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Coping with Medically Unexplained Physical Symptoms: the Role of Illness Beliefs and Behaviors

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Abstract

Background Medically unexplained syndromes (MUS) are both prevalent and disabling. While illness beliefs and behaviors are thought to maintain MUS-related disability, little is known about which specific behavioral responses to MUS are related to disability or the way in which beliefs and behaviors interact to impact functioning. The purpose of the present study was to examine the relationship between illness beliefs and disability among patients with MUS, and assess the extent to which behaviors mediate this relationship.

Methods The study examined data from the baseline assessment of a multi-site randomized controlled trial (RCT). Participants were 248 veterans with MUS. Illness beliefs, behavioral responses to illness, and disability were assessed through self-report questionnaire. Data were analyzed using mediation analysis.

Results Threat-related beliefs predicted greater disability through decreased activity and increased practical support seeking. Protective beliefs predicted less disability through reductions in all-or-nothing behavior and limiting behavior.

Conclusions These outcomes suggest that all-or-nothing behavior, limiting behavior, and practical support seeking are important in the perpetuation of disability among those with MUS. This has implications for improving MUS treatment by highlighting potential treatment targets.

Trial Registration ClinicalTrials.gov Identifier: NCT02161133

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Introduction

Persistent "medically unexplained" physical symptoms/ syndromes (MUS), such as fibromyalgia and chronic fatigue syndrome, are prevalent in primary care, disabling, and difficult to treat [1]. The significant disability coupled with the absence of a clear etiology causes clinical uncertainty about how to best manage these conditions. Clinical practice guidelines recommend cognitive behavioral therapy (CBT) which targets the illness beliefs and behaviors thought to maintain MUS [2]. While research finds support for CBT [3, 4], there is room for improvement. Effect sizes are generally small with relatively high dropout rates [3], and there is a lack of support for the long-term effects of CBT on MUS symptoms [5]. Furthermore, CBT does not outperform other standard treatments [6] and is even less effective for certain sub-populations, including patients exposed to trauma, those with chronic fatigue syndrome, and veterans with Gulf War Illness [7, 8].

One reason for the small effect sizes in these studies may be that it is unclear, and at times even controversial, *which* behaviors are related to health outcomes for patients with MUS. This was seen after the PACE trial for cognitive fatigue syndrome, which compared typical specialist medical care, CBT, a treatment with gradual increases in activity (graded exercise), and a treatment with pacing activity (adaptive pacing therapy, which assumes that one has limited energy that needs to be reserved). After the trial, patients, advocates, and other researchers argued to have the data reanalyzed, questioning the benefit of graded exercise and CBT [9]. Soon after this controversy, the US Center for Disease Control removed their recommendations for graded exercise and CBT as treatments for chronic fatigue syndrome. This controversy has highlighted the need to better understand the relationship between behavior and health outcomes among those with MUS, and has emphasized the importance of investigating daily functioning and disability among those with MUS in addition to assessing physical symptoms [9, 10].

Despite this, there have been few studies of the relationship of behavioral responses to MUS and disability to guide treatment development. Most studies have examined the relationship of general coping styles to health outcomes. And the few studies on MUS-specific behavioral responses have mostly examined how these behaviors contribute to the development of MUS and have not yet focused on examining the relationship between behavior and disability for long-standing MUS. In a series of innovative studies, Moss-Morris and colleagues developed a measure of behavioral predictors of MUS—the Behavioural Responses to Illness Questionnaire (BRIQ)—and showed that behavioral responses to MUS are causally related to the onset of MUS. In particular, all-or-nothing behaviors (i.e., a cycle of activity avoidance followed by extreme bouts of activity) in response to some initiating event like an infection or injury predict onset of MUS [11–13] while seeking practical support and limiting behaviors (i.e., reducing activity) can protect against the onset of MUS [11, 13].

