"Optimism Is a Strategy for Making a Better Future"

A Systematic Review on the Associations of Dispositional Optimism With Health-Related Quality of Life in Cancer Patients

Giulia Marton[1,2], Dario Monzani[1,2], Laura Vergani[1,2], Silvia Francesca Maria Pizzoli[1,2], and Gabriella Pravettoni[1,2]

[1]Applied Research Division for Cognitive and Psychological Science, IEO, European Institute of Oncology (IRCCS), Milan, Italy
[2]Department of Oncology and Hemato-Oncology, University of Milan, Italy

Abstract: Cancer is a deadly disease that can lead to psychological suffering and decreased quality of life (QoL). Personality has been proven to have an effect on QoL and, in particular, Dispositional Optimism (DO) has been studied in relation to overcoming health crisis. The aim of this systematic review is to deepen the state of art of the relationship between QoL and DO in cancer patients. PubMed and Embase databases were systematically searched. Fifteen studies were included with a total of 5,249 cancer patients. All of the studies consider the relationship between DO and QoL, some studies analyze the correlation between the two variables and found a positive association. The majority of the studies investigate the predictive power of DO over QoL and most of them found DO to be predictive of a higher QoL. Results confirmed the association between DO and QoL in a sample of cancer patients. These results could influence the clinical practice as DO has been proven to have a beneficial effect on mental and physical health.

Keywords: cancer patients, quality of life, dispositional optimism, cancer care

Cancer is one of the leading causes of death worldwide. In 2018, in the United States there were nearly 2 million new cancer diagnosis and more than 600,000 deaths (Siegel et al., 2019). There is considerable evidence to suggest that cancer patients suffer from substantial and long-term psychological distress (Bailo et al., 2019). This psychological distress is due not only to the cancer diagnosis, but also the related medical treatments (Moltu et al., 2012). Cancer, often a life-threatening disease, impacts on many aspects of the patient's existence with implications for life adjustments to cope with it (Zenger et al., 2011). Various authors (Giesinger et al., 2011; Hwang et al., 2003) have suggested that cancer, in particular, has a detrimental impact on quality of life (QoL).

QoL is defined by Emerson (1985, p. 282) as "the satisfaction of an individual's values, goals and needs through the actualisation of their abilities or lifestyle"; however, it is such a wide and multifaceted concept that Baker and Intagliata (1982) state that there are as many definitions of the concept as the number of scientists studying it.

One of the most studied aspects of QoL is Health Related Quality of Life (HRQoL). The link between HRQoL and

QoL was defined by Torrance (1987, p. 594) as: "Quality of life is an all-inclusive concept incorporating all factors that impact upon an individual's life. HRQoL includes only those factors that are part of an individual's health". Scholars talk about HRQoL when considering the impact of illnesses and diseases, such as cancer, on QoL (Sosnowski et al., 2017). Since the early days of the conceptualization of the term, psychological aspects have been considered as a fundamental part of it (de Wit & Hajos, 2013; Sosnowski et al., 2017). In fact, HRQoL encompasses not only the objective effect of the disease but also the patient's satisfaction with care, implying that also subjective expectancies with the disease and its treatment play a role in such a perception.

In particular, the impact of cancer on HRQoL has been highlighted by the Institute of Medicine that reports the usefulness of intervention aimed to enhance HRQoL of patients and their families. In the last decade, in fact, increasing attention has also been given to why and how individual differences and personality traits can influence QoL and HRQoL (Huang et al., 2017; Zenger et al., 2011). Following Allport (1961), we may define personality as a dynamic

organization of psychological systems that regulate individual behaviors, feelings, and thoughts. Among other personality traits, optimism has evolved from a concept of naïve psychology that arouses curiosity in the general population to a construct with a relevant role in the contemporary psychological literature. Specifically, the Cambridge Dictionary defined optimism as "the quality of being full of hope and emphasizing the good parts of a situation, or a belief that something good will happen". This evolution includes also the development of the concept of dispositional optimism (DO), defined as a relatively stable trait of expecting positive results in relevant life situations in a generalized way (Scheier & Carver, 1985). As the definition suggests, DO influences expectancy in different life domains (Wrosch & Scheier, 2003), and it can influence different aspects of life. One of the best ways to describe DO is summarized in the explanation attributed to Noam Chomsky "Optimism is a strategy for making a better future. Because unless you believe that the future can be better, you are unlikely to step up and take responsibility for making it so." Thus, both the popular and scientific definition of optimism highly stress the way optimistic people look at their future. Specifically, pessimists generally expect bad experiences in their future. On the contrary, optimistic people tend to expect positive experiences. Optimistic people generally display higher confidence in the likelihood of attaining their goals and are more tenacious in pursuing these goals (O'Connor & Cassidy, 2007). In the general population, DO is a favorable individual resource that can be especially relevant when people have to face new or strong adversities and stressors. DO has a beneficial effect on personal goal pursuit (Monzani, Steca, Greco, D'Addario, Pancani, et al., 2015); positive and optimistic expectancies promote persistence and facilitate performance in carrying out tasks (Armor & Taylor, 1998). Regarding coping strategies, optimistic people are more likely to be approach copers and to adopt problem-focused coping strategies (Carver et al., 2010). Thus, optimists tend to adopt those coping modalities that could be considered effective because of their strong links with goal commitment and goal progress (Monzani, Steca, Greco, D'Addario, Cappelletti, et al., 2015). Magnano and colleagues (2015) also proposed that these aspects could influence people's decision-making styles. In fact, they stated that DO makes people more confident that they will be able to solve the problem. Thus, highly optimistic people generally report rational and logic decision-making styles characterized by a strong ability to seek information, set goals, action planning and defining alternative plans of action. On the contrary, lower levels of optimism are more likely associated with avoidant coping strategies that may lead to ineffective influence decision making style, such as procrastination, doubtfulness, and delegation (Carver et al., 2010; Magnano et al., 2015).

Similar results were reported by Creed and colleagues (2002) who analyzed optimism and pessimism in the setting of career choice. They demonstrated that a high level of DO is associated with better career planning and that optimists are more focused on their goals. Pessimists, instead, are more indecisive, less informed, and less aware of their possible choices.

DO is a personality aspect that has been associated with health (Scheier & Carver, 1985) and has been studied in relation to the overcoming of health crisis. Starting from the seminal paper by Scheier and Carver (1992), several researches have investigated the role of DO in shaping adjustment to acute and chronic illness and in influencing physical and psychological well-being in samples of patients affected by various kinds of diseases, as well as in healthy individuals and the general population. For example, one study by Steca et al. (2017) demonstrated that, compared to healthy adults, people with chronic heart failure generally report lower levels of DO. Moreover, these results also highlighted that DO is weakly but negatively correlated with depression and anxiety within the chronic heart failure population. Moreover, DO is proven to promote psychological adjustment to chronic heart failure and act as a protective factor against onset and mortality for cardiovascular diseases (Giltay et al., 2004, 2006).

DO has also been studied in the oncological context. In one of the earliest studies (Carver et al., 1993), DO was examined in a group of early stage breast cancer's patients. The study evaluates levels of DO before and after surgery and, in all the evaluations, it was negatively associated with distress. DO was also associated with coping mechanism of acceptance of the situation, positive reframing and humor. In a similar way, women with early stage breast cancer with high levels of DO report low mood disturbance and they rate their life more satisfactory than women with low levels of DO.

