

# Psychometric Properties and Feasibility of the M-3 Checklist: a Brief, Self-rated Screen for Depressive, Bipolar, Anxiety, and Posttraumatic Stress Disorders in Primary Care

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## ABSTRACT

**Background:** Mood and anxiety are the two most common psychiatric disorders seen in primary care, yet they remain under-detected and under-treated. Screening tools can improve identification, but available instruments are limited by the number of disorders assessed.

**Objective:** To assess the feasibility and diagnostic validity of the M-3 checklist, a new one-page, patient-rated, 27-item tool developed to screen for multiple psychiatric disorders in primary care.

**Design, Setting, and Participants:** A sample of 647 consecutive participants 18 years and older who were seeking primary care at an academic family medicine clinic between July 2007 and February 2008. A two-step scoring procedure was utilized to make screening more efficient.

**Main Outcome Measure(s):** Sensitivity and specificity of the M-3 for Major Depression; Bipolar Disorder; Anxiety Disorders; and PTSD. Using a split sample technique, analysis proceeded from determination of optimal screening thresholds to assessment of the psychometric properties of the self-report instrument using the determined thresholds and the Mini International Neuropsychiatric Interview as the diagnostic standard. Feasibility was assessed with patient and physician exit questionnaires.

**Results:** The depression module had a sensitivity of 84% and a specificity of 80%. The bipolar module had a sensitivity 88%, and a specificity of 70%. The anxiety module had a sensitivity of 82% and a specificity of 78%, while the PTSD module had a sensitivity of 88% and a specificity of 76%. As a screen for any disorder, sensitivity was 83% and specificity was 76%. The M-3 took patients less than 5 minutes to complete in the waiting room, and less than 1% reported not having time to complete it. 83% of clinicians reviewed the checklist in  $\leq 30$  seconds, and 80% thought it was helpful in reviewing subjects' emotional health.

**Conclusions:** The M-3 is a valid, efficient, and feasible tool for screening multiple common psychiatric illnesses, including bipolar disorder and PTSD, in primary care. Its diagnostic accuracy equals that of presently used single disorder screens but with the additional benefit of being combined into a one-page tool. The M-3 potentially can reduce missed psychiatric diagnoses and facilitate proper treatment of identified cases.

## INTRODUCTION

- Psychiatric illness is frequent in primary care, where mood and anxiety disorders are the most frequent psychiatric disorders encountered.<sup>1</sup>
- Primary care doctors provide the majority of health care visits and write the bulk of antidepressant and anti-anxiety prescriptions for those with mood and anxiety disorders in the United States.<sup>2,3</sup>
- Still, the under-recognition and inadequate treatment these disorders in primary care clinics remain a substantial concern.<sup>3,4</sup>
- Tools to improve the identification and management of these disorders in primary care are a key step towards addressing this problem.<sup>5,6</sup>
- The available tools are limited, narrowly and singularly focusing on identifying either depressive or anxiety disorders. They do not address the full spectrum of mood and anxiety disorders seen in primary care, such as bipolar illness and posttraumatic stress disorder.
- Our aim was to assess the feasibility and diagnostic validity of the M-3 checklist, a new one-page, patient-rated, 27-item tool developed to screen for multiple psychiatric disorders in primary care.

### Study Population/Patient Selection

- Eligibility criteria: patients at least 18 years old and English speaking who consecutively presented to the Family Medicine Clinic at the University of North Carolina between July 2007 and February 2008.
- To avoid sampling bias, consecutive patients of each clinician present were approached until the target quota for the day (3) was reached.

### Study Questionnaire

- The M-3 is a 23-item self-report symptom checklist that assesses the **past two weeks** for symptoms of Major Depressive Disorder, Generalized Anxiety Disorder, Panic Disorder, Social Anxiety Disorder, Post-Traumatic Stress Disorder, Obsessive Compulsive Disorder, and queries for a **lifetime history** of symptoms of Bipolar Spectrum Disorder.<sup>7</sup>
- In addition, it has four functional impairment questions that follow the symptom checklist.

### Reference Standard

- The Mini International Neuropsychiatric Interview (MINI), a reliable and valid reference diagnostic tool,<sup>8</sup> served as the reference standard.

### Study Procedure

- A study coordinator approached consecutive patients entering the clinic's waiting area.
- To avoid self selection of participants with mental health concerns, potential participants were invited to participate in a health survey that their clinician might use to help guide their management.
- Following the appointment, patients and physicians separately filled out a brief exit questionnaire.
- After visit completion, experienced diagnostic interviewers blinded to M-3 results administered a MINI, either in person following the clinic visit or by phone within 30 days. The interviewers assigned final diagnoses after the interview in consultation with a psychiatrist (B.N.G) blinded to M3 results.

