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Physical Activity Preferences Among Patients With Lung Cancer in Taiwan

KEY WORDS

Lung cancer
Physical activity
Self-efficacy
Social support

Background: Lung cancer is the leading cause of cancer deaths in the world. Physical activity could help lung cancer patients improve their health. **Objective:** The purpose of our study was to investigate lung cancer patients' physical activity preferences and relevant contributing factors, so that we could develop individualized intervention strategies to fit their needs. **Methods:** This study used a descriptive and correlational design. Instruments included a physical activity preference survey form, the Physical Activity Social Support Scale, and Physical Activity Self-efficacy Scale. **Results:** From 81 lung cancer patients' physical activity preferences, our results showed that during the course of their illness, 85.2% of patients wanted to have a physical activity consultation and preferred to obtain advice from their physicians (28.4%) through face-to-face counseling (48.1%). Moreover, patients (70.4%) showed an interest in physical activity programs, and many (69.1%) revealed that they were able to participate. About 88.9% of patients showed a preference for walking, and 54.3% patients preferred moderate physical activity. **Conclusions:** This study also revealed that social support and self-efficacy for physical activity effectively predicted moderate physical activity preferences. **Implications for Practice:** The adherence to regular physical activity is improved by understanding the lung cancer patients' unique preferences for physical activity.

L ung cancer is the leading cause of cancer deaths world-wide[1] and the top cause of cancer deaths in Taiwan. Five-year survival rates of lung cancer patients, dependent on their stage at diagnosis, range approximately from 10% to 54%.[2,3] Interventions that lead to improvements in their quality of life (QOL) will greatly benefit patients with lung cancer. Physical activity is an element of wellness promotion that is associated with lower morbidity and mortality

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and a higher QOL.[4,5] Broadly defined, "physical activity" refers to physical movement and energy consumption by skeletal muscles, including leisure-time physical activities, exercise, sports, transportation, occupational work, and chores. Thirty minutes of moderate physical activity a day improves health and physical fitness.[5] According to the US Healthy People 2010 program, physical activity is first among the top 10 individual and community health indicators.[6] Other sources confirm that regular physical activity provides many health benefits.[5,7]

Findings from previous studies indicate that physical activity can help lung cancer patients promote and maintain their health[8,9] and that effective participation in physical activity is influenced by patient motivation and adherence. Adherence to regular exercise is a challenge for generally healthy adults and even more difficult for cancer patients. Only about a fourth of cancer survivors engage in regular physical activities.[10–13] Understanding individual patient preferences for physical activity could help in designing ideal intervention strategies to improve patient adherence to regular physical activity.

Karvinen et al[14] found that the most preferred approach for exercise recommendations was face-to-face counseling provided by cancer center specialists among 397 bladder cancer patients. In another study of the physical activity counseling preferences of 90 head and neck cancer patients, patients also reported a preference for obtaining physical activity information through face-to-face counseling with physicians at cancer centers.[15]

Stevinson et al[16] surveyed preferences for physical activity programs among 359 patients with ovarian cancer and found that those patients preferred home-based physical activities, particularly walking, that began 3 to 6 months after cancer treatment. Additionally, Karvinen et al[14] studied the preferences for physical activity programs of 397 bladder cancer patients and found that those patients favored home-based physical activities that began immediately after cancer treatment; walking and other physical activities that required no supervisory guidance were more highly preferred. From the exercise preference survey of 307 cancer survivors, Jones and Courneya[17] also indicated that patients preferred walking, beginning the activity programs before cancer treatment, and engaging in morning exercise with moderate intensity with no assistance from either family members or supervisors.

Physical activity may help lung cancer patients promote and maintain their health. However, research on physical activity preferences of lung cancer patients is still lacking. Knowledge of the physical activity preferences of cancer patients can help in designing ideal interventions for them. Previous research mainly investigated the impact of the popularity of physical activities,[10–13,18] demographic characteristics, and the cancer treatment status on the physical activity preferences of cancer patients but did not reflect an assessment of psychosocial conditions. To our knowledge, this is the first study to investigate the physical activity preferences of lung cancer patients. We also evaluated social support and self-efficacy impacts on physical activity preferences. Implications from this study will have the potential to improve lung cancer patients' physical activity levels and their QOL.

