Prevalence of Current, 12-Month, and Lifetime Major Depressive Disorder among Patients with Systemic Sclerosis

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* See Supplementary Data for a list of the CSRG Recruiting Rheumatologists, available at Rheumatology online.

Running Head: Depression in systemic sclerosis

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ABSTRACT

Objectives: Patients with systemic sclerosis (SSc) experience a range of problems affecting their quality of life, but only one small study has assessed the prevalence of major depressive disorder (MDD) in SSc. The objectives of this study were (1) to assess the prevalence of current (30-day), 12-month, and lifetime MDD in a large sample of Canadian SSc patients and (2) to investigate sociodemographic and disease factors associated with 12-month MDD.

Methods: SSc patients were recruited from 7 Canadian Scleroderma Research Group (CSRG) Registry sites (April 2009 to May 2012). MDD and history of prior depression episode (major or minor) were assessed with the Composite International Diagnostic Interview (CIDI).

Results: Among 345 patients, prevalence of 30-day, 12-month, and lifetime MDD were 3.8% (95% confidence interval [CI] 2.2% to 6.3%; n=13), 10.7% (95% CI 7.9% to 14.4%; n=37), and 22.9% (95% CI 18.8% to 27.6%; n=79), respectively. Patients with 12-month MDD had more severe gastrointestinal track involvement than patients without 12-month MDD, but there were no other significant differences on sociodemographic or disease variables. Among patients with 12-month MDD, 81.1% (95% CI 65.8% to 90.3%) reported a prior depression episode compared to 3.9% (95% CI 2.2% to 6.7%) among patients without 12-month MDD (p < 0.01).

Conclusions: The prevalence of 30-day, 12-month, and lifetime MDD among Canadian SSc patients is approximately twice that of the Canadian general population and somewhat higher than in arthritis. SSc patients face a range of psychosocial problems and may benefit from a broad supportive care approach.
**Keywords:** Systemic sclerosis; scleroderma, depression; major depressive disorder; psychosocial
INTRODUCTION

Systemic sclerosis (SSc), or scleroderma, is a rare, chronic autoimmune connective tissue disease characterized by vascular injury, immune dysfunction, and abnormal fibrotic processes [1]. SSc is a multi-system disease that can affect various organs, including the skin, lungs, heart and gastrointestinal tract [1] and that is associated with significant morbidity and increased mortality [2]. Approximately 80% of people affected by SSc are women with disease onset most common between 30-50 years of age [3]. Patients with SSc experience a range of problems that affect quality of life, including gastrointestinal symptoms, respiratory problems, fatigue, pain, pruritus, and disfiguring changes in appearance [4].

A 2007 systematic review found that a high percentage of patients with SSc report significant symptoms of emotional distress based on self-report questionnaires, but that no studies had used a validated diagnostic interview to assess major depressive disorder (MDD) in SSc [5]. In 2011, a study from France [6] reported that 28% of 49 hospitalized SSc patients had current MDD based on the Mini International Neuropsychiatric Interview (MINI), compared to 10% of 51 people with SSc recruited from a patient society meeting. Lifetime rates of MDD were similar in hospitalized patients (53%) and patients from the patient society (59%).

No studies have assessed prevalence of MDD in a large sample of ambulatory SSc patients. Thus, the objectives of the present study were to (1) determine the prevalence of current (30-day), 12-month, and lifetime MDD in a large sample of SSc patients; and to (2) assess sociodemographic and disease characteristics associated with a MDD episode in the last 12 months.

METHODS

Patients and Procedures
The present study was a sub-study of the 15-centre Canadian Scleroderma Research Group (CSRG) Registry. Registry patients must have a diagnosis of SSc from a Registry rheumatologist, be ≥18 years of age, and be fluent in English or French. Registry patients undergo physician evaluations at their initial and subsequent yearly visits and complete a series of self-report questionnaires. Patients from 7 of 15 CSRG centres were recruited for the present study. Of the 7 sites, 1 has dedicated mental health resources, including psychologists and social workers on staff who can provide mental health services to patients and an annual interdisciplinary day program to support coping with SSc.