Measurement Issues

The definition of DO came alongside with the creation of the Life Orientation Test (LOT) (Scheier & Carver, 1985), a self-reported questionnaire formulated to identify the expectancies of the future, core concept of this trait. Later Scheier et al. (1994), addressed some fallacies in the original LOT and decided to publish a revised version of it. The main reason for the revised version (LOT-R) is the need to focus more precisely on expectation for the future and better distinguish DO from neuroticism, trait anxiety, self-mastery, and self-esteem (Scheier et al., 1994). Nowadays the LOT-R is the most used, valid, and reliable instrument for assessing DO. It is a self-reported questionnaire comprising 10 items. While half of them are positively phrased, the other half are in a negative form, the remaining four items

are fillers and are not used in computing composite score of DO.

In the last decades, the construct validity and dimensionality of the DO has been controversial. The main debate is whether the LOT-R should be considered as a one-dimensional or a two-factor measure. In the literature, there is evidence for both factor structures. Several studies reported that the two correlated factor model of the LOT-R has a better fit then the unidimensional one. However, some recent findings attested that the better fit of the bi-dimensional structure may be due to use of a balanced number of both positively and negatively worded items in the LOT-R (Alessandri et al., 2010; Monzani et al., 2014; Rauch et al., 2007; Steca et al., 2015, 2017; Vautler et al., 2003). This practice may lead to a multifactor structure caused by item wording. Thus, all these recent findings gave support to the unidimensionality of the LOT-R and, subsequently, of the DO. The one-dimensional factor structure of the LOT-R has been demonstrated also by assessing the psychometric properties of this self-report measure by performing Item Response Theory analysis (Chiesi et al., 2013; Steca et al., 2015).

Aim of the Systematic Review

Given the relevance of DO in shaping the way optimistic individuals cope with acute and chronic stressors, this systematic review is aimed at evaluating the state of art of the literature assessing the relationship between DO and QoL in oncological samples. Specifically, we considered all the quantitative studies evaluating DO with the LOT-R, the only reliable and valid self-report measure of this relevant personality trait, by assessing the association between DO with QoL in people that have received a cancer diagnosis. We were also interested in understating whether a different structure of the LOT-R (i.e., uni-dimensional or bi-dimensional construct) could lead to different results in assessing the links between the construct of optimism (or pessimism) and QoL.

Methods

Our search followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA; Moher et al., 2015). The search strategy is shown in the flow diagram in Figure 1 and the PRISMA checklist is Figure 2.

Selection of the Study

The PubMed and Embase databases were searched to retrieve studies for possible inclusion. We searched the databases with a combination of terms such as optimism,

DO, generalized expectancy, life orientation, Quality of Life: ((optimism) OR ("generalized expectancy") OR ("life orientation")) AND (("quality of life") OR ("patient reported outcome*")). To be included the studies had to measure DO and QoL in an oncological population so we added the term to the search criteria. The studies selected were identified by the first authors and then checked by a co-author. On an initial screen, articles were selected and retained by evaluating their relevance for the study of the links between DO and QOL by screening their title and abstract. Then, the full text was examined. The full text analysis of all the potentially relevant studies was conducted by two authors. During the full text analysis, we excluded all the studies that did not meet the inclusion criteria below.

Inclusion and Exclusion Criteria

As shown in Table 1, quantitative studies in which DO was evaluated with the LOT-R and that assess QoL were included. Case reports, editorial, reviews, and animal studies were excluded from this review. Considering the chronicity of cancer (Pizzoli et al., 2019), studies involving both cancer patients or survivors of an oncological disease were included. Various cancer patients were analyzed as there was no restriction on diagnosis or age group. The different types of diagnosis were combined according to the following categories:

- Prostate cancer
- Colorectal cancer
- Breast cancer
- Gynaecological cancer
- Kidney cancer
- Pediatric cancer
- General (various type of cancer)

A main exclusion criterion referred to the way DO and QoL were measured. Specifically, we excluded studies assessing DO with measures other than the LOT-R and evaluating QoL with not valid and reliable measure of QoL. Given that the primary aim of the review was to analyze the potential relationship between the two constructs, all the articles that did not report the association between the two were excluded.

Data Analysis

Studies were summarized and analyzed qualitatively. Due to the high heterogeneity of methods and measures of QoL employed across the studies, a meta-analysis was not feasible. From each study, we have extracted the following information: the study characteristics and categories, the characteristics of the quality of life questionnaire, the
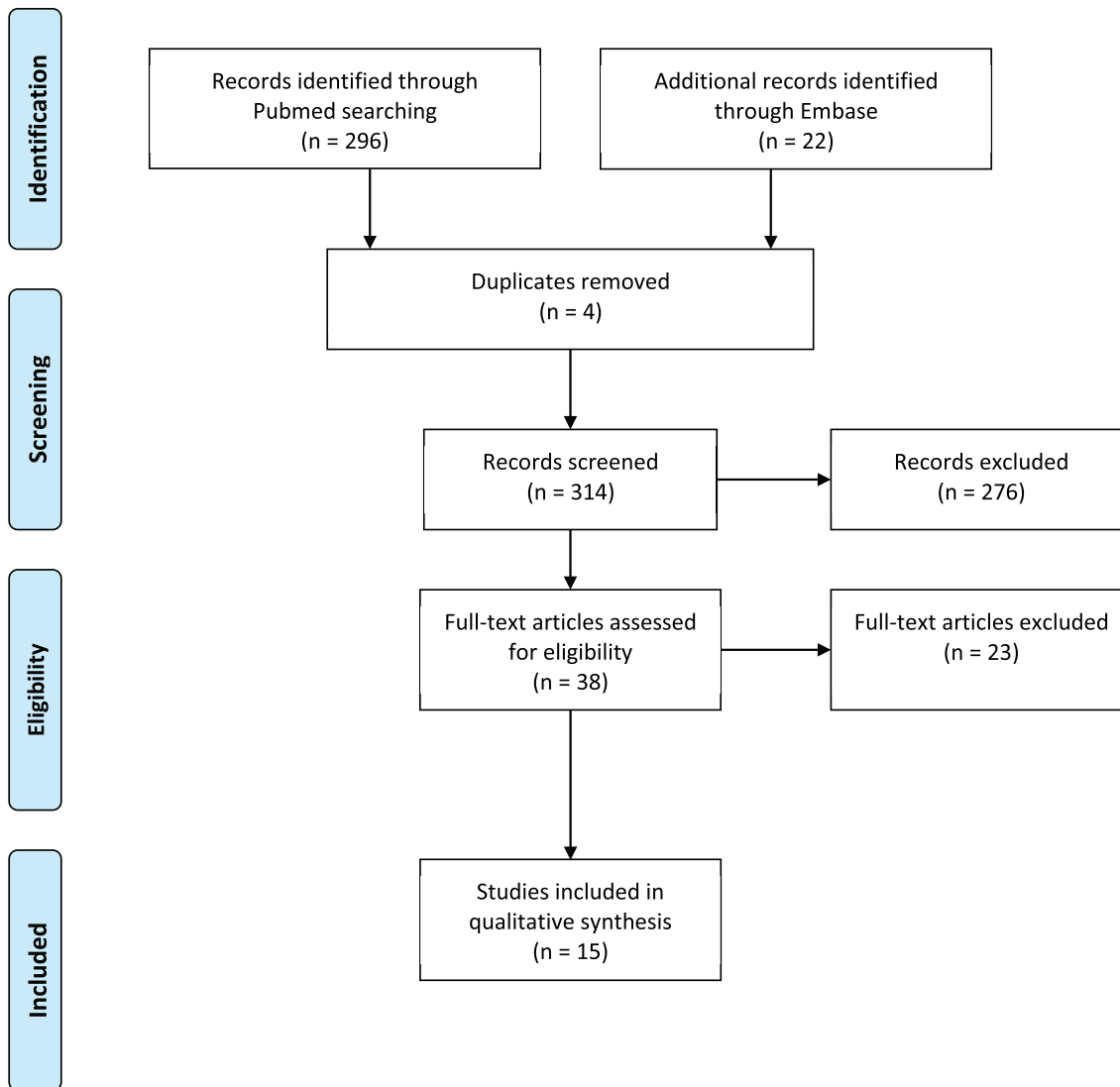
Figure 1. Flow diagram.

dimensionality of DO, the relationship between DO and quality of life as well as the relationship between DO and other variables found in the studies. For each study we extracted the regression coefficient and correlation matrix (r) and we evaluated them following the guidelines by Cohen (1988) and by Acock (2018). We performed a risk of bias (Table 2) following the Study Quality Assessment Tools guidelines provided by National Heart, Lung and Blood Institute (NHLBI).

