RAPID COMMUNICATION

Coping Style and Sleep Quality in Men with Cancer

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Abstract

Background Few studies have characterized the effects of cancer diagnosis and treatment on sleep quality in men with cancer, and even fewer have identified mediators between psychosocial factors and physical symptoms. It has been debated whether active, approach-oriented, coping behaviors or more passive, avoidance-oriented, coping behaviors are more important to the preservation of sleep quality.

Purpose This study tested the impact of coping style (i.e., approach vs. avoidance) on sleep quality and depressive symptoms and intrusive thoughts as putative mediators.

Methods Utilizing a longitudinal design, men with cancer ($N=55$) were assessed at study entry (T1) and again 6 months later (T2). Two indicators of sleep quality were assessed: severity of sleep disturbance symptoms and resulting interference with daily functioning from sleep problems.

Results Higher use of avoidance coping at T1 was related to greater severity in sleep-related symptoms ($p<0.01$) and more interference with daily functioning ($p<0.001$) at T2. Approach coping at T1 was unrelated to indicators of sleep quality. Depressive symptoms and not intrusive thoughts mediated the relationship between avoidance coping and sleep symptom interference and partially mediated the effect on sleep symptom severity based on examination of bootstrapped standard errors for indirect paths.

Conclusions Avoidance of cancer-related stressors and circumstances likely contributes to declines in mood states and in turn compromises sleep. An individual's coping style may be an important consideration in the assessment and treatment of sleep problems in men with cancer.

Keywords Sleep · Coping · Cancer · Depression · Approach · Avoidance

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Introduction

Individuals with cancer may be particularly vulnerable to sleep-related problems [1–3]. Sleep-related difficulties in cancer patients have been linked to poorer quality of life [1, 4], fatigue, and distress [5], as well as disruption in neuroendocrine and immune factors associated with tumor progression [6]. Changes in daily routines, physical pain, and treatment-related side effects may be just some of the factors contributing to poor sleep among cancer patients, and recent findings suggest that men with cancer may be particularly vulnerable to disruption in sleep/wake patterns [1]. Yet, little is known about the influence of psychological factors on sleep in the context of chronic illness. The extent to which coping style and emotional upset contribute to disturbances in sleep is poorly understood, and theoretical and empirical work seeking to determine which coping

styles are adaptive in regard to sleep outcomes in cancer patients are inconsistent. This study examines whether the manner in which an individual copes with cancer-related stressors affects self-reported nighttime sleep quality, and if so, whether more pervasive indicators of emotional distress (i.e., depressive symptoms, intrusive thoughts) mediate this relationship.

The extent to which a coping strategy involves approaching a particular stressor, versus avoidance, is a widely used classification of coping processes [7, 8]. For instance, in the patient with a physical illness, active strategies such as problem solving to reduce treatment side effects, information-seeking regarding treatment options, expressing emotions to friends and family, and social support-seeking can be construed as approach-oriented coping, and strategies that involve disengagement from significant others, denial of illness severity, or distraction can be viewed as avoidance-oriented efforts. Neither approach-oriented nor avoidance-oriented coping behaviors are inherently adaptive or maladaptive; coping effectiveness is better determined by the characteristics of the individual and the situation [9]. However, a meta-analysis by Roesch et al. [10] suggested a salutary effect of approach-oriented coping on physical and emotional health outcomes (e.g., pain, depression, fatigue) in men with cancer.

Limited work has been done to characterize adaptive and maladaptive coping behaviors related to sleep. Morin et al. [11] examined the effects of stress and daytime coping in primary insomnia patients relative to good sleepers. Although few between-group differences in reported stressful life events were found, insomniacs perceived their lives as more stressful and relied more heavily on emotion-oriented coping strategies. The authors concluded that presleep cognitive arousal mediated the impact of daytime coping on nighttime sleep. They did not find an association for task-oriented coping styles, and avoidant coping strategies were not examined. They also observed that individuals who relied more heavily on emotion-focused coping had reductions in overall sleep time during high stress periods. Presleep cognitive arousal was found to mediate the effect of emotion-focused coping on sleep efficiency, suggesting that emotionally activating daytime coping efforts may be associated with more compromised sleep. It should be noted, however, that emotion-focused coping is not construed as an exclusively approach-oriented strategy.

