The Influence of Service Era: Comparing Personality Assessment Inventory (PAI) Scale Scores Within a Posttraumatic Stress Disorder Treatment Clinic (PCT)

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Abstract

Research is mixed on the role of service era in symptom endorsement among Veterans, with differences emerging depending on the instrument evaluated. This study compares Personality Assessment Inventory (PAI) scale scores of VA test-takers who served during the Vietnam, Desert Storm, or Post-9/11 service eras. The sample was collected at a VA Posttraumatic Stress Disorder Clinical Team. Associations between gender and combat exposure were also examined as covariates. Results suggest that Veterans' self-report on the PAI is influenced by service era, even after accounting for gender and combat exposure during deployment. The largest differences were between Vietnam or Post-9/11 Veterans and those from the Gulf War era. Symptom differences typically varied across scales commonly associated with symptoms of trauma exposure/posttraumatic stress disorder. Implications for the clinical use of, and research with, the PAI and other broadband personality assessments within the VA healthcare system and trauma treatment settings are discussed.

Keywords PAI · Veteran affairs · Psychological assessment · PTSD · Service era

Introduction

Military identity is an internalized sense of self comprising both the zeitgeist of service era and the nature of experiences from that service. In this way, the experiences of service members may shape their self-concept (see Kümmel, 2018). Navigating this sense of identity is critical in promoting service member mental health (Lancaster & Hart, 2015; Meca et al., 2020) as shared military experience among service members form cognitive patterns that are important

to target in psychological intervention (Migliore & Pound, 2016). Moreover, successful reintegration into civilian society relies on assimilating an individual's military identity with their civilian sense of self (Orazem et al., 2017). Given the impact of this component of identity, it is unsurprising that evaluating military self-concept is an important part of understanding Veteran experience and is central to providing culturally competent care (American Psychological Association [APA], 2017a, 2017b; Atuel & Castro, 2018; Meyer et al., 2016; Zwiebach et al., 2019).

Given the role of military service in Veteran health and well-being, evaluating Veterans effectively requires consideration of their specific service experiences (e.g., Armistead-Jehle et al., 2017; Coll & Weiss, 2016). One salient component of military identity which receives regular attention is the Veteran's era, or time, of service (e.g., Vietnam or Korean War). Service era is typically divided by wartime proclamations or periods of extended military conflict. Evaluation of differences between these groups offers a pragmatic way to examine clinical presentation trends and to address the unique cultural needs of those being served. Exemplifying these reasons, the Department of Veteran Affairs (DoVA, 2018) groups compensation for injuries by periods of eligible service to help understand patterns of

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prevalence. Thus, Veteran experiences are conceptualized as a function of these groupings and research regularly contrasts service eras (e.g., Teigen, 2006; Wilmoth et al., 2010) or reports this information descriptively (e.g., region of deployment, combat deployment, etc.) when such comparisons are outside of the primary research topic (e.g., Bellet et al., 2018; Ingram et al., 2020a; Morey et al., 2011; Mozley et al., 2005). Moreover, it is common for Veterans to engage in expressive methods that highlight a given service era, such as using license plates, hats, and stickers (e.g., "Vietnam Veteran"), underscoring the perceived importance of service era to an individual's sense of identity.

Research also supports this approach to treating service eras as unique in their clinical implications. The medical needs of service era groups regularly differ as a function of their combat experiences (e.g., exposure to chemical weapons or improvised explosive devices; Haley et al., 1997; Stellman & Stellman, 2018; Wells et al., 2011), as do the supports needed after military discharge (Fontana & Rosenheck, 2008; Maclean & Elder, 2007). Individuals from distinct eras also seek treatment at different rates, and in different ways (Boyd et al., 2015; Quatana et al., 2014; Rosenheck & Fontana, 2008). Further, they suffer from psychiatric disorders at different rates as well. For instance, post-9/11 Veterans have higher rates of physical and sexual intimate partner violence relative to their Gulf War counterparts (Cancio & Altal, 2019) and post-9/11 Veterans also respond differently to posttraumatic stress disorder (PTSD) treatment relative to Veterans from the Vietnam era (Chard et al., 2010). Likewise, PTSD ranges in the prevalence from 8 to 50% among deployed Veterans, depending on the conflict (e.g., Hoge & Warner, 2014; Magruder & Yeager, 2009; McCarroll et al., 1995; Stretch et al., 1996; Weiss et al., 1994; Wolfe et al., 1993). Within the most frequently served groups currently receiving care at the VA (see DoVA, 2018), Vietnam era Veterans have higher PTSD prevalence than their Gulf War counterparts, and those serving post-9/11 have rates comparable to Vietnam Veterans (Fulton et al., 2014; Kang et al., 2003). Similarly, those with post-9/11 deployments have far higher rates of head injury relative to those in the Gulf War Period (Lindquist et al., 2017; Yee et al., 2017, 2021).

