Factors related to daily life interference in lung cancer patients: A cross-sectional regression tree study

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Introduction

- **In Taiwan, lung cancer has been the leading cause of cancer-related deaths since 1999, and the incidence has continued on an upward trend over the past decade (Department of Health, 2008).**
- **The overall 5-year rate of survival is in the 21%-24% range (Chiang et al., 2008).**

- **Among cancer patients, symptoms usually occur not in isolation, but in pairs, groups, or clusters, and also result from a variety of physiological, psychological, behavioral, and socio-cultural factors interacting with each other (Dodd et al., 2004;Parker et al., 2005).**

- **Symptom severity correlates with many aspects of illness, including treatment-related factors, psychosocial factors, physical conditions, comorbidities, and personal profiles and can seriously impact on patients' daily lives(Gift et al., 2004) .**

- **Most prior research on the relationship between symptom severity and symptom interference among lung cancer patients has focused on the study of individual symptoms in isolation or clusters rather than on the potential interactions and inter-relationships among various symptoms that can be used to classify subjects into high- and low-risk groups.**

Research Purpose

- The present study sought to identify symptom combination patterns and symptom severity levels that induce severe symptom interference level in daily life activities(**SIL-DLA**), including physical(**SIL-Phys**) and psychological activity interference(**SIL-Psy**) in lung cancer patients using regression tree modeling.

Material and Methods

Study design

- Cross-sectional, descriptive design
- Subjects were recruited from outpatient settings in a medical center in Taiwan.

Study participants

- **The inclusion criteria were:**
  - pathologically diagnosed lung cancer
  - over 18 years of age
  - free of cognitive impairments/mental illness
  - able to communicate in Mandarin or Taiwanese
  - willing to participate.

Study participants

- A total of 132 lung cancer patients were recruited.
- Only one patient was too weak to complete the interview.
- **131** participants completed the study.

Instruments

- **Demographic characteristics**
  - age
  - gender
  - years of education-more or less than nine years
  - marital status-married or other
  - employment status-employed, unemployed or retired, unemployed due to disease
  - religious affiliation-yes or no
  - smoking status-never smoked, has stopped smoking, still smoking

Disease-related characteristics

- cell type-small and non-small cell
- stage of disease-IA-IIIA or IIIB-IV
- metastasis
- disease duration
- complications-yes or no
- co-morbidity-yes or no
- self-perceived disease severity-no, moderate, and severe

Treatment-related characteristics

- cancer-related treatments-chemotherapy, chemotherapy combined with radiotherapy, and/or operation, others
- received since cancer diagnosis and during the most recent one-week period
- narcotics and/or analgesics used or not
- self-perceived treatment effectiveness-yes or no

Performance status (PS)

- PS was measured by the Eastern Cooperative Oncology Group (ECOG) performance status.
- The ECOG was rated on a scale of 0-5, where 0 was being fully active; and 5 being dead (Oken et al., 1982).
- PS was classified as good (scores of 0-1) or poor performance (scores of 2-4) (Cleeland et al., 2000).

Taiwanese version of the M.D. Anderson Symptom Inventory (MDASI-T)

- The original MDASI included two subscales
- thirteen core symptom items
  - pain, fatigue, sleep disturbance, distress, shortness of breath, memory difficulties, drowsiness, dry mouth, sadness, numbness, poor appetite, nausea and vomiting
- six symptom interference items
  - physical activities-general activity, walking, and normal work
  - psychological activities-mood, relationships with others, and enjoyment of life

- MDASI is a patient-reported outcome tool.
- Each symptom severity item was rated on an 11-point numeric scale
  - 0- not severe at all
  - 10- as severe as you can imagine
- Each symptom interference item was rated on a similar scale
  - 0- no interference
  - 10- complete interference

- The MDASI-T was developed using a standard translation and back-translation procedure, with content validity.
- Cronbach's α of internal consistency was 0.87 for symptom severity items and 0.86 for interference items.
- Test-retest reliability over a one-week interval was 0.77 for symptom severity items and 0.86 for interference items.

Data collection procedures

- Physicians referred the patients to the researcher.
- Researcher provided a verbal explanation of the study.
- Patients completed the questionnaire during a face-to-face interview.
- Disease- and treatment-related information were obtained from medical charts.

Ethical considerations

- The study was approved by the institution and permission was granted by the participating patients.
- All patients were informed that they could withdraw from the study at any time without penalty, and all information would be kept confidential.

