange their life priorities. Another widely used construct is benefit finding (BF), referring to the short-term benefits obtained from the adverse experience. The BF, in fact, is more prone to emerge just in the close aftermath of an adversity, while PTG tends to appear after a certain amount of time since trauma.

A distinction should also be done between meaning making and PTG. The first is a way of changing individuals' view of life to integrate what has happened and to give the event an existential value in the persons' life framework. Therefore, meaning refers to the process of understanding how the event fits in ones' life.

Similarly, the concept of sense of coherence underlines the importance of making sense for adverse life circumstances, and it incorporates 3 features: manageability, comprehensibility, and meaningfulness of the event. The concept of resilience is defined with similar terms, and underlined that it refers to the capability of maintaining stable levels of psychological functioning when being exposed to a potentially stressful event, especially when it lasts for a long period, as the case of chronic illnesses and cancer. Finally, thriving has also been used as a synonym of PTG, but psychological thriving results from a continued growth and gains in one or more important psychosocial areas, like personal relationships, self-confidence, and life skills. Thus, it would be something more than PTG, being the result of growth and an increased well-being (WB).

In sum, substantial differences have been found among the definitions of positive constructs that emerge out of a potentially adverse event. Accordingly, several measurement tools have been developed and used interchangeably to assess the diverse positive reactions to trauma, as indicated in Table S1.

Moreover, when it comes to illness-related trauma, there is no clear consensus regarding the specific clinical characteristics that define these positive reactions, and their beneficial consequences, in physical and mental health. The PTG and its related concepts, in fact, derived from psychological trauma research, and not from psychosomatic or medical fields of investigation. These considerations may be particularly relevant for psycho-oncology for 2 main reasons. First, cancer is the preferred life-threatening medical condition that has been studied in growth, meaning, and spirituality, up to date. Secondly, psycho-oncology entails the consideration of psychological and medical variables associated with the illness. Thus, psycho-oncology would require a careful examination of possible positive reactions to the illness, considering both psychological and clinical correlates.

Hence, the main aim of this systematic and critical review of the existing literature is to analyze the findings obtained for clinical and psychological correlates of PTG in cancer. We chose to give priority to the model proposed by Tedeschi and Calhoun (PTG) for many reasons. First of all, it is the prevailing one in current trauma research. Nevertheless, the question whether it might be the best model to capture positive reactions in medical trauma remains unanswered.[2] Moreover, the model of PTG encompasses various components (ie, spiritual, cognitive, and interpersonal). Thus, among the various models described above, PTG inventory may be the most appropriate to capture a wider range of positive responses following a cancer illness, for interpersonal, psychological, and spiritual changes. However, we included other similar concepts and assessment tools to be as much inclusive as possible in identifying the psychological and clinical correlates of PTG in cancer.

2 | METHODS

2.1 | Literature search strategy

Electronic literature searches were performed using Medline, PsycINFO, Web of Science, Scopus, and Proquest Psychology Journals databases using relevant review terms: *posttraumatic growth*, *benefit finding*, *personal growth*, *positive psychological changes*, *stress-related growth*, *positive posttrauma outcomes*, *positive posttrauma life changes*, *meaning**, *sense of coherence*, *adversial growth*, *thriving*, *positive reappraisal*, *resilience* combined with *cancer* and with *assessment*, *tool*, *inventory*, *measure*, *questionnaire*, excluding *review*, *metaanalysis*, and *case report*. There was no restriction on the year of publication. Search was performed using subject headings, keywords, titles, and abstracts (up to October 2016). The PRISMA criteria were followed.

2.2 | Study selection criteria

The following selection criteria were applied on the articles found in databases:

Type of studies

Published primary studies were eligible for inclusion; reviews, editorials, letters, and case reports were excluded. No limitations regarding study designs were used. Language of the articles included was English. Articles that validated assessment tools were also considered, as could include cancer patients.

Type of participants

We included only studies where the participation of cancer patients or survivors was clearly specified in the title, the abstract, or keywords. There were no restrictions regarding the age or the number of participants, neither the stage of their disease. We also included articles with samples composed by cancer patients and other chronic diseases.

Posttraumatic growth-related constructs

We selected the articles when the assessment of PTG and the related constructs was specified in title, in the abstract, or in the

keywords, including BF, personal growth, meaning, positive psychological changes, stress-related growth, positive posttrauma outcomes, positive posttrauma life changes, sense of coherence, adversarial growth, thriving, positive reappraisal, and resilience. Those articles that clearly did not refer to PTG, but only to other terms were excluded after the full-text screening. Articles not reporting medical and psychological/psychiatric data were excluded.