Participants were approached during their annual CSRG Registry visit and asked if they would be willing to participate in a study involving a telephone interview about depression. Consenting patients were contacted by telephone, and two interviews were conducted, one following the annual Registry visit, and a second a month later. The present study included data from the first telephone interview only. Interviews were conducted between April 2009 and May 2012. The study was approved by the McGill University Institutional Review Board and the research ethics boards of each participating CSRG centre. Patients provided written informed consent for the CSRG Registry and for the present study.

Measures

The World Mental Health Composite International Diagnostic Interview Version 3.0 (CIDI). The CIDI [7] is a widely used epidemiological tool that generates psychiatric diagnoses based on International Classification of Diseases-10 (ICD-10) and Diagnostic and Statistical Manual-IV (DSM-IV) criteria. The CIDI is a fully-structured interview that can be administered by trained lay interviewers. In the present study, only the Depression Module of the CIDI was administered to assess whether patients met criteria for current (30-day), 12-month, and lifetime
MDD based on *DSM-IV* criteria. The Depression Module also assesses the number of episodes of major or minor depression in the last 12 months and lifetime. This information was used to identify patients who had experienced episodes of major or minor depression prior to the most recent 12-month period. Minor depression involves the presence of at least 2 of 9 symptoms rather than at least 5 of 9 as is required for a diagnosis of MDD.

In addition to psychiatric diagnoses, the CIDI contains items pertaining to receiving treatment for depression in the past 12-months and lifetime. These items query patients as to whether they received treatment for depression in the last 12 months, whether they have ever talked to a medical doctor or other professional (psychologist, counselor, spiritual advisor, herbalist, acupuncturist, or other healing professional) about their depression, and whether they ever received treatment for depression that they considered effective.

*Disease-related variables.* Limited disease was defined as skin involvement distal to the elbows and knees with or without face involvement and diffuse disease as skin involvement proximal to the elbows and knees and/or involving the trunk [8]. The extent of skin involvement was assessed using the modified Rodnan skin score (mRss), a validated method that has been used in other SSc samples (e.g., [9]). For each of 17 body areas, physicians rate the skin from 0 (*normal*) to 3 (*hidebound*), summing to obtain the mRss; scores can range from 0 to 51. Disease severity was assessed via the 9 items of the Medsger Scleroderma Disease Severity Scale [9,10]. Disease duration was measured by the time, in years, since diagnosis of SSc. The time, in years, since onset of first non-Raynaud’s disease symptoms was also recorded, as many patients experience Raynaud’s phenomenon well before the onset of other symptoms of SSc.

**Data Analysis**
Current (30-day), 12-month, and lifetime prevalence rates of MDD were reported, along with 95% confidence intervals (CIs) [11]. To compare demographic and disease characteristics between patients with and without 12-month MDD, we used independent samples t-tests for continuous variables and chi-square tests for categorical variables. We did not conduct multivariate analyses because of the relatively small number of patients with a 12-month diagnosis. The odds ratio of having a previous lifetime depressive episode among patients with and without 12-month MDD was calculated along with a 95% CI. The proportion of patients with current (30-day), 12-month, and lifetime MDD who had received treatment from a medical doctor or other professional (psychologist, counselor, spiritual advisor, herbalist, acupuncturist, or other healing professional) at any point in their life was calculated, as well as the proportion of those who had received treatment that they considered effective. The proportion of people with current (30-day) and 12-month MDD who received treatment in the past 12-months was also calculated. All analyses were conducted using SPSS version 20.0 (Chicago, IL), and all statistical tests were 2-sided with a p < .05 significance level.

RESULTS

Sample Characteristics

A total of 345 participants were interviewed. Patient disease and sociodemographic characteristics are presented in Table 1. Mean age was 57.7 years (SD=11.8), 87.5% of patients were female. Mean time since diagnosis was 7.0 years (SD=8.1), and 24.3% had diffuse SSc.

Depression Prevalence and Predictors

Current (30-day) MDD prevalence was 3.8% (n=13, 95% CI=2.2-6.3%); 12-month prevalence was 10.7% (n=37, 95% CI=7.9-14.4%); and lifetime prevalence was 22.9% (n=79, 95% CI=18.8-27.6%). Among women (n=302), prevalence was 3.3% (n=10, 95% CI=1.8-6.0%)
for 30 days; 10.9% (n=33, 95% CI=7.9-15.0%) for 12 months; and 24.2% (n=73, 95% CI=19.7-29.3%) lifetime. Among men (n=43), prevalence was 7.0% (n=3, 95% CI=2.4-18.6%) for 30 days; 9.3% (n=4, 95% CI=3.7-21.6%) for 12 months; and 14.0% (n=6, 95% CI=6.6-27.2%) lifetime.

