



DOES OPTIMISM IMPROVE CANCER SURVIVAL- A META ANALYSIS

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Abstract

Objective: To provide a quantitative summary of role of optimism on cancer survival, and to present the year wise reporting aspects of the previous studies.

Method: Electronic searches and manual searches of reference lists were done from review articles and retrieved papers. A coding manual was prepared which include the following variables: publication year, authors name, title of the studies, statistical analysis used, result and whether the study accepted/ rejected the role of optimism in cancer survival.

Results: twenty five articles from published journal between 1966 and 2016(20 years) were included in the present meta-analysis. Of these, only 11 studies are aimed to find out the direct relation between optimism and cancer survival and 6 of them proved significant relation except five that oppose the direct relation between optimism and cancer survival. 14 studies are aimed to find out the relation between cancer survival and the related concepts of optimism like pessimism, minimization/ denial, physical as well as mental health, emotional wellbeing coping style and benefit finding and found positive relation between the variable that may indirectly influence the survival. Three studies identified the psychosocial factors that influence cancer survival and didn't point out optimism as a psychosocial factors. Very few studies were found (only 10 in number) before 2006 and 5 of them didn't prove optimism as a factor in cancer survival. The recent findings from the remaining 15 studies proved significant relation between optimism and cancer survival.

Conclusion: 20 out of 25 studies revealed a significant relation between optimism and cancer survival. But a definite conclusion about whether optimism predicts cancer survival seems premature, because of the lack of articles related to the topic. Future studies within the psycho-oncology should address the role of psycho-social factors in

cancer survival and if it is proved should develop a psycho-social intervention module which can reach the needed people for betterment of the life.

Key words: cancer, meta- analysis, optimism, psycho-social factors, survival,

Medical advancement in the area of cancer treatment improves people to live beyond cancer diagnosis, with nearly 18 million cancer survivors expected by 2020 (Moor, et al., 2013; Nilssen, et al., 2016). Cancer treatment can significantly impair physical and mental health of the patient and the significant people around them. The health costs related to the disease extending beyond immediate health effects of illness (Ewertz& Jensen, 2011; Treanor, et al., 2013). Physical health costs may include fatigue, pain and other side effects and poorer health related quality of life (Ewertz& Jensen, 2011; Gosain& Mileer, 2013; Treanor, et al., 2013; Denlinger, 2014; & Weaver, 2012). Survivors may also experience mental health costs including depressive and anxiety symptoms (Champion, 2014) and chemotherapy related cognitive decline that can last 10- 20 years of post-treatment (Arndt, et al., 2014; Hodgson, et al., 2013; Nelson & Suls, 2013; & Tannock, et al., 2004).

The traditional way of thinking have been changed and positive psychological variables started to receive more attention over the last 20 years. As a budding branch of psychology, researchers from psycho-oncology have found/argued an important relationship between psychological traits and cancer. Majority of them are very much enthusiastic and powerful to compete the disease condition. As such, understanding how to promote physical and mental health among survivors is of utmost importance.

The psychosocial aspects of cancer has been well studied during the past few years (Ganz, 2001; Ganz, et al., 1998; Hassey, et al., 1999; & McKenna, 1995) and there is much work in the area of cancer survivorship also. The researchers felt difficulties to reach a conclusion while organizing the related studies through the literature search. So the researchers has planned to ease these difficulties, through a systematic literature review in the area of cancer survivorship and related psycho-social factors and found that many of psychological variables, especially hope, optimism, coping style, resilience, educational level (Hussain, 2007) gender histology, marital status, employment status, academic career (Nonaka, et al., 2006) and socio-economic status (Klein & Knesebeck., 2015)) do play significant role in the cancer survivorship. This meta-analysis investigates optimism as a well-established predictor of cancer survivorship only because of the personal interests of the investigators.

