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Hope-related Goal Cognitions and Daily Experiences of Fatigue, Pain, and Functional Concern among Lung Cancer Patients

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Abstract

Purpose: Cross-sectional research suggests that thinking about multiple ways to reach goals (hope pathways) and the belief that one can reach them (hope agency) may be adaptive for lung

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Dr. Steffen has full control of the primary data and agrees to allow the journal to review upon request.

cancer patients. We examined the between-person and within-person associations among aspects of hope agency and pathways thinking, daily fatigue, pain, and functional concerns (e.g., sense of independence, usefulness) among lung cancer patients during active treatment.

Methods: Data from a daily diary study were used to examine relations among hope agency, hope pathways, fatigue, pain, and functional concern in 50 patients with advanced lung cancer. Participants were accrued from one outpatient cancer center and completed the study between 2014 - 2015.

Results: Adjusting for covariates and the previous day's symptoms or concern, patients who engaged in higher pathways thinking reported lower daily symptoms, whereas those who engaged in higher agency thinking reported less functional concern. Within-person increases in pathways thinking were associated with less daily fatigue, pain, and functional concern; within-person increases in agency thinking were associated with less daily fatigue and pain. Models examining symptoms and concerns as predictors of hope suggested within-person increases in functional concern and fatigue and pain were related to lower agency and pathways thinking the same day. Patients with higher fatigue and pain did not report lower agency or pathways thinking, but patients with more functional concern did.

Conclusions: Increases in hope pathways thinking are associated with lower symptoms and better functioning in lung cancer patients. This suggests that it is important to determine the efficacy of interventions that emphasize the pathways the component of hope.

Keywords

hope; goal setting; lung cancer; fatigue; pain; palliative

Introduction

Most lung cancer patients face incurable disease [1], symptoms and treatment side effects that can interfere with daily life [2], and concerns about lost roles and impaired activity [3]. Fatigue and pain are two of the most prevalent and bothersome symptoms patients experience [4,2]. They tend to co-occur [5], can vary daily [6,7], and are often accompanied by functional concerns about losing independence or becoming a burden to others [8,9,2]. These symptoms and concerns negatively affect patients' daily quality of life [10–12].

Hope may influence patients' experience of these daily challenges. Hope, as defined by Snyder and colleagues (1991), is a cognitive set derived from the identification of valued goals, goal-directed motivation (agency), and planning to meet goals (pathways; [13,14]). People who are higher in hope identify more pathways to achieve their goals [15] and generate new goals to pursue when goals are blocked. This may be useful in the context of lung cancer when symptoms or treatment schedules can become obstacles to daily goals [16] and when new goals (e.g., spending more time with family or friends, getting affairs in order) need to be identified given the likely blockage of existing goals [17].

Among cancer patients, higher overall hope has been related to less depression, anxiety, fatigue, and pain [18–23]. However, most of these studies have been cross-sectional, assessed hope only as a between-person difference variable, and have not tested the

contributions of the components of hope, specifically agency and pathways, in relation to these outcomes. Yet, hope is conceptualized as both a behavioral tendency (i.e., between-person difference) and a behavior (i.e., state or within-person difference [24,13,14]). Further, agency and pathways may be differentially important for certain outcomes. For example, higher mean agency (i.e., between-person difference) has been more strongly related to fewer depressive symptoms among cancer patients [25], lower perceived risk for needing help in the future among older adults [26], and greater life satisfaction [27]. Higher mean pathways has been related to greater posttraumatic growth among cancer patients [28] and more planning behavior for future care needs among older adults [26].

Daily diary studies are one way to evaluate within-person and between-person effects of hope components to help clarify hope's association with important patient outcomes. We recently completed a daily diary study in which we demonstrated that higher between and within-person overall hope is related to better daily social and role functioning among lung cancer patients [29]. The aim of the present set of analyses was to test whether between and within-person variation in aspects of hope agency and pathways thinking was related to lung cancer patients' daily experiences of fatigue and pain, and functional concerns (i.e., perceived burden, usefulness, independence, etc.). We examined two aspects of pathways thinking, thinking about ways to reach goals and perceiving ways around problems (hereafter referred to as pathways), and two aspects of agency thinking, perceiving goals are being met and trying to pursue goals (hereafter referred to as agency).

