Mediating Effect of Intolerance of Uncertainty and Cancer-Related Dysfunctional Beliefs About Sleep on Psychological Symptoms and Fear of Progression Among Cancer Patients

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Objective   This study aimed to explore the mediating effects of cancer-related dysfunctional beliefs regarding sleep and intolerance of uncertainty on the effect of depression, insomnia, and anxiety on fear of progression (FoP).

Methods   We retrospectively reviewed medical records of patients with cancer who visited the Sleep Clinic for cancer patients in Asan Medical Center for the first time between December 2021 and March 2022. Data collected included age, sex, types of cancer, staging, current treatment modalities, and history of surgical procedures. In addition, psychological symptoms were rated using the Insomnia Severity Scale (ISI), Patient Health Questionnaire–9 items (PHQ-9), State subcategory of the State and Trait of Anxiety Inventory (STAI-S), Short form of Fear of Progression Questionnaire, Cancer-related Dysfunctional Beliefs about Sleep scale (C-DBS), single item of pain and fatigue, Connor Davidson Resilience Scale 2-item (CD-RISC2), and Intolerance of Uncertainty–12 (IUS-12). The predictive variables for FoP were determined by linear regression analysis.

Results   The FoP was significantly correlated with age (r=-0.289), ISI (r=0.178), PHQ-9 (r=0.703), STAI-S (r=0.377), fatigue (r=0.452), CD-RISC2 (r=-0.270), IUS-12 (r=0.585), and C-DBS (r=0.427, all p<0.01). A mediation analysis showed that intolerance of uncertainty and dysfunctional beliefs about sleep mediated the relationship of FoP with insomnia, depression, or anxiety.

Conclusion   Psychological support for intolerance of uncertainty and cancer-related dysfunctional beliefs about sleep in patients with cancer may be beneficial to reduce their FoP.   **Psychiatry Investig 2023;20(10):912-920**

Keywords   Cancer; Sleep; Anxiety; Fear; Stress.

INTRODUCTION

The experience of psychiatric symptoms such as insomnia, depression, or anxiety, is more prevalent in patients with cancer than the general population.[1] As per the Internal Classification of Diseases and the Diagnostic and Statistical Manual of Mental Disorders, depression in patients with cancer is not easily recognized. Nevertheless, alongside anti-cancer therapies, such as chemotherapy or radiotherapy, improving sleep and managing depressive disorders are essential for the treat-

ment.[2] Moreover, fear of progression (FoP) and fear of cancer recurrence, which are associated with depression[3,4] and anxiety,[5] have destructive effects on numerous aspects of the lives of the patients.

Reassurance-seeking behaviors such as requesting extra medical examinations, asking for second opinions, or searching for more information about the illness online, are often reported when patients have a significant level of anxiety. Although reassurance-seeking behaviors can temporarily relieve stress, their repetition can aggravate their level of anxiety and even negatively affect their illness.[6]

FoP in patients with cancer

FoP, also referred to as fear of cancer recurrence, is one of the most common responses among cancer survivors.[7] Upto 70% of cancer survivors experience FoP, which is a highly adaptive and normal phenomenon.[8] The major concerns that cause significant distress are learning about cancer stage shift-

ing, being informed of their recurrence, and death anxiety, which is often accompanied by insomnia. FoP does not yet have a standardized definition or method for quantification in patients with cancer.[9] In recent years, the term "fear of cancer recurrence" covering both recurred and metastatic cancer has gained acceptance and relevant clinical attention.[10] FoP of clinical significance includes certain characteristics such as high level of distress, maladaptive adjustment, and marked impairment in daily function and/or future planning.[11]

Nevertheless, there seems to be common agreement that the manifestation of FoP can lead to mortality in patients with cancer. The negative effects of FoP have been widely studied in various cancers, and its correlation with survival rate and quality of life is well known.[8] Despite the high prevalence and well-known effects, interventions for the psychological distress are poorly understood, and the necessity to manage FoP is commonly overlooked.[10] Long-term monitoring of cancer survivors requires thorough longitudinal studies, despite no clear, unanimous criteria for assessing FoP, as yet.[12] Therefore, to help patients cope with FoP, constructing questionnaires to comprehensively and accurately evaluate their psychological status should be emphasized along with their thorough analysis.

