



# Social support as a moderator between the perception of the disease and stress level in lung cancer patients

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## Abstract

**Introduction.** Many studies attempt to explain the relationship between living in highly industrialized societies and the development of various diseases among people. Nowadays, the incidence of lung cancer is increasing worldwide. This is a highly stressful situation, both psychologically and physically. The study investigates the variable of social support and its moderating role between stress level and the perception of the disease among patients diagnosed with lung cancer.

**Objective.** The aim of the study was to verify the hypothesis that there is a correlation between the subjective appraisal of one's disease and the level of stress, as well as the hypothesis that social support is a moderator between the perception of the disease and stress level in patients diagnosed with lung cancer.

**Materials and method.** The study involved 97 respondents diagnosed with lung cancer – 50 men and 47 women. The following methods were used for the study: the Disease-Related Appraisals Scale, the Disease-Related Social Support Scale, and the Perceived Stress Scale. Socio-demographic data were also collected.

**Results.** The results show that informational support may increase the level of perceived stress in lung cancer patients. It can be concluded that social support fulfils its moderating function in forming a stress response to cancer. A statistically significant moderating effect was observed of social support on the relationship between the appraisal of one's disease as harmful and the stress level.

**Conclusions.** The research findings demonstrate that social support plays a substantial role. It is important to diagnose the individual specific needs of lung cancer patients concerning the support they need.

## Key words

lung cancer, stress, social support, perception of the disease, environmental factors

## INTRODUCTION

Nowadays, cancer and cardiovascular diseases are the leading causes of death worldwide [1]. Every year, about 1.3 million people are diagnosed with lung cancer, 80% of whom are men, with the incidence rate in women increasing steadily. The growth in the incidence of lung cancer can also be observed in Poland. In the Lublin Province, lung cancer tops the list both in terms of incidence and mortality in men (21.4% and 33.2%, respectively), and ranks fifth in terms of incidence and second in death rates in women (5.4% and 9.75%, respectively) [2]. Lung cancer occurs increasingly more often as a consequence of increasing air pollution, living in highly industrialized cities, as well as the fast pace of life, stress, and lack of time to maintain mental balance. A high risk group for lung cancer includes individuals who have been smoking a minimum of one packet of cigarettes a day for 20 years, or those with history of cancer in the family. It should also be noted that passive smokers also run an increased risk of developing lung cancer [3]. It can be stated that lung cancer in all its dimensions is a biological and psychological stressor that affects the whole body and determines the way it functions. Some psychological variables are important in the treatment process.

It is pointed out that in the case of cancer, social support is an important resource that facilitates the use of adaptive strategies for coping with stress; for example, it is related to taking care of one's health or more successful handling of extreme situations [4, 5]. Two types of support are distinguished: perceived support and received support, with perceived support considered to be a better predictor of health, life satisfaction and ability to cope with stress in a disease situation [6]. It is important to note that received support is not always regarded as something positive because it may be inadequate for the person's needs, or it may constitute a threat to their self-esteem [7]. Lung cancer is a critical life event when patients feel a considerable need for care and for various types of social support, which is understood as providing supportive elements from the social network. These can be other individuals, emotional resources, informational resources, or tangible resources [8]. Support defined in this way may have several dimensions, e.g. it can be an interpersonal transaction, exchange in the form of emotional, instrumental, informational or appraisal support [9]. Research shows that emotional support helps to adapt well to a new situation and the consequences of disease [10, 11].

At the initial stage of cancer, support of any type may reduce anxiety, which is reflected in making a faster decision to get a diagnosis and treatment. This in turn affects the effectiveness of treatment, as early detection of cancer improves the chances of curability. At this stage, the social

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network may have a motivating effect on an individual [12, 13]. Other studies point to the relationship between an increase in social support and the perceived sense of security, as well as the reduction of anxiety and alienation among women suffering from breast cancer [14]. Studies also reveal a positive correlation of this variable with the occurrence of post-traumatic growth, which is understood as positive personality changes [15, 16]. It is also emphasised that in the case of lung cancer, support from medical personnel is of great importance [17]. This support is defined as actions that are undertaken by nurses or doctors, in order to minimize or alleviate the physical symptoms of the disease. Lung cancer patients attach great importance to emotional and informational support, both from the family and from the medical staff [18].

Studies among women suffering from breast cancer have shown that social support plays the role of a moderator. Researchers have proposed a model in which social support modifies the perception of cancer experience in some way [19]. The results of the extensive meta-analysis of the role of social support in functioning of cancer patients have shown that it is an essential source of coping, often related with positive adaptation and well-being of patients [20]. Important factors that moderate the above correlations include: type of support, cancer type, time period when support is obtained, level of stress felt, and the people providing support. The results of longitudinal studies conducted among cancer patients by Scignaro, Barni and Magrin show that social support strengthens the mental well-being and positive changes by enabling patients to re-interpret their situation, increasing their sense of control, and stimulating cognitive processes and search for the meaning of life [21]. On the other hand, Lee et al proved that social support may be indirectly related to the occurrence of depression symptoms in women after mastectomy [22].