■ Methods

Patients and Setting

This survey study used a descriptive correlational study design and convenience sampling to collect data from survey questionnaires that patients filled in by themselves. Participants were registered lung cancer patients in the clinical chest and surgery departments of 2 medical centers, one each in northern and southern Taiwan. Inclusion criteria were as follows: diagnosed with lung cancer by a primary physician, treated (surgery, chemotherapy, radiation therapy, and/or targeted therapy), and have no evidence of recurrent or progressive disease; patients were 18 years old or older and were able to communicate in Mandarin or Taiwanese.

Instruments

Demographic and Disease Characteristics

Participants reported basic demographic and health variables including age, gender, occupation, educational level, living status, marital status, religion, and treatment complications. Disease and treatment conditions included the disease stage, treatment modalities, and the Karnofsky performance status.

Physical Activity Preferences

On the survey form, physical activity preference questions consisted of 2 parts. The first part consisted of 5 questions to determine patient preferences for physical activity counseling, and the second part consisted of 14 questions to determine the physical activity preferences. We adopted physical activity counseling and program preference questionnaires designed for cancer survivors by Jones and Courneya[17] that were previously applied to survey bladder cancer, head and neck cancer, endometrial cancer, and breast cancer patients.[14,15,19,20] The physical activity preference questions were first translated into Chinese and then back-translated into English, and the 2 English versions were compared. The validity was established by a panel of experts.

Social Support for the Physical Activity Scale

We used the "perceived social support specific to health-related exercise behaviors scale" with 13 questions developed by Sallis et al[21] to evaluate physical activity social support levels in our study. The evaluation used a 5-point Likert scale ranging from 1 indicating "never" (received support) to 5 indicating "always" (received support). The scale of social support revealed how much physical activity support participants received from their family, friends, and medical staff. A study by Sallis et al[21] surveyed family's and friends' support for participants' physical activity with a test-retest reliability of 0.55 to 0.79 in a 2-week period. Williams et al[22] studied psychosocial predictors for physical activity adjustment and maintenance of 205 healthy adults and determined good reliability and a high internal consistency of 0.91 to 0.92.

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Physical Activity Self-efficacy Scale

We used a self-efficacy questionnaire designed by Marcus et al[23] with 5 questions, each scored from 1 point indicating no self-confidence to 5 points indicating strong self-confidence. The questionnaire was translated into Chinese using a translation and back-translation process. This questionnaire was used to evaluate how much self-confidence a patient needs to maintain consistent physical activity in unfavorable situations. Williams et al[22] studied predictable psychosocial factors for physical activity adjustment and maintenance of 205 healthy adults and determined it had good reliability and an internal consistency of .86.

Procedures

This study was reviewed and approved by the institutional review board of Taipei Medical University, Taiwan. The study began with lung cancer patient enrollment carried out in the chest and surgical department of 2 medical centers, one each in northern and southern Taiwan. We sought approval from the primary physicians to contact their patients (as required by our ethics board). During patient enrollment, researchers explained the study purpose and data collection methods and ensured patients that their right to receive appropriate medical care would not be affected by whether they participated in the study, and written consent was obtained from all participants. Researchers explained to participants how to complete the questionnaire and allowed them to fill out the basic personal information and a structured questionnaire that was completed in about 10 minutes. Patients who were unable to complete the survey questionnaire themselves were assisted by a researcher who read out the questions one by one and recorded the patient's answers. During the course of the study, participants were informed that their wishes and rights to withdraw were respected.

Statistical Analysis

The SPSS17.0 software package (SPSS, Chicago, Illinois) was utilized for data analysis, descriptive statistics, and inferential statistics. Descriptive statistics, including the frequency, percentages, means, and SDs, were used to describe lung cancer patient demographic data, health status, disease and treatment statuses, and physical activity counseling and program preferences. Inferential statistics used a logistic regression analysis to examine factors influencing the relationship between physical activity counseling and program preferences.

■ Results

Demographic and Disease Characteristics

Data for physical activity preferences among 81 lung cancer survivors, including 43 men and 38 women, are provided as follows. The average age of the participants was 61.37 (SD, 11.36) years. Most patients (75.3%) were unemployed or retired, and 79% of them were married. Thirty percent of pa-

tients had finished college or above, and 88.9% of the patients lived with their families. The majority of patients (60.5%) had comorbid disease, and 64.2% of them had a normal body weight index (body mass index [BMI]). Detailed data of the demographic and health status profiles of participants are presented in Table 1.