There is some indication that these relationships may be different when examining disability among patients with long-standing MUS. For example, studies with measures of general coping and activity (as opposed to MUS-specific responses) have found that activity avoidance (similar to limiting behavior) is associated with greater disability among those with ongoing MUS, and there is mixed support for the role of practical support seeking on long-standing disability [14, 15]. Surprisingly, few studies have used the BRIQ to understand how behavioral responses to MUS are related to disability among those with long-standing symptoms and these studies have only used subscales, not the full measure [16, 17].

In addition to determining *which* behaviors are related to disability, we need to improve our understanding of *what* contributes to these behavioral responses. The Common Sense Model of Self-Regulation [18] posits that beliefs about one's

illness direct the behavioral response to that illness, which in turn leads to either positive or negative health outcomes [19]. This is a feedback model where beliefs, behaviors, and health continue to have an effect on each other in a cyclical fashion. For example, beliefs that an illness is severe and uncontrollable could lead to all-or-nothing behavior, which can, in turn, potentially lead to worsened disease state and related disability, which could lead to stronger beliefs in the severity of the illness and more all-or-nothing behavior, and so on. Illness beliefs can be divided into two categories, threat-related beliefs and protective beliefs. Threat-related beliefs are beliefs that the illness is endangering to the individual and include such beliefs as the illness will last a long time, has severe consequences, and results in negative emotional reactions. Protective illness beliefs about MUS are beliefs that are generally considered more adaptive and include beliefs such as one can control MUS, treatment can be beneficial, and that MUS is understandable. It is well known that illness beliefs are related to health outcomes, such as disability, for those with MUS, with threat-related beliefs leading to worse outcomes [20–22]; what is not clear is if these illness beliefs are related to outcomes because they influence behavioral responses, as suggested by the Common Sense Model.

McAndrew et al. conducted a meta-analysis of the relationship between illness beliefs, behaviors, and health outcomes to understand if these illness beliefs drive behaviors and if this influenced outcomes (specifically, perceived disease state, psychological distress, and quality of life) [23]. They found that threatening illness beliefs (e.g., MUS has severe consequences) were related to poorer behavioral responses to MUS (e.g., all-or-nothing behavior) which led to worse health outcomes. Protective illness beliefs (e.g., I can manage my MUS) increased positive behavioral responses (e.g., seeking social support) and decreased poorer behavioral responses, resulting in better health outcomes. This work suggested that illness beliefs do influence behaviors; however, this meta-analysis collapsed across results from patients near the onset of their MUS and patients with long-standing MUS, and did not specifically assess disability. This meta-analysis also collapsed across behavioral categories which limits information about which specific behaviors best predict health outcomes. This is particularly problematic because research on specific behaviors finds inconsistent relationships between specific behaviors and specific health outcomes [21, 24–29].

The aim of the present study is to address the gaps in our understanding of *which* behavioral responses are related to disability and *what* factors contribute to these behavioral responses (i.e., illness beliefs) among patients with long-standing MUS, namely, veterans with Gulf War Illness (GWI). GWI is characterized by a cluster of medically unexplained symptoms (e.g., chronic pain, chronic fatigue, gastrointestinal symptoms, respiratory symptoms, skin conditions, and neurological and cognitive symptoms) that emerged

among veterans after their service in the 1990–1991 Gulf War.[38, 39] While research is investigating the association between GWI symptoms and certain environmental exposures during military service, there is no consensus on a single causative agent, the physiological underpinnings of the illness, or an effective medical treatment [38, 39, 30]. Using data from veterans with GWI provides the opportunity to assess the relationship between illness beliefs, behaviors, and disability in a sub-population with particularly complex and long-standing MUS, which could inform the critical behaviors and beliefs for many other patients with MUS.

Our a priori hypotheses are that greater all-or-nothing and limiting behaviors will be associated with greater disability among those with long-standing MUS, whereas greater practical support seeking and emotional support seeking will be associated with less disability. Additionally, we hypothesize that illness beliefs will be associated with these behaviors; that is we are testing a mediational model where behaviors mediate the relationship between illness beliefs and health outcomes. Specifically, greater all-or-nothing and avoidance behaviors will mediate the relationship between greater threat-related illness beliefs and worse disability, whereas greater practical support seeking and emotional support seeking would mediate the relationship between greater protective illness beliefs and less disability.

