Received: 26 April 2021 | Revised: 28 October 2021 | Accepted: 12 November 2021

DOI: 10.1002/pon.5861

WILEY

ORIGINAL ARTICLE

Distress in hospitalized cancer patients: Associations with personality traits, clinical and psychosocial characteristics

Theresia Pichler[1,2] | Birgitt Marten-Mittag[3] | Kerstin Hermelink[4] | Eva Telzerow[5] | Tamara Frank[1,3] | Ulrike Ackermann[6] | Claus Belka[7] | Stephanie E. Combs[8,9,10] | Christian Gratzke[11,12] | Jürgen Gschwend[13] | Nadia Harbeck[4,14] | Volker Heinemann[1,5] | Kathleen Herkommer[13] | Marion Kiechle[6] | Sven Mahner[4] | Steffi Pigorsch[8] | Josefine Rauch[7] | Christian Stief[12] | Friederike Mumm[1,5] | Pia Heußner[5,15] | Peter Herschbach[3] | Andreas Dinkel[3]

[1]Comprehensive Cancer Center Munich (CCC Munich), Munich, Germany

[2]Department of Sport and Health Sciences, Technical University of Munich, Munich, Germany

[3]Department of Psychosomatic Medicine and Psychotherapy, Klinikum Rechts der Isar, School of Medicine, Technical University of Munich, Munich, Germany

[4]Department of Obstetrics and Gynecology, University Hospital, LMU Munich, Munich, Germany

[5]Department of Internal Medicine III, University Hospital, LMU Munich, Munich, Germany

[6]Department of Obstetrics and Gynecology, Klinikum Rechts der Isar, School of Medicine, Technical University of Munich, Munich, Germany

[7]Department of Radiation Oncology, University Hospital, LMU Munich, Munich, Germany

[8]Department of Radiation Oncology, Klinikum Rechts der Isar, School of Medicine, Technical University of Munich, Munich, Germany

[9]Department of Radiation Medicine, Helmholtz Zentrum München (HMGU), Oberschleißheim, Germany

[10]Deutsches Konsortium für Translationale Krebsforschung (DKTZ), Partner Site Munich, Munich, Germany

[11]Department of Urology, University Hospital of Freiburg, Freiburg, Germany

[12]Department of Urology, University Hospital, LMU Munich, Munich, Germany

[13]Department of Urology, Klinikum Rechts der Isar, School of Medicine, Technical University of Munich, Munich, Germany

[14]Department of Obstetrics and Gynecology, Breast Center, University Hospital, Ludwig Maximilian University of Munich, Munich, Germany

[15]Cancer Center Oberland, Garmisch-Partenkirchen General Hospital, Garmisch-Partenkirchen, Germany

Correspondence
Theresia Pichler, Comprehensive Cancer Center Munich, Technical University of Munich, Munich 81675, Germany.
Email: theresia.pichler@mri.tum.de and theresia.pichler@med.uni-muenchen.de

Funding information
Open access funding enabled and organized by Projekt DEAL.

Abstract

Objective: To improve allocation of psychosocial care and to provide patient-oriented support offers, identification of determinants of elevated distress is needed. So far, there is a lack of evidence investigating the interplay between individual disposition and current clinical and psychosocial determinants of distress in the inpatient setting.

Methods: In this cross-sectional study, we investigated 879 inpatients with different cancer sites treated in a German Comprehensive Cancer Center. Assessment of determinants of elevated distress included sociodemographic, clinical and

psychosocial characteristics as well as dimensions of personality. Multiple linear regression was applied to identify determinants of psychosocial distress.

Results: Mean age of the patients was $M = 61.9$ (SD = 11.8), 48.1% were women. In the multiple linear regression model younger age ($\beta = -0.061$, $p = 0.033$), higher neuroticism ($\beta = 0.178$, $p = <0.001$), having metastases ($\beta = 0.091$, $p = 0.002$), being in a worse physical condition ($\beta = 0.380$, $p = <0.001$), depressive symptoms ($\beta = 0.270$, $p = <0.001$), not feeling well informed about psychological support ($\beta = 0.054$, $p = 0.046$) and previous uptake of psychological treatment ($\beta = 0.067$, $p = 0.020$) showed significant associations with higher psychosocial distress. The adjusted R^2 of the overall model was 0.464.

Conclusion: Controlling for sociodemographic characteristics and dispositional vulnerability, that is neuroticism, current clinical and psychosocial characteristics were still associated with hospitalized patients' psychosocial distress. Psycho-oncologists should address both, the more transient emotional responses, such as depressive symptoms, as well as more enduring patient characteristics, like neuroticism.