Disease and treatment information indicated that 43.2% of participants were at stage I, 69.1% had undergone surgery, and 53.1% had received chemotherapy. On average, participants had been diagnosed 26.14 (SD, 28.15) months before entering this study. Most of the participants had a good Karnofsky performance status (range, 70–100). Other information is presented in Table 2.

⁂ Table 1 • Descriptive Statistics of the Demographic and Health Status Characteristics of Lung Cancer Survivors

Variable	Mean (SD)	Range
Age, y	61.37 (11.36)	30–82
Comorbid conditions	0.80 (0.81)	0–3
Body mass index, kg/m^2	23.59 (3.79)	17.01–33.53

Variable	Frequency	%
Age,[a] y		
<65	47	58
≥65	34	42
Gender		
Male	43	53.1
Female	38	46.9
Employment status		
Employed	20	24.7
Unemployed or retired	61	75.3
Educational level		
None	9	11.1
Elementary	18	22.2
Junior high	6	7.4
Senior high	23	28.4
College or above	25	30.9
Marital status		
Never married	2	2.5
Married	64	79
Divorced	7	8.6
Widowed	8	9.9
Living arrangement		
Alone	9	11.1
With others	72	88.9
Religious beliefs		
No	16	19.8
Yes	64	78.9
No. of comorbid conditions		
None	32	39.5
1	37	45.7
2	8	9.9
≥3	4	4.9

[a]The cutoff point of 65 years was based on Nelson et al.[24]

Table 2 • Descriptive Statistics of Disease and Treatment Characteristics of Lung Cancer Survivors

Variable	Mean (SD)	Range
Karnofsky performance status	92.84 (6.37)	70–100
Time since diagnosis, mo	26.14 (28.15)	1–159

Variable	Frequency	%
Stage of cancer[a]		
I	35	43.2
II	1	1.2
III	17	21
IV	20	24.7
Treatment[b]		
Operation[c]	56	69.1
Radiotherapy	15	18.5
Chemotherapy	43	53.1
Target therapy	26	32.1

[a]The frequency was less than 81 because of missing data.
[b]The frequency added up to more than 81 because some patients had received more than 1 treatment.
[c]Defined as receiving either endoscopic procedures or an operation.

Physical Activity Counseling Preferences

For physical activity counseling, 85.2% of participants preferred to receive physical activity counseling during their cancer experience. Moreover, 48.1% of participants preferred to receive physical activity counseling face to face, 28.4% preferred to receive it from an oncologist, and 21% preferred to receive it at 3 to 6 months after treatment. Detailed data of the physical activity counseling preferences of participants are provided in Table 3.

Physical Activity Program Preferences

Regarding physical activity programs, most participants (70.4%) were interested in a physical activity program, and 69.1% were able to participate in such a program. For the physical activity program, 96.3% of participants preferred recreational activities, 92.6% preferred a flexible physical activity program, 88.9% preferred walking, 64.2% preferred unsupervised physical activities, 55.6% preferred the same activity each time, and 54.3% preferred moderate-intensity physical activity.

Additionally, 53.1% of participants preferred physical activity in the early morning, 54.3% preferred outdoor activities, 44.4% preferred physical activity alone, and 23.5% preferred to begin their physical activity 3 to 6 months after treatment. Detailed data of the physical activity program preferences of participants are provided in Table 4.

Differences in Physical Activity Counseling Preferences

With regard to differences in physical activity counseling preferences, a higher percentage of participants with a college education (52.9% vs 25%, $\chi^2 = 4.91$, $P < .027$) preferred to receive physical activity counseling from an exercise specialist affiliated with a cancer center. Moreover, a higher percentage of participants who were employed (55.6% vs 20.8%, $\chi^2 = 5.187$, $P < .037$), had completed college (66.7% vs 26.4%, $\chi^2 = 6.082$, $P < .022$), and had no comorbid conditions (77.8% vs 34.7%, $\chi^2 = 6.205$, $P < .025$) preferred to receive physical activity counseling face to face.

