

# A Pilot Study Comparing Two Measures of Perceived Health Services Access Among Military Veterans With Musculoskeletal Injuries and Mental Health Conditions

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## ABSTRACT

### Introduction:

Service members endure a number of musculoskeletal injuries (MSIs) during service (e.g., ankle sprains and chronic back pain). Musculoskeletal injuries can reduce engagement in physical activity after military service and contribute to a sedentary lifestyle that diminishes physical health and elevates the risk for psychological distress including suicide-related behaviors. Yet, little is known about barriers and facilitators to accessing care in veterans with co-occurring MSI and mental health conditions. The purpose of this study was to pilot two brief measures of barriers and facilitators to rehabilitation and mental health services in military veterans with musculoskeletal and mental health conditions. Self-report tools vary in their response formats in ways that can impact usability, data quality, and completeness. We examine two response styles (i.e., checklist vs. thermometer) for two health services (mental health and rehabilitation) to determine usability, patterns in item endorsement, and veteran preference.

### Materials and Methods:

Barriers and facilitators informed by the Fortney Veterans Healthcare Access model were assessed by veterans ( $n = 31$ ) on the newly developed 22-item, paper-and-pencil scale with separate ratings for mental health and rehabilitation services. All participants completed scales with both response styles and the order of administration was randomized (i.e., either the checklist first or the thermometer-style response first). Data also included self-reported demographics, musculoskeletal and mental health diagnoses, health-related quality of life, physical activity levels, mental health symptoms, suicide risk, and coronavirus disease of 2019 pandemic-related stress.

### Results:

Veterans reported no differences in ease of use across response formats; however, 83.9% ( $n = 26$ ) preferred the checklist style, with only 3.22% ( $n = 1$ ) preferring the thermometer format. Checklist items also resulted in less missing data (i.e., range 0.00%-6.45%) than the thermometer-style option (i.e., range 6.45%-61.30%). On the checklist, total number of perceived barriers was low for mental health and rehabilitation services (i.e.,  $M = 1.58$  and  $M = 1.61$ , respectively). Distance to care and problems related to symptoms were the most frequently identified barriers for both services. Facilitators outnumbered barriers for mental and rehabilitation services, and nearness of the clinic/hospital was the top-rated facilitator for both. On the thermometer, the perceived strength of each mental health ( $M = 39.37$ ) and rehabilitation ( $M = 39.81$ ) service barrier was moderate (0-100 scale), while the average perceived strength of each mental health ( $M = 61.66$ ) and rehabilitation service ( $M = 61.84$ ) facilitator was higher. Associations between barrier and facilitator scores with mental and physical health indicators were small with exceptions. For instance, suicide attempt likelihood was positively correlated with rehabilitation services barriers; mental health burden was positively associated with both barriers and facilitators.

### Conclusions:

Results of this pilot comparing two measurement approaches identified actionable next steps. Brief barriers and facilitators checklists were viable for veteran ratings across type of health. The thermometer-based tool captured the perceived strength of barriers and facilitators but yielded problematic rates of missing data in its current form and was not preferred by veterans.

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Military service members and veterans experience escalated prevalence of musculoskeletal injury (MSI) and mental health conditions.<sup>1</sup> More than one in four veterans returned from service in Operation Enduring Freedom with MSIs.<sup>2</sup> Despite physical therapy, long-term negative impacts of MSI include

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increased pain and psychological distress,<sup>3</sup> both of which can elevate the risk for suicide-related behaviors in veterans.<sup>4</sup> Veterans with mental health diagnoses are more likely to use Department of Veterans Affairs (VA) care<sup>5</sup> than those without a diagnosis, and mental health diagnoses also increase rates of non-mental-health service use.<sup>6</sup>

Effective rehabilitation and mental health services for military veterans are available; yet, barriers to accessing treatment remain prevalent. Stigma, cost, lack of knowledge about where to go for services, and logistical limitations (e.g., transportation particularly in rural areas) dampen service use among military veterans.<sup>7-9</sup> Fortunately, facilitators can counterbalance barriers, including lower cost, short waiting times, enhanced outreach, perceived competence of providers, as well as urgency due to higher symptom severity.<sup>10,11</sup> Some setting-specific work has been initiated (e.g., cardiac rehabilitation),<sup>12</sup> but few studies examine the impact of co-occurring physical and mental health conditions on treatment engagement.<sup>6</sup> Increasing health services capacity to address co-occurring MSI and mental health conditions may help mitigate elevated suicide risk.<sup>13</sup>

How veterans utilize care, navigate service barriers, and experience pre-existing health conditions are shifting as a result of the coronavirus disease of 2019 (COVID-19) pandemic. For example, the VA pushed a rapid expansion of tele-mental health services that resulted in a more than 550% increase in video mental health appointments within weeks of the World Health Organization's 2020 declaration of the pandemic.<sup>14</sup> Another study examined outpatient service use more broadly for evidence of inequities by demographic group; their results ( $n = 5,400,878$  veterans) indicated that older, rural, and homeless veterans were less likely to access virtual care than their younger (i.e., 18-43 years), urban, and housed peers.<sup>15</sup> Beyond changes to the healthcare system (e.g., suspension of non-urgent care), the impact of pandemic-related stress (e.g., financial, family care burdens, and grief/loss) on pre-existing mental health burdens has raised concern about exacerbations and poor outcomes (e.g., psychological distress and new-onset suicidal ideation) for veterans. Consideration of these factors is necessary as empirical and clinical data accumulate to inform care decisions, advance treatment access, and determine the evaluation of care quality and related procedures in the months and years to come.

