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Somatic Symptoms in Cancer Patients with Pain and/or Depression Prevalence, Disability, and Health Care Use

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Abstract

Background—The adverse impact of high somatic symptom burden is well established for primary care and other noncancer populations with chronic medical disorders. This study examines the impact of somatic symptom burden on disability and health care use in cancer patients suffering from pain and/or depression.

Methods—Secondary analysis of baseline data from 405 cancer patients enrolled in a telecare management trial for pain and/or depression. Somatic symptom burden was measured with a 22-item scale. Multivariable models were conducted to determine the association of somatic symptom burden with the Sheehan Disability Scale (SDS) score, the number of self-reported disability days in the past 3 months, and health care use. Models were adjusted for sociodemographic characteristics, medical comorbidity, and depression and pain severity.

Results—Somatic symptoms were highly prevalent, with 15 of the 22 symptoms reported by more than 50% of patients. Somatic symptom burden was similar across different types and phases of cancer. The mean SDS (scored 0 to 10) was 5.4 and the mean number of self-reported disability days in the past 4 weeks was 16.9 days. In multivariable models, somatic symptom burden was associated with both SDS ($P < .001$) and the likelihood of ≥ 14 disability days in the past 4 weeks (OR=1.51; 95% CI, 1.19–1.92) but was not with increased health care use.

Conclusions—Somatic symptom burden is high in cancer patients with pain and/or depression. Given the strong association with disability and the high prevalence of many types of symptoms, recognizing and managing somatic symptoms may be important in improving quality of life and functional status regardless of type or phase of cancer.

Keywords

cancer; somatic symptoms; somatization; pain; depression; disability; quality of life; health care use

Somatic symptoms have been the subject of numerous studies in the general population as well as primary care and specialty clinic settings.[1, 2] Somatic symptoms account for more than half of all general medical visits, lack a definitive medical explanation a third to half of the time, and are frequently persistent. Both physical and psychological factors appear to

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contribute to somatic symptom reporting, even in patients with chronic medical disorders.[3, 4] These symptoms are associated with substantial functional impairment, disability, and health care use, even after controlling for medical and psychiatric comorbidity.[5–7]

Studies of symptom prevalence in cancer have often focused on patients with advanced cancer or with selected types of cancer seen at tertiary care centers.[8–18] A literature synthesis of 44 studies involving more than 25,000 patients showed that symptoms present in at least 30% of cancer patients include fatigue (74%), pain (71%), weakness (60%), appetite loss (53%), dry mouth (40%), depressed mood (39%), constipation (37%), insomnia (36%), dyspnea (35%), nausea (31%), and anxiety (30%).[17] Somatic symptoms can have a substantial impact on functional status, quality of life and even a desire for hastened death.[14, 19–24] Somatization – the relationship between psychological distress and somatic symptom reporting – has been the focus of only a few small cancer studies.[25–29] This is an important gap given that numerous studies in noncancer medical populations demonstrate a high prevalence of poorly or partially explained symptoms, even among those symptoms considered to be more disease-specific.[2, 4, 30]

The purpose of this report is to examine somatic symptom prevalence, disability, and health care use in cancer patients using baseline data from the Indiana Cancer Pain and Depression (INCPAD) trial. In contrast to previous studies, INCPAD drew participants from multiple community-based oncology practices and included a wide range of types and phases of cancer. Although all INCPAD patients had pain and/or depression, standardized assessment of pain, depression, anxiety, and medical comorbidity facilitated adjustment for these potential confounders. Hypotheses for the secondary analyses in the present paper are:

1. Somatic symptoms are prevalent in cancer patients who present with pain and/or depression.
2. Somatic symptom burden in cancer patients is associated with greater disability, even after controlling for depression, anxiety, pain and other relevant covariates.
3. Somatic symptom burden in cancer patients is associated with greater health care use, even after controlling for depression, anxiety, pain and other relevant covariates.

METHODS

Setting and Sample

The current paper uses baseline data from patients enrolled in the Indiana Cancer Pain and Depression (INCPAD) trial which is described in detail elsewhere.[31] Briefly, participants were recruited from 16 oncology outpatient sites throughout urban and rural areas of the state of Indiana to test the effectiveness of telecare management versus usual care for the treatment of depression and/or cancer-related pain. From March 2006 through August 2008, patients presenting to the oncology practices on selected days were screened for INCPAD study inclusion. Patients were potentially eligible if they had depression or pain of at least moderate severity (i.e., a Patient Health Questionnaire eight-item depression scale [PHQ-8] score of ≥ 10,[32, 33] or worst pain in the past week of ≥ 6 on a 0 to 10 scale[31]). Additionally, pain had to be cancer-related and persistent despite the use of at least one analgesic.