KEYWORDS
cancer, depression, inpatients, mental health, oncology, personality, psycho-oncology, psychosocial distress, risk factors

1 | INTRODUCTION

Distress in patients with cancer is associated with various negative outcomes, like reduced adherence to treatment,[1] treatment complications,[2] lower quality of life,[3,4] and mortality.[4,5]

Psychosocial distress often accompanies the psychological adaptation process to the diagnosis of cancer. However, identifying patients with clinical levels of psychosocial distress and investigating the associated determinants is crucial for patient-oriented and timely support. As hospitalization often follows or precedes initial diagnosis or other significant crossroads (e.g. discontinuation/change of treatment goals, disease progression), distress screening in the inpatient setting is of high importance. Accordingly, implementation of a distress screening procedure is mandatory in certified comprehensive cancer centers (CCC) in Germany.[6]

Actually, studies differentiating between treatment settings are scant, and only very few studies explicitly examined psychosocial distress in hospitalized patients with various tumor entities. In these studies, prevalence rates of high psychosocial distress amounted to more than 60%.[7,8]

Regarding determinants of distress, previous studies demonstrated the relevance of sociodemographic characteristics: Female gender[8–10] and younger age[11,12] were associated with higher distress. Some studies that investigated the clinical characteristics of patients with cancer showed that patients with poor physical performance status are more likely to be distressed[13] as are those at advanced disease states.[10] The prevalence of distress also varies with cancer site; however, associations are less clear.[8]High rates of clinical distress were found for example among patients with genitourinary cancer, hematologic, lung, and head and neck cancer.[10,14]

Numerous psychosocial variables have been investigated as determinants of distress in patients with cancer. For instance, recent research found negative associations between cancer coping self-efficacy,[15] acceptance of cancer[16] and elevated distress. However, as people's dispositional characteristics impact psychological well-being, it seems useful to control for such variables before assigning unique predictive power to clinical variables and more volatile personal characteristics.

Research has shown that personality traits and especially neuroticism (usually referring to the Big Five personality trait model), are highly relevant regarding the onset and chronicity of numerous mental disorders.[17] With regard to cancer patients, there is evidence that personality traits are associated with distress in outpatients at time of diagnosis,[18] in out-patients undergoing treatment[19] as well as in cancer survivors beyond primary treatment.[20] However, the interplay between individual dispositions and current clinical and psychological variables in determining psychosocial distress in the inpatient setting which is characterized by, among others, reduced mobility, lack of personal space, frequent diagnostic and therapeutic procedures and interaction with multiple health professionals, remains unclear.

Therefore, this study aimed to investigate the relevance of clinical and psychosocial determinants for elevated distress in cancer inpatients when controlling for dispositional determinants (e.g. personality traits).

2 | METHODS

2.1 | Study design and participants

This was a secondary analysis of the study by Pichler et al.[21] that investigated factors associated with decline of psychological support during hospital stay. For this cross-sectional study, inpatients were recruited from the two university hospitals of the Comprehensive Cancer Center Munich (CCC Munich), Germany. The data collection took place between August 2016 and October 2017 at the departments of gynecology, urology, and radiation oncology in each hospital. Participants were eligible if they were ≥18 years, German-speaking, and had a verified diagnosis of a malignant tumor. Exclusion criteria were verbal, mental, or physical impairments that were incompatible with giving informed consent and filling out a self-report questionnaire (physician's assessment). After giving written informed consent, patients completed the questionnaires during their hospital stay. The Ethics Committee of the Technical University of Munich (238/16 S) and the Ethics Committee of the University of Munich (402-16) approved this study. For a more detailed description of the study methods, please see Pichler et al.[21]

2.2 | Measures

2.2.1 | Sociodemographic characteristics and clinical information

Sociodemographic data (*age, sex, marital status, education, and work situation*) and clinical information (*tumor entity, date of initial diagnosis, disease status, metastases, and current treatment*) were assessed using standardized sheets. Moreover, patients indicated their current physical condition on a visual analog scale (1 = "very good physical condition", 10 = "very bad physical condition").

2.2.2 | Psychosocial distress

Psychosocial distress was assessed using self-reporting questionnaires (distress screenings). In certified cancer centers in Germany, the assessment of psychosocial distress via distress screening is mandatory and part of the clinical routine care pathway.

Following the different screening measures implemented at the two university hospitals of the CCCM, we used the Questionnaire on Stress in Cancer Patients-Revised (QSC-R10),[22] a self-reporting questionnaire that is routinely used at one partner site of the CCC Munich, and the Distress Thermometer (DT),[23] which is routinely used at the other partner site.

The 10 items of the QSC-R10 relate to potentially distressing cancer-related experiences. For each item, patients indicate whether it applies to them or not. If the item applies, they indicate how severely distressed they feel about it (0 = "the problem does not apply to me" to 5 = "the problem does apply and causes severe distress"). A sumscore of ≥15 is recommended as a cut-off for clinically significant distress (Cronbach's Alpha in the current sample: $\alpha = 0.87$).