According to the buffer hypothesis, the perceived social support reduces or eliminates the negative effect of stress on the subject's health or well-being [23]. Cancer deprives patients of the opportunity to realise themselves in many social roles, including family and professional roles. The inability to work and worse financial situation may also generate stress. Studies on the quality of life among lung disease patients under palliative care have shown that such patients often give up their work and keep interpersonal contacts to a minimum [24]. Acting as a buffer, support does not directly affect either the stress factor or the well-being of the subject. However, it modifies (moderates) the relationship between these variables. This means that the link between stress and health depends on the level of social support.

Richard Lazarus, who is believed to be the world's most cited researchers on psychological stress, emphasised the importance of the situational context and the relationship that an individual has with the environment. He introduced the term 'transaction' to highlight that in a stressful situation an individual and the environment are treated as a current situational context and are inseparably connected. He defined stress as the relationship of an individual with the environment that was considered to be resource-damaging and dangerous to their well-being [25]. Lung cancer patients experience stress from the very beginning of the illness. The uncertainty of their situation, frequent stays in hospital, and physical weakness increase psychological stress [26]. Hospitalization often gives rise to negative

emotions which result from a large amount of information, often incomprehensible, received by patients [27]. While adapting to a new and unknown situation, patients are under stress that threatens their mood [28]. The attempts made by researchers to explain the relation between health and stress can be categorised into two approaches. The first focuses on the question how stressors negatively influence our body and health, while the other explains what predispositions an individual has to maintain health [29]. The influence of stress on the person's health depends on many individual resources. Social resources are among those resources that modify the cognitive appraisal of stress and the way stress is experienced [30]. It should be emphasised that making use of these resources depends on the relationship between the constancy and repetitiveness of response patterns to various factors generating stress and the individual's activity.

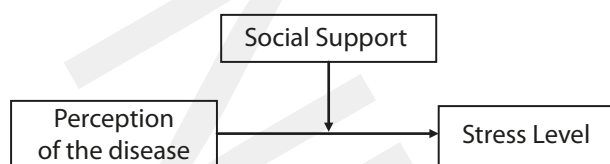
The perception of the disease, which is referred to as the cognitive representation of the disease, affects patients' behaviour, thus expanding their ability to adapt [31, 32]. It is emphasised that the subjective appraisal of one's disease also depends on the team of professionals providing treatment, who attribute specific values to collected information and determine treatment [33]. Under their influence, patients develop their own representation of the disease [33]. This cognitive element is rooted in the concept of Lazarus and Folkman [28]. Cognitive appraisal consists of primary appraisal, i.e. interpretation of a given situation, and secondary appraisal, which involves activating the possibilities for coping with this situation. In the primary appraisal, a situation can be classified into three categories; namely, it can be considered to be a threat, harm/loss, or a challenge, which in turn determines employing specific coping strategies [31]. Disease is perceived as a threat when it is believed to harm the individual's well-being. It is interpreted as harm/loss when a person feels deprived of something. On the other hand, when an individual is convinced that it may bring some profit/gain, it is viewed as a challenge [28]. It is believed that the information from both the primary and secondary appraisal makes up a specific cognitive structure, which is based on life experience [34]. This cognitive structure is shaped through interactions between past experiences, information obtained from doctors and other patients, and information from the mass media.

In his research on the perception of illness, Lipowski described different ways of interpreting illness and illness-related behaviours [34, 35]. In his opinion, illness can be interpreted as an interruption, loss, relief, gain or value [32, 34, 36]. Illness as an interruption is understood as a difficult situation that must be combated by all available means. Viewing illness as a loss is connected with the feeling of lack of control and the inability to influence the situation, and may result in depression and resignation. Interpreting illness as some value helps to build a certain distance between what is mundane and what is spiritual. This leads to a change in attitudes and beliefs. Finally, illness may be seen as a gain, a situation when patients can satisfy their need to be cared for and receive attention from others. Acceptance, i.e. accepting specific changes in life, is a determinant of adaptation to illness. It affects the way patients perceive themselves and their self-esteem, and it may concern appearance, intellectual abilities, character, emotional maturity, interpersonal contacts and life aspirations [37]. Research shows that people who accept their illness take up the struggle to recover and experience less negative emotions [38].