Based on existing literature [22,25,27] and our previous diary findings of between and within-person effects of overall hope [29], we hypothesized that lung cancer patients with higher pathways would have less daily fatigue and pain (i.e., between-person variation) and that patients would report less fatigue and pain on days when they engaged in more pathways thinking than usual (i.e., within-person variation). We expected pathways to be more important for symptoms than agency because of the focus on identifying ways around obstacles, which is how patients often conceptualize symptoms [16]. We hypothesized that lung cancer patients with higher agency would have less daily functional concern and that patients would report less functional concern on days when they engaged in more agency thinking than usual. We expected agency to be more important than pathways for functional concerns because of its focus on the perception that goals are being pursued and met, which should support perceived independence [26].

Methods

Participants

Eligibility criteria included: (a) histologically or cytologically documented non-small cell lung cancer (NSCLC) stage IIIa, IIIb, or IV (AJCC 7th edition staging) or limited or extensive small cell lung cancer (SCLC); (b) 21 years of age or older; (c) Eastern Cooperative Oncology Group performance status 0-2 (0 = fully active, 2 = ambulatory and capable of all self-care, but unable to carry out any work activities); (d) no concurrent malignancy or unstable brain metastases; (e) undergoing treatment for lung cancer; (f) ability to provide informed consent in English.

Recruitment began in April 2014 and ended in September 2015. Patients were pre-screened for eligibility and provided written informed consent in clinic. The University of New Mexico Health Sciences Center Institutional Review Board (#13-303) and the New Mexico Cancer Care Alliance (#1403) approved this study.

Assessment

Patients completed an initial questionnaire on a computer or on paper. Patients chose how to complete the diaries (i.e., online, paper, or via telephone) and what time to complete them. Patients who chose to complete surveys online (38%) were emailed a link for the daily survey each day at their preferred time. Patients were to report the previous day's diary before entering the current day if they missed a day (66 instances occurred). The online system captured date and time of diary completion, but patients were also required to enter the date to which their responses corresponded.

Patients who completed diaries on paper (56%) were given 21 diaries and a self-addressed, postage-paid return envelope. Initially, patients who completed paper diaries were given a flat-rate envelope and returned all 21 diaries at once; partway through the study, patients who completed paper diaries were given envelopes to mail each week ($n = 10$; 36% of those who completed on paper). Authors (LS, HN) administered the diary to patients who completed the diaries by phone (6%) at the preferred time each day. Participants were paid \$30 for completing the initial questionnaire, \$3 for each daily entry (up to \$63 possible), \$4 for each week they completed (up to \$12 possible), and \$6 for completing all 21 days.

Measures

Level-1 (Daily) Dependent Variables

Symptoms.: Fatigue and pain were assessed with three items (“Did you feel weak?”, “Were you tired?”, Did you have pain?”) on a scale of 0 = *not at all* to 3 = *very much*. Items were averaged to form a single symptom scale (α 's = .71 to .89, days 1-21), as there is some evidence of this symptom cluster in lung cancer [5]. This scale correlated with the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30 (EORTC-QLQ-C30) [30] Fatigue ($r = .79$, day 1) and Pain ($r = .70$, day 1) subscales that were administered at baseline.

Functional Concern.: Functional concern was assessed with four items from the Functional Assessment of Chronic Illness Therapy – Palliative Care (FACIT-Pal[31]), “I feel useful (reverse scored),” “I feel independent (reverse scored),” “I make each day count (reverse scored),” and “I feel like a burden to my family” on a scale of 0 = *not at all* to 4 = *very much*. All items except “I feel like a burden to my family” load at .60 or above on the Functional Wellbeing subscale of the FACT, supporting their grouping [31]. Items were averaged (α 's = .72 to .86, days 1-21). In this sample, the four-item scale correlated in the expected direction with the Functional Wellbeing subscale of the Functional Assessment of Cancer Therapy-Lung [32] administered at baseline ($r = -.66$, day 1).