Method

Participants and Procedure

The current cross-sectional study examined data from the baseline assessment of a multi-site randomized controlled trial (RCT) comparing health education and problem-solving treatment among veterans with GWI. Participants were recruited nationally through letters and flyers as well as various outreach events, and monetary compensation was provided for participation. Inclusion criteria included the following: deployment to Operation Desert Shield/Storm, daily functioning half a standard deviation below the mean as measured by the World Health Organization Disability Schedule (WHODAS 2.0) [31], and diagnosis of GWI as measured by participants' self-report on the Kansas symptom questionnaire. The Kansas case definition requires that veterans endorse moderately severe symptoms in at least 3 out of 6 symptom clusters (fatigue/ sleep, pain, neurologic/cognitive/mood, gastrointestinal, respiratory, and skin) over at least the past 6 months [32]. The sample included 248 veterans with GWI aged 42–79 years (M_{age} = 52.86 years, SD_{age} = 7.36 years; 218 males, 30 females). After providing informed consent, participants were provided a questionnaire packet consisting of demographic questions and measures of illness beliefs, behavioral responses to illness, and disability. All participants provided

consent to be part of this study and to have the data published. The study was reviewed by the Veterans Affairs New Jersey Healthcare System Institutional Review Board, Canandaigua VA Medical Center Institutional Review Board, and Edith Nourse Rogers Memorial VA Hospital Institutional Review Board (IRB Approval # 01484). See Table 1 for summary of descriptive statistics for all study variables.

Measures

Illness Beliefs Illness beliefs were assessed with the Illness Perception Questionnaire-Revised (IPQ-R) [33]. The IPQ-R was designed to assess an individual's perceptions about their illness consistent with Leventhal's Commonsense Model of Self-Regulation. The questions were adapted to be specific to GWI (e.g., "My GWI has major consequences on my life"). The following categories of illness beliefs were assessed: causal beliefs, timeline acute/chronic, consequences, personal control, treatment control, illness coherence, and emotional representations. Responses to all items were provided on a 5-point scale from 0 (strongly disagree) to 4 (strongly agree). Higher scores on the timeline, consequences, and emotional representations dimensions represent strongly held beliefs about the chronicity of GWI, the negative consequences of GWI, and the negative emotional effects of GWI. Higher scores on the personal control, treatment control, and coherence dimensions represent strongly held beliefs about the controllability of GWI and a personal understanding of GWI. Causal beliefs were assessed by asking participants how much they agreed on a 5-point scale from 0 (strongly disagree) to 4 (strongly agree) with the following causes of GWI: military deployment-related exposure, psychological/stress, physical causes, and behavioral causes (e.g., diet, physical activity). Internal consistency for the measure was high in this study, and Cronbach's alphas ranged from .79 to .90 for each subscale.

Table 1 Descriptive statistics

	M (SD)	Range	Percent
Age	52.86 (7.36)	42–79	
Gender	–	–	87.9%
Male	–	–	12.1%
Female			
Disability	46.25 (18.50)	2.17–97.83	
Threat-related illness beliefs	17.40 (3.65)	7.0–24.0	
Protective illness beliefs	12.28 (3.68)	0–22.33	
All-or-nothing behavior	2.16 (.80)	.17–4.0	
Limiting behavior	2.11 (.71)	.20–4.0	
Practical support seeking	.87 (.88)	0–4.0	
Emotional support seeking	.59 (.71)	0–4.0	

Consistent with how previous studies have conceptualized illness beliefs [23], and for ease of interpretation, all threat-related illness beliefs (i.e., beliefs that GWI is chronic, has severe consequences, and is associated with negative emotions) were combined into a single composite score (Cronbach's alpha = .89), and all protective illness beliefs (i.e., beliefs that GWI is controllable and makes sense within one's life) were combined into a single composite score (Cronbach's alpha = .86).