Intolerance of uncertainty in patients with cancer

Intolerance of uncertainty is defined as "a dispositional incapacity to endure the aversive response triggered by the perceived absence of salient, key, or sufficient information, and sustained by the associated perception of uncertainty."[13] Intolerance of uncertainty is considered as a risk factor or cognitive vulnerability in the development and maintenance of anxiety and problematic worry. Therefore, reducing intolerance of uncertainty is crucial for the reduction of anxiety by increasing the element of predictability or controllability.[14]

Studies have shown that cancer survivors who experience intolerance of uncertainty may be at higher risk for cancer-related distress.[15] Sources of uncertainty in cancer survivorship include medical, personal, and social aspects. Examples of medical sources of uncertainty include cancer diagnosis, treatment, and the overall outcome. Personal and social sources include career-related questions, communicative aspects, and relation or familial problems, which are somewhat more ambiguous. The uncomfortable and unacceptable feeling stemming from uncertainty often persists long after cancer remission. Therefore, psychological intervention and adequate management are necessary to face this chronic uncertainty.[16]

FoP is one of the most common psychological disorders faced by patients with cancer and cancer survivors. Although further work to clarify the relationship between intolerance of uncertainty and FoP in patients with cancer is essential, some studies suggest that prognostic uncertainty can act as both cause and effect on FoP. Long-term uncertainty of illness in patients with cancer affects the patients' symptoms, quality of life, and stage shifting; however at the same time, uncertainty itself may include FoP.[17]

Cancer-related dysfunctional beliefs about sleep

Many patients with cancer in all stages experience sleep disturbance as they undergo treatments such as chemotherapy, radiation therapy, or hormonal therapy. Patients with cancer and insomnia often worry about the negative consequences of lack of sleep and believe that their disease could worsen or metastasize due to their poor sleep quality.[18] Often, patients have strong beliefs about sleep timing, its duration, and that lack of good sleep may lead to immune dysfunction. Insomnia can not only be psychologically harmful, but can pose high risks of health problems and mortality, as well. However, these beliefs could be dysfunctional and can prolong or even aggravate the symptoms of insomnia.[19]

Psychological distress in patients with cancer can be caused by psychiatric symptoms such as depression, anxiety, or insomnia, while their FoP might be affected by these psychiatric symptoms. Additionally, psychological factors such as intolerance of uncertainty or dysfunctional beliefs about sleep may interfere with the influence of the psychiatric symptoms. Therefore, in this study, we aimed to explore the influence of psychological symptoms such as depression, anxiety, or insomnia on FoP in patients with cancer. Additionally, we aimed to examine whether intolerance of uncertainty or cancer-related dysfunctional beliefs about sleep may mediate this association.

METHODS

Participants and procedure

We retrospectively reviewed the medical records of patients with cancer who visited the Sleep Clinic for Cancer Patients in Asan Medical Center for the first time between December 2021 and March 2022. The inclusion criteria were as follows: 1) self-report questionnaire scores were completely recorded in medical records and 2) never diagnosed with organic brain disorders or brain metastasis. Exclusion criteria were as follows: 1) age of less than 18 years old and over than 80 years old and 2) impaired cognitive function and severely decreased physical activity. We collected patients' information such as age, sex, types of cancer, staging, current treatment modalities, and history of surgical procedures. Furthermore, responses to rating scales were gathered. The study protocol was approved by the Asan Medical Center Institutional Review Board (2022-0428), and the requirement of informed consent was waived.

Measures

Insomnia Severity Scale

The Insomnia Severity Scale (ISI) is a self-assessment tool used to measure the severity of insomnia.[20] It includes seven questions that evaluate the intensity of the symptoms of insomnia, the individual's satisfaction with their sleep pattern, the level of disruption to daily functioning, the degree of impairment, and the distress caused by insomnia. Each question is rated on a 5-point Likert scale, and a high total score indicates a severe level of insomnia.

Patient Health Questionnaire–9 items

The Patient Health Questionnaire–9 items (PHQ-9) is a self-administered questionnaire designed to measure the severity of depression.[21] It consists of 9 items, which are rated on a 4-point Likert scale, with scores ranging from 0 (not at all) to 3 (nearly every day). The total score of the PHQ-9 ranges from 0 to 27, with higher scores indicating more severe levels of depression. The present study used the Korean version of the PHQ-9.[22]

State subcategory of the State and Trait of Anxiety Inventory

The State-Trait Anxiety Inventory (STAI) is a psychological questionnaire used to assess levels of anxiety.[23] It includes questions related to both state anxiety (feelings of anxiety in a particular moment) and trait anxiety (a general tendency to feel anxious). The questionnaire uses a 4-point Likert scale, with higher scores indicating higher levels of anxiety. In this study, only the 20-item state anxiety subcategory (STAI-S) was utilized, with the total score ranging from 20 to 80.

