Received: 25 March 2022 | Revised: 5 April 2022 | Accepted: 6 April 2022

DOI: 10.1111/jsr.13617

RESEARCH ARTICLE

Poor sleep quality may contribute to dysfunctional illness perception, physical and emotional distress in hospitalised patients: results of a national survey of the Italian Society of Consultation-Liaison Psychiatry

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Funding information
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Summary

Distress associated with physical illness is a well-known risk factor for adverse illness course in general hospitals. Understanding the factors contributing to it should be a priority and among them dysfunctional illness perception and poor sleep quality may contribute to it. As poor sleep quality is recognised as a major risk factor for health problems, we aimed to study its association with illness perception and levels of distress during hospitalisation. This cross-sectional study included a consecutive series of 409 individuals who were hospitalised in medical and surgical units of different hospitals located throughout the Italian national territory and required an assessment for psychopathological conditions. Sleep quality was assessed with the Pittsburgh (Sleep Quality Index), emotional and physical distress with the Edmonton Symptom Assessment System (ESAS), and illness perception with the Brief Illness Perception Questionnaire (BIPQ). Differences between groups, correlations and mediations analyses were computed. Patients with poor sleep quality were more frequently females, with psychiatric comorbidity, with higher scores in the ESAS and BIPQ. Poor sleep

quality was related to dysfunctional illness perception, and to both emotional and physical distress. In particular, by affecting cognitive components of illness perception, poor sleep quality may, directly and indirectly, predict high levels of distress during hospitalisation. Poor sleep quality may affect >70% of hospitalised patients and may favour dysfunctional illness perception and emotional/physical distress.Assessing and treating sleep problems in hospitalised patients should be included in the routine of hospitalised patients.

KEYWORDS
dysfunctional illness perception, hospitalised patients, liaisons psychiatry, physical and emotional distress, poor sleep quality

INTRODUCTION

Physical and emotional distress represent multi-dimensional factors including fatigue, pain, depression, and anxiety, which are well-known risk factors for adverse illness course and increased risk of morbidity and mortality in general hospitals (Zhang et al., 2014). Hence, the understanding of the factors contributing to emotional and physical distress during hospitalisation should be considered as a priority to better prevent potential modifiable factors of morbidity.

Among the important factors contributing to physical and emotional distress during hospitalisation, illness perception has been considered to play a key role (Lambregts, 2017). Illness perception, which is defined as an individual's cognitive (i.e., beliefs, ideas, thoughts) and emotional (i.e., feelings) illness representation, has significant implications for treatment adherence and the management of illness distress (Broadbent et al., 2006) Dysfunctional illness perception is associated with high illness distress, somatic symptom severity and low quality of life in hospitalised patients and may negatively influence not only the adaptation to disease, but disease outcomes as well (Broadbent et al., 2015; Marke & Bennett, 2017; Petrie & Weinman, 2006).

Despite that good sleep quality might play a key role in the recovery from sickness and plays a critical role in maintaining proper emotional/cognitive processing (Gobin, Banks, Fins, & Tartar, 2015; Irwin, 2019), hospitalised patients often experience fragmented and poor sleep quality mainly related to disease severity and to the hospital environment (Kulpatcharapong et al., 2020).

Sleep serves important regulatory functions playing a key role for the maintenance of cognitive, physical, and emotional wellbeing, while sleep disturbances including poor sleep quality are recognised as major risk factors for mental and physical health problems contributing to all-cause mortality (Irwin, 2019; Miller, Renn, Chu, & Torrence, 2019). Despite that poor sleep quality may affect daytime emotional and cognitive processing, to date, it remains unclear whether poor sleep quality may contribute to emotional and physical distress or to dysfunctional illness perception during hospitalisation for medical/surgical problems.

In this context of the paucity of research examining how sleep quality may be related to physical and emotional distress or to illness perception in hospitalised patients, we examined their associations in a population of patients hospitalised in medical and surgical wards of different hospitals. Hospitals were located throughout the Italian national territory and required an assessment for psychological/psychopathological conditions usually referred to as consultation-liaison psychiatry. The present study was in fact promoted by the Italian Society of Consultation-Liaison Psychiatry (SIPC), which is a psychiatric subspecialty addressing the psychological care of medically ill patients as well as the relationship between medical and psychiatric disorders (Grassi et al., 2015), and that organised the first national survey on the potential role of poor sleep quality in patients hospitalised in a general hospital. As sleep plays a major role in regulating emotion and cognition, we hypothesised that poor sleep quality may be related to emotional and physical distress, and to the emotional and cognitive components of dysfunctional illness perception in patients hospitalised for a physical condition.