Results

Search Outcomes

As reported in Figure 1, overall, 15 studies met the inclusion criteria for this review. The initial search strategy identified

potentially 314 articles: 296 from PubMed, and 22 from Embase (with 4 articles found in both the databases). After screening the titles and abstracts according to the selection criteria, we excluded 276 studies. After full text screening, 23 articles were excluded.

Study Characteristics and Categories

Study characteristics and extracted data are shown in Table 3 and Table 4. Table 3 describes the main characteristics of the selected studies, in terms of aim, sample, and other variables being assessed alongside DO and QoL. The 15 studies involved 5,249 people with cancer. As inclusion criterion, we focused only on studies that included cancer patients. However, the characteristics of samples were quite heterogeneous. Five (Applebaum et al., 2014; Dunn et al., 2011; Gustavsson-Lilius et al., 2007; Mazanec et al., 2010;

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	1-3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	-
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3-4
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3-4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3-4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	Table 2
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	4
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	4
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Table 2
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	4
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Table 3-4
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Table 2
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	4-17
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	-
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	Table 2
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	-
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	17-18
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	18
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	17-18
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	21

Figure 2. PRISMA 2009 checklist.

Yoon et al., 2015) out of 15 studies considered a sample of patients with a diagnosis that we have defined as a "general" diagnosis of cancer. Specifically, these studies did not specify the cancer type of the included population or there were multiple cancer diagnoses. Two studies included patients with a diagnosis of colorectal cancer (Chambers, Meng, et al., 2012; Steginga et al., 2009) and two included patients with renal cancer (J. Liu et al., 2018; Milbury

Table 1. Inclusion and exclusion criteria to select studies for the systematic review

Inclusion criteria	Exclusion criteria
• Quantitative studies assessing the relationship between DO and QoL	• Case reports, editorial, reviews and animal studies
• Population of cancer patients or cancer survivors	• DO assessed with LOT or other instruments
• QoL assessed with a valid and reliable measure of QoL	• QoL assessed with not valid and reliable measure of QoL.
• DO assessed with LOT-R	

Note. DO = Dispositional Optimism; QoL = Quality of Life; LOT-R = Life Orientation Test – Revised.

et al., 2011). Only one study aimed at considering the whole patient-caregiver dyad and, thus, also the main caregiver was recruited (Gustavsson-Lilius et al., 2007). Moreover, five studies considered gender specific cancers. Thornton and colleagues (2012) considered prostate cancer patients, whereas the other four, instead, considered a female specific cancer: two involved women with gynecological cancer (de Moor et al., 2006; Price et al., 2013), two included woman with either a gynecological or breast cancer (Thieme et al., 2017; Zenger et al., 2011). Thus, these 5 studies considered a sample composed of only female (4) and one male (1). Overall, gender is almost equally distributed across studies: the 50.2% of the recruited patients are women.

Regarding the sample age, the mean age of patients included in the 15 studies was 61.3 years, with age ranging from 16.1 to 71.8 years. The majority of the studies had a mean age < 50 years; only two studies involved younger patients. In detail, Zenger and colleagues (2011) have a sample with a mean age of 48 years and only one study, made by Mannix and colleagues (2009), considered a sample of pediatric patients (M_{age} = 16.1 years). The oldest sample is the one evaluated by Yoon and colleagues (2015) (M_{age} = 71.8 years). Sample size varied across the studies: Steginga and colleagues (2009) recruited 1,822 patients whereas Mannix and colleagues (2009) had only 23 people. Mean sample size was 350.

Characteristics of the Quality of Life Questionnaires

Table 4 describes the main results, as well as methodological and analytical aspects of the selected studies, focusing on the measurement of QoL and DO and on the evaluation of their concurrent or longitudinal associations. Specifically, as can be seen, quality of life was assessed in different ways. In the selected studies, the three most used questionnaires are the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire – Core 30 (EORTC QLQ-C30; Aaronson et al., 1993), the Functional Assessment of Cancer Therapy – General (FACT-G; Cella et al., 1993), and the Short Form 36 Health Survey (SF-36; Brazier et al., 1992) and Short Form 8 Health Survey (SF-8) (Ware

et al., 2001) versions. In particular, the EORTC QLQ-C30 and the FACT-G both comprehend a core section developed for measuring QoL in patients with cancer. Often, the core section is given alongside the cancer specific modules, being developed to be more sensitive in analyzing the construct in a specific cancer population by considering exact symptomatology and adverse events. The FACT was used in a total of six studies (Chambers, Meng, et al., 2012; de Moor et al., 2006; Mazanec et al., 2010; Milbury et al., 2011; Price et al., 2013; Steginga et al., 2009): the cancer specific modules for colorectal, ovarian, and the core ones were used. The FACT-G, the core section of the FACT, was used by Mazanec and colleagues (2010) and Milbury and colleagues (2011). Price and colleagues (2013) decided to use the FACT-O (specific for ovarian cancer), de Moor and colleagues (2006) used the FACT-O but only with the subscale of social well-being and functional well-being. The FACT-C (specific for colorectal cancer) was used by Chambers, Meng, et al. (2012) and Steginga and colleagues (2009). The EORTC QLQ-C30 was used in three studies (J. Liu et al., 2018; Thieme et al., 2017; Yoon et al., 2015). In this case the module used is only the core one. Thornton and colleagues (2012) measured QoL by using the Prostate Cancer-Related Quality of Life Scale, a self-report measure being developed to assess QoL in men with prostate cancer. Finally, Mannix and colleagues (2009) focused only on a pediatric sample of children with cancer and measured QoL with the Pediatric Quality of Life Inventory (Varni et al., 1999), Generic Core Scale and Cancer Module Acute Version: age-specific questionnaires to assess QoL in pediatric and oncological samples. Similarly, to the EORTC QLQ-C30 and the FACT scales, the questionnaire used by Mannix and colleagues is composed by a core scale plus an extra and cancer-specific module.