An additional 17 patients endorsed a sufficient number of symptoms to meet criteria for 30-day, 12-month, or lifetime MDD, but did not receive diagnoses because they indicated that symptoms were always the result of physical causes. Including these patients would have added 7 patients with 30-day MDD, 12 with 12-month MDD, and 17 with lifetime MDD with adjusted prevalence rates of 5.8% (n=20, 95% CI=2.8-8.8%) for 30-days, 14.2% (n=49, 95% CI=11.0-18.3%) for 12-months, and 27.8% (n=96, 95% CI=23.4-32.8%) lifetime. No patients reported a recent suicide plan or attempt.

As shown in Table 1, there were no significant differences between patients with and without 12-month MDD on any sociodemographic characteristics. For disease characteristics, the only statistically significant difference was in gastrointestinal tract severity, which was greater among patients with 12-month MDD (p<0.05). Patients with a diagnosis of MDD in the last 12 months were less likely to be married, had somewhat shorter disease duration, and were more likely to have at least some education beyond high school, although none of these were statistically significant (Table 1). The majority of patients (81.1%) with a 12-month MDD diagnosis had experienced a previous episode of major or minor depression, which was significantly greater than among patients without 12-month MDD (3.9%, p<0.01; see Table 1). Among patients with 12-month MDD, 80% (24 of 30) reported that they had experienced at least three previous major or minor depressive episodes compared to 66.7% (8 of 12) of patients without 12-month MDD who reported a prior lifetime major or minor depressive episode (not
shown). The odds of having experienced an episode of major or minor depression prior to the most recent 12 months among patients with 12-month MDD was 105.7 (95% CI 38.7 to 288.8; \( p<0.01 \)) times that of patients without 12-month MDD.

**Depression Treatment**

Twelve of 13 patients (92.3%) with current (30-day) and 32 of 37 patients (88.9%) with 12-month MDD had talked to a professional at some point in their life about their depression. Among the 12 patients with current (30-day) MDD, 9 (75.0%) indicated that they had treatment in the last 12 months and 8 (66.7%) indicated that they had received treatment they found useful at some point in their lives. Of the 32 patients with 12-month MDD, 20 (62.5%) had received depression treatment in the past 12-months, and 25 (78.1%) had received treatment that they found useful in their lifetime.

Data on SSRI use were available for 287 of 345 patients from the CSRG Registry. Only 4.5% (13 of 287) reported current SSRI use, including 10.0% (1 of 10) of patients with current (30-day) MDD, 6.9% (2 of 29) of patients with 12-month MDD, and 7.9% (5 of 63) with lifetime MDD. However, indication for use was not reported in the Registry, and it is not known to what extent SSRIs were prescribed to treat depression versus other indications, such as Raynaud’s phenomenon.

Of the 345 patients in the study, 64 were recruited from a CSRG site with dedicated resources available to provide mental health services to patients with SSc. The rate of 30-day MDD for patients from this CSRG site was 6.3% (4 of 64); the rate of 12-month MDD was 15.5% (10 of 64); and the rate of lifetime MDD was 25.0% (16 of 64). Among patients from this site with data on professional help, 7 of 9 (77.8%) with 12-month MDD and 11 of 15 (73.3%) with lifetime MDD reported that they had talked to a professional at some point in their life.
about their depression. Among patients with 12-month MDD, 5 of 7 (71.4%) who had spoken to a professional about depression indicated that they had received treatment in the past 12 months, and 4 of 7 (57.1%) indicated that they had received treatment that they found useful.

**DISCUSSION**

The main finding of this study was that the prevalence of MDD among patients with SSc was 4% for current (30-day) MDD, 11% for 12-month MDD, and 23% for lifetime MDD. There were no significant differences in sociodemographic variables between patients with and without 12-month MDD. Patients with 12-month MDD had significantly more severe gastrointestinal involvement, but there were no other differences in disease characteristics. Approximately 80% of patients with 12-month MDD reported a prior episode of major or minor depression compared to only 4% of patients without 12-month MDD. Among patients with 12-month MDD, almost two-thirds reported that they received treatment for depression in the past 12 months, including 75% of patients with current (30-day) MDD.