### Statistical Analysis

- We devised a scoring method that used clinically relevant functional impairment as a first stage screen, with scoring of the remaining checklist symptoms completed only if a patient screened positive in the first stage.
- To determine cut-points for each diagnosis, we calculated the sensitivity and specificity of each score using the first 80% of the cohort. We then calculated the threshold identified by both the Youden Index<sup>9</sup> and the (0, 1) Method by Holmes.<sup>10</sup>
- We validated these thresholds with the remaining 20% of the cohort

## Sample Description

- 723 patients consented to participate, representing 54% of all patients invited to participate.
- The most common reasons for non-participation were lack of interest in filling out checklist or anticipated difficulty in arranging follow-up interview.
- Lack of available study personnel was the only reason eligible patients were not invited to participate.
- Of the 723 participants, 15 were missing the M-3, 59 did not complete the MINI, and 2 were missing both, leaving an analyzable set of 647.
- The mean number of days between M-3 and MINI for the full group was 9.
- Baseline demographics are below in Table 1.

**Table 1. Baseline Characteristics**

| Characteristic               | No Disorder (N=423)       | Anxiety (without depression) (N=59) | Depression/Expanded Depression (N=105) | Bipolar (N=60)         |
|------------------------------|---------------------------|-------------------------------------|--|------------------------|
| Mean age (SD) [range], years | 46.4<br>(16.6)<br>[18-92] | 41.2 (10.7)<br>[18-63]              | 45.0 (12.9)<br>[19-70]                 | 41.0 (13.8)<br>[21-72] |
| Women, %                     | 69.5                      | 66.1                                | 75.2                                   | 78.3                   |
| Race, %                      |                           |                                     |  |                        |
| White                        | 67.4                      | 76.3                                | 63.8                                   | 60.0                   |
| Black                        | 27.4                      | 18.6                                | 34.3                                   | 35.0                   |
| Other                        | 5.2                       | 5.1                                 | 1.9                                    | 5.0                    |
| Marital status*, %           |                           |                                     |  |                        |
| Married                      | 53.8                      | 46.0                                | 37.1                                   | 26.0                   |
| Single                       | 26.2                      | 30.0                                | 25.8                                   | 38.0                   |
| Divorced                     | 9.6                       | 12.0                                | 19.1                                   | 14.0                   |
| Separated                    | 1.4                       | 2.0                                 | 11.2                                   | 2.0                    |
| Widowed                      | 4.2                       | 2.0                                 | 3.4                                    | 4.0                    |
| Living with Partner          | 4.8                       | 8.0                                 | 3.4                                    | 16.0                   |
| Education*, %                |                           |                                     |  |                        |
| None                         | 2.9                       | 4.1                                 | 5.6                                    | 6.3                    |
| High school diploma/GED      | 30.6                      | 36.7                                | 28.3                                   | 54.2                   |
| Associate/Technical degree   | 13.5                      | 20.4                                | 20.2                                   | 6.3                    |
| College diploma              | 29.4                      | 26.5                                | 16.9                                   | 27.1                   |
| Graduate degree              | 23.6                      | 12.2                                | 9.0                                    | 6.3                    |
| Household's gross income*, % |                           |                                     |  |                        |
| \$14,999 or less             | 10.9                      | 14.3                                | 28.1                                   | 50.0                   |
| \$15,000-\$9,999             | 24.6                      | 26.5                                | 33.7                                   | 27.1                   |
| \$40,000-\$9,999             | 11.8                      | 20.4                                | 3.4                                    | 8.3                    |
| \$60,000 or more             | 40.4                      | 28.6                                | 16.9                                   | 4.2                    |
| Don't know/refused           | 12.3                      | 10.2                                | 18.0                                   | 10.4                   |

\*Employment status, marital status, education, and income were not collected on the first 99 patients. For these variables, percentages were calculated for patients with available data.

- Relative to the general clinic population, enrolled patients were similar in age, race/ethnicity, and general income level. However, enrolled patients were more likely to be female (71% vs. 60%,  $p < 0.0001$ ).

## Prevalence of Mental Illness

**Table 2. Prevalence of Disorders by MINI\* (n=647)**

| MINI Diagnosis                          | Frequency | Percent |
|---|-----------|---------|
| No Diagnosis                            | 423       | 65.4%   |
| Any Bipolar Disorder (lifetime)         | 60        | 9.3%    |
| Current depressive episode              | 37        | 5.7%    |
| Any Major Depressive Disorder (current) | 105       | 16.2%   |
| Major Depression alone                  | 27        | 4.2%    |
| Major Depression + Anxiety              | 78        | 12.0%   |
| Any Anxiety Disorder                    | 182       | 28.1%   |
| Anxiety Disorder alone                  | 59        | 9.1%    |
| Any PTSD                                | 41        | 6.3%    |

\* Frequencies will not add to 100% because patients can have more than 1 disorder

## Psychometrics of M-3, Specific Diagnoses

- For each specific diagnosis and for any psychiatric diagnosis, the results for the validation cohort were similar or better than those found in the original cohort.
- Consequently, we report results for the full cohort.