Short form of Fear of Progression Questionnaire

The FoP-Questionnaire (Fop-Q) is a measurement tool designed to assess the FoP in chronically ill patients.[24] The shortened version has been validated in a group of patients with breast cancer and has demonstrated adequate reliability. It is considered a valid clinical instrument for use in clinical research. In the present study, the Korean version of the short form of FoP-Q (FoP-Q-SF) which includes 12 items rated on a 5-point Likert scale (1−5) was used.[5] The total score ranged 12−60.

Cancer-related Dysfunctional Beliefs about Sleep scale

The Cancer-related Dysfunctional Beliefs about Sleep scale (C-DBS) is a self-report questionnaire designed to measure dysfunctional cancer-related beliefs about sleep.[18] It consists of two items, which evaluate the beliefs that patients with cancer may have about their sleep, specifically regarding the impact of sleep on their immune system and the potential for

cancer recurrence or metastasis. The two items are rated on a 0−10 scale, and a higher total score indicates a greater level of dysfunctional beliefs about sleep. In the current study, the

Table 1. Demographic and clinical characteristics of the study participants

Variable	Value (N=184)
Male sex	76 (41.3)
Age (yr)	57.1±12.8
Cohabitants, presence	167 (90.8)
Psychiatric illness, presence	179 (97.3)
Sleep-wake disorders	75 (40.8)
Depressive disorders	58 (31.5)
Anxiety disorders	6 (3.8)
Adjustment disorder	2 (1.1)
Somatic symptoms and related disorders	1 (0.5)
Substance use disorders	2 (1.1)
Bipolar and related disorders	0 (0.0)
Delirium	2 (1.1)
Schizophrenia spectrum and other psychotic disorders	13 (7.1)
Cancer types	
Solid tumor	175 (95.1)
Breast cancer	56 (30.4)
Gastrointestinal, hepatobiliary, and pancreatic cancer	42 (22.8)
Other malignancy	77 (41.8)
Hematologic malignancy	9 (4.9)
Cancer stages (among cancer types with TNM classification) (N=125)	
Stage 0	4 (3.2)
Stage I, II, III	82 (65.6)
Stage IV	39 (31.2)
Surgery within 3 months	46 (25.0)
Current cancer treatment, presence	82 (44.6)
Questionnaires, score	
ISI	15.2±6.6
PHQ-9	11.6±6.5
STAI	40.1±7.4
FoP	35.2±12.9
C-DBS total	11.8±6.0
Pain-single item	3.4±2.8
Fatigue-single item	5.8±2.6
CD-RISC2	4.4±1.7
IUS-12	32.0±7.0

Values are presented as mean±standard deviation or number (%). ISI, Insomnia Severity Index; PHQ-9, Patient Health Questionnaire–9 items; STAI, State and Trait of Anxiety Inventory; FoP, fear of progression; C-DBS, Cancer-related Dysfunctional Beliefs about Sleep; CD-RISC2, Connor Davidson Resilience Scale 2-item; IUS-12, Intolerance of Uncertainty–12

original C-DBS, which was developed in the Korean language, was used.

Single-item scales of pain and fatigue

The single-item scales were used as a numerical rating scale to measure fatigue and pain symptoms, in this study.

Connor Davidson Resilience Scale 2-item

The Connor Davidson Resilience Scale 2-item (CD-RISC2) scale is a self-report questionnaire designed to measure an individual's resilience.[25] It is a shortened version of the original 25-item CD-RISC scale.[26] The scale includes two items, which are rated on a 5-point Likert scale from 0 (not true at all) to 4 (true nearly all the time). The Korean version of the CD-RISC2 scale was administered.[27]

Intolerance of Uncertainty-12

The Intolerance of Uncertainty-12 (IUS-12) is a shortened version of the original IUS, a measurement tool for assessing intolerance of uncertainty.[28] It includes 12 items that are rated on a scale of 1 to 7, with a higher total score indicating greater intolerance of uncertainty. This study referenced the Korean version of the IUS-12.[29]