Differences in Physical Activity Program Preferences

With regard to differences in physical activity program preferences, a higher percentage of participants who were illiterate (94.8% vs 50%, $\chi^2 = 11.13$, $P < .026$), were female (81.3% vs 38.5%, $\chi^2 = 9.439$, $P < .002$), had less than a college education (100% vs 61.5%, $\chi^2 = 8.901$, $P < .002$), and had not

Table 3 • Preferences Regarding Physical Activity Counseling of Lung Cancer Patients

Preference Variable	n (%)
Would you prefer to receive exercise counseling? (n = 81)	
Yes	69 (85.2)
No	3 (3.7)
Maybe	9 (11.1)
From whom would you prefer to receive exercise counseling? (n = 100)[a]	
Oncologist	23 (28.4)
Nurse	18 (22.2)
Exercise specialist affiliated with a cancer center	17 (21)
Another cancer patient/survivor	2 (2.5)
No preference	40 (49.4)
When would you prefer to receive exercise counseling? (n = 81)	
Before treatment	11 (13.6)
During treatment	14 (17.3)
Immediately after treatment	11 (13.6)
3-6 mo after treatment	17 (21)
At least 1 y after treatment	8 (9.9)
No preference	20 (24.7)
Where would you prefer to receive exercise counseling? (n = 81)	
Cancer center	29 (35.8)
Community center	7 (8.6)
At home	13 (16)
No preference	32 (39.5)
How would you prefer to receive exercise counseling? (n = 92)[a]	
Face to face	39 (48.1)
By telephone	9 (11.1)
Videotape	15 (18.5)
Brochure/pamphlet	17 (21)
On audiotape	1 (1.2)
No preference	10 (12.3)

[a]Total values of n being more than 81 was due to some respondents listing more than 1 type.

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Table 4 • Preferences Regarding Physical Activity Programs of Lung Cancer Patients	
Preference Variable	n (%)
Would you be interested in an exercise program? (n = 81)	
Yes	57 (70.4)
No	9 (11.1)
Maybe	15 (18.5)
Are you able to participate in an exercise program? (n = 81)	
Yes	56 (69.1)
No	4 (4.9)
Maybe	21 (25.9)
With whom would you prefer to exercise? (n = 81)	
Alone	36 (44.4)
With 1 to 2 cancer survivors	1 (1.2)
With 1 to 2 non–cancer survivors	1 (1.2)
With a group of cancer survivors	7 (8.6)
With a group of non–cancer survivors	13 (16)
Other	21 (25.9)
No preference	2 (2.5)
Where would you prefer to exercise? (n = 81)	
At home	16 (19.8)
At a community exercise center	7 (8.6)
Outdoors	44 (54.3)
No preference	14 (17.3)
What time of day would you prefer to exercise? (n = 91)[a]	
Early morning	43 (53.1)
Morning	7 (8.6)
Afternoon	20 (24.7)
Evening	12 (14.8)
No preference	9 (11.1)
When would you prefer to start an exercise program? (n = 81)	
Before treatment	18 (22.2)
During treatment	11 (13.6)
Immediately treatment	8 (9.9)
3–6 mo after treatment	19 (23.5)
At least 1 y after treatment	7 (8.6)
No preference	18 (22.2)
What type of exercise would you prefer to do? (n = 182)[a]	
Walking	72 (88.9)
Dancing	7 (8.6)
Swimming	9 (11.1)
Cycling	22 (27.2)
Jogging	5 (6.2)
Ball games	4 (4.9)
Qigong	22 (27.2)
Gymnastics	31 (38.3)
Other	10 (12.3)
What intensity would you prefer your exercise program to be? (n = 81)	
Low	35 (43.2)
Moderate	44 (54.3)
High	1 (1.2)
No preference	1 (1.2)
continues	

Table 4 • Preferences Regarding Physical Activity Programs of Lung Cancer Patients, Continued	
Preference Variable	n (%)
What type of activity would you like to perform? (n = 81)	
Same each time	45 (55.6)
Different each time	15 (18.5)
No preference	21 (25.9)
How would you prefer to perform these exercises? (n = 81)	
Supervised	13 (16)
Unsupervised	52 (64.2)
By kind of exercise	10 (12.3)
No preference	6 (7.4)
How would you prefer the structure of your exercise program to be? (n = 81)	
Flexible	75 (92.6)
Scheduled	6 (7.4)
What type of activities would you prefer? (n = 81)	
Recreational	78 (96.3)
Competitive	3 (3.7)

