



# Assessing the Impact of Proactive and Reactive Mindfulness on Health Symptomatology in Veterans with Complex Military Exposure Histories

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## ABSTRACT

**Background:** Mindfulness (MF) is often considered an abstract and multifaceted construct that requires focused practice to manipulate. One approach that may disentangle the benefits of such practice is evaluating the facets of MF, and associated subdomains. Previous examination of the MF state suggests a dual mode framework, where individual perception of MF consists of proactive and reactive facets. Proactive facets (Pro-MF) reflect focused attention to general life events, whereas reactive facets (Re-MF) reflect disposition monitoring and suppression of irrelevant information. Therefore, this study aimed to further understand the relationship between Pro-MF and Re-MF facets and subjective ratings of health (i.e., Neurobehavioral Symptom Inventory (NSI), PTSD Checklist for DSM-5 (PCL-5), and Quality of Life in Neurological Disorders (Neuro-QoL), for veterans with complex health conditions. **Methods:** Veterans receiving care at the Washington DC War-Related Illness and Injury Study Center (WRIISC; n=48, age=36-70) were enrolled in an observational study. Veterans' MF was assessed using the Five-Factor Mindfulness Questionnaire (FFMQ). Further discrimination of MF states was computed via scores of Pro-MF (Awareness, Describing, Non-judgement) and Re-MF (Non-reactivity, Observing) facets of the FFMQ. Finally, subjective health symptoms (i.e., NSI, PCL-5, and Neuro-QoL) were regressed on Pro-MF and Re-MF scores. **Results:** A significant negative relationship was noted between FFMQ and NSI ( $R^2(46) = 0.22, p < .001$ ). Additionally, there were significant negative relationships between Re-MF and NSI ( $R^2(45) = 0.29, p < .001$ ), and PCL-5 ( $R^2(45) = 0.29, p < .001$ ). Furthermore, there was a significant positive relationship between Re-MF and Neuro-QoL ( $R^2(45) = 0.27, p < .01$ ). No significant relationships were observed between Pro-MF and NSI, PCL-5, or Neuro-QoL ( $p > .05$  for all). **Conclusions:** This study underscores the positive impact of dispositional mindfulness on veterans' mental health and well-being. Results indicated that greater levels of reactive mindfulness reported by veterans is significantly related to lower overall ratings of neurobehavioral symptoms and post-traumatic stress symptoms. Furthermore, increased traits of reactive mindfulness were significantly associated with enhancements in quality of life. Thus, improving trait mindfulness may be a promising option for reductions in neurobehavioral and PTSD symptoms, as well as improvements in overall quality of life, making it a potential treatment strategy for veterans with diffuse health conditions.

## BACKGROUND

Behavioral health interventions and lifestyle medicine intended to augment well-ness and resilience offer promising solutions to chronic disease management. A growing body of evidence exists demonstrating that mindfulness-based interventions can improve mental health (Hofmann et al., 2010). Thus, the link between trait mindfulness and psychological health has received a growing amount of attention in the recent literature (Carpenter et al., 2019; Tomlinson et al., 2018). Typically rated subjectively, trait mindfulness scales measure one's disposition to pay nonjudgmental attention to the present moment (Treves et al., 2024). Trait mindfulness differs from state mindfulness, which alternatively describes the nonjudgmental present-focused awareness experienced in any given moment (Medvedev et al., 2017), and from mindfulness practice, which involves deliberately engaging in mindful exercises to foster a state of mindfulness (Carpenter et al., 2019).



- Trait, or dispositional mindfulness may be a stable personality-like characteristic that is a window into consciousness, emotional experience, and other constructs, usually measured using self-report scales (Treves et al., 2024)
- Previous research in cognitive control theory suggests a "Dual Modes of Control" (DMC) framework, which categorizes control processes into "proactive" and "reactive" processes (Braver, 2012; Braver et al., 2008)
- Similar to the DMC framework, Proactive Mindfulness is comprised of Acting with Awareness, Describing and Non-judging facets, and is associated with 'action' oriented questions that evaluate focused attention during daily activities and selective inhibition of bad thoughts which are top-down mediated (Baer et al., 2006; Wang et al., 2016)
- Similar to the DMC framework, Reactive Mindfulness is comprised of of Observing and Non-reactivity facets, and is associated with 'perception' (e.g., engages bottom-up processes; resembles reactive cognitive control); this reflects bottom-up or stimulus evoked response to sensory stimuli, spontaneous thoughts and mental imagery (Samuel et al., 2024)

Since increased practice of mindfulness may improve cognitive control processes, the purpose of this study was to further understand the relationship between Proactive Mindfulness and Reactive Mindfulness facets, and subjective ratings of health for veterans with complex health conditions.