Patient were excluded if they: (a) did not speak English; (b) had moderately severe cognitive impairment (c) had schizophrenia or other psychosis; (d) had a disability claim currently being adjudicated for pain; (e) had depression directly precipitated by a cancer therapy for which depression is a well-known side effect (e.g., interferon, corticosteroids) and in whom

short treatment duration and tolerable depression severity justify withholding antidepressant therapy; (f) were pregnant; or (g) were in hospice care.

Measures

The primary independent variable in this paper is the number and severity of somatic symptoms as measured by a 22-item somatic symptom burden scale. This scale consists of 14 symptoms from the PHQ-15 somatic scale (all items except sexual dysfunction)[34] plus 8 symptoms selected from the Memorial Symptom Assessment Scale[35] and the MD Anderson Symptom Inventory (MDASI).[15] The PHQ-15 and MDASI have been shown to have good internal reliability (Cronbach's alpha of 0.80 and 0.82, respectively) as did the composite 22-item scale used in our study (Cronbach's alpha = 0.76). Respondents are asked to rate on a 0 to 2 scale the degree to which each symptom has bothered them in the past 4 weeks from "not bothered at all" to "bothered a little" to "bothered a lot". Increasing scores on this 0 to 44 point scale can reflect a greater number and/or greater severity of symptoms; thus higher scores reflect greater *somatic symptom burden*.

The dependent variables are disability and health care use. Disability was assessed with two measures. One was the 3-item Sheehan Disability Scale (SDS) which asks respondents to what extent on a 0 to 10 scale their health has interfered with their work, family life, and social life in the past month.[36] The SDS score is the mean of the 3 items and higher scores reflect greater disability. Previous research has shown high correlations among the 3 items of the SDS resulting in strong internal reliability consistency in previous research (Cronbach's $\alpha = 0.89$)[37, 38] and our own sample ($\alpha = 0.82$), as well as good construct validity and responsiveness.[39] A second measure was the number of days in the past 4 weeks that respondents reported they either had to stay in bed or reduce their usual activities by at least 50% due to physical health or emotional problems.[40] Health care use was assessed by asking study participants about their use of 5 types of health care in the 90 days preceding study enrollment: the number of outpatient visits, hospital days, emergency department (ED) visits, mental health visits, and visits to a complementary and alternative medicine provider.

Two principal covariates include pain and depression. Pain severity was measured by the 4-item Brief Pain Inventory (BPI) severity scale (Cronbach's alpha = 0.79).[41, 42] Respondents rate their average, worst, least, and current pain in the past week on a 0 ("no pain") to 10 "(pain as bad as you can imagine") scale, and the mean of the 4 items is determined, with higher scores reflecting more severe pain . Depression severity was assessed with the 20-item Hopkins Symptom Checklist depression scale (HSCL-20) (α=.89).[42, 43] Respondents rate how much they were distressed in the past month by each of the items on a 0 ("not at all") to 4 ("extremely") scale, and the mean of the 20 items is determined, with higher scores on this 0 to 4 scale reflecting more severe depression.

Several additional covariates were used in the analyses. Anxiety was assessed by the GAD-7 (α=.86), a 7-item validated scale that assesses anxiety severity as well as the likelihood of the 4 most common clinical anxiety disorders – generalized anxiety disorder, panic disorder, social anxiety disorder, and posttraumatic stress disorder.[44] Respondents are asked to indicate how often in the past 2 weeks they have been bothered by each symptom on a 0 to 3 scale where 0 represents "not at all" and 3 represents "nearly every day". The individual GAD-7 item scores are summed, and higher scores on this 0 to 21 scale indicate greater anxiety. Medical comorbidity was assessed by a checklist of 8 common categories of medical disorders, including heart disease, pulmonary disease, diabetes, hypertension, neurological conditions, arthritis, liver disease, and renal disease.[45] Sociodemographic variables included age, sex, race, education, employment, and income. The Socioeconomic Disadvantages (SED) index assigns one point each for low education (less than high school),

unemployment, and low income ("not enough to make ends meet").[46] Higher scores on this 0 to 3 scale represent worse socioeconomic conditions. Cancer type and phase were abstracted from the oncology records. Cancer phase was categorized as newly diagnosed, maintenance therapy only, disease-free, recurrent cancer, and progressive cancer.