Service era is a critical aspect to the Veteran population. Therefore, it can influence clinical measurement, resulting in potential over- or undertreatment of critical conditions due to poor measurement quality (see Morgan et al., 2005). Advancing evidence-based psychological services for Veterans within the Veteran Affairs Healthcare system therefore requires that services and assessment instruments evaluate the influence of service era to ensure clinical decisions are not biased by potential impacts attributable to service era. Accordingly, the influence of service era has garnered some attention by researchers evaluating the validity and utility of some commonly used broadband personality assessment instruments (Russo, 2017). Three frequently utilized broadband instruments are the Minnesota Multiphasic Personality Inventory-2 (MMPI-2; Butcher et al., 2001), Minnesota Multiphasic Personality Inventory-2-Restructed Form (MMPI-2-RF; Tellegen & Ben-Porath, 2008/2011), and the Personality Assessment Inventory (Morey, 1991). Research has investigated the impact of service era in two of these instruments, the MMPI-2 (Glenn et al., 2002) and the MMPI-2-RF (Ingram et al., 2020a), while none have yet investigated its influence in the PAI.

Glenn et al (2002) evaluated the service era differences on the MMPI-2 in a sample of Veterans referred for treatment on an outpatient PTSD treatment team (PCT). They found that there were notable differences between Gulf War and Vietnam Veterans. Those who served during the Gulf War endorsed higher rates of hypomania, whereas Vietnam Veterans reported higher depression, anxiety, and social isolation. These differences were evident not only in single-scale mean score differences, but also in the prevalence of code types for different service eras. Specifically, Vietnam era Veterans were more frequently classified as displaying a 2–8/8–2, while Gulf Veterans more frequently had a 1–8/8–1 profile. As a result, Glenn et al. concluded that service era played a notable role in clinical presentation and was a critical evaluative consideration that potentially leads to PTSD subtypes (see Miller et al., 2008) or symptom presentation variation. In contrast, Ingram et al (2020a) utilized a sample of Veterans undergoing psychological assessments on PCTs to evaluate service era differences on the MMPI-2-RF, a revised form of the MMPI-2. Generally contrasting the results of Glenn et al (2002), Ingram et al. (2020a) found that magnitudes of scale score difference between service eras were small and unlikely to be clinically meaningful, particularly as it relates to PTSD-related symptoms. Ingram et al. did find some differences in the frequency of scale elevations between service era, although these concerns centered on aging-related concerns (e.g., neurological complaints) rather than trauma-related and service-era-specific concerns. Ingram et al (2020a) interpreted the differences between service eras found in earlier research by Glenn et al. (2002), which was not repeated in their evaluation of the MMPI-2-RF, as evidence of the improved psychometrics (e.g., reduced scale intercorrelation and removal of demoralization from core clinical scales).

Taken together, the influence of service era in personality assessment has produced diverging interpretations (i.e., service era differences exist, or they do not exist). Observed differences across service eras in the MMPI-2 have, for instance, been interpreted as a function of measure error and scale quality (Ingram et al., 2020a) as well as clinically interpretable and meaningful patterns of effect (Glenn et al., 2002). Results have also varied depending on the instrument

analyzed. Given the paucity of work on the PAI despite its frequent use, investigation of service era on the PAI is necessary to ensure appropriate interpretations are provided with this instrument. In addition to variations observed across instruments, existing studies have evaluated only Vietnam and Gulf War service eras, excluding those who participate in post-9/11 conflicts due to the age of the study (Glenn et al., 2002) or combining post-9/11 service members with those who served during Desert Storm because of the way the VA classifies service era (Ingram et al., 2020a). Thus, existing research has not only omitted a popular instrument, but also omitted a distinct period of service (United States Census Bureau, 2020).

Given the substantial impact of PTSD on Veteran health (Kyle et al., 2010; Maguen et al., 2010; Pacella et al., 2013) and disability (National Center for Veterans Analysis and Statistics [NCVAS], 2014), as well as the conflicting findings of past studies on service era's role in diagnostic assessment (Glenn et al., 2002; Ingram et al., 2019), elucidating the role of service era (and the combat experiences as part of service; Kaplan et al., 2012) in clinical presentation is important for those seeking services for PTSD treatment within the Veteran Affairs medical care system. While past research has evaluated some service era differences using the MMPI-2 and MMPI-2-RF, no similar investigations have occurred using the PAI, despite research supporting its frequent clinical use (Wright et al., 2017) and utility in assessing Veteran relevant health constructs (e.g., Bellet et al., 2018; Ingram et al., 2019; Mozley et al., 2005). In this study, we examine differences in symptomatology across common service eras using the PAI in a sample of VA outpatients seeking PTSD treatment to determine the degree to which distinct service experiences of each era (Vietnam, Gulf War, and post-9/11) may influence clinical presentation.

Method

Participants

This study draws its sample from a Midwestern VA PCT and the assessment was conducted as part of intake into trauma treatment services. Veterans undergoing these intake assessments were referred primarily by VA behavioral health clinicians. Other, less frequent, referral sources include VA physicians providing primary care services. Consistent with our research questions, we excluded individuals ($n = 64$) who indicated that they served in any era other than (1) Vietnam, (2) Desert Storm, or (3) Post-9/11 [e.g., Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), or Operation New Dawn (OND)]. We also excluded patients who scored the above-recommended validity cut scores on standard PAI validity scales (INF $\geq$ 75 ($n = 9$, pre-exclusion $M = 51.7$, SD $= 7.8$) or ICN $\geq$ 73 ($n = 13$, pre-exclusion $M = 53.1$, SD $= 7.8$); NIM $\geq$ 110 ($n = 2$, pre-exclusion $M = 66.6$, 13.8), PIM $\geq$ 68 ($n = 0$, pre-exclusion $M = 40.0$, SD $= 10.0$); Morey, 1996), as such scores indicate invalid responding which should not be interpreted due to the potential of such responding biasing substantive scale elevations. Our sampling criteria resulted in 288 Veterans for whom we had valid PAI profiles and service era information: [$n = 76$ Vietnam (August 1964–May 1975), $n = 37$ Desert Storm (August 1990–February 1991), and $n = 199$ Post-9/11 (September 2001–Present)], a majority of which were used in analysis because they also had valid information on gender and combat exposure that were modeled as covariates ($n = 57$ Vietnam, $n = 33$ Desert Storm, and $n = 166$ Post-9/11).

