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PSYCHOSOCIAL ISSUES IN THE RHEUMATIC DISEASES

# Multidimensional Health Assessment Questionnaire as an Effective Tool to Screen for Depression in Routine Rheumatology Care

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**Objective.** To analyze the use of the Multidimensional Health Assessment Questionnaire (MDHAQ) to screen for depression, as compared to 2 reference standards, the Patient Health Questionnaire 9 (PHQ-9) and the Hospital Anxiety and Depression Scale depression domain (HADS-D).

**Methods.** Patients from Barcelona with a primary diagnosis of rheumatoid arthritis (RA) or spondyloarthritis (SpA) completed the MDHAQ, the PHQ-9 (depression ≥10), and the HADS-D (depression ≥8) measures. The MDHAQ includes 2 depression items, 1 in the patient-friendly HAQ, scored in a 4-point format from 0 to 3.3, and a yes/no item on a 60-symptom checklist. Percentage agreement and kappa statistics quantified the agreement between 6 screening criteria: yes on the 60-symptom checklist, a score of ≥1.1, a score of ≥2.2 on a 4-point scale, and either a response of yes on the 60-symptom checklist or scores of ≥2.2, PHQ-9 ≥10, and HADS-D ≥8.

**Results.** Depression screening was positive according to 6 criteria in 19.6–32.4% of 102 patients with RA, and 27.9–44.8% of 68 with SpA (total = 170). All MDHAQ scores, including depression items, were higher in patients with SpA compared to patients with RA, and within each diagnostic group in patients who met PHQ-9 ≥10 and HADS-D ≥8 depression screening criteria. The highest percentage agreement between an MDHAQ screening criterion versus PHQ-9 ≥10 was 83.3% for either an answer of yes on the 60-symptom checklist or a score of ≥2.2 on a 4-point scale, which we have termed MDHAQ-Dep. The agreement of MDHAQ-Dep versus HADS-D ≥8 was 81.7%, similar to the agreement of PHQ-9 ≥10 versus HADS-D ≥8, which was 82.2%. Kappa measures of agreement were 0.63 for MDHAQ-Dep versus PHQ-9 ≥10, 0.60 for MDHAQ-Dep versus HADS-D ≥8, and 0.62 for PHQ-9 ≥10 versus HADS-D ≥8.

**Conclusion.** A positive MDHAQ-Dep response (either an answer of yes on a 60-symptom checklist or a score of ≥2.2 on a 4-point scale) yielded similar results to PHQ-9 ≥10 or HADS-D ≥8 to screen for depression in these RA and SpA patients.

## INTRODUCTION

In comparison to the general population, depression is more prevalent in patients with rheumatoid arthritis (RA) (1,2) or spondyloarthritis (SpA) (3). Worse outcomes are reported in patients with these rheumatic diseases who also have comorbid depression (4–12). Therefore, recognition and treatment of depression in individual patients with rheumatic diseases is an important component of disease management.

One approach to screen for comorbid depression is to have patients complete a screening questionnaire, such as the Patient Health Questionnaire 9 (PHQ-9) (13,14) and the Hospital Anxiety and Depression Scale depression domain (HADS-D) (11,15). At the same time, patients should complete another questionnaire, such as the Health Assessment Questionnaire (HAQ) for RA (16), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for osteoarthritis (OA) (17), the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) for ankylosing spon-

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**SIGNIFICANCE & INNOVATIONS**

- To assess clinical status, rheumatologists can use the same 2-page Multidimensional Health Assessment Questionnaire (MDHAQ), which includes the Routine Assessment of Patient Index Data 3 (RAPID3), the Fibromyalgia Assessment Screening Tool to screen for fibromyalgia, and the MDHAQ Depression to screen for depression, without a need for an additional questionnaire, which is generally not feasible in busy clinical settings.
- Positive scores from depression screening, as well as all other MDHAQ scores, were higher in patients with spondyloarthritis than in patients with rheumatoid arthritis.
- Results of screening for depression can differ substantially using different cut points on a 4-point scale.
- Screening for depression may be of clinical value in rheumatic diseases to recognize whether treatment of depression might improve clinical outcomes, in view of the evidence that individual MDHAQ scores, as well as RAPID3 scores, were higher in patients with positive screening for depression and that comorbid depression is associated with worse responses to rheumatology medications.

dylitis (AS) (18), or other rheumatology questionnaires, so that rheumatologists can assess clinical status and guide clinical decisions. However, having patients complete 2 different questionnaires in busy clinical settings is generally not feasible.

The Multidimensional Health Assessment Questionnaire (MDHAQ) was initially developed from the standard HAQ to help guide the routine care of patients with RA (19,20). The 3 self-reported RA core data set measures found in the HAQ (physical function, pain, and patient global assessment) have been compiled into the Routine Assessment of Patient Index Data 3 (RAPID3) index (21–23), which yields similar results as the Disease Activity Score in 28 joints (DAS28) and the Clinical Disease Activity Index (CDAI) in patients with RA (21). Over the years, additional scales have been added to contribute to clinical decisions, including scores for fatigue (24), the self-reported painful joint count Rheumatoid Arthritis Disease Activity Index (RADAI) (25), a 60-symptom checklist to serve as a review of systems and screen for flares and adverse effects of medication (26), and another MDHAQ index, the Fibromyalgia Assessment Screening Tool (FAST3), which yields results similar to formal revised fibromyalgia criteria (27,28).