The German version of the DT contains a single-item visual analog scale (0 = "no distress" to 10 = "extreme distress") to assess a global level of psychosocial distress. Further, patients answer a 34-item problem-checklist by checking "yes" or "no" for each item. Different cut-off scores were used for the DT.[24] Based on previous studies examining mixed samples of cancer patients, we choose a cut-off of ≥6 at the visual analog scale, which indicates clinically significant distress.[12,25,26]

2.2.3 | Depressive symptoms

We used the 2-item-version of the Patient Health Questionnaire (PHQ-2),[27] which is a screening instrument for depressive symptoms. A sum score ≥3 differentiates between no/low and clinical level of depressive symptoms (Cronbach's Alpha in the current sample: $\alpha = 0.73$).

2.2.4 | Self-efficacy

We assessed self-efficacy using the short form of the German version of the General Self-Efficacy Scale (ASKU).[28] It consists of three items. Participants indicate for each statement to which extent it applies to them (1 = "doesn't apply at all" to 5 = "applies completely"). A higher mean score indicates higher self-efficacy (Cronbach's Alpha in the current sample: $\alpha = 0.89$).

2.2.5 | Personality

The Big Five Inventory-Short Form (BFI-10)[29] was applied to assess personality traits. The 10 items of this instrument measure extraversion, agreeableness, conscientiousness, neuroticism, and openness. Higher subscale-values are associated with stronger manifestations of the corresponding personality trait.

2.2.6 | Information about psychological support

We assessed informational need regarding psychological support via the question "Do you feel well informed about the psychological support offered in this hospital?" (response options: "yes" and "no").

2.2.7 | Previous use of psychological treatment

Previous uptake of psychological treatment was determined by the item "Have you ever been in psychological treatment?" (response

options: "yes, due to my cancer", "yes, because of other problems" and "no"). For further analysis, we categorized the answers into "yes" and "no".

2.3 | Statistical analysis

We report frequencies (total numbers and percentages), mean values, and standard deviations for sociodemographic, clinical and psychological characteristics, and personality traits for descriptive purposes. The distress scores of the DT and the QSC-R10 were standardized (z-scores) in order to combine the two samples for intercorrelation analysis and linear regression analysis. We performed Pearson correlations for the following variables: distress, age, personality traits (extraversion, neuroticism, openness, conscientiousness, and agreeableness), physical condition, depressive symptoms, and self-efficacy. Finally, we calculated a multiple linear regression analysis with psychosocial distress as dependent variable. The selection of independent variables was based on theoretical considerations. We included sociodemographic characteristics (sex, age, marital status, and education), personality traits (extraversion, neuroticism, openness, conscientiousness, and agreeableness), clinical characteristics (illness duration, metastases, current treatment, and physical condition), and psychosocial characteristics (depressive symptoms, self-efficacy, informational need, and previous use of psychological treatment). We dummy-coded variables if necessary. For missing values within variables with high numbers of missings (education, illness duration, metastases, depressive symptoms, and informational need), we performed a separate category. All statistical tests were two-tailed, and the level of significance was set at $p < 0.05$. We calculated analyses restricted to patients with complete data regarding distress and performed those using IBM SPSS Statistics for Windows, Version 25.0.[30]

3 | RESULTS

3.1 | Sample characteristics

Out of 2999 inpatients with cancer eligible during the study period, we contacted $n = 1737$ for study participation. Of these, 972 (55.6%) participated and 879 (90.4%) of the participants provided complete data regarding psychosocial distress (for a detailed study flowchart please see Supporting Information). The analyzed sample comprised 48.1% women, mean age was 61.9 years (standard deviation = 11.8). The most frequent cancer diagnoses were prostate (27%), breast (18.1%), and kidney/urinary passages/bladder (11.9%). For half of all patients, illness duration was up to 3 months (50.5%, $n = 433$); 27.9% had metastases (53.3% had no metastases and 18.8% did not know). Patients were most frequently treated with surgery 64.1% ($n = 562$), followed by radiotherapy (33.6%, $n = 295$), chemotherapy (24.4%, $n = 214$), and hormone therapy (7.3%, $n = 64$). Further sociodemo-

TABLE 1 Sociodemographic and clinical variables of the study participants ($n = 879$)