On the contrary, in the remaining study, QoL was measured through self-report measures not specifically developed to evaluate QoL in cancer patients. In five studies, QoL has been evaluated with a questionnaire for evaluating health status in the general population, namely the SF-36 in two studies (Dunn et al., 2011; Gustavsson-Lilius et al., 2007), and the SF-8 in one study (Zenger et al., 2011). Moreover, Applebaum and colleagues (2014) used another questionnaire, the McGill Quality of Life Questionnaire (MQOL; R. Cohen et al., 1995), which is not cancer specific

Table 2. Risk of bias

Risk of bias	Applebaum (2014)	Chambers, Meng, et al. (2012)	De Moor (2006)	Dunn (2011)	Gustavsson-Lilius (2007)	Liu (2018)	Mannix (2009)	Mazanec (2010)	Milbury (2011)	Price (2013)	Steginga (2009)	Thieme (2017)	Thornton (2012)	Yoon (2015)	Zenger (2011)
1. Was the research question or objective in this paper clearly stated?	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
2. Was the study population clearly specified and defined?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3. Was the participation rate of eligible persons at least 50%?	Y	N	NR	Y	N	Y	Y	Y	Y	N	Y	Y	N	Y	N
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5. Was a sample size justification, power description, or variance and effect estimates provided?	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	N	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	N	Y
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	N	Y	Y	N	Y	N	N	N	Y	Y	Y	Y	Y	N	Y
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table 2. (Continued)

	Applebaum (2014)	Chambers, Meng, et al. (2012)	De Moor (2006)	Dunn (2011)	Gustavsson-Lilius (2007)	Liu (2018)	Mannix (2009)	Mazanec (2010)	Milbury (2011)	Price (2013)	Steginga (2009)	Thieme (2017)	Thornton (2012)	Yoon (2015)	Zenger (2011)
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10. Was the exposure(s) assessed more than once over time?	N	N	N	N	N	N	N	N	N	Y	N	Y	N	N	Y
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12. Were the outcome assessors blinded to the exposure status of participants?	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13. Was loss to follow-up after baseline 20% or less?	NA	N	NR	NA	N	NA	NA	NA	N	N	N	Y	N	NA	N
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N

Note. Yes = Y; No = N; CD = cannot determine; NA = not applicable; NR = not reported.

Table 3. Study's characteristics

Authors (year)	Aim	Cancer	Sample n	Mean age	Gender (%)	Other variables
Applebaum (2014)	To evaluate optimism as a moderator of social support, anxiety, depression, hopelessness and QoL	General cancer non-Hodgkin	168	58.4	F: 75 M: 25	– Anxiety and depression (HADS) – Pessimism and hopelessness (BHS) – Pessimism and hopelessness (BHS) – Social support (DUFSS)
Chambers, Meng, et al., 2012	To evaluate long-term QoL and psychological distress after colorectal cancer	Colorectal cancer	763	60–69	F: 45.7 M: 54.3	– Cancer treat appraisal (Constructed Meaning Scale) – Perceived social support (Brief Social Support Questionnaire) – Distress (Brief Symptoms Inventory)
De Moor (2006)	– To evaluate if optimism is a protective factor against distress and HRQoL – To evaluate if optimism predict a decrease in CA125	Gynaecological cancer	90	NA	F	– Perceived stress (Perceived Stress Scale) – Anxiety (State Anxiety Subscale) – Depression (Centre of Epidemiologic Studies Depression Scale) – Situational Optimism (Treatment-Specific Optimism Scale)
Dunn (2011)	To evaluate role of optimism, intrusion, avoidance, social support, and social constraints as predictors of benefit finding	General cancer	439	59.27	F: 59 M: 41	– Anxiety and depression (HADS) – Benefit findings – Intrusion and avoidance (Impact of Event Scale) – Social Support (ENRICHD Social Support Instrument) – Social constraint
Gustavsson-Lilius (2007)	To evaluate the effect of partner support, DO, and hopelessness of QoL in a sample of oncological patients	General cancer	155 couples	58	F: 56.8 M: 43.2	– Hopelessness (Hopelessness Scale) – Partner Support (12-Item Family Support)
Liu (2018)	To evaluate QoL and the effect of hope, resilience and optimism on QoL	Kidney cancer	284	55	F: 37.32	– Hope (adult hope scale)

(Continued on next page)

Table 3. (Continued)

Authors (year)	Aim	Cancer	n	Mean age	Gender (%)	Other variables
Mannix (2009)	To evaluate the relationship between DO and QoL	Pediatric	23	16.1	M: 62.68	– Resilience (The Resilience Scale – 14)
Mazanec (2010)	To evaluate the relationship between DO and QoL	General cancer	146	58.24	F: 17 M: 83	–
Milbury (2011)	To evaluate the relationship of psychosocial variables and QoL over the course of a clinical trial	Kidney cancer	114	58.7	F: 54 M: 46 F: 21 M: 79	– Spirituality (FACIT-Sp-12 Version) – Anxiety and depression (POMS) – Functional and physical activity level (ECOG) – Treatment optimism (Treatment Specific Optimism Scale) – Social support (Duke Social Support Index) – Prognostic Risk (ad hoc)
Price (2013)	To evaluate physical symptoms, coping style, and QoL. To analyze the relationship between QoL and coping	Gynaecological cancer	217	63	F	– Helplessness/hopelessness and minimisation (Mental Adjustment to Cancer)
Steginga (2009)	To evaluate the influence of medical, sociodemographic, psychological, and lifestyle variables on physical and psychosocial variable	Colorectal cancer	1,822	65	F: 40 M: 60	– Social support (Brief Social Support Questionnaire) – Cancer threat appraisal (Constructed Meaning Scale)
Thieme (2017)	To evaluate psychological resources in cancer and to evaluate their predictivity on depression, anxiety and QoL	– Breast cancer – Gynaecological cancer	354	61.2	F	– Self-efficacy (General Self-Efficacy Scale) – Anxiety and depression (HADS)
Thornton (2012)	To evaluate the relationship between DO, prostate cancer specific expectation and QoL	Prostate cancer	83	61.83	M	– Prostate Cancer Specific Expectations (ad hoc)
Yoon (2015)	To evaluate QoL of older cancer patients and to evaluate the factors associated with it	General cancer	339	71.8	F: 36 M: 64	– Performance status (Eastern Cooperative Oncology Group classification) – Cancer related health worries – Social support (The Multidimensional Scale of Perceived Social Support)
Zenger (2011)	To evaluate the predictivities of optimism/pessimism on anxiety, depression, and QoL	– Breast cancer – Gynaecological cancer	97	54	F	– Anxiety and depression (HADS)

Note. DO = Dispositional Optimism; QoL = Quality of Life; BHS = Beck Hopelessness Scale; DUFSS = Duke-UNC Functional Social Support Questionnaire; HADS = Hospital Anxiety and Depression Scale; FACIT-Sp-12 Version =The Functional Assessment of Chronic Illness Therapy – Spiritual Well-Being Scale; POMS = Profile of Mood States; ECOG = Eastern Cooperative Oncology Group.

