The Mood-5 (M5): A New Scale for Detecting COVID-19 Psychological Burden in Post-acute and Long-term Care Residents

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Submitted to: JMIR Aging
on: December 07, 2020

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Abstract

Background: Older adults are at high risk for developing serious somatic and psychological symptoms from the 2019 novel coronavirus (COVID-19). Available instruments may not be sensitive to concerns about COVID-19 in post-acute and long-term care (PA/LTC) and have unknown utility for telehealth.

Objective: We investigated the psychometric properties of the Mood-5 Scale (M5) as a rapid self-assessment of COVID-19 psychological burden in PA/LTC residents.

Methods: Residents (N = 131, age ? 50) in 20 Maryland, USA PA/LTC settings were evaluated in-person or via telehealth (33%) during a four-week COVID-19 period (05/11/2020 – 06/05/2020). COVID psychological burden was rated by psychologists who independently reviewed clinical documentation. Psychometric analyses were performed on the M5 in relation to psychological tests, COVID-19 psychological burden, and diagnostic data collected during the evaluation.

Results: The M5 demonstrated acceptable internal consistency (???? = .77). M5 scores were not confounded by demographic variables or telehealth administration (ps > 0.08). Convergent validity for the M5 was established via positive associations with anxiety (r = 0.56, p < 0.001) and depressive (r = 0.49, p < 0.001) symptoms. A M5 cutoff of 3 demonstrated strong sensitivity (.92) and adequate specificity (.75) for identifying COVID-19 psychological distress in PA/LTC residents (AUC = .89, PPV = .79, NPV = .91).

Conclusions: The M5 is a reliable and valid mood self-assessment that can identify residents with significant psychological burden associated with COVID-19. It can be completed in less than one minute and is appropriate for in-person and virtual visits.

(JMIR Preprints 07/12/2020:26340)
DOI: https://doi.org/10.2196/preprints.26340

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The Mood-5 (M5): A New Scale for Detecting COVID-19 Psychological Burden in Post-acute and Long-term Care Residents

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Manuscript type: Measurement Articles, brief report

Special issue: Gerontology in a Time of Pandemic

Counts: 250 abstract words, 2998 main text words, 21 references, 3 tables, 1 figure, 1 supplementary table

Abstract

Background: Older adults are at high risk for developing serious somatic and psychological symptoms from the 2019 novel coronavirus (COVID-19). Available instruments may not be sensitive to concerns about COVID-19 in post-acute and long-term care (PA/LTC) and have unknown utility for telehealth. **Objective:** We investigated the psychometric properties of the Mood-5 Scale (M5) as a rapid self-assessment of COVID-19 psychological burden in PA/LTC residents. **Methods:** Residents (N = 131, age ≥ 50) in 20 Maryland, USA PA/LTC settings were evaluated in-person or via telehealth (33%) during a four-week COVID-19 period (05/11/2020 – 06/05/2020). COVID psychological burden was rated by psychologists who independently reviewed clinical documentation. Psychometric analyses were performed on the M5 in relation to psychological tests, COVID-19 psychological burden, and diagnostic data collected during the evaluation. **Results:** The M5 demonstrated acceptable internal consistency (α = .77). M5 scores were not confounded by demographic variables or telehealth administration (ps > 0.08). Convergent validity for the M5 was established via positive associations with anxiety (r = 0.56, p < 0.001) and depressive (r = 0.49, p < 0.001) symptoms. A M5 cutoff of 3 demonstrated strong sensitivity (.92) and adequate specificity (.75) for identifying COVID-19 psychological distress in PA/LTC residents (AUC = .89, PPV = .79, NPV = .91). **Conclusions:** The M5 is a reliable and valid mood self-assessment that can identify residents with significant psychological burden associated with COVID-19. It can be completed in less than one minute and is appropriate for in-person and virtual visits.