	Total sample	
Sociodemographic characteristics	**M**	**SD**
Age ($n = 878$)	61.9	11.8
	n	**%**
	879	100
Sex ($n = 879$)		
Female	423	48.1
Male	456	51.9
Age group ($n = 878$)		
≤50	151	17.2
51–65	364	41.5
66–75	261	29.7
76 and older	102	11.6
Marital status ($n = 877$)		
Single	98	11.2
Married/living with partner	617	70.4
Divorced/separated	99	11.3
Widowed	63	7.2
Education level ($n = 872$)		
None/elementary school	214	24.5
Junior high	236	27.1
High school	115	13.2
Graduated	285	32.7
Other	22	2.5
Work situation ($n = 878$)		
Employed	371	42.3
Unemployed	30	3.4
Retired	416	47.4
Homemaker	45	5.1
Other	16	1.8
Clinical characteristics	**n**	**%**
Disease condition ($n = 859$)		
First occurrence	626	72.9
Recurrence	123	14.3
Second tumor	84	9.8
Unknown[a]	26	3.0
Entities ($n = 875$)		
Brain	30	3.4
Head & neck	59	6.7
Gastrointestinal	30	3.4
Breast	158	18.1

TABLE 1 (Continued)

Clinical characteristics	n	%
Female reproductive organs	81	9.3
Kidney/urinary passages/bladder	104	11.9
Prostate	236	27.0
Testicles	7	0.8
Bone/soft tissue	17	1.9
Lung	34	3.9
Others	44	5.0
Multiple entities	75	8.6
Metastases (n = 860)		
Yes	240	27.9
No	458	53.3
Unknown[a]	162	18.8
Illness duration (n = 858)		
Up to 3 months	433	50.5
4 to 12 months	149	17.4
More than 1 year to 5 years	138	16.1
More than 5 years	138	16.1
Current treatment (agree)[b]		
Chemotherapy (n = 877)	214	24.4
Radiotherapy (n = 877)	295	33.6
Surgery (n = 877)	562	64.1
Hormone therapy (n = 877)	64	7.3
No therapy (n = 877)	42	4.8
Other therapy (n = 876)	39	4.5
	M	SD
Physical condition (n = 841)[c]	4.5	2.0

Abbreviations: M, means; SD, standard deviations.

[a]patients who did not know their status and answered that item with "I do not know".

[b]multiple response possible.

[c]Visual analog scale (1 = "very good physical condition", 10 = "very bad physical condition").

graphic and clinical characteristics are presented in Table 1 and psychosocial characteristics are presented in Table 2.

3.2 | Prevalence and correlates of psychosocial distress

Applying the QSC-R10, 48.2% (n = 191) of the participants reported clinically significant distress. At the second university hospital, which routinely used the DT, 44.5% (n = 215) of the patients were above the cut-off. Intercorrelations of distress, age, personality traits (extraversion, neuroticism, openness, conscientiousness, and agreeableness), physical condition, depressive symptoms, and self-efficacy are shown in Table 3.

TABLE 2 Psychological variables of the study participants (n = 879)

	Total sample	
Psychosocial characteristics	n	%
Feeling well informed about psych. support (n = 842)		
Yes	580	68.9
No	262	31.1
Previous psychological treatment (n = 875)		
Yes	236	27.0
No	639	73.0
Depressive symptoms (n = 847)		
Significantly elevated	182	20.7
No symptoms/low levels	665	75.7
Missing data	32	3.6
	M	SD
Depressive symptoms (n = 847)	1.64	1.53
Self-efficacy (n = 868)	3.99	0.70
Personality traits		
Extraversion (n = 869)	3.42	1.03
Neuroticism (n = 867)	2.78	0.92
Openness (n = 866)	3.62	0.99
Conscientiousness (n = 865)	4.14	0.74
Agreeableness (n = 868)	3.36	0.79

Abbreviations: M, means; SD, standard deviations.

3.3 | Determinants of psychosocial distress

Inspection of the intercorrelations did not suggest problems with multicollinearity. Accordingly, the variance inflation factor (VIF) ranged between 1.05 and 2.08, indicating that inclusion of each variable was adequate. Results of the multiple linear regression model showed that younger age (β = −0.061, p = 0.033), higher neuroticism (β = 0.178, p = <0.001), having metastases (β = 0.091, p = 0.002), being in a worse physical condition (β = 0.380, p = <0.001), depressive symptoms (β = 0.270, p = <0.001), not feeling well informed about psychological support (β = 0.054, p = 0.046) and previous psychological treatment (β = 0.067, p = 0.020) showed significant associations with higher psychosocial distress (Table 4). No significant associations were found for sex, marital status, education, illness duration, current treatment, self-efficacy and personality factors other than neuroticism. The R^2 of the overall model was 0.481 (adjusted R^2 = 0.464).