Table 4. Study's Optimism and Quality of Life (QoL) evaluations

| Authors (year) | Optimism (LOT-R) | | | QoL | | Results |
	Uni dimensional	Bi dimensional	Predictivity	Questionnaire	Specific for	QoL – Optimism
Applebaum (2014)	✓		✓	McGill quality of life questionnaire (MQOL)	Terminally ill patients	– Optimism was associated with quality of life. The correlation was strong (r = .64) – Optimism was predictive of QoL. The regression was strong (β = .53)
Chambers, Meng, et al. (2012)	✓		✓	– Functional Assessment Cancer Therapy – Colorectal (FACT-C) – Satisfaction with Life Scale (conceptualized as global QoL)	– Colorectal – General	– Optimism was predictive of QoL (physical well-being, emotional well-being, functional well-being, colorectal cancer (CRC) specific well-being, and global QoL). The regression was weak with physical well-being (β = .08), emotional well-being (β = .07), functional well-being (β = .14), colorectal cancer specific well-being (β = .13), FACT-C (β = .48), and global well-being (β = .18)
De Moor (2006)	✓		✓	Functional Assessment Cancer Therapy – Ovarian (subscale of social well-being, functional well-being) (FACT-O)	Ovarian cancer	– Dispositional optimism was associated with QoL (social, functional, and physical well-being) at baseline. The correlation was moderate with physical well-being (r = .30), social well-being (r = .38), and functional well-being (r = .34) – Optimism was associated QoL (social and functional well-being) at follow-up. The correlation was weak with social well-being (r = .28) and functional well-being (r = .27) – Optimism was predictive of QoL (functional, social, and physical) at baseline social well-being (B = .25), physical well-being (B = .40), and functional well-being (B = .47)
Dunn (2011)	✓		✓	36-Item Short Form Survey (SF-36)	Health	– Optimism was associated with QoL. The correlation was moderate with mental QoL (r = .39) and weak with physical QoL (r = .10)
Gustavsson-Lilius (2007)	✓		✓	36-Item Short Form Survey (SF-36)	Health	– Female patients' optimism was associated with QoL. The correlation was moderate with mental QoL (r = .37) and physical QoL (r = .32) – Optimism was predictive of QoL. The regression was moderate in female patients with mental QoL component (β = .37) and physical component (β = .30)
Liu (2018)	✓		✓	The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire – Core 30 (EORTC QLQ-C30)	Cancer	– Optimism was associated with QoL (functioning scale, symptom scale and global scale). The correlation was moderate with functioning scale (r = .46) and symptom scale (r = –.47) and weak with the global score (r = .15). – Optimism was predictive of QoL. The regression was moderate with functioning scale (β = .26) and symptom scale (β = –.27)

(Continued on next page)

Table 4. (Continued)

Authors (year)	Optimism (LOT-R) Uni dimensional	Optimism (LOT-R) Bi dimensional	Optimism (LOT-R) Predictivity	QoL Questionnaire	QoL Specific for	Results QoL – Optimism
Mannix (2009)	✓			– Pediatric Quality of Life Inventory, Cancer Module, Acute Version (PedsQL) – Pediatric Quality of Life Inventory, Generic Core Scale	Pediatric	– Optimism was associated with QoL (pain and hurt, cognitive problem, and communication). The correlation was moderate ($r = .47$)
Mazanec (2010)	✓		✓	Functional Assessment of Cancer Therapy – General (FACT-G Version 4)	Cancer	– Optimism was associated with QoL (social well-being, emotional well-being, and functional well-being). The correlation was moderate with the total score ($r = .30$), social well-being ($r = .32$), and emotional well-being subscale ($r = .39$). The correlation was weak with the functional well-being subscale ($r = .19$). – Optimism was not predictive of QoL
Milbury (2011)	✓		✓	Functional Assessment of Cancer Therapy – General (FACT-G)	Cancer	– Optimism was associated with QoL. The correlation was weak ($r = .24$) – Optimism was predictive of QoL ($B = .77$)
Price (2013)	✓		✓	Functional Assessment of Cancer Therapy – Ovarian (FACT-O version 4)	Ovarian cancer	– Optimism was predictive of QoL ($B = .60$)
Steginga (2009)	✓		✓	Functional Assessment of Cancer Therapy – Colorectal (FACT-C)	Colorectal cancer	– Optimism was associated with QoL (physical well-being, social well-being, emotional well-being, functional well-being, colorectal cancer-specific additional concerns, and global). The correlation was moderate with the total score ($r = .33$) and the functional well-being subscale ($r = .32$). The correlation was weak with physical well-being ($r = .13$), social well-being ($r = .28$), emotional well-being ($r = .28$), and colorectal well-being ($r = .23$) – Optimism was predictive of QoL (social well-being, emotional well-being, functional well-being, and colorectal cancer specific). The regression was weak with social well-being ($\beta = .08$), emotional well-being ($\beta = .10$), functional well-being ($\beta = .10$), colorectal cancer specific additional concerns ($\beta = .05$), FACT-C ($\beta = .09$)
Thieme (2017)	✓	✓		The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire – Core 30 (EORTC QLQ-C30)	Cancer	– Optimism was associated with QoL. The correlation was weak with total score ($r = .16$), and optimism ($r = .15$)
Thornton (2012)	✓		✓	Prostate Cancer-Related Quality of Life Scales	Prostate cancer	– Optimism was predictive of QoL (health worry, cancer control score, sexual intimacy, and sexual confidence). The regression was moderate with sexual intimacy ($\beta = .31$), sexual confidence ($\beta = .23$), health worry ($\beta = -.39$), and cancer control ($\beta = .31$)

(Continued on next page)

Table 4. (Continued)

| Authors (year) | Optimism (LOT-R) | | | QoL | | Results |
	Uni dimensional	Bi dimensional	Predictivity	Questionnaire	Specific for	QoL – Optimism
Yoon (2015)	✓		✓	The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire – Core 30 (EORTC QLQ-C30)	Cancer	– Optimism was associated with QoL (physical function, role function, emotional function, and social functions). The correlation was moderate with emotional function (r = .31) and global function (r = .36). The correlation was weak with physical function (r = .26), role function (r = .27), and social function (r = .28) – Optimism was predictive of QoL (physical function, role function, emotional function, and social functions). The regression was weak and medium with physical function (β = .19), role function (β = .18), emotional function (β = .20), social function (β = .16), and global function (β = .22)
Zenger (2011)	✓		✓	8-Item Short Form Survey (SF-8)	Health	– Optimism was associated with QoL. The correlation was moderate and weak with total score and mental QoL (r = .35) and pessimism (mental QoL r = −.40; physical QoL r = −.27)

but focuses on life threatening illnesses in general. Chambers, Meng, et al. (2012) evaluated quality of life with two questionnaires: one is the FACT-C and the other the Satisfaction with Life Scale (Pavot & Diener, 2009). The latter is a validated questionnaire that measures the general life satisfaction that Chambers, Meng, et al. (2012) used as a proxy of quality of life.

The Relationship Between Optimism and Quality of Life

Since the main inclusion criterion is the evaluation of the relationship between DO and QoL, all the studies analyzed the possible links between these two variables. Specifically, almost all the studies (12 out of 15; Applebaum et al., 2014; de Moor et al., 2006; Dunn et al., 2011; Gustavsson-Lilius et al., 2007; J. Liu et al., 2018; Mannix et al., 2009; Mazanec et al., 2010; Milbury et al., 2011; Steginga et al., 2009; Thieme et al., 2017; Yoon et al., 2015; Zenger et al., 2011) analyzed the correlation between DO and QoL. Most of the studies demonstrated an existing association between the two variables; there are exceptions: for example, in the study by Gustavsson-Lilius and colleagues (2007) female patients' optimism was positively associated with QoL, but the authors also analyzed the possible correlation between DO and QoL in male patients and the same results was not reached.

In other studies, it was suggested that DO may have a predictive power over measurements of QoL. Specifically, 11 (Applebaum et al., 2014; Chambers, Baade, et al., 2012; de Moor et al., 2006; Gustavsson-Lilius et al., 2007; J. Liu et al., 2018; Mazanec et al., 2010; Milbury et al., 2011; Price et al., 2013; Steginga et al., 2009; Thornton et al., 2012; Yoon et al., 2015) out of 15 studies assessed the influence of DO on concurrent measure of QoL by performing regression analysis. The regression standardized coefficients are evaluated with Acock (2018) guidelines. Regressions were considered weak (β > .20), moderate ($|.20| < \beta < |.5|$), or strong (β < .5). These studies demonstrated that DO could be considered as a factor influencing the QoL of cancer patients.