METHODS

This study included a consecutive series of individuals who were hospitalised in the medical and surgical wards of eight different hospitals located throughout the Italian national territory and required an assessment for psychopathological conditions (usually referred to consultation-liaison psychiatry). The present study was a cross-sectional observational study conducted from January 2018 to January 2020 as a part of an ongoing broader research study promoted and organised by the SIPC aimed at characterising psychopathological aspects of patients hospitalised in medical and surgical wards in Italy. This study was approved by the University of Pisa, Italy Ethics Committee (protocol # 15627).

Inclusion criteria for patients in the present study were: (i) hospitalised in medical and surgical wards, (ii) aged >18 years, (iii) able to sign an informed consent to the study, and (iv) for whom an assessment for psychopathological conditions was required by the medical staff of medical or surgical wards during hospitalisation. The exclusion criteria from the study were the presence of documented severe dementia, and an inability to express informed consent to the study.

All subjects were evaluated with a set of self-reported questionnaires, with the supervision of a trained physician. The assessments included: the Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989; Curcio et al., 2013) to assess sleep quality, the Brief Illness Perception Questionnaire (BIPQ; Broadbent, Petrie, Main, & Weinman, 2006; Pain, 2006) to assess illness perception, and the Edmonton Symptom Assessment System (ESAS; Bruera & Macdonald 1993; Moro et al., 2006) to evaluate emotional and physical distress. Axis I psychiatric diagnoses were computed according to the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5) criteria (American Psychiatric Association, 2013). At baseline, all the subjects also completed sociodemographic and clinical report forms, which included current pharmacological therapy. The study conformed to the Declaration of Helsinki and all participants provided written informed consent before being enrolled in the study.

ASSESSMENT

Sleep quality was assessed with the PSQI, which is the most frequently adopted scale to evaluate sleep quality, and it has already been validated in Italian showing an overall reliability coefficient (Cronbach's α) of 0.835, indicating a high degree of internal consistency (Buysse et al., 1989; Curcio et al., 2013). It consists of 19 self-rated questions that are combined to form seven "components" scores, with a range of 0–3 points such as subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, daytime symptoms, and use of hypnotic medication. A total score of ≥5 is indicative of poor sleep quality.

Illness perception was evaluated with the Italian version of the BIPQ, which has been shown to have good psychometric properties in 36 countries including Italy and in many illness populations. The test–retest reliability correlation coefficients of the original English form (Cronbach's α) were between 0.48 and 0.7 (Broadbent et al., 2006; Pain, 2006). It consists of nine items that represent nine dimensions of the construct such as (i) Consequences: the expected effects and outcome of the illness; (ii) Timeline: how long the patient believes the illness will last; (iii) Personal control: the extent to which the patient believes that they can recover from or control the illness; (iv) Treatment control; (v) Identity: the label the person uses to describe the illness and the symptoms they view as being part of the disease; (vi) Concern; (vi) Understanding; (viii) Emotional response: emotional representation incorporates negative reactions such as fear, anger, and distress, which were assessed using a Likert scale from 0 to 10, comprising the total score from 0 to 80. The cognitive component of BIPQ was computed according to literature by summing scores of items 1–6 and the emotional component by summing scores of items 6–8.

Emotional and physical distress were evaluated with the ESAS, which was validated in Italian with good reliability for measuring depression, well-being and overall distress (Cronbach's α) ranging from 0.61 to 0.80 (Bruera & Macdonald, 1993; Moro et al., 2006). The questionnaire is used to rate the intensity of nine common symptoms experienced by patients, including pain, tiredness, nausea, depression, anxiety, drowsiness, appetite, well-being, and shortness of breath. The ESAS physical score (total of six physical symptoms with a score range of 0–60), the ESAS emotional score (total of two emotional symptoms such as anxiety and depression with a score range of 0–60), and the ESAS total symptom distress score (physical score + emotional score + well-being) were computed.

STATISTICAL ANALYSIS

The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS®) version 22.0 for Windows. Results were expressed as mean ± standard deviation (SD) and/or percentage values. The Shapiro–Wilk test was used to check the normality of the variables. Differences in means between subjects with poor sleep quality (PSQI total score of ≥5) and subjects with good sleep quality (PSQI total score of <5) were assessed using *t* tests for normally distributed variables, or the Mann–Whitney *U*/Wilcoxon test for non-normally distributed variables. Categorical variables were analysed via the chi-squared test. Correlations between continuous variables were tested using the Spearman rho correlation for non-normally distributed variables and using the Pearson correlations index for normally distributed variables. Linear and multiple regression models were then built with emotional/psychiatric distress and illness perception as dependent variables, while taking into account medical or surgical wards and related diagnosis, psychiatric diagnosis, and current pharmacological treatments. All the multiple regression models were checked for multicollinearity. A variable was excluded from the model if it had a variance inflation factor of >10 and a condition number >100 in the eigenvalues of centred correlations. A mediation analysis using SPSS was performed in order to study the potential processes that may underlie the relationships between these variables. All pathways of the mediation were tested.