Behavioral Responses Behavioral responses to illness were assessed with the BRIQ [11]. The BRIQ is a 19-item questionnaire designed to assess frequency of illness behaviors over the past month, and consists of 4 subscales: all-or-nothing behavior (e.g., "I would overdo things, then need to rest up for a while"), limiting behavior (e.g., "I would put parts of my life on hold"), emotional support seeking (e.g., "I would talk to others about how bad I feel"), and practical support seeking (e.g., "I would ask for help from my family and friends"). Responses to all items were provided on a 5-point scale from 0 (not at all) to 4 (every day), with higher scores indicating that the participant engaged in the behavior more frequently. Cronbach's alphas in this study were .85 (all-or-nothing behavior), .60 (limiting behavior), .80 (emotional support seeking), and .85 (practical support seeking).

Disability Disability was assessed with the World Health Organization Disability Assessment Schedule (WHODAS 2.0) [31]. The WHODAS is a 36-item questionnaire designed to assess disability and functioning across six domains (cognition, mobility, self-care, getting along with others, life activities, and participation). Participants indicated how much difficulty they experienced in various domains of functioning. Responses to all items were provided on a 5-point scale from 0 (no difficulty) to 4 (extreme difficulty), with higher scores indicating greater disability. Internal consistency for the measure was high in this study (Cronbach's α = .94).

Statistical Analysis

The study employed a cross-sectional design. Correlation analyses were first performed to assess the strength of relationships between study variables. In order to test the mediating effects of behavior on the relationship between illness beliefs and disability, we conducted a mediation analysis using PROCESS [34]. PROCESS is a versatile modeling tool used for mediation and moderation analyses that effectively combines the functions of multiple statistical software instruments to implement the mediation methods that are currently being advocated in the field [35]. Two models were assessed. In the first model, threat-related illness belief was the independent variable, disability was the dependent variable, and four behavioral responses to illness were included as mediators

(all-or-nothing behavior, limiting behavior, practical support seeking, and emotional support seeking). In the second model, protective illness belief was the independent variable, disability was the dependent variable, and the four behavioral responses to illness were included as mediators. In line with Hayes' [34] reporting recommendations, bias-corrected bootstrap confidence intervals are reported below for inferential tests of indirect effects (number of bootstrap samples = 5000).

Results

Correlations

Correlations showed that threat-related illness beliefs (i.e., beliefs that GWI is chronic, has severe consequences, and is associated with negative emotions) were positively related to all four behavioral responses to illness, whereas protective illness beliefs (i.e., beliefs that GWI is controllable and makes sense within one's life) were negatively correlated with all-or-nothing behavior and limiting behavior. Greater all-or-nothing behavior, limiting behavior, practical support, and emotional support seeking were each associated with worse disability. Greater threat-related illness beliefs were associated with worse disability, and greater protective illness beliefs were associated with less disability. Causal beliefs about GWI were not significantly correlated with disability, with the exception of a small positive correlation between greater belief that GWI has a psychological cause and worse disability. Therefore, causal beliefs were not included in the larger mediation analysis. Bivariate correlations are included in Table 2.

Mediation

To determine whether behavioral responses to illness mediate the relationship between illness beliefs and disability, mediation analyses were performed. The first model included threat-related beliefs and the four behavioral responses and significantly predicted disability: $F(1, 246) = 163.85$, $p < .01$, $R^2 = .40$. There was a direct effect of greater threat-related beliefs on greater disability ($B = 2.11$, 95% CI [1.58, 2.63], $t = 7.94$, $p < .01$). There was also a direct effect of greater limiting behavior ($B = 8.47$, $p < .001$), all-or-nothing behavior ($B = 2.44$, $p = .03$), and practical support seeking ($B = 2.68$, $p = .01$) on greater disability. The relationship between threat-related illness belief and disability was mediated by greater limiting behaviors ($B = .71$, 95% CI [.46, 1.02]) and greater practical support seeking behaviors ($B = .16$, 95% CI [.03, .35]); all-or-nothing behavior ($B = .23$, 95% CI [− .01, .50]) and emotional support seeking behavior ($B = − .01$, 95% CI [− .16, .14]) did not mediate this relationship. In other words, participants who held stronger beliefs that GWI is chronic, has severe consequences, and is associated with