Meta- analysis is a type of study in which the researcher compiles numerous previously published research studies on a particular research question and re-analyses the result to find the general trend for results across the studies. As long as a reasonable body of primary research studies exists, we can investigate a wide variety of questions through the method of meta-analysis. Hence, while meta-analyzing the dispositional optimism as a

predictor of cancer survivorship, the reader can easily avail most acceptable or appropriate researches in the area during the last 20 years and can understand the threshold of dispositional optimism in cancer survivorship

Dispositional Optimism can generally be defined as a positive expectancy about the future. It is a personality trait characterized by a general tendency to hold positive expectations about the future (Carver, et al., 2002) that functions as a psychological resource conferring health benefits (Carver & Scheier, 2014; Nes & Segerstrom, 2006; & Rasmussen, et al., 2009). Dispositional Optimism will help to develop a kind of positive energy in the individual as a result of using more active than avoidant coping and greater persistence when striving to achieve goals (Carver & Scheier, 2014; Nes & Segerstrom, 2006; & Aspinwall & Taylor, 2002). The so called positive energies include greater happiness, less depression, quality of life, positive affect, less impairment in sexual behavior and less fatigue and distress (Blank & Bellizzi, 2006; Carver, et al., 2006; Chambers, et al., 2012).

Cancer survivorship is a very recent concept in the area of psycho-oncology and was first described as a concept by Fitzhugh Mullan, a physician diagnosed with cancer (Mullan, 1985). What is cancer survivorship? Mullan (Mullan, 1985) described the survivorship experience as being similar to the seasons of the year. He recognized three seasons or phases of survival: acute (extending from diagnosis to the completion of initial treatment, encompassing issues dominated by treatment and its side effects), extended (beginning with the completion of initial treatment for the primary disease, remission of disease, or both; dominated by watchful waiting, regular follow-up examinations and, perhaps, intermittent therapy) and permanent survival (not a single moment; evolves from extended disease-free survival when the likelihood of recurrence is sufficiently low). We can define a cancer survivor philosophically as anyone who has been diagnosed with cancer is a survivor, from the time of diagnosis to the end of life (National Coalition of Cancer Survivors). Caregivers and family members are also cancer survivors (secondary survivors) (Aziz, 2016). The present meta-analysis includes studies among primary cancer survivors irrespective of the stages of survival. Issues facing the cancer survivor are not extensions of the issues facing the cancer patient in treatment. Psycho-social Issues of particular importance to cancer survivors includes the quality of life and psychosocial adjustment beyond acute treatment (Varricchio & Aziz, 2000; & Clark, et al., 1996)

Aim

The present paper describes an effort to synthesize the current evidence for the role of dispositional optimism in cancer survival. A year-wise descriptive comparison of the studies during the past 20 years has been attempted to achieve the same.

Methods

Search strategy

A computer based information search was conducted on the Infonet- a computer database, which provides abstracts and full paper of related articles. The search covered studies from 1996 up to 2016. These steps produced a pool of 25 studies that met inclusion criteria. Searches includes data from Psych info, PubMed, science direct and Google scholar. The mainSearch strategy was (“optimism” OR “cancer survivorship”) and (“cancer survival?” OR “psychological well-being” OR “optimism”) and (“survival” OR “optimism”). In addition, we manually searched the reference lists of retrieved publications and reviews. Supplementary information was sometimes obtained directly from the authors or from another published report.

Inclusion criteria

To be included, a study had to meet the following criteria: First- the study had to deal with cancer survivor’s population, second- the study examined the role of optimism/ related concepts on cancer survivorship. Third- the sample of the studies should met the criterion of definition of the survivorship.