RESULTS

A total of 522 patients were evaluated for this study, of whom 113 were excluded due to incomplete questionnaires or to incomplete clinical and therapeutic information. The final sample consisted of 409 patients, most of whom were males (234 males, 57.2%) with a mean (SD) age of 60.5 (17.3) years, hospitalised for acute physical diseases or scheduled surgery.

The demographic, clinical, and psychometric variables are summarised in Table 1. Poor sleep quality involved the majority of patients: 78.8% ($n = 322$), 36% had a sleep onset latency of >30–60 min, 42% had a sleep duration of <6 h, 38% had a sleep efficiency of <85%, 35% habitually consumed hypnotics (more than twice a week), and 48% had disturbances during the day more than three-times a week (Figure 1).

Comparison between patients with and without poor sleep quality showed that patients with poor sleep quality were more frequently

TABLE 1 Demographic, clinical, and psychometric variables

Variable	Total sample ($N = 409$)	Individuals with poor sleep quality PSQI ≥5 ($N = 322$)	Individuals with good sleep quality PSQI <5 ($N = 87$)	Statistics
Age, years, mean (SD)	60.5 (17.3)	60.9 (17.5)	58.8 (16.6)	$t = -1.0$, $df = 397$, $p = 0.3$, $q = 0.0375$
Gender, *n* (%)				
Female	234 (57.2)	182 (56.5)	52 (59.8)	$\chi^2 = 0.2$, $df = 1$, $p = 0.587$, $q = 0.0453$
Male	175 (42.8)	140 (43.5)	35 (40.2)	
Sociodemographic information, *n* (%)				
Unmarried	99 (26.0)	75 (25.1)	24 (29.3)	$\chi^2 = 0.9$, $df = 2$, $p = 0.621$, $q = 0.0484$
Couple	165 (43.3)	129 (43.1)	36 (43.9)	
Widowed/separated/other	117 (30.7)	95 (31.8)	22 (26.8)	
Working status, *n* (%)				
Employed	96 (25.9)	70 (24.4)	26 (31.0)	$\chi^2 = 2.1$, $df = 3$, $p = 0.533$, $q = 0.0438$
Unemployed	64 (17.3)	48 (16.7)	16 (19.0)	
Retired	162 (43.7)	130 (45.3)	32 (38.1)	
Housewife/student/other	49 (13.2)	39 (13.6)	10 (11.9)	
Psychiatric comorbidity, *n* (%)				
Yes	240 (30.2)	205 (75.4)	35 (48.6)	$\chi^2 = 19.3$, $df = 1$, $\mathbf{p = 0.001}$, $\mathbf{q = 0.0031}$
No	104 (69.8)	67 (24.6)	37 (51.4)	
Depression, *n* (%)				
Yes	46 (13.4)	35 (12.9)	11 (15.3)	$\chi^2 = 0.2$, $df = 1$, $p = 0.593$, $q = 0.0469$
No	298 (86.6)	237 (87.1)	61 (84.7)	
Delirium/dementia, *n* (%)				
Yes	27 (7.8)	24 (8.8)	3 (4.2)	$\chi^2 = 1.7$, $df = 1$, $p = 0.191$, $q = 0.0359$
No	317 (92.2)	248 (91.2)	69 (95.8)	
Anxiety disorders, *n* (%)				
Yes	53 (15.4)	49 (18.0)	4 (5.6)	$\chi^2 = 6.78$, $df = 1$, $\mathbf{p < 0.01}$
No	291 (84.6)	223 (82)	68 (94.4)	
Bipolar disorders, *n* (%)				
Yes	13 (3.8)	10 (3.7)	3 (4.2)	$\chi^2 = 0.03$, $df = 1$, $p = 0.84$
No	331 (96.2)	262 (96.3)	69 (95.8)	
Schizophrenia, *n* (%)				
Yes	12 (3.5)	9 (3.3)	3 (4.2)	$\chi^2 = 0.124$, $df = 1$, $p = 0.72$
No	332 (96.5)	263 (96.7)	69 (95.8)	
Substance abuse, *n* (%)				
Yes	22 (6.4)	21 (7.7)	1 (1.4)	$\chi^2 = 3.81$, $df = 1$, $p = 0.53$
No	322 (93.6)	251 (92.3)	71 (98.6)	
Personality disorder, *n* (%)				
Yes	27 (7.8)	26 (9.6)	1 (1.4)	$\chi^2 = 5.25$, $df = 1$, $p = 0.22$
No	317 (92.2)	246 (90.4)	71 (98.6)	
Other psychiatric disorder, *n* (%)				
Yes	40 (11.6)	31 (11.4)	9 (12.5)	$\chi^2 = 0.06$, $df = 1$, $p = 0.79$
No	304 (88.4)	241 (88.6)	63 (87.5)	
Hospitalisation, days, mean (SD)	10.4 (7.59)	10.09 (7.53)	9.88 (7.11)	$t = -0.16$, $df = 244$, $p = 0.86$
Ward, *n* (%)				
Medical	278 (81.8)	222 (82.8)	56 (77.8)	$\chi^2 = 0.9$, $df = 1$, $p = 0.324$, $q = 0.0391$
Surgical	62 (18.2)	46 (17.2)	16 (22.2)	