Keywords: Nursing Homes, Long-term Care, COVID-19, Depression, Stress & coping (anxiety & agitation)

Introduction

The base rates of depression and anxiety are high among post-acute and long-term care (PA/LTC) residents. Approximately one-third suffer from significant depressive symptoms,[1,2] while

an estimated 5-10% suffer from an anxiety disorder.[3,4] These numbers were found to be significantly higher in residents referred for neuro-cognitive evaluation; in a sample of post-acute and long-term care (PA/LTC) residents referred for evaluation of mood and/or cognitive symptoms, 55% met criteria for a major depressive episode, and 36.6% met criteria for generalized anxiety disorder.[5] While we found no studies investigating COVID-19 associated psychological burden in PA/LTC settings, there is evidence to suggest that the context of the COVID-19 pandemic is contributing to an increase in mental health concerns. In a community sample, the American Psychiatric Association found that 36% of Americans reported that COVID-19 is having a significant impact on their mental health, and 48% reported feeling anxious about potentially contracting the virus.[6] Given that the CDC warns that people over the age of 65, those with serious underlying medical conditions[7,8], and those living in residential care settings are at the greatest risk for developing severe illness from COVID-19, it is expected that these groups have high psychological burden, placing them at great risk for development or exacerbation of psychiatric symptoms.

To our knowledge, evidence supporting a rapid mood screening tool that can be used to capture psychological burden associated with COVID-19 is lacking. Rapid screening is especially critical in the context of COVID-19. Under normal circumstances healthcare providers are highly limited in the amount of time that they can spend on assessments, particularly for co-occurring medical problems.[9,10] Time is even more limited when duration and extent of face-to-face encounters is capped to prevent spread of infection, and competition for resources restricts duration of virtual visits. This all but rules out the use of multiple measures or instruments that take more than two minutes of providers' time to administer. The measures of depression and anxiety most commonly used in PA/LTC settings, the Patient Health Questionnaire (PHQ-9)[11] and the Generalized Anxiety Disorder 7-item Scale (GAD-7)[12], assess depression or anxiety but not both, and formal anxiety screening is not required in PA/LTC settings. The Geriatric Depression Scale – Short Form (GDS)[13] is a mood instrument developed specifically for older adults, but has limited psychometric properties

and double the items than the PHQ-9.[14]

We developed and validated the M5 to break down barriers to practical use in the context of COVID-19 by minimizing administration time, allowing for self-administration, and combining assessment of depression and anxiety. The scale is an adapted version of the Brief Anxiety and Depression Scale (BADS®), a screening tool that assesses both depressive and anxiety symptoms and is widely used by healthcare professionals in PA/LTC settings.[5] The M5 was designed so that it can be (a) self-administered by residents ranging from normal cognitive functioning to mild dementia, (b) completed in less than one minute, and (c) completed as part of an in-person visit or via telehealth, which is particularly relevant in the context of COVID-19. We hypothesize that the M5 will be able to rapidly identify COVID-19 associated psychological burden, as well as clinical anxiety and depression.

Methods

Participants and Procedures

Residents (N = 131, age ≥ 50) in 20 Maryland, USA PA/LTC settings were evaluated by a behavioral health interdisciplinary team (10 psychologists, 1 psychiatrist, and 10 nurse practitioners) in-person or via telehealth (33%) during a four-week COVID-19 period (05/11/2020 – 06/05/2020). Data was collected during a four-week period to obtain a "snapshot" of possible psychological burden during the pandemic, with the intention of sharing actionable information with providers who care for PA/LTC residents. The relatively small sample size reflects this effort to fast-track the research process to maximize impact in the context of COVID-19. Institutional approval was obtained from each setting, all residents or their responsible parties completed a consent agreement, and all residents were deidentified for analysis. M5 items were pulled from the standard evaluation procedures so residents experienced no additional burden through its administration. A battery of psychological tests, including the M5, the Brief Anxiety and Depression Scale **(**BADS®)[5]; and the Brief Cognitive Assessment Tool (BCAT®)[15], was administered as part of the usual evaluation. The

ICD-10[16] and Clinical Dementia Rating Scale[17] were used to assign psychiatric diagnoses and dementia stages, respectively. Residents were excluded from the study analyses if they had incomplete M5 data, moderate to severe dementia, or age < 50. Table 1 presents the sample characteristics (Table 1).

Measures

The Mood-5 Scale (M5)

The M5 was adapted from the Brief Anxiety and Depression Scale (BADS®). The BADS® was chosen because it has separate depression and anxiety factors, is used widely in PA/LTC settings, and has strong psychometric properties. Two items from each of the depression and anxiety factors were selected for inclusion in the M5. A fifth item was added that addresses somatic/cognitive features. A panel of experts (3 geriatric psychologists, 1 psychiatrist, and 2 PA/LTC medical directors) vetted the instrument before data collection.