2.3 | Review methods

The abstracts of the identified records were screened for relevance. Articles were rejected if they failed to meet the selection criteria. When an abstract could not be rejected with certainty, the full article was appraised. A review template was developed specifying key details for each study (see Table S1). Details were extracted by one reviewer, and results were commented with the other reviewers. Discrepancies were resolved by consensus. The methodological quality of the studies was appraised using specific tools for quantitative,[3] mixed-method,[4] and qualitative[5] designs (see Table S1). No studies were rejected from the final analysis for low methodological quality (see Table S1).

3 | RESULTS

After removing duplicates, 2205 articles were screened by title from 5 databases. Articles were excluded if (1) did not assess PTG-related terms; (2) were not focused on patients or survivors of cancer (eg, they were focused on careers or family members); (3) were not empirical articles; (4) were not in English; and (5) were not focused on cancer disease, or did not include participants with a cancer illness, as illustrated in Figure 1. The final articles included by full text in this review were 72 and are reported in Table S1. In this table, articles are grouped according to the label(s) and tool(s) used when referring to PTG, beginning with PTG alone, and adding subsequent labels and tools. Categories "*a*" to "*d*" collect articles focused on PTG that assessed it with the Tedeschi and Calhoun PTGI; with PTGI plus other questionnaires or qualitative methods; or that assessed PTG with tools other than PTGI, respectively. Categories "*e*" and "*f*" collect articles generically referring to growth, or personal growth, which was measured with PTGI or other tools, respectively. Categories "*g*" and "*h*" group articles referring to BF, which was assessed it with the benefit finding scale (BFS), or with tools other than BFS. Finally, categories "*i-j-k*" group articles focused on meaning and assessed it with meaning in life scale (MiLS), with the PTGI, or with tools other than MiLS, respectively. In each of these groups, articles are alphabetically ordered.

The subsequent tables (Tables 1 and 2) present a subanalysis that shows in detail the outcome found among studies concerning illness-related characteristics (Table 1). the relationships between PTG and psychological aspects, including psychiatric conditions and other positive dimensions such as optimism, hope, or meaning (Table 2).

Of the 72 articles reviewed, 46% were addressed to breast cancer only, and 39% included samples of patients with various cancer diagnoses. The remaining articles included samples with only colorectal cancer, others with head/neck cancer, prostate or testicular cancer, and leukemia.

Most studies (68%) had a cross-sectional design, while the remaining 32% used a longitudinal design. In addition, most articles assessed PTG in a specific moment of the illness, and/or confronted cancer patients' PTG to those of healthy controls, of siblings, or of other type of traumatic event survivors.

3.1 | Instruments for assessing positive reactions in cancer

Most investigations (76%) adopted the model of Tedeschi and Calhoun[1] for analyzing the positive psychological changes occurring in the aftermath of cancer. Most of the articles that relied on this model assessed it using the PTG inventory (PTGI) assessment tool, alone or together with other similar tools. Further, as displayed in Table S1, some articles referred to the Tedeschi and Calhoun definition