## METHODS

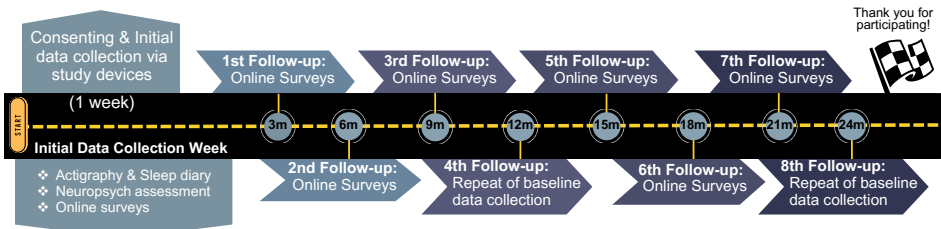
The reported results are focused on data from the Initial Data Collection as part of a larger study conducted by the War-Related Illness and Injury Study Center (WRIISC; see study timeline below). Veterans receiving care at the Washington DC WRIISC (n=48, age=36-70) completed seven days of at-home data collection. Participants completed a series of baseline questionnaires including:

- Five Facet Mindfulness Questionnaire (FFMQ)
- Neurobehavioral Symptom Inventory (NSI)
- PTSD Checklist for DSM-5 (PCL-5)
- Quality of life in Neurological Disorders (Neuro-QoL)

Table 1. Descriptive Statistics	
Variable	N = 48
Age (years)	51.13 (8.85)
BMI	30.60 (5.83)
Sex	
Male	43
Female	5
EOD	29

<sup>1</sup> Mean (SD)

MF was further discriminated into Proactive and Reactive mindfulness states. Proactive mindfulness was computed as the mean of the Acting with Awareness, Describing, Non-judgement facets of the FFMQ, whereas Reactive mindfulness was computed as the mean of the Non-reactivity and Observing facets of the FFMQ (Samuel et al., 2024). To further understand the relationship between proactive and reactive mindfulness facets and subjective ratings of health, subjective health symptoms (i.e., NSI, PCL-5, and Neuro-QoL) were regressed separately on Proactive and Reactive mindfulness scores.



## RESULTS

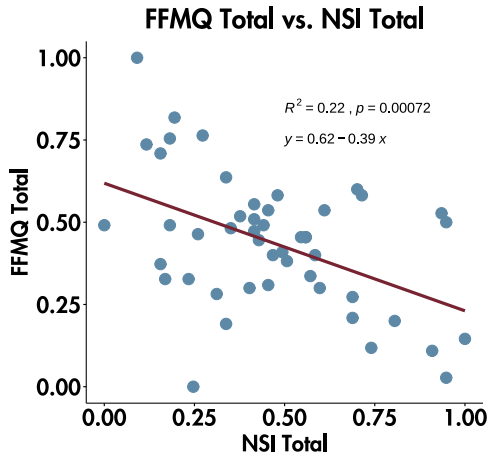


Figure 1. Veterans reporting higher levels of trait mindfulness exhibited significantly lower levels of neurobehavioral symptoms ( $\beta = -0.39, 95\%CI = [-0.60, -0.17], p < .001$ ).

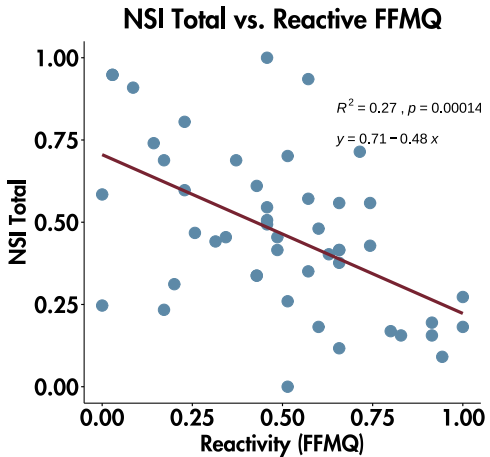


Figure 2. Veterans reporting higher levels of Reactive Mindfulness exhibited significantly lower levels of neurobehavioral symptoms ( $\beta = -0.42, 95\%CI = [-0.68, -0.17], p < .01$ ).