For standardized administration, residents are instructed to: *"Think about how you have been feeling during the past month as you answer the following five questions. Please answer: 'no' = 0, 'somewhat' = 1, or 'yes' = 2."* The M5 items are as follows: (1) *"Have you lost interest in activities that you had found pleasurable?"*; (2) *"Do you worry about things more than usual?"*; (3) *"For at least two consecutive days, have you felt depressed, hopeless, or down?"*; (4) *"Are you feeling nervous, anxious, or "wound up" much of the time?"*; (5) *"Are you experiencing fatigue, headaches, stomach upset, or memory problems?"*. The Supplementary Material presents the M5 items and standardized scoring instructions.

COVID-19 Psychological Burden

The outcome binary variable "COVID-19 psychological burden" was based on a geriatric psychologist's independent review of the behavioral health providers' clinical documentation. In the medical record of PA/LTC residents, health care professionals were required to directly ask the patient if they were experiencing psychological symptoms *associated* with fear of contracting

COVID-19 and/or the social distancing precautions to reduce vial transmission. An affirmative score was assigned if the documentation supported that the resident was queried about COVID-19 psychological burden; and the resident made direct statements about experiencing increased anxiety or depression symptoms associated with COVID-19, or healthcare professionals observed increased anxiety or depression associated with COVID-19."

Validity Measures

The Brief Anxiety and Depression Scale (BADS®)[5] and Brief Cognitive Assessment Tool (BCAT®)[15] were selected to evaluate the convergent and discriminant validity of the M5, respectively. The BADS® is an 8-item mood questionnaire designed to identify anxiety and depression (range = 0 to 16) in older adults. The BCAT® is a 21-item multi-domain cognitive instrument (range = 0 to 21) that distinguishes between normal cognition, MCI, and dementia.[15,18]

Statistical plan

Analyses were performed in R version 3.6.1[19] using RStudio version 1.2.5019[20]. Descriptive statistics were used to report demographics, clinical characteristics, and study measures. Pearson correlations, independent-sample t-tests, and analysis of variance investigated the relationship between these variables and the M5. Cronbach's alpha estimated internal consistency. Receiver operator characteristic curve analyses examined the ability of the M5 to identify COVID-19 psychological burden. In spite of the compressed data collection period, the sample size was sufficient for preliminary reliability.[21,22] Residents with missing study measures were removed pairwise to maximize the use of available M5 data.

Results

Pre-analysis

Table 2 reports descriptive statistics for the M5 and validity measures. M5 scores were not associated with gender, race, marital status, education, or provider discipline (*p*s > .05). Residents in skilled nursing settings (*n* = 87, 66%) reported higher M5 scores than residents in assisted living

settings (diff = 1.73; 95% CI: 0.29, 3.18; p = 0.01). Younger age was associated with greater M5 scores (r = -0.19, p = 0.03). M5 scores did not differ as a function of telehealth (33%) or in-person evaluations (diff = 0.08; 95% CI: -0.97, 1.13; p = 0.88). (Table 2)

Psychometric analyses

The M5 demonstrated acceptable internal consistency (α = .77, 95% CI: 0.71, 0.83). The Supplementary Material also includes item-level statistics for the M5.

Convergent validity for the M5 was established via positive and moderate associations with anxiety (r = 0.56, p < 0.001) and depressive (r = 0.49, p < 0.001) symptoms on the BADS®. Discriminant validity was confirmed for the M5 by the negligible relationship with cognitive functioning on the BCAT® (r = 0.17, p = 0.15).

Residents with generalized anxiety disorder or anxiety disorder due to a known physiological condition reported statistically significantly higher M5 scores (n = 41, 31%) than the remaining residents without these anxiety diagnoses, [diff = 1.94; 95% CI: -0.92, 2.95; t(129) = 3.78; p < 0.001]. The effect size for this difference was medium (d = 0.71; 95% CI: 0.33, 1.09).