The MDHAQ includes 2 items concerning depression (see Supplementary Figure 1, available on the *Arthritis Care & Research* website at http://onlinelibrary.wiley.com/doi/10.1002/acr.24467/abstract) (19). One item is in the format of the patient-friendly HAQ, "Are you able to deal with feelings of depression or feeling blue?" on a 4-point scale: "without any difficulty, with some difficulty, with much difficulty, unable to do," which had been found to be correlated significantly with the Beck Depression Inventory, the Centers for Epidemiologic Studies Depression scale, and the Arthritis Impact Measurement Scales depression scale (19). The second MDHAQ depression item is recorded as yes (check)/no (blank) for depression as 1 query in the 60-symptom checklist. In this article, we compared criteria based on these 2 MDHAQ depression items to PHQ-9 and HADS-D as reference screening standards to possibly screen for depression in routine care of patients with RA or SpA.

## PATIENTS AND METHODS

**Study participants.** Patients with a diagnosis of RA according to the 2010 American College of Rheumatology/European League Against Rheumatism criteria (29) or of SpA according to the 2010 Assessment of SpondyloArthritis international Society criteria (30), who were under care in the Department of Rheumatology at Hospital Clinic Universitari de Barcelona, Barcelona, Spain were invited to participate in the study. All patients with these diagnoses seen between November 2018 and February 2019 were invited to participate; approximately 80% accepted. Each participant gave written consent, as approved by the Hospital Clinic Universitari de Barcelona Ethics Committee (Reg. HCB/2019/0024).

Participants were asked to complete 3 questionnaires, an MDHAQ, the PHQ-9, and HADS-D (patients completed both the anxiety and depression domains of HADS, but only the depression domain [HADS-D] is analyzed in this article). The questionnaires were completed in the waiting area prior to a routine care visit.

**Patient self-report MDHAQ.** A Spanish version of the MDHAQ (see Supplementary Figure 1, available on the *Arthritis Care & Research* website at http://onlinelibrary.wiley.com/doi/10.1002/acr.24467/abstract) was used to assess clinical status. The MDHAQ was developed from the original HAQ (16,23). It includes 10 queries concerning physical function, each scored 0–3 (0 = without any difficulty, 1 = with some difficulty, 2 = with much difficulty, 3 = unable to do). The MDHAQ also includes 3 visual analog scales (range 0–10) or visual numeric scales (31) for pain, patient global estimate, and fatigue (19,24), a RADAI self-report painful joint count (19,25), a 60-symptom checklist (26), and demographic data (19,20,23,32,33). Two indices based on the MDHAQ are RAPID3 (range 0–30), which yields results similar to the DAS28 and CDAI to assess and monitor patients with RA (21–23,34), and FAST3 (range 0–3), with results similar to formal fibromyalgia criteria (27,28).

The MDHAQ also includes 2 depression items. The first is a query concerning depression/feeling blue in the patient-friendly HAQ, scored 0, 1.1, 2.2, or 3.3 (rather than 0–3), so a total of 3 items, depression, anxiety, and sleep problems, provides a screening index for psychological issues (19,20) (only the 0–3.3 depression scores are analyzed in this article). The second MDHAQ depression item is a query for depression assessed as

a yes (check)/no (blank) response included in the 60-symptom MDHAQ checklist. Four MDHAQ-based depression criteria were compared to PHQ-9 and HADS-D as screening tools: 1) yes for depression on the symptom checklist; 2) a score ≥1.1; 3) a score ≥2.2; and 4) yes for depression on the symptom checklist or a score ≥2.2.

**Assessment tools for psychological status.** Positive screening for depression was evaluated according to 2 widely used questionnaires, PHQ-9 (13) and HADS-D (15). The PHQ-9 is the 9-item depression module from the more extensive 15-item PHQ (13), on which scores of 5, 10, 15, and 20 represent mild, moderate, moderately severe, and severe depression, respectively. A score ≥10 indicates positive screening for depression, with a sensitivity of 88% and a specificity of 88% for major depression diagnosed by a physician according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition criteria. Because the current article is not designed to detect actual depression, but rather to describe tools to screen for depression, we use the phrasing "positive screening for depression" rather than "diagnosis of depression" (13). A validated Spanish version of PHQ-9 was used in this study (35).

The HADS is a 14-item self-report questionnaire, with 7 items to screen for anxiety (HADS-A) and 7 items to screen for depression (HADS-D) (15). All items are scored 0–3 on a 4-point scale; higher scores indicate a more severe problem for each item. The language varies between items, e.g., "I look forward with enjoyment to things: as much as I ever did (score 0), rather less than I used to (score 1), definitely less than I used to (score 2), hardly at all (score 3)"; "I can enjoy a good book or radio or TV program: often (score 0), sometimes (score 1), not often (score 2), very seldom (score 3)." The total score is 0–21 for each domain, either anxiety or depression. A cut point of 8 is interpreted as a positive screen for anxiety or depression (15). A Spanish version of the HADS was used (36). As noted, only HADS-D (depression) is analyzed in this article.

**Other variables.** Other variables also collected for the study included height and weight (to calculate body mass index), erythrocyte sedimentation rate (ESR), and the C-reactive protein (CRP) level (abnormal ESR >16 mm/hour and CRP ≥0.5 mg/dl). Treatment-related data were extracted from the electronic health records for the use of biologic disease-modifying antirheumatic drugs, as well as antidepressant medications.