Level 2 (i.e. Between-Person) Covariates

Demographics.: Participant gender, education, relationship status, age, ethnicity, race, income, treatment type, time since diagnosis, and smoking history were assessed at baseline. Treatment type was coded 0 = *not receiving concurrent chemoradiotherapy*, 1 = *receiving concurrent chemoradiotherapy*.

Depression Symptoms.: The Hospital Anxiety and Depression Scale [33] was administered at baseline to assess depression symptoms. Each of the 7 depression items was answered on a four-point Likert-type scale (1 = *not at all* to 4 = *very often*; $\alpha = .82$).

Physical Function.: The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30 (EORTC QLQ-C30) [30] Physical Function subscale was used to measure patient self-reported physical function at baseline. Five items (e.g., “Do you have any trouble doing strenuous activities, like carrying a heavy shopping bag or a suitcase?”) were answered on a four-point Likert-type scale (1 = *not at all* to 4 = *very much*; $\alpha = .82$). The subscale was transformed linearly to have a range of 0-100, with higher scores reflecting better physical function.

Focal Predictors

Hope.: Three original and one modified item from the State Hope Scale [14] were used to assess hope components. Participants used a scale ranging from 0 (*definitely false*) to 7 (*definitely true*) and items were averaged to create sub-scale scores. Two items (“There are ways around any problem that I am facing now,” “I can think of many ways to reach my current goals”) were averaged to assess pathways thinking (α 's = .84 to .97, days 1-21). Two items (“At this time, I am meeting the goals that I have set for myself”; “At the present time, I am trying to pursue my personal goals and plans” – modified from the original) were averaged to assess agency thinking (α 's = .78 to .94, days 1-21). Oncology nurses who consulted with the first author on the feasibility and acceptability of the daily diary with this population were concerned about this agency item overlapping with fatigue and recommended omitting “energetically” and adding the word “plans” to the agency item from the Hope Scale, “At the present time, I am energetically pursuing my goals.” A person's average level of hope across the study was used to estimate between-person differences (i.e., a person's tendency to engage in these thoughts).

Statistical Analyses

Data were analyzed using SPSS v. 24 [34]. Means, standard deviations, ranges, and frequencies were examined for each variable. All variables were normally distributed. The spread and distribution of residuals indicated the assumption of homoscedascity was met. Hierarchical linear modeling (HLM) addressed the nested structure of the data and estimated both level-1 (daily) and level-2 (individual) variance. Level-1 data included day of the diary, symptoms, and functional concern. Level-2 data included demographic information (e.g., age, treatment type), baseline physical function, and baseline depression symptoms. Day was centered so that 0 corresponded with day 1 of the diary. Level-1 predictors were person-mean centered. A person's average level of hope agency and pathways across the 21 days was included as a level-2 predictor. Depression at baseline was centered on “8” to

correspond with a likely “case” of depression. Physical function at baseline was grand-mean centered. Age was centered at 65 (0 corresponded with age 65). Models were estimated using restricted maximum likelihood. An autoregressive covariance structure for residual level-1 errors was used to account for within-person interdependence of the repeated outcomes. In order to test the equality of variances between the diary completion methods, an F-test was conducted comparing the variances of daily predictor and dependent variables on days 1, 7, 14, and 21.

Analysis of Fixed Effect Hypotheses

The unconditional model was estimated first to partition variance into within- and between-person variability. Intra-class correlations ranged from .74-.78. Next, time was included as a predictor variable to help assess for reactivity to monitoring [35]. The pre-specified model was then estimated.

Results

Fifty-six of 62 eligible patients approached consented (90.3%), of which 50 (89.3%) provided baseline and enough diaries to assess lead and lag effects (i.e., at least 7 diaries). After excluding diary entries in excess of 21 for 3 patients who completed more than 21 diaries, 1,029 (98%) of the potential 1,050 (50 people $\times$ 21 days) diaries were completed. Patients completed an average of 20 diaries ($SD = 1.3$; range = 15-21). Diaries were completed on paper (56%; $n = 28$), phone (6%; $n = 3$), or online (38%; $n = 19$). There was no evidence for statistically significant differences in the variability of measures between participants completing the diary online vs. on paper (smallest p -value = .11; all other p -values $> .20$).