Table 2 Pearson correlations between the measures (N = 248)

|	2	3	4	5	6	7
1. Disability	.63**	− .28**	.43**	.58**	.36**	.26**
2. Threat-related illness beliefs		− .36**	.43**	.44**	.25**	.28**
3. Protective illness beliefs			− .21**	− .20**	− .06	− .09
4. All-or-nothing behavior				.33**	.28**	.16*
5. Limiting behavior					.33**	.24**
6. Practical support seeking						.46**
7. Emotional support seeking						

*$p < .05$; **$p < .01$

negative emotions were more likely to limit their behaviors and rely on others for practical support, which in turn was associated with more disability. Threat-related illness beliefs continued to be directly related to greater disability independent of its effect on behavior (see Fig. 1). Of note, when age was included as a covariate in the model, the direct effect of all-or-nothing behavior on disability trended towards significance ($B = 2.22$, $p = .05$), but there were no other qualitative differences (results available upon request).

The second model included protective illness beliefs and the four behavioral responses and significantly predicted disability: $F(1, 246) = 20.61$, $p < .01$, $R^2 = .08$. There was a direct effect of greater protective illness beliefs on less disability ($B = − .67$, 95% CI [− 1.17, − .18], $t = − 2.68$, $p = .01$). There was also a direct effect of greater limiting behavior ($B = 11.15$, $p < .001$), all-or-nothing behavior ($B = 4.90$, $p < .001$), and

practical support seeking ($B = 2.76$, $p = .02$) on greater disability. The relationship between protective illness belief and disability was mediated by less all-or-nothing behaviors ($B = − .22$, 95% CI [− .45, − .08]) and less limiting behaviors ($B = − .44$, 95% CI [− .79, − .14]). Practical support seeking ($B = − .04$, 95% CI [− .16, .02]) and emotional support seeking ($B = − .03$, 95% CI [− .15, .02]) did not mediate the relationship between protective illness beliefs and disability. In other words, participants who held stronger beliefs that GWI is controllable and makes sense within their life were less likely to engage in all-or-nothing and limiting behaviors, which in turn was associated with less disability. Protective illness beliefs continued to be directly related to less disability independent of its effect on behavior (see Fig. 2). Of note, including age as a covariate in the model did not qualitatively affect the mediation results (results available upon request).

Fig. 1 Summary of mediation analysis for threat-related illness belief model. *$p < .05$; n.s. not significant
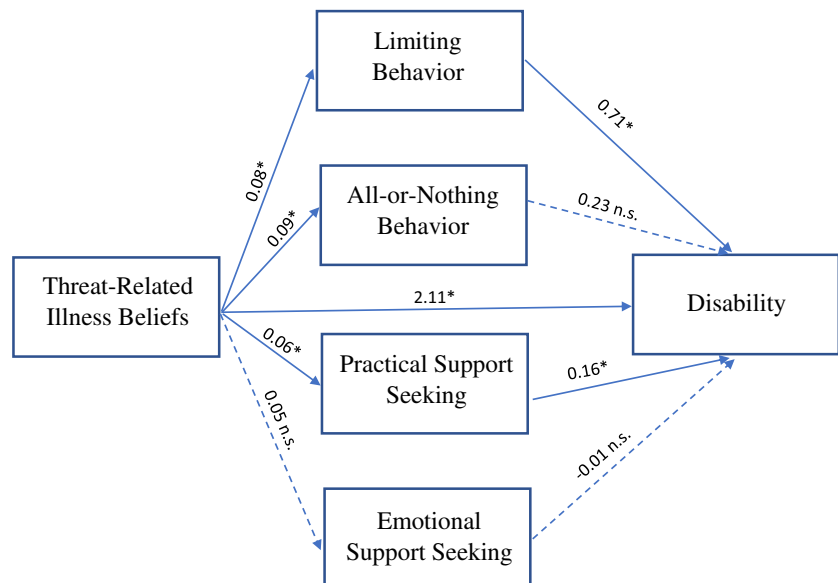
*p<0.05; n.s. not significant.