[a]Total values of n being more than 81 was due to some respondents listing more than 1 type.

undergone surgery (56.3% vs 24.6%, $\chi^2 = 6.022$, $P < .031$) or radiotherapy (100% vs 76.6%, $\chi^2 = 4.615$, $P < .033$) preferred to engage in a physical activity program at home. In addition, a higher percentage of participants who were younger than 65 years preferred unsupervised physical activity, and those with comorbid conditions (72.1% vs 47.4%, $\chi^2 = 5.161$, $P < .023$) preferred physical activities in the early morning. Finally, a higher percentage of participants who were single (57.1% vs 6.8%, $\chi^2 = 10.438$, $P < .002$) and had no comorbid conditions (85.7% vs 35.1%, $\chi^2 = 6.846$, $P < .014$) preferred dancing, and those with a normal BMI preferred qigong (81.8% vs 57.6%, $\chi^2 = 4.080$, $P < .043$) and moderate-intensity physical activity (73.3% vs 51.4%, $\chi^2 = 4.088$, $P < .043$).

Table 5 shows the results of the logistic stepwise regression analysis, which indicated that participants who had higher social support and self-efficacy were more likely to participate in a moderate- to vigorous-intensity physical activity program ($\chi^2 = 13.941$, $P < .001$).

■ Discussion

Previous studies showed that physical activity can help cancer patients promote and maintain their health.[10,12] In addition, understanding cancer patients' preferences for physical activities could facilitate development of intervention tactics to meet the needs of cancer patients and increase their regular participation in and compliance with physical activities; however, a survey of physical activity preferences of lung cancer

Table 5 • Prediction of Preferences Regarding Physical Activity Intensity (n = 81)

Variable	B	SE	P	OR	95% CI
Social support	0.067	0.027	0.013	1.069	1.014–1.127
Self-efficacy	0.086	0.040	0.029	1.090	1.009–1.178
Constant	−3.098	1.049	0.003	0.045	

Abbreviations: B, regression coefficient; CI, confidence interval; OR, odds ratio.

patients is still urgently needed. Our study results show that, in the course of lung cancer morbidity, the majority of lung cancer patients (85.2%) were willing to receive physical activity counseling. In some other cancer patient groups, about 70% to 84% of cancer patients were willing to receive similar counseling.[17,25–27] About 88.9% of our study participants were interested in physical activity programs, which is similar to the findings in some other cancer patient groups.[14,24]

About 90% of lung cancer patients participating in our study reported being able or possibly able to participate in physical activities or program plans, compared with 80% of other cancer patients diagnosed with a brain tumor or lymphoma.[26,27] We conclude from these data that implementing physical activities as a cancer patient care intervention is feasible. Our results showed that the majority of lung cancer patients preferred consultation with a physician (oncologist) for advice regarding physical activities. This is consistent with a report by Rogers et al[20] on head and neck cancer patients. However, among patients with other cancers (bladder cancer, endometrial cancer, breast cancer, prostate cancer, etc), most patients preferred to seek advice from sports counselors at hospitals. There are 2 possible reasons for this. First, there is a cultural difference that physicians in Taiwan are much more respected than any other healthcare professionals, so their advice is more convincing and better accepted by patients. Second, hospitals usually do not provide physical activity counselors for patients as an option for physical activity advice. In addition, nearly half of patients with lung cancer (49.4%) reveal no preferences regarding resources for physical activity consultation. Future studies should focus on how to increase participants' responses regarding their preference. In the present study, about half of the participants followed the physicians' and nurses' advice about physical activities; however, physicians and nurses do not have appropriate sports professional training or certification in Taiwan. Therefore, training and preparing physicians and nurses for physical activity counseling are now areas for educational attention and improvement.

Face-to-face physical activity counseling was another preference of our lung cancer participants, and this finding is consistent with several previous studies that included patients treated for lung cancer, bladder cancer, breast cancer, head and neck cancer, endometrial cancer, and prostate cancer.[14,15,19,20,25] Primary brain tumor patients are more interested in obtaining physical activity counseling through a different way utilizing technological tools, such as the Internet or CD-ROMs, perhaps secondary to younger patients having higher social and economic status.[26] The physical activity information acquired by the face-to-face method highlights a gap between what is currently provided and what patients desire. Moreover, face-

to-face programs provide immediate feedback and increase the motivation to exercise. These results indicate that future study designs related to physical activities should consider face-to-face counseling.