**Statistical analysis.** Descriptive statistics were computed for all patient characteristics, including demographic variables, MDHAQ-related variables, and reference depression screening scales. We described categorical variables using frequencies and percentages, and continuous variables using means ± SDs. We compared groups of interest regarding categorical variables using chi-square tests (Fisher's exact tests if needed); for the continuous variables, we used Student's *t*-tests (Wilcoxon's rank-sum test if needed). We first compared the patients with PsA and axial SpA regarding their characteristics to evaluate the possibility of combining PsA and axial SpA into a pooled SpA group. Secondly, we compared the patients with RA and SpA regarding their characteristics. In subsequent analyses, we evaluated possible associations between depression screening status and patient characteristics, both overall and separately for patients with RA and SpA.

Percent agreement and kappa statistics (37) with corresponding 95% confidence intervals were used to quantify the agreement between the 4 MDHAQ-based candidate screening criteria presented above, PHQ-9, and HADS-D. We chose a recommended MDHAQ depression screening criterion from the 4 candidates based on the optimal agreement with the 2 reference depression questionnaires, PHQ-9 and HADS-D. All statistical analyses were performed using SAS software, version 9.4.

## RESULTS

**Patient characteristics.** A total of 170 patients were studied, 102 (60%) with RA, 34 (20%) with axial SpA, and 34 (20%) with peripheral psoriatic arthritis (PsA) (Table 1). Patients with axial SpA and PsA were similar in almost all characteristics; differences in body mass index (BMI) ($P < 0.05$) did not appear clinically important (Table 1). The patients with axial SpA and PsA were therefore pooled as 68 patients with all SpA (hereafter called SpA; 40% of all patients in the study) for subsequent analyses, based on the noted similarity of data as well as clinical features.

Age and formal education did not differ significantly in patients with RA versus SpA. A higher proportion of patients with RA than SpA were female, and patients with RA had lower BMI than other patients (Table 1). Scores and criteria for positive screening on both reference depression screening questionnaires were higher in patients with SpA than with RA, and statistically significant for PHQ-9 (Table 1). Similarly, scores for MDHAQ depression items and for other MDHAQ items were higher in patients with SpA versus RA, but not statistically significant (Table 1).

The prevalence of positive screening according to the 4-point depression item score (range 0–3.3) was higher for scores ≥1.1 and somewhat lower for scores ≥2.2, but considerably more similar to the 2 reference depression questionnaires for scores ≥2.2. The prevalence of screening according to the yes/no depression item on the 60-symptom checklist was closer to the reference questionnaires. The highest agreement with the reference depression questionnaires was seen for either an answer of yes on the 60-symptom checklist or a score ≥2.2, which we have termed MDHAQ-Dep (Table 1).

**Analyses of demographic and MDHAQ psychological variables according to criteria for depression using PHQ-9 and HADS-D.** Patients with either RA or SpA with positive screening results for PHQ-9 ≥10 and HADS-D ≥8 were younger