Statistical analysis

Demographic characteristics and rating scale scores are shown as means±standard deviation (SD). A two-tailed significance level of 0.05 was used for the analyses. To determine which variables are associated with FoP, Pearson's correlation coefficients were calculated. The bootstrap method with 2,000 resamples was implemented to examine whether cancer-related dysfunctional beliefs or intolerance of uncertainty may mediate the influence of psychological symptoms, including depression, anxiety, or insomnia, on FoP. Statistical analysis

was performed using the software IBM SPSS version 21.0 (IBM Corp., Armonk, NY, USA), AMOS version 27 for Windows (IBM SPSS., Chicago, IL, USA), and jamovi version 1.6.18.0 (https://www.jamovi.org).

RESULTS

A total of 184 patients were included in the analysis. The mean age of patients was 57.1 (SD=12.8) years, of whom 76 (41.3%) were male. Most patients (n=179, 97.3%) were diagnosed with at least one psychiatric disorder, which included sleep-wake disorders (n=75, 40.8%), depressive disorders (n=51, 31.5%), anxiety disorders (n=6, 3.8%), among others, as presented in Table 1. As for the cancer-related variables, nine (4.9%) had a hematologic malignancy, and 31.2% of solid tumors were stage IV disease. A total of 46 patients (25.0%) had undergone cancer surgery within 3 months and were currently on either chemotherapy, radiation therapy, hormonal therapy, or targeted therapy (n=82, 44.6%).

Table 2 shows the results of Pearson's correlation analysis. The FoP score significantly correlated with age (r=-0.289, p<0.01), ISI (r=0.178, p<0.05), PHQ-9 (r=0.703, p<0.01), STAI-S (r=0.377, p<0.01), fatigue (r=0.452, p<0.01), CD-RISC2 (r=-0.270, p<0.01), C-DBS (r=0.427, p<0.01), and IUS-12 (r=0.585, p<0.01).

Mediation analysis results showed that the total effect of anxiety, depression, or insomnia (represented by STAI-S, PHQ-9, and ISI, respectively) on FoP was significant. With the inclusion of the mediating variables IUS-12 and C-DBS, the impact of ISI and STAI on FoP was significant. The indirect effect of STAI and PHQ-9 on FoP through IUS and C-DBS was found to be significant. The indirect effect of ISI on FoP mediated by C-DBS was also significant, whereas the impact of ISI on FoP mediated by IUS-12 had a marginally sig-

Table 2. Correlation coefficients of each variable in all participants (N=184)

Variables	Age	FoP	ISI	PHQ-9	STAI-S	Pain	Fatigue	CD-RISC2	IUS-12
FoP	-0.289**								
ISI	0.006	0.178*							
PHQ-9	-0.077	0.703**	0.407**						
STAI-S	0.006	0.377**	0.180*	0.329**					
Pain	0.089	0.098	0.112	0.174*	0.088				
Fatigue	-0.139	0.452**	0.306**	0.488**	0.211**	0.338**			
CD-RISC2	-0.082	-0.270**	-0.053	-0.331**	0.016	-0.110	-0.313**		
IUS-12	-0.084	0.585**	0.145*	0.430**	0.296**	-0.018	0.279**	-0.249**	
C-DBS	-0.129	0.427**	0.386**	0.335**	0.318**	0.114	0.312**	-0.128	0.412**

*p<0.05; **p<0.01. FoP, fear of progression; ISI, Insomnia Severity Index; PHQ-9, Patient Health Questionnaire–9 items; STAI-S, State subcategory of State and Trait Anxiety Inventory; CD-RISC2, Connor Davidson Resilience Scale 2-item; IUS-12, Intolerance of Uncertainty–12 items; C-DBS, Cancer-related Dysfunctional Beliefs about Sleep

Table 3. The results of direct, indirect, and total effects on mediation analysis