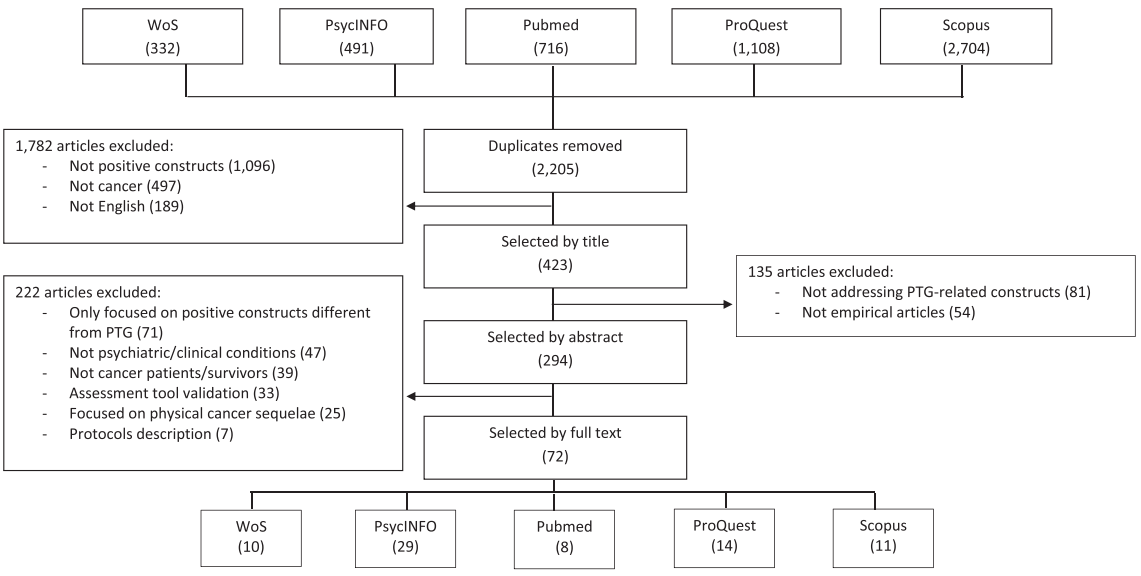

FIGURE 1 Articles search process

TABLE 1 Illness characteristics related or not to PTG

	Reference	Tool/label	Type of relationship between the illness characteristic and PTG
Cancer site	Widows et al[6]	PTG – PTGI	0
	Silva et al[7]	PTG – PTGI	0
	Cormio et al[8]	PTG – PTGI	0
	Yi and Kim[9]	PTG – PTGI	0
	Park et al[10]	Personal growth (PG) – Perceived benefits scale (PBS)	0
Cancer stage	Widows et al[6]	PTG – PTGI	0
	Cordova et al[11]	PTG-PTGI	0
	Salsman et al[12]	PTG – PTGI	0
	Wang et al[13]	PTG – PTGI	0
	Danhauer et al[14]	PTG – PTGI	0
	Jones et al[15]	Positive changes –medical expenditure panel survey (MEPS)	0
	Bellizzi and Blank[16]	PTG – PTGI	+
	Mols et al[17]	PTG – PTGI; benefit finding (BF) – Impact of event scale (IES)	+
	Bellizzi et al[18]	PTG – PTGI	+
	Jansen et al[19]	PTG – PTGI; BF –benefit finding scale (BFS)	+
Cancer surgery	Bellizzi and Blank[16]	PTG – PTGI	0
	Ransom et al[20]	PTG – PTGI	0
	Brunet et al[21]	PTG – PTGI	0
	Cohen and Numa[22]	PTG – PTGI	0
	Silva et al[7]	PTG – PTGI	0
	Wang et al[13]	PTG – PTGI	0
	Jones et al[15]	Positive changes – MEPS	0
Cancer treatment	Widows et al[6]	PTG – PTGI	0
	Mystakidou et al[23]	PTG – PTGI	0
	Ransom et al[20]	PTG – PTGI	0
	Salsman et al[12]	PTG – PTGI	0
	Brunet et al[21]	PTG – PTGI	0
	Tallman et al[24]	Anticipated PTG – PTGI	0
	Silva et al[7]	PTG – PTGI	0
	Turner-Sack et al[25]	PTG – PTGI	0
	Cormio et al[8]	PTG – PTGI	0
	Wang et al[13]	PTG – PTGI	0
	Lelorain et al[26]	PTG – PTGI	+ chemotherapy –PTG
	Hefferon et al[27]	PTG – Qualitative methods	+ chemotherapy –PTG
	Jansen et al[19]	PTG – PTGI; BF – BFS	+ chemotherapy –PTG
	Danhauer et al[14]	PTG – PTGI	+ chemotherapy –PTG
	Rahmani et al[28]	PTG – PTGI	+ radiotherapy –PTG
	Mols et al[17]	PTG – PTGI; BF – IES	- radiotherapy –PTG
Time since diagnosis	Weiss[29]	PTG – PTGI; BF– *ad hoc* questionnaire	–
	Yi and Kim[9]	PTG – PTGI	–
	Gianinazzi et al[30]	PTG – PTGI	–
	Gunst et al[31]	PTG – PTGI	–
	Sears et al[32]	PTG – PTGI; BF – Qualitative methods	+
	Manne et al[33]	PTG – PTGI	+
	Jansen et al[19]	PTG – PTGI	+

(*Continues*)

TABLE 1 (Continued)