Regression analysis indicating an association between DO and QoL was found by Applebaum and colleagues (2014) where optimism was a strong predictor of QoL (β = .53), Chambers, Meng, et al. (2012) found that optimism was a weak predictor of QoL also (physical well-being β = .08; emotional well-being β = .07; functional well-being β = .14; colorectal cancer specific well-being β = .13; FACT-C β = .48; global well-being β = .18). De Moor and colleagues (2006) found that DO was a predictor of QoL (social well-being B = .25; physical well-being B = .40; functional well-being B = .47) but the same results were not found at follow-up.

Gustavsson-Lilius and colleagues (2007) found that DO was a moderate predictor of QoL in female patients (HRQoL mental component β = .37; HRQoL physical component β = .30) as well as J. Liu and colleagues (2018) (functioning scale β = .26; symptom scale β = −.27).

Milbury and colleagues (2011) found similar results: DO was a predictor of QoL (B = .77), Price and colleagues (2013) also found that DO was a significant predictor of QoL (B = .6), Steginga and colleagues (2009) found optimism to be a weak significant predictor of QoL (social well-being β = .08; emotional well-being β = .10; functional well-being β = .10; colorectal cancer-specific additional concerns β = .05; FACT-C β = .09), Thornton and colleagues (2012) found similar results but a moderate association: (sexual intimacy β = .31; sexual confidence β = .23; health worry β = −.39 cancer control β = .31), just as well as Yoon and colleagues (2015) that found weak and medium association (physical function β = .19; role function β = .18; emotional function β = .20; social function β = .16; global β = .22).

The predictability of DO on QoL was confirmed in almost all the studies except Mazanec and colleagues (2010).

Some studies have also a follow-up evaluation of the QoL in order to investigate the differences in the construct in a period of time.

This type of measures could be extremely useful in order to have a better idea of the situation but in some studies (e.g., Thieme et al., 2017; Zenger et al., 2011) correlation between the DO and QoL at different times were used in order to evaluate the predictive power that DO could have on QoL.

Evaluation of the Correlation Between Dispositional Optimism and Quality of Life

Coherently with its theoretical definition, in the vast majority of the selected studies, DO has been considered and measured as a unidimensional construct. These studies generally reported a positive correlation between DO and QoL. Following guidelines by Cohen (1988), we interpreted these correlations as measures of effect size. Correlations were considered weak ($|.10| < r < |.29|$), moderate ($|.30| < r < |.49|$), or strong ($|.50| < r < |1|$). The only correlation that can be considered as strong is the one found by Applebaum and colleagues (2014) ($r = .64$). The majority of other correlations were considered moderate. De Moor and colleagues (2006) found a moderate correlation between DO and the three used subscale of the FACT-O: physical well-being ($r = .30$), social well-being ($r = .38$), and functional well-being ($r = .34$) at baseline but a weak correlation with the same subscale and DO at follow-up (social well-being $r = .28$ and functional well-being $r = .27$). The same core form of this questionnaire was used by Mazanec and colleagues (2010) but they reported different results: a moderate correlation between DO and the total score of the questionnaire ($r = .30$), with social well-being ($r = .32$) and with emotional well-being ($r = .39$). The correlation between DO and the functional well-being subscale was weak ($r = .19$). Steginga and colleagues (2009) found a moderate correlation between DO and the total score ($r = .33$) and the functional well-being subscale ($r = .32$). For the other subscales, they found only weak correlations (physical well-being $r = .13$, social well-being $r = .28$, emotional well-being $r = .28$, and colorectal well-being $r = .23$). Dunn and colleagues (2011) instead use the SF-36 questionnaire and found a moderate correlation of DO with Mental QoL ($r = .39$) and a weak one with physical QoL ($r = .10$). Gustavsson-Lilius and colleagues (2007) instead found a moderate correlation with Mental QoL ($r = .37$) and with physical QoL ($r = .32$) in female's patients but not in men. Yoon and colleagues (2015) correlation were instead calculated between DO and EORTC – QLQ C30. They found a moderate correlation with emotional function ($r = .31$) and with global function ($r = .36$). The other correlations between DO and the subscales which compose QoL were weak (physical function $r = .26$, role function $r = .27$, social function $r = .28$). J. Liu and colleagues (2018) used the EORTC QLQ-C30 and they found a moderate correlation with functioning scale ($r = .46$) and symptom scale ($r = −.47$) and a weak one with the global score ($r = .15$). Mannix and colleagues (2009) found a moderate correlation between DO and QoL ($r = .47$) whereas Milbury and colleagues (2011) found a weak one ($r = .24$).

On the contrary, Thieme and colleagues (2017) and Zenger and colleagues (2011) considered optimism primarily as a bidimensional construct, but both reported also the LOT-R total score. Regarding the results of these studies, no differences, possibly related to the bidimensionality of the scales, were found: they both found a correlation between DO and quality of life. Thieme and colleagues (2017) found only weak correlations between all the variables (total score $r = .16$ and optimism $r = .15$). Zenger and colleagues (2011) found a moderate and weak correlation between the total score and mental QoL ($r = .35$) and pessimism (mental QoL $r = −.40$; physical QoL $r = −.27$).

Other Variables

In almost all the studies, other variables have been evaluated alongside QoL and DO. The only exception being the study by Mannix and colleagues (2009). Among other evaluated constructs, one of the most considered individual differences is hopelessness, defined as "negative expectancies regarding one's prospects of symptom relief" (Boffa et al., 2018, p. 299). Hopelessness is evaluated in three studies (Applebaum et al., 2014; Gustavsson-Lilius et al., 2007; Price et al., 2013). J. Liu and colleagues (2018) instead

measure hope, defining it as "a cognitive set that is based on a reciprocally derived sense of successful (a) agency (goal-directed determination) and (b) pathways (planning of ways to meet goals)" (Snyder et al., 1991, p. 571). Nearly all the studies that measure hope/hopelessness do not use a questionnaire specific for a cancer population. Applebaum and colleagues (2014) and Gustavsson-Lilius and colleagues (2007) use a questionnaire that defines the construct as negative expectations for the future. Only Price and colleagues (2013) measure the construct with a questionnaire that is specific to cancer and measures mental adjustment to this specific disease in a general cancer population.

The other variables measured were anxiety, depression, social support, distress, cancer threat appraisal, situational optimism, perceived stress, intrusion, avoidance, social constraint, resilience, spirituality, treatment optimism, minimization, self-efficacy, prostate cancer specific expectation, performance status, and cancer related health worries.

The majority of the studies analyzed the variables with both correlation and regression analysis.

Applebaum and colleagues (2014) found some significant correlation between optimism and anxiety, depression, hopelessness, and social support (respectively $r = -.61$; $r = -.62$; $r = -.70$; $r = .34$). QoL was positively correlated with social support ($r = .43$). They analyzed their data also with regression: social support was a predictor of QoL ($\beta = .20$). DO was a predictor of anxiety, depression, and hopelessness (respectively $\beta = -.50$; $\beta = -.61$; $\beta = -.65$).

Chambers, Meng, et al. (2012) instead were only interested in regression analysis. They found a significant association and the results suggest that cancer threat appraisal was predictive of QoL (physical well-being $\beta = .09$; social well-being $\beta = .13$; functional well-being $\beta = .15$; colorectal cancer (CRC) specific well-being $\beta = .14$; FACT-C $\beta = .48$) instead social support was significantly associated only with the QoL subscale of social well-being ($\beta = .70$).