Research findings indicate that there is a strong correlation between the appraisal of one's disease and the process of adapting to it; on the basis of this correlation, it is possible to determine the stress level [39]. Adaptation to the disease is elicited by emotions that differ depending on the subjective meaning attributed to the disease. Cognitive appraisal forms the basis for developing emotional reactions, and influences the choice of strategies used to cope with stress, lowering or increasing stress level [40]. On the basis of the literature and results of other studies, a hypothesis was formulated regarding the correlation between the appraisal of the disease and stress level in lung cancer patients.

## OBJECTIVE

The aim was to verify the following hypotheses: Hypothesis 1) There is a correlation between appraisal of the disease and stress level in lung cancer patients. Hypothesis 2) Social support moderates the correlation between the appraisal of the disease and stress levels in lung cancer patients.



## MATERIALS AND METHOD

**Respondents and procedure.** The research was conducted in the Department of Pneumology, Oncology and Allergology at the Independent Public Clinical Hospital No. 4 in Lublin, Poland, and involved patients diagnosed with lung cancer. The results obtained from 97 respondents, including 50 men (51.5%) and 47 women (48.5%), were examined. The respondents' ages ranged from 35–84 (SD: 7.822), average age – 64.84. In terms of their education, the majority completed secondary education (41%, 40 respondents), followed by those with vocational education (29%, 28 respondents), and then by those with primary (15%, 15 respondents) and higher education (13%, 13 respondents). The situation of respondents varied in terms of time since diagnosis, severity of diagnosis and stage of treatment. They were asked only about lung cancer, any previous illnesses or medical problems were not taken into consideration. The questionnaire was administered individually in direct contact with the patients. Participated in the survey voluntarily, after giving consent. A face-to-face meeting with each patient during which the questionnaire data was collected, lasted 30–60 minutes.

**Measurement of variables – Appraisal of the disease.** The Disease-Related Appraisals Scale (DRAS) developed by Steuden and Janowski [34] was used to measure the subjective perception of the disease. This is a questionnaire tool that tests the subjective meanings attributed by patients to their disease, consisting of 47 statements to which the respondents mark their answers on a 5-point scale: 5 – yes and 1 – no. The raw scores are converted into sten scores. Statistical analyses showed that the internal reliability ( $\alpha$ ) on particular scales ranged from 0.64–0.87. Correlations between scales were independent.

**Table 1.** Characteristics of the research groups

Variable	N	%	
Gender	Male	50	51.5
	Female	47	48.5
	Total	97	100.0
Smoking tobacco	Yes	48	49.5
	No	49	50.5
	Total	97	100
Type of cancer	Non-small cell cancer	81	83.5
	Small cell cancer	16	16.5
	Total	97	100
Marital status	Single	4	4.1
	Married	68	70.1
	Widower / Widow	19	19.6
Place of residence	Divorced	6	6.2
	Total	97	100.0
	Village	38	39.2
Professional status	Small town	18	18.6
	Medium-sized city	14	14.4
	Big city	28	26.8
Education	Total	96	99.0
	Active	18	18.6
	On sick leave	5	5.2
Social support	Retirement pension	61	62.9
	Disability pension	11	11.3
	Total	95	97.9
Stress level	Higher	13	13.0
	Secondary	40	41.0
	Primary	15	15.0
Vocational	Vocational	28	29.0
	Total	96	99.0

**Social support.** The Disease-Related Social Support Scale (DRSSS/ Polish abbreviation – SWCh) developed by Brachowicz, Janowski and Sadowska [32, 34, 41] was used to measure the social support variable. It consists of 30 items designed to describe types of perceived social support. Respondents provide answers to each item on a 4-point scale: 1 – no, 2 – rather not, 3 – rather yes, 4 – yes. The Disease-Related Social Support Scale distinguishes five types of social support corresponding to 5 subscales: emotional, tangible, spiritual, instrumental, and informational. The total score is the sum of all test items [41]. In all subscales, the results were obtained by calculating the mean value from the score for items that make up a given subscale. Cronbach's reliability coefficients  $\alpha$  were high and ranged from 0.91 for the tangible support subscale to 0.95 for the informational support subscale, while for the entire questionnaire the coefficient  $\alpha$  is 0.97.

**Stress level.** The Perceived Stress Scale (PSS-10) developed by Cohen et al. was used to measure the stress level variable [28]. The scale was designed to assess an individual's response to a stressful situation in which they find themselves. In its Polish version, the tool is called the Felt Stress Scale (Skala Odczuwanego Stresu), which is used to assess the intensity of stress related to one's life situation during the previous month. It consists of 10 questions about subjective feelings

that accompany problems, personal events, behaviours and ways of coping. The questions relate both to the assessment of stress intensity connected with one's life situation during the last month, and the effectiveness of coping [42]. The total scale score is the sum of all items. The score values are 0–40, with higher scores indicating higher perceived stress. In the case of the stress scale, the results were obtained by calculating the mean value from values obtained for all questions. Cronbach's internal reliability coefficient  $\alpha$  was high – 0.91.