Best practices for quantifying barriers and facilitators to care are developing but not yet defined. For example, Fortney and colleagues<sup>16</sup> model of Veterans Healthcare Access for the 21st Century outlines dimensions (e.g., geographic), determinants (e.g., provider), and characteristics (e.g., satisfaction) impacting access. Several researchers have generated lists of barriers to care<sup>17,18</sup> in veteran samples identifying themes such as concern about what others think, difficulty navigating or low confidence in the VA system, and worry about privacy. For example, Bauer and colleagues<sup>19</sup> created a set of 29 barriers to care from a veteran sample seeking pharmacy, primary care, or mental health care services.

Furthermore, the VA initiated a Veterans Access Research Consortium in 2020 to nurture and advance innovation in this priority area.<sup>20</sup> These and similar efforts<sup>21</sup> offer a valuable collective start to design more efficient, theory-grounded assessments of barriers and facilitators that can be used across veteran health services contexts.

## THE PRESENT STUDY

We developed and pilot tested two brief measurement tools to assess barriers and facilitators to mental health and rehabilitation services in veterans with co-occurring mental health and musculoskeletal conditions. Informed by the Fortney model<sup>16</sup> and Bauer's list of barriers,<sup>19</sup> we developed two different response formats to determine the number and perceived magnitude of barriers and facilitators. Administration formats impact data quality (e.g., missing data) and can contribute to incorrect conclusions in health services research. Dichotomous checklists (yes/no, absent/present) are often deployed as screening tools, while thermometer-style measures—nearly ubiquitous in healthcare—are easy for patients to understand<sup>22</sup> and capture intensity or severity.<sup>23</sup> Therefore the purpose of this randomized pilot is to examine the relative strengths and limitations of each measurement approach. Given the potential variation in perceived and actual access to different types of care, we also examine whether veterans will rate mental health and rehabilitation-type services differently.<sup>13,24</sup> Specifically, this pilot addresses two specific aims (SAs):

- SA1: Determine the strengths and limitations of a checklist-style format vs. a thermometer-style format for assessing perceived barriers and facilitators to care for veterans (1) rehabilitation services use and (2) mental health services use. Specifically, we examine veteran-rated ease of use and preference along with rates of missing data, patterns of item endorsement, and administration order effects.<sup>25</sup> Finally, we explore responses to the COVID-19 pandemic as a potential exacerbating factor.
- SA2: Determine if physical and mental health conditions are associated with perceived barriers and facilitators to care? Specifically, physical health is assessed using history of MSI-related diagnoses, pain and pain interference, perceived overall general health, and role limitations due to musculoskeletal conditions. Mental health is assessed using history of mental health diagnoses, related role limitations, and symptoms of depression, anxiety, general distress, and suicidality.

## METHOD

### Participants

A total of 31 veterans enrolled in the pilot study (see Table I) between September 2020 and January 2021. Participants were middle-aged, primarily Black/African American or White, and living in metropolitan or micropolitan areas.

**TABLE I.** Demographic Characteristics of the Study Sample

	Variable	M (SD) or n (%)
Experimental condition	Thermometer first	16 (51.61)
	Checklist first	15 (48.39)
Primary mental health diagnosis	Post-traumatic stress disorder	10 (32.25)
	Depressive disorder	9 (29.03)
	Anxiety or panic disorder	4 (12.90)
	Bipolar disorder	3 (9.68)
	Other	4 (12.90)
	Missing	1 (3.22)
Primary musculoskeletal injury diagnosis	Back pain–related condition (e.g., chronic lower back)	6 (19.35)
	Arthritis/osteoarthritis	3 (9.68)
	Lower extremity pain–related condition (e.g., ankle joint)	3 (9.68)
	Gout	2 (6.45)
	Hammer toe	2 (6.45)
	Arthralgia	2 (6.45)
	Other pain-related (e.g., shoulder)	6 (19.35)
	Other	4 (12.90)
	Missing	3 (9.68)
	Race	Black
White		12 (38.71)
Native American/Alaskan Native		1 (3.22)
Other		2 (6.45)
Employment status	Retired	12 (38.71)
	Unemployed	10 (32.25)
	Full-time	7 (22.58)
	Prefer not to say	1 (3.22)
	Missing	1 (3.22)
Education	8th grade or less	1 (3.22)
	Higher school or general education diploma	7 (22.58)
	Trade or vocational school	3 (9.68)
	Some college	7 (22.58)
	Associate’s degree	2 (6.45)
	Bachelor’s degree	10 (32.25)
Annual household income (U.S. dollars)	Graduate degree	1 (3.22)
	Less than 25k	11 (35.48)
	25-50k	14 (45.16)
	50-100k	2 (6.45)
	100-200k	1 (3.22)
Rural–urban commuting area code	200k+	3 (9.68)
	Metropolitan area core	19 (61.29)
	Metropolitan area high commuting	5 (16.13)
	Metropolitan area core	1 (3.22)
	Metropolitan low commuting	2 (6.45)
	Small town core	1 (3.22)
Age (years)	Rural	3 (9.68)
		54.52 (12.69)