Exclusion criteria

Cancer survivors under ongoing treatment and another publication reported earlier results (i.e., shorter follow-up) on the same sample were excluded from analysis

Coding variables

A coding manual was prepared before coding the studies. The manual was revised during the coding to incorporate important aspects of the located studies. The final list of manual included the following variables: publication year, authors name, title of the studies, statistical analysis used, result and whether the study concluded the role of optimism in cancer survival. Coding manual is available by contacting the first author. A copy of the manual is presented in the Table 1

Sl no.	Name of authors	Year of publication	Topic of study	Method used	Conclusion	Optimism predicts survival (yes/no)
1	Allison, P. J., Guichard, C., Funk, K., & Gilain, L	2003	Dispositional optimism predicts survival status one year after diagnosis in head and neck cancer patients	Prospective observational study among 101 cancer patients	Optimism predicts one year survival independent of other socio-demographic and clinical variables	Yes
2	Ringdall, G., testaml, K. G., Kaasa, K., Kvinnsland, S & Ringdal, K.	1996	Prognostic factors and survival in a heterogeneous sample of cancer patients	univariate analysis	several clinical, demographic and psychosocial covariates are significantly related to survival, but not mentioned optimism as a factor	No
3	Howren, M.B., Christensen, A.J., Karnell, L. H., & Funk, G. F.	2013	Psychological factors related to head and neck cancer treatment and survivorship: evidence and opportunities for behavioral medicine	Meta-analysis	Optimism is associated with benefit findings among cancer patients and survivors	Yes
4	Novotny, P., Colligan, R. C. Szydlo, D. W., Clark, M. M., Rausch, S., Wampfler, J., Sloan, J. A., & Yang, P.	2010	A pessimistic explanatory style is prognostic for poor lung cancer survival		Patient exhibited a non-pessimistic explanatory style survived approximately six month longer than patients having a pessimistic explanatory style	Yes
5	Hecht, D.	2013	The neural basis of optimism and pessimism	Meta-analysis	Optimism generally contribute to better physical health	Yes

6	Yang, Y., Liu, L. L., Wang, X. X., Wang, Y., & Wang, L.	2014	Prevalence and associated positive variables of depression and anxiety among Chinese cervical cancer patients	Cross sectional study	hope and optimism have a protective effects in general self-efficacy.	Yes
7	Lamers, S. M. A., Bolier, I., Westerhof, G. J., Smit, F &Bohlmeijer , E. T.	2010	The impact of emotional wellbeing on long term recovery and survival in physical illness	Meta- analysis	Emotional wellbeing have a large impact in cancer survival	Yes
8	Segerstrom, S. C	2005	Optimism and immunity: do positive thought always leads to positive effects		Effect of optimistic belief on the physical health is not as consistent as the effect of mental health	No
9	Rasmussen,H .N.,Scheir,M. F.,Michael,M .F.,&Greenh ouse, J. B.	2009	Optimism and physical health	Meta-analysis	Optimism is a significant predictor of physical health	Yes
10	Keefe, F. J., &Wren, A. A.	2013	Optimism and pain: a positive move forward		Optimism is linked with lower pain sensitivity and better adjustment to pain	Yes
11	Shelby,R.A., Crespin, T.R.,Gregori o,S.M.W.,La mdan,R.M.,S iegel,J.E&Ta ylor, K. L.	2008	Optimism, social support and adjustment in African American women with breast cancer		Both optimism and social support are associated with better adjustment	Yes
12	Lee, S. J.,	2003	Optimistic	prospective	optimistic expectations	Yes

	Loberiza,F.R .,Rizzo, J.D.,Soiffer, R.J.,Antin, J. H., & Weeks J. C.		Expectations and Survival after Hematopoietic Stem Cell Transplantation	cohort of 313 autologous and allogeneic hematopoietic stem cell transplant patients	were associated with better survival	
13	Kenzik, K.,Huang, C., Rizzo, J. D., Shenkman, E., &Wingard, J.	2015	relationship among symptoms, psycho- social factors and health related quality of life in Hematopoietic stem cell transplant survivors	Secondary data analysis	Psychosocial factors play a role in cancer survivorship and optimism is a predictor of overall quality of life	Yes
14	Taber, J. M., Klein, W. M., Ferrer, R. A., Kent, E. E & Harris, P. R.	2016	Optimism and spontaneous self affirmation are associated with lower likelihood of cognitive impairment and greater positive affect among cancer survivors		Participant higher in optimism reported better physical, mental and cognitive health	Yes
15	Matthews, E. E & Cook P. F.	2009	Relationship between optimism and emotional wellbeing and the individual and combined mediation of this relationship by perceived social support, problem focused coping and self-transcendence in women with breast		Optimism was positively related to emotional wellbeing and social support	Yes