**Statistical analysis.** The two hypotheses were tested with regression models using the PROCESS procedure for IBM SPSS Statistics, version 25.00 [43]. This procedure enables the testing of over 70 models of moderation, mediation or moderated mediation. To verify the hypotheses, the so-called Model 1 was used which tested the effect of an interaction between the subjective appraisal of the disease and social support in relation to the dependent variable: stress level. The mean values, standard deviations of variables and correlations are presented in Table 2.

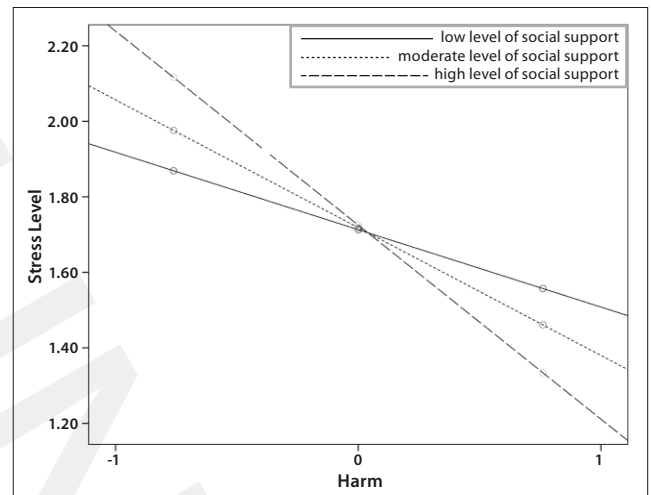
## RESULTS

**Correlations.** Table 2 shows the results of the analysis of Pearson's correlation coefficient between studied variables. Almost all dimensions of disease appraisal are correlated with each other. The stress level is correlated with the appraisal of the disease as a threat ( $r = -.58$ ;  $p < .001$ ), loss ( $r = -.45$ ;  $p < .001$ ), challenge ( $r = -.30$ ;  $p < .01$ ), harm ( $r = -.41$ ;  $p < .001$ ), and significance ( $r = -.34$ ;  $p < .01$ ). There was no correlation between stress levels and social support, or between social support and any type of disease assessment. The results confirmed Hypothesis 1 about the correlation between the appraisal of the disease and stress level.

**Moderation.** The results revealed a statistically significant moderating effect of social support on the relationship between the harm scale and stress level. Moreover, an increase in the determination coefficient  $R^2$  ( $R^2 = 0.060$ ),  $F(1,93) = 9.39$ ;  $p = 0.003$  was found to be low, but still statistically significant. As shown in Table 3, a negative relationship close to statistical significance between the predictor and the dependent variable was recorded when social support was low, whereas with higher social support, this relationship was clearly stronger. The results are illustrated in Figure 1.

**Table 3.** Influence of perception of disease as harm on the stress level, depending on social support

Social support	B	SE	t	p	95% CI	
					LLCI	ULCI
Low	-0.21	0.11	-1.81	0.073	-0.43	0.02
Moderate	-0.34	0.09	3.92	<0.001	-0.51	-0.17
High	-0.51	0.08	-6.51	<0.001	-0.67	-0.36



**Figure 1.** Moderating effect of social support

On the other hand, the results showed that the moderating effect of social support on the relationship between the value scale and stress level was only close to statistical significance. An increase in the determination coefficient  $R^2$  ( $R^2 = 0.035$ ),  $F(1,92) = 3.13$ ;  $p = 0.080$  was low, being only close to statistical significance. As can be seen in Table 4, in the situation of low social support, the correlation between the predictor and the dependent variable was statistically insignificant, whereas when the moderator was high, this correlation was negative and statistically significant. The results are illustrated in Figure 2.

No moderating effect of social support was noted for the relationship between the stress level and the scale of Threat ( $R^2$  ( $R^2 = 0.010$ ),  $F(1,93) = 1.61$ ;  $p = 0.207$ ); Gain ( $R^2$  ( $R^2 = 0.001$ ),  $F(1,93) = 0.32$ ;  $p = 0.858$ ); Interruption ( $R^2$  ( $R^2 = 0.019$ ),  $F(1,92) = 3.72$ ;  $p = 0.057$ ); Challenge ( $R^2$  ( $R^2 = 0.000$ ),  $F(1,93) = 0.00$ ;  $p = 0.972$ ), and Significance ( $R^2$  ( $R^2 = 0.034$ ),  $F(1,92) = 2.09$ ;  $p = 0.152$ ).