TABLE 1 (Continued)

Variable	Total sample ($N = 409$)	Individuals with poor sleep quality PSQI ≥5 ($N = 322$)	Individuals with good sleep quality PSQI <5 ($N = 87$)	Statistics
Medical diagnosis, *n* (%)				
None	53 (13.4)	45 (14.5)	8 (9.4)	$\chi^2 = 13.5$, $df = 9$, $p = 0.140$, $q = 0.0328$
Gastrointestinal	38 (9.6)	29 (9.4)	9 (10.6)	
Cancer	75 (19.0)	52 (16.8)	23 (27.1)	
Cardiovascular	30 (7.6)	22 (7.1)	8 (9.4)	
Neurological	27 (6.8)	20 (6.5)	7 (8.2)	
Respiratory	46 (11.6)	39 (12.6)	7 (8.2)	
Trauma/muscular	31 (7.8)	28 (9.0)	3 (3.5)	
Infective	17 (4.3)	11 (3.5)	6 (7.1)	
Nephrological	7 (1.8)	7 (2.3%)	0 (0)	
Other	71 (18.0)	57 (18.4%)	14 (16.5)	
PSQI TOT, mean (SD)	9.3 (5.0)	11.2 (3.8)	2.2 (1.4)	$t = -34.1$, $df = 375$, $\mathbf{p = 0.001}$, $\mathbf{q = 0.001}$
BIPQ TOT, mean (SD)	47.2 (8.4)	48.1 (8.3)	45.2 (8.1)	$t = -2.1$, $df = 162$, $\mathbf{p = 0.036}$, $q = 0.0234$
BIPQ cognitive, mean (SD)	29.4 (5.9)	30.1 (6.0)	27.9 (5.6)	$t = -2.1$, $df = 162$, $\mathbf{p = 0.037}$, $q = 0.0250$
BIPQ emotional, mean (SD)	13.4 (3.2)	13.8 (3.2)	12.6 (2.8)	$t = -2.2$, $df = 163$, $\mathbf{p = 0.024}$, $q = 0.0219$
ESAS physical distress, mean (SD)	28.1 (14.5)	29.3 (14.6)	23.8 (13.2)	$t = -3.1$, $df = 403$, $\mathbf{p = 0.02}$, $\mathbf{q = 0.0203}$
ESAS emotional distress, mean (SD)	16.3 (7.8)	17.2 (7.5)	13.1 (7.9)	$t = -4.3$, $df = 403$, $\mathbf{p = 0.001}$, $\mathbf{q = 0.0047}$
ESAS pain, mean (SD)	4.1 (3.2)	4.2 (3.2)	3.7 (3.1)	$t = -1.4$, $df = 403$, $p = 0.153$, $q = 0.0344$
ESAS tiredness/fatigue, mean (SD)	5.7 (2.9)	5.9 (2.8)	5.0 (2.9)	$t = -2.5$, $df = 403$, $\mathbf{p = 0.012}$, $\mathbf{q = 0.0156}$
ESAS nausea, mean (SD)	2.3 (2.8)	2.4 (2.9)	1.9 (2.6)	$t = -1.5$, $df = 403$, $p = 0.094$, $q = 0.0297$
ESAS depression, mean (SD)	5.1 (3.1)	5.4 (3.0)	4.2 (3.0)	$t = -3.0$, $df = 403$, $\mathbf{p = 0.002}$, $\mathbf{q = 0.0141}$
ESAS anxiety, mean (SD)	5.5 (3.1)	5.8 (3.0)	4.3 (3.1)	$t = -3.8$, $df = 403$, $\mathbf{p = 0.001}$, $\mathbf{q = 0.0063}$
ESAS dyspnoea, mean (SD)	2.9 (3.3)	3.0 (3.3)	2.4 (2.9)	$t = -1.6$, $df = 403$, $p = 0.073$, $q = 0.0281$
ESAS drowsiness, mean (SD)	3.4 (3.0)	3.6 (3.0)	2.8 (2.6)	$t = -2.4$, $df = 154.7$, $\mathbf{p = 0.017}$, $\mathbf{q = 0.0188}$
ESAS loss of appetite, mean (SD)	3.6 (3.1)	3.77 (3.2)	3.0 (2.9)	$t = -2.0$, $df = 144.6$, $\mathbf{p = 0.043}$, $q = 0.0266$
ESAS well- being, mean (SD)	5.8 (2.8)	4.9 (2.7)	6.2 (2.7)	$t = -3.6$, $df = 403$, $\mathbf{p = 0.001}$, $\mathbf{q = 0.0078}$
ESAS TOT, mean (SD)	44.4 (19.9)	46.5 (19.5)	36.9 (19.3)	$t = -4.0$, $df = 403$, $\mathbf{p = 0.001}$, $\mathbf{q = 0.0094}$
Current drug treatments				
Antidepressants, *n* (%)				
Yes	129 (31.7)	209 (65.3)	18 (20.7)	$\chi^2 = 6.1$, $df = 1$, $\mathbf{p = 0.013}$, $\mathbf{q = 0.0172}$
No	278 (68.0)	111 (34.7)	69 (79.3)	
Mood stabilisers				
Yes	44 (10.8)	37 (11.6)	7 (8.0)	$\chi^2 = 0.8$, $df = 1$, $p = 0.349$, $q = 0.0406$
No	363 (89.2)	283 (88.4)	80 (92.0)	
Lithium				
Yes	9 (2.2)	6 (1.9)	3 (3.4)	$\chi^2 = 0.7$, $df = 1$, $p = 0.371$, $q = 0.0422$
No	400 (97.8)	316 (98.1)	84 (96.6)	
Benzodiazepines				
Yes	175 (43.0)	150 (46.9)	25 (28.7)	$\chi^2 = 9.1$, $df = 1$, $\mathbf{p = 0.002}$, $\mathbf{q = 0.0125}$
No	232 (57.0)	170 (53.1)	62 (71.3)	
Neuroleptics				
Yes	76 (18.7%)	65 (20.3)	11 (12.6)	$\chi^2 = 2.6$, $df = 1$, $p = 0.104$, $q = 0.0313$
No	331 (81.3%)	255 (79.7)	76 (87.4)	