n = 31.

Abbreviations: M = Mean; SD = standard deviation; SF-36 = 36-Item Short Form Survey.

Employment status varied, with an annual household income of less than or equal to \$50,000/year on average. Two-thirds completed some college or another degree. Mental health history was characterized primarily by anxiety, mood, and post-traumatic stress. MSI history included primarily pain-related and joint-related conditions. Randomization resulted in approximately equal experimental conditions.

**Procedure**

This pilot study was conducted using paper and pencil measures with participants randomized to receive either (1) the thermometer-style measure first or (2) the checklist-style measure first. Well-being measures (e.g., mental health) followed barriers/facilitators instruments in both conditions. Veterans were referred to the study team by a clinical provider

( $n = 98$ ) and screened for eligibility (i.e., presence of MSI and mental health diagnoses) using electronic health records and telephone screening. A Health Insurance Portability and Accountability Act (HIPAA) waiver was obtained for screening/recruitment. Veterans with active suicidal/homicidal ideation or experiencing psychosis were excluded. Eligible participants were randomized to scale administration order in batches until target enrollment ( $n = 30$ ) was met through mailed or in-person consents. Sixty-seven survey packets were distributed: 31 (46%) completed, 33 (49%) were not returned, and 3 (4%) declined, yielding an overall response rate of 46.26%. Procedures were approved by the Tuscaloosa VA Institutional Review Board, and all participants received a \$25 incentive in the form of either a VA “canteen book” (i.e., voucher to a campus store) or direct deposit to their bank account.

## Measures

### Barriers and facilitators to care

Ten barriers and 12 facilitators of care were included in the pilot measures. Selections were made to prioritize brevity, frequency in available literature, and inclusion of all Veterans Healthcare Access model domains.<sup>8,10,16,19</sup> An additional item for indicating “other” barriers or facilitators was also included. The pilot assessment had four parts: (1) barriers to mental health services, (2) facilitators of mental health services, (3) barriers to rehabilitation services, and (4) facilitators of rehabilitation services. The assessment was administered with two different response formats: (1) checklist-style and (2) thermometer-style, resulting in a total of eight item sets completed by all veterans (see Online Supplement). The checklist instructions read: “please check the box next to items that make it harder/easier for you to access” either mental health or rehabilitation services. The thermometer instructions were as follows: “please rate each of the following items on how hard/easy they make it for you to access” mental health or rehabilitation services.

### Veteran perceptions of usability and survey format preference

Following the barriers and facilitators questionnaires, participants responded to two questions: (1) “which method of reporting barriers and facilitators was easiest?” and (2) “which method of reporting barriers and facilitators do you prefer?”. Response options for both questions were: “checklist,” “thermometer,” or “no difference.”

### Demographic and medical history

Demographic and medical history information (e.g., age, race, income, and education) was collected via self-report or extracted from the electronic health record (e.g., sex assigned at birth, self-identified gender identity, primary mental health diagnosis, and primary MSI diagnosis; see Table I). Rurality was determined by zip code based on the VA Office of

Rural Health’s definitions of rural using rural–urban commuting area (RUCA) codes,<sup>26</sup> which account for population density and proximity to urbanized areas.

### Mental health

Three self-report measures assessed symptoms of mental health: Patient Health Questionnaire-9 (PHQ-9),<sup>27</sup> Generalized Anxiety Disorder-7 (GAD-7) Scale,<sup>28</sup> and the Suicidal Behaviors Questionnaire-Revised (SBQ-R).<sup>29</sup> The PHQ-9 is a nine-item measure of depressive symptoms yielding a summed total score.<sup>27</sup> The GAD-7 is a seven-item assessment of generalized anxiety symptoms, resulting in a summed score.<sup>28</sup> Internal consistency was acceptable for both the PHQ-9 ( $\alpha = 0.92$ ) and GAD-7 ( $\alpha = 0.92$ ). The SBQ-R is a four-item suicide risk screener with each item assessing an aspect of suicide-related behavior (rated on varying scales). Items can be used separately or totaled. Our analyses focused on two items: (1) “How often have you thought about killing yourself in the last year,” with responses from 1 (“never”) to 5 (“very often—5 or more times”) and (2) “I am likely to commit suicide one day,” with responses from 0 (“never”) to 6 (“very likely”).