**Table 1.** Patient characteristics by diagnosis group*

| Characteristics (n = 170) | RA (n = 102) | All SpA (n = 68) | PsA (n = 34) | Axial SpA (n = 34) | *P* PsA vs. AS | *P* RA vs. SpA |
|---|---|---|---|---|---|---|
| Demographic variables | | | | | | |
| Age, years | 58.8 ± 12.2 | 55.7 ± 12.2 | 56.6 ± 10.6 | 54.7 ± 13.7 | 0.523 | 0.104 |
| Female, no. (%) | 84 (82.4) | 32 (47.1) | 19 (55.9) | 13 (38.2) | 0.145 | <0.0001 |
| Education, years | 11.8 ± 4.3 | 11.4 ± 3.7 | 11.1 ± 4.3 | 11.6 ± 3.1 | 0.282 | 0.723 |
| Body mass index | 26.1 ± 4.4 | 27.7 ± 5.0 | 29.0 ± 4.6 | 26.4 ± 5.1 | 0.032 | 0.018 |
| MDHAQ variables | | | | | | |
| Physical function (0–10) | 2.4 ± 1.8 | 3.0 ± 2.1 | 2.9 ± 2.1 | 3.1 ± 2.0 | 0.717 | 0.083 |
| Pain VNS (0–10) | 4.5 ± 2.8 | 4.9 ± 3.0 | 5.1 ± 3.1 | 4.8 ± 2.9 | 0.539 | 0.395 |
| Patient global assessment VNS (0–10) | 4.6 ± 2.8 | 5.3 ± 2.9 | 5.4 ± 3.0 | 5.1 ± 2.9 | 0.787 | 0.126 |
| RAPID3 (0–30) | 11.6 ± 6.8 | 13.3 ± 7.3 | 13.7 ± 7.6 | 13.0 ± 7.1 | 0.672 | 0.132 |
| RAPID3 severity categories, no. (%) | | | | | 0.789 | 0.393 |
| High | 48 (47.1) | 41 (60.3) | 21 (61.8) | 20 (58.8) | – | – |
| Moderate | 28 (27.5) | 13 (19.1) | 6 (17.6) | 7 (20.6) | – | – |
| Low | 12 (11.8) | 6 (8.8) | 2 (5.9) | 4 (11.8) | – | – |
| Remission | 14 (13.7) | 8 (11.8) | 5 (14.7) | 3 (8.8) | – | – |
| Fatigue VNS (0–10) | 4.2 ± 2.9 | 4.5 ± 3.1 | 4.7 ± 3.3 | 4.3 ± 3.0 | 0.551 | 0.497 |
| MDHAQ psychological items | | | | | | |
| Depression (0–3.3) | 0.8 ± 1.0 | 1.1 ± 1.1 | 1.1 ± 1.0 | 1.1 ± 1.1 | 0.943 | 0.099 |
| Depression ≥1.1 on 0–3.3, no. (%) | 51 (50.0) | 42 (61.8) | 22 (64.7) | 20 (58.8) | 0.618 | 0.131 |
| Depression ≥2.2 on 0–3.3, no. (%) | 20 (19.6) | 19 (27.9) | 9 (26.5) | 10 (29.4) | 0.787 | 0.206 |
| Depression yes on 60-symptom checklist, no. (%) | 26 (25.7) | 24 (35.3) | 11 (32.4) | 13 (38.2) | 0.612 | 0.182 |
| Depression yes on 60-symptom checklist or depression ≥2.2 on 0–3.3, no. (%) | 33 (32.7) | 28 (41.2) | 15 (44.1) | 13 (38.2) | 0.622 | 0.259 |
| Reference depression scales | | | | | | |
| PHQ-9 | 6.8 ± 6.6 | 9.5 ± 7.2 | 8.6 ± 6.8 | 10.5 ± 7.6 | 0.410 | 0.012 |
| PHQ-9 depressed, no. (%) | 28 (27.5) | 30 (44.8) | 12 (35.3) | 18 (54.6) | 0.113 | 0.020 |
| HADS-D | 5.5 ± 4.9 | 6.8 ± 4.9 | 6.4 ± 4.5 | 7.2 ± 5.3 | 0.522 | 0.095 |
| HADS-D depressed, no. (%) | 33 (32.4) | 29 (42.6) | 13 (38.2) | 16 (47.1) | 0.462 | 0.172 |
| Other measures | | | | | | |
| ESR | 16.2 ± 12.7 | 16.1 ± 14.0 | 17.6 ± 12.6 | 14.5 ± 15.4 | 0.073 | 0.667 |
| CRP | 0.7 ± 1.2 | 0.8 ± 1.4 | 0.7 ± 1.2 | 1.0 ± 1.7 | 0.846 | 0.135 |
| Taking biologic DMARDs, no. (%) | 63 (66.3) | 49 (72.1) | 24 (70.6) | 25 (73.5) | 0.787 | 0.436 |
| Taking antidepressants, no. (%) | 17 (21.3) | 20 (31.3) | 9 (28.1) | 11 (34.4) | 0.590 | 0.172 |

* Values are the mean ± SD unless indicated otherwise. Fisher's exact test was used for categorical variables when at least 25% of the cells had expected counts <5; the chi-square test was used otherwise. Student's *t*-test was used for continuous variables when the normality assumption was satisfied; Wilcoxon's rank-sum test was used otherwise. CRP = C-reactive protein; DMARDs = disease-modifying antirheumatic drugs; ESR = erythrocyte sedimentation rate; HADS-D = Hospital Anxiety and Depression Scale depression domain; MDHAQ = Multidimensional Health Assessment Questionnaire; PHQ-9 = Patient Health Questionnaire 9; PsA = psoriatic arthritis; RA = rheumatoid arthritis; RAPID3 = Routine Assessment of Patient Index Data 3; SpA = axial spondyloarthritis; VNS = visual numeric scale.

and had fewer years of formal education compared to patients with negative screening results, although only the difference in age was statistically significant (Table 2 and Figure 1). Patients with RA with positive screening results were more likely to be female, while patients with SpA with positive or negative screening results were similar in sex distribution (Table 2). The 2 MDHAQ psychological depression items had scores that were significantly higher in patients who had positive screening for depression according to PHQ-9 or HADS-D ($P < 0.001$ for all) (Table 3); again the highest agreement with the reference depression questionnaires was seen for MDHAQ-Dep (Table 1).

All other scores on the MDHAQ, including physical function, pain, patient global assessment, fatigue, painful joint count, and the 60-symptom checklist were significantly higher in patients with positive screening results based on the 2 depression scales (Table 4). For example, the mean level of RAPID3 (range 0–30) was 17.8 in patients who had positive screening for depression and 9.5 in those with negative screening for depression (Table 4). The proportion of abnormal values of CRP level and ESR did not differ in patients who were positive or negative screening for depression according to the PHQ-9 or HADS-D.