TABLE 3 Intercorrelations between distress, age, personality traits (BFI-10), physical condition (VAS), depressive symptoms (PHQ-2), and self-efficacy (AKSU); (n = 812–878)

		M	SD	1	2	3	4	5	6	7	8	9	10
1	Distress (z-score)	–	–	–	−0.121**	−0.168**	0.365**	−0.125**	−0.107**	−0.004	0.559**	0.612**	−0.204**
2	Age	61.89	11.84	–	–	−0.067*	−0.106**	0.034	0.020	−0.064	−0.073*	−0.064	−0.033
3	Extraversion	3.42	1.03	–	–	–	−0.197**	0.162**	0.245**	0.140**	−0.156**	−0.183**	0.226**
4	Neuroticism	2.78	0.92	–	–	–	–	−0.160**	−0.101**	−0.072*	0.193**	0.324**	−0.349**
5	Openness	3.62	0.99	–	–	–	–	–	0.153**	0.080*	−0.089*	−0.127**	0.262**
6	Conscientiousness	4.14	0.74	–	–	–	–	–	–	0.097**	−0.104**	−0.123**	0.333**
7	Agreeableness	3.36	0.79	–	–	–	–	–	–	–	−0.010	−0.031	0.086*
8	Physical condition	4.54	2.00	–	–	–	–	–	–	–	–	0.465**	−0.195**
9	Depressive symptoms	1.64	1.53	–	–	–	–	–	–	–	–	–	−0.216**
10	Self-efficacy	3.99	0.70.	–	–	–	–	–	–	–	–	–	–

*$p \leq 0.05$;**$p \leq 0.01$.

4 | DISCUSSION

In certified cancer centers, the consideration of psychological aspects has evolved into standard integrated care for patients with cancer. Hereby, two main aspects are the identification of distress as well as the subsequent referral to professional support.[6] It is beneficial to identify which patients are most likely to be clinically distressed to improve the navigation of psychosocial care and to adapt support offers according to patients' needs during hospital stay and beyond. Therefore, this cross-sectional study investigated 879 inpatients with heterogeneous cancer sites in a German Comprehensive Cancer Center, comprising 2 university hospitals located in a large German city. Assessment of determinants of elevated distress comprised personality traits, sociodemographic characteristics, as well as current clinical and psychosocial variables.

In this sample, the prevalence rates of elevated distress are 48.2% and 44.5%, respectively. These are slightly lower compared to results of previous studies that examined distress in hospitalized patients.[7,8] Regarding determinants, the results revealed that neuroticism was associated with heightened distress. After controlling for personality traits and sociodemographic characteristics, some clinical and psychosocial characteristics remained significant. Unique clinical characteristics included having metastatic disease and being in a poor physical condition. Regarding psychosocial determinants, we found that current depressive symptoms, not being well informed about psychological support as well as having received psychological treatment in the past were significant determinants of heightened distress.

Regarding personality traits, only a higher level of neuroticism was associated with higher levels of distress. This result corroborates the findings of previous work which showed neuroticism to be associated with fear of cancer recurrence,[31] and poor life satisfaction.[32] In addition, Macia and colleagues[33] stated the potential protective effect of low levels of neuroticism as well as high levels of extraversion on positive health outcomes in patients with cancer. Similar results were found in studies with general population samples: The meta-analysis of Anglim et al.[34] showed associations of neuroticism, extraversion, and conscientiousness with psychological and subjective well-being. Negative effects of high levels of neuroticism towards physical and psychological health, the ability to address these problems as well as the development and maintenance of mental disorders are well documented.[17,35] Therefore, the concept of neuroticism is increasingly recognized as a key domain for many psychopathologies.[35] Consequently, the personality trait neuroticism, or, more precisely, these patterns of experience and behavior, are understood as underlying vulnerabilities for a broad variety of symptoms.[36]

This approach might be particularly useful for diagnosis and treatment in psycho-oncology, since distress mostly comprises a wide range of burdensome emotional experiences for which concepts of mental disorders many times fall short. Against the background that neuroticism predicts longer-term distress,[20] the awareness regarding patterns characteristic for neuroticism might help to indicate and navigate psychosocial care for patients with cancer. In addition, this considerable influence of a premorbid vulnerability for distress in patients with cancer, as reflected in the effect for neuroticism, is further supported by the result that former use of psychological treatment also had a predictive value. This is in line with previous research.[11]

Moreover, depressive symptoms were associated with high levels of distress. Overall, 21% of inpatients had significantly elevated depressive symptom burden. This result is comparable with a previous study.[37] To note, in the present investigation the PHQ-2 was used, which is a screening tool for depressive symptoms and does not allow for a diagnosis. Also, patients who did not feel well informed about psychological support showed higher levels of distress. This further elucidates results of our first analysis,[21] which showed, that patients who felt well informed, more often declined psychological

TABLE 4 Linear regression predicting psychosocial distress (n = 815)