Statistical Analysis

Scoring of the somatic symptom burden scale was described above. The other measures (PHQ-8, SDI, BPI, HSCL-20, GAD-7, disability days) were scored by algorithms recommended by the developers. Since items were infrequently missing (< 5% on all scales), a missing item was assigned a score of 0. Also, since this paper used baseline data obtained by direct interview of all 405 participants, all bivariate analyses and multivariable models included data from 403 to 405 participants.

For hypothesis 1, we reported prevalence rates (including 95% confidence intervals) of each of the 22 somatic symptoms. We also assessed bivariate associations of the somatic symptom burden score with sociodemographic characteristics, type and phase of cancer, depression, anxiety, and measures of disability and health care use in order to identify potential confounders and adjust for them in our multivariable models (hypotheses 2 and 3). Variables that were significant in bivariate relationships at $p > .20$ were not entered into subsequent multivariable modeling.

For hypothesis 2, multiple linear regression analysis was used to assess associations of somatic symptom burden, pain, depression, and other covariates with the Sheehan Disability Scale score. Similarly, we used logistic regression analysis to assess associations these variables with the number of self-reported disability days. Herein, disability days were dichotomized as 14 days or more (coded as 1) vs. less than 14 days (coded as 0) in the past four weeks. For hypothesis 3, multivariable logistic regression models were used to evaluate associations of somatic symptom burden, pain, depression, and other covariates with emergency department visits (any vs. none) and mental health care visits (any vs. none).

For the five continuous variables in our final models, we report parameter estimates or odds ratios in terms of meaningful units of change, including 10 years for age, 0.5 units for HSCL-20 depression score (which can range from 0 to 4), 1 unit for BPI pain severity score (which can range from 0 to 10), 5 units for GAD-7 anxiety score (which can range from 0 to 21), and 5 units for somatic symptom score (which can range from 0 to 44). The unit changes used for the 4 scales scores were derived from previous research.[34, 42, 44, 47] Data analysis was implemented using the Statistical Analysis Software (SAS) version 9.1.2.

RESULTS

Study Sample

The 405 study participants had a mean age of 58.8 (range, 23–96) years; 69% were female, 80% were white, and 49% were married. The mean number of comorbid medical diseases was 2.1. Education level varied with 21% having less than a high school education, 40% having only a high school education, and 39% having college credits or college degree. The most frequently reported employment status was being unable to work due to disability (43%), followed by retired (29%), employed (20%), or other (8%). Income was reported as being comfortable (25%), making just enough to make ends meet (48%), or not comfortable (27%). There were 131 (32%) participants with depression only, 96 (24%) with pain only, and 178 (44%) with both depression and pain. For the total sample, mean HSCL-20 depression severity (which can range from 0 to 4) was 1.45, and mean BPI pain severity (which can range from 0 to 10) was 4.7, both representing mild-moderate levels of symptom severity.[42] The type of cancer was breast in 118 (29%) of the participants, lung in 81 (20%),

gastrointestinal in 70 (17%), lymphoma or hematological in 53 (13%), genitourinary in 41 (10%), and other in 42 (10%). The phase of cancer was new onset in 150 (37%), maintenance or disease-free in 172 (42%), and recurrent or progressive in 83 (21%).

Participants had a mean Somatic Symptom Burden score (which can range from 0 to 44) of 18.3 (SD=6.6), with a median of 18, interquartile range (25^{th}-75^{th} percentile) of 14 to 23, and 90% percentile score of 27. They had a mean PHQ-14 subscale score (which can range from 0 to 28) of 12.2 (SD=4.3), with a median of 12, interquartile range of 9 to 15, and 90^{th} percentile score of 18. These PHQ-14 scores are indicative of moderate somatic symptom burden in noncancer medical populations.[34]

The mean Sheehan Disability Scale score (which can range from 0 to 10) was 5.4, and the mean number of self-reported disability days in the past 4 weeks was 16.9 days, including 5.7 bed days and 11.2 days where there was a ≥ 50% reduction in usual activities. Thus, participants reported 60% of their past 28 days as full or partial disability days. The number of participants who reported ≥ 14 disability days in the past 4 weeks was 238 (58.8%)

Self-reported health care use in the 3 months preceding study enrollment was high. The proportion of patients who reported 3–5, 6–10, and > 10 outpatient visits was 32%, 28%, and 26%, respectively. More than one-third (38%) of the patients reported at least one hospitalization, and the proportion of the entire sample reporting 3–5, 6–10, and > 10 hospital days was 10%, 12%, and 8%, respectively. An emergency department (ED) visit was reported by 33% (n=134) of the patients, with 17% reporting 2 or more ED visits. A mental health visit was reported by 18% (n=72) of the patients, with 12% reporting 2 more such visits. Finally, few patients (4.7%) reported any visits to a complementary and alternative medicine provider.