As our study shows, more than half of lung cancer patients (54.3%) preferred outdoor physical activity programs that were also favored by head and neck cancer patients,[28] whereas bladder cancer, breast cancer, ovarian cancer, and brain tumor patients were more inclined to exercise at home.[14,16,20,26] Outdoor physical activities normally associated with fresh and better-circulating air seemed to be more desirable for lung cancer patients who often have respiratory defects. Contrary to what we observed, a study by Jones and Courneya[17] on prostate cancer, breast cancer, colon cancer, and lung cancer patients revealed that lung cancer patients preferred indoor physical activities. One possible reason for this discrepancy in physical activity preferences between our study and Jones and Courneya's findings[17] is that lung cancer patients (n = 19) of a total of 307 patients were a relatively small sample size in their study as the majority were breast cancer (n = 154) and prostate cancer (n = 90) patients. Collectively, current findings indicate that the future designs of physical activities for cancer patients should consider environmental conditions (slippery path, extreme temperatures, etc) that can substantially increase risks of outdoor programs.

Additionally, our study participants preferred engaging in physical activity alone, similar to the preference expressed by patients with bladder cancer, breast cancer, head and neck cancer, and prostate cancer.[14,17,20,28] When they preferred companions, our study participants were more interested in doing physical activities together with family members. Jones and Courneya[17] and Stevinson et al,[16] respectively, found the same preference among brain tumor and ovarian cancer patients. The results of our study showed that the design of physical activity programs for patients with lung cancer should not ignore individual emphasis and the role of family support. Physical activities have not only health benefits but also risks, such as potentially harmful changes in the heart rate and shortness of breath. Because lung cancer patients tend to be alone during physical activity, the design of safe and nonstressful physical activity programs for them is very important and should not be overlooked.

We also found that more than half of lung cancer survivors (55.6%) were willing to exercise after treatment, particularly 3 to 6 months after treatment; 23.5% of patients with bladder cancer, endometrial cancer, and ovarian cancer desired to begin physical exercise at similar time points when the adverse effects of treatment had almost completely disappeared. Only about 20% of lung cancer patients and a similar portion

of prostate cancer and breast cancer patients chose physical activity plans before treatment began. As to the timing of physical activity, mornings were the first choice for 60% of patients with lung cancer and for similar portions of other patients with breast cancer and endometrial cancer.[19,20] Although the best daily physical activity timing and the ideal time point according to cancer therapy to implement physical activity for lung cancer patients are not yet clear, knowing patients' most preferred exercise starting point and timing would be helpful for planning exercise intervention programs that would increase patient compliance with regular exercise.

Walking programs (88.9%) were the most preferred exercise for lung cancer patients, followed by gymnastics (ie, range of motion exercise, including motions of head and neck, shoulder, knee, and body trunk), whereas cycling and qigong exercises were tied for third. The same trends were found in other cancer patients,[14,16,17,20,26–28] who chose walking as the preferred physical activity. Walking is one of the lightest physical activities with no additional need for equipment or instructors.[27] In addition, in terms of exercise intensity, about 50% of lung cancer patients chose moderate exercises, as did 50% of patients with head and neck cancer, 56% of patients with prostate cancer and endometrial cancer, and 61% of breast cancer patients. Those studies indicated that future designs of physical activities for cancer patients should include walking and other moderate exercise programs that appeal to the interests of the majority of patients.

As to preferences for the physical activity structure, lung cancer patients strongly favored exercise of a recreational nature (96.3%) over activities of a competitive nature (3.7%). Jones and Courneya[17] and Gjerset et al[24] showed similar preferences for physical activity structure in patients with prostate cancer and breast cancer. Moreover, lung cancer patients preferred a physical activity structure with flexibility (92.6%) and no supervisors (64.2%), the same preferences as found in bladder cancer, breast cancer, and head and neck cancer patients. However, endometrial cancer patients preferred a physical activity structure with a regular schedule and a supervisor.[19] These results suggest that flexible, unsupervised physical activities of a leisure nature would be highly accepted by lung cancer patients.