Abbreviations: BIPQ, brief illness perception questionnaire; ESAS, Edmonton Symptom Assessment System; PSQI, Pittsburgh Sleep Quality Index; *t*, *t* test; TOT, total. Significance in bold.

Note: Demographic and clinical characteristic of the total sample of patients hospitalised in medical and surgical wards in general hospitals and comparison between subjects with poor sleep quality with a PSQI of ≥5 versus subjects with good sleep quality with a PSQI of <5. Significance in bold. Corrected significance level $q = 0.02031$.

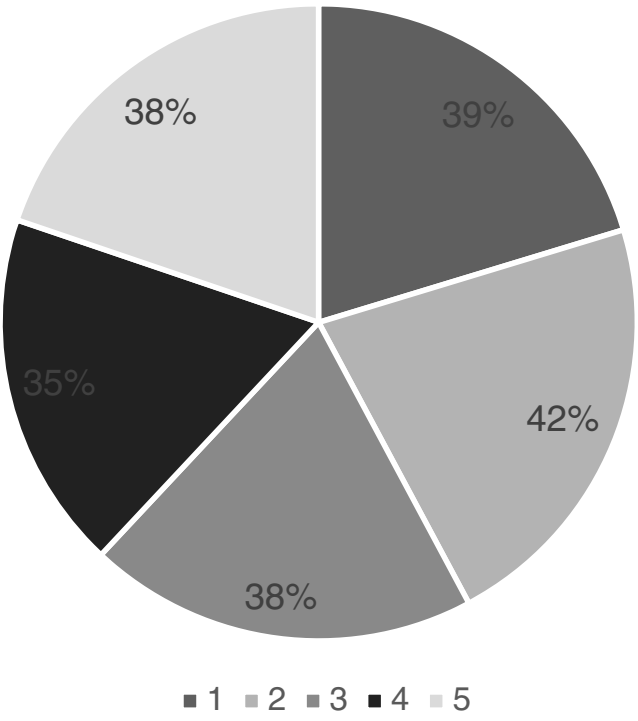

FIGURE 1 Pittsburgh Sleep Quality Index subscales. (1) Sleep latency >60 min, 39% of the sample; (2) sleep duration <6 h, 38%; (3) sleep efficiency <85%, 38%; (4) use of hypnotics more than twice a week, 35%; (5) daytime symptoms for more than three-times a week, 38%

females ($n = 182$, 56.5%), even if no statistical differences emerged. Also, no differences emerged in terms of age (mean [SD] 60.9 [17.5] versus 58.8 [16.6] years; $p = 0.350$), sociodemographics (marital status, $p = 0.621$; employment status, $p = 0.533$), duration of hospitalisation ($p = 0.638$), or if they were hospitalised in medical versus surgical wards ($p = 0.324$), or type of medical diagnosis ($p = 0.140$).

Patients with poorer sleep quality were those with psychiatric comorbidity ($n = 205$ [75.4%] versus 35 [48.6%]; $\chi^2 = 19.3$, $df = 1$, $p = 0.001$). Depressive, anxious and delirium-related symptoms were the most frequent comorbid psychiatric conditions associated to poor sleep quality during hospitalisation. In particular, anxious symptoms was significantly higher in patients with poor sleep quality compared to patients with good sleep quality ($n = 49$ [18.0%] versus four [5.6%]; $p < 0.01$).