Residents with moderate or severe recurrent major depressive disorder (without psychotic symptoms) reported statistically significantly higher M5 scores (n = 22, 17%) than the remaining residents without these depression diagnoses [diff = 3.65; 95% CI: 2.49, 4.82; t(129) = 6.21; p < 0.001]. The effect size for this difference was large (d = 1.45; 95% CI: 0.96, 1.95).

COVID-19 psychological distress

An M5 cut score of 3 (i.e., scores of 3 or higher) maximized the product of sensitivity (0.92) and specificity (0.75) for detecting COVID-19 psychological distress in PA/LTC residents (positive predictive value = 0.79, negative predictive value = 0.91). Area under the curve for the 0.89 (95% CI: 0.83, 0.95) and 84% of residents were correctly classified (16 false positive, 5 false negative. Table 3 reports the properties for alternative M5 cut scores. Figure 1 visualizes the M5 receiver operative characteristic curve. (Table 3)

Discussion

Our findings support the reliability and validity of the M5 as a mood scale that can identify PA/LTC residents with COVID-19 psychological burden. The M5 is a reliable and valid mood scale that can be completed rapidly, is appropriate for in-person or virtual visits, and can be self-administered. It can be facilitated by a staff member or completed by a resident prior to or during a visit with a healthcare professional. Given its brevity, the M5 fits easily into an attending physician's assessment toolbox and can provide real-time information to guide management of psychiatric medications. This may help right-size psychotropic use, especially for PA/LTC settings in which behavioral health specialists are lacking. We recommend a cut score of 3 (scores of 3 or higher) to identify those residents who are more psychologically vulnerable and may benefit from a formal mood evaluation. We selected a M5 cutoff that emphasized sensitivity to identify these residents who would benefit from specific counseling to address concerns about COVID-19. Such concerns could be associated with contracting the virus, the experience of having it, reduced opportunities for meaningful engagement resulting from social distancing, and concerns about the health of loved ones.

Study strengths include: (1) our use of the ICD-10 and Clinical Dementia Rating scale for diagnoses, (2) determination of COVID-19 psychological burden by a geriatric psychologist's independent review, (3) feedback on the M5 from attending physicians and medical directors, and (4) selection of widely used validity measures (BCAT® and BADS®) developed specifically for PA/LTC settings. Due to the urgency to develop a scale that could be applied to PA/LTC residents during the pandemic, our sample size is relatively small. This is partly mitigated by inclusion of residents from multiple settings. Next steps should involve cross-validation, collecting additional data to investigate psychological burden over time as prevalence of confirmed COVID-19 cases decline, and investigating psychological burden and associated M5 scores from healthcare professionals and staff who care for PA/LTC residents. The primary focus of this paper was to establish a clinically relevant

cut score for the M5. Future studies should compare the psychometric properties of the M5 to separate measures of anxiety and depression commonly used in PA/LTC settings, such as the GAD-7 and PHQ-9.

The most immediate implication of this study is that widespread deployment of the M5 in PA/LTC settings can identify those residents with higher risk for psychological burden associated with COVID-19 and facilitate timely intervention. However, the M5 has potential utility beyond its ability to identify residents with high psychological burden associated with COVID-19. For nursing homes, incorporating the M5 into standard screening practices would redress a shortcoming in the current Minimum Data Set (MDS 3.0), which mandates a depression screen but does not include an instrument sensitive to anxiety symptoms. The M5 is sensitive to *both* depression and anxiety symptoms. Because mood symptoms may elevate risk for hospital readmission[23], the use of mood scales that are sensitive to both could help reduce rehospitalizations, thereby improving some quality measures. Finally, use of the M5 during post-acute care can provide a mood baseline that can be used to track mood symptoms post-discharge, improving care transitions.

Conflicts of Interest: The corresponding author (WEM) has ownership rights of the Mood-5 Scale (M5). RAM is partially employed by Mansbach Health Tools, LLC. The authors report no other conflicts of interest.

Funding Sources: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Acknowledgements: The authors thank the healthcare professionals of CounterPoint Health Services for their assistance with data collection.

