

# The Relationship of Health Locus of Control and Psychological Distress in Lung Cancer Patients during the COVID-19 Pandemic

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## Abstract

**Introduction:** Lung cancer remains among the deadliest types of cancers despite advances in treatment modalities. During the COVID-19 pandemic, lung cancer patients, a well-recognized vulnerable population, faced many difficulties in their diagnostic and treatment pathways due to significant changes in the delivery of lung cancer care. Their subsequent psychological distress and their perception of health locus of control (HLOC) still remain vague. **Aim:** To investigate the association between health locus of control and psychological distress among lung cancer patients during the COVID-19 pandemic in Greece. **Material and Method:** We prospectively studied consecutive patients diagnosed with lung cancer, at the Oncology Outpatients’ Clinic in “Sotiria” Athens’ Chest Diseases Hospital, Athens, Greece. Medical records were reviewed to collect demographics and relevant clinical information. The Health Locus of Control Scale and the Distress Thermometer were used to assess health behaviors and levels of psychological distress, respectively. **Results:** 160 patients with lung cancer were enrolled. Mean age was 66.2 years (age range 45 - 83 years) and 70% were male. All patients received their treatments during the pandemic. Treatment modalities included chemotherapy, immunotherapy, radiotherapy independent or in combination with the above. The most common clinical symptoms were fatigue (63.7%), breathing (48.1%) and sleep (45.0%). The most frequent emotional problems were nervousness (41.3%), anxiety (46.9%), fears (21.9%) and grief (29.4%). HLOC

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was positively correlated with the existence of psychological problems ( $p < .05$ ) indicating a more external locus of control. Moreover, distress was positively affected by HLOC “doctors” scale dimension ( $p < .05$ ) showing that lung cancer patients rely more on their doctors rather than themselves for the control of their disease. All distress thermometer (DT) subscales were positively correlated with one another ( $p < .001$ ) indicating that they are interdependent. **Conclusions:** External HLOC is associated with psychological distress, which in turn is affected by interdependent emotional and physical problems, leading to behaviors which negatively affect lung cancer patients’ adjustment to their disease and their quality of life, which should be taken into account when treating lung cancer patients amidst unpredictable situations and frequent screening should be applied.

### Keywords

Lung Cancer, COVID-19, HLOC, DT

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## 1. Introduction

During the past decade, lung cancer mortality has moderately but steadily declined across Europe due to access to novel treatments (Bosetti et al., 2013; De Angelis et al., 2014; Sung et al., 2021). However, lung cancer remains the second most common cancer and the leading cause of cancer-related deaths worldwide (Huang et al., 2022) with a total of 1.8 million annual deaths, accounting for 18% of all cancer mortality (Sung et al., 2021). Lung cancer is a debilitating disease with many life changing persisting symptoms that impact on quality of life despite novel treatments leading to a prolonged progression free survival (Chen et al., 2018; Deer et al., 2011; Caraceni et al., 2012; Paice & Ferrell, 2011). Aside from clinical symptoms, psychological distress stemming from lung cancer plays a pivotal role in disease perception and management. Psychological distress is an emotional state characterized by mental health problems, including depression and anxiety, and it is associated with poor treatment compliance and low quality of life (Plank & Nemesure, 2016; Chad-Friedman et al., 2017; Wang et al., 2017).

Psychological distress affects up to 65% of lung cancer patients (Plank & Nemesure, 2016) which accounts for one of the highest rates among patients with solid organ cancers (Liu et al., 2018; Occhipinti et al., 2019). Females are more affected than men (58.2% vs 28.7% respectively) as they are more emotional, sensitive, and tend to express their feelings while males tend to try to rationalize them and do not express them (Passarelli et al., 2021). The increased frequency of psychological distress among lung cancer patients is mainly attributed to the severity and dismal clinical course of the disease and poor prognosis (Wang et al., 2017).