			cancer during radiation therapy			
16	Price, M. A., Butow, P. N., Bell, M.L.,DeFazio, A., Friedlander, M.,Fardell,J. E., Protani, M. M.,&Webb, P. M.	2016	Helplessness/hopelessness, minimisation and optimism predict survival in women with invasive ovarian cancer: a role for targeted support during initial treatment		Higher optimism leads the survival among ovarian cancer patients	Yes
17	Schofield, E.,Stockler, M.R., Zannino, D., Tebbutt,N. C., Price T. J., Simes R. J., Wong N.,PavlakisN., Ransom,D., Moylan E., Underhill C., Wyld D., Burns I., Ward R., WilckenN&J effordM	2003	Hope, optimism and survival in a randomised trial of chemotherapy for metastatic colorectal cancer.		Survival was associated negatively with depression, positively with health utility, hopefulness and not related with optimism, anxiety or hope	No
18	Lehto,U.S., Ojanen,M., Dyba, T., Aromaa,A.,& Lehtinen, P.	2006	Baseline psychosocial predictors of survival in localized breast cancer		Not mentioning optimism as a psycho-social predictor of cancer survival	No

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19	Dahl, A. A	2010	Link between personality and cancer		Higher neuroticism and lower optimism are related with lower cancer survival	Yes
20	Butow, P. N., Coates, A. S., & Dunn, S. M.	1999	Psychosocial predictors of survival in metastatic melanoma		Psychosocial variables of minimisation/ denial (related concept of optimism) is a predictor of survival	Yes
21	Butow, P. N., Coates, A. S., & Dunn, S. M.	2000	Psychosocial predictors of survival: metastatic breast cancer		Minimisation, predicted cancer survival	Yes
22	schofield,P., Ball, D., Smith,J. G., Boreland,R., O'Brien,P., Davis, S., Olver,I.,Ryan , G., & Joseph, D.	2004	Optimism and survival in lung carcinoma patients		There was no evidence that high level of optimism enhanced survival in patients with NSCLC	No
23	Walker, L. G.,Heys, S. D., &Eremin, O.	1999	Surviving cancer:do psychosocial factors count?	February 15 th in diary	Coping strategy, fighting spirit and denial were associated with prolonged survival	Yes
24	Grau, A. C., Vives, J., Font, A. & Ochoa, C	2016	Positive psychological functioning in breast cancer: An integrative review		dispositional optimism had an influence on the women's coping styles.	Yes
25	Brown, J. E., Butow, P. N., Culjak, G.,	2000	Psychosocial predictors of outcome: time to relapse and		Perception of the aim of the treatment is to be cured is related with	No

	Coates, A. S., & Dunn, S. M.	survival in patients with early stage melanoma		survival and not mentioning optimism as a predictor of survival	
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Results & Discussion

Selected studies from 1996- 2016(20 years)are given in table 1. While analyzing these studies, we cannot promise optimism as a significant factor in cancer survival, but the variable “optimism “ plays a role in cancer survival. Cancer survival is approximately a common issue almost all countries, but persistent regional and international differences can be seen because of the inequalities in the standards of health care system in each country. Even though the relative survival increased during 1995-2007 for all jurisdiction, survival was persistently higher in Australia, Canada and Sweden compared to that of Denmark, Norway and UK (Coleman, et al., 2011).

The present study utilized 25 related published article that both directly and indirectly discusses optimism as a predictor in cancer survival (from 1996 to 2016). Of these, only 11 studies are aimed to find out the direct relation between optimism and cancer survival. Most recent studies concluded that higher optimism leads the survival among ovarian cancer patients (Price, et al., 2016) and hematopoietic stem cell transplant survivors (Kenzik, et al., 2015; Lee, et al., 2003).Link between personality and cancer was studied by Dahl, A. A (2010) with the objective of studying the role of neuroticism, extraversion and optimism on cancer survival and found significant association between lower optimism and higher neuroticism with lower survival.