### Physical health and health-related quality of life

Four instruments assessed physical health and well-being. The 36-Item Short Form Health Survey<sup>30</sup> is a quality-of-life measure divided into eight domains: physical functioning ( $\alpha = 0.92$ ), bodily pain ( $\alpha = 0.84$ ), role limitations due to physical health ( $\alpha = 0.58$ ), role limitations due to emotional health ( $\alpha = 0.77$ ), emotional well-being ( $\alpha = 0.68$ ), social functioning ( $\alpha = 0.77$ ), energy/fatigue ( $\alpha = 0.59$ ), and general health perceptions ( $\alpha = 0.48$ ). All items are scored from 0 to 100, with higher scores representing more favorable health. The Disablement in Physically Active Scale<sup>31</sup> is a 16-item tool of self-perceived physical and mental health in physically active individuals often used in MSI research. Items are rated on a Likert scale (0 = “no problem” and 4 = “severe problem”), and item means are calculated for each subscale. Higher scores indicate greater disablement. Internal consistency values were acceptable for physical ( $\alpha = 0.90$ ) and mental ( $\alpha = 0.85$ ) disablement. The Defense and Veterans Pain Rating Scale<sup>32</sup> is a pain assessment that utilizes a numerical rating scale with functional descriptors, color coding, and facial expressions matched to pain levels. Four additional questions assess pain interference with usual activity, sleep, mood, and impacts on stress. Items are used individually. The Tegner Activity Level Scale<sup>33</sup> is a graduated list of activities of daily living, recreation, and competitive sports designed to assess an individual’s current level of activity. A score of 0 represents sick leave because of injury/illness, whereas a score of 10 corresponds to participation in elite competitive sports.

## Response to the pandemic

A 10-item Coronavirus Response Scale was developed in part for the present study to detect changes in common health concerns (e.g., stress level, pain, and emotional distress) and styles of coping (e.g., alcohol/drug use, physical activity, and social interaction) in response to the pandemic and related restrictions on a 5-point response scale (1 = “a lot less” to 5 = “a lot more”). Items are used individually.

## Data Analysis

Veteran perceptions of usability and preference for response formats were evaluated based on percentages of responses to the two questions. Higher usability and preference for a particular response format would be indicated by a higher frequency of choosing that approach. Percent of missing data was also reported as a supplemental objective indicator of survey format usability; to the extent a survey response format yielded low rates of missing data, it was deemed more usable. Missing data were assessed differently by scale response type. For the thermometer, missing data were tabulated as the percentage of items lacking any response on each scale because instructions required participants to respond to all items with a 0-100 rating. For the checklist, missing data were indicated only when an entire checklist lacked data. We made this decision because individual unchecked items on responses where other items are checked suggest the participant did not perceive the item as a barrier/facilitator, not that they skipped or missed the question. Barrier and facilitator checklist endorsement were assessed as follows: (1) percentages of individual item-level endorsement (i.e., how many veterans checked the item on the checklist) and (2) mean barrier and facilitator total scores. Thermometer scores were assessed in two ways. First, we calculated the average perceived strength of barriers and facilitators (0-100 range of scores). We did so using only those items the person rated (mean score ÷ number of rated barriers). For example, if a veteran provided scores for only two barriers, their mean score was divided by two. We then report overall patterns of item endorsement (i.e., a non-zero score on the thermometer item) in order to provide a direct comparison of response rates to the checklist format (see [Table II](#)).

Independent samples *T*-tests with Cohen’s *d* effect sizes were used to compare the percentage (for the checklist) and the strength (for the thermometer) of barriers and facilitators. Pearson correlations were calculated between the set of eight mental health and rehabilitation services barriers and facilitators scores with indicators of mental health ([Table III](#)), physical health ([Table IV](#)), and reactions to the COVID-19 pandemic ([Table S1](#)). To be consistent with best practices in the literature,<sup>34,35</sup> we emphasize effect sizes (i.e., magnitude of associations) for all inferential analyses. Using established recommended cut-offs,<sup>36</sup> we highlight moderate or larger correlation values of  $r_s \geq \pm 0.30$  and moderate or larger Cohen’s *d* values of  $d \geq \pm 0.50$ .

## RESULTS

### SA1: Assessment of the Strengths and Limitations of a Checklist-Style Format vs. a Thermometer-Style Format for Assessing Service Access Barriers and Facilitators to Rehabilitation and Mental Health Services

#### Veteran usability and preference

Veterans reported (1) no differences in ease of use across response formats (i.e., 100%,  $n = 31$ , indicated that neither was easier to complete than the other) and (2) 83.9% ( $n = 26$ ) preferred the checklist, whereas only 3.22% ( $n = 1$ ) preferred the thermometer response format.