In terms of factors affecting patients' physical activity program preferences, we discovered that gender, educational level, treatment status, age, other chronic diseases, marital status, and BMI were involved in the preferences of lung cancer patients for physical activity programs. Vallance et al[27] also found in a study of non-Hodgkin lymphoma patients that exercise preferences were affected by gender, educational level, age, marital status, and BMI. Another study showed that, for ovarian cancer patients, age, educational level, and working conditions also influenced physical activity program preferences.[16]

This study showed that female patients with less than a college education and with neither surgical treatment nor radiotherapy preferred doing physical activities at home. A previous study indicated that obese and elderly patients with bladder cancer also preferred to exercise at home, but gender was not relevant to this preference.[14] The gender preference for home exercises by female patients may be due to a Taiwanese tradition of men providing for the family by working away from home and women being more homebound. Furthermore, 1 study found that ovarian cancer patients younger than 65 years and with an educational of less than high school also preferred to engage in activities at home.[16]

The intensity preference of physical activities by lung cancer survivors was affected by the BMI. Normal-BMI patients favored physical activities of moderate intensity. Research performed on breast cancer patients by Rogers et al[28] showed that a high BMI and older breast cancer survivors are associated with mild physical activities.

Physical activity may help cancer patients promote and maintain good health. Encouraging regular participation in physical activities can achieve maximal benefits for cancer patients. From our study, lung cancer patients preferred to exercise by walking and were more likely to accept a moderate-exercise structure. These are well aligned with the emphasis on indicators of moderate physical exercise from the US Centers for Disease Control and Prevention and the American College of Sports Medicine. Moreover, it is worth noting that this study found that high social support and self-efficacy can effectively predict lung cancer patients' participation in physical activities of moderate to vigorous intensity. The future planning of lung cancer patients' physical activity programs should not overlook enhancing a patient's support system and self-efficacy. In such efforts, lung cancer patients can effectively engage in regular moderate to vigorous physical activities to maintain and promote their health; enhancing the QOL of lung cancer survivors is the ultimate goal.

There are several limitations of this study. First, resources and time were limited, so only a cross-sectional study was carried out. In the future, a longitudinal study should be considered to investigate changes and trends of lung cancer patients' physical activity preferences over time. Second, because of rather shorter lung cancer patient survival, the severe nature of the disease, and convenience for sample data collection, only metropolitan medical centers were included in this study. In future studies, we need to include patients in rural hospitals and other types of hospitals to increase the ability to generalize the study's inferences. Third, the closed questionnaire method used in this study might not reflect all of the physical activity preferences of the responding lung cancer patients. In future studies, the same questionnaires combined with qualitative interviews or a survey with open-ended questions would more truly reveal patient preferences.

■ Conclusions and Relevance to Clinical Practice

This is the first article to specifically investigate the physical activity preferences of lung cancer patients, and the study showed that walking was the most preferred physical activity for such patients and that social support and self-efficacy could effectively predict preferences for moderate to vigorous physical

activities. These results provide a valuable recommendation for future designs of physical activity interventions to improve the QOL of lung cancer patients.

