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A Latent Profile Analysis of Aggression and Victimization across Relationship Types Among Veterans Who Use Substances

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Abstract

Objective: This study examined patterns of violence victimization and aggression in both intimate partner and non-partner relationships among veterans, and used latent profile analysis to identify subtypes of violence involvement.

Methods: Participants were 841 substance use treatment-seeking veterans (94% male) from a large VA Medical Center who completed screening measures for a randomized controlled trial. Self-report measures were: substance use, legal problems, depression, and violence involvement.

Results: Past year violence involvement, including both intimate partner (IPV) and non-partner (NPV) were common in the sample; although NPV occurred at somewhat higher rates. When including either IPV or NPV aggression or victimization, over 48% reported involvement with physical violence, 31% with violence involving injury and 86% with psychological aggression. Latent profile analysis including both aggression and victimization in partner and non-partner relationships indicated a four profile solution: no-low violence (NLV, $n = 701$), predominantly IPV ($n = 35$), predominantly NPV ($n = 83$), and high general violence (HGV, $n = 22$). Multinomial logistic regression analyses revealed that compared to the no-low violence group, the remaining three groups differed in demographics, depressive symptoms, alcohol and other drug use, and legal involvement. Individuals within each profile had different patterns of substance use and legal involvement with the participants with an HGV profile reporting the most legal problems.

Conclusions: IPV and NPV are relatively common among veterans seeking substance use treatment. Characteristics of violence and associated substance use, mental health, and legal difficulties may be useful in considering how to tailor substance use and mental health services.

A Latent Profile Analysis of Aggression and Victimization across Relationship Types

Among Veterans Who Use Substances

Involvement with violence (i.e., aggression and/or victimization) is a significant public health

concern affecting approximately 30% of Americans in their lifetimes and is associated with an

array of psychosocial problems, including substance use (Resnick et al., 1997; Rhodes et al.,

2009; Tjaden and Thoennes, 2000). Experiencing victimization is associated with an array of

mental and physical health complaints and even decreased occupational functioning (Byrne,

Resnick, Kilpatrick et al., 1999; Tjaden & Thoennes, 2000). Engaging in aggression is also

associated with poorer health including substance abuse and risk of HIV (Dunkle, Jewkes,

Nduna et al., 2006; Raj, Reed, Welles et al., 2008).

There is a strong relationship between substance use and violence (Murphy & Ting). For

example, rates of intimate partner violence (IPV), including either aggression or victimization,

often exceed 50% among patients in substance use disorder (SUD) treatment settings (Brown et

al., 1998; Chermack et al., 2000; Schumm et al., 2009). The few studies that have also assessed

violence in non-partner relationships (e.g., friends, strangers, acquaintances, etc.) among patients

in SUD treatment also show similar rates of non-partner violence (NPV) (Chermack et al., 2000;

Murray et al., 2008a). In fact, when examining past-year involvement in either IPV *or* NPV

among SUD patients, greater than 70% reported physical aggression (Chermack et al., 2000).

The purpose of the present study was to identify patterns of violence involvement in partner and

non-partner relationships among SUD treatment seeking veterans.

Violence involvement in veterans

IPV and NPV are relatively common problems among veterans, with factors such as SUDs,

posttraumatic stress disorder (PTSD), and more recent service era (the time period/conflict

during enlistment) related to higher rates of violence (Elbogen et al., 2014; Gierisch et al., 2013; LaMotte et al., 2014; Marshall et al., 2005).Rates of past year IPV involvement among veterans with SUDs have been estimated in the 42-54% range (Chermack et al., 2008; Teten et al., 2009). The elevation of violence involvement in veterans with SUDs is consistent with biopsychosocial theories postulating that historical factors (e.g., prior violence exposure), psychological characteristics (psychological symptoms), alcohol and/or drug use, and social/contextual factors impact the risk for violence involvement (Chermack et al., 2009; Beck et al., 2013).

Thus, despite progress in research regarding IPV treatment among veterans (for example, Marshall et al., 2005 and Taft et al., 2013), examination of aggression *and* victimization simultaneously, across both partner and non-partner relationships, is under-explored in this population. Veterans tend to have high rates of problems that are associated with aggression/victimization risk, including poorer physical health functioning, PTSD and exposure to violence, heavy alcohol use, etc. (Hoerster et al., 2012; Elbogen et al., 2014; Gierisch et al., 2013; LaMotte et al., 2014; Marshall et al., 2005). Given these previous findings, it is important to explore profiles of violence among veterans' with SUDs in order to assist with prevention and treating violence-related problems in this population.

Forms of violence

An additional limitation of prior work includes lack of measurement of multiple forms of violence (psychological, physical and violence involving injury). Specification of the form of violence is important because different forms of violence may have different correlates and clinical outcomes (Epstein-Ngo et al., 2014). Physical assault and injury-related violence are primarily differentiated by severity where physical assault comprises any behavior that is inflicted physically and intended to cause harm whereas injury is indicated by bone or tissue

damage, a need for medical attention, or continuing physical pain. Differentiating these forms of violence highlights meaningful clinical differences; when examining only physical assault, it is common to find that women are equally or more violent than men (Archer, 2000), but when focusing on injury, women are much more likely to be seriously injured than men (Archer, 2000). There is also greater understanding that psychological forms of abuse, causing harm through verbal (e.g., calling names) or nonverbal behavior (e.g., stomping out of the room), can cause psychological distress and are worthy