	Reference	Tool/label	Type of relationship between the illness characteristic and PTG
	Tallman et al[24]	Anticipated PTG – PTGI	+
	Danhauer et al[34]	PTG – PTGI	+
	Pat-Horenczyk et al[35]	PTG – PTGI	+
	Aflakseir et al[36]	PTG – PTGI	+
	Bellizzi and Blank[16]	PTG – PTGI	0
	Mystakidou et al[23]	PTG – PTGI	0
	Olden[37]	PTG – PTGI; BF – BFS	0
	Salsman et al[12]	PTG – PTGI	0
	Brunet et al[21]	PTG – PTGI	0
	Lelorain et al[26]	PTG – PTGI	0
	Bellizzi et al[18]	PTG – PTGI	0
	Morris et al[38]	PTG – PTGI	0
	Silva et al[39]	PTG – PTGI	0
	Turner-Sack et al[25]	PTG – PTGI	0
	Cormio et al[8]	PTG – PTGI	0
	Jones et al[15]	Positive changes – MEPS	0
Time since treatment	Widows et al[6]	PTG – PTGI	0
	Andrykowski et al[40]	Growth – PTGI	0
	Brunet et al[21]	PTG – PTGI	0
	Turner-Sack et al[25]	PTG – PTGI	0
	Barakat et al[41]	PTG – ITSIS	–
	Ransom et al[20]	PTG – PTGI	+
Recurrence	Olden[37]	PTG – PTGI; BF – BFS	0
	Yi and Kim[9]	PTG – PTGI	0
	Gunst et al[31]	PTG – PTGI	0

The "0" means no statistically significant relationship; "+" means direct and statistically significant relationship; and "–" means inverse and statistically significant relationship.

of PTG, but used different tools to assess it, such as the silver lining questionnaire, the perceived benefits scales, or qualitative methods. Similarly, BF was assessed with the BFS, and also with PTGI and other instruments, such as Stress-Related Growth Scale, positive contributions scale or qualitative methods (categories *g* and *h* in Table S1). Thus, these articles present a certain degree of disagreement in their methodologies. Poor concordance between the main focus of research and the methodology used may represent a risk of outcome bias in the investigations.

Consequently, the results among these investigations were not always concordant, especially concerning the correlations between PTG levels and medical or psychiatric characteristics of cancer patients (see Tables 1 and 2).

3.2 | PTG and illness-related characteristics

The articles reporting relationships between clinical data and PTG are 38, but only 18 were explicitly looking for these relationships. Among these, different areas were explored, including characteristics related to the type of cancer, the type of treatment received, and also the time elapsed since the traumatic experience. In general, illness-related characteristics were poorly related to PTG (see Table 1). Articles found no relationship between cancer site, cancer surgery, cancer recurrence, and PTG. Other investigated variables are the elapsed time since diagnosis, type of oncological treatment received, and cancer stage. They all presented inconsistent findings:

3.2.1 | Time since diagnosis and treatment

Nearly all the 6 articles that analyzed the relationship between time since treatment and PTG found no relationship, except for two.[20,41] Barakat et al[41] used a different assessment tool rather than PTGI and found an inverse relationship between these two variables. Ransom et al[20] assessed the modification of PTG before and after radiotherapy in breast and prostate cancer patients and found a direct relationship between time since treatment and PTG. Another similar variable is time since diagnosis; and either no relationship or a direct relationship between this variable and PTG emerged (see Table 1). Thus, elapsed time since diagnosis and treatment seems to be unrelated to the occurrence of PTG. However, the definition of PTG itself highlights the importance of time for the development of PTG. Therefore, as most of the articles studying this aspect used the PTGI, this questionnaire might lack of sensitivity in analyzing the passing of time and the emerging of PTG in oncological patients.