The rates of MDD based on the CIDI in the present sample of SSc patients were substantially higher than in general population samples. The National Comorbidity Survey Replication (NCS-R) study of a large community sample from the United States, for example, reported a prevalence of 6.6% for 12-month MDD and 16.2% for lifetime MDD, based on the CIDI [12]. In Canada, rates of MDD from a pan-Canadian population survey, excluding patients with probable bipolar disorder, were 1.3% for 30-day MDD, 4.0% for 12-month MDD, and 10.8% for lifetime MDD, also based on the CIDI [12]. Women had higher prevalence rates for both 30-day (1.4%) and 12-month MDD (5.0%) than men (1.2% and 2.9%, respectively) [13]. In the present study, prevalence of 30-day MDD among SSc patients was approximately three times as high as in the Canadian general population, and the 12-month and lifetime prevalence rates of
MDD in the present study were approximately twice the rates from the general population. As in the general population, women with SSc in the present sample had somewhat higher 12-month prevalence rates (10.9%) compared to men (9.3%). Lifetime, 24.2% of women versus 14.0% of men with SSc had at least one episode of MDD.

Generally, the prevalence of depression is elevated among patients with chronic medical conditions compared to the general population [14]. For instance, the 12-month prevalence of MDD among patients with arthritis in the NCS-R study from the United States was 7.4%, using the CIDI [15]. Similarly, across 17 countries from the Americas, Europe, the Middle East, Africa, Asia, and the South Pacific, 12-month rates of MDD among people with arthritis based on the CIDI were between 5% and 10% in most countries with an odds ratio of MDD of 1.9 among people with arthritis compared to people without arthritis [16]. The 11% prevalence of 12-month MDD in the present study was somewhat higher than 12-month estimates for people with arthritis in those studies. It was similar to the 10% prevalence reported among 51 French SSc patients recruited from a patient society meeting, but substantially lower than the 28% prevalence among 49 hospitalized patients from the same study [6]. The 23% lifetime prevalence in the present study was also substantially lower than lifetime prevalence for both the SSc patients from the patient society (59%) and from the hospital (53%) in the French study [6].

Beyond sampling differences between the two studies, another possible reason for this discrepancy is the different methods used to assess MDD in the two studies. The 2011 study from France used the MINI [17] to assign diagnoses of MDD. The MINI is a structured diagnostic interview that is compatible with DSM-IV diagnostic criteria; however, it is intended to be a brief, rather than a comprehensive evaluation. It does not query to establish whether symptoms of depression elicited from the interview cause functional impairment. This omission
could potentially result in higher rates than interviews, such as the CIDI, which was used in this study, and which requires 5 of 9 *DSM-IV* symptoms plus evidence of functional impairment, consistent with *DSM-IV* criteria for a diagnosis of MDD.

In this SSc sample, as in many other patient groups, the most important predictor of a recent depressive episode was a history of at least one prior depressive episode [18]. It is important to point out, however, that although past episodes were highly predictive of more recent episodes and the prevalence of depression among patients with SSc was approximately twice that of the Canadian general population, most SSc patients did not report a recent episode of depression, either in the last 30 days or in the last 12 months. Nonetheless, as reported in a 2007 systematic review, a large percentage of patients with SSc do report high levels of emotional distress [5]. Together, this suggests that many people with SSc experience distress, but a relatively small proportion meet criteria for MDD as per the *DSM-IV*. Consistent with this, the authors of a recent report based on extensive qualitative interviews with women with SSc [19] noted that interviewees described a high level of distress and suffering related to living with SSc. Many of the women interviewed, however, emphasized that they would not label their psychological and emotional distress as depression. Indeed, a common sentiment among the women who were interviewed was that their distress was not the result of a depressive disorder and did not reflect an inability to cope, generally.

CIDI items that query about treatment-seeking behaviours are not specific about who provided the treatment (e.g., psychiatrist, psychologist, counselor, spiritual advisor), the specific type of treatment received, or the amount of treatment received. Nonetheless, our results suggest that a majority of patients with recent MDD did seek out help of some sort. We do not know how many patients in the study who did not have an episode of MDD sought professional help, but
evidence from other groups of patients with serious medical conditions suggest that needs may be diverse and that meeting criteria for a psychiatric diagnosis may not be a strong indicator of the desire for psychosocial support. A study of cancer patients from Germany, [20] for instance, found that nearly as many patients with low levels of distress sought supportive care as patients above a cut-off for psychosocial distress on a screening tool.