Although Sadeh and Gruber [12] theorized that disengagement processes would likely be associated with a tendency to "escape" to sleep, their empirical work did not support this association [13]. In fact, they found no direct or moderating effect of disengagement on sleep, though they did find that more problem-focused coping during a relatively low-stress period was associated with greater

overall sleep time (as assessed by actigraphy). Likewise, Voss et al. [14] observed that otherwise healthy individuals with primary insomnia were more likely to engage in monitoring (approach) versus blunting (avoidance) coping behaviors. However, sleep problems in medically ill individuals may exhibit unique relationships among coping processes and sleep difficulty.

In regard to sleep difficulties in cancer patients, Savard and Morin [2] posited that predisposing, precipitating, and perpetuating factors may influence sleep problems. Accordingly, psychological conditions such as depression and hyperarousal might be predisposing factors for sleep problems in cancer patients. However, no published study has examined whether mood disturbances influence sleep quality in cancer patients, despite that cancer diagnosis and treatment have been associated with depression and psychological distress [15, 16]. Given that sleep problems often co-occur with depressive symptoms and general distress [17], research is needed to characterize these relationships in cancer patients.

We hypothesized that the manner in which men cope with stressors related to having cancer will affect sleep quality (i.e., lower severity of sleep symptoms and reported interference with daily function caused by sleep problems). Specifically, we expect approach coping to have a salutary effect on sleep and avoidance coping to have a detrimental effect. We will also examine the potential of depressive symptoms and cancer-related intrusive thoughts to mediate effects of approach coping.

Method

Procedures and Participants

Participants included 55 men being treated for cancer at an outpatient oncology clinic at a veteran's hospital in a major metropolitan area in the southwestern USA. Patients were recruited as part of a larger study on "men's experiences with cancer". Participants were not excluded by primary cancer site, disease stage, or by treatment type, but were screened to exclude individuals with any cognitive debilitating comorbidity (e.g., Alzheimer's disease, dementia). Following informed consent, patients completed questionnaire assessments at study entry (T1) and again 6 months later (T2). Participants were entered into a drawing to receive gift certificates to a reputable local retailer. The Institutional Review Board at the Phoenix Veterans Affairs Health Care System approved study procedures.

Participants ranged in age from 51 to 94 years ($M=68.7$, $SD=10.6$). Nearly 91% of participants were white (non-Hispanic), 7% Hispanic/Latino, and 2% Native American. The majority (67.3%) were married or in a significant

relationship. Only 16% did not complete high school, and 37% earned a college degree or graduate degree. The median income range was $20,000–$30,000. Additionally, 89% of participants reported being retired. Men had stage I (3%), stage II (21%), stage III (31%), and stage IV (45%) cancers. Prostate cancer was the most prevalent (29%), followed by colorectal (19%), blood/bone cancers (15%), followed by lung (11%), lymphoma (9%), gastrointestinal (7%), bladder and kidney (4%), head and neck cancer (2%), and others (4%). Nearly 20% of the sample had received their initial diagnosis within the 6 months prior to study entry, 11% in the prior 7 months to 1 year, 38% were diagnosed 1 to 5 years prior, and 31% were diagnosed more than 5 years prior. The majority of men had received chemotherapy (56%) and 56% had received radiation treatment.