Patients with poor sleep quality were more frequently prescribed benzodiazepines ($n = 150$ [46.9%] versus 25 [28.7%]; $p = 0.002$) and antidepressants ($n = 209$ [65.3%] versus 18 [20.7%]; $p = 0.013$) compared to patients with good sleep quality.

Patients with poor sleep quality, compared to patients with good sleep quality, had higher scores for the BIPQ total score (mean [SD] 48.1 [8.3] versus 45.2 [8.1], $p = 0.036$) and in both the BIPQ cognitive (mean [SD] 30.1 [6.0] vs 27.9 [5.6], $p = 0.037$) and emotional (mean [SD] 13.8 [3.2] versus 12.6 [2.8], $p = 0.024$) components indicating pronounced dysfunctional illness perception.

Patients with poor sleep quality, compared to patients with good sleep quality, had higher scores in the ESAS total score (mean [SD] 46.5 [19.5] versus 36.9 [19.3], $p = 0.001$) and in both its components measuring emotional (mean [SD] 29.3 [14.6] versus 23.8 [13.2], $p = 0.02$) and physical distress (mean [SD] 17.2 [7.5] versus 13.1 [7.9], $p = 0.001$). In particular, both ESAS depression ($p = 0.002$) and anxiety ($p = 0.001$), ESAS fatigue ($p = 0.012$), drowsiness ($p = 0.017$), and well-being ($p = 0.001$) scores were significantly higher in patients with poor sleep quality compared to patients with good sleep quality (Table 1).

CORRELATIONS AMONG VARIABLES

Results of Spearman's correlation for non-normally distributed variables and Pearson's correlation for normally distributed variables showed significant correlations among poor sleep quality (PSQI), dysfunctional illness perception (BIPQ) total score (coefficient 0.28, $p < 0.001$), cognitive (coefficient 0.28, $p < 0.001$) and emotional components (coefficient 0.25, $p < 0.001$), and ESAS emotional (coefficient 0.30, $p < 0.001$) and physical distress (coefficient 0.20, $p < 0.001$).

The BIPQ and ESAS were correlated in the total score (coefficient 0.43, $p < 0.001$) in all emotional and cognitive components (shown in Table 2).

Results of regression analyses showed that distress during hospitalisation (ESAS total score) was predicted by poor sleep quality (coefficient 0.45, $p = 0.04$) and by the emotional component of dysfunctional illness perception (BIPQ) (coefficient 1.18, $p = 0.02$).

Results of regression analyses showed that emotional distress during hospitalisation (ESAS emotional) was predicted by poor sleep quality (coefficient 0.53, $p = 0.03$), by the emotional component of dysfunctional illness perception (BIPQ) (coefficient 0.46, $p = 0.01$) and by the physical component of distress (coefficient 0.15, $p < 0.01$). Similarly the physical component of distress was predicted by poor sleep quality (coefficient 0.36, $p = 0.03$), by the cognitive component of dysfunctional illness perception (coefficient 0.47, $p = 0.02$), and by the emotional component of distress (coefficient 0.69, $p < 0.01$) (Table 3).

Results of the mediation analyses showed that the PSQI directly predicted the ESAS and BIPQ, but the PSQI also showed a mediating effect on the ESAS with BIPQ (shown in Figure 1). The relationship between the PSQI and ESAS total was mediated by the BIPQ total (shown in Figure 1). The standardised regression coefficient between poor seep quality (PSQI) and dysfunctional illness beliefs (BIPQ) was statistically significant, as was the standardised regression coefficient between dysfunctional illness beliefs and physical and emotional distress (ESAS total). The indirect effect of the PSQI on the ESAS total was found to be statistically significant (Effect = 0.24; 95% confidence interval [CI] 0.17–0.88) (Figure 2).

DISCUSSION

In the present study, we aimed at evaluating the association between sleep quality and illness perception and their association with physical

TABLE 2 Correlations among variables

	PSQI total	ESAS physical distress	ESAS emotional distress	ESAS total	BIPQ total	BIPQ cognitive	BIPQ emotional
PSQI total	1						
ESAS physical distress	**0.20****	1					
ESAS emotional distress	**0.30****	**0.54****	1				
ESAS total	**0.27****	**0.94****	**0.79****	1			
BIPQ total	**0.28****	**0.41****	**0.35****	**0.43****	1		
BIPQ cognitive	**0.28****	**0.41****	**0.33****	**0.43****	**0.95****	1	
BIPQ emotional	**0.25****	**0.47****	**0.43****	**0.51****	**0.79****	**0.66****	1

Abbreviations: BIPQ, Brief Illness Perception Questionnaire; ESAS, Edmonton Symptom Assessment System; PSQI, Pittsburgh Sleep Quality Index. Significance in bold. ****p* < 0.01.**

Note: *Correlations among variables*: results of Spearman's correlation for non-normally distributed variables and Pearson's correlation for normally distributed variables.