It is important that patients with MDD receive evidence-based treatment. In light of the fact that many SSc patients experience significant emotional distress, even if they do not have MDD [5], and that SSc patients appear to use supportive care resources at relatively high rates, a broad care approach that does not focus exclusively on diagnosing and treating a psychiatric disorder should be considered. Psycho-oncology patient care provides a useful model for this kind of approach, as a central point of psycho-oncological care is to support the coping of patients and their support systems rather than emphasizing the diagnosis and treatment of psychiatric disorders, such as MDD [21]. Psycho-oncology care models highlight the provision of services and interventions to patients and their families to help manage the psychological, behavioral, and social aspects of living with the disease, including the facilitation of the flow of information, resources, and services to the patient and surrounding support systems.

There are a number of limitations to consider when interpreting the results from this study. First, the CSRG Registry constitutes a convenience sample. The CSRG does not have statistics on the number of patients approached versus consented for all CSRG centres, although it is estimated that more than 80% of patients approached to participate in the Registry do enrol. The Registry is comprised of SSc patients who are cared for by a rheumatologist; who have a relatively stable disease; and who are healthy enough to undergo routine visits and participate. Patients with severe SSc are under-represented in the Registry. The proportion of patients with
diffuse disease who participated in this study (24%) was lower than in the overall CSRG sample (approximately 40%). Therefore, our sample may not reflect the full spectrum of the SSc population. The CSRG Registry also does not have an active assessment of fibromyalgia patients; therefore, we were unable to determine whether or not presence of fibromyalgia in certain patients was related to mood disturbance in the present study.

Second, although the CSRG collects data on the use of selective serotonin reuptake inhibitors (SSRIs), the indication for their use is not recorded. Since SSRIs are often used to treat Raynaud’s phenomenon (22), it is not known to what degree SSRIs were prescribed for depression. Related to this, the CSRG does not collect data on other classes of antidepressant medications that may be prescribed to treat depression. Because the CSRG Registry is primarily a database for collecting information related to SSc, information was not available on other possible treatments for depression, such as psychological treatments.

Finally, we were unable to examine sociodemographic and disease-related predictors of current (30-day) MDD due to the very small number of patients with a current diagnosis. Furthermore, we were limited to bivariate analyses and did not use multivariate analyses to examine potential independent correlates of 12-month MDD, such as age and gender. Bivariate analyses did not identify any sociodemographic or SSc-related predictors of 12-month MDD and underlined the importance of a history of depression as the primary risk factor for a recent episode. Income and work status were not associated with MDD, but a large proportion of patients were missing data for those variables. Related to the small number of patients with a current diagnosis, there were only 43 men in the current sample, which resulted in a wide confidence interval around the estimate of current MDD prevalence for this group.
In summary, this study found that the prevalence of current (30-day), 12-month, and lifetime MDD among SSc patients was approximately twice the prevalence for the Canadian general population and somewhat higher than in patients with arthritis. Although only one disease variable was associated with 12-month MDD, approximately 80% of patients with 12-month MDD reported a prior episode compared to only 4% of patients without 12-month MDD. The majority of patients with current (30-day) and 12-month MDD reported that they had sought treatment from a professional. Given the multiple psychosocial problems faced by patients with SSc and that many patients have high levels of distress, but relatively few have MDD, a broad care approach similar to that used in psycho-oncology settings is recommended.
KEY MESSAGES

- Prevalence of major depressive disorder in systemic sclerosis was 4% in the last 30-days.
- Prevalence of 12-month and lifetime major depression in systemic sclerosis was 11%, and 23%, respectively.
- In systemic sclerosis, 81% of patients with 12-month major depression reported previous depression.
ACKNOWLEDGMENTS

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DISCLOSURE STATEMENT

There are no conflicts of interest to disclose.
FUNDING STATEMENT

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SUPPLEMENTARY DATA

Canadian Scleroderma Research Group Recruiting Rheumatologists who contributed to this study include M. Baron, Montreal, Quebec; M. Hudson, Montreal, Quebec; N. Khalidi, Hamilton, Ontario; E. Kaminska, Hamilton, Ontario; J. Pope, London, Ontario; J. Markland, Saskatoon, Saskatchewan; N. Jones, Edmonton, Alberta; P. Docherty, Moncton, New Brunswick; J-P. Mathieu, Montreal, Quebec.
REFERENCES