Psychological distress among lung cancer patients has increased further dur-

ing the COVID-19 pandemic mainly due to the patients' fear of diagnostic and treatment delays (Albano et al., 2021). The entire lung cancer pathway, from diagnosis to treatment and palliative care, has been significantly challenged by the COVID-19 pandemic, mainly due to changes in the delivery of care and re-organization of healthcare services to meet the increased demands posed by the pandemic. These changes resulted in delays in clinic appointments, investigations and treatments (Indini et al., 2020) and most importantly impacted on the timeliness and completion of shared decision-making as healthcare professionals were re-allocated to other services to meet the new unprecedented needs (Di Giacomo et al., 2020; Zhang, Xie, & Huang, 2020). To address these new needs, scientific societies have issued new guidelines for the diagnosis and management of lung cancer including palliative care amidst the COVID-19 pandemic (European Society for Medical Oncology, 2022).

Furthermore, psychological distress further increased among lung cancer patients during the pandemic due to the possibility of contracting COVID-19 and suffered potential respiratory complications leading to intensive care unit (ICU) admission (Indini et al., 2020; Tian et al., 2020; Wang & Zhang, 2020; Liang et al., 2020). This perception combined with the emotional distress caused by lung cancer symptoms, treatments and side-effects pose a great challenge in lung cancer patients' management (Tian et al., 2020).

The emotional distress experienced by lung cancer patients is closely linked with internal and external Health Locus of Control (iHLOC, eHLOC). Internal HLOC patients believe they have control over their cancer which results in an improved psychological adjustment to this life-changing condition. As a result, they are actively involved in the decision making process, which leads to improved health outcomes (Hashimoto & Fukuhara, 2004; Wallston, 2005; Marton et al., 2021; Dopelt et al., 2022).

External HLOC patients believe their physicians, families and fate are in control of their disease (Wallston et al., 1994) and subsequently they have adopted a passive approach with low adjustment levels. eHLOC patients are not involved in the decision making process regarding their diagnosis and treatment and this has been correlated with poor health outcomes (Gibek & Sacka, 2019; Arraras et al., 2002). This behavior impacts negatively on their prognosis and quality of life and has an additive effect on the preexisting emotional distress (Henselmans et al., 2015; Bailo et al., 2019; Albano et al., 2021). However, a recent meta-analysis investigating the psychosocial and emotional impact of the COVID-19 pandemic on cancer patients, reported that the majority of the reviewed studies used tools that did not provide deeper and improved understanding of how and why patients' emotional states were affected (<https://www.sciencedirect.com/science/article/pii/S0093775422000604>, accessed on 21.12.2022). Therefore, the relationship between HLOC and emotional distress among cancer patients and in particular those with lung cancer has not been extensively investigated especially amidst health care crises, such as the COVID-19 pandemic.

In this study we aim to investigate this relationship and identify the factors associated with the presence of psychological distress.

## 2. Materials and Methods

### 2.1. Sample

We prospectively reviewed 160 lung cancer patients (stage III-IV) at the Oncology Outpatients' Clinic, "Sotiria" Athens' Chest Diseases Hospital, Greece. The study was approved by the Hospital's Science and Medical Ethics Board (registration number 7488/12-3-2021) and met the General Data Protection Regulation (GDPR) requirements. Patients were enrolled in the study following their informed consent.

### 2.2. Data Collection

Data collection was conducted during 2021-2022. Patients completed general and specific forms as follows:

1) General form: demographics (gender, age), educational and marital status, financial situation, place of residence and occupation which was based on [Ginieri-Coccosis' et al., form \(2008\)](#).