Most patients were female (58%); married (62%); and Caucasian (80%; Native American: 6.0%; African American: 4.0%; Asian/Pacific Islander: 4.0%; Other/Declined to identify: 6.0%). On average, patients were 68.7 years old ($SD = 8.8$) and had 13.5 years ($SD = 2.0$) of education; 41% had a high school degree or less. A minority (14.0%) identified as current smokers. Cancer details are shown in Table 1. Average days since lung cancer diagnosis was 153.1 ($SD = 202.9$). Most patients had non-small cell lung cancer (78.0%); metastatic disease (stage IV NSC = 64.1%, $n = 25$; extensive SC = 72.7%, $n = 8$); a good performance status (ECOG 1 = 54%); and were receiving only chemotherapy (52.0%). Descriptive statistics for self-report measures are shown in Table 1; 17 patients (34%) were at or above the clinical cutoff of 8 for likely depression on the HADS. The average daily hope agency score was 4.44 ($SD = 1.51$) and the average daily hope pathways score was 4.29 ($SD = 1.59$). The average daily symptom score was 1.21 ($SD = 0.81$), indicating patients, on average, experienced relatively low fatigue and pain.

There did not appear to be reactivity to the diary. Although diary day trended toward predicting daily fatigue and pain when added to the null model as a sole predictor ($Est. = -0.005$, $SE = 0.003$, $p = 0.10$), day did not predict daily functional concern. Further, variance estimates in the null model and model with day as a sole predictor were similar (e.g., .51 vs. .50).

Fatigue and Pain

Results for models of same and next day daily fatigue and pain appear in Table 2. Adjusting for covariates and the previous day's ratings of fatigue and pain, patients with higher mean pathways (between-person variation) reported less fatigue and pain in same day ($Est. = -0.16$, $SE = 0.07$, 95% $CI = -0.30, -0.01$, $p = .04$) and next day models ($Est. = -0.15$, $SE = 0.07$, 95% $CI = -0.29, -0.01$, $p = .04$). Within-person increases in agency ($Est. = -0.04$, $SE = 0.02$, 95% $CI = -0.08, -0.01$, $p = 0.02$) and pathways ($Est. = -0.04$, $SE = 0.02$, 95% $CI = -0.08, -0.002$, $p = .04$) were related to less same day fatigue and pain. Next day models suggested a trend for within-person increases in agency to predict less fatigue and pain the following day ($Est. = -0.03$, $SE = 0.02$, 95% $CI = -0.07, 0.005$, $p = 0.09$).

Functional Concern

Results for models of same and next day functional concern appear in Table 3. Adjusting for covariates and the previous day's concern, patients with higher mean agency reported less functional concern in same day models ($Est. = -0.12$, $SE = 0.06$, 95% $CI = -0.25, -0.001$, $p = .048$) and trended toward less functional concern the next day ($Est. = -0.12$, $SE = 0.06$, 95% $CI = -0.24, 0.001$, $p = .05$). Within-person increases in pathways were related to less functional concern the same day ($Est. = -0.09$, $SE = 0.02$, 95% $CI = -0.13, -0.04$, $p < .001$) and the next day ($Est. = -0.08$, $SE = 0.02$, 95% $CI = -0.12, -0.04$, $p < .001$). There was a trend suggesting that within-person increases in agency were associated with less functional concern the same day ($Est. = -0.04$, $SE = 0.02$, 95% $CI = -0.08, 0.01$, $p = .09$).