The percentage of patients receiving antidepressant medications was 13.5–15.1% for patients who were negative for depression screening versus 44–45.5% for patients who were positive for depression screening (Table 2). Although these differences were statistically significant ($P < 0.001$ for all patients, both with RA and SpA), fewer than half of those with positive depression screening results were being treated with antidepressant medications,

**Table 2.** Demographic variables and other measures by depression status according to PHQ-9 and HADS-D scores*

| | All patients (n = 170) | | | RA (n = 102) | | | All SpA (n = 68) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Negative | Positive | *P* | Negative | Positive | *P* | Negative | Positive | *P* |
| PHQ-9 | 111 (65.7) | 58 (34.3) | | 74 (72.5) | 28 (27.5) | | 37 (55.2) | 30 (44.8) | |
| Demographic variables | | | | | | | | | |
| Age, years | 59.5 ± 12.0 | 54.1 ± 11.8 | 0.006 | 60.1 ± 12.0 | 55.5 ± 12.2 | 0.090 | 58.5 ± 11.9 | 52.9 ± 11.4 | 0.057 |
| Female, no. (%) | 75 (67.6) | 41 (70.7) | 0.678 | 57 (77.0) | 27 (96.4) | 0.021 | 18 (48.6) | 14 (46.7) | 0.872 |
| Education, years | 12.0 ± 4.3 | 10.8 ± 3.4 | 0.135 | 12.3 ± 4.5 | 10.4 ± 3.5 | 0.081 | 11.6 ± 4.1 | 11.2 ± 3.4 | 0.828 |
| Other measures | | | | | | | | | |
| Biologic DMARDs, no. (%) | 75 (71.4) | 36 (63.2) | 0.279 | 46 (67.6) | 17 (63.0) | 0.663 | 29 (78.4) | 19 (63.3) | 0.174 |
| Antidepressants, no. (%) | 14 (15.1) | 22 (44.0) | 0.0001 | 8 (13.6) | 9 (42.9) | 0.011 | 6 (17.6) | 13 (44.8) | 0.019 |
| ESR | 15.6 ± 12.5 | 17.4 ± 14.4 | 0.568 | 16.3 ± 13.6 | 15.8 ± 10.2 | 0.727 | 14.1 ± 10.0 | 19.0 ± 17.6 | 0.561 |
| CRP | 0.7 ± 1.2 | 0.8 ± 1.5 | 0.689 | 0.8 ± 1.3 | 0.5 ± 0.8 | 0.531 | 0.6 ± 0.9 | 1.1 ± 1.9 | 0.355 |
| HADS-D | 107 (62.9) | 63 (37.1) | | 68 (66.7) | 34 (33.3) | | 39 (57.4) | 29 (42.6) | |
| Demographic variables | | | | | | | | | |
| Age, years | 59.3 ± 12.1 | 54.6 ± 12.1 | 0.017 | 59.7 ± 12.1 | 56.9 ± 12.4 | 0.271 | 58.7 ± 12.1 | 51.7 ± 11.2 | 0.017 |
| Female, no. (%) | 72 (66.7) | 44 (71.0) | 0.562 | 55 (79.7) | 29 (87.9) | 0.311 | 17 (43.6) | 15 (51.7) | 0.506 |
| Education, years | 12.0 ± 4.3 | 10.9 ± 3.5 | 0.139 | 12.2 ± 4.6 | 10.7 ± 3.4 | 0.165 | 11.6 ± 3.9 | 11.1 ± 3.6 | 0.611 |
| Other measures | | | | | | | | | |
| Biologic DMARDs, no. (%) | 69 (68.3) | 43 (69.4) | 0.890 | 41 (66.1) | 22 (66.7) | 0.958 | 28 (71.8) | 21 (72.4) | 0.955 |
| Antidepressants, no. (%) | 12 (13.5) | 25 (45.5) | <0.0001 | 7 (13.0) | 10 (38.5) | 0.009 | 5 (14.3) | 15 (51.7) | 0.001 |
| ESR | 16.0 ± 12.8 | 16.4 ± 14.0 | 0.962 | 17.0 ± 13.7 | 14.6 ± 10.5 | 0.555 | 14.2 ± 10.8 | 18.6 ± 17.1 | 0.477 |
| CRP | 0.8 ± 1.2 | 0.7 ± 1.4 | 0.498 | 0.8 ± 1.3 | 0.5 ± 0.8 | 0.295 | 0.7 ± 1.1 | 1.0 ± 1.8 | 0.955 |

* Values are the mean ± SD unless indicated otherwise. Fisher's exact test was used for categorical variables when at least 25% of the cells had expected counts <5; the chi-square test was used otherwise. Student's *t*-test was used for continuous variables when the normality assumption was satisfied; Wilcoxon's rank-sum test was used otherwise. CRP = C-reactive protein; DMARDs = disease-modifying antirheumatic drugs; ESR = erythrocyte sedimentation rate; HADS-D = Hospital Anxiety and Depression Scale depression domain; PHQ-9 = Patient Health Questionnaire 9.