Prevalence of Individual Somatic Symptoms

Somatic symptoms were prevalent in all cancer patients presenting with cancer pain and/or depression (see Table 1). Nearly all patients reported feeling tired (98%) and most were bothered a lot by this symptom (79%). The 5 most commonly reported symptoms were feeling tired (fatigue), difficulty sleeping, pain in the limbs or joints, back pain, and difficulty remembering things. Of the 22 symptoms inquired about, 15 were reported by more than 50% of patients, and 14 were reported as very bothersome by at least 20% of patients. We also examined the proportion of patients reporting a symptom as very bothersome (i.e., they felt they were “bothered a lot” by the symptom). For example, 319 (81%) of the 395 individuals reporting fatigue felt they were bothered a lot by fatigue, whereas only 82 (36%) of the 229 individuals reporting headaches were bothered a lot by their headaches. Excluding the two symptoms infrequently endorsed (menstrual problems and fainting spells), patients were most likely to rate fatigue, sleep complaints, pain in the limbs or back, and dry mouth as very bothersome (> 60% of patients reporting these symptoms felt they were “bothered a lot”) and least likely to rate headaches, dizziness, nausea, vomiting, palpitations and chest pain as very bothersome (< 40% of patients reporting these symptoms felt they were “bothered a lot”).

Bivariate Correlates of Somatic Symptom Burden

As shown in Table 2, somatic symptom burden was associated with education, employment status, income, and an emergency department or mental health visit in the past 3 months, but not with gender, race or marital status. Regarding continuous variables, somatic symptom burden was strongly correlated with HSCL-20 depression severity (.61) and GAD-7 anxiety severity (.50); moderately correlated with the Sheehan Disability Scale score (0.45) and self-reported disability days (.38); and weakly correlated with medical comorbidity (0.22) and

age (−.17). All of these correlations were significant at $P < .0001$, except age ($P < .001$). Somatic symptom burden was not significantly correlated with either outpatient visits (.05) or hospital days (.06) in the past 3 months.

Mean (SD) symptom burden scores by cancer type and phase are shown in Table 3. There were no significant differences by cancer type (p = .22) or cancer phase (p = .28), indicating a similar somatic symptom burden across different types and phases of cancer.

Somatic Symptom Burden and Disability

Table 4 shows multivariable regression results for disability. For every 5 unit increase in somatic symptom burden, the Sheehan Disability Scale (SDS) score increased (worsened) by 0.42 points. Depression was the only other significant predictor: for every 0.5 unit increase in depression (on the 0 to 4 HSCL-20 scale), the SDS score increased (worsened) by 0.90 points. These changes in SDS score (which has a standard deviation of 2.86) associated with somatic symptom burden and depression in our multivariable model are equivalent to an effect size (i.e., change divided by the standard deviation) of 0.15 and 0.31, respectively. Effect sizes of 0.2 and 0.5 are commonly considered small and moderate changes in health status.[48] An effect size of 0.2 would correspond to an SDS change of 0.75 which in turn would be approximately a 9-point change on the somatic symptom burden scale.

Disability days were also independently associated with both somatic symptom burden and depression. For every 5 unit increase in somatic symptom burden, the probability of having ≥ 14 disability days in the past 28 days increased by 50% (OR=1.51, 95%CI; 1.19 to 1.92). The only other significant variable was depression: for every 0.5 unit increase in HSCL-20 depression scores, the probability of having ≥ 14 disability days increased by 60% (OR=1.61, 95% CI; 1.24 to 2.07).

Somatic Symptom Burden and Health Care Use

Because bivariate analyses showed no association of somatic symptom burden with outpatient visits or hospital days, multivariable modeling was conducted only for ED and mental health visits (too few patients reported complementary and alternative medicine visits to model the latter). One or more ED visits in the past 3 months was reported by 134 (33.1%) of the participants, and one or more mental health visits by 72 (17.8%). Multivariable logistic regression models entering the same independent variables shown in Table 4 showed that only greater socioeconomic disadvantage was associated with a higher likelihood of ED visits (OR=1.55; 95% CI, 1.20–1.99), and only race (black/other vs. white, OR=1.90; 95% CI, 1.01–3.60) and not being married (OR=1.81; 95% CI, 1.03–3.20) were associated with a higher likelihood of mental health visits. Somatic symptom burden was not associated with a higher likelihood of having an ED visit (OR=1.20 for each 5-point increase in somatic symptom score; 95% CI, 0.97–1.49; $P = .10$) or a mental health visit (OR=1.24 for each 5-point increase; 95% CI, 0.96–1.61; $P = .10$). Likewise, neither depression nor pain severity was associated with either ED or mental health visits.