Fig. 2 Summary of mediation analysis for protective illness belief model. *p* < .05; n.s. not significant
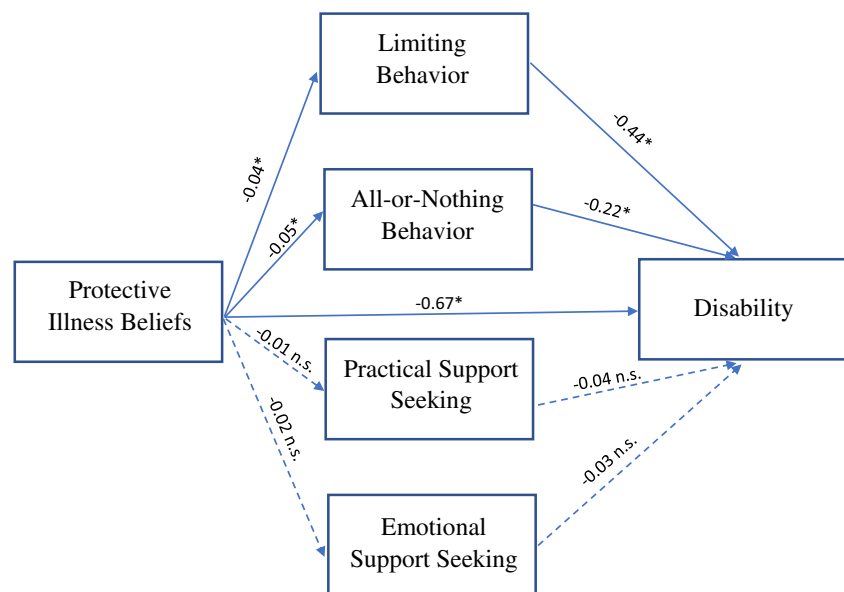
*p<0.05; n.s. not significant.

Discussion

We sought to clarify the relationship between illness beliefs, behavioral responses to illness, and disability among veterans with a complex long-standing medically unexplained syndrome (i.e., GWI). We found greater all-or-nothing behavior, limiting behavior, and practical support seeking predicted worse disability in regression analyses. These findings are somewhat inconsistent with our a priori hypotheses. The direct relationship between greater all-or-nothing behavior and worse disability is consistent with previous research which found all-or-nothing behavior is associated with the development of MUS and ongoing disability [11–13, 16]. However, greater limiting behavior and practical support seeking were also related to worse disability. This is inconsistent with previous research utilizing the BRIQ to investigate onset of MUS symptoms, which found greater limiting behavior and practical support seeking in response to acute illness protected against the development of medically unexplained symptoms [11, 13]. This discrepancy can be interpreted in one of three ways. First, these results may highlight how behaviors that may be protective prior to onset of MUS may actually perpetuate disability over the long term. In other words, while rest and seeking help from others are adaptive for acute illness and recovery, long-term inactivity and reliance on others can lead to decreased engagement in life and decreased functioning. However, it is also possible that more severe disability necessitates greater limiting behaviors and practical support from others. We believe the most likely interpretation of these results, based on the tenets of the Common Sense Model, is that there is a cyclical relationship between behaviors and disability such that the severity of one's illness informs behaviors,

and these behaviors in turn influence disability level, which in turn influences behavior, and so on. However, given the cross-sectional design of this study, further research is needed to confirm the directionality of these relationships.