#### Missing data and variation in responding by response format

Analyses collapsed across both conditions revealed that checklist items resulted in a missing data range between 0.00% and 6.45%, whereas thermometer items yielded a missing data range of 6.45%-61.30%. The level of missing data was largely consistent across the experimental condition. In the thermometer first condition, missing data ranges were as follows: checklist items (0.00%-6.25%) and thermometer items (0.00%-50.00%). In the checklist first condition, missing data ranges were as follows: checklist items (0.00%-6.67%) and thermometer items (0.00%-73.33%). Overall, the checklist yielded considerably less missing data regardless of administration order.

#### Patterns of endorsement of barrier and facilitators

[Table II](#) contains item endorsement frequency for barriers and facilitators of mental health and rehabilitation services, respectively. In the checklist format, total perceived barriers to care were low for mental health ( $M = 1.58$ ,  $SD = 1.38$ ) and rehabilitation ( $M = 1.61$ ,  $SD = 1.38$ ) services (total score out of 11). The most frequently endorsed barriers for both mental health and rehabilitation services were distance to care and problems due to symptoms. In the checklist format, total perceived facilitators of care were moderate for mental health ( $M = 4.97$ ,  $SD = 3.57$ ) and rehabilitation ( $M = 4.97$ ,  $SD = 3.58$ ) services (total score out of 13). The most frequently endorsed facilitators of mental health services were having hospitals/clinics nearby, access to transportation, ability to contact providers, health insurance coverage, having a reason to get better, access to care on nights and weekends, access to effective treatments, and support from family and friends. The most endorsed rehabilitation services facilitators were having hospitals/clinics nearby, access to transportation, health insurance coverage, ability to contact providers when in need of help, access to effective treatments, having an important reason to get better, ability to afford out-of-pocket expenses, ability to get care on nights and weekends, having written forms and instructions, and support from family and friends.

**TABLE II.** Patterns of Item Endorsement for Barriers and Facilitators by Health Service Type and Response Format

	Mental health services		Rehabilitation services	
	Thermometer	Checklist	Thermometer	Checklist
<b>Barriers</b>				
1. Miles from home or distance to care	23 (74.19)	15 (48.39)	22 (70.97)	19 (61.29)
2. Overall travel problems	21 (67.74)	5 (16.13)	20 (64.52)	4 (12.90)
3. Contacting or leaving messages for providers	20 (64.52)	6 (19.35)	21 (67.74)	3 (9.68)
4. Overall work or home commitment problems	18 (58.06)	5 (16.13)	18 (58.06)	5 (16.13)
5. Financial problems	22 (70.96)	6 (19.35)	22 (70.96)	5 (16.13)
6. Problems due to symptoms	25 (80.64)	9 (29.03)	23 (74.19)	9 (29.03)
7. Lack of time with provider during appointments	15 (48.39)	2 (6.45)	14 (45.16)	2 (6.45)
8. Patient-provider cultural/value/religious differences	10 (32.26)	2 (6.45)	10 (32.26)	1 (3.22)
9. Treatment is ineffective	18 (58.06)	2 (6.45)	19 (61.29)	1 (3.22)
10. Health insurance coverage	7 (22.58)	1 (3.22)	8 (25.81)	2 (6.45)
11. Other	3 (9.68)	0 (0.00)	3 (9.68)	1 (3.22)
<b>Facilitators</b>				
1. Having hospitals, clinics, or community health centers nearby	24 (77.42)	19 (61.29)	25 (80.64)	19 (61.29)
2. Having convenient access to transportation	21 (67.74)	17 (54.84)	22 (70.97)	18 (58.06)
3. Being able to contact providers when you need help	28 (90.32)	17 (54.84)	28 (90.32)	14 (45.16)
4. Being able to afford out-of-pocket expenses such as copays and deductibles	21 (67.74)	11 (35.48)	22 (70.97)	13 (41.93)
5. Being able to get care on nights and weekends	20 (64.52)	13 (41.93)	20 (64.52)	12 (38.71)
6. Having access to childcare	11 (35.48)	2 (6.45)	14 (45.16)	2 (6.45)
7. Having written medical forms, instructions, and information in my language	18 (58.06)	10 (32.26)	19 (61.29)	12 (38.71)
8. Having healthcare providers who look like me, speak my language, and/or share my values/experiences	20 (64.52)	10 (32.26)	20 (64.52)	9 (29.03)
9. Effective treatment	22 (70.97)	13 (41.93)	23 (74.19)	14 (45.16)
10. Health insurance coverage	20 (64.52)	16 (51.61)	21 (67.74)	15 (48.39)
11. Having support from family or friends	11 (35.48)	12 (38.71)	22 (64.52)	12 (38.71)
12. Having an important reason to get better (e.g., spending time with grandkids)	13 (41.93)	14 (45.16)	21 (67.74)	14 (45.16)
13. Other	5 (16.13)	0 (0.00)	2 (6.45)	0 (0.00)

All values: *n* (%).