Participants in this study reported being part of only one era of service. The observed distribution of service era is generally representative of Veterans enrolled in VA healthcare services (DoVA, 2018). In general, participants were White, Male, had been deployed to a combat zone, and most served in the post-9/11 era (see Table 1 for extended demographics). Post-9/11 service members had the highest frequency of service-connected pension (30.7%), while Desert Storm Veterans were the most frequently employed (66.7%). Vietnam Veterans had lower rates of college graduation (15.2%). The Vietnam Veteran group also had a slightly lower frequency of African American Veterans (5.3%) and the highest portion of those identifying as White (84.2%).

Instruments

Personality Assessment Inventory

The PAI (Morey, 1991) is a 344-item personality measure that includes four validity, 11 clinical (typically with three or four subscales each), five treatment consideration, and two interpersonal scales. The clinical scales of the PAI assess somatic concerns (SOM), anxiety (ANX), anxiety-related disorders (ARD), depression (DEP), mania (MAN), paranoia (PAR), schizophrenia (SCZ), borderline features (BOR), antisocial features (ANT), as well as alcohol (ALC) and drug (DRG) problems. The treatment consideration scales of the PAI assess aggression (AGG), suicidal ideation (SUI), stress (STR), non-support (NON), and treatment rejection (RXR). PAI items are scored on a 4-point Likert-type scale (i.e., *False*, *Slightly True*, *Mainly True*, or *Very True*) with T-scores which meet or exceed 70 indicating clinical concern. The PAI has extensive validity and reliability data supporting its clinical utility, including with Veteran populations (see Morey, 1996).

Table 1 Demographic information

	Era of service		
	Vietnam ($n = 57$)	Desert Storm ($n = 33$)	Post-9/11 ($n = 166$)
Age	65.9 (10.7)	48.2 (5.6)	36.17 (8.5)
Male	100% ($n = 57$)	93.9% ($n = 31$)	94.6% ($n = 157$)
Ethnicity			
White	84.2% ($n = 48$)	54.5% ($n = 18$)	68.1% ($n = 113$)
African American	5.3% ($n = 3$)	24.2% ($n = 8$)	14.5% ($n = 24$)
Hispanic/Latino	7% ($n = 4$)	12.1% ($n = 4$)	8.4% ($n = 14$)
Other/Missing	3.6% ($n = 2$)	9.1% ($n = 3$)	9% ($n = 15$)
Education			
College Graduate	33.3% ($n = 19$)	15.2% ($n = 5$)	21.1% ($n = 35$)
HS Graduate	24.6% ($n = 14$)	30.3% ($n = 10$)	21.1% ($n = 35$)
Some College	28.1% ($n = 16$)	54.5% ($n = 18$)	54.8% ($n = 91$)
Other/missing	14.1% ($n = 8$)	0	3% ($n = 5$)
Income			
Unemployed/no income	1.8% ($n = 1$)	9.1% ($n = 3$)	6.6% ($n = 11$)
SC Pension	17.5% ($n = 10$)	15.2% ($n = 5$)	30.7% ($n = 51$)
Retired	59.6% ($n = 34$)	0	7.2% ($n = 12$)
Employed	12.3% ($n = 7$)	66.7% ($n = 22$)	47% ($n = 78$)
Other/missing	8.8% ($n = 5$)	9.1% ($n = 3$)	8.4% ($n = 14$)
Combat exposure			
Light	14% ($n = 8$)	27.3% ($n = 9$)	12.7% ($n = 21$)
Light–moderate	26.3% ($n = 15$)	33.3% ($n = 11$)	17.5% ($n = 29$)
Moderate	17.5% ($n = 10$)	24.2% ($n = 8$)	34.3% ($n = 57$)
Moderate–heavy	21.1% ($n = 12$)	9.1% ($n = 3$)	28.3% ($n = 47$)
Heavy	21.1% ($n = 12$)	6.1% ($n = 2$)	7.2% ($n = 12$)
Missing	0	0	0

Frequencies were calculated out of those with available demographic information. Percentages were calculated based on available demographic information

Combat Exposure Scale

The Combat Exposure Scale (CES; Keane et al., 1989) is a widely used 7-item self-report measure assessing wartime stressors of those who were involved in combat. Items are rated on a 5-point frequency scale (e.g., "Were you ever surrounded by the enemy?"; 1 = "no" to 5 = "26 + times"), a 5-point duration scale ("Were you ever under enemy fire?"; 1 = "never" to 5 = "7 + months"), or 5-point degree of loss scale ("What percentage of the soldiers in your unit were killed (KIA), wounded, or missing in action (MIA)?"; 1 = "none" to 45 = "76% or more") scale. CES items are then converted to five categories of combat exposure intensity: light ($n = 61$), light–moderate ($n = 70$), moderate ($n = 84$), moderate–heavy ($n = 70$), and heavy ($n = 27$).