TABLE 3 Linear and multiple regression analyses on Edmond Symptom Assessment System (ESAS)

	B	SE (*B*)	*β*	*t*	*p*	Model R^2
ESAS total						**20.5%**
(Constant)	20.76	6.10		3.40	0.00	
PSQI total	**0.45**	**0.22**	**0.17**	**2.08**	**0.04**	
BIPQ cognitive	0.52	0.26	0.22	2.00	0.05	
BIPQ emotional	**1.18**	**0.50**	**0.25**	**2.37**	**0.02**	
ESAS physical						**26.0%**
(Constant)	4.46	5.00		0.89	0.37	
PSQI total	**0.36**	**0.17**	**0.17**	**2.15**	**0.03**	
BIPQ cognitive	**0.47**	**0.20**	**0.24**	**2.34**	**0.02**	
BIPQ emotional	0.25	0.40	0.07	0.63	0.53	
ESAS emotional	**0.69**	**0.18**	**0.31**	**3.83**	**0.00**	
ESAS emotional						**21.5%**
(Constant)	7.99	2.25		3.54	0.00	
PSQI total	**0.53**	**0.25**	**0.18**	**2.16**	**0.03**	
BIPQ cognitive	−0.04	0.10	−0.05	−0.45	0.65	
BIPQ emotional	**0.46**	**0.18**	**0.27**	**2.51**	**0.01**	
ESAS physical	**0.15**	**0.04**	**0.33**	**3.83**	**0.00**	

Abbreviations: B, unstandardised regression coefficient; BIPQ, Brief Illness Perception Questionnaire; ESAS, Edmonton Symptom Assessment System; PSQI, Pittsburgh Sleep Quality Index; SE, standard error. Significance in bold.

Note: Linear and multiple regression analyses on the ESAS. Results of linear and multiple logistic regression analyses among ESAS and other variables. Significance in bold. ****p* < 0.01.**

and emotional distress in patients hospitalised in medical and surgical wards of different hospitals located throughout the Italian national territory. The present study has been promoted by the SIPC, representing the first national survey on the potential role of poor sleep quality in patients hospitalised in a general hospital in Italy. The present study has shown that poor sleep quality was indeed frequent in hospitalised patients in Italy, affecting >70% of the patients evaluated. In particular, sleep disturbances were severe in >35% of patients who had <6 h of sleep, low sleep efficiency (<85%), and daytime symptoms for >3 days a week.

Importantly, poor sleep quality in hospitalised patients was related to dysfunctional illness perception and to emotional and physical distress in these patients. Poor sleep quality directly predicted dysfunctional illness perception and emotional/physical distress. In addition, by affecting the emotional and cognitive components of illness perception, poor sleep quality showed an indirect effect on emotional and physical distress. It is well known that disturbed sleep may impair immune function, which is crucial for healing and may contribute to the vulnerability for mental and medical illness during hospitalisation (Miller et al., 2019), but it may also contribute to those factors associated with impairment of quality of life, increased risk of morbidity and mortality such as emotional and physical distress and dysfunctional illness perception. In this framework,

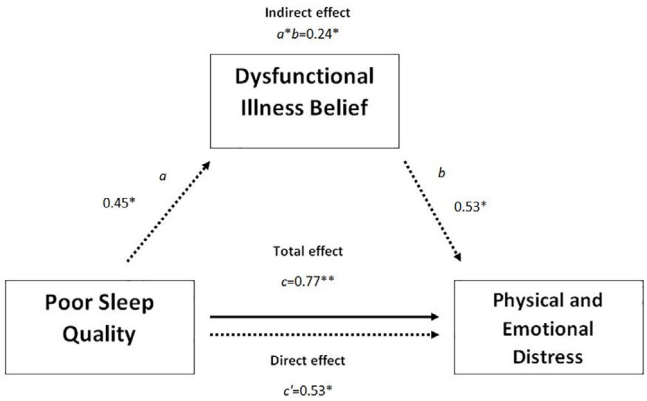

FIGURE 2 Mediation analysis. Values show direct and indirect effect of poor sleep quality on physical and emotional distress in hospitalised patients with medical/surgical problems. *a* is effect of poor sleep quality on dysfunctional illness belief; *b* is effect of dysfunctional illness belief on physical and emotional distress; *c'* is direct effect of poor sleep quality on physical and emotional distress; *c* is the total effect (direct and indirect) of poor sleep quality on physical and emotional distress. $^{*}p < 0.05$; $^{**}p < 0.01$

these data appear useful to inform preventive strategies, in that acting on sleep quality or disturbed sleep may improve emotional and physical distress and illness perception during hospitalisation.