**TABLE III.** Barrier and Facilitator Checklist and Thermometer Correlations With Mental Health Indicators

	Number of MH diagnoses	12-month suicidal ideation	Suicide attempt likelihood	Depression	Anxiety
<b>Checklist ratings</b>					
1. MH barriers	0.24	0.16	0.28	-0.02	0.02
2. Rehab barriers	0.04	0.21	<b>0.33**</b>	-0.09	-0.06
3. MH facilitators	-0.05	-0.27	-0.16	0.30	0.28
4. Rehab facilitators	-0.10	-0.25	-0.13	0.26	0.21
<b>Thermometer ratings</b>					
1. MH barriers	-0.20	-0.10	0.05	<b>0.40*</b>	0.29
2. Rehab barriers	0.30	-0.06	0.09	<b>0.41*</b>	0.28
3. MH facilitators	-0.10	-0.23	-0.11	<b>0.32**</b>	<b>0.33**</b>
4. Rehab facilitators	-0.11	-0.27	-0.10	0.26	0.29

\**P* < .05.

\*\**P* < .10; bold font indicates interpreted as a potentially meaningful effect.

Abbreviations: MH = mental health services; Rehab = rehabilitation services.

The average perceived strength of each mental health (*M* = 39.37, *SD* = 25.40) and rehabilitation (*M* = 39.81, *SD* = 25.34) services barriers was moderate (0-100 scale). The most endorsed mental health barriers were problems

**TABLE IV.** Barrier and Facilitator Checklist and Thermometer Correlations With Physical Health Indicators

	MSI	PA	Pain	Act	Sleep	Mood	Str	PF	PHR	EPR	Ener	EWB	SF	PhSF	GH	PD	MD
<b>Checklist ratings</b>																	
1. MH barriers	-0.08	0.10	0.02	-0.02	-0.005	-0.13	0.04	0.05	0.04	-0.27	0.11	0.03	0.08	-0.11	0.03	0.06	0.04
2. Rehab barriers	-0.19	0.08	-0.04	-0.14	-0.14	-0.17	-0.01	0.18	0.08	-0.29	0.01	-0.04	0.04	-0.004	0.06	-0.09	-0.09
3. MH facilitators	0.13	0.25	<b>0.42*</b>	<b>0.44*</b>	<b>0.36*</b>	0.19	0.16	-0.24	<b>-0.35**</b>	0.09	0.04	0.09	-0.15	-0.27	<b>-0.34**</b>	<b>0.40*</b>	0.19
4. Rehab facilitators	0.19	0.22	<b>0.42*</b>	<b>0.46*</b>	<b>0.38*</b>	0.21	0.17	-0.23	<b>-0.33**</b>	-0.01	0.09	0.16	-0.15	<b>-0.31**</b>	<b>-0.34**</b>	<b>0.39*</b>	0.15
<b>Thermometer ratings</b>																	
1. MH barriers	<b>-0.38*</b>	0.04	0.18	0.21	0.25	0.08	0.09	0.08	-0.30	-0.30	-0.09	-0.02	-0.12	0.002	0.04	0.18	<b>0.33**</b>
2. Rehab barriers	<b>-0.42*</b>	-0.01	0.20	0.21	0.26	0.09	0.11	0.07	<b>-0.33**</b>	-0.32	-0.12	-0.02	-0.12	-0.001	-0.01	0.20	<b>0.35**</b>
3. MH facilitators	0.28	-0.08	0.26	<b>0.32**</b>	0.27	0.23	0.15	-0.22	-0.23	-0.24	-0.12	0.15	-0.19	-0.20	<b>-0.59**</b>	0.27	<b>0.31**</b>
4. Rehab facilitators	0.29	-0.12	0.21	<b>0.31**</b>	0.23	0.16	0.10	-0.17	-0.22	-0.20	-0.11	0.20	-0.11	-0.21	<b>-0.53**</b>	0.24	0.23

\* $P < .05$ .

\*\* $P < .10$ ; bold font indicates interpreted as potentially meaningful effect.

Abbreviations: Act = Pain interference with activity; EPR = emotional problem role limits; Ener = energy/fatigue; GH = general health; MD = mental health; MH = mental health services; Mood = pain interference with mood; MSI = number of musculoskeletal injury diagnoses; PA = physical activity level; PD = physical disability; PF = physical functioning; PHR = physical health role limits; PhSF = pain (SF-36); Rehab = rehabilitation services; Sleep = pain interference with sleep; Str = strain; PF = physical activity level; PHR = physical functioning; PhSF = physical health role limits; SF = social functioning; SF-36 subscale in which higher scores reflect better health.

due to symptoms, distance to care, financial problems, overall travel problems, and contacting providers. The most endorsed rehabilitation services barriers were problems due to symptoms, financial problems, distance to care, contacting providers, and overall travel problems (see Table II). The average perceived strength of each mental health ( $M = 61.66$ ,  $SD = 27.25$ ) and rehabilitation ( $M = 61.84$ ,  $SD = 26.33$ ) services facilitator was high. The most common mental health services facilitators were being able to contact providers, having health facilities nearby, effective treatments, access to transportation, and ability to afford out-of-pocket costs. The most common rehabilitation services facilitators were being able to contact providers, having health facilities nearby, effective treatment, access to transportation, ability to afford out-of-pocket costs, and having support (see Table II).