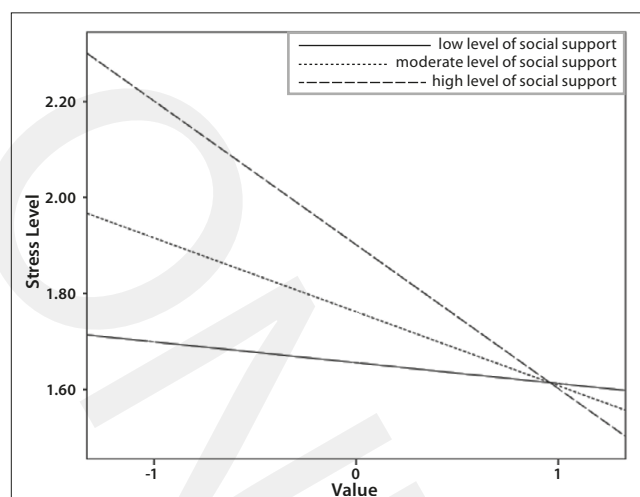
**Table 2.** Mean values, standard deviations and correlations for studied variables

Variable	M	SD	1	2	3	4	5	6	7	8
1. DA: Threat	2.55	0.92	-							
2. DA: Gain	3.11	0.71	.51**	-						
3. DA: Loss	2.60	0.82	.69**	.55**	-					
4. DA: Challenge	2.36	0.73	.39**	.50**	.43**	-				
5. DA: Harm	3.36	0.76	.54**	.39**	.65**	.32**	-			
6. DA: Value	3.24	1.01	.28**	.35**	.19	.41**	.06	-		
7. DA: Significance	1.74	0.71	.66**	.24*	.45**	.33**	.40**	.20	-	
8. Stress level	1.73	0.66	-.58***	-.15	-.45***	-.30**	-.41***	-.19	-.34**	--
9. Social support	1.45	0.60	.47	.15	-.05	.05	-.11	.20	.06	.11

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ ; DA – disease appraisal

**Table 4.** Influence of perception of disease as a value on stress level, depending on social support

Social support	B	SE	t	p	95% CI	
					LLCI	ULCI
Low	-0.04	0.09	-0.48	0.629	-0.22	0.14
Moderate	-0.15	0.07	-2.17	0.033	-0.30	-0.01
High	-0.30	0.11	-2.64	0.010	-0.53	-0.07

**Figure 2.** Moderating effect of social support

## DISCUSSION

The results demonstrate that informational support in the situation of lung cancer may intensify the level of perceived stress, thus losing its function of a resource. Analyses show that lung cancer patients exhibit higher stress level when they receive more informational support. In other words, more stressed individuals rated higher the informational support they received. These results are consistent with other studies that indicate the role of social support in shaping adverse adaptive behaviours, which is explained as the incompatibility or inadequacy of the type of support to a given individual [44]. In their research, Shiozaki et al. proved that significant others who preferred a support style based on avoiding conversations with patients about the problem situation, greatly reduced their psychological adjustment to the disease [45]. Information concerning lung cancer is widely available, but for the most part it is negative. On the basis of all the information received from other patients and medical staff, or available online and on TV, individuals associate lung cancer with very poor prognosis and high mortality. It is commonly believed to be a terminal disease. According to Lifton, receiving a cancer diagnosis is an extreme stress situation, or a life-threatening situation. The individual is suddenly and unpredictably confronted with death [46]. The emphasis in the situation of lung cancer diagnosis is on what patients can do to improve their well-being connected with the negative effects of treatment, rather than on how they can recover. In society, cancer is considered to be a negative event [47]. Therefore, obtaining information about lung cancer may be connected with higher stress levels, which may justify the above findings. However, taking into account the moderating role of social support,

it can be stated that it fulfils its function in forming a stress response to cancer. A statistically significant moderating effect was observed of social support on the relation between the appraisal of the disease as harm and the stress level. With low social support, only a close to statistical significant negative relationship between the appraisal of the disease as harm and the stress level was observed, whereas with higher intensity of this moderator, this relationship was significant and clearly stronger. It can therefore be concluded that people who rated their disease higher on the harm scale had lower stress levels. Hence, it can be concluded that social support is of great importance in forming a response to cancer. The first to view social support in this way were Cassel and Cobb [48, 49], who pointed out that this variable acted as a buffer to combat stress. They also described inter-human relations as a moderator of harmful effects of stress on the functioning of individuals. Social support maintains or encourages the individual's efforts aimed at beneficial adaptation. It may also intervene between the cognitive appraisal of an event and the stress response [50]. Women suffering from breast cancer appraised their disease as carrying less risk when they received information about successful treatment from others. What follows is that mere knowledge of the possibility of obtaining social support may reduce stress [51]. Other studies have also demonstrated that higher social support is related to an increase in factors determining the quality of life [52].