Table 1. SSc Patient Disease and Sociodemographic Characteristics and Comparisons

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<th>Sociodemographic Characteristics</th>
<th>Total Sample</th>
<th>12-Month N=345</th>
<th>MDD N=37</th>
<th>No 12-Month N=308</th>
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<td>Age, <em>mean (SD)</em></td>
<td>57.7 (11.8)</td>
<td>57.4 (13.3)</td>
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<td>Female sex, n (%)</td>
<td>302 (87.5%)</td>
<td>33 (89.2%)</td>
<td>269 (87.3%)</td>
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<td>Education ≤ high school, n (%)</td>
<td>153 (45.5%)</td>
<td>13 (35.1%)</td>
<td>140 (46.8%)</td>
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<td>Married or living as married, n (%)</td>
<td>236 (70.0%)</td>
<td>21 (56.8%)</td>
<td>215 (71.7%)</td>
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<td>Employment Status†</td>
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<td>Employed</td>
<td>74 (21.4%)</td>
<td>9 (24.3%)</td>
<td>65 (21.1%)</td>
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<td>Disabled/on sick leave</td>
<td>49 (14.2%)</td>
<td>2 (5.4%)</td>
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<tr>
<td>Otherwise not working</td>
<td>124 (35.9%)</td>
<td>13 (35.1%)</td>
<td>111 (36.0%)</td>
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<td>Income level‡</td>
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<td></td>
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<td>&lt; 40,000$/year, n (%)</td>
<td>73 (31.1%)</td>
<td>7 (31.8%)</td>
<td>66 (31.0%)</td>
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<td>≥ 40,000$/year</td>
<td>162 (68.9%)</td>
<td>15 (68.2%)</td>
<td>147 (69.0%)</td>
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| Disease Characteristics                          |                |                |          |                   |
| Time since non-Raynaul’s symptom onset in years, *mean (SD)* | 10.0 (9.8) | 8.3 (7.4) | 10.2 (10.1) | 0.33 |
| Time since diagnosis of SSc in years, *mean (SD)* | 7.0 (8.1) | 5.6 (6.4) | 7.1 (8.2) | 0.34 |
| Diffuse SSc, n (%)‡                               | 84 (24.3%)     | 8 (21.6%)      | 76 (24.8%) | 0.50              |
| modified Rodnan skin score, *mean (SD)*           | 8.3 (9.6)      | 7.8 (8.4)      | 8.4 (9.7)  | 0.75              |

Disease Severity Scale‡
General Health
<table>
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<tr>
<th>Disease severity score</th>
<th>0.7 (0.9)</th>
<th>0.7 (0.8)</th>
<th>0.7 (0.9)</th>
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<td>peripheral vascular</td>
<td>1.3 (1.2)</td>
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<td>skin</td>
<td>1.1 (0.7)</td>
<td>1.1 (0.6)</td>
<td>1.1 (0.7)</td>
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<tr>
<td>joint/tendon</td>
<td>0.9 (1.4)</td>
<td>0.9 (1.3)</td>
<td>0.9 (1.4)</td>
<td>0.99</td>
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<td>muscle</td>
<td>0.2 (0.7)</td>
<td>0.2 (0.6)</td>
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<td>gastrointestinal tract</td>
<td>1.9 (0.8)</td>
<td>2.2 (0.5)</td>
<td>1.9 (0.8)</td>
<td>&lt;0.05</td>
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<td>lung</td>
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<td>heart</td>
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<td>0.4 (0.7)</td>
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<td>kidney</td>
<td>0.1 (0.4)</td>
<td>0.0 (0.0)</td>
<td>0.1 (0.4)</td>
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</tbody>
</table>

At least one lifetime major or minor depressive episode prior to most recent 12 months, n (%), 95% CI

9% to 16% 65.8% to 90.3% 2.2% to 6.7%

aN=336; bN=337; cN=279. “Employed” included full-time, part-time, or self-employment. “Otherwise not working” included patients who reported student status, that they were retired, that they were unemployed, or that they were not working for other reasons.; dN=247; eN=344; fN ranged from 240 to 295 on all items except the joint/tendon item, where N=160.