**Table 3: Results of Gateway Approach by Diagnosis (N=647)**

|                                  | Depression          | Anxiety             | PTSD                | Bipolar             |
|----------------------------------|---------------------|---------------------|---------------------|---------------------|
| M-3 sub-score cut off ( $\geq$ ) | 5                   | 3                   | 2                   | 2                   |
| Questions                        | 1-7                 | 8-19                | 13-16               | 20-23               |
| Sensitivity (95%CI)              | .84<br>(.77-.89)    | .82<br>(.75-.87)    | .88<br>(.74-.96)    | .88<br>(.77-.95)    |
| Specificity (95%CI)              | .80<br>(.77-.83)    | .78<br>(.74-.81)    | .76<br>(.73-.80)    | .70<br>(.66-.74)    |
| Positive LR (95%CI)              | 4.19<br>(3.47-5.06) | 3.65<br>(3.05-4.39) | 3.70<br>(3.08-4.44) | 2.94<br>(2.53-3.44) |
| Negative LR (95%CI)              | 0.20<br>(.14-.29)   | 0.23<br>(.17-.32)   | 0.16<br>(.07-.36)   | 0.17<br>(.08-.33)   |

LR = likelihood ratio

## Psychometrics of M-3, Any Psychiatric Diagnosis

**Table 4: M-3 Psychometrics for Any Diagnosis**

| Any M-3 Dx<br>Frequency<br>Percent | Any Diagnosis by MINI |              | Total        |
|------------------------------------|-----------------------|--------------|--------------|
|                                    | Yes                   | No           |              |
| Yes                                | 186<br>28.75          | 101<br>15.61 | 287<br>44.36 |
| No                                 | 38<br>5.87            | 322<br>49.77 | 360<br>55.64 |
| Total                              | 224<br>34.62          | 423<br>65.38 | 647<br>100   |

|             | Any Diagnosis    |
|-------------|------------------|
| Sensitivity | .83 (.77-.88)    |
| Specificity | .76 (.72-.80)    |
| Positive LR | 3.48 (2.90-4.16) |
| Negative LR | 0.22 (.167-0.30) |

LR = likelihood ratio

## Feasibility

### •Patient Perspective

- The M-3 took less than 5 minutes to fill out.
- Among patients who received a diagnosis by the MINI, 75% said that the M-3 helped them talk to their doctor about their mood or feelings.
- Approximately 50% of patients reported that they talked to their doctor about moods and feelings for 1 minute or longer.

### •Clinician Perspective

- 83% of clinicians read the checklist in  $\leq 30$  seconds
- No clinicians reported that the checklist was too complicated.
- 80% felt the M-3 was helpful in reviewing patients' emotional health.

## DISCUSSION

- The psychometrics of the M-3 compare favorably with available single disorder screening tools.

**Table 5: Comparison of Sensitivity/Specificity**

|             | PHQ-9 <sup>11</sup> | GAD-7 <sup>12</sup> | CAPS <sup>13</sup> | Mood Disorders Questionnaire <sup>14</sup> | M-3                                   |
|-------------|---------------------|---------------------|--------------------|--|---------------------------------------|
| Outcome     | Depression          | Anxiety             | PTSD               | Bipolar                                    | Depression, Anxiety, PTSD, or Bipolar |
| Sensitivity | .88                 | .77                 | .74                | .73  | .83                                   |
| Specificity | .88                 | .82                 | .84                | .90  | .76                                   |

- The clinic's depression prevalence is slightly higher than some primary care estimates in, but it is consistent with what is reported in low income primary care settings.
- The prevalence of anxiety and bipolar disorders reflect what is reported in primary care mental health literature.

## CONCLUSION

- The M-3 is a valid, efficient, and feasible tool for screening multiple common psychiatric illnesses in primary care.
- It can accurately identify both single psychiatric diagnoses (e.g., Major Depressive Disorder) and the presence of a psychiatric diagnosis, in general (e.g., either a mood or an anxiety disorder).
- Its accuracy is equivalent to existing single disorder screens with the benefit of being combined into a one page tool.
- It has the potential to reduce missed psychiatric diagnoses and assure proper treatment of those identified.
- Both patients and clinicians found it easy to use, quick, and helpful.
- Subsequent research will address ways to make M-3 self-rating and scoring quicker in primary care settings and to assess whether the tool can promote collaborative discussion of mental health issues and more evidence-based management of psychiatric illness.

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