Measures

Sleep Quality

Self-reported sleep quality was assessed at T1 and T2 by the Insomnia Severity Index (ISI) [18]. The ISI is particularly well suited to capture the full spectrum of insomnia symptoms experienced by cancer patients [19]. The seven ISI items provide information about satisfaction with sleep, perceived severity of initial insomnia, maintenance insomnia, and early morning awakenings, interference in functioning due to sleep problems, worry about sleep problems, and beliefs about how noticeable the sleep problems are to others. Responses on the ISI ranged from 0 (not at all) to 4 (very severe). Totaled scores can range from 0 to 28. The ISI has been shown to have adequate concurrent validity; it is significantly correlated to self-reports of sleep onset latency, waking after sleep onset, and early morning awakenings [18]. Prior reliability estimates with cancer patients for the ISI have been good (Cronbach's alpha=0.90) [19]. Participants were instructed to complete the ISI based on the quality of their sleep in the past 2 weeks.

Savard et al. [19] identified a two-component factor structure that delineates sleep symptom severity and sleep symptom interference, which demonstrated stability and consistency across cancer types. Sleep symptom severity includes items related to the severity of difficulty falling asleep, maintaining sleep, early morning awakenings, and satisfaction with sleep. Sleep severity scores can range from 0 to 16. Sleep symptom interference evaluates the degree of interference with daily functioning, the appearance of sleep problems to others, and worries related to sleep problems. Sleep interference scores can range from 0 to 12. Cronbach's alpha for severity and interference were 0.88 and 0.86, respectively.

Coping Style

Coping was assessed by the Brief COPE [20], a 28-item self-report inventory that assesses 14 coping styles, and the Emotional Approach Coping Scale [21], which consists of the four-item emotional processing and four-item emotional expression scales. Patients were instructed to rate their coping behaviors in response to the stress of their cancer and rated items on a response scale of 1 (I do not do this at all) to 4 (I do this a lot).

A composite measure of approach coping was constructed using items measured at T1 from scales representing approach-oriented coping strategies utilized by Low et al. [22]. These included active coping, planning, acceptance, support seeking, emotional expression, and emotional processing. All subscales included in the approach-oriented coping score were positively and significantly correlated with each other ($r=0.53$ to 0.74, $p<0.01$). Likewise, subscales representing avoidance-oriented coping strategies at T1 were used to construct a measure of avoidance coping. These included behavioral disengagement, denial, and distraction. All subscales included in the avoidance-oriented coping score were positively and significantly correlated with each other ($r=0.59$ to 0.66, $p<0.01$).[1] The composite scale score represents the mean of included items (approach coping $\alpha=0.86$; avoidance coping $\alpha=0.77$).

Depressive Symptoms

Depressive symptoms were measured at study entry (T1) with the abbreviated Center for Epidemiologic Studies Depression Scale (CES-D) [23], a ten-item depression-screening questionnaire. The abbreviated CES-D has been validated against the full 20-item CES-D in a sample of more than 4,000 community-residing elderly adults [23]. In the present study, Cronbach's alpha=0.70.

Cancer-Specific Intrusive Thoughts

Intrusive thoughts were measured at study entry (T1) with the Impact of Events Scale—Intrusion subscale [24]. The intrusion scale has frequently been used to measure cancer-specific distress [25]. As in previous research, the seven-item scale was slightly modified to be relevant to a cancer context (e.g., had thoughts about cancer when you did not mean to; pictures or thoughts about cancer came into your mind when trying to fall asleep). Respondents indicated

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[1] The remaining coping styles were computed; none were found to significantly correlate with sleep quality.

how frequently in the past week (1=not at all; 5=often) they experienced such thoughts. In the present study, the internal consistency was 0.89.

Health Status and Demographics

Participants self-reported their age, level of education, income, employment status, family composition, and ethnicity. In addition, disease information including primary cancer type and stage, secondary cancer site(s), time since diagnosis, treatment history, and health history were obtained by medical record review.

Results

Sociodemographic and Cancer-Related Predictors of Sleep Quality

Correlations and descriptive statistics for coping strategies and putative mediators (i.e., depressive symptoms, cancer-related intrusive thoughts) are shown in Table 1. Total scores on the ISI at T1 (8.56) and at T2 (10.00) place this sample at about the 76th (T1) and 81st (T2) percentile as determined by normative data for men with cancer [19]. Further, the majority of the sample (59.3%) reported depressive symptoms above the clinical cutoff score (≥10). Reported levels of negative cancer-related intrusive

thoughts, although low, were consistent with previous research with men with cancer [26].