De Moor and colleagues (2006) distinguish between baseline analysis (BL) and follow-up analysis (FU), they performed correlation and then they added DO to a regression model containing the prognostic, clinical, and sociodemographic covariates. The found situational optimism to be positive and significantly correlated to QoL (BL social well-being $r = .43$, BL physical well-being $r = .37$; BL functional well-being $r = .28$) and to optimism ($r = .44$). BL and FU anxiety were both negatively and significantly correlated to QoL (BL anxiety: BL social well-being $r = -.48$; FU social well-being $r = -.22$; BL physical well-being $r = -.66$; FU physical well-being $r = -.49$; BL functional well-being $r = -.69$; FU functional well-being $r = -.55$ and FU anxiety: BL social well-being $r = -.39$; FU social well-being $r = -.37.$; BL physical well-being $r = -.45.$; FU physical well-being $r = -.44.$; BL functional well-being $r = -.52$; FU functional well-being $r = -.53$) and DO (BL anxiety:

$r = -.34$; FU anxiety $r = -.38$). BL anxiety was a predictor of DO ($B = -1.09$).

Similar results were found also for BL and FU perceived stress and QoL (BL perceived stress; BL social wellbeing $r = -.56$; FU social wellbeing $r = -.30$; BL physical wellbeing $r = -.59$; FU physical wellbeing $r = -.43$; BL functional wellbeing $r = -.69$; FU functional well-being $r = -.51$ and FU perceived stress BL social well-being $r = -.52$; FU social well-being $r = -.40$; BL physical well-being $r = -.57$; FU physical well-being $r = -.61$; BL functional well-being $r = -.58$; FU functional well-being $r = -.63$) and optimism ($r = -.49$). The only significant regression was between DO and BL perceived stress ($B = -.84$), perceived stress was a significant predictor of DO. Other similar results were with BL and FU depression. The correlation was significant and negative between BL and FU depression and QoL (BL depression: BL social well-being $r = -.55$; FU social well-being $r = -.31$; BL physical well-being $r = -.72$; FU physical well-being $r = -.50$; BL functional well-being $r = -.77$; FU functional well-being $r = -.55$ and FU depression: BL social well-being $r = -.48$; FU social well-being $r = -.40$; BL physical well-being $r = -.58$; FU physical well-being $r = -.64$; BL functional well-being $r = -.56$; FU functional well-being $r = -.64$) and optimism as well ($r = -.43$). BL depression was a negative and significant predictor of DO ($B = -.77$).

Dunn and colleagues (2011) instead focused only on correlation. QoL was negative and significantly correlated with intrusion (physical $r = -.21$; mental $r = -.58$), avoidance (physical $r = -.19$; mental $r = -.53$), anxiety (physical $r = -.32$; mental $r = -.68$), depression (physical $r = -.49$; mental $r = -.69$), social support (physical $r = -.49$; mental $r = -.69$), and social constraint (physical $r = -.18$; mental $r = -.43$). The correlation between DO and the variables were: intrusion ($r = -.34$), avoidance ($r = -.27$), anxiety ($r = -.47$), depression ($r = -.44$), social support ($r = .31$), and social constraint ($r = -.28$).

Gustavsson-Lilius and colleagues (2007) presented the results of both correlation and regression. The negative significant correlations were between QoL and patient hopelessness in female patients (physical: $r = -.35$; mental $r = -.24$) and between patient hopelessness and DO in female and male patients (respectively: $r = -.65$; $r = .54$). The significant regression found that patient hopelessness was a predictor of QoL (physical $\beta = .27$) in females and males (physical $\beta = .41$ and mental $\beta = .44$).

J. Liu and colleagues (2018) decided to analyze the data with correlation and regression. The significant correlation was between QoL and hope and resilience (respectively: global $r = 25$; functioning $r = .41$; symptoms $r = -.41$ and global $r = .26$; functioning scale $r = .44$; symptoms $r = -.43$). Hope and resilience were both associated also with DO (respectively: $r = .47$; $r = .45$). The regression analysis was performed and found hope and resilience to be

predictive of QoL (respectively: global β = .18; functioning scale β = .21; symptoms β = −.16 and global β = .17; functioning scale β = .16; symptoms β = −.17).

Mazanec and colleagues (2010) found significant correlation between DO and spirituality (r = .45), depression (r = −.35), and anxiety (r = −.38). The regressions found that QoL was predicted by spirituality (social well-being β = .40; emotional well-being β = .29; functional well-being β = .34), depression (social well-being β = −.33; emotional well-being β = −.40), anxiety (physical well-being β = −.21; social well-being β = .22; emotional well-being β = −.26), and functional and physical activity levels (physical well-being β = −.53; social well-being β = −.14; functional well-being β = −.53).

Milbury and colleagues (2011) also found a significant correlation between baseline QoL and treatment optimism (r = .45) and social support (r = .48). Treatment optimism was also a predictor of QoL (B = 1.28).

Price and colleagues (2013) focused on regression analysis. They found helpless/hopelessness to be a predictor of QoL (B = −.8) also minimization (B = .11) were a predictor of QoL.

Steginga and colleagues (2009) found some significant correlation between QoL and social support (physical well-being r = .09; social well-being r = .36; emotional well-being r = .17; functional well-being r = .20; colorectal cancer specific additional concerns r = .17; FACT-C r = .26) and cancer threat appraisal (physical well-being r = .21; social well-being r = .29; emotional well-being r = .32; functional well-being r = .39; colorectal cancer specific additional concerns r = .32; FACT-C r = .40). They also analyzed the data with regression. Social support was a predictor of QoL (social well-being r = .18; functional well-being r = .05; FACT-C r = .08) as well as cancer threat appraisal (physical well-being r = .07; social well-being r = .12; emotional well-being r = .07; functional well-being r = .12; colorectal cancer specific additional concerns r = .12; FACT-C r = .11).

Thieme and colleagues (2017) instead performed a correlation. Self-efficacy was positively correlated with QoL (r = .17) and DO was negatively correlated with anxiety (r = −.28) and depression (r = −.36).

Thornton and colleagues (2012) found prostate cancer specific expectation to be a predictor of QoL (health worry β = −.29; cancer control β = .23; informed decision β = .23).

Yoon and colleagues (2015) found QoL to be significantly correlated with performance status (physical function r = −.40; role function r = −.37; emotional function r = −.25; social function r = −.23; global r = −.35), cancer related health worry (physical function r = −.18; role function r = −.14; emotional function r = −.25; social function r = −.22; global r = −.23), support from family (emotional function r = −.29; social function r = −.23; global r = −.24),

support from friends (emotional function r = .13; social function r = .22; global r = .15), and support from medical staff (physical function r = .19; role function r = .15; emotional function r = .14; global r = .23). DO was correlated with the same variables (respectively; r = −.12; r = −.16; r = 24; r = .24; r = .20). QoL was predicted by performance status (physical function β = −.28; role function β = −.31; emotional function β = −.15; social function β = −.13; global β = −.28) and support from family (social function β = .12).

Lastly, Zenger and colleagues (2011) found DO to be negatively and significant associated with anxiety (r = −.44) and depression (r = −.36).