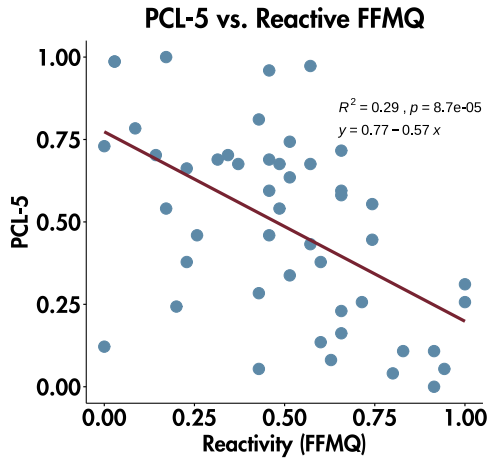


Figure 3. Veterans reporting higher levels of Reactive Mindfulness exhibited significantly lower levels of post-traumatic stress symptoms ( $\beta = -0.61, 95\%CI = [-0.90, -0.32], p < .001$ ).

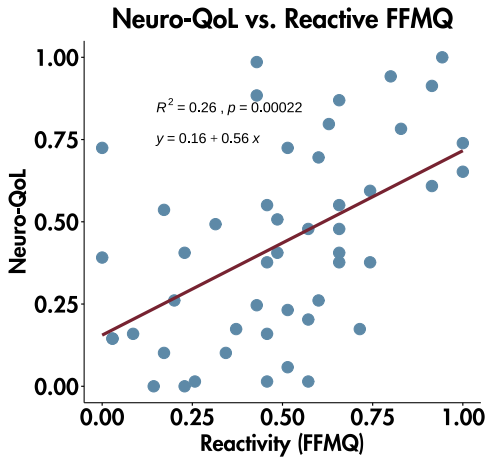


Figure 4. Veterans reporting higher levels of Reactive Mindfulness exhibited significantly improved quality of life ( $\beta = 0.51, 95\%CI = [0.21, 0.82], p < .01$ ).

## RESULTS

Table 2. Regression Output			
	Dependent variable:		
	NSI Total (1)	PCL-5 (2)	NQoL (3)
Constant	0.75*** (0.60,0.91)	0.75*** (0.57,0.92)	0.11 (-0.07,0.29)
Proactivity_FFMQ	-0.19 (-0.49,0.12)	0.11 (-0.24,0.46)	0.16 (-0.20,0.52)
Reactivity_FFMQ	-0.42*** (-0.68,-0.17)	-0.61*** (-0.89,-0.32)	0.51*** (0.21,0.81)
Observations	48	48	48
R <sup>2</sup>	0.30	0.29	0.27
Adjusted R <sup>2</sup>	0.27	0.26	0.24
Residual Std. Error (df = 45)	0.21	0.25	0.26
F Statistic (df = 2; 45)	9.48***	9.32***	8.36***

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Table 3. Mean Subjective Ratings	
Variable	N = 48
FFMQ (Total)	115.08 (22.60)
FFMQ - Observing	24.67 (6.18)
FFMQ - Describing	22.58 (5.64)
FFMQ - Acting with Awareness	22.13 (8.73)
FFMQ - Nonjudging	24.00 (8.70)
FFMQ - Nonreactivity	20.56 (5.78)
PCL-5	36.29 (21.45)
NQoL	47.77 (20.54)
NSI (Total)	36.02 (19.23)
NSI - Vestibular	4.79 (4.19)
NSI - Somatosensory	7.96 (5.78)
NSI - Cognitive	8.42 (5.60)
NSI - Affective	14.85 (7.79)
NSI - Validity	13.52 (8.69)

<sup>1</sup> Mean (SD)

## CONCLUSIONS

- Previous research has revealed that individuals who report higher levels of trait mindfulness report less perceived stress, as well as lower resting physiological stress (i.e., skin conductance) (Hicks et al., 2020)
- Veterans reporting higher levels of trait mindfulness exhibited significantly lower levels of neurobehavioral symptoms, which is consistent with findings from Carpenter et al. (2019)
- Greater levels of Reactive Mindfulness was associated with lower levels of neurobehavioral symptoms in veterans
- Greater levels of Reactive Mindfulness was associated with lower levels of post-traumatic stress symptoms in veterans
- Reactive Mindfulness was positively associated with enhanced quality of life
- Given that cognitive control is a critical element for efficient behavioral functioning, introducing mindfulness practices to veterans may improve cognitive control processes, which, in turn, can improve health outcomes (Samuel & Costanzo, 2020; Samuel et al., 2024)
- Improving trait mindfulness may be a promising option for reductions in neurobehavioral and PTSD symptoms, as well as improvements in overall quality of life, thus making it a potential treatment strategy for veterans with diffuse health conditions

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