Statistical analysis

- Demographics, disease- and treatment-related characteristics were expressed as a **mean ± standard deviation (SD)** for continuous variables and as **proportions** for categorical variables.
- The type of combinations and discriminate levels were used in a **regression tree analysis**.

Results

Participant characteristics

- The participant average age was **63.9** years.
- The mean duration of disease since diagnosis was **12.4** months.
- Almost three quarters (73.3%) of the participants had at least one co-morbidity.
- **91.6%** were diagnosed with non-small cell lung cancer
- **57.3%** of the participants had no metastasis

- **80.2%** had good performance status (ECOG=0-1).
- **77.9%** had received chemotherapy or combined cancer-related therapy treatments since diagnosis.

Table 1
Patient demographics and disease-related characteristics ($n = 131$).

Variable	n	(%)
Mean age (SD)	63.9	(12.8)
Age range	27–89	
Mean disease duration (SD)	12.4 (months)	(14.8)
Gender		
Male	65	(49.6)
Female	66	(50.4)
Years of education		
$<$ 9 yrs	78	(59.5)
$>$ 9 yrs	53	(40.5)
Marital status		
Married	93	(71.0)
Other	38	(29.0)
Employment		
Employed	10	(7.6)
Unemployed or retired	81	(61.8)
Unemployed due to disease	40	(30.5)
Religious affiliation		
Yes	87	(66.4)
No	44	(33.6)
Smoking status		
Never smoked	60	(45.8)
Stopped smoking	62	(47.3)
Keeps smoking	9	(6.9)

Table 1
Patient demographics and disease-related characteristics ($n = 131$).

Cell type		
SCLC	11	(8.4)
NSCLC	120	(91.6)
Stage of disease		
IA-IIIA	24	(18.3)
IIIB-IV	107	(81.7)
Metastasis		
Yes	56	(42.7)
No	75	(57.3)
Complication(s)		
Yes	63	(48.1)
No	68	(51.9)
Comorbidity(ies)		
Yes	96	(73.3)
No	35	(26.7)
Performance status		
Good (ECOG = 0-1)	105	(80.2)
Poor (ECOG = 2-4)	26	(19.8)
Self-perceived disease severity		
None	50	(38.2)
Moderate	34	(26.0)
Severe	47	(35.9)

Table 1
Patient demographics and disease-related characteristics ($n = 131$).

Variable	n	(%)
Treatment following disease diagnosis		
Chemotherapy	41	(31.3)
Chemotherapy combined with others	61	(46.6)
Others	29	(22.1)
Treatment administered during the previous week		
Yes	48	(36.7)
No	83	(63.4)
Narcotics and/or analgesics used or not		
Yes	41	(31.3)
No	90	(68.7)
Self-perceived treatment effect ($n = 122$)		
Yes	70	(57.4)
No	52	(42.6)

SD = standard deviation; SCLC = small cell lung cancer; NSCLC = non-small cell lung cancer; ECOG = Eastern Cooperative Oncology Group.

Symptom severity and symptom Interference

- The highest ranking five mean levels of symptom severity were **fatigue, dry mouth, shortness of breath, sleep disturbance and pain**.
- The highest ranking three activities in regard to the symptom interference level were **work, walking and enjoyment of life**.

Symptom severity and symptom Interference

Table 2
Symptom severity and symptom interference in lung cancer patients ($n = 131$).

Item	Mean	SD
Symptom severity	2.35	1.59
Fatigue	3.48	3.37
Dry mouth	2.91	3.38
Shortness of breath	2.80	2.91
Sleep disturbance	2.63	3.24
Pain	2.56	3.05
Lack of appetite	2.54	3.46
Sadness	2.51	3.50
Distress	2.47	3.36
Drowsiness	2.40	3.11
Difficulty remembering	2.02	3.05
Numbness	1.93	2.80
Nausea	1.50	2.79
Vomiting	0.81	2.10
Symptom interference	2.76	2.58
Physical interference	3.28	2.95
Work	4.22	3.73
Walking	3.42	3.33
General activity	2.20	3.17
Psychological interference	2.23	2.59
Enjoyment of life	2.82	3.69
Mood	2.50	3.35
Relationships with others	1.38	2.65

SD = standard deviation.