Discussion

This systematic review focuses on the studies that evaluated both DO and QoL in a sample of cancer patients. The studies included in this systematic review had to evaluate the relationship between the two variables. This attention toward DO as a potential factor to modulate QoL is especially important because cancer is reported to decrease QoL of patients (Thieme et al., 2017). For this reason, it is important to focus on the psychological aspects that can improve patients' condition not only physiologically, but also their mental health and QoL (Thieme et al., 2017).

Here, we have demonstrated an association between DO and QoL in cancer patients and suggested that this personality trait may play a relevant role in the responses and adjustment to illness of people dealing with a cancer diagnosis. This could also entail new considerations in cancer care; having a clear view of all the aspects that can have an impact on patient's QoL is a mean to enhance patients' empowerment (Moattari et al., 2012) that is beneficial for patients in many ways: quality of care, patient's perceived control over their treatments, and on the relationship with the medical staff (Bailo et al., 2019). Empowering the patient can also have an impact on the shared decision making process (Renzi et al., 2016). An empowered patient is more involved in the care process and feel more in control of their health due to the shared decision making process (Arnaboldi et al., 2020). The shared decision making paradigm can be implemented by health care professionals that should consider the patient preferences and find together a consensus with the decisions that are being made (Marton et al., 2020; Monzani et al., 2020). These implementations could be considered also as suggestions to implement the health care professionals' experiences: shared decision making benefit also health care professionals' well-being and it can prevent burnout (Dobler et al., 2017). Considering its many benefits, the foundation of the shared decision making paradigm should be taught in

health care training and courses with the aim of implementing health care as a whole.

This review highlights also a series of issues.

One of the issues is related to the study sample. The authors chose patients affected by different types of cancer and this means that the sample cannot be considered as representative of a general cancer population. Only 5 out of 15 declared that they had a general cancer sample, all the other studies involved a specific population of cancer patients. Although the gender of the patients is well distributed in the total sample (overall the 50.2% are female patients) the same could not be said for the sample size which varied from a maximum of 1,822 to a minimum of 23 patients, and this high variability of the sample size makes it difficult to compare the results of the studies.

This review highlights also a series of questions about the methods used to have a quantitative measure of QoL.

QoL, in fact, is a complex concept that should be defined and evaluated with strict criteria and in a more homogeneous way (Felce & Perry, 1995). Chambers, Meng, et al. (2012), for example, evaluated QoL with a questionnaire that is demonstrated to analyze QoL (FACT-C), but added another questionnaire, the Satisfaction with Life Scale, that as the name would suggest, is made to analyze satisfaction with life; nevertheless, he and colleagues decided to conceptualize it as a measure of QoL.

One of the selection criteria of these studies is that they have to measure QoL with a validated questionnaire. Even with this inclusion criterion, we found different ways to evaluate QoL and that entails different ways of defining it. Many authors decided to consider only a subscale of the QoL questionnaire that they picked: even if it was less time consuming for the patients, a more specific result would be have been gained if the questionnaire had been completed in full.

Another difference that this review highlights is the lack of a shared questionnaire to evaluate the concept. Only five authors, decide to evaluate the concept with questionnaires specific for the exact type of cancer.

With all these limits and differences, including the methodologies and clinical sample variation we anticipated heterogeneity in the results. Also the design and aim of the studies had some limitations. The majority of the studies aimed to evaluate the impact of DO on QoL but only in two studies (Mannix et al., 2009; Mazanec et al., 2010) it was the primary aim: in all the other studies the impact of DO on QoL was a secondary aim of wider interest. In these two studies, even if the link between the variables of interest is the main aim, only one of them considered the predictability of DO on QoL. The predictability of DO on QoL, is an analysis that gives important information: it reveals if DO could be considered as a protective factor for a low QoL. Many studies considered, in fact, use a correlation for the evaluation of the relationship between patient's DO and QoL and the results were mostly in agreement with the fact that the two variables were correlated. The majority of the studies also consider the predictability that DO has of QoL and that could mean an increasing attention on DO as a protective factor in the deteriorating of QoL driven by cancer. These results are extremely interesting as DO has been proven to have a beneficial impact on physical health (Kim et al., 2011) and also on people's life in general: both optimists and the pessimists can face tragedies and difficult situations, but the optimists deal with them in a better way. If the optimist deals with the failure starting again, the pessimist instead surrenders and could fall into depression; even when things go well, the pessimist is followed by catastrophic thoughts and predictions. Pessimists also have a worst physical health compared to optimists (M. Seligman, 1990). Future studies may further explore the link between optimism and physical health with the main aim being to improve cancer patients' condition. In fact, the link between DO and QoL may have different explanations. Specifically, personality traits, such as optimism, may directly influence the illness itself or alternatively, illnesses and disease may affect ones personality (S. Cohen & Rodriquez, 1995). In particular, some studies defined a connection between optimism, depression, and physical health. The relationship between the variables is that present and future physical health problems can be worsened by mental states such as depression and pessimism (Buchanan & Seligman, 1995; Peterson et al., 2017; Vollrath, 2006). These results demonstrating a direct connection between the variables, establish the possibility to improve physical health by improving optimism or reducing depression (Vollrath, 2006).

Thanks to Seligman and other scholars, we know that optimism could be taught (Peters et al., 2010; M. Seligman, 1990). Even pessimists could learn to live in a more optimistic way, and this means that their quality of life and physical health can be improved as a consequence (Seligman, 1990). This has a big impact for clinical implications; cancer patients have specific needs (Vergani et al., 2019) due to both toxic treatments and the impact of the diagnosis. If DO could be taught it could improve the patient's condition and that of the carers.

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ORCID

Giulia Marton
https://orcid.org/0000-0002-6360-7569

Giulia Marton
Department of Oncology and Hemato-Oncology
Via Festa del Perdono 7
20122 Milan
Italy
giulia.marton@ieo.it

Giulia Marton is a psychologist and a PhD candidate of the University of Milan, Department of Oncology and Hemato-Oncology. She works also for the European Institute of Oncology (IEO) IRCCS Applied Research Division for Cognitive and Psychological Science. Her interests are dispositional optimism and its effects on the quality of life of cancer patients. She is also interested in the decision-making processes of the cancer patients and the impact that a personality trait, such as optimism, could have on those.

Dario Monzani (PhD) is a Research Fellow at the Department of Oncology and Hemato-Oncology, University of Milan and at the Applied Research Division for Cognitive and Psychological Science at the IEO European Institute of Oncology IRCCS, Milan. His main research activity focuses on studying the influence of personality traits, cognition and social-cognitive factors on medical decision-making, information processing, and patient-physician communication to develop effective and useful decisional supporting tools.

Silvia F. M. Pizzoli is a psychotherapist and a PhD candidate in Medical Humanities in the European School of Molecular Medicine (SEMM), University of Milan. Her studies focus on personalized approaches for the development of digital interventions to reach relaxation. She published works on tailored approaches for relaxation for lay people and breast cancer patients.

Laura Vergani is a psychologist and a PhD candidate in Medical Humanities in the European School of Molecular Medicine (SEMM), University of Milan. Her studies focus on analyzing the psycho-linguistic characteristics in patient-doctor communication in the oncological field, both in the face-to-face context and in the mediate one.

Gabriella Pravettoni is the Director of the Department of Oncology and Hemato-Oncology at the University of Milan and Director of the Psychoncology Division at the European Institute of Oncology (IEO). She is Full Professor of General Psychology at the University of Milan, and the Coordinator of Doctorate FOLSATEC at the European School of Molecular Medicine. Her research activities especially focus on cognitive processes, decision-making and error prevention, with particular attention to the medical field, medical humanities, health, and centrality of patient.