Abbreviations:

Brief Anxiety and Depression Scale (BADS®)

Brief Cognitive Assessment Tool (BCAT®)

Mood-5 Scale (M5)

Generalized Anxiety Disorder 7-item Scale (GAD-7)

Geriatric Depression Scale – Short Form (GDS-SF)

Patient Health Questionnaire (PHQ-9)

Post-acute and long-term care (PA/LTC)

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Table 1

Select demographics and clinical characteristics (N = 131)

Variable	*Category*	*n*	*%*
Age	76.12 (*SD* = 11.05)		

Gender	Female	69	52.67
	Male	62	47.33
Race	White	110	83.97
	Black	14	10.69
	Other	4	3.05
	Missing	3	2.29
Marital	Single	23	17.56
	Married	14	10.69
	Widowed	52	39.69
	Separated	6	4.58
	Divorced	34	25.95
	Missing	2	1.53
Education	≤ 11	18	13.74
	12	55	41.98
	13-15	22	16.79
	16	17	12.98
	≥ 17	14	10.69
	Missing	5	3.82
Facility	Skilled nursing	87	66.41
	Assisted living	44	33.59
Cognitive level	No dementia	10	7.63
	MCI	67	51.15
	Mild dementia	54	41.12
Telehealth delivery		43	31.82
COVID-19 distress		67	51.15

Table 2

Descriptive statistics and correlation matrix of study measures

	Descriptive Statistics						*Correlation Matrix*		
Measure	*n*	*M*	*SD*	*Min*	*Ma x*	*Skew*	*Kurtosis*	*2*	*3*	*4*
1. M5	131	3.60	2.86	0	10	0.57	-0.59	0.17	0.49*	0.56*
2. BCAT	70	34.61	6.38	22	46	-0.05	-1.02	—	0.03	0.23
3. BADS AF	110	2.70	1.78	0	6	0.47	-0.75		—	0.52*
4. BADS DF	110	3.31	3.01	0	10	0.68	-0.59			—

Note. Mood-5 Scale (M5); Brief Cognitive Assessment Tool (BCAT®); Depression (DF) and Anxiety Factor (AF) of the Brief Anxiety and Depression Scale (BADS®). * $p < .05$

Table 3

Predictive utility of several M5 cut scores

Cut score	Sensitivity	Specificity	PPV	NPV
2	1.00 (.93, 1.00)	.56 (.43, .68)	.71 (.60, .79)	1.00 (.88, 1.00)
3	**.93 (.83, .97)**	**.75 (.62, .85)**	**.79(.69, .87)**	**.91 (.79, .96)**
4	.78 (.65, .87)	.84 (.73, .92)	.84 (.72, .92)	.78 (.66, .87)

Note. PPV (Positive Predictive Value); Negative Predictive Value (NPV). 95% confidence interval in parentheses. The Mood-5 Scale (M5) cut score with the optimal product of sensitivity, specificity, PPV, and NPV for identifying COVID-19 psychological distress is bolded. Area Under the Curve was 0.89 (95% CI: 0.83, 0.95) and 84% of participants were correctly classified (16 false positive, 5 false negative).

Figure 1. Receiver operating characteristic (ROC) and area under the curve (AUC) were calculated from sensitivity and 1- specificity values for the Mood-5 Scale (M5) for identifying COVID-19 psychological distress.

Supplementary Material

Supplementary Table 1

Item-level statistics for the M5

M5 item	*M*	*SD*	*Skew*	*Kurtosis*	*Alpha*	*Inter-item*	*Item-total*
1. Anhedonia	0.52	0.74	1.02	-0.45	0.76	0.43	0.65
2. Excessive worry	0.86	0.83	0.26	-1.51	0.73	0.40	0.74
3. Depressed mood	0.81	0.84	0.37	-1.50	0.70	0.36	0.79
4. Irritability/agitation	0.66	0.80	0.67	-1.13	0.69	0.36	0.79
5. Somatic symptoms	0.74	0.74	0.45	-1.08	0.76	0.44	0.63

Note. Mood-5 Scale (M5). Alpha = Cronbach's alpha if item deleted, inter-item = average inter-item correlation, item-total = correlation with total M5 score. Standardized scoring instructions: *"Think about how you have been feeling during the past month as you answer the following five questions. Please answer: 'no' = 0, 'somewhat' = 1, or 'yes' = 2."*

Supplementary Files

Figures

Receiver operating characteristic (ROC) and area under the curve (AUC) were calculated from sensitivity and 1- specificity values for the Mood-5 Scale (M5) for identifying COVID-19 psychological distress.