Determinants	B	SE B	β	p
Constant	−1.128	0.375		0.003
Soziodemographic characteristics				
Sex[a]				
Female	Ref.			
Male	−0.100	0.059	−0.050	0.092
Age	−0.005	0.002	−0.061	0.033
Marital status[a]				
Married/living with partner	Ref.			
Single/widowed/divorced	−0.019	0.059	−0.009	0.742
Education[a]				
Up to 10 years	Ref.			
More than 10 years	0.083	0.057	0.041	0.146
Other; missing data	−0.127	0.159	−0.021	0.426
Personality traits[c]				
Extraversion	−0.023	0.028	−0.024	0.407
Neuroticism	0.193	0.032	0.178	<0.001
Openness	−0.036	0.028	−0.036	0.203
Conscientiousness	−0.004	0.039	−0.003	0.917
Agreeableness	0.004	0.034	0.003	0.905
Clinical characteristics				
Illness duration[a]				
Up to 3 months	Ref.			
More than 3 months	−0.079	0.054	−0.040	0.145
Missing data	−0.166	0.190	−0.023	0.381
Metastases[a]				
No	Ref.			
Yes	0.204	0.067	0.091	0.002
Unknown/Missing data	0.197	0.069	0.079	0.005
Current treatment[a]				
Chemotherapy	−0.109	0.069	−0.046	0.114
Radiotherapy	0.028	0.077	0.013	0.713
Surgery	−0.041	0.078	−0.019	0.600
Hormone therapy	0.054	0.103	0.014	0.601
No therapy	−0.112	0.142	−0.023	0.430
Physical condition[b]	0.190	0.014	0.380	<0.001
Psychosocial characteristics				
Depressive symptoms[a]				
No	Ref.			
Yes	0.672	0.071	0.270	<0.001
Missing data	0.209	0.160	0.035	0.191
Self-efficacy	0.002	0.044	0.001	0.968
Feeling well informed about psych. support[a]				
Yes	Ref.			
No	0.118	0.059	0.054	0.046
Missing data	−0.200	0.142	−0.037	0.158
Previous psychological treatment received[a]				
No	Ref.			
Yes	0.150	0.064	0.067	0.020

Note: Confidence interval = 95%; R^2 = 0.464.

Abbreviations: B, regression coefficient; β, Beta/standardised coefficients; p, p values; SE, standard error.

[a]dummy-coded variables.

[b]Visual analog scale (1 = "very good physical condition", 10 = "very bad physical condition").

[c]Range: 1–5.

support. This might be partly because these patients are less distressed too. Our results are supported by Faller et al.[38] who found, that patients who were less satisfied with information and those who reported more unmet information needs experienced more anxiety, depression and lower quality of life. Moreover, they showed that more than three quarters of highly distressed patients had unmet information needs regarding psychological support.[38]

Regarding clinical characteristics, patients with worse self-reported physical constitution experienced more distress. This has also been found in earlier studies.[13] Most patients were currently under treatment, but there were no associations of treatment type and distress. However, the investigation of the divergent impacts of novel therapies, for example immunotherapy or targeted therapy, on patients' wellbeing might be important issues for future research and clinical practice.[39] Our results showed that having metastatic cancer is associated with heightened distress. In this regard, Herschbach et al.[40] found that presence of metastasis is of low relevance for many entities, but for example highly relevant for young patients with breast cancer and patients with tumors of the upper gastrointestinal tract. Their study population included in- and outpatients with heterogeneous cancer types.

4.1 | Limitations

The strengths of this study are the large sample size and the inclusion of a broad set of variables. However, our findings need to be interpreted under consideration of the following limitations. Since psycho-oncological service is well established in Comprehensive Cancer Centers in Germany, our results may not be generalizable to other types of hospitals or regions. The specific circumstances of a

hospitalization in a university hospital, including many closely timed processes, and treatments close to academic medicine, need to be considered when deriving implications from our results. Future studies need to take into account more determinants regarding the specific aspects of hospitalization, such as length of stay. As this was a secondary analysis, variables were predefined and thus we were confined in the selection of further psychosocial and structural characteristics which might have further contributed to variance explanation for heightened distress. Due to differences in the routine care at the two study sites, there were two different questionnaires to assess psychosocial distress. However, applying z-transformation allowed us to combine the two samples in order to analyze a broad set of pre-defined variables. Nonetheless, our results should be replicated in a sample where all participants answer the same distress measure.

4.2 | Conclusions and clinical implications

Our results show that personality traits, that is neuroticism, represents a relevant dispositional factor determining psychological distress in hospitalized patients with cancer. However, patients' current distress is not only determined by personal dispositions. In addition to such vulnerability (i.e. neuroticism), age, current clinical characteristics as well as depression, informational need and previous psychological treatment contribute to inpatients experience of clinical distress. To provide patient-oriented care for distressed patients with cancer during hospital stay and beyond, interventions of psycho-oncologists should address both, the more transient emotional responses, such as depressive symptoms as well as more enduring patient characteristics, such as neuroticism.[36]

ACKNOWLEDGEMENT

We would like to thank all health care teams involved in the collection of the data in both participating hospitals of the Comprehensive Cancer Center Munich. In addition, we would like to acknowledge the valuable comments of Heribert Sattel and Prof. Dr. Dr. Jürgen Beckmann. There are no funders.