Our study also helped to clarify if illness beliefs are used to guide behavioral responses. That is, we found that threat-related illness beliefs about GWI are associated with decreases in activity and increased reliance on others for practical support, which in turn is associated with greater disability. We also found reductions in all-or-nothing behavior and limiting behavior partially mediated the relationship between more protective illness beliefs and disability. Specifically, beliefs that GWI is understandable (i.e., makes sense within one's life) and controllable are associated with less engagement in limiting behavior and all-or-nothing behavior, which in turn is associated with less disability. These findings highlight the particular importance of limiting behaviors as a mediator between illness beliefs and disability for those with chronic MUS.

If these results are duplicated in future, and longitudinal studies, they suggest implications for treatment. The present results suggest that limiting behavior and all-or-nothing behavior are strongly negatively related to functioning. The commonality among these behavioral responses to illness is the disruption of typical life activities. Thus, strategies that help promote the return to an individual's routine despite the obstacles presented by physical symptoms would likely be beneficial. This is different from the typical recommendation of gradually increasing activity or graded exercise. Rather, treatment recommendations may need to be more patient-centered and individualized to address the specific ways in which MUS symptoms are interfering in a patient's typical daily behaviors, which may or may not include physical activity.

Interestingly, practical support seeking was also related to greater disability, highlighting the importance of social interactions among those with MUS, and specifically caregiver relationships. Relationship factors may easily be overlooked in the treatment of MUS given the focus on physical symptoms; however, there is the potential for a number of interpersonal problems to emerge which could affect both emotional and physical functioning. For example, caregiver burden, hostility, or overinvolvement could all negatively affect patient functioning and lead to social isolation. Thus strategies to help individuals seek support from their caregivers in a manner that maximizes the benefits of social supports and minimizes the occurrence of negative social interactions, as well as support and education for the caregivers themselves, may be beneficial to include within MUS treatments.

Our study also supported previous research in that we found threat-related MUS beliefs are associated with greater disability, protective illness beliefs (e.g., that MUS is understandable and controllable) are associated with less disability, and causal beliefs have little to no association with disability [36, 37]. Further, the relationship between threat-related beliefs and disability is stronger as compared to the relationship between positive beliefs and disability. Our findings suggest that beliefs related to the threat, severity, and chronicity of MUS are particularly important among veterans with GWI, and may be valuable treatment targets. What is not known is how treatments can best address these beliefs.

Current approaches to MUS treatment utilize top-down methods of teaching patients to challenge illness beliefs (e.g., cognitive therapy). While this approach has merit, it risks alienating patients who may feel the provider is minimizing the impact of their MUS. Our data suggests that illness beliefs influence outcomes, in part, because they direct behavior. This suggests that a bottom-up approach of teaching patients to change their behaviors and monitor if these changes may result in improvements in disability and a change in illness beliefs could be effective.

This study is important because it identified specific behaviors that may be contributing to disability among those with traditionally treatment-resistant MUS. A limitation is that our study is cross-sectional. While the current study proposes a model whereby illness beliefs direct behavior which in turn influence disability, the reverse is also plausible. For example, disability status could drive changes in behavior which then influence illness beliefs. Alternatively, disability could affect how one thinks about their illness, which in turn could influence behavior. The Common Sense Model can account for all of these interpretations as it is a feedback model where beliefs, behaviors, and health continue to have an effect on each other in a cyclical fashion [18], and future longitudinal research is needed to clarify temporal relationships. Additionally, the results may not generalize to other MUS patient populations and/or civilian populations. Finally, all variables were measured by self-report.

In sum, this study's results have implications regarding the mechanisms that perpetuate disability among those with long-standing GWI. If replicated in longitudinal studies, our findings can help providers tailor interventions to target the particular illness beliefs and behaviors that are salient to MUS, and specifically GWI. Such tailored interventions might help improve both the effect size and long-term efficacy of standard cognitive behavioral treatments for MUS.

Compliance with Ethical Standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Conflict of Interest The authors declare that there is no conflict of interest.

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