## CONCLUSIONS AND CLINICAL IMPLICATIONS

The research results demonstrate that social support plays a substantial role. It is important to diagnose the individual specific needs of lung cancer patients concerning needed support. In the case of chronic and long-term diseases, it is crucial that the support should be adequate to the patient's current physical and mental condition. Moreover, it is important to expand knowledge about how lung cancer patients function to adjust support methods. The results indicating a positive correlation between informational support and stress levels are an important source of knowledge for those responsible for training medical staff on how to provide patients with information about their disease, i.e. how to give a diagnosis or inform about the course of treatment.

## REFERENCES

1. Miller KD, Nogueira L, Mariotto AB, Rowland JH, Yabroff KR, Alfano CM, et al. Cancer treatment and survivorship statistics, 2019. *CA Cancer J Clin.* 2019;
2. Zatoński WA, Sulkowska U, Didkowska J. Cancer epidemiology in Poland. *Nowotwory J Oncol [Internet].* 2015; 65(3): 179–96. doi: 10.5603/NJO.2015.0041
3. Lin H-T, Liu F-C, Wu C-Y, Kuo C-F, Lan W-C, Yu H-P. Epidemiology and Survival Outcomes of Lung Cancer: A Population-Based Study. Domagala-Kulawik J, editor. *Biomed Res Int [Internet].* 2019; 2019: 8148156. Available from: <https://doi.org/10.1155/2019/8148156>
4. Lee Y, Baek JM, Jeon YW, Im EO. Illness perception and sense of well-being in breast cancer patients. *Patient Prefer Adherence.* 2019; 13: 1557–1567. doi: 10.2147/PPA.S225561
5. Akbari S, Dortaj F, Ranjgar B, Akbari ME. The effect of personality, social support, and life events on overall survival in breast cancer. *Int J Cancer Manag.* 2019; 12(3): e83625. doi: 10.5812/ijcm.83625. doi: 10.4103/njcp.njcp\_372\_17
6. Ozbayir T, Gok F, Arican S, Koze B S, Uslu Y. Influence of demographic factors on perceived social support among adult cancer patients in Turkey. *Niger J Clin Pract.* 2019; 22: 1147–56.