Allison.et al., (2003) found the dispositional optimism predicted one year survival after adjusting for several clinical and socio demographic variables in head and neck cancer patients. The opposite concept of optimism (pessimism) has been proved to be related with cancer survival (Novotny, et al., 2010). The pessimistic life orientation is an important risk factor for mortality (Maruta, et al., 2000), that indirectly influence survival.

Schofield et al., (2003), had investigated the relationship between Hope, optimism and survival in patients of metastatic colorectal cancer. Survival was associated negatively with depression, positively with health utility, hopefulness and not related with optimism, anxiety or hope. Schofield, et al., (2004) investigated Optimism and survival in lung carcinoma patients and found no evidence that high level of optimism enhanced survival in patients with NSCLC

A special consideration has to be given to the three reviews, which aimed to find out the psycho-social factors relevant in cancer survival and doesnot point out optimism as a predictor in cancer survival. Ringdal, et al., (1996) had investigated the psycho-social factors in cancer survival and found initial performance status as a significant predictor in cancer survival. Lehto, et al., (2006) had studied the relative impact of socio-economic , psychological and psycho-social factors on survival in breast cancer and found that longer survival was predicted by high education and high socio-economic status and shorter survival was predicted by emotional defensivity(anti-emotionality)and depressive symptoms and not mentioning optimism as a significant predictor of survival. Brown, et

al., (2000) has studied the Psycho- social predictors of survival in patients with early stage melanoma and found positive mood and the use of avoidance as a coping strategy as a factor in survival

Year wise comparison of the 11 reviews collected can be clearly understood from the Table. 2

Sl. No	First Author	Year	Concept studied	Optimism predicts survival
1	Brown, et al.,	2000	Psychosocial factors on survival	No
2	Schofield, et al.,	2003	Optimism and survival	No
3	Allison, et al.,	2003	Optimism and survival	Yes
4	Lee, et al	2003	Optimism and survival	Yes
5	Schofield, et al.,	2004	Optimism and survival	No
6	Novotny, et al.,	2010	Pessimism and survival	Yes
7	Dahl, A. A	2010	Optimism and survival	Yes
8	Kenzik, et al.,	2015	Optimism and survival	Yes
9	Price, et al.,	2016	Optimism and survival	Yes
10	Lehto	2006	Psycho-social predictors of survival	No
11	Ringdal	1996	Psycho-social predictors of survival	No

Among the 11 studies, 7 of them are conducted between 1996-2006 (during 1st half) and remaining 4 between 2006-2016 (during 2nd half) and 6 of them proves the relation of optimism with cancer survival and the remaining 5 conducted during the 1st half nullify the relationship. Positive psychology and psycho-oncology are very recent concepts and only during the past few years researchers become interested in positive psycho-oncology. Lack of conceptual clarity and unawareness of the scope of psycho-social factors in cancer survival may be the reason for the gap found in the studies. Hopefully, the quality of studies has improved greatly over the years.

It can be seen that there are some psycho-social factors closely related with the concept of optimism that play a significant role in cancer survival. Some authors (Butow, et al., 1999; Butow, et al., 2000) has studied the psycho-social predictors of survival in metastatic melanoma and found that the psycho-social variables of minimization/denial (related concept of optimism) has a role in cancer survival. Walker, et al., (1999) reported an association between psychological factors of denial and survival. Dispositional optimism has been shown to be associated with benefit finding in cancer patients (Harrington, et al., 2008; Howren, et al., 2013)) which is consistent with other cancer literatures (Rasmussen, et al., 2009; Urkuyo, et al., 2008). A few studies have investigated the association of dispositional optimism with health outcomes- both physical as well as mental health and emotional wellbeing gave the same result (Mathew & Cook, 2009; Lamer, et al., 2012; Segerrstrom, 2005; Hecht, 2013). Allison.et.al. (2000) examined the impact of optimism in a sample of French head and neck cancer patients and found dispositional optimism has positive relation with health outcomes. Older adults who have experienced cancer and maintained a positive outlook on their lives and engaged in personally meaningful activities tended to experience psychological well-being and life satisfaction (Heo, et al., 2016).