DISCUSSION

Our study has several important findings. Numerous somatic symptoms (rather than just a few) are highly prevalent in cancer patients with comorbid pain and/or depression. Moreover, somatic symptom burden appears similar across a wide range of cancer types and phases. Somatic symptom burden is associated with disability, even after controlling for potential confounders. In contrast, somatic symptom burden is not related to increased health care use.

It should be emphasized that all patients in our sample had pain and/or depression. Pain and depression are two of the most common and potentially treatable symptoms in cancer patients. Pain is present in 14–100% of cancer patients, depending upon the setting, and the prevalence of major depressive disorder is 10–25%, with a similar range for clinically depressive symptoms.[49–52] However, the reporting of most somatic symptoms is increased in the presence of depression.[53] Thus, somatic symptom burden is likely higher in our study sample than in a general cancer population not selected specifically for the presence of pain or depression.

An important question is whether our study was adequately powered to detect significant associations. We examined bivariate associations between somatic symptom burden and other variables to limit the number of variables entered into our models. As a result, we modeled as dependent variables two measures of health care use that were associated with somatic symptom burden in bivariate analyses, and two distinct measures of disability. Bivariate screening also limited the number of independent variables we entered into our models to 10. Since about 10 events for each independent variable in a multivariable model is typically desired, this would correspond to 100 events for our models. Three of our four models had a binary outcome, and the number of patients with ≥ 14 disability days, at least one ED visit, or at least one mental health visit was 238, 134, and 72, respectively. Thus, our models achieved the 10:1 independent variable to outcome event ratio for 2 of these 3 models. Finally, somatic symptom burden was significantly associated with disability but not with the two measures of health care use that we modeled. However, in the health care use models, the absolute differences in mean somatic symptom burden between ED users and nonusers (19.8 vs. 17.6 on the 44-point scale) as well as between mental health users and nonusers (20.3 vs. 17.9) were quite small. Thus, the relationship between somatic symptom burden and health care use in our sample appeared to be clinically as well as statistically insignificant.

The prevalence of symptoms was surprisingly high: 15 of the 22 symptoms assessed were reported at rates greater than 50%, and 14 of the symptoms were each reported as very bothersome in more than 20% of patients. The fact that fatigue, sleep complaints, memory impairment and musculoskeletal pain were the most common symptoms may be partly due to the fact all of our patients were enrolled for depression and/or pain: the first 3 symptoms are core criteria in diagnosing depression, and musculoskeletal pain accounts for more than two-thirds of pain complaints in both clinical and population samples. However, these symptoms have also proven to be among the most common in previous studies of symptom prevalence in cancer patients.[11, 13–18, 54] Also, many symptoms that are neither pain complaints nor core criteria for depressive disorders were common in our sample.

Not only was symptom prevalence high, a substantial percent of patients noted they were “bothered a lot” by their symptoms, regardless of type of symptom. In a palliative care study, more than half of somatic symptoms were rated as moderate to severe, yet two-thirds of severe symptoms were not volunteered by patients but rather were only identified by systematic assessment.[16] In our study, the proportion of symptoms rated as severe was higher for some symptoms than others. When patients report multiple symptoms, the assessment of severity coupled with patient preferences and concerns are important considerations in making treatment decisions.

Somatic symptom burden was not only similar across various types of cancer but, more surprisingly, across different phases of cancer as well. Why did cancer patients who were disease-free or simply on maintenance therapy report similar levels of somatic symptoms as those with newly diagnosed cancer or recurrent or progressive cancer? One important reason is that patients in our study already had pain and/or depression, factors themselves

associated with high somatic symptom burden. Also, in contrast to patients with cancer under active treatment, those who are disease-free or doing well on maintenance therapy but still willing to enter a clinical trial may be more likely to be a selected group with chronic symptoms or problems.

Our patients experienced substantial disability, reporting nearly 17 (60%) of the past 28 days as either bed days or days in which they had to reduce their usual activities by at least 50%. Somatic symptom burden was associated with both a disability scale score as well as the number of self-reported disability days. Moreover, somatic symptoms had an independent effect on disability even after adjusting for depression and pain severity, sociodemographic characteristics, and medical comorbidity. Indeed, multivariable models revealed that certain factors, such as age, medical comorbidity, and adverse socioeconomic disadvantage, were not associated with disability when controlling for somatic symptom burden and depression. The strong association between the number and severity of somatic symptoms and functional impairment is well-established in primary care patients or other populations with chronic medical disorders.[6, 34]