Procedures and Planned Analysis

For this investigation, we utilized a sample from an outpatient PTSD Clinical Team (PCT) to contrast service eras, ensuring a comparable sample to previous studies on

service era conducted with other instruments (i.e., Glenn et al., 2002; Ingram et al., 2020a). PCTs provide specialized treatment services for trauma-exposed individuals, most of whom meet diagnostic criteria for PTSD (e.g., ~ 90%; Mozley et al., 2005). Individuals were excluded from analysis if their PAI contained validity scale elevations suggesting an uninterpretable profile.

A series of one-way ANCOVAs were planned to examine differences in mean scale scores between Vietnam, Gulf War, and post-9/11 Veterans. We planned to evaluate differences across the clinical and treatment consideration scales, as well as for all subscales of both scales (i.e., SOM, ANX, ARD, DEP, MAN, PAR, SCZ, BOR, ANT, and AGG). Biological sex and combat exposure intensity were planned as covariates to account for gender differences in service frequency (e.g., males are more represented in Vietnam compared to post-9/11) and to adjust for combat intensity. The inclusion of these covariates was done to provide similar methodology to previous research, which has already incorporated gender and has also called for greater inclusion of service-related experiences as part of investigations into

service era's influence in assessment instruments (Ingram et al., 2020a).

An a priori decision was made to set statistical significance at $p < .01$ to account for multiple comparisons. An a priori decision was also made to only interpret clinically meaningful differences between groups, defined as those which meet or exceed a medium effect size (5T-score points; Cohen, 1988; Rosenthal et al., 2000). Effect sizes were interpreted using Cohen's (1988) recommended thresholds (small $= g > 0.2$, medium $= 0.5 \leq g < 0.8$, and large $= g \geq 0.8$).

Results

A series of one-way ANCOVAs were used to analyze the differences in PAI Clinical and Treatment Consideration scales between Veterans of the Vietnam, Desert Storm, and Post-9/11 era (i.e., Iraq/Afghanistan wars). Gender and combat exposure were used as covariates to account for gender and combat exposure differences.

There were 13 significant differences ($p < .01$) between service era on PAI Clinical (SOM, ANX, ARD, DEP, MAN, PAR, SCZ, BOR, and ANT), Treatment Consideration (AGG, STR, and RXR), and Interpersonal scales (DOM), with varying levels of effect (Table 2). Apart from DOM and DEP, each difference was also of at least a medium effect (5T-score; $g \geq 0.50$), indicating that most differences between eras were clinically meaningful. In general, we saw the largest effects when we compared scores between the Vietnam and Desert Storm Veterans (Hedges $g_{mean} = 0.75$), with Vietnam era Veterans scoring higher on all significant scales (large effect size differences on five scales: ANX, MAN, SCZ, BOR, and STR). The second largest pattern effects sizes were observed between Desert Storm and Post-9/11 Veterans (Hedges $g_{mean} = 0.56$). Effect sizes were typically within the moderate effect range; none met the threshold for a large effect ($g \geq 0.8$). Vietnam and Post-9/11 Veterans had the smallest pattern of effect differences (Hedges $g_{mean} = 0.16$) and only five (38%; SOM, ANX, ARD, SCZ, and DOM) of the statistically significant scales also demonstrated clinical meaningfulness. All effects observed between Vietnam and Post-9/11 Veterans were small in magnitude.

There were 21 significant differences ($p < .01$) between service era and the PAI Clinical Subscales, with varying levels of effect (Table 3). Apart from ARD-T, MAN-A, MAN-G, and AGG-V, each difference was also of at least a medium effect (5T-score; $g \geq 0.50$), indicating that most differences between eras were clinically meaningful. In general, we saw the largest effects when we compared scores between the Vietnam and Desert Storm Veterans (Hedges $g_{mean} = 0.66$), with Vietnam era Veterans scoring higher on all significant scales (large effect size differences on five

scales: SOM-S, ANX-P. DEP-P, MAN-I, and BOR-A). The second largest pattern effects sizes were observed between Desert Storm and Post-9/11 Veterans (Hedges $g_{mean} = 0.52$). Effects sizes were typically within the moderate effect range; none met the threshold for a large effect ($g \geq 0.8$). Vietnam and Post-9/11 Veterans had the smallest pattern of effect differences (Hedges $g_{mean} = 0.17$) and only six (28%; SOM-C, SOM-S, ANX-C, DEP-P, MAN-G, BOR-A, and AGG-V) of the statistically significant scales also demonstrated clinical meaningfulness. All effects observed between Vietnam and Post-9/11 Veterans were small in magnitude.

Discussion

This study evaluated differences in mean scale scores and elevation frequencies on the substantive scales of the PAI across three distinct periods of military service. Previous research has found that some psychological assessments are impacted differently by service era. For instance, research suggests that these service era differences on the MMPI-2 denote unique interpretive and treatment needs (Glenn et al., 2002). Conversely, research on updated versions of that same instruments (i.e., MMPI-2-RF) has indicated no influence of service era in Veteran response (Ingram et al., 2020a). Results from our study partially support both sets of conclusions and help explain the incongruence existing within the literature across instruments. This study suggests four distinct trends that are relevant to psychological assessments being conducted on Veterans at outpatient trauma treatment clinics in the VA, and with the PAI specifically.