Effect	Standardized estimate	SE	Z-value	p	95% CI
Insomnia to FoP					
Direct effect					
ISI → FoP	0.02	0.12	0.38	0.707	-0.20 to 0.29
Indirect effect					
ISI → IUS-12 → FoP	0.07	0.07	1.94	0.053	-0.00 to 0.28
ISI → C-DBS → FoP	0.09	0.06	2.92	0.003	0.05 to 0.27
Total effect					
ISI → FoP	0.18	0.14	2.45	0.014	0.07 to 0.63
Depression to FoP					
Direct effect					
PHQ-9 → FoP	0.53	0.11	9.81	<0.001	0.84 to 1.26
Indirect effect					
PHQ-9 → IUS-12 → FoP	0.13	0.06	4.39	<0.001	0.15 to 0.38
PHQ-9 → C-DBS → FoP	0.04	0.04	2.22	0.027	0.01 to 0.15
Total effect					
PHQ-9 → FoP	0.70	0.10	13.35	<0.001	1.19 to 1.60
Anxiety to FoP					
Direct effect					
STAI-S → FoP	0.19	0.11	2.98	0.003	0.11 to 0.54
Indirect effect					
STAI-S → IUS-12 → FoP	0.14	0.06	3.69	<0.001	0.11 to 0.36
STAI-S → C-DBS → FoP	0.06	0.04	2.51	0.012	0.02 to 0.18
Total effect					
STAI-S → FoP	0.38	0.12	5.51	<0.001	0.43 to 0.90

SE, standard error; CI, confidence interval; FoP, fear of progression; ISI, Insomnia Severity Index; IUS-12, Intolerance of Uncertainty Scale–12 items; C-DBS, Cancer-related Dysfunctional Beliefs about Sleep; PHQ-9, Patient Health Questionnaire–9 items; STAI-S, State subcategory of State and Trait Anxiety Inventory

nificant p-value. PHQ-9 and STAI-S directly influenced the FoP of patients with cancer, ISI did not. This indicates that the relationship between depression and anxiety on FoP was partially mediated by dysfunctional beliefs about sleep and intolerance of uncertainty, whereas these two mediators fully mediated the relationship between insomnia and FoP (Table 3 and Figure 1).

DISCUSSION

In this study, we observed that FoP in patients with cancer was associated with age, depression, anxiety, insomnia, dysfunctional beliefs about sleep, and intolerance of uncertainty. Depression and anxiety in patients with cancer directly influenced their FoP, and intolerance of uncertainty and dysfunctional beliefs about sleep partially mediated this association. Insomnia indirectly influenced FoP in patients with cancer,

dysfunctional beliefs about sleep fully mediated this association, and intolerance of uncertainty mediated this relation through a marginally significant indirect effect.