Veterans consistently endorsed greater frequency (on the checklist) and strength (on the thermometer) of facilitators over barriers. Participants endorsed a significantly higher percent of mental health services facilitator items ( $M = 38.21$ ,  $SD = 27.48$ , Cohen's  $d = 0.64$ ) compared to barrier items ( $M = 14.37$ ,  $SD = 12.59$ ),  $t(30) = 4.51$ ,  $P < .001$ . Participants endorsed a significantly higher percent of rehabilitation services facilitator items ( $M = 38.21$ ,  $SD = 27.55$ , Cohen's  $d = 0.63$ ) compared to barrier items ( $M = 14.66$ ,  $SD = 12.57$ ),  $t(30) = 4.47$ ,  $P < .001$ . Participants rated mental health services facilitators ( $M = 61.60$ ,  $SD = 27.25$ , Cohen's  $d = 0.59$ ) significantly more intensely compared to barriers ( $M = 39.37$ ,  $SD = 25.40$ ),  $t(28) = 3.32$ ,  $P = .003$ . Participants rated rehabilitation services facilitators ( $M = 61.84$ ,  $SD = 26.33$ , Cohen's  $d = 0.63$ ) significantly more intensely compared to barriers ( $M = 39.81$ ,  $SD = 25.34$ ),  $t(28) = 3.43$ ,  $P = .002$ .

### SA2: Associations Between Perceived Barriers and Facilitators to Care with Indicators of Physical and Mental Health

#### Associations with physical and mental health indicators

Mental health and rehabilitation services barriers and facilitators score correlations are presented for mental health (see Table III), physical health (see Table IV), and reactions to the COVID-19 pandemic (see Table S2). The majority of the associations between mental health and rehabilitation services barrier and facilitator scores with indicators of mental and physical health were negligible. Notable patterns are summarized. Depressive symptoms were positively associated with thermometer scores for mental health services barriers, rehabilitation services barriers, and mental health services facilitators (see Table III). Suicide attempt likelihood was positively correlated with the checklist score for rehabilitation services barriers. Finally, anxiety symptoms were positively associated with the thermometer score for mental health facilitators.

Mental health and rehabilitation services facilitators, measured with the checklist, were positively associated with the

following indicators of poorer health (see [Table IV](#)): pain, pain-related interference with activity, pain-related interference with sleep, physical health role limitations, general health, and physical disablement. The strength of mental health and rehabilitation services barriers, measured with the thermometer, was associated with a smaller number of MSI diagnoses and greater mental disablement. Further, the strength of rehabilitation services barriers was associated with worse physical health role limits. Also, using the thermometer format, the strength of mental health and rehabilitation services facilitators was associated with worse pain-related interference with activity and overall general health. The strength of mental health service facilitators was additionally linked to worse mental disablement.

Mental health and rehabilitation services barriers, measured with the checklist, were associated with decreasing alcohol/drug use and increasing pain during the pandemic (see [Table S1](#)). Mental health facilitators were associated with decreasing prescription medication use during the pandemic. On the thermometer format, the strength of barriers was associated with increasing pain during the pandemic. Finally, the strength of facilitators was associated with increasing emotional distress during the pandemic.

## **DISCUSSION**

Before we can address service access barriers and facilitators to increase engagement with effective treatments, tools that are both usable and yield high-quality data are needed.<sup>7,9,10</sup> The first goal of our pilot study was to explore the strengths and weaknesses of two approaches to measuring barriers and facilitators to mental health and rehabilitation services for military veterans to help determine which may be a better tool to use. Although no veteran indicated either assessment format (thermometer vs. checklist) was easier to use than the other, the majority preferred the checklist. The checklist format also resulted in less missing data—a pattern that held across health services types and for both barriers and facilitators. Item endorsement patterns revealed that perceived facilitators were endorsed at higher percentages than barriers for mental health and rehabilitation services ([Table II](#)). Similarly, the most prominent barriers and facilitators were largely the same across health services and response formats. However, both barriers and facilitators were endorsed at higher rates using the thermometer compared to the checklist format ([Table II](#)). Given that commonly endorsed factors were largely the same, a single checklist approach across settings would likely increase feasibility in practice settings (e.g., to facilitate discussion about solutions to barriers or ways to leverage facilitators).