Specifically, we found that (a) not all service eras will differ meaningfully from one another, but when they do it generally results in differences in self-reported symptoms centered around trauma-related psychopathology beyond that which is attributable to the combat experience itself, (b) differences between service eras are more pronounced in some era comparisons than in others, (c) when differences between eras emerge they are typically medium in effect and indicate a clinically meaningful influence, and (d) combat exposure was impactful more frequently than gender when examining differences between service era groups; however, both offer important considerations, albeit in distinct ways (e.g., combat exposure in ruling out an explanation of observed differences between areas and gender in highlighting an area of potential future research). Below we discuss some implications of these findings for use and research with the PAI specifically, as well as for the practice of personality assessment within Veteran Affairs (VA) and other Veteran-serving healthcare systems more broadly.

The contrasting findings on service era differences in psychological assessment instruments (Glenn et al., 2002; Ingram et al., 2020a) have pointed to distinct interpretations

Table 2 ANCOVA results for service era with gender and combat exposure covaried for PAI full clinical, treatment, and interpersonal scales

Scale/scale domain	Gender (covariate) $F(1, 255)$	Combat exposure (covariate) $F(1, 255)$	Service era $F(2, 255)$	p	Vietnam ($n = 57$)[a] M (SD)	% ≥ 70	Desert Storm ($n = 33$)[b] M (SD)	% ≥ 70	Post-9/11 ($n = 166$)[c] M (SD)	% ≥ 70	Hedge's g effect size 1v2	1v3	2v3
Clinical													
SOM	1.487ns	9.715**	8.338	<.001	73.6 (10.6)	57.4%	64.6 (12.8)	30.3%	69.6 (11.5)	49.8%	.75	.35	.43
ANX	4.588*	1.102ns	9.024	<.001	76.9 (12.1)	66.6%	66.6 (10.6)	35.5%	73.3 (12.4)	59.4%	.92	.29	.56
ARD	2.930ns	7.379**	8.245	<.001	79.4 (10.6)	78.7%	70.7 (12.7)	56.0%	76.4 (11.2)	73.2%	.73	.27	.49
DEP	.278ns	1.608ns	4.359	.014	80.6 (19.1)	69.5%	73.6 (11.9)	69.0%	79.3 (13.1)	74.2%	.47	.09	.45
MAN	.024ns	9.257**	13.577	<.001	59.8 (9.8)	12.1%	51.5 (10.0)	5.4%	59.3 (11.1)	16.8%	.84	.04	.72
PAR	.58ns	1.409ns	9.921	<.001	71.9 (13.0)	57.6%	62.0 (13.0)	33.5%	70.4 (13.9)	42.6%	.76	.11	.62
SCZ	.38ns	2.464ns	7.400	.001	75.3 (13.3)	60.5%	65.1 (11.8)	28.1%	72.3 (15.5)	57.6%	.82	.20	.49
BOR	.727ns	5.787*	10.869	<.001	72.8 (10.6)	60.7%	63.5 (10.4)	30.2%	70.7 (12.1)	53.4%	.90	.18	.62
ANT	2.433ns	7.069**	4.990	.007	60.7 (11.7)	21.2%	55.1 (10.9)	10.7%	59.8 (13.0)	15.6%	.50	.07	.38
ALC	2.413ns	.589ns	3.400	.350	62.1 (19.0)	30.2%	54.4 (14.0)	14.2%	56.2 (14.5)	19.2%	.48	.38	.13
DRG	1.085ns	2.84ns	3.254	.040	54.4 (14.6)	12.0%	56.1 (12.9)	8.9%	51.7 (10.7)	8.4%	.13	.24	.40
Treatment consideration													
AGG	1.446ns	3.475ns	7.294	.001	67.8 (13.2)	42.3%	60.8 (13.7)	24.8%	68.1 (13.8)	42.6%	.52	.03	.53
SUI	.533ns	4.671*	1.266	.284	62.8 (16.4)	33.2%	59.6 (15.7)	26.5%	63.8 (18.8)	33.9%	.20	.06	.23
STR	1.546ns	1.94ns	12.584	<.001	63.6 (13.0)	27.4%	54.8 (9.7)	7.1%	62.8 (11.5)	24.6%	.80	.07	.72
NON	2.899ns	.08ns	0.508	.602	65.0 (13.4)	36.3%	63.5 (11.0)	24.7%	65.1 (12.5)	33.0%	.13	.01	.13
RXR	1.043ns	4.291*	10.033	<.001	36.6 (7.8)	0.0%	43.0 (9.5)	0.0%	37.6 (8.3)	0.0%	.72	.12	.63
Interpersonal													
DOM	.337ns	5.820*	8.355	<.001	49.0 (15.1)	3.0%	46.4 (10.6)	0.0%	53.5 (11.7)	6.6%	.21	.37	.62
WRM	1.981ns	.039ns	0.463	.630	32.5 (12.9)	0.0%	34.1 (11.6)	0.0%	32.7 (11.7)	0.0%	.13	.02	.12

No differences between service eras exceed Cohen's (1988) interpretive classifications for small, medium, or large effects. Scale means are following exclusion for invalid responding using standard PAI exclusion criteria. Means presented are averaged over gender

ns non-significant, *SOM* somatic concerns, *ANX* anxiety, *ARD* anxiety-related disorders, *DEP* depression, *MAN* mania, *PAR* paranoia, *SCZ* schizophrenia, *BOR* borderline features, *ANT* antisocial features, *ALC* alcohol problems, *DRG* drug problems, *AGG* aggression, *SUI* suicidal ideation, *NON* non-support, *STR* stress, *RXR* treatment rejection, *DOM* dominance, *WRM* warmth