TABLE 2 Psychiatric and positive dimensions related or not to PTG

	Reference	Tool/Label	Type of relationship between psychiatric/positive dimensions and PTG
Anxiety	Abdullah et al[42]	PTG – PTGI	0
	Jaarsma et al[43]	PTG – PTGI	0
	Mystakidou et al[44]	PTG – PTGI	0
	Schroevers et al[45]	PTG – PTGI	0
	Salsman et al[12]	PTG-PTGI	0
	Gunst et al[31]	PTG – PTGI	0
	Jansen et al[19]	PTG – PTGI	0
	Canavarro et al[46]	PTG – PTGI	–
	Wang et al[13]	PTG – PTGI	–
PTSS/PTSD/stress	Widows et al[6]	PTG – PTGI	0
	Salsman et al[12]	PTG – PTGI	0
	Nenova et al[47]	PTG – PTGI	0
	Gunst et al[31]	PTG – PTGI	0
	Tillery et al[48]	PTG – BFS	0
	Sears et al[32]	PTG – PTGI; BF – Qualitative methods	+
	Barakat et al[41]	PTG – Impact of traumatic stressors interview schedule	+
	Mystakidou et al[23]	PG/PTG – PTGI	+
	Morrill et al[49]	PTG – PTGI	+
	Mcdonough et al[50]	PTG – PTGI	+
	Yi and Kim[9]	PTG – PTGI	+
Distress	Schroevers et al[45]	PTG – PTGI	0
	Rand et al[51]	PTG – PTGI	0
	Widows et al[6]	PTG – PTGI	–
	Ruini and Vescovelli[52]	PTG – PTGI	–
	Liu et al[53]	PTG – PTGI	–
	Gunst et al[31]	PTG – PTGI	–
	Jansen et al[19]	PTG – PTGI	–
Concerns about life/disease/negative intrusions	Widows et al[6]	PTG – PTGI	0
	Salsman et al[12]	PTG – PTGI	0
	Park et al[54]	PTG – BFS	–
Depression	Morrill et al[49]	PTG – PTGI PG – personal growth initiative scale (PGIS)	–
	Olden[37]	PTG – PTGI	–
	Morrill[55]	PTG – PTGI and PGIS	–
	Abdullah et al[42]	PTG – PTGI	0
	Schroevers et al[45]	PTG – PTGI	0
	Salsman et al[12]	PTG – PTGI	0
	Moore et al[56]	PTG – PTGI	0
	Wang et al[13]	PTG – PTGI	0
	Danhauer et al[14]	PTG – PTGI	+
Meaning	Bower et al[57]	Positive meaning/growth – PTGI	+
	Costa and Pakenham[58]	BF – The stress-related growth scale (SRGS) and PTGI.	+ (BF as a pathway to achieve meaning)
	Jim et al[59]	Meaning in life – Meaning in life scale (MiLS).	+ (PTG is included into meaning)
	Jim and Andersen[60]	Meaning in life – MiLS	+ (PTG is included into meaning)
	Fleer et al[61]	PTG – SRGS –; meaning in life –the life regard index	Expressive writing enhanced both PTG/BF and meaning

(*Continues*)

TABLE 2 (Continued)

	Reference	Tool/Label	Type of relationship between psychiatric/positive dimensions and PTG
	Labelle et al[62]	PTG – PTGI	Both meaning and PTG can be increased using mindfulness skills
	Park et al[10]	Growth – PBS	+
	Park et al[54]	PTG – PTGI	Both meaning and PTG were related to better WB
	Ruini et al[63]	PTG – PTGI	Both meaning and PTG directly related to gratitude
	Svetina and Nastran[64]	PTG –PTGI	+ (Meaning as a part of PTG)
	Lethborg et al[65]	PTG – PTGI	0 between
	Manne et al[33]	PTG – PTGI	0
	Sherman et al[66]	Global and illness-related meaning – Sense of coherence scale	0
	Yanez et al[67]	Cancer-related growth - PTGI	0 related growth
	Bower et al[57]	Meaning – *ad hoc* positive meaning scale and PTGI.	Consider PTG and meaning as synonyms
	Fleer et al[61]	Meaning –life regard index, and two qualitative questions	Consider PTG and meaning as synonyms
	Heinrichs et al[68]	PTG/BF/meaning – PTGI	Consider PTG and meaning as synonyms
	Penedo et al[69]	BF/PTG/meaning – positive contributions scale	Consider PTG and meaning as synonyms.
	Wang et al[70]	BF/personal growth/PTG/meaning – BFS	Consider PTG and meaning as synonyms
Optimism	Bellizzi and Blank[16]	PTG – PTGI	0
	Bellizzi et al[18]	PTG – PTGI	0
	Sears et al[32]	PTG – PTGI; BF – Qualitative question;	0
	Bözo et al[71]	PTG – PTGI	+
	Olden[37]	PTG – PTGI	+
	Moore et al[56]	PTG – PTGI	+
	Turner-Sack et al[25]	PTG – PTGI	Pessimistics had greater PTG
Positive effect	Jaarsma et al[43]	PTG – PTGI	0
	Schroevers et al[45]	PTG – PTGI	0
	Salsman et al[12]	PTG –PTGI	0
	Lelorain et al[72]	PTG – Qualitative methods	+
	Park et al[54]	PTG – BFS	+
	Yu et al[73]	PTG – PTGI	+
QoL/HRQoL	Bellizzi et al[18]	PTG – PTGI	+ Between PTG and mental HRQoL
	Morrill[55]	PTG – PTGI; PG – PGIS	+
	Lelorain et al[26]	PTG – PTGI	+
	Zebrack[74]	PG – Impact of cancer scale	0
	Jansen et al[19]	PTG – PTGI; BF – BFS	0
	Moore et al[56]	PTG – PTGI	0
Hope	Sears et al[32]	PTG – PTGI; BF – Qualitative question;	0
	Bellizzi and Blank[16]	PTG – PTGI	0
	Yuen et al[75]	PTG – PTGI	+
Spiritual WB	Olden[37]	PTG – PTGI; BF-BFS	+
	Lelorain et al[26]	PTG – PTGI	+
	Danhauer et al[76]	PTG – PTGI	+
Psychological WB	Ruini and Vescovelli[52]	PTG – PTGI	+
Happiness	Lelorain et al[26]	PTG – PTGI	+
Gratitude	Ruini et al[63]	PTG – PTGI	+