2) Focused forms

a) The Health Locus of Control Scale (HLOC) form which was developed to predict health-related behaviors ([Wallston et al., 1994](#)) and has been used in the Greek population, with Cronbach's alpha ranging from .50 to .85 ([Ginieri-Coccosis et al., 2008](#)). It consists of eighteen 6-point Likert scale questions, ranging from "strongly disagree" to "strongly agree". These questions are allocated to 4 subscales which are: the Internal subscale, Chance, Doctors, Other people. The HLOC form with interpretation is attached in the supplements' section. The internal consistency of the HLC was  $\alpha = .77$ .

b) The Distress Thermometer (DT) form applied by the National Comprehensive Cancer Network (NCCN) to screen cancer patients for the presence of psychological distress, with sensitivity .80 and specificity .70 ([Tang et al., 2011](#)). It consists of 40 "yes" or "no" items which are grouped into five categories: practical problems, family problems, emotional problems, religious/spiritual problems, and physical problems. Furthermore, the form includes a question requiring from patients to choose a score which represents their distress levels the previous week, ranging from 0 to 10, with 0 indicating absence of distress and 10 presence of severe distress. The DT form is available in the supplements' section. The internal consistency of DT in this study was  $\alpha = .85$ .

## 3. Results

We prospectively reviewed 160 patients, Mean patient age was 66.2 years ( $\pm 8.2$ ), 70% ( $n = 112$ ) were male and the majority were married ( $n = 110$ , 68.8%). 38.1% ( $n = 61$ ) had received only basic education, 53.8% ( $n = 86$ ) described their financial situation as sufficient and half of them ( $n = 80$ ) were retired ([Table 1.](#))

Most patients (45.0%) were diagnosed with lung cancer in 2020. Treatment options included chemotherapy, immunotherapy and radiotherapy as stand alone treatments or combined. **Table 2** summarizes clinical information including treatment options and comorbidities. 45.6% (73/160) patients had chronic comorbidities while 6.9% contracted COVID-19 prior, during or after oncological treatment.

Regarding DT results, insurance and financial situation were the most frequently reported concerns ( $n = 46$ , 28.7%), followed by family-health problems ( $n = 26$ , 16.3%), anxiety ( $n = 75$ , 46.9%) and fatigue ( $n = 10$ , 63.7%). The less frequent problems concerned childcare ( $n = 150$ , 93.8%), fertility ( $n = 158$ , 98.8%), depression ( $n = 142$ , 88.8%), spiritual/religious worries ( $n = 145$ , 90.6%) and substance use ( $n = 157$ , 98.1%) (**Table 3**).

**Table 1.** Demographics characteristics patients with lung cancer (N = 160).

Characteristics	N	%
<b>Gender</b>		
Male	112	70
Female	48	30
<b>Marital status</b>		
Single	9	5.6
Married	110	68.8
Divorced	21	13.1
Widowed	20	12.5
<b>Occupation</b>		
Retired	80	50
Employee	49	30.6
Other	31	19.4
<b>Financial situation</b>		
Good	43	26.9
Sufficient	86	53.8
Poor	31	19.4
<b>Educational level</b>		
Basic education	61	38.1
Secondary education	56	35
Tertiary education	43	26.9
<b>Place of residence</b>		
Prefecture of Attika	114	71.3
Other prefectures	46	28.7

**Table 2.** Medical characteristics of lung cancer patients during COVID-19 pandemic.

	N	%
<b>Year of diagnosis</b>		
2019	42	26.3
2020	72	45.0
2021	46	28.7
<b>Time of onset of symptoms and first visit to the doctor</b>		
One month	66	41.3
3 months	14	8.8
>3 months	17	10.6
Randomly	28	17.5
Not given	35	21.9
<b>Treatment</b>		
Chemotherapy	57	35.6
Immunotherapy	40	25.0
Chemotherapy/Immunotherapy	26	16.3
Chemotherapy/radiotherapy	18	11.3
Chemotherapy/radiotherapy/immunotherapy	11	6.9
Radiotherapy/immunotherapy	8	5.0
Radiotherapy/immunotherapy		
<b>Comorbidity</b>		
Yes	73	45.6
No	87	54.4
<b>COVID-19 infection</b>		
Yes	11	6.9
No	149	93.1
<b>COVID-19 infection of family members</b>		
Yes	19	11.9
No	141	88.1

Regarding DT results, fatigue (63.7%), anxiety (46.9%), insurance and financial situation (28.7%) and family health problems (16.3%) were the most frequently reported outcomes and fertility (1.3%), substance use (1.9%), child-care (6.3%), spiritual/religious worries (9.4%) and depression (11.3%) were the least reported (**Table 3**).