*$p < .05$

**$p < .01$

***$p < .001$

Table 3 ANCOVA results for service era with gender and combat exposure covaried for PAI clinical subscales

Scale	Subscale	Gender (covariate) $F(1, 255)$	Combat exposure (covariate) $F(1, 255)$	Service era $F(2, 255)$	p	Vietnam ($n = 57$)[a] M (SD)	%≥70	Desert Storm ($n = 33$)[b] M (SD)	%≥70	Post-9/11 ($n = 166$)[c] M (SD)	%≥70	Hedge's g effect size 1v2	1v3	2v3
SOM	Conversion (SOM-C)	4.386*	7.564**	5.183	.006	73.0 (13.3)	63.6%	63.8 (14.6)	28.3%	68.2 (14.9)	42.6%	.65	.33	.30
	Somatization (SOM-S)	.469ns	1.686ns	8.152	<.001	72.1 (9.5)	60.6%	63.0 (11.9)	31.8%	68.9 (11.8)	54.7%	.82	.28	.50
	Health concerns (SOM-H)	.046ns	.748ns	.657	.519	67.3 (11.0)	42.4%	61.6 (12.4)	26.1%	68.6 (51.4)	30.0%	.48	.03	.16
ANX	Cognitive (ANX-C)	4.018*	.019ns	5.243	.006	70.8 (11.7)	57.7%	62.8 (10.5)	24.8%	67.7 (11.4)	46.8%	.72	.27	.43
	Affective (ANX-A)	5.563*	3.428ns	5.229	.006	74.8 (12.6)	69.7%	67.7 (11.4)	42.1%	72.6 (11.3)	65.4%	.60	.19	.44
	Physiological (ANX-P)	2.936ns	2.168ns	9.382	<.001	75.9 (13.6)	60.6%	65.0 (10.9)	28.2%	73.3 (14.4)	51.0%	.91	.18	.61
ARD	Obsessive-compulsive (ARD-O)	1.806ns	1.512ns	6.437	.002	64.0 (10.5)	45.4%	56.7 (10.4)	9.0%	62.0 (11.1)	27.0%	.71	.18	.49
	Phobias (ARD-P)	4.148*	.039ns	1.784	.170	65.1 (12.8)	45.5%	59.9 (10.7)	22.9%	61.9 (11.7)	28.2%	.46	.27	.17
	Traumatic stress (ARD-T)	.223ns	15.427***	5.117	.007	83.2 (11.0)	91.0%	77.1 (13.8)	77.7%	81.8 (12.4)	82.2%	.47	.11	.37
DEP	Cognitive (DEP-C)	.556ns	.527ns	5.518	.031	76.3 (18.5)	60.5%	68.5 (11.4)	40.6%	73.2 (14.5)	56.4%	.55	.21	.34
	Affective (DEP-A)	.087ns	1.606ns	3.105	.047	76.9 (17.3)	66.6%	71.4 (13.5)	56.3%	76.8 (14.6)	66.0%	.37	.01	.37
	Physiological (DEP-P)	.014ns	3.003ns	10.270	<.001	77.5 (9.1)	81.9%	69.3 (9.9)	45.7%	73.9 (8.8)	64.2%	.85	.41	.51
MAN	Activity level (MAN-A)	.270ns	2.939ns	4.835	.009	58.2 (12.2)	15.2%	53.4 (9.0)	8.9%	58.4 (11.4)	20.4%	.47	.02	.47
	Grandiosity (MAN-G)	.100ns	9.476**	5.276	.006	45.5 (8.6)	3.0%	43.2 (9.7)	5.4%	48.1 (11.0)	6.6%	.24	.25	.46
	Irritability (MAN-I)	.083ns	4.620*	14.308	<.001	67.5 (11.2)	45.5%	57.9 (12.3)	17.7%	66.5 (10.9)	35.4%	.80	.09	.76
PAR	Hypervigilance (PAR-H)	.024ns	3.382ns	8.241	<.001	72.3 (11.4)	54.6%	63.1 (12.6)	31.8%	70.5 (13.8)	52.8%	.75	.13	.54
	Persecution (PAR-P)	.927ns	.357ns	7.977	<.001	65.1 (14.0)	30.2%	56.0 (10.8)	14.1%	63.7 (14.6)	29.4%	.75	.10	.56
	Resentment (PAR-R)	1.101ns	.666ns	5.749	.004	67.9 (12.8)	39.5%	61.3 (12.2)	24.7%	66.8 (11.7)	36.0%	.53	.09	.47
SCZ	Psychotic experiences (SCZ-P)	.128ns	1.731ns	4.100	.018	56.7 (12.8)	21.2%	50.0 (8.1)	1.8%	54.8 (14.2)	15.6%	.66	.13	.38
	Social detachment (SCZ-S)	1.071ns	.026ns	2.515	.083	74.0 (14.6)	54.6%	67.8 (13.7)	42.3%	71.3 (13.4)	58.2%	.44	.20	.26
	Thought disorder (SCZ-T)	.607ns	3.202ns	10.157	<.001	74.2 (12.3)	72.9%	65.6 (10.9)	40.5%	73.9 (13.7)	62.4%	.78	.02	.66
BOR	Affective instability (BOR-A)	.220ns	3.84ns	12.681	<.001	74.8 (9.1)	66.7%	65.6 (11.0)	35.3%	72.4 (10.4)	60.8%	.89	.24	.64
	Identity Problems (BOR-I)	3.7ns	2.804ns	9.721	<.001	67.6 (10.7)	48.5%	60.8 (9.8)	17.7%	68.1 (11.0)	50.5%	.67	.05	.69
	Negative relationships (BOR-N)	1.549ns	1.945ns	9.534	<.001	68.5 (11.7)	48.4%	60.0 (10.8)	21.2%	67.5 (11.8)	42.6%	.76	.09	.64
	Self-harm (BOR-S)	.437ns	4.280*	2.635	.074	60.6 (15.9)	18.2%	55.4 (11.1)	14.1%	58.6 (13.8)	16.2%	.40	.14	.25
ANT	Antisocial behaviors (ANT-A)	5.472*	1.553ns	1.489	.227	59.0 (9.6)	18.1%	56.3 (10.3)	10.7%	58.2 (11.7)	14.4%	.28	.08	.17
	Egocentricity (ANT-E)	2.166ns	3.549ns	2.620	.075	55.7 (11.5)	12.1%	51.2 (10.51)	7.1%	54.5 (13.8)	12.6%	.41	.09	.25
	Stimulus-seeking (ANT-S)	.002ns	10.952**	6.409	.002	60.9 (13.9)	27.2%	54.2 (12.1)	17.6%	60.7 (13.8)	27.6%	.53	.02	.48
AGG	Aggressive attitude (AGG-A)	.750ns	1.623ns	4.076	.018	65.3 (11.8)	42.5%	60.1 (13.1)	28.1%	64.9 (12.0)	38.4%	.41	.04	.39
	Verbal aggression (AGG-V)	.518ns	1.5ns	9.372	<.001	56.9 (13.0)	18.2%	54.0 (11.3)	7.2%	61.3 (11.2)	25.2%	.25	.38	.65
	Physical aggression (AGG-P)	2.536ns	5.173*	6.389	.002	73.4 (15.1)	57.7%	63.8 (14.7)	30.0%	70.5 (17.0)	47.4%	.64	.17	.41