FoP is one of the most common responses among cancer survivors.[7] FoP of clinical significance involves high levels of distress, dysfunctional adjustment, and psychological disorders affecting daily routines. The adverse effects of FoP have been discussed in several studies, which agree that it can worsen the survival rate and quality of life of patients with cancer. Managing FoP is essential for patients with cancer, yet despite its importance, studies on the interventions for psychological distress are limited.[11] Intolerance of uncertainty is considered an aggravating factor for cancer-related distress.[15] The uncomfortable and unacceptable feelings that accompany uncertainty in patients with cancer arise from various sources, and due to their persistent characteristics, management is crucial.[16] Previous studies suggest that intolerance of uncertainty
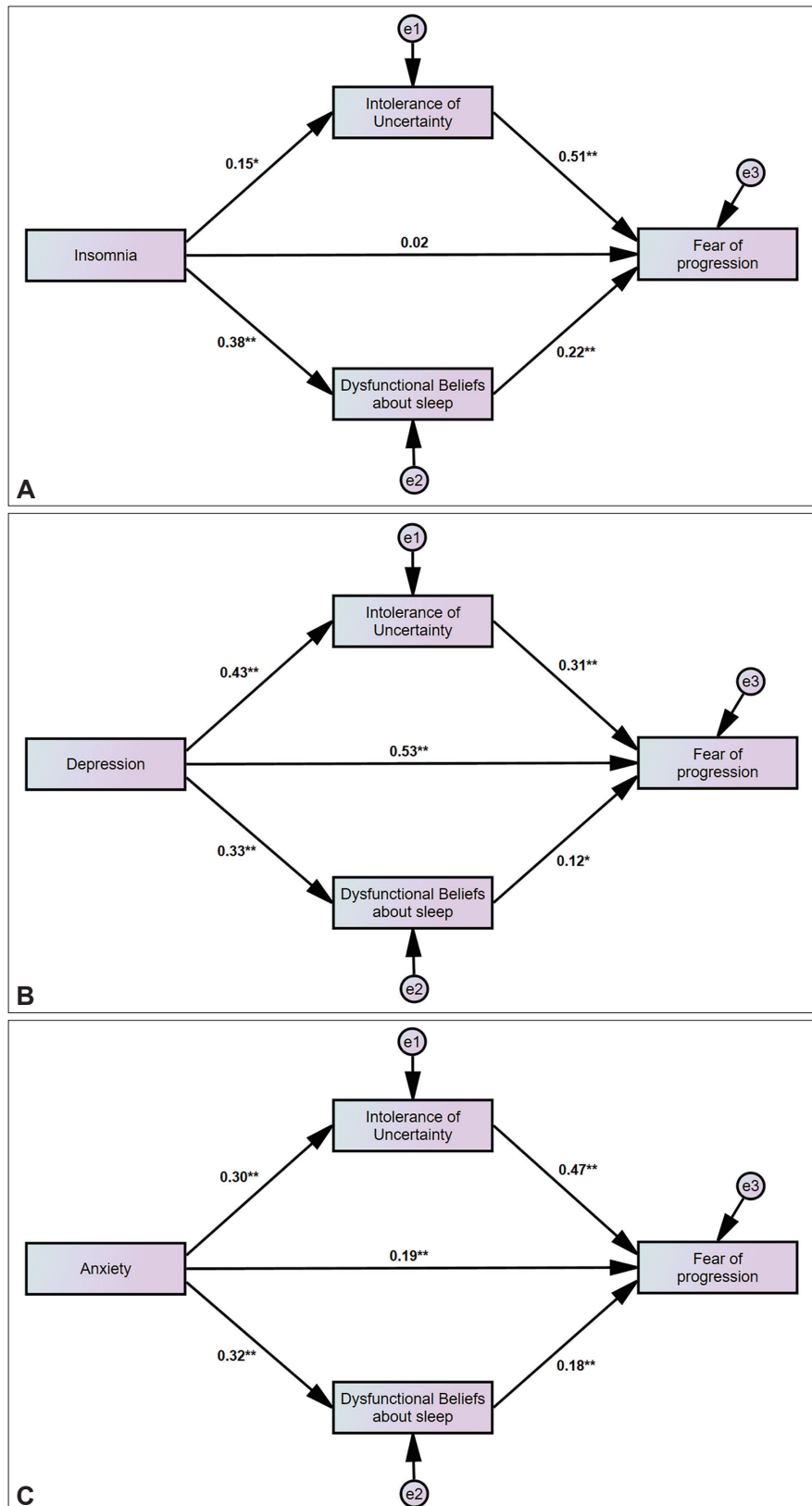
Figure 1. Mediation model showing the pathway from the effect of insomnia (A), depression (B), and anxiety (C) (independent variables) on fear of disease progression (outcome) through intolerance of uncertainty and cancer-related dysfunctional beliefs about sleep (mediator). *p<0.05; **p<0.01.

may have a role as both a cause and effect of FoP. Long-term uncertainty of illness in patients with cancer has a negative impact on patients' symptoms and quality of life, and even leads to stage shifting, but at the same time, "uncertainty" itself may encompass FoP.[17] As expected, FoP was strongly correlated with intolerance of uncertainty, and this study demonstrated that the IUS-12 scale can be a good parameter to predict FoP.

Patients with cancer often experience sleep disturbance and worry that their lack of good sleep may lead to negative consequences, including higher risks of health problems, shifting of stages, and even higher mortality.[30] Studies on sleep-related dysfunctional belief in patients with cancer suggest that these beliefs may have a significant association with the severity of insomnia.[31] In a prior retrospective study, cancer-related dysfunctional beliefs about sleep and depressive symptoms were strongly related to the severity of insomnia; further, higher C-DBS scores were significantly associated with worse symptoms of insomnia, regardless of depression. Nonetheless, depression also correlated with dysfunctional beliefs about sleep, independent of insomnia.[32] Therefore, patients with cancer with dysfunctional beliefs about sleep may be more likely to experience FoP, independent of intolerance of uncertainty.

In this study, we observed that age, insomnia, depression, and anxiety had a significant correlation with FoP. Among these parameters, insomnia, depression, and anxiety, represented as ISI, PHQ-9, and STAI-S, respectively, were positively associated with the level of FoP, while age was negatively associated with it. In other words, younger age was significantly associated with FoP, which is consistent with prior research.[31,33] As for physical risk factors, fatigue and resilience were significantly associated with FoP; pain, however, was not.