Regression tree models

Regression tree model for overall SIL-DLA

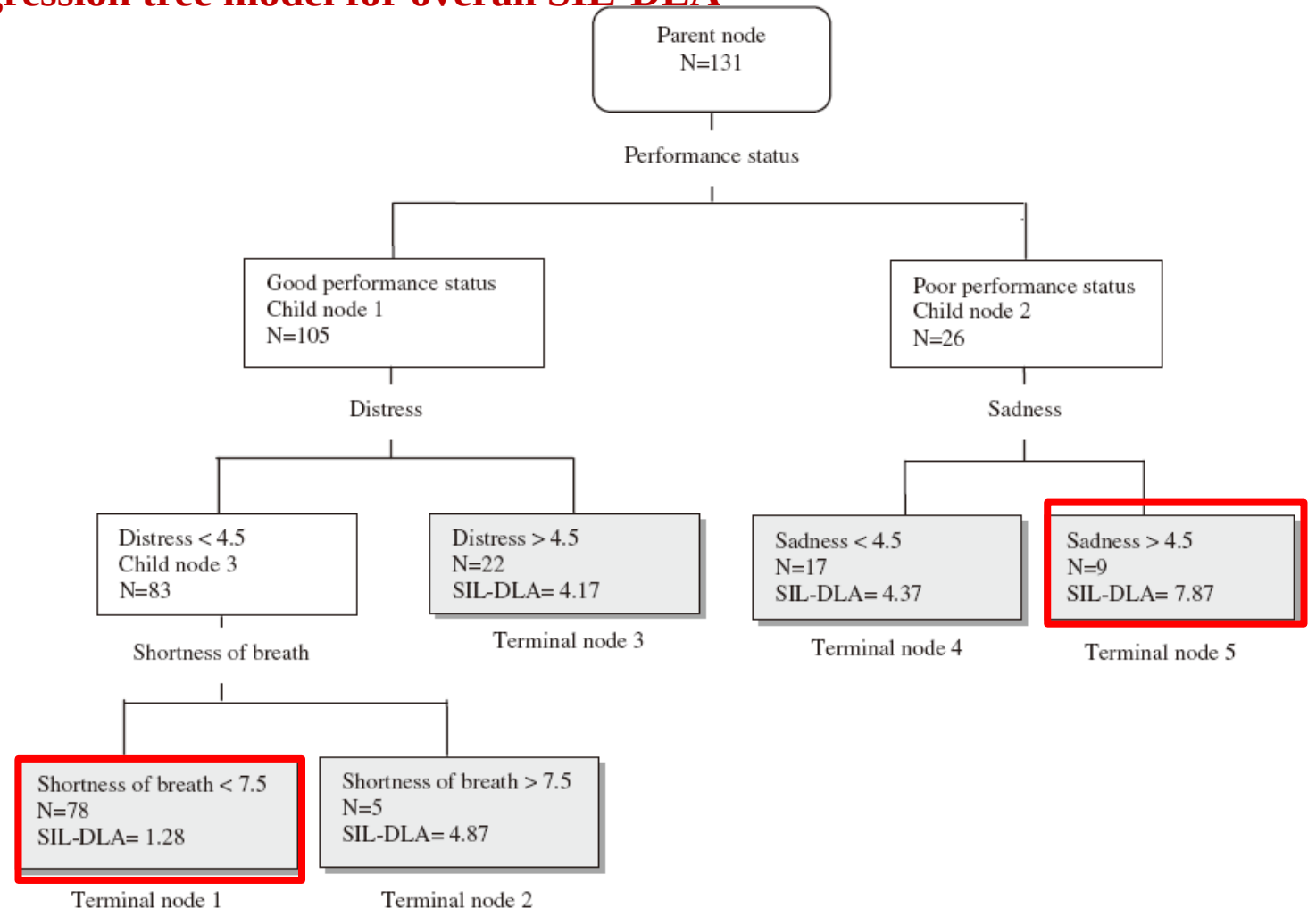

Fig. 1. Regression tree for symptom interference level in daily life activities of 131 lung cancer patients in Taiwan. SIL-DLA, symptom interference level in daily life activities; Parent node, start with an empty tree; Child node, the splitting attribute that was the most appropriate in separating the samples into distinct classes based on statistical goodness measure of split; Terminal node, the process was conducted recursively until the criterion of statistical stop rule was reached.