DT was positively correlated with HLOC “chance” subscale ( $p < .001$ ) and HLOC “doctors” subscale ( $p < .001$ ). Also, regarding the subscales of DT, Family problems were correlated with practical problems ( $p < .001$ ), emotional prob-

lems with practical and family problems ( $p < .001$ ), physical problems with all the rest of DT subscales ( $p < .001$ ) (**Table 4**).

**Table 3.** Problems identified by DT (DT).

Problems	Yes		No	
	n	%	n	%
<b>Practical problems</b>				
Childcare	10	6.3	150	93.8
Feeding	17	10.6	143	89.4
Housing	20	12.5	140	87.5
Insurance/finances	46	28.7	114	71.3
Transportation	38	23.7	122	76.3
Work/school	23	14.4	137	85.6
Treatment-related decisions	37	23.1	123	76.9
<b>Family problems</b>				
Relations with children	16	10.0	144	90.0
Relations with spouses	11	6.9	149	93.1
Fertility	2	1.3	158	98.8
Family-health problems	26	16.3	134	83.8
<b>Emotional problems</b>				
Depression	18	11.3	142	88.8
Fears	35	21.9	125	78.1
Nervousness	66	41.3	94	58.5
Grief	47	29.4	113	70.6
Anxiety	75	46.9	85	53.1
Loss of interest in usual activities	46	28.7	114	71.3
<b>Spiritual/religious worries</b>	15	9.4	145	90.6
<b>Physical problems</b>				
Appearance	29	18.1	131	81.9
Bathing/dressing difficulties	33	20.6	127	79.4
Breathing	77	48.1	83	51.9
Changes in urination	50	31.3	110	68.8
Constipation	6	42.5	92	57.5
Diarrhea	17	10.6	143	89.4
Nutrition	36	22.5	124	77.5
Fatigue	102	63.7	58	36.3
Feeling of swelling	32	20.0	128	80.0

## Continued

Fever	12	7.5	148	92.5
Walk	61	38.1	99	61.9
Indigestion/dyspepsia	31	19.4	129	80.6
Memory/concentration	38	23.8	122	76.3
Mouth sores	19	11.9	141	88.1
Nausea	33	20.6	127	79.4
Nasal congestion	32	20.0	128	80.0
Pain	55	34.4	105	65.6
Sexual activity	59	36.9	101	63.1
Dry/itchy skin	66	41.3	94	58.8
Sleep	75	45.0	88	55.0
Substance use	3	1.9	157	98.1
Arm/leg tingling	55	34.4	105	65.6

**Table 4.** Correlation of health locus of control and distress thermometer (N = 160).

	1	2	3	4	5	6	7	8	9	10
1. Health Locus of Control Internal										
2. Health Locus of Control Chance	.09									
3. Health Locus of Control Doctors	.09	1.00**								
4. Health Locus of Control Others	.54**	.26**	.26**							
5. Distress Thermometer	-.09	.21**	.21**	.02						
6. Practical problems	-.17	-.07	-.07	-.10	.36**					
7. Family problems	-.07	.01	.01	-.02	.25**	.28**				
8. Emotional problems	-.11	.15	.15	-.03	.55**	.29**	.42**			
9. Religion/Spirituality	-.08	.02	.02	-.05	.17*	.24**	.02	.19*		
10. Physical problems	.01	.03	.03	.10	.48**	.36**	.38**	.54**	.12	

\*Correlation is significant at .05 level (2-tailed) \*\*Correlation is significant at .01 level (2-tailed).

As per multiple linear regression analyses, HLOC Doctors has a significant statistically positive influence on lung cancer patients' distress ( $p = .008$ ). More specifically in the presence of eHLOC patients rely more on their doctors about their lung cancer but they do not rely on others ( $p = .653$ ) (Table 5).