**Table 3.** MDHAQ psychological variables by depression status according to PHQ-9 and HADS-D scores*

| | All patients (n = 170) | | | RA (n = 102) | | | All SpA (n = 68) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Negative | Positive | *P* | Negative | Positive | *P* | Negative | Positive | *P* |
| PHQ-9 | 111 (65.7) | 58 (34.3) | | 74 (72.5) | 28 (27.5) | | 37 (55.2) | 30 (44.8) | |
| Depression (0–3.3), mean ± SD | 0.5 ± 0.7 | 1.8 ± 1.0 | <0.0001 | 0.5 ± 0.7 | 1.7 ± 1.1 | <0.0001 | 0.4 ± 0.7 | 1.9 ± 1.0 | <0.0001 |
| Depression yes on 60-symptom checklist | 11 (9.9) | 39 (68.4) | <0.0001 | 7 (9.5) | 19 (70.4) | <0.0001 | 4 (10.8) | 20 (66.7) | <0.0001 |
| Depression ≥1.1 on 0–3.3 | 41 (36.9) | 51 (87.9) | <0.0001 | 28 (37.8) | 23 (82.1) | <0.0001 | 13 (35.1) | 28 (93.3) | <0.0001 |
| Depression ≥2.2 on 0–3.3 | 6 (5.4) | 33 (56.9) | <0.0001 | 4 (5.4) | 16 (57.1) | <0.0001 | 2 (5.4) | 17 (56.7) | <0.0001 |
| Depression yes on 60-symptom checklist or depression ≥2.2 on 0–3.3 | 16 (14.4) | 45 (78.9) | <0.0001 | 11 (14.9) | 22 (81.5) | <0.0001 | 5 (13.5) | 23 (76.7) | <0.0001 |
| HADS-D | 107 (62.9) | 63 (37.1) | | 68 (66.7) | 34 (33.3) | | 39 (57.4) | 29 (42.6) | |
| Depression (0–3.3), mean ± SD | 0.5 ± 0.7 | 1.7 ± 1.0 | <0.0001 | 0.4 ± 0.6 | 1.7 ± 1.0 | <0.0001 | 0.6 ± 0.9 | 1.7 ± 1.0 | <0.0001 |
| Depression yes on 60-symptom checklist | 12 (11.1) | 38 (62.3) | <0.0001 | 6 (8.7) | 20 (62.5) | <0.0001 | 6 (15.4) | 18 (62.1) | <0.0001 |
| Depression ≥1.1 on 0–3.3 | 39 (36.4) | 54 (85.7) | <0.0001 | 22 (32.4) | 39 (85.3) | <0.0001 | 17 (43.6) | 25 (86.2) | 0.0003 |
| Depression ≥2.2 on 0–3.3 | 6 (5.6) | 33 (52.4) | <0.0001 | 3 (4.4) | 17 (50.0) | <0.0001 | 3 (7.7) | 16 (55.2) | <0.0001 |
| Depression yes on 60-symptom checklist or depression ≥2.2 on 0–3.3 | 15 (14.0) | 46 (74.2) | <0.0001 | 8 (11.8) | 25 (75.8) | <0.0001 | 7 (17.9) | 21 (72.4) | <0.0001 |

* Values are the number (%) unless indicated otherwise. Fisher's exact test was used for categorical variables when at least 25% of the cells had expected counts <5; the chi-square test was used otherwise. Student's *t*-test was used for continuous variables when the normality assumption was satisfied; Wilcoxon's rank-sum test was used otherwise. HADS-D = Hospital Anxiety and Depression Scale depression domain; MDHAQ = Multidimensional Health Assessment Questionnaire; PHQ-9 = Patient Health Questionnaire 9.

**Table 4.** Other MDHAQ variables by depression status according to PHQ-9 and HADS-D scores*

| | All patients (n = 170) | | | RA (n = 102) | | | All SpA (n = 68) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Negative | Positive | *P* | Negative | Positive | *P* | Negative | Positive | *P* |
| PHQ-9, no. (%) | 111 (65.7) | 58 (34.3) | | 74 (72.5) | 28 (27.5) | | 37 (55.2) | 30 (44.8) | |
| Physical function (0–10) | 1.9 ± 1.4 | 4.1 ± 1.9 | <0.0001 | 1.9 ± 1.5 | 3.7 ± 1.9 | <0.0001 | 1.8 ± 1.4 | 4.5 ± 1.9 | <0.0001 |
| Pain (0–10) | 3.6 ± 2.6 | 6.8 ± 2.1 | <0.0001 | 3.6 ± 2.6 | 6.9 ± 1.7 | <0.0001 | 3.6 ± 2.6 | 6.6 ± 2.5 | <0.0001 |
| Patient global assessment (0–10) | 3.8 ± 2.6 | 7.0 ± 2.2 | <0.0001 | 3.8 ± 2.6 | 7.0 ± 1.8 | <0.0001 | 4.0 ± 2.5 | 7.0 ± 2.5 | <0.0001 |
| RAPID3 (0–30) | 9.5 ± 6.2 | 17.8 ± 5.2 | <0.0001 | 9.3 ± 6.1 | 17.8 ± 4.3 | <0.0001 | 9.9 ± 6.4 | 17.7 ± 5.9 | <0.0001 |
| RAPID3 remission, no. (%) | 20 (18.0) | 2 (3.5) | 0.008 | 14 (18.9) | 0 | 0.013 | 6 (16.2) | 2 (6.7) | 0.281 |
| RAPID3 high severity, no. (%) | 40 (36.0) | 49 (84.5) | <0.0001 | 25 (33.8) | 23 (82.1) | <0.0001 | 15 (40.5) | 26 (88.7) | 0.0001 |
| Fatigue (0–10) | 3.0 ± 2.5 | 6.8 ± 2.2 | <0.0001 | 3.1 ± 2.4 | 7.0 ± 2.1 | <0.0001 | 2.9 ± 2.7 | 6.6 ± 2.4 | <0.0001 |
| RADAI (0–48) | 9.4 ± 9.2 | 19.5 ± 12.2 | <0.0001 | 9.2 ± 9.2 | 20.8 ± 11.3 | <0.0001 | 9.8 ± 9.5 | 18.3 ± 13.1 | 0.005 |
| 60-symptom checklist | 9.4 ± 7.4 | 22.0 ± 10.3 | <0.0001 | 9.0 ± 7.2 | 22.1 ± 10.1 | <0.0001 | 10.2 ± 7.9 | 21.9 ± 10.7 | <0.0001 |
| HADS-D, no. (%) | 107 (62.9) | 63 (37.1) | | 68 (66.7) | 34 (33.3) | | 39 (57.4) | 29 (42.6) | |
| Physical function (0–10) | 1.8 ± 1.4 | 4.1 ± 1.9 | <0.0001 | 1.6 ± 1.3 | 4.1 ± 1.6 | <0.0001 | 2.1 ± 1.5 | 4.2 ± 2.2 | <0.0001 |
| Pain (0–10) | 3.7± 2.7 | 6.2 ± 2.5 | <0.0001 | 3.5 ± 2.6 | 6.6 ± 2.0 | <0.0001 | 4.1 ± 2.8 | 6.0 ± 2.9 | 0.006 |
| Patient global assessment (0–10) | 3.8 ± 2.5 | 6.7 ± 2.5 | <0.0001 | 3.5 ± 2.4 | 7.0 ± 1.9 | <0.0001 | 4.4 ± 2.6 | 6.4 ± 3.0 | 0.005 |
| RAPID3 (0–30) | 9.6 ± 6.2 | 16.9 ± 5.9 | <0.0001 | 8.7 ± 5.7 | 17.7 ± 4.5 | <0.0001 | 11.1 ± 6.7 | 16.3 ± 7.1 | 0.003 |
| RAPID3 remission, no. (%) | 19 (17.8) | 3 (4.8) | 0.015 | 14 (20.6) | 0 | 0.004 | 5 (12.8) | 3 (10.3) | >0.999 |
| RAPID3 high severity, no. (%) | 40 (37.4) | 49 (77.8) | <0.0001 | 22 (32.4) | 26 (76.5) | <0.0001 | 18 (46.2) | 23 (79.3) | 0.006 |
| Fatigue (0–10) | 3.3 ± 2.6 | 6.1 ± 2.8 | <0.0001 | 3.1 ± 2.5 | 6.5 ± 2.2 | <0.0001 | 3.6 ± 2.7 | 5.7 ± 3.3 | 0.005 |
| RADAI (0–48) | 9.3 ± 8.9 | 18.8 ± 12.6 | <0.0001 | 8.8 ± 8.8 | 19.9 ± 11.6 | <0.0001 | 10.0 ± 9.0 | 18.0 ± 13.9 | 0.016 |
| 60-symptom checklist | 9.5 ± 7.1 | 20.7 ± 11.4 | <0.0001 | 9.2 ± 7.4 | 19.9 ± 10.9 | <0.0001 | 10.0 ± 6.6 | 22.3 ± 11.6 | <0.0001 |