Agency and Pathways as Dependent Variables

Agency and pathways were examined as dependent variables to assess potential bidirectional associations. Age, gender, treatment type, physical function, and depression symptoms were included as covariates. Within and between-person effects of symptoms and functional concern were examined. Intra-class correlations suggested that 78% of the variance in pathways thinking and 76% of the variance in agency thinking was at the between-person level. Within-person increases in fatigue and pain were related to lower agency ($Est = -.18$, $SE = .06$, $p = .003$) and pathways ($Est = -.21$, $SE = 0.06$, $p = .001$) in same-day, but not next day models (p 's $> .60$). People with higher fatigue and pain did not have lower daily agency or pathways thinking in either same or next-day models (p 's $> .25$). Within-person increases in functional concern were related to lower pathways in same-day ($Est = -.25$, $SE = .06$, $p < .001$), but not next-day models ($p = .19$) and to lower agency in both same ($Est = -.28$, $SE = .05$, $p < .001$) and next-day models ($Est. = -.12$, $SE = .05$, $p = .023$). People with more functional concern reported lower pathways and agency thinking in both same and next-day models ($Est. = -.49$ to $-.53$, p 's $< .01$).

Discussion

Fatigue, pain, and related functional concerns such as feeling one is becoming a burden or losing independence are common, difficult to treat issues faced by lung cancer patients [36]. Cross-sectional research suggests that lung cancer patients with higher hope report less fatigue and pain [22]. This study extends those findings in three important ways. First, we examined aspects of pathways and agency thinking in a sample predominantly composed of

patients undergoing treatment for advanced stage lung cancer. Second, we evaluated the effects of patients' tendency to engage in (i.e., between-person effects) and of daily changes in (i.e. within-person effects) these thoughts on symptoms and related functional concerns. The daily diary design afforded tests of these between and within-person effects in same-day models that adjusted for a previous day's symptoms and concern and in next-day models. Third, we examined the potential bidirectional nature of these relations by evaluating daily agency and pathways thinking as dependent variables. As discussed below, hypotheses were generally supported, but many relations between hope components, symptoms, and functional concerns were bidirectional, especially for the relations with agency. The strongest evidence to suggest that hope may precede symptom and functional outcomes was for the pathways component of hope, which showed a between-person effect on daily fatigue and pain and a within-person effect on daily functional concerns.

Building on cross-sectional research on hope and symptoms [22], we found patients who tended to engage in more pathways thinking reported less daily fatigue and pain and that within-person increases in agency and pathways thinking were associated with less daily fatigue and pain. These associations were found when adjusting for a person's previous day's level of fatigue and pain and for relevant covariates such as depression and physical functioning. However, in next-day models, only the between-person effect of pathways thinking remained significant. When we examined hope components as dependent variables, the within-person associations among hope, fatigue, and pain appeared bidirectional, but the between-person associations did not: patients who could think of more ways towards their goals and around obstacles (higher pathways thinking) reported less fatigue and pain, but patients with more fatigue and pain did not report less hope.

Extending prior cross-sectional research on hope and related functional concerns among older adults [26], we found patients who tended to engage in more agency thinking reported less functional concern, and that within-person increases in pathways thinking— although, not agency thinking—were associated with less functional concern. These associations were found when adjusting for a previous day's level of concern and when predicting the next-day's concern. However, the reverse was true in all cases except for one: within-person increases in functional concern did not predict next-day pathways. Thus, the within and between person associations among hope components and functional concern appeared largely bidirectional, with the exception of the within-person effects of pathways thinking. The bidirectional relation between agency and outcomes is consistent with Gum and Snyder's (2002) suggestion that some degree of symptom management and reminders of past successes may be needed to foster agency in terminal illness and a recent finding that functional wellbeing in colorectal cancer survivors predicted hope two years later [37].

Clinical Implications

This study adds to observational research supporting patient hope as a useful explanatory variable in patient outcomes [23,20,38,25,28,29]. Interventions developed and tested in other cancer [39,40] and non-cancer populations [41] suggest hope can be increased. Research needs to determine whether such interventions can increase hope in lung cancer patients and whether changes in hope mediate important patient symptom and functional outcomes. Our

study results suggest that such interventions should focus on the pathways component of hope, particularly in planning ways to pursue goals on high symptom days. Our results also suggest that patients with more functional concern (e.g., those who feel that they are losing their independence or are becoming a burden to others) likely need more help identifying and pursuing goals. For these patients, hope enhancing interventions may start by assessing what activities patients want to pursue that allow them to maintain a sense of independence, with an emphasis on generating ideas for feasible, meaningful activities and identifying the resources needed to pursue them [37].