7. Leite MA, Nogueira DA, Terra Fde S. Evaluation of self-esteem in cancer patients undergoing chemotherapy treatment. *Rev Lat Am Enfermagem*. 2015; 23(6): 1082–1089. doi: 10.1590/0104-1169.0575.2652
8. Fitch MI. The Changing Face of Lung Cancer: Survivor Perspectives on Patient Engagement. *Asia Pac J Oncol Nurs*. 2019; 6(1): 17–23. doi: 10.4103/apjon.apjon\_43\_18
9. Applebaum AJ, Stein EM, Lord-Bessen J, Pessin H, Rosenfeld B, Breitbart W. Optimism, social support, and mental health outcomes in patients with advanced cancer. *Psychooncology*. 2014; 23(3): 299–306. doi: 10.1002/pon.3418
10. Daniela Berardo & Maria Valentina Mussa. Application of relational tool to support acute cardiac patients' emotional recovery: analysis of effects during acute and follow-up care, *International Journal of Qualitative Studies on Health and Well-being*, 2019; 14: 1. doi: 10.1080/17482631.2019.1595957
11. Chan EA, Tsang PL, Ching SSY, Wong FY, Lam W. Nurses' perspectives on their communication with patients in busy oncology wards: A qualitative study. *PLoS ONE*. 2019; 14(10): e0224178. doi: <https://doi.org/10.1371/journal.pone.0224178>
12. Barre VP, Padmaja G, Saxena RK, Rana S. Impact of medical intervention on stress and quality of life in patients with cancer. *Indian J Palliat Care*. 2015; 21(2): 203–208. doi:10.4103/0973-1075.156503
13. Elsner K, Naehrig D, Halkett GKB, Dhillon HM. Reduced patient anxiety as a result of radiation therapist-led psychosocial support: a systematic review. *J Med Radiat Sci*. 2017; 64(3): 220–231. doi:10.1002/jmrs.208
14. Rizalar S, Ozbas A, Akyolcu N, Gungor B. Effect of perceived social support on psychosocial adjustment of Turkish patients with breast cancer. *Asian Pacific Journal of Cancer Prevention: Apjcp*. 2014; 15(8): 3429–3434. doi: 10.7314/APJCP.2014.15.8.3429
15. Peng X, Su Y, Huang W, Hu X. Status and factors related to posttraumatic growth in patients with lung cancer: A STROBE-compliant article. *Medicine (Baltimore)*. 2019; 98(7): e14314. doi:10.1097/MD.00000000000014314
16. Trzmielewska W, Zięba M, Boczkowska M, Rak T, Wrześniowski S. Motivation of cancer patients to help others and the relation between posttraumatic growth and helping. *Current Issues in Personality Psychology*. 2019; 7(3): 232–241. doi: 10.5114/cipp.2019.86231
17. Yang N, Xiao H, Cao Y, Li S, Yan H, Wang Y. Influence of oncology nurses' empathy on lung cancer patients' cellular immunity. *Psychol Res Behav Manag*. 2018; 11: 279–287. Published 2018 Jul 31. doi: 10.2147/PRBM.S168649
18. Pourfallahi, Masoumeh, et al. The effect of informational-emotional support program on illness perceptions and emotional coping of cancer patients undergoing chemotherapy." *Supportive Care in Cancer*. 2019; 1–11. doi: 10.1007/s00520-019-04842-w
19. Somasundaram RO, Devamani KA. A Comparative Study on Resilience, Perceived Social Support and Hopelessness Among Cancer Patients Treated with Curative and Palliative Care. *Indian J Palliat Care*. 2016; 22(2): 135–140. doi: 10.4103/0973-1075.179606
20. Leow, Kenneth, et al. Social Support, Basic Psychological Needs, and Social Well-Being Among Older Cancer Survivors. *The International Journal of Aging and Human Development*. Nov. 2019, doi: 10.1177/0091415019887688
21. Scrignaro M, Barni S, Magrin ME. The combined contribution of social support and coping strategies in predicting post-traumatic growth: a longitudinal study on cancer patients. *Psycho-Oncology*. 2011. 20(8): 823–831.
22. Lee V, Cohen S, Edgar L. Meaning of making intervention during breast or colorectal cancer treatment improves self-esteem, optimism, and self-efficacy. *Social Science & Medicine*. 2006; 62(12): 3133–3145. <https://doi.org/10.1016/j.socscimed.2005.11.041>
23. Hartley C, Coffee P. Perceived and Received Dimensional Support: Main and Stress-Buffering Effects on Dimensions of Burnout. *Front Psychol*. 2019; 10: 1724. Published 2019 Aug 2. doi: 10.3389/fpsyg.2019.01724
24. Lachowicz M, Raszeja S. Jakość życia pacjenta z rakiem płuc objętych opieką paliatywną. *Choroby XXI wieku – wyzwania w pracy fizjoterapeuty*, edited by M. Podgórska. 2017; 233–251.
25. Taniguchi A, Mizuno M. Psychological Stress and Coping in Recently Discharged Postsurgical Cancer Patients. *Asia Pac J Oncol Nurs*. 2016; 3(2): 176–182. doi: 10.4103/2347-5625.177394
26. Jafri SH, Ali F, Mollaiean A, et al. Major Stressful Life Events and Risk of Developing Lung Cancer: A Case-Control Study. *Clin Med Insights Oncol*. 2019; 13: 1179554919835798. Published 2019 May 1. doi: 10.1177/1179554919835798
27. Pękała M, Kozaka J. Jakość życia chorych na raka płuca. *Psychooncologia*. 2016; 20(2): 90–97. doi: 10.5114/pson.2016.62058
28. Commodari E. Children staying in hospital: a research on psychological stress of caregivers. *Ital J Pediatr*. 2010; 36: 40. Published 2010 May 25. doi: 10.1186/1824-7288-36-40