Regression tree model for SIL-Phys

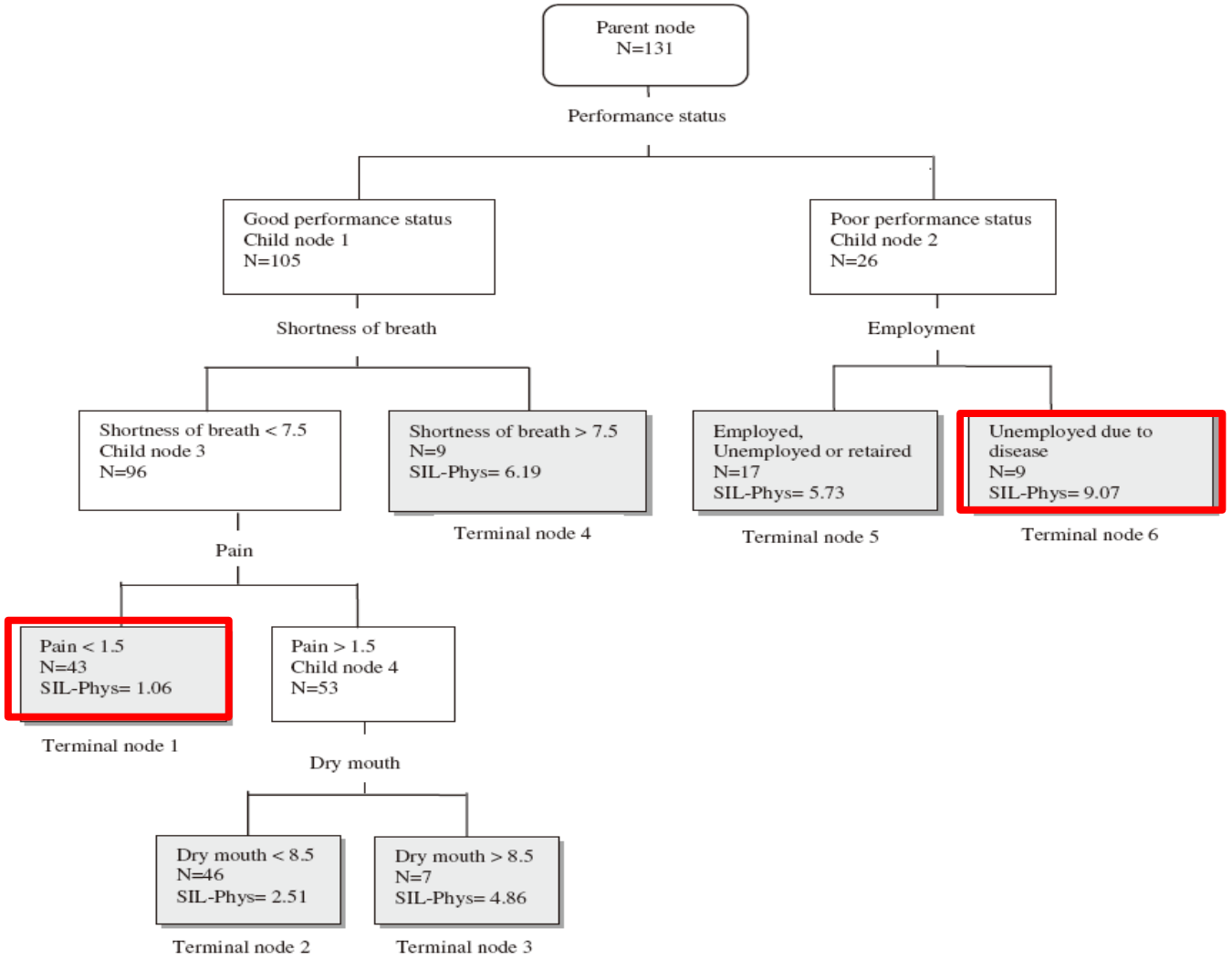

Fig. 2. Regression tree for symptom interference level in physical activities of 131 lung cancer patients in Taiwan. SIL-Phys, symptom interference level in physical activities; Parent node, start with an empty tree; Child node, the splitting attribute that was the most appropriate in separating the samples into distinct classes based on statistical goodness measure of split; Terminal node, the process was conducted recursively until the criterion of statistical stop rule was reached.