In terms of the psychological symptoms that may affect FoP, the total effect of insomnia, depression, and anxiety on FoP was highly significant. Depression and anxiety had a direct effect, as expected. However, insomnia did not have a direct effect on FoP. Moreover, both cancer-related dysfunctional beliefs about sleep and intolerance of uncertainty were shown to mediate the influence of anxiety and depression on FoP, whereas, in the case of insomnia, its effect on FoP was carried out through dysfunctional beliefs about sleep, and the indirect effect of intolerance of uncertainty was marginally significant. Patients with cancer who experience sleep disorders often have FoP, and such distorted beliefs about lack of good sleep harming their health significantly correlated with both insomnia severity and FoP. Insomnia itself may be physically harmful and induce psychological disorders. Concerns about the consequences of insomnia, such as immune decline or cancer recurrence, can worsen as insomnia intensifies.[18,31] Anxiety and depression are also strongly associated with dysfunctional beliefs about sleep as well as insomnia. Patients

with cancer frequently have anxiety involving certain beliefs, concerns, and behaviors, including health problems regarding the quality and quantity of sleep. Depression negatively affects quality of life, response to chemotherapy, and even survival rates. Although anxiety, depression, and insomnia may increase FoP in their own destructive manner, the mediation model implied that they aggravate dysfunctional beliefs about sleep, which transmits the significant effect on FoP that anxiety and insomnia have. Dysfunctional beliefs about sleep include the idea that a poor amount of high-quality sleep may harm the immune system due to deprived melatonin secretion or its lack of function. In line with previous studies, those worries and concerns are defined as "dysfunctional" because they strongly affect FoP and are simultaneously significantly correlated with anxiety, depression, and insomnia.

Insomnia, anxiety, and depression are also strongly correlated with intolerance of uncertainty, which comprises various sources. For instance, medical sources of uncertainty include cancer diagnosis, metastasis, chronic health problems, response to treatment, and the overall survival rate or outcome; further, personal and social sources include familial issues or career-related problems. Regardless of the source, this uncomfortable feeling of uncertainty usually has a long-term effect and acts as a powerful risk factor in aggravating depression and anxiety.[14] As per the present study, however, intolerance of uncertainty was aggravated by anxiety and depression as well. Additionally, concordant to prior studies, it also had consequences on FoP and mediated the effects that insomnia, anxiety, and depression had on FoP.[17]

Several limitations of this study should be considered. Causal relationships between the variables cannot be ascertained owing to the retrospective, cross-sectional nature of the study. Only subjective data based on questionnaire scores and self-report scales were recorded; objective tests on sleep quality such as polysomnography, electroencephalogram, or actigraphy were not analyzed in this study. Furthermore, a selection bias may exist as all the participants were from the Stress Management Clinic for Patients with Cancer in a tertiary hospital, and over 97% experienced at least one or more psychiatric illnesses. The heterogeneity of cancer types, stages, treatment, overall outcome, and known-survival rate could have affected the results as well, showing discrepancies compared to prior studies. Furthermore, other risk factors that may contribute to FoP were not evaluated in this study; socioeconomic status, family relationships, quality of life, and physical symptoms such as pain and fatigue were not thoroughly investigated.

Despite these limitations, this study also has several strengths. First and foremost, the effects of dysfunctional beliefs about sleep and intolerance of uncertainty on FoP among patients with cancer were thoroughly examined. In addition, various

risk factors such as age, physical status, cancer types, and psychiatric illness were included, giving an overview of what factors may aggravate FoP in patients with cancer. Essentially, pathway models based on mediation analysis constituted adequate information on how the impact of insomnia, anxiety, and depression on FoP were bridged by cancer-related dysfunctional beliefs about sleep and intolerance of uncertainty. Therefore to alleviate FoP, psychological interventions to improve intolerance of uncertainty and dysfunctional beliefs about sleep may be effective in these patients with cancer.

Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

Conflicts of Interest

Seockhoon Chung, a contributing editor of the *Psychiatry Investigation*, was not involved in the editorial evaluation or decision to publish this article. All remaining authors have declared no conflicts of interest.

Author Contributions

Conceptualization: Harin Kim, Seockhoon Chung. Data curation: Eulah Cho, Inn-Kyu Cho, Dongin Lee, Jiyoung Kim. Formal analysis: Jaeeun Song, Seockhoon Chung. Methodology: Seockhoon Chung. Writing—original draft: all authors. Writing—review & editing: all authors.

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