The "0" means no statistically significant relationship; "+" means direct and statistically significant relationship; and "−" means inverse and statistically significant relationship.

3.2.2 | Oncological treatment

Regarding the type of oncological treatment received, some discrepancies were found. Most articles (10 of 16) reported no relationship between this variable and PTG. The remaining ones found a direct relationship between undergoing chemotherapy and PTG compared to no chemotherapy, radiotherapy, or their combination, respectfully.[19,26,27] Regarding radiotherapy, one study (which used the Persian version of PTGI) found a direct relationship between PTG and this treatment versus chemotherapy or surgery[28]; while another one found an inverse relationship as compared to surgery.[17]

3.2.3 | Cancer stage

Concerning cancer stage, results were also equally divided. Six of 10 articles reported no association; the remaining 40% documented a direct relationship. These discrepancies appear to be particularly relevant and basically independent from the assessment tool used. Only few authors[10,54,77] actually stressed out the importance of differentiating illness-related, life-threatening stressors from other forms of trauma, and the potentially different mechanisms connected with PTG outcome.

3.3 | PTG and psychiatric conditions

Twenty-six articles investigated this issue. Ten of them did specifically focus on the relationship between PTG and psychiatric conditions such as anxiety, depression, or stress, between others (see Table 2). The remaining articles were focused on the evaluation of positive functioning and, in addition, assessed psychiatric symptoms in cancer patients.

3.3.1 | Anxiety and depression

Most articles (18 of 26) evaluated the levels of anxiety and depression, and 11 of 18 studies found no relationship with PTG (see Table 2). Only two[13,46] reported an inverse relationship between anxiety symptoms and PTG. In the case of depression, 4 of 9 articles found an inverse relationship between this variable and PTG.[31,37,49,55] However, 2 of 3 articles[49,55] used the personal growth initiative scale rather than PTGI. The third[37] assessed PTG in cancer patients in a palliative care setting. The last one[31] used the PTGI in German long-term survivors of adolescent cancer. Finally, Danhauer et al[14] found a direct relationship between depressive symptoms and PTG, suggesting that the more depressive symptoms, the more reflexive the women became and thus the more PTG emerged. Therefore, the heterogeneity in the assessment methodology could explain such inconsistent findings.

3.3.2 | Posttraumatic stress disorder, distress, negative rumination

The relationship between PTSD or posttraumatic stress symptoms (PTSS) and later PTG development in cancer was investigated by 11 studies. No consensus on the results was found: 5 articles[6,12,31,47,48] showing no relationship; and the remaining 6 reporting a direct relationship. None of these studies reported data on the quadratic relationship between PTG and PTSD; rather, they focused on the linear one.[2] Higher consensus was observed regarding distress and PTG: 2 of 6 articles found no relationship between these variables,[51,78] while another found an inverse relationship. Finally, negative rumination was studied by only 3 articles: two of them found no relationship with PTG,[6,12] while the third[54] found an inverse relationship. However, the assessment of PTG was done using the BFS in this last article.

Also for psychiatric variables associated with PTG, findings seem to be inconclusive because of heterogeneity in assessing methods. Thus, correlations between psychiatric conditions and PTG need to be more accurately investigated in future research with cancer patients.

3.4 | PTG and other positive constructs

We evaluated the relationship between PTG and other positive constructs such as meaning, optimism, WB, hope, and gratitude, between others (see Table 2). These were analyzed by 35 articles, nearly the half (N = 16) of them being explicitly focused on studying these relationships. Articles documented a direct relationship between PTG and these positive constructs in oncological patients. However, spiritual and psychological WB, gratitude, and happiness were studied only in few articles compared to meaning, optimism, hope, and positive effect. Specifically, when considering optimism, the results were discrepant, because half of the articles documented a direct relationship, the remaining ones found no relationship, and one article found pessimists to display greater PTG.[25] The same pattern of relationship was also observable for PTG and positive effect; PTG and quality of life; and PTG and hope.