of influence depending on the instrument (MMPI-2 versus MMPI-2-RF). Our results suggest another possibility: findings of these studies do not contradict and are better explained by sampling differences between them. Glenn et al (2002) compared Vietnam and Gulf War Veterans and identified meaningful differences. Meanwhile, Ingram et al., (2020a, 2020b) contrasted Vietnam Veterans with those of a combined group (Gulf War plus Post-9/11) due to their reliance on the Veteran Affairs (VA) electronic medical record grouping. Glenn et al (2002) noted differences with medium effects between these two groups while Ingram et al., (2020a, 2020b) did not. In our study, we found similar effect sizes to Glenn et al (2002) in comparable analyses (Vietnam versus Gulf War) and similar non-effects to those seen in the Ingram et al., (2020a, 2020b) study, when one takes into effect the over-representation of Post-9/11 Veterans likely included within their combined Gulf plus Post-9/11 sample. The Post-9/11 service era is the fastest growing group of Veterans within the VA (DoVA, 2018) and assessment needs of those individuals are highest as they initiate treatment for the first time within the VA healthcare system. As our analyses demonstrate, lumping Post-9/11 Veterans with Gulf War Veterans in efforts to make diagnostic advancements is not appropriate given the observable, and clinically meaningful differences between these groups.

In addition to where the distinction between service era falls, there are also implications within our study about the potential cause of such differences. Glenn et al. (2002) concluded that three distinct reasons might explain these differences: homecoming factors, combat exposure, and having lived with PTSD for a longer period. Our study helps clarify that neither homecoming factors nor combat exposure severity is likely a cause for differences in era presentation. Although combat exposure impacts PAI scale scores, accounting for it does not explain differences between service eras. Exemplifying this conclusion, the homecoming experiences are similarly distinct between Vietnam and Post-9/11 Veterans as they are between Vietnam and Gulf War Veterans in terms of medical and psychological treatment available through the VA, as well as differences in public support. Likewise, Post-9/11 Veterans will have a substantially shorter period with lived trauma exposure than Gulf War Veterans. Thus, the nature of combat experience is more likely influential than the severity of combat experience. The non-conventional warfare experience is common in both Vietnam and Post-9/11 Veterans. Additionally, distinctions between eras are consistent with trauma symptomology (e.g., Bellet et al., 2018; Glenn et al., 2002; Mozley et al., 2005). Thus, our findings suggest that service era differences are most likely to emerge when comparing those with conventional and non-conventional warfare experiences.

Building upon this point, exposure to non-conventional warfare appears to result in greater trauma symptom endorsement. Increased trauma-related symptoms occur on content-related diagnostic criteria (APA, 2013), such as Criterion D's focus on negative mood [e.g., Depression (DEP) and its subscales (DEP-C, DEP-A, and DEP-P)]. However, the scale that is the best indicators of PTSD on the PAI (i.e., ARD-T; Bellet et al., 2018; Mozley et al., 2005) is highest and most frequently elevated in Gulf War Veterans, who experienced a more conventional warfare experience. Thus, patterns of service era differences in trauma pathology are only partially congruent with patterns observed on clinician-rated measures (Brown et al., 2016) and in non-broadband trauma symptom checklist [i.e., PTSD Checklist (PCL); Erbes et al., 2009; Yoder et al., 2012]. Differences exist between broadband personality measures and these assessment approaches (clinician-rated inventory and symptom checklist), as well as between these other methods. As such, questions about service era's influence on trauma treatment seeking Veteran PTSD symptom presentation remain unresolved.