Sociodemographic variables including age, education, income, ethnicity, and marital status were entered as a single block in a regression model predicting sleep symptom severity and interference. No sociodemographic variables were significantly associated with either dimension of sleep quality at T2. Together, sociodemographic variables accounted for only 4% of the variance of sleep symptom severity and 2.5% of the sleep symptom interference variance. Cancer-related variables including cancer stage, time since diagnosis, cancer site, and whether or not radiation therapy or chemotherapy was received were entered as a single block in a regression model predicting T2 sleep quality. Again, none of the disease-specific predictors were significantly associated with sleep quality. Together, cancer-related variables accounted for 3.5% of the variance of sleep symptom severity and 1.4% of the sleep symptom interference variance. Therefore, sociodemographic and cancer-related variables were not retained as control variables in subsequent analyses.

Sleep Symptom Severity and Interference

To examine the relationship of psychological variables to sleep symptom severity, linear regression analysis was conducted with approach coping and avoidance coping entered simultaneously as independent variables and T2 sleep

Table 1 Descriptive statistics and correlations for study variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10
1. Approach coping (T1)	2.58	0.85	–	0.49***	0.58***	0.30*	0.20	0.22	0.39**	0.32*	0.30***	0.27*
2. Approach coping (T2)	2.73	0.78		–	0.05	0.35**	−0.04	−0.17	0.06	−0.01	0.12	0.22
3. Avoidance coping (T1)	1.67	0.54			–	0.38**	0.46***	0.38**	0.49***	0.47***	0.41***	0.19
4. Avoidance coping (T2)	1.65	0.61				–	0.22***	−0.05	0.14	0.30***	0.33*	0.16
5. Sleep severity (T1)	5.87	4.24					–	0.77***	0.76***	0.64***	0.48***	0.21
6. Sleep severity (T2)	6.41	4.39						–	0.61***	0.74***	0.39**	0.17
7. Sleep interference (T1)	2.69	2.80							–	0.69***	0.49***	0.25
8. Sleep interference (T2)	3.56	3.00								–	0.57***	0.23
Potential mediators												
9. Depressive symptoms (T1)	10.61	4.15									–	0.49***
10. Intrusive thoughts (T1)	1.51	0.61										–

*p<0.05; **p<0.01; ***p<0.001

symptom severity as the dependent variable. Avoidance coping at T1 ($\beta=0.38$, $p<0.01$) was significantly related to more sleep symptom severity at T2; however, approach coping was not a significant predictor of sleep symptom severity ($\beta=0.22$, ns). Similarly, linear regression was used to test associations to sleep symptom interference. Again, only avoidance coping ($\beta=0.43$, $p<0.01$) and not approach coping ($\beta=0.07$, ns) was a significant predictor of sleep symptom interference.

Regression analyses were repeated controlling for T1 sleep variables; however, no significant relationships were observed. The strong correlation of T1 and T2 sleep quality (see Table 1) suggest little change in sleep quality over time in this sample.

Next, the relationships of putative mediators to sleep quality were examined. Depressive symptoms were related to both the severity ($\beta=0.57$, $p<0.001$) and interference ($\beta=0.39$, $p<0.01$) of sleep symptoms. However, cancer-related intrusive thoughts were not related to either severity ($\beta=0.17$, ns) or interference ($\beta=0.23$, ns) of sleep symptoms.
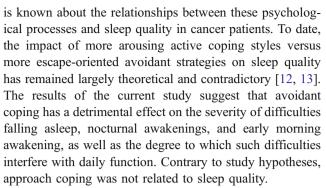
Mediation Models

Mediational analyses were carried out using path analysis with individual tests of specific mediational paths to examine whether depressive symptoms mediated the relation between avoidance coping and sleep quality indicators. Because intrusive thoughts were not related to avoidance coping (see Table 1), it was not a candidate for mediation [27].