The area where more consensus emerged was the one concerning meaning, which was often linked with PTG, positive reappraisal, or other positive coping styles. Thus, according to the literature examined, meaning-making process seems to be a direct path leading to PTG.[10,54,58-60,62-64] Different from other positive dimensions (such as optimism, hope, and positive effect), existential dimensions in individuals life (such as meaning and meaning-making processes) seem to be more consistently linked to PTG in cancer patients. Accordingly, when PTG was measured together with, or by using instruments evaluating meaning, it seems that more converging areas of positive changes in dealing with cancer have been detected. Hence, findings examined in this review tend to be more concordant and conclusive.

4 | DISCUSSION

The present review was aimed at analyzing the clinical and psychological correlates of PTG in patients diagnosed and treated for oncological illness. An evaluation of the measurement tools used to assess this construct and the concordance with their theoretical definition was also performed.

The limitations of this review of the literature concern the heterogeneity of the populations included (different cancer types, stages, age of participants, etc), the selection of articles written only in English available as full text, and the inclusion of various psychometric instruments. Considering that PTG research is rapidly growing, we may have omitted in press or more recent investigations, where full text was not available, yet.

A total of 72 relevant articles were analyzed. Most of them included breast cancer patients, referred to the Tedeschi and Calhoun[1]

definition of PTG, and used the PTG inventory as the main assessment tool, alone or in combination with other scales (see Table S1).

Interestingly, most of the 72 articles were published in multidisciplinary or psychological databases/journals (see Figure 1). This observation may suggest that PTG is particularly investigated by clinical psychologists and less explored in medical journals. The articles found in medical databases mostly reported stress and other related physical reactions during cancer, not providing a specific emphasis on PTG. This observation may have clinical implications, because researchers, nurses, and physicians working in oncological settings may not be sufficiently aware of the possible positive psychological reactions to the illness experienced by their patients. Further, the distribution of publications in this review on PTG and its clinical correlates suggest that psychosocial concomitants of cancer still remain confined to humanistic and social sciences, without fully embracing the medical ones.

A second observation concerns researchers and clinicians have evaluated phenomena as PTG, BF, meaning, personal growth, thriving, resilience, and others and subsumed them under the broad umbrella of positive reactions to the illness. As a result, research is still inconclusive in identifying clinical predictors, correlates, and mediators of PTG in this domain as highlighted by Table S1, Tables 1 and 2.

By a methodological viewpoint, the use of one or another assessment tool when measuring PTG can lead to diverse results. Although most articles clearly refer to the Tesdeschi and Calhoun[1] definition in their abstracts and introductions, sometimes researchers used another assessment tool. For example, Barakat et al[41] assessed PTG using an interview with dicotomic and Likert scales not on the basis of the Tedeschi and Calhoun's definition of PTG, which encompasses 5 specific domains. Other articles, like the one by Rand et al[51] used an opposite approach: they were aimed at assessing positive psychological responses using the Tedeschi and Calhoun PTG inventory, but not on the basis of their model. Yanez et al[67] and Park et al[54] were aimed at assessing the cancer-related growth and PTG, respectively, but then used the BFS (Table S1). The choice of one or another questionnaire might have conditioned the emergence of specific variables that better fitted with the tool itself. Indeed, these investigations yield a relevant risk of outcome bias.

Further, the discrepancies between PTG definition and the assessment tool(s) used are not the only emerging problems, but the definition of PTG itself in cancer should be also examined. Specifically, while most articles distinguished PTG from other constructs, some others did not. For example, some authors considered PTG and BF as synonyms (eg, Rahmani et al[28]; Labelle et al[62]), and they used the PTGI, the BFS, or the Stress-Related Growth Scale. In other articles, authors did not distinguish among PTG, BF, and meaning (eg, Bower et al[57]; Heinrichs et al[68]) and used the PTGI to assess all of them. Again, the risk of outcome bias is present also in these cases.

Very few articles, however, were aimed at providing a specific definition of positive psychological reactions following a cancer illness[21,27,41,43,74] and their peculiar characteristics. Rather, it seems that researchers and clinicians applied the constructs of PTG, BF, resilience or thriving, which originally derived from research on war, natural disasters or other type of trauma, to the cancer settings. This may have contributed to generate confusing and often inconsistent findings, which do not provide full and valid descriptions of positive reactions triggered by an oncological illness.