In contrast to its association with disability, somatic symptom burden was not associated with health care use. This differs from some studies where patients with high somatic symptom burden do utilize a disproportionate amount of health care services.[5, 7, 55, 56] One reason for a lack of association in our study may be that baseline health care use was already quite high in our sample: 80% of patients had cancer under active treatment, either newly diagnosed or recurrent/progressive. In unselected primary care populations where many patients have low annual visit rates the subgroup with multiple somatic symptoms may distinguish itself by higher health care use. Also, somatic symptom burden might be related to excess health care use in a different sample of cancer patients, e.g., a sample in which more patients are disease-free or on maintenance therapy only, or in which fewer patients suffer from depression and/or pain. Regarding the latter, however, neither depression nor pain severity were associated with health care use in our multivariable models.

There are two other types of research regarding somatic symptoms that should be mentioned in the context of our study. The first is the rather extensive literature on somatization. Whereas somatization has traditionally referred to the reporting of multiple somatic symptoms that lack an adequate medical explanation and are related instead to psychological factors, recent research suggests that an interaction between medical and psychological factors (rather than an “either-or” dichotomy) contribute to the experiencing and reporting of somatic symptoms.[2, 57, 58] Indeed, even symptoms considered to be disease-specific (e.g., chest pain in cardiac disease, dyspnea in pulmonary disorders, pain in arthritis) may be accounted for as much by comorbid depression and anxiety as by physiologic severity of the underlying medical disorder.[4] Similarly, an interplay of medical and psychological factors has been found for symptoms reported by patients with other chronic medical disorders.[53] Indeed, somatic, anxiety, and depressive symptoms (the “SAD” triad) have been found to have both overlapping and independent effects on one another as well as functional status and quality of life outcomes.[59] Certainly, many factors can account for somatic symptom burden in cancer patients, including the type and severity of cancer, spread to other organs, and the adverse effects of therapy. At the same time, the degree to which somatization may be a contributing factor to somatic symptom burden in some cancer patients, and the influence of psychological factors and a patient’s premorbid symptom reporting history, warrants further research beyond the few studies reported to date.[25–29]

A second type of research relevant to our study is that on symptom clusters in cancer patients. A symptom cluster is typically defined as two or more concurrent symptoms.[60, 61] Our study findings indicate that patients with cancer pain and/or depression were

experiencing multiple additional symptoms, or symptom clusters. Analytic strategies, such as factor analysis or cluster analysis, have been used to define which symptoms commonly co-occur in cancer patients.[60, 62] We did not apply such analytic strategies to our data for two reasons. First, our study sample was unique in that patients had to be reporting pain and/or depression and nearly half reported both symptoms at study entry. Second, our study sample was otherwise heterogeneous in terms of cancer type and phase and symptoms. Because the particular symptoms being experienced were likely to vary by cancer type or phase (e.g., acute treatment effects versus late effects), it is very likely we would have found multiple different symptom clusters, each with their own set of specific symptoms.

Our study has several limitations. First, the associations between somatic symptom burden and disability cannot yet be assumed as causal due to the cross-sectional nature of our analyses. Conceptually, however, it makes sense that at least part of the directionality is higher somatic symptom burden producing greater disability rather than the converse (i.e., disability exclusively leading to higher symptom reporting). Alternatively, an unmeasured confounder could explain some of the associations. Second, we enrolled patients with a wide range of cancer types and phases which increases the generalizability of our findings but at the same time also decreases our ability to draw firm conclusions about any one type or phase of cancer. Further studies of somatic symptoms in larger numbers of patients with single types and/or phases of cancer will be useful to verify, amplify, or modify our findings. Third, all of the patients in our sample had depression and/or pain which could have inflated both somatic symptom prevalence as well as disability. However, previous studies in less selected cancer populations have also documented a high prevalence of somatic symptoms. Moreover, somatic symptom burden remained associated with disability in our multivariable models even after controlling for depression and pain severity. Fourth, all measures, including disability, were self-report. Though other studies document the functional and work consequences of cancer, our findings would be further substantiated by independent measures of disability.