The mediated effects were tested based on bootstrapped standard errors for indirect paths generated in Mplus 3.0 [28]. It has been suggested that this method makes fewer assumptions about the sampling distribution than existing statistical methods for assessing mediation effects (e.g., Sobel test) [29]. The mediated effect statistic is the product of the unstandardized path for the relation between the independent variable and the mediator and the unstandardized path of the relation between the mediator and the outcome. Significance of the mediated effect is determined by dividing the mediated effect by the bootstrapped standard error generated in Mplus. The mediated effect of depressive symptoms was significant for sleep symptom interference (0.37, $p<0.05$), but not for sleep symptom severity (0.29, ns).

Discussion

Although a significant amount of work has been done to characterize the role of coping style and depression on adjustment to cancer and other chronic illnesses [30], little

is known about the relationships between these psychological processes and sleep quality in cancer patients. To date, the impact of more arousing active coping styles versus more escape-oriented avoidant strategies on sleep quality has remained largely theoretical and contradictory [12, 13]. The results of the current study suggest that avoidant coping has a detrimental effect on the severity of difficulties falling asleep, nocturnal awakenings, and early morning awakening, as well as the degree to which such difficulties interfere with daily function. Contrary to study hypotheses, approach coping was not related to sleep quality.

Mediational analyses further elucidated the relationship of avoidance coping and sleep quality. Depressive symptoms and not intrusive thoughts were found to mediate the relationship of avoidant coping and sleep interference and partially mediated the effect on sleep symptom severity. Avoidance of cancer-related stressors and circumstances likely contributes to declines in mood states and in turn compromises sleep. Avoidance coping potentially predisposes men to cycles of depressive rumination that interfere with sleep behavior. Despite previous work that has linked intrusive thoughts and sleep quality in men with cancer [31], intrusive thoughts were not related to sleep quality in this study. More work is needed to assess the nature of cognitive processes that interrupt sleep in cancer patients.

It should be noted that the coping style did not predict changes in sleep quality over time (i.e., analyses controlling for T1 sleep). However, in this sample, sleep problems remained relatively consistent. Examination of the effect of time on the relationship of coping style and sleep may be more informative when examined relative to significant events in the cancer treatment trajectory (e.g., commencement of treatment) when changes in sleep quality are expected.

Several limitations should be noted when considering these results. This study utilized a small sample of men that were heterogeneous in respect to cancer type, time from diagnoses, and disease stage. Although the limited number of specific disease factors assessed in this study did not appear to account for a significant amount of the variance of sleep quality, it is likely that specific cancer-related symptoms and treatment modalities affect sleep in unique ways. It should be considered that avoidance coping strategies and depressive symptoms share significant conceptual overlap and are reciprocally influenced. Causal inferences cannot be made in this study and results should be considered correlational. Disengagement from typical coping efforts could be construed as a symptom of depression or a signal of hopelessness, and one likely affects the other. However, only a moderate correlation was observed among these variables suggesting that these are distinct, but related, constructs. Finally, this study relied on retrospective self-report assessments of sleep quality and

predictors of sleep quality increasing the possibility of response bias. More research is needed to observe coping behaviors and sleep quality over a period of time and in respect to distinct periods of the cancer experience (e.g., diagnosis, treatment). Studies that utilize momentary reports of sleep quality (e.g., actigraphy, sleep diaries) will help elucidate the relationships of psychological processes on sleep by allowing for observation of more direct cause and effect relationships among coping behaviors, cognitive and emotional processes, and sleep.

These findings suggest that health care providers should conduct comprehensive assessments of sleep problems in patients with cancer that incorporate considerations of coping style, mood, and other psychosocial factors. Behavioral interventions to improve sleep that address patterns of avoidance coping in addition to proper sleep hygiene (e.g., bedtime routines, regimented wake times) should be tested.

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