A notable exception among these confusing results may be represented by investigations focused on meaning and its association with PTG. As described in the introduction, although distinguishable, these two concepts share commonalities and similar pathways in identifying positive trajectories following cancer. For instance, according to Park et al,[10] growth could be considered a final outcome of meaning-making process and a direct ingredient in restoring life meaning (Table 2). These robust overlaps between meaning and growth were documented by other articles examined in this review (Table 2). some articles considered PTG and meaning as synonyms[57,61,68-70] or one being a pathway to reach another.[58-60] Thus, when considering the various proposed definitions of positive reactions following cancer, the two that basically displayed more commonalities and less discrepant results across investigations are the Tedeschi and Calhoun PTG and meaning models (Table 2). However, the model of meaning was poorly investigated in association with cancer clinical correlates, where most the studies used PTGI or BF (see Table 1).

According to traditional psychosomatic and psycho-oncology approach, illness-related variables should have an influence on patients' psychological reactions and adaptation to the medical condition. Nevertheless, in case of cancer and PTG, the only clinical variable displaying some correlations seems to be time since diagnosis/treatment. According to the Tedeschi and Calhoun definition, PTG needs time to appear in the aftermath of a traumatic event. Thus, a positive correlation should have emerged, but some of our findings do not provide confirmation of this statement, even when the PTGI was used (see Table 2). Further, the authors state that the intensity and severity of the stress should be directly related to PTG. However, most of the investigations documented no significant relationship between severity of illness, stage, and type of treatment received.

The same discrepancies were also documented in the relationship with psychiatric conditions where, for example, PTG was inversely or not related to depression, to negative intrusions and worries, to distress, and to anxiety (Table 2). The PTSD or PTSS was the only psychiatric conditions that displayed a direct relationship with PTG in cancer populations. However, confirming Shakespeare-Finch meta-analyses,[2] the inverted U shape pattern of relationship between PTG and PTSD is not reported in these investigations, because authors did not usually evaluate quadratic correlations between PTG and PTSD.

More homogeneous results were found when evaluating the relationships between PTG and other positive psychological resources, such as spiritual and psychological WB, happiness, and gratitude. However, other positive domains, such as hope, optimism, quality of life, and positive effect, displayed a controversial pattern of correlations among investigations involving cancer patients (Table 2). These findings confirm the Tedeschi and Calhoun definition of PTG, which encompasses the presence of positivity and distress at the same time. In cancer settings, however, this phenomenon seems to be more complex and mediated by other variables, such as type of clinical populations, and assessment tools used.

We suggest that a possible explanation for the discrepancies found in this review relies on that the Tedeschi and Calhoun model of PTG was originally conceptualized as a description of positive

changes after traumatic events, not necessarily considering their medical nature. Edmondson[79] suggested to differentiate the nature and characteristics of PTSD when it is triggered by life-threatening illnesses, as opposed to other type of trauma. The author proposed the Enduring Somatic Threat model of PTSD due to acute life-threatening medical events, which underlines the differences in symptom manifestations when due to acute manifestations of chronic and severe disease that are enduring/internal in nature. In cancer, the illness experience has a nuanced onset (it often begins with routine-screening examinations); it continues through cancer diagnosis and treatments (that may be long-lasting and invasive), and it goes on for many years with the fear of future recurrences. However, the specificities of the medical nature of the trauma are not assessed by the 21 items of the PTGI.

5 | CONCLUSIONS

The Tedeschi and Calhoun PTG is the most used model to describe positive psychological changes following a cancer illness. The PTG resulted inversely associated with depressive and anxious symptoms and directly related to hope, optimism, spirituality, and meaning. Thus, it seems worthy to evaluate and promote PTG in cancer patients for better adaption to the illness.

However, PTG entails a direct relationship with PTSD and PTSS symptoms in cancer, which do not confirm the quadratic correlations emerging in other traumatic events.[5] Future research is needed to solve these inconsistent findings.

Cancer-related variables resulted scarcely and inconsistently associated with PTG, probably because the PTGI does not explicitly refer to the medical nature of trauma. Thus, the Tedeschi and Calhoun model may not be completely adequate to capture the full spectrum of positive reactions in cancer.

Future research could benefit from the inclusion of the Enduring Somatic Threat model toward the development of PTG, as opposed to PTSD. Similarly, the inclusion of a questionnaire measuring the fear of cancer recurrences could shed new lights on the development of PTG, according to the illness characteristics and individual psychological reactions.

In the medical context, a complexity of issues may influence the manifestation of PTG, which current research has often neglected. This critical review documents that more detailed and extended research is needed to describe the full spectrum of positive psychological changes from cancer experience and their time trajectories.

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