29. Naughton MJ, Weaver KE. Physical and mental health among cancer survivors: considerations for long-term care and quality of life. *N C Med J*. 2014; 75(4): 283–286. doi:10.18043/ncm.75.4.283
30. Huss E, Samson T. Drawing on the Arts to Enhance Salutogenic Coping With Health-Related Stress and Loss. *Front Psychol*. 2018; 9: 1612. Published 2018 Sep 25. doi: 10.3389/fpsyg.2018.01612
31. Antoni MH. Psychosocial intervention effects on adaptation, disease course and biobehavioral processes in cancer. *Brain Behav Immun*. 2013; 30 Suppl(Suppl): S88–S98. doi: 10.1016/j.bbi.2012.05.009
32. Kupcewicz E, Olewińska J, Pikus H, Józwick M. Differentiating factors of mental adaptation to disease in women treated for gynaecological cancer. *J Educ Heal Sport*. 2017 Nov; 6:7. doi: 10.5281/zenodo.1041024
33. Shinan-Altman S, Werner P. Illness representations of dementia: a scoping review. *Clin Interv Aging*. 2019; 14: 179–193. Published 2019 Jan 18. doi: 10.2147/CIA.S193316
34. Janowski K, Steuden S, Kuryłowicz J, Nieśpiałowska-Steuden M. The Disease-Related Appraisals Scale: a tool to measure subjective perception of disease situation. In: K. Janowski, S. Steuden (ed.) *Biopsychosocial Aspects of health and disease*. Lublin. 2009; 1: 108–125. CPPP Scientific Press.
35. Sirri L, Fava G, A, Sonino N: The Unifying Concept of Illness Behavior. *Psychother Psychosom* 2013; 82: 74–81. doi: 10.1159/000343508
36. Cipora E, Konieczny M, Sobieszkański J. Acceptance of illness by women with breast cancer. *Ann Agric Environ Med*. 2018; 25(1): 167–171. doi: 10.26444/aaem/75876
37. Smoleń E, Hombek K, Jarema M, Słysz M, Kalita K. Factors determining the acceptance of the disease in patients treated oncologically. *Med Og Nauk Zdr*. 2018; 24(1): 37–43. doi: 10.26444/monz/86142
38. Mazurek J, Lurbiński J. Skala Akceptacji Choroby i jej znaczenie w praktyce klinicznej. *Pol Merk Lek*. 2014; 36(212): 106–108.
39. Szymona-Pałkowska K, Janowski K, Pedrycz A, et al. Knowledge of the Disease, Perceived Social Support, and Cognitive Appraisals in Women with Urinary Incontinence. *Biomed Res Int*. 2016; 2016: 3694792. doi: 10.1155/2016/3694792
40. Amirifard N, Payandeh M, Aeinfar M, Sadeghi M, Sadeghi E, Ghafarpor S. A Survey on the Relationship between Emotional Intelligence and Level of Depression and Anxiety among Women with Breast Cancer. *Int J Hematol Oncol Stem Cell Res*. 2017; 11(1): 54–57.
41. Janowski K, Tatala M, Jedynak T, Wałachowska K. Social support and psychosocial functioning in women after mastectomy. *Palliative and Supportive Care*. Cambridge University Press. 2019; 1–8. <https://doi.org/10.1017/S1478951519000774>
42. Ravindran OS, Shankar A, Murthy T. A Comparative Study on Perceived Stress, Coping, Quality of Life, and Hopelessness between Cancer Patients and Survivors. *Indian J Palliat Care*. 2019; 25(3): 414–420. doi: 10.4103/IJPC.IJPC\_1\_19
43. Hayes AF. PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. 2012. Retrieved from <http://www.afhayes.com/public/process2012.pdf>
44. Lauriola M, Tomai M. Biopsychosocial Correlates of Adjustment to Cancer during Chemotherapy: The Key Role of Health-Related Quality of Life. Merrick J, editor. *Sci World J [Internet]*. 2019; 2019: 9750940. <https://doi.org/10.1155/2019/9750940>
45. Shiozaki M, Hiraib K, Koyamac A, Inuid H, Yoshida R, Tokorof A. Negative support of significant others affects psychological adjustment in breast cancer patients. *Psychology and Health*. 2011; 26(11): 1540–1551. doi: 10.1080/08870446.2010.551211
46. Perloff T, King JC, Rigney M, Ostroff JS, Johnson Shen M. Survivor guilt: The secret burden of lung cancer survivorship. *J Psychosoc Oncol [Internet]*. 2019 Sep 3; 37(5): 573–85. Available from: <https://doi.org/10.1080/07347332.2019.1569191>
47. Flanagan J, Holmes S. Social perceptions of cancer and their impacts: Implications for nursing practice arising from the literature. *J Adv Nurs*. 2000 Sep 1; 32: 740–9. doi: 10.1046/j.1365-2648.2000.01535.x
48. Song L, Son J, Lin N. Social Support. In: *Handbook of Social Network Analyses*. 2011. p. 116–28. doi: 10.4135/9781446294413.n9
49. Coob S. Social support as a moderator of life stress. *Psychosomatic Medicine*. 1976; 38: 300–314.
50. Wu SM, Yang HC, Thayer JF, Andersen BL. Association of the physiological stress response with depressive symptoms in patients with breast cancer. *Psychosom Med*. 2014; 76(4): 252–256. doi: 10.1097/PSY.0000000000000060
51. Chou AF, Stewart SL, Wild RC, Bloom JR. Social support and survival in young women with breast carcinoma. *Psychooncology*. 2012; 21(2): 125–133. doi: 10.1002/pon.1863
52. Finck C, Barradas S, Zenger M, Hinz A. Quality of life in breast cancer patients: Associations with optimism and social support. *Int J Clin Health Psychol*. 2018; 18(1): 27–34. doi: 10.1016/j.ijchp.2017.11.002