The remaining 14 studies are aimed to find out the relation between cancer survival and the related concepts of optimism like pessimism, minimization/ denial, physical as well as mental health, emotional wellbeing coping style and benefit finding and found positive relation between the variable that may indirectly influence the survival. 4 studies were conducted during the first half of the time and the remaining 10 during the 2nd half. The findings from studies proved significant indirect relation between optimism and cancer survival.

Optimism seems to be positively related to individual responses to cancer. Optimism from individual as well as from significant people around the patient seems to be strongly associated with cancer disease, as it fosters emotional and behavioral adjustment. Dispositional optimism assessed in the time of diagnosis both in cancer patients and their partners predicted less depressive and anxious symptoms at 8 month follow ups (Gustravsson, et al., 2012). Rajendram, et al., (2011) found that oral cavity cancer outpatients having high level of hope and optimism reported lower level of anxiety and depression of follow-up controls may be because both the qualities help them efficiently engaging in adaptive coping strategies which leads to a better psychological health. Another study states high optimism and high disengagement from unattained goals in women with breast cancer diagnosis were associated with low anxiety and depression (Lam, et al., 2016)

More recent publications regarding cancer survivorship discusses related psycho-social factors like obesity, exercise, diet, and nutrient supplement use (Irwin & Mayne, 2008). resilience (Rosenberg, et al., 2015), social support (Bloom & Bernard, 2008), age (Bloom., et al, 2004), volunteerism (Heo, Chun, Lee, & Kim, 2016). However such factors may be of little importance when the body experiences serious or fatal medical conditions or potentially lethal diseases such as lung cancer. More specifically, stages of cancer have significant role in the optimistic view that lead to survival. Eventhough, patient classified as having an optimistic explanatory styles survived an average of 6 month longer than the patients with pessimistic explanatory styles. This was only true if the patient is going through stage 1 / 2 lung cancer.

Conclusion

11/25 studies are aimed to find out the direct relation between optimism and cancer survival. 6 of the studies proves the relation of optimism with cancer survival and the remaining 5 conducted during the 1st half nullify the relationship. Lack of conceptual clarity and unawareness of the scope of psycho-social factors in cancer survival may be the reason for the result.

The remaining 14 (4 studies-during first half and 10 during the 2nd half) studies are aimed to find out the relation between cancer survival and the related concepts of optimism like pessimism, minimization/ denial, physical as well as mental health, emotional wellbeing coping style and benefit finding. The findings from studies proved significant indirect relation between optimism and cancer survival.

While analyzing the selected 25 studies, we cannot promise optimism as a significant factor in cancer survival, but the variable "optimism " plays a role in cancer survival.

Limitations and scope for further research

Very little systematic work has explored positive psycho-oncology, as it is a very recent field in cancer research. Researches related to the field started at 1990s only and majority of them compromises quality may be due to unavailability of data or lack theoretical support. Looking back, the quality of studies has improved greatly over the years, and this will certainly continue.

Type and stages of cancer have significant role in the optimistic view that lead to survival. The present study didn't consider this as an exclusion criteria. A very limited number of diverse studies and the lack of complete data on variables such as cancer survival/ optimism prevent the investigators to avoid those study sample. Of course, a meta-analysis is only as good as its available data and this should only be regarded as a starting point for future updates. The relative lack of knowledge that currently exists about the optimism and the related variables in cancer survival represents a clear area of challenge. It is also one for exciting opportunity and growth.

Cancer is expected to become the leading cause of death in the future as a result of our aging population, reduced death rates from cardiovascular disease, and efficacious treatment and screening methodologies. Effective strategies to prevent and delay treatment-related physiologic and psychosocial sequelae must be developed, tested and disseminated to achieve not only the goal of higher cancer cure rates but also a decreased risk of adverse health and social outcomes.

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