

9. **Sophie Hu^{1,2}**, Brett Thombs^{1,2,4,8}.

Marie-Eve Carrier¹; Marie-Claude Geoffroy^{2,4}; Linda Kwakkenbos⁵⁻⁷; Susan J. Bartlett^{8,9}; Catherine Fortuné¹⁰; Amy Gietzen¹¹; Karen Gottesman¹²; Geneviève Guillot¹³; Laura K. Hummers¹⁴; Amanda Lawrie-Jones^{15,16}; Vanessa Malcarne^{17,18}; Michelle Richard¹⁹; Maureen Sauvé^{20,21}; James Stempel²²; Luc Mouthon^{23,24}; Andrea Benedetti^{2,9,25}, Brett Thombs^{1,2,4,8} on behalf of the SPIN Investigators¹.

¹Lady Davis Institute for Medical Research, Jewish General Hospital, Montreal, QC; ²Department of Epidemiology, Biostatistics, and Occupational Health, McGill University, Montreal, QC; ³Douglas Mental Health University Institute, Montreal, QC; ⁴Department of Psychiatry, McGill University, Montreal, QC; ⁵Department of Clinical Psychology, Behavioural Science Institute, Radboud University, Nijmegen, the Netherlands; ⁶Department of IQ Health, Radboud University Medical Center, Nijmegen, the Netherlands; ⁷Radboudumc Center for Mindfulness, Department of Psychiatry, Radboud University Medical Center, Nijmegen, the Netherlands; ⁸Department of Medicine, McGill University, Montreal, QC; ⁹Research Institute of the McGill University Health Centre, Montreal, QC; ¹⁰Ottawa Scleroderma Support Group, Ottawa, ON; ¹¹National Scleroderma Foundation, Tri-State Chapter, Binghamton, NY, USA; ¹²National Scleroderma Foundation, Los Angeles, CA, USA; ¹³Sclérodermie Québec, Montreal, QC; ¹⁴Johns Hopkins University School of Medicine, Baltimore, MD, USA; ¹⁵Scleroderma Australia, Australia; ¹⁶Scleroderma Victoria, Australia; ¹⁷Department of Psychology, San Diego State University, CA, USA; ¹⁸San Diego State University/University of California, San Diego Joint Doctoral Program in Clinical Psychology, San Diego, CA, USA; ¹⁹Scleroderma Atlantic, Halifax, NS; ²⁰Scleroderma Society of Ontario, Hamilton, ON; ²¹Scleroderma Canada, Hamilton, ON; ²²Scleroderma Chicago, Chicago, IL, USA; ²³Service de Médecine Interne, Centre de Référence Maladies Autoimmunes Systémiques Rares d'Ile de France, Hôpital Cochin, Assistance Publique-Hôpitaux de Paris (AP-HP), Paris, France; ²⁴APHP-CUP, Hôpital Cochin, Université de Paris, Paris, France; ²⁵Respiratory Epidemiology and Clinical Research Unit, McGill University Health Centre, Montreal, QC.

Differential Item Functioning on the 8-item Patient Health Questionnaire by Disease Sub-type, Language, Sex and Age among People with Systemic Sclerosis. A Scleroderma Patient-centered Network (SPIN) Cohort Study.

Systemic sclerosis (scleroderma; SSc) is a chronic, autoimmune rheumatic disease characterized by fibrosis of the skin and other organs. SSc can be classified into 2 main subtypes, diffuse and limited, which are associated with different patterns of disease presentation and symptom severity. Depression assessments for people with SSc can potentially be influenced by symptoms that overlap with somatic items of depression. Fatigue, gastrointestinal issues, and sleep problems are common symptoms of SSc that are also measured by the 8-item Patient Health Questionnaire (PHQ-8), a commonly used tool to assess depression symptom severity. No studies have looked at whether PHQ-8 somatic item scores can be influenced by SSc subtypes, and no studies have looked at whether other factors could influence PHQ-8 responses for people with SSc, including language, sex, and age. The primary objective was to assess differential item functioning (DIF) in PHQ-8 somatic items across SSc subtypes. The secondary objective was to assess the PHQ-8 for DIF across language of administration, sex, and age.

Participants enrolled in the Scleroderma Patient-centered Intervention Network (SPIN) Cohort who completed the PHQ-8 at their baseline assessment between April 2014 and October 2020 were included in this study. A confirmatory factor analysis (CFA) was used to evaluate the unidimensional structure of the PHQ-8, and DIF analyses based on SSc subtype, language, sex, and age were conducted using Multiple Indicators Multiple Causes (MIMIC) models.

In total, 2,191 participants were included. CFA with covarying error terms supported a one-factor structure for the PHQ-8 (Tucker Lewis Index = 0.99, Comparative Fit Index = 0.98, Root Mean Square Error of Approximation = 0.08). We did not identify any statistically significant DIF based on SSc subtype. We identified statistically significant DIF in 4 items for language, sex, and age. French-language participants scored higher than expected on 1 item (depressed mood) compared to English-language participants, male participants scored lower than expected on 1 item (sleep problems) compared to female participants, and participants aged >60 years scored lower than expected on 2 items (negative feelings and difficulty concentrating) compared to participants aged ≤60 years. However, the impact of DIF on the overall latent depression factor was negligible in any analyses.

PHQ-8 somatic items did not display any DIF between the diffuse and limited SSc groups, and the questionnaire performed comparably for both groups. Overall PHQ-8 scores were also comparable across language of administration, sex, and age groups.