Open access funding enabled and organized by Projekt DEAL.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest relevant to this study.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Theresia Pichler https://orcid.org/0000-0001-5569-1249
Marion Kiechle https://orcid.org/0000-0003-4237-2657
Andreas Dinkel https://orcid.org/0000-0001-6587-1550

REFERENCES

1. Berry DL, Blonquist TM, Hong F, Halpenny B, Partridge AH. Self-reported adherence to oral cancer therapy: relationships with symptom distress, depression, and personal characteristics. *Patient Prefer Adherence*. 2015;9:1587-1592.
2. Anderson J, Slade AN, McDonagh PR, Burton W, Fields EC. The long-lasting relationship of distress on radiation oncology-specific clinical outcomes. *Adv Radiat Oncol*. 2019;4(2):354-361.
3. Dunne S, Mooney O, Coffey L, et al. Psychological variables associated with quality of life following primary treatment for head and neck cancer: a systematic review of the literature from 2004 to 2015. *Psycho Oncol*. 2017;26(2):149-160.
4. Geerse OP, Brandenbarg D, Kerstjens HAM, et al. The distress thermometer as a prognostic tool for one-year survival among patients with lung cancer. *Lung Cancer*. 2019;130:101-107.
5. Batty GD, Russ TC, Stamatakis E, Kivimaki M. Psychological distress in relation to site specific cancer mortality: pooling of unpublished data from 16 prospective cohort studies. *BMJ*. 2017;356:j108.
6. Weis J, Hönig K, Bergelt C, et al. Psychosocial distress and utilization of professional psychological care in cancer patients: an observational study in National Comprehensive Cancer Centers (CCCs) in Germany. *Psycho Oncol*. 2018;27(12):2847-2854.
7. Clark PG, Rochon E, Brethwaite D, Edmiston KK. Screening for psychological and physical distress in a cancer inpatient treatment setting: a pilot study. *Psycho Oncol*. 2011;20(6):664-648.
8. Peters L, Brederecke J, Franzke A, de Zwaan M, Zimmermann T. Psychological distress in a sample of inpatients with mixed cancer-A cross-sectional study of routine clinical data. *Front Psychol*. 2020;11:591771.
9. Carlson LE, Zelinski EL, Toivonen KI, et al. Prevalence of psychosocial distress in cancer patients across 55 North American cancer centers. *J Psychosoc Oncol*. 2019;37(1):5-21.
10. Mehnert A, Hartung TJ, Friedrich M, et al. One in two cancer patients is significantly distressed: prevalence and indicators of distress. *Psycho Oncol*. 2018;27(1):75-82.
11. Siedentopf F, Marten-Mittag B, Utz-Billing I, Schoenegg W, Kentenich H, Dinkel A. Experiences with a specific screening instrument to identify psychosocial support needs in breast cancer patients. *Eur J Obstet Gynecol Reprod Biol*. 2010;148(2):166-171.
12. Hamilton J, Kroska EB. Distress predicts utilization of psychosocial health services in oncology patients. *Psycho Oncol*. 2019;28(1):61-67.
13. Banks E, Byles JE, Gibson RE, et al. Is psychological distress in people living with cancer related to the fact of diagnosis, current treatment or level of disability? Findings from a large Australian study. *Med J Aust*. 2010;193(S5):S62-S67.
14. Herschbach P, Britzelmeir I, Dinkel A, et al. Distress in cancer patients: who are the main groups at risk? *Psycho Oncol*. 2020;29(4):703-710.
15. Chirico A, Lucidi F, Merluzzi T, et al. A meta-analytic review of the relationship of cancer coping self-efficacy with distress and quality of life. *Oncotarget*. 2017;8(22):36800-36811.
16. Secinti E, Tometich DB, Johns SA, Mosher CE. The relationship between acceptance of cancer and distress: a meta-analytic review. *Clin Psychol Rev*. 2019;71:27-38.
17. Jeronimus BF, Kotov R, Riese H, Ormel J. Neuroticism's prospective association with mental disorders halves after adjustment for baseline symptoms and psychiatric history, but the adjusted association hardly decays with time: a meta-analysis on 59 longitudinal/prospective studies with 443 313 participants. *Psychol Med*. 2016;46(14):2883-2906.
18. Ando N, Iwamitsu Y, Kuranami M, et al. Predictors of psychological distress after diagnosis in breast cancer patients and patients with benign breast problems. *Psychosomatics*. 2011;52(1):56-64.