Next, identifying how high rates of mental health and MSI conditions<sup>2,4</sup> affect the perception of access was the second aim of our pilot study. First, we observed a consistent pattern in which poorer mental health was associated with higher perceived strength of barriers and facilitators. This pattern is consistent with the Behavioral Model of Health Service

Use,<sup>37</sup> which explains that the experience of mental health symptoms (e.g., depression) creates a need for services, which yields more efforts to engage the system and more opportunity to experience increased barriers and facilitators. This effect may have been particularly pronounced given that the current sample was recruited from a VA medical center. Examining whether the finding holds for those not engaged with VA health services needs further study. Another actionable finding is that suicide attempt likelihood was associated with more barriers to rehabilitation services. Although directionality is not clear, reporting difficulty accessing needed rehabilitation services and higher suicide likelihood points to a largely under-explored avenue for veteran suicide prevention efforts.

Second, two notable patterns emerged concerning physical health. Participants with worse physical health reported more access-related facilitators. Like mental health, this pattern may suggest that those most in need of health care services are more practiced with navigating those services. The temporal and possible bidirectional nature of health symptoms and experience of access facilitators and barriers needs to be established. Two, we observed tenuous evidence that suggests the magnitude of barriers is associated with aspects of poorer health. For instance, the strength of rehabilitation services barriers was related to worse mental disablement and physical role limitations. This pattern of barrier strength—poorer physical health also held for increased pain during the pandemic such that those with more pain reported more severe barriers. It is likely that veterans experiencing worse physical health may also have other related challenges (e.g., financial/vocational and transportation access). Connections between life stressors and poorer health<sup>38</sup> are well established, as are reduced treatment access and use.<sup>39</sup>

A final avenue of further investigation is the interplay between service access barriers and facilitators with veteran reactions to the pandemic. The number of facilitators was associated with worse pain and decreased use of medication and alcohol or drugs. Efforts to enhance access to mental health and other services for veterans during the pandemic were widespread through rapid telehealth expansion.<sup>40,41</sup> Perhaps, easy-to-access services or social distancing restrictions enabled desirable changes during the pandemic for this small sample.

As a pilot study, several limitations are acknowledged. First, improved barrier and facilitator measurement is relevant to all veterans, but particularly those not engaged in the healthcare system. This sample included veterans already engaged with a VA medical center for treatment. This design decision was made for pragmatic recruitment reasons early in the tool-development process, yet item endorsement findings must be interpreted with this considerable caveat as it may not represent those who do not use VA care. Expanding the sample to veterans in the community and including additional demographic information known to impact access (e.g., gender identity and sexual orientation) could further validate this measurement approach.<sup>42,43</sup> Although central to our research

question, we note the high rates of missing data from the thermometer responses. Studying the paper surveys, veterans may have interpreted the list of barriers or facilitators in the thermometer as a checklist; we infer this from the observation that they did not provide “0” ratings on the thermometers but instead left items blank. Any tentative associations we report involving strengths of barriers or facilitators should be interpreted with caution because missing data can bias inferential and other findings. Procedurally, we did not include formal strategies to account for survey fatigue or participant completion of surveys in the desired order. The use of the postal mail procedure allowed participants to complete surveys at home and at their own pace, possibly creating a situation where questionnaires were completed out of the prescribed order. Future utilization of the barriers and facilitators instruments can include online administration and fuller survey randomization in order to control for survey fatigue and order effects. Analytically, the tabulation of missing data for the checklist format is imprecise because it is possible that a participant perceived no items as a barrier or facilitator, as opposed to missing the set of questions. Thus, missing data conclusions should be viewed with caution. Finally, the small sample size and modest response rate (typical for mailed surveys) restrict the power and generalizability of findings, respectively.

In conclusion, results of this study comparing two measurement formats for health services barriers and facilitators enable identification of important next steps in this line of inquiry. Building on prior efforts to articulate measurable lists of barriers or facilitators for veterans’ access to health services;<sup>17–19</sup> we find that brief paper-delivered measurement checklists are quite viable for veteran data collection. The Veterans Healthcare Access model<sup>16</sup> provided a useful framework on which to base such measurement. Although thermometer-based tools capture the perceived strength or impact of barriers and facilitators, the tool in its current form yielded problematic rates of missing data and was not preferred by veterans. Future research seeking to understand the magnitude of barriers or facilitators on access use could improve on our measurement approach by including a sample item or altering instructions. Opportunities to incorporate more patient-directed designs<sup>21</sup> could also be employed by engaging veteran groups to improve the thermometer or develop other innovative approaches to capture the intensity of barriers and facilitators on experiences accessing services.

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## SUPPLEMENTARY MATERIAL

Supplementary material is available at *Military Medicine* online.

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## CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to disclose.

## DATA AVAILABILITY

Data for this pilot study are not publicly available; however, deidentified data can be made available on request to the lead author, in accordance with Department of Veterans Affairs data use agreement policies.

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