References

1. Jemal A, Siegel R, Xu J, Ward E. Cancer statistics, 2010. *CA Cancer J Clin.* 2010;60(5):277–300.
2. Sugimura H, Yang P. Long-term survivorship in lung cancer: a review. *Chest.* 2006;129(4):1088–1097.
3. Yabroff KR, Lawrence WF, Clauser S, Davis WW, Brown ML. Burden of illness in cancer survivors: findings from a population-based national sample. *J Natl Cancer Inst.* 2004;96(17):1322–1330.
4. Blair SN, Cheng Y, Holder JS. Is physical activity or physical fitness more important in defining health benefits? *Med Sci Sports Exerc.* 2001; 33(Suppl 6):S379–S399.
5. Bouchard C, Blair SN, Haskell WL. *Physical Activity and Health.* Champaign, IL: Human Kinetics; 2007.
6. US Department of Health and Human Services. *Health People 2010.* McLean, VA: International Medical Publishing, Inc; 2000.
7. Brown DR, Heath GW, Martin SL. *Promoting Physical Activity: A Guide for Community Action.* Champaign, IL: Human Kinetics; 1999.
8. Jones LW, Eves ND, Peterson BL, et al. Safety and feasibility of aerobic training on cardiopulmonary function and quality of life in postsurgical nonsmall cell lung cancer patients: a pilot study. *Cancer.* 2008;113(12):3430–3439.
9. Riesenberg H, Lübbe AS. In-patient rehabilitation of lung cancer patients—a prospective study. *Support Care Cancer.* 2010;18(7):877–882.
10. Bellizzi KM, Rowland JH, Arora NK, Hamilton AS, Miller MF, Aziz NM. Physical activity and quality of life in adult survivors of non-Hodgkin's lymphoma. *J Clin Oncol.* 2009;27(6):960–966.
11. Lynch BM, Cerin E, Owen N, Hawkes AL, Aitken JF. Prospective relationships of physical activity with quality of life among colorectal cancer survivors. *J Clin Oncol.* 2008;26(27):4480–4487.
12. Milne HM, Gordon S, Guilfoyle A, Wallman KE, Courneya KS. Association between physical activity and quality of life among Western Australian breast cancer survivors. *Psychooncology.* 2007;16(12):1059–1068.
13. Stevinson C, Faught W, Steed H, et al. Associations between physical activity and quality of life in ovarian cancer survivors. *Gynecol Oncol.* 2007;106(1):244–250.
14. Karvinen KH, Courneya KS, North S, Venner P. Associations between exercise and quality of life in bladder cancer survivors: a population-based study. *Cancer Epidemiol Biomarkers Prev.* 2007;16(5):984–990.
15. Rogers LQ, Courneya KS, Robbins KT, et al. Physical activity correlates and barriers in head and neck cancer patients. *Support Care Cancer.* 2008;16(1):19–27.
16. Stevinson C, Capstick V, Schepansky A, et al. Physical activity preferences of ovarian cancer survivors. *Psychooncology.* 2009;18(4):422–428.
17. Jones LW, Courneya KS. Exercise counseling and programming preferences of cancer survivors. *Cancer Pract.* 2002;10(4):208–215.
18. Rogers LQ, Courneya KS, Robbins KT, et al. Physical activity and quality of life in head and neck cancer survivors. *Support Care Cancer.* 2006;14(10):1012–1019.
19. Karvinen KH, Courneya KS, Campbell KL, et al. Exercise preferences of endometrial cancer survivors: a population-based study. *Cancer Nurs.* 2006;29(4):259–265.
20. Rogers LQ, Markwell SJ, Verhulst S, McAuley E, Courneya KS. Rural breast cancer survivors: exercise preferences and their determinants. *Psychooncology.* 2009;18(4):412–421.
21. Sallis JF, Grossman RM, Pinski RB, Patterson TL, Nader PR. The development of scales to measure social support for diet and exercise behaviors. *Prev Med.* 1987;16(6):825–836.
22. Williams DM, Lewis BA, Dunsiger S, et al. Comparing psychosocial predictors of physical activity adoption and maintenance. *Ann Behav Med.* 2008;36(2):186–194.
23. Marcus BH, Selby VC, Niaura RS, Rossi JS. Self-efficacy and the stages of exercise behavior change. *Res Q Exerc Sport.* 1992;63(1):60–66.
24. Nelson ME, Rejeski WJ, Blair SN, et al. Physical activity and public health in older adults: recommendation from the American College of Sports Medicine and the American Heart Association. *Circulation.* 2007;116(9): 1094–1105.
25. Gjerset GM, Fosså SD, Courneya KS, Skovlund E, Jacobsen AB, Thorsen L. Interest and preferences for exercise counselling and programming among Norwegian cancer survivors. *Eur J Cancer Care.* 2011;20(1):96–105.
26. Jones LW, Guill B, Keir ST, et al. Exercise interest and preferences among patients diagnosed with primary brain cancer. *Support Care Cancer.* 2007; 15(1):47–55.
27. Vallance JK, Courneya KS, Jones LW, Reiman T. Exercise preferences among a population-based sample of non-Hodgkin's lymphoma survivors. *Eur J Cancer Care.* 2006;15(1):34–43.
28. Rogers LQ, Malone J, Rao K, et al. Exercise preferences among patients with head and neck cancer: prevalence and associations with quality of life, symptom severity, depression, and rural residence. *Head Neck.* 2009;31(8): 994–1005.

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