* Values are the mean ± SD unless indicated otherwise. Fisher's exact test was used for categorical variables when at least 25% of the cells had expected counts <5; the chi-square test was used otherwise. Student's *t*-test was used for continuous variables when the normality assumption was satisfied; Wilcoxon's rank-sum test was used otherwise. HADS-D = Hospital Anxiety and Depression Scale depression domain; MDHAQ = Multidimensional Health Assessment Questionnaire; PHQ-9 = Patient Health Questionnaire 9; RA = rheumatoid arthritis; RADAI = Rheumatoid Arthritis Disease Activity Index; RAPID3 = Routine Assessment of Patient Index Data 3; SpA = spondyloarthritis.

**Table 5.** Percent agreement and kappa statistics for 4 MDHAQ-based criteria, PHQ-9, and HADS-D*

| | Depression item on 60-symptom checklist | Depression score 0 vs. 1.1–3.3† | Depression score 0–1.1 vs. 2.2–3.3† | MDHAQ-Dep | PHQ-9 |
|---|---|---|---|---|---|
| Agreement, % | | | | | |
| PHQ-9 | 82.7 | 71.6 | 81.7 | 83.3 | – |
| HADS-D | 79.3 | 72.4 | 79.4 | 81.7 | 82.2 |
| Kappa statistic (95% CI) | | | | | |
| PHQ-9 | 0.60 (0.47–0.73) | 0.45 (0.33–0.57) | 0.56 (0.43–0.69) | 0.63 (0.51–0.76) | – |
| HADS-D | 0.53 (0.40–0.67) | 0.46 (0.34–0.58) | 0.52 (0.38–0.65) | 0.60 (0.48–0.73) | 0.61 (0.49–0.74) |

* Depression item on 60-symptom checklist: no (negative) versus yes (positive); depression score (range 0–3.3): 0 (negative) versus 1.1–3.3 (positive); depression score (range 0–3.3): 0–1.1 (negative) versus 2.2–3.3 (positive); MDHAQ-Dep: no depression item and depression score 0–1.1 (negative) versus yes depression item or depression score ≥2.2 (positive); PHQ-9: <10 (negative) versus ≥10 (positive); HADS-D: <8 (negative) versus ≥8 (positive). 95% CI = 95% confidence interval; HADS-D = Hospital Anxiety and Depression Scale depression domain; MDHAQ = Multidimensional Health Assessment Questionnaire; MDHAQ-Dep = MDHAQ depression screening; PHQ-9 = Patient Health Questionnaire 9.
† Range 0–3.3.

although the screening results are not definitive for a diagnosis of depression.