There is a direct implication for increased general symptom endorsement among those with non-conventional warfare experiences. Increased endorsement across multiple PAI scales may result in greater patterns of profile invalidity since increased clinical scale item endorsement is linked with increased over-reporting determinations (i.e., Boress et al., 2021; Gaines et al., 2013). Moreover, this is increasingly likely since trauma clinics already see heightened cases of invalid and clinical endorsement (Ingram et al., 2019, 2020b). As such, compensation and pension (CNP) determinations for PTSD (accounting for around 17% of all VA CNP determinations; NCVAS, 2014) might become impacted depending on the nature of an era's combat experiences, if scales assessing profile validity (e.g., over-reporting) are not robustly validated and effective at properly identifying feigned and actual pathology within Veteran populations (see Ray, 2017). Our removal of participants with profiles invalidated by the PAI validity scales may, therefore, raise questions about research design decisions. Given the minimal number of cases removed because of NIM scores, it is unlikely to have biased our results. Likewise, it is important to note that research on the PAI validity scales utilized within this study has supported their utility in making determinations of test interpretability (see Hawes & Boccaccini, 2009) and are recommended for use in standard practice of the instrument (see Morey, 1991). Our decision to exclude participants, in light of research demonstrating elevations on NIM associated with trauma symptoms (Ingram et al., 2019), was undertaken to maximally account for error variance (e.g., identified invalid responding using empirically supported validity scales) within our data such that we may have as much certainty as possible with regard to the cause of our findings.

Another area of interest in our findings is the observation that service eras also differed thematically (i.e., conventional versus non-conventional experiences) on the Treatment Rejection (RXR) scale, which relates to issues of motivation, acceptance of responsibility, and willingness to change (Morey, 1996). This inverse relationship with increased general symptomology (i.e., Gulf Veterans had the lowest pattern of clinical scale scores and the highest treatment rejection) may indicate the perceived necessity of treatment by Veterans with the most unstable, unpredictable warfare experiences (see Reisman, 2016). Another possibility is that distinctive PTSD symptom trajectories (e.g., Bonanno et al., 2012) may play a role in who is being assessed from each service era, conflating the appearance of service era differences with issues of selection bias. For example, Vietnam Veterans seen decades after their military traumas are more likely to fall within a worsening-chronic PTSD trajectory, while Post-9/11 Veterans may include a greater number of those with long-term recovery outcomes (Galatzer-Levy et al., 2018). Thus, further investigation into the relationship between service era, treatment rejection, and general symptomology/trajectory may be needed in order to better understand these specific results.

Service eras also demonstrate substantially elevated rates of risk for suicidality [26.5–33.9% elevated scores on the Suicidality (SUI) scale] with only small differences between the eras. Suicidality in Veterans is a major concern, (Kang et al., 2015), particularly those with trauma histories (Conner et al., 2014; Jakupcak et al., 2009). The slightly higher rates of elevation on the PAI SUI scale in the Vietnam and Post-9/11 era veterans may point to the potential influence of the non-conventional warfare experiences as a heightening factor of this clinical risk, providing a framework for when era-related suicidality might increase (Ilgen et al., 2012). Within the VA, regular screenings for suicidality are clearly warranted and primary care locations seem highly effective for this purpose (Ashrafioun et al., 2016; Oslin et al., 2006). Given the high rates (25%+) of SUI scale elevation in this study, screenings are needed regardless of a Veteran's era of service.

This study has several strengths which expand existing literature and provide meaningful clinical implications within the VA system. We include combat exposure intensity as a covariate in the evaluation of service era differences and we evaluate multiple eras to bridge the existing literature within similar areas and clinical service settings more directly [i.e., VA PTSD treatment clinics (PCT); Glenn et al., 2002; Ingram et al., 2020a]. However, our study should also be considered within the scope of its limitations. First, these findings are not specific to those diagnosed with PTSD as no structured interview of diagnostic information was available on participants. Although, those seeking services at PCTs generally meet criteria for PTSD

(~90%; Mozley et al., 2005), consistent with mean scores across our sample on ARD-T falling well above the recommended clinical cut-score. Additionally, we contrasted only self-report personality instruments and additional focus on clinician-rated measures would also be beneficial for future studies given the inconsistent results seen across studies. Treatment outcome differences across service era should be further investigated given that treatment attitudes differ in this study (i.e., RXR) and such a finding contrasts with the limited literature on treatment completion differences by era (e.g., Brown et al., 2016). Future studies may wish to evaluate symptom presentation across eras at equal time points after trauma experiences to determine if PTSD symptom trajectory (Galatzer-Levy et al., 2018), or traditional/non-traditional combat experience, may better explain service era differences. Lastly, although significant differences between gender were observed, the limited representation of women within our sample draws into question if these findings warrant meaningful interpretation, particularly given that gender differences are not always observed as meaningful when comparing service era differences in other measures (Ingram et al., 2020a). Research, inclusive of a larger and more representative sampling of women, is needed to evaluate PAI scale gender invariance.

Declarations

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