Limitations

Our assessment was limited by not administering the full State Hope Scale [14] and by modifying one agency item due to concerns that it would be confounded with fatigue in this population. Findings should be replicated using the original and full State Hope Scale [14]. Our assessment of agency diverges from hope theory's emphasis on an energetic approach to goal pursuit. However, an energetic approach to goal pursuit may not be the essential aspect of agency, particularly in a sample of patients with advanced cancer. Perhaps it is more important that goals are highly valued and, therefore, motivating. In future research with samples likely to have low energy attributable to physical causes, it would be useful to test agency items both with and without an explicit focus on energetic pursuits of goals. Other limitations include lack of information about medication or education received for pain or fatigue management; variation in what time patients completed the diary, which could have affected fatigue ratings [42,7]; heterogeneity with respect to clinical characteristics (e.g., treatment history, stage, time since diagnosis), and level-2 (person-level) sample size. Finally, we did not assess what type of goals patients were reflecting on each day, how providers were discussing prognosis with patients, and whether providers were encouraging patients to set goals, which could impact hope[43].

Regarding generalizability, results described in this paper likely generalize to other advanced stage solid tumors with comparable prognosis (e.g., colorectal, head and neck). While the specific symptoms and therapeutics differ, the overall concerns of life expectancy, becoming a burden to others, and loss of independence are undoubtedly similar. Future research should test whether the role of hope may be similar as well.

Conclusion

Hope, or patients' perceptions of their ability to work toward and meet valued goals, identify ways to pursue those goals, and overcome obstacles to goals, may be an important variable in experiences of fatigue, pain, and related functional concern. Interventions based on sound theoretical and empirical conceptualization of hope in advanced cancer [44,17,45] should be tested in this population to determine whether hope can be increased and whether changes in hope agency and pathways mediate treatment effects on important patient symptom and functional outcomes.

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Table 1:

Descriptive Statistics of Sample (N = 50)

Variable	n (%)
<u>Lung Cancer Subtype & Stage</u>	
Non-small cell	39 (78.0)
IIIA	11 (28.2)
IIIB	3 (7.7)
IV	25 (64.1)
Small-cell	11 (22.0)
Limited	3 (27.3)
Extensive	8 (72.7)
<u>Current Treatment</u>	
Chemotherapy	26 (52.0)
Chemoradiotherapy	16 (32.0)
Radiation	5 (10.0)
Chemotherapy, radiation, and surgery	1 (2.0)
Surgery and radiation	2 (4.0)
<u>ECOG Performance Status</u>	
0	10 (20.0)
1	27 (54.0)
2	13 (26.0)
<u>Brain Metastases Present</u>	10 (20.0)
<u>Whole Brain Radiotherapy</u>	9 (19.6)
<u>Self-Report Measures</u>	
	<i>Mean (SD)</i>
Agency Thinking	4.44 (1.51); range = 0 - 7
Pathways Thinking	4.29 (1.59); range = 0 - 7
Physical Function (before centering)	59.23 (22.54); range = 0 - 100
Depression (before centering on "8")	5.33 (3.93) range = 0 - 18
Daily functional concern	1.51 (0.89); range = 0 - 4
Daily fatigue, pain	1.21 (0.81); range = 0 - 3