#### 4. Discussion

The aim of the present study was to investigate the association of HLOC with psychological distress among lung cancer patients during the COVID-19 pandemic. All patients were in advanced stage of their disease and were diagnosed



**Table 5.** Influence of locus of control on lung cancer patients' distress.

	<b>B</b>	<b>Std.Error</b>	<b>Beta</b>	<b>T</b>	<b>P</b>
Locus of control internal	-.33	.22	-.14	-1.50	.135
Locus of control doctor	.46	.17	.22	2.67	.008
Locus of control other	.11	.24	.04	.45	.653

Dependent variable: Distress Thermometer,  $R^2 = .06$ .

during the first two waves of the pandemic when a lot of restrictive measures were put in place to prevent COVID19 transmission and healthcare services were re-organized to meet the rising needs secondary to the pandemic (Albano et al., 2021; Indini et al., 2020; Di Giacomo et al., 2020).

Regarding COVID-19 infection a small percentage (6.9%) contracted the virus prior, during or after their treatment, which may be due to their shielding and raised self awareness for self-protective measures knowing COVID-19 is an airborne disease (Wang & Zhang, 2020; Tian et al., 2020; Liang et al., 2020). Family members presented low COVID-19 infection rates amidst the pandemic, alluding to increased cautiousness and protective measures by the entire family to protect their relative with lung cancer. To the best of our knowledge, this study is the first to provide evidence that lung cancer patients' behaviour is strongly associated with psychological distress and physicians should take this into consideration in order to promote better mental health and quality of life to this population.

In this study, the most prevalent problems concerned insurance and finances, family-health problems, anxiety and fatigue. The less frequent problems concerned childcare, fertility, depression, spiritual/religious worries and substance use. However, emotional and physical problems were found to be the main cause for emotional distress. This could be attributed to the fact that negative feelings derive from the therapy related side-effects, since the participants in this study were already being treated for their lung cancer. This is in agreement with other published papers where it has been shown that physical problems, could enhance psychological distress, and poor quality of life (Plank & Nemesure 2016; Chad-Friedman et al., 2017; Wang et al., 2017; Liu et al., 2018; Occhipinti et al., 2019).

In the present study, it was also found that HLOC is strongly associated with psychological distress and it increases proportionally. Increased eLOC is associated with higher psychological distress in lung cancer patients due to the patients' perception they are not in control of their disease and adopt behaviors negatively impacting their psychological status. This finding is consistent with previously published papers, supporting the opinion that when patients believe their health is controlled by chance or others, such as their doctors, they experience more mental health issues (Hashimoto & Fukuhar, 2004; Marton et al, 2021; Dopelt et al, 2022).

Moreover, the subscale of HLOC "doctors" was positively correlated with

psychological distress. This means that during the COVID-19 pandemic, patients followed their doctor's advice regarding which treatment they should have. According to Dopelt et al. (2022) many cancer patients rely on their doctors to make a decision for them because they face difficulties regarding treatment decisions, as was also found in the present study.

Psychological distress is increased when cancer patients rely on their doctors about cancer treatment decisions. These patients are retracted and they do not participate actively on the decision-making process. This leads to unhealthy behaviors, such as unhealthy diet and inactive lifestyle, which have been associated with deterioration of their health, poor prognosis, non-adherence to treatment and poor quality of life (Henselmans et al., 2015; Bailo et al., 2019).

This study has proven that iLOC is associated with psychological distress among lung cancer patients amidst COVID-19 pandemic, a finding which should be considered when treating cancer patients in highly unpredictable situations so as to screen patients for psychological distress and recognize whether they are characterized by external or internal LOC. However, there are some limitations which should be noted. Our study is limited by the non recording of lung cancer stage and the fact is it a single centre study. Despite these limitations, this study is the first to provide evidence that lung cancer patients' behavior is strongly associated with psychological distress and physicians should take this into consideration in order to promote better mental health and quality of life to this population.

## 5. Conclusion

HLOC is strongly associated with psychological distress and in the case of iLOC, the emotional state of lung cancer patients is compromised. Such patients should be screened for the existence of distress and referred to specialists to mitigate its effects on their quality of life and disease management.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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