19. Morgan S, Cooper B, Paul S, et al. Association of personality profiles with depressive, anxiety, and cancer-related symptoms in patients undergoing chemotherapy. *Pers Indiv Differ*. 2017;117:130-138.
20. Cook SA, Salmon P, Hayes G, Byrne A, Fisher PL. Predictors of emotional distress a year or more after diagnosis of cancer: a systematic review of the literature. *Psycho Oncol*. 2018;27(3):791-801.
21. Pichler T, Dinkel A, Marten-Mittag B, et al. Factors associated with the decline of psychological support in hospitalized patients with cancer. *Psycho Oncol*. 2019;28(10):2049-2059.
22. Book K, Marten-Mittag B, Henrich G, et al. Distress screening in oncology-evaluation of the questionnaire on distress in cancer patients-short form (QSC-R10) in a German sample. *Psycho Oncol*. 2011;20(3):287-293.
23. Mehnert A, Müller D, Lehmann C, Koch U. Die deutsche Version des NCCN Distress-Thermometers: empirische Prüfung eines Screening-Instruments zur Erfassung psychosozialer Belastung bei Krebspatienten. Z für Psychiatr. *Psychol Psychother*. 2006;54(3):213-223.
24. Ownby KK. Use of the distress thermometer in clinical practice. *J Adv Pract Oncol*. 2019;10(2):175-179.
25. Meggiolaro E, De Padova S, Ruffilli F, et al. From distress screening to uptake: an Italian multicenter study of cancer patients. *Cancers*. 2021;13(15):3761.
26. Lambert SD, Pallant JF, Clover K, Britton B, King MT, Carter G. Using Rasch analysis to examine the distress thermometer's cut-off scores among a mixed group of patients with cancer. *Qual Life Res*. 2014;23(8):2257-2265.
27. Lowe B, Wahl I, Rose M, et al. A 4-item measure of depression and anxiety: validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *J Affect Disord*. 2010;122(1-2):86-95.
28. Beierlein C, Kovaleva A, Kemper CJ, Rammstedt B. *Ein Messinstrument zur Erfassung subjektiver Kompetenzerwartungen: Allgemeine Selbstwirksamkeit Kurzskala (ASKU)*. GESIS - Leibniz-Institut für Sozialwissenschaften; 2012. Available from: https://doi.org/10.23668/psycharchives.418
29. Rammstedt B, John OP. Measuring personality in one minute or less: a 10-item short version of the Big Five Inventory in English and German. *J Res Pers*. 2007;41(1):203-212.
30. IBM Corp. *IBM SPSS Statistics for Windows, Version 25.0*. IBM Corp; 2017.
31. Ng DW, Kwong A, Suen D, et al. Fear of cancer recurrence among Chinese cancer survivors: prevalence and associations with metacognition and neuroticism. *Psycho Oncol*. 2019;28(6):1243-1251.
32. Grov EK, Dahl AA. Is neuroticism relevant for old cancer survivors? A controlled, population-based study (the Norwegian HUNT-3 survey). *Support Care Cancer*. 2021;29(7):3623-3632.
33. Macía P, Gorbeña S, Gómez A, Barranco M, Iraurgi I. Role of neuroticism and extraversion in the emotional health of people with cancer. *Heliyon*. 2020;6(7):e04281.
34. Anglim J, Horwood S, Smillie LD, Marrero RJ, Wood JK. Predicting psychological and subjective well-being from personality: a meta-analysis. *Psychol Bull*. 2020;146(4):279-323.
35. Widiger TA, Oltmanns JR. Neuroticism is a fundamental domain of personality with enormous public health implications. *World Psychiatr*. 2017;16(2):144-145.
36. Sauer-Zavala S, Wilner JG, Barlow DH. Addressing neuroticism in psychological treatment. *Personal Disord*. 2017;8(3):191-198.
37. Hartung TJ, Brähler E, Faller H, et al. The risk of being depressed is significantly higher in cancer patients than in the general population: prevalence and severity of depressive symptoms across major cancer types. *Eur J Cancer*. 2017;72:46-53.
38. Faller H, Koch U, Brähler E, et al. Satisfaction with information and unmet information needs in men and women with cancer. *J Cancer Surviv*. 2016;10(1):62-70.
39. Rohrmoser A, Pichler T, Letsch A, et al. Cancer patients' expectations when undergoing extensive molecular diagnostics-A qualitative study. *Psycho Oncol*. 2020;29(2):423-429.
40. Herschbach P, Keller M, Knight L, et al. Psychological problems of cancer patients: a cancer distress screening with a cancer-specific questionnaire. *Br J Cancer*. 2004;91(3):504-511.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

How to cite this article: Pichler T, Marten-Mittag B, Hermelink K, et al. Distress in hospitalized cancer patients: associations with personality traits, clinical and psychosocial characteristics. *Psychooncology*. 2021;1-9. https://doi.org/10.1002/pon.5861