Note. ECOG = Eastern Cooperative Oncology Group

Table 2:**Multilevel Models of Same and Next Day Fatigue and Pain**

Fixed Effects	Daily Fatigue and Pain (ICC = .78)				Next Day Fatigue and Pain			
	Est (SE)	p	95% CI		Est (SE)	p	95% CI	
Intercept	1.10 (0.19)	<.001	0.70	1.50	1.02 (0.18)	<.001	0.65	1.40
Day	−0.01 (0.002)	<.001	−0.01	−0.003	−0.001 (0.002)	.013	−0.01	−0.001
Yesterday's/today's fatigue and pain	0.42 (0.03)	<.001	0.37	0.48	0.46 (0.03)	<.001	0.40	0.52
Age	−0.01 (0.01)	.229	−0.02	0.01	−0.01 (0.01)	.225	−0.02	0.005
Gender	−0.05 (0.11)	.624	−0.28	0.17	−0.05 (0.10)	.606	−0.26	0.16
Treatment type	0.07 (0.11)	.547	−0.16	0.30	0.07 (0.10)	.502	−0.14	0.29
Baseline physical function	−0.003 (0.003)	.262	−0.01	0.002	−0.003 (0.002)	.260	−0.01	0.002
Baseline depression	0.02 (0.02)	.208	−0.01	0.06	0.02 (0.02)	.213	−0.01	0.05
Person-mean pathways	−0.16 (0.07)	.039	−0.30	−0.01	−0.15 (0.07)	.035	−0.29	−0.01
Person-mean agency	0.10 (0.07)	.193	−0.05	0.24	0.09 (0.07)	.188	−0.05	0.23
Within-person pathways	−0.04 (0.02)	.038	−0.08	−0.002	0.02 (0.02)	.210	−0.13	0.06
Within-person agency	−0.04 (0.02)	.022	−0.08	−0.01	−0.03 (0.02)	.087	−0.07	0.005
Repeated								
Variance	0.13 (0.01)		0.11	0.14	0.13 (0.01)		0.12	0.14
Correlation	−0.14 (0.06)		−0.26	−0.02	−0.17 (0.06)		−0.28	−0.06
Random Effects								
Intercept	0.12 (0.04)		0.07	0.22	0.10 (0.03)		0.06	0.19

Note. ICC = Intraclass correlation; Gender (0 = female; 1 = male); Treatment type (1 = concurrent chemoradiotherapy; 0 = not in chemoradiotherapy); LL = lower limit; UL = upper limit; SE = standard error.

Table 3:**Multilevel Models of Same Day and Next Day Functional Concern**

Fixed Effects	Daily Functional Concern (ICC = .74)				Next Day Functional Concern			
	Est (SE)	p	95% CI		Est (SE)	p	95% CI	
Intercept	1.39 (0.17)	<.001	1.04	1.74	1.37	(0.17)	1.02	1.73
Day	-0.002 (0.002)	.360	-0.006	0.002	-0.001	(0.002)	.772	-0.01
Yesterday's functional concern/today's concern	0.46 (0.03)	<.001	0.41	0.52	0.47	(0.03)	<.001	0.41
Age	-0.0003 (0.01)	.955	-0.01	0.01	-0.0003	(0.01)	.959	-0.01
Gender	0.20 (0.10)	.041	0.01	0.38	0.20	(0.10)	.040	0.01
Treatment type	0.16 (0.10)	.103	-0.03	0.35	0.16	(0.10)	.089	-0.03
Baseline physical function	-0.005 (0.002)	.063	-0.01	0.003	-0.005	(0.002)	.061	-0.01
Baseline depression	0.01 (0.01)	.321	-0.01	0.04	0.01	(0.01)	.349	-0.02
Person-mean pathways	-0.02 (0.06)	.704	-0.15	0.10	-0.03	(0.06)	.634	-0.15
Person-mean agency	-0.12 (0.06)	.048	-0.25	-0.001	-0.12	(0.06)	.053	-0.24
Within-person pathways	-0.09 (0.02)	<.001	-0.13	-0.04	-0.08	(0.02)	<.001	-0.12
Within-person agency	-0.04 (0.02)	.093	-0.08	0.01	0.03	(0.02)	.119	-0.01
Repeated								
Variance	0.16 (0.01)		0.15	0.18	0.17	(0.01)	0.16	0.19
Correlation	-0.16 (0.05)		-0.25	-0.06	-0.13	(0.06)	-0.24	-0.02
Random Effects								
Intercept	0.08 (0.02)		0.05	0.14	0.08	(0.02)	0.04	0.14

Note. ICC = Intraclass correlation; Gender (0 = female; 1 = male); Treatment type (1 = concurrent chemoradiotherapy; 0 = not in chemoradiotherapy); LL = lower limit; UL = upper limit; SE = standard error.