Regression tree model for SIL-Psy

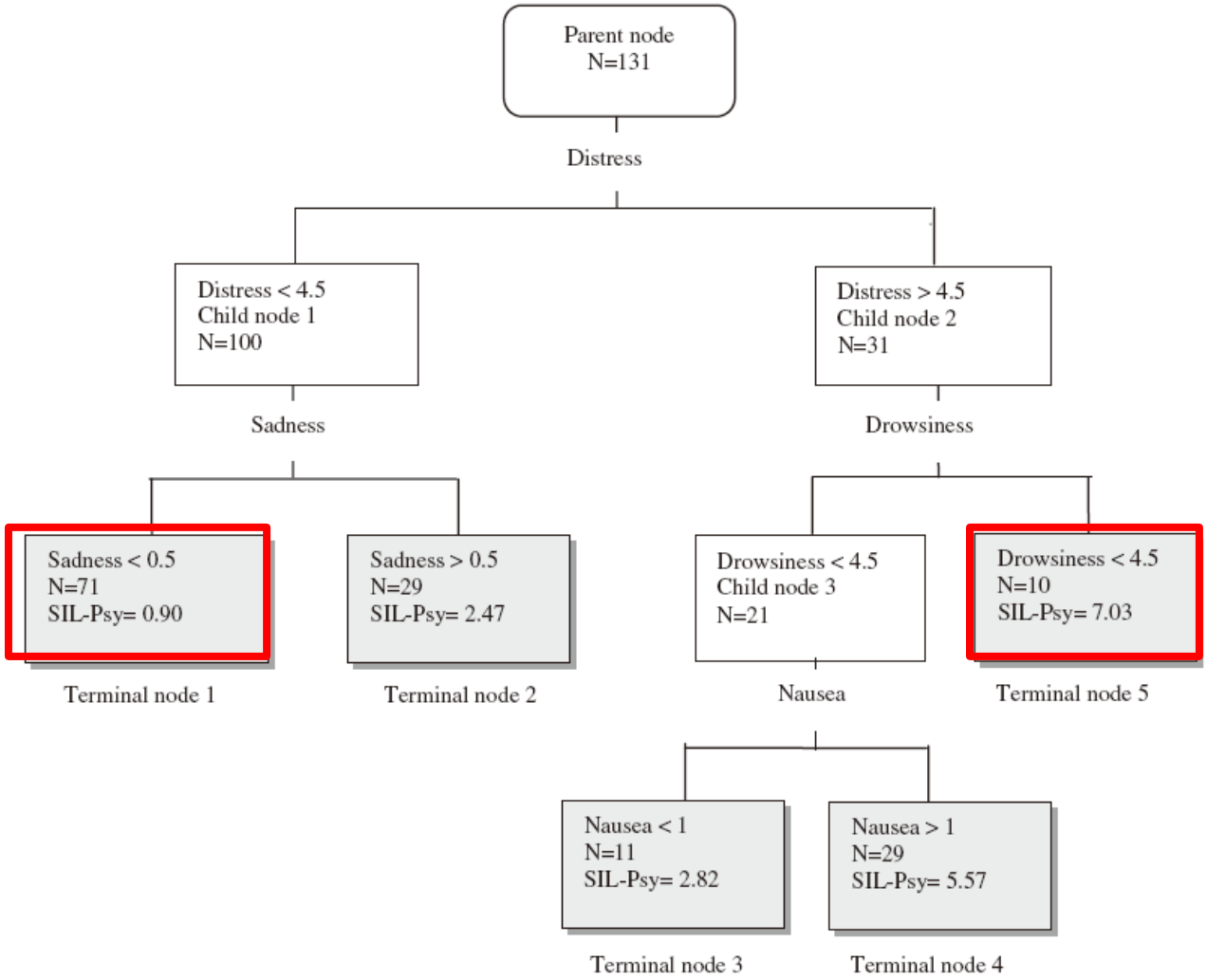

Fig. 3. Regression tree for symptom interference level in psychological activities of 131 lung cancer patients in Taiwan. SIL-Psy, symptom interference level in psychological activities; Parent node, start with an empty tree; Child node, the splitting attribute that was the most appropriate in separating the samples into distinct classes based on statistical goodness measure of split; Terminal node, the process was conducted recursively until the criterion of statistical stop rule was reached.

Conclusion

- **This study provided essential information to identify combination patterns of symptom interaction as well as each cutoff point related to symptom interference level among Taiwanese lung cancer patients.**
- **This study used an alternative approach to identify low- and high-risk groups of symptom interference.**

- **The regression tree analysis used in this study is different from traditional variable-oriented regression analysis. It is a subject-oriented multivariate statistic that aims to recognize people with the same characteristics by the overlap of many factors.**

- **Increased awareness and further understanding of the risk combinations and discriminate levels of symptom severity that induced high symptom interference offer different perspectives to develop patient-centered care planning for lung cancer patient rehabilitation.**

Thank you for your attention

Questions and Comments?