Our study strengthens the case for improving the recognition and treatment of somatic symptoms in cancer patients. If only one or a few symptoms predominate, symptom-specific evaluation and treatments may be warranted, understanding that evidence-based treatments are better established for some symptoms (e.g, pain, depression, nausea/vomiting) than for others (e.g., fatigue, cognitive complaints, dizziness, dry mouth) If symptoms are more numerous, persistent, and/or less amenable to specific treatments, more general strategies should be considered as well, such as treating comorbid depression and anxiety, assessing the patient's pre-cancer history of symptom reporting and somatization, identifying health-related anxiety and concerns, and considering nonpharmacological interventions such as cognitive-behavioral therapy, exercise, symptom self-management, and other behavioral treatments.[63–68] One might also need to be careful of repeated evaluations for cancer-related or occult causes of persistent symptoms, particular in stable, disease-free patients, in patients with multiple symptoms, persistent symptoms with recent negative work-ups, or with a prior history suggesting somatization or somatoform disorders preceding their cancer diagnosis. In summary, the high prevalence of these symptoms coupled with their concomitant disability and adverse impact on quality of life make optimized management well-aligned with the Institute of Medicine report on improving the cancer care of the whole patient.[69]

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Table 1

Somatic Symptom Prevalence and Severity in 405 Cancer Patients with Pain and/or Depression

Somatic Symptom	Patient Reported Symptom			Bothered a little			Bothered a lot		
	N	%	(95% CI)	N	%	(95% CI)	N	%	(95% CI)
Feeling tired or having low energy	395	97.8	(96.0–99.0)	76	18.8	(15.0–22.6)	319	78.8	(74.8–82.8)
Trouble falling or staying asleep	319	78.8	(74.8–82.8)	91	22.5	(18.4–26.5)	228	56.3	(51.5–61.1)
Pain in arms, legs, or joints	316	78.0	(74.0–82.1)	85	21.0	(17.0–25.0)	231	57.0	(52.2–61.9)
Back pain	303	74.8	(70.6–79.0)	111	27.4	(23.1–31.8)	192	47.4	(42.6–52.3)
Problems with remembering things	292	72.1	(67.7–76.5)	152	37.6	(32.8–42.3)	140	34.6	(29.9–39.2)
Having a dry mouth	283	69.9	(65.4–74.4)	105	25.9	(21.7–30.2)	178	44.0	(39.1–48.8)
Shortness of breath	262	64.7	(60.0–69.3)	129	31.9	(27.3–36.4)	133	32.8	(28.3–37.4)
Gas or indigestion	246	60.7	(56.0–65.5)	130	32.1	(27.6–36.7)	116	28.6	(24.2–33.0)
Feeling drowsy or sleeping too much	246	60.7	(56.0–65.5)	113	27.9	(23.5–32.3)	133	32.8	(28.3–37.4)
Numbness or tingling	242	59.8	(55.0–64.5)	123	30.4	(25.9–34.9)	119	29.4	(24.9–33.8)
Lack of appetite	229	56.6	(51.7–61.4)	106	26.2	(21.9–30.5)	123	30.4	(25.9–34.9)
Headaches	229	56.6	(51.7–61.4)	147	36.3	(31.6–41.0)	82	20.3	(16.3–24.2)
Dizziness	225	55.6	(50.7–60.4)	159	39.3	(34.5–44.0)	66	16.3	(12.7–19.9)
Stomach pain	221	54.6	(49.7–59.4)	124	30.6	(26.1–35.1)	97	24.0	(19.8–28.1)
Nausea	208	51.4	(46.5–56.2)	133	32.8	(28.3–37.4)	75	18.5	(14.7–22.3)
Constipation	192	47.4	(42.6–52.3)	96	23.7	(19.6–27.8)	96	23.7	(19.6–27.8)
Feeling your heart pound or race	182	44.9	(40.1–49.8)	132	32.6	(28.0–37.2)	50	12.4	(9.2–15.6)
Diarrhea or loose bowels	175	43.2	(38.4–48.0)	99	24.4	(20.3–28.6)	76	18.8	(15.0–22.6)
Chest pain	138	34.1	(29.5–38.7)	89	22.0	(18.0–26.0)	49	12.1	(8.9–15.3)
Vomiting	108	26.7	(22.4–31.0)	75	18.5	(14.7–22.3)	33	8.2	(5.5–10.8)
Menstrual cramps or problems *	16	9.5	(5.1–14.0)	6	3.6	(0.8–6.4)	10	6.0	(2.4–9.5)
Fainting spells	28	6.9	(4.4–9.4)	19	4.7	(2.6–6.8)	9	2.2	(0.8–3.7)

* Menstrual symptoms were asked about only in women ≤ 50 y/o (n = 168)

Table 2

Bivariate Associations of Somatic Symptom Burden Score with Sociodemographic Characteristics and Health Care Use