**Comparison of PHQ-9, HADS-D, and 4 MDHAQ-based depression criteria according to percent agreement and kappa statistics.** Percent agreement for MDHAQ-Dep was 83.3% with PHQ-9 and 81.7% with HADS-D, similar to 82.2% for PHQ-9 with HADS-D, suggesting comparability to screen for depression (Table 5). Kappa statistics for the agreement between 6 screening criteria for depression were in the 0.50–0.63 range, indicating generally moderate agreement between all measures. Again, the kappa statistic for the agreement between PHQ-9 and HADS-D of 0.61 was similar to 0.63 for MDHAQ-Dep with PHQ-9 and 0.60 of MDHAQ-Dep with HADS-D (Table 5).

## DISCUSSION

We have documented that 4 MDHAQ-based criteria to screen for depression appear to give similar information to 2 reference standard full-page depression-screening questionnaires, PHQ-9 and HADS-D, in 170 patients with rheumatic inflammatory disease, RA or SpA. The highest level of agreement to the 2 reference depression questionnaires was for a criterion defined as positive for either a yes on the MDHAQ 60-symptom checklist or a score ≥2.2 on the 0–3.3 MDHAQ scale, the MDHAQ-Dep, which is recommended for clinical use. We emphasize that our study concerns screening for depression in routine clinical care and addresses neither the actual diagnosis, the prevalence, or the mechanisms of comorbid depression in patients with RA or SpA, which are subjects of excellent published reports (1,3–11,38).

At the same time, most routine care rheumatology visits do not include any formal or informal screening for depression, despite evidence of increased levels of depression, the severity of rheumatic status, and poorer responses to treatment associated with depression (1,3–11). Some types of formal screening for depression that involve minimum physician time would appear preferable to only possible informal subjective dialog between the patient and the health professional, which may be variable or unreliable or not occur at all in many instances, to screen for depression in busy clinical settings. Administering a full-page questionnaire such as PHQ-9 or HADS, in addition to a possible HAQ, BASDAI, WOMAC, MDHAQ, or other disease-specific questionnaires, is not feasible; we are unaware of any rheumatology setting in which that is a routine practice.

We also confirm reports that patients with depression have more severe clinical status in RA (4–6) and also in SpA (3,7,8), seen on the MDHAQ, according to the RAPID3 (21–23), which is informative to assess clinical status and change in status in all rheumatic diseases studied (19,32,33,39–42). The MDHAQ also includes the FAST3 to screen for fibromyalgia (27,28), a 60-symptom checklist (26) to recognize possible disease flares and/or adverse events to medications, the self-report RADAI painful joint count, and medical history information. Evidence that MDHAQ-Dep is effective to screen for depression similarly to PHQ-9 and HADS-D provides further possible applications of this tool, which requires only 5–10 minutes for patients to complete.

The observation of higher depression screening scores on MDHAQ, PHQ-9, and HADS-D, as well as higher scores on almost all other MDHAQ items in patients with SpA versus RA, is not widely recognized (43,44). Rheumatic diseases differ widely in pathophysiology and treatment from the perspective of health professionals but are associated with common similar problems from the perspective of patients, including functional disability, pain, fatigue, and comorbidities, including depression (19,42). Of course, individual patients vary considerably in clinical status; some patients with RA in our study had higher depression scores and more severe disease burden than patients with SpA.

Several limitations are seen in our study. First, the number of patients was relatively small, particularly in the SpA group; however, the similarity of results concerning depression in RA, PsA, and axial SpA to previously reported data (which allowed pooling of patients with axial SpA and PsA) suggests the generalizability of the results. Second, we did not seek to correlate self-report questionnaire findings with a clinical diagnosis assigned by a physician, although similar findings to literature observations and the observation that 40–50% of those identified with positive screening for depression took antidepressant medications suggest a

strong likelihood of physician diagnosis in many, perhaps most, patients. Third, recognition of whether antidepressant medications or their absence were appropriate was beyond the scope of the study. Fourth, possible benefits of recognition and/or treatment of depression on RA are not established.

We do suggest that MDHAQ-Dep can be used to screen for depression with results similar (but not identical, as is the case with any 2 measures to assess a clinical construct) to PHQ-9 and HADS-D, providing additional information to RAPID3 and RADAI concerning patient clinical status and to FAST3 to screen for fibromyalgia, and to recognize disease comorbidities, clinical flares, and medication adverse events on the symptom checklist. Possible benefits of treatment of depression as an adjunct to the overall management of patients who have inflammatory rheumatic diseases would appear of potential value even if there were no incremental improvement in clinical status measures for the rheumatic disease. Since the basis for disease flares and poor outcomes remains very incompletely understood, the possibility that treatment for depression might improve rheumatic disease outcomes would appear worthy of consideration for clinical trials and observational research.

## AUTHOR CONTRIBUTIONS

All authors were involved in drafting the article or revising it critically for important intellectual content, and all authors approved the final version to be submitted for publication. Dr. Pincus had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Study conception and design.** Morlà.
**Acquisition of data.** Morlà.
**Analysis and interpretation of data.** Morlà, Li, Castrejon, Luta, Pincus.

## ROLE OF THE STUDY SPONSOR

Medical History Services, LLC had no role in the study design, collection, or analysis of the data. Dr. Pincus, president of Medical History Services, LLC, made suggestions concerning interpretation of the data, writing of the manuscript, and a decision to submit the manuscript for publication, in collaboration with the other authors. Publication of this article was not contingent upon approval by Medical History Services, LLC.

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