The present study sheds some light on the existing scientific literature. Firstly, our study demonstrated a high prevalence of poor sleep quality in hospitalised patients, interestingly more than half of the patients at ~70%. Our finding was similar to previously published studies that were conducted in other countries and have shown the prevalence of poor sleep quality in hospitalised patients to range between 43% and 91% (Dobing, Frolova, McAlister, & Ringrose, 2016; Kulpatcharapong et al., 2020; Matsuda et al., 2017).

Subjects with poor sleep quality were more frequently females with psychiatric comorbidity, in particular with depressive disorders. These findings were expected, as women are more likely to experience sleep disturbances across the lifespan (Mallampalli & Carter, 2014; Pengo, Won, & Bourjeily, 2018) and the association between poor sleep quality and depression in hospitalised patients is already known (Matsuda et al., 2017). Poor sleep quality was not different in medical or surgical wards or for different medical conditions. These findings were expected as well, as the hospital environment in general is a well-known factor contributing to poor sleep quality (Dobing et al., 2016; Kulpatcharapong et al., 2020; Matsuda et al., 2017) and medical problems may equally contribute to poor sleep quality. Patients with poor sleep quality were more frequently treated with benzodiazepines and antidepressants, as these drugs are commonly used in Italian clinical practice to treat sleep problems (Palagini et al., 2020).

Interestingly, hospitalised patients with poor sleep quality showed dysfunctional cognitive and emotional illness perception and higher emotional/physical distress compared to patients with no problems in sleep quality.

In particular results of correlation and regression analyses showed that poor sleep quality was related and could predict dysfunctional cognitive and emotional illness perception and high emotional/physical distress. These findings are consistent with data showing that poor sleep quality is related to negative cognitive bias, dysfunctional cognition, may alter the perception of stress (Gobin et al., 2015), and is related to emotional/psychological distress in the clinical and non-clinical population (Scott, Paterson, & Happell, 2014; Wang et al., 2016).

Results of mediation analyses showed that poor sleep quality may hold not only a direct effect on emotional/physical distress, but also an indirect effect. By affecting cognitive and emotional illness perception, poor sleep quality may indirectly affect emotional/physical distress.

Taken together, these findings emphasise the need to assess and treat sleep problems in hospitalised patients. Routinely screening of sleep problems in hospitalised patients should be useful to provide additional strategies to improve medical/surgical illness recovery.

STUDY LIMITATIONS

These results should be interpreted considering several limitations including the lack of physiological measures of sleep quality. In particular, the use of objective measures such as actigraphy could be used in future studies; in addition, specific rating scales should be used for evaluating mental and neurocognitive disorders. More data about patients should be taken into account including years of education, w could affect the ability to answer the questionnaires. The cross-sectional design limits any causal interpretations. Consequently, longitudinal studies are needed with larger samples of hospitalised patients with different disorders. Hospital organisation and environment should be taken into account, as well as the effect of medical treatments on sleep when studying sleep problems in hospitalised patients. Moreover, besides studying sleep quality the study of different sleep disorders should be included in future studies.

CONCLUSION

This study suggests that: (i) poor sleep quality may affect >70% of hospitalised patients in Italy; (ii) poor sleep quality may favour dysfunctional illness perception and emotional/psychical distress in hospitalised patients; (iii) assessing and treating sleep problems in hospitalised patients should be included in the routine of hospitalised patients. Treating sleep disturbance in this context could be a useful strategy to improve medical/surgical illness recovery and reduce the duration of hospitalisation.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

AUTHOR CONTRIBUTIONS

Laura Palagini, Luigi Zerbinati, Luigi Grassi collected and analysed the data, wrote and supervised the paper; Matteo Balestrieri, Martino Belvederi Murri, Rosangela Caruso, Armando D'Agostino, Maria Ferrara,

Silvia Ferrari, Antonino Minervino, Alessandra Petrucci, Lucia Massa, Paolo Milia, Nanni Maria Giuliai, Mario Miniati, Stefano Pini Pierluigi Politi, Matteo Porcellana, Matteo Rocchetti, Ines Taddei, Tommaso Toffanin, collected data and gave the final approval to the manuscript.

DATA AVAILABILITY STATEMENT

Data sharing not applicable.

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How to cite this article: Palagini, L., Zerbinati, L., Balestrieri, M., Belvederi Murri, M., Caruso, R., D'Agostino, A., Ferrara, M., Ferrari, S., Minervino, A., Massa, L., Milia, P., Miniati, M., Maria Giulia, N., Petrucci, A., Pini, S., Politi, P., Porcellana, M., Rocchetti, M., Taddei, I., … Grassi, L. (2022). Poor sleep quality may contribute to dysfunctional illness perception, physical and emotional distress in hospitalised patients: results of a national survey of the Italian Society of Consultation-Liaison Psychiatry. *Journal of Sleep Research*, e13617. https://doi.org/10.1111/jsr.13617