Baseline Characteristic	N	Somatic Symptom Burden Mean (SD)	*P* Value
Gender			.124
Male	130	17.56 (6.85)	
Female	275	18.64 (6.48)	
Race			.076
Black	73	16.71 (7.63)	
White	322	18.63 (6.30)	
Other	10	19.00 (7.35)	
Marital status			.081
Married	199	17.71 (6.42)	
Not married (all other categories)	206	18.86 (6.76)	
Education			.014
Less than High school	87	19.68 (6.72)	
High school	160	17.29 (6.67)	
Some college or trade school	108	19.16 (6.54)	
College graduate	50	17.26 (5.79)	
Employment status			.000
Employed	81	16.38 (6.56)	
Retired	117	16.50 (5.75)	
Other	30	18.97 (6.35)	
Unable to work due to health or disability	176	20.26 (6.70)	
Income			.0001
Comfortable	100	15.95 (5.61)	
Just enough to make ends meet	192	18.78 (6.77)	
Not comfortable	111	19.52 (6.74)	
Emergency department visit in past 3 months			.002
No	271	17.55 (6.17)	
Yes	134	19.81 (7.21)	
Mental health visit in past 3 months			.005
No	333	17.87 (6.66)	
Yes	72	20.26 (6.06)	

Table 3

Mean (SD) Somatic Symptom Burden Score by Type and Phase of Cancer

Type of Cancer	Phase of Cancer			
	Newly Diagnosed	**Disease-Free or Maintenance Therapy**	**Recurrent or Progressive**	**All Phases** *
Breast	(n = 32)	(n = 67)	(n = 19)	**(n = 118)**
	17.81 (6.62)	18.24 (6.91)	17.63 (7.40)	**18.03 (6.86)**
Lung	(n = 52)	(n = 19)	(n = 10)	**(n = 81)**
	17.65 (6.81)	21.89 (5.33)	16.40 (5.40)	**18.49 (6.56)**
Gastrointestinal	(n = 27)	(n = 21)	(n = 22)	**(n = 70)**
	18.15 (5.52)	16.14 (6.31)	20.23 (4.71)	**18.20 (5.69)**
Lymphoma / hematological	(n = 10)	(n = 32)	(n = 11)	**(n = 53)**
	15.90 (7.39)	19.59 (7.49)	17.26 (5.70)	**18.43 (7.17)**
Genitourinary	(n = 15)	(n = 11)	(n = 15)	**(n = 41)**
	19.00 (5.83)	17.73 (7.23)	13.33 (6.59)	**16.59 (6.83)**
Other	(n = 14)	(n = 22)	(n = 6)	**(n = 42)**
	24.29 (7.06)	18.82 (5.22)	16.67 (3.20)	**20.33 (6.29)**
All Types *	**(n=150)**	**(n=172)**	**(n=83)**	(n=405)
	18.41 (6.72)	**18.68 (6.70)**	**17.29 (6.18)**	18.30 (6.61)

* There were no significant differences in mean somatic symptom burden score by cancer type (p=.22) or phase (p=.28) of cancer. For these statistical comparisons, phases were pooled together to compare mean symptom burden scores across cancer type, and cancer types were pooled together to compare mean symptom burdens scores across phase of cancer. .

Table 4

Multivariable Correlates of Disability in Cancer Patients with Pain and/or Depression *

Variable	Sheehan Disability Scale		≥ 14 Disability Days in past 4 weeks	
	Beta	t-value	Odds Ratio	95%CL
Categorical				
Gender (female vs. male)	−0.21	−0.80	1.30	0.79–2.12
Race (black/others vs. white)	0.46	1.49	1.52	0.83–2.78
Marital (married vs. other)	−0.04	−0.15	0.72	0.45–1.14
Continuous				
Depression – HSCL-20 score (per 0.5 units on 0–4 scale)	0.90 †	6.99	1.60 †	1.24–2.07
Somatic symptom score (per 5 units on 0–44 scale)	0.42 †	3.48	1.51 †	1.19–1.92
Age (per 10 years)	0.19	1.53	1.03	0.81–1.31
Socioeconomic disadvantage index (per 1 unit on 0–3 scale)	0.20	1.49	1.09	0.84–1.41
Pain severity – BPI score (per 1 unit on 0–10 scale)	0.07	1.33	1.04	0.94–1.15
Medical comorbidity (per 1 unit on 0–9 scale)	−0.01	−0.07	0.93	0.80–1.09
Anxiety – GAD-7 score (per 5 units on 0–21 scale)	−0.11	−0.77	1.05	0.80–1.38

* Multiple linear regression for Sheehan Disability Scale, $p < .0001$, $R^2 = 0.33$.

Multiple logistic regression for Disability Days (≥ 14 days vs. < 14 days in past 4 weeks), $X^2_{(df=10)} = 96.31$, $p < .0001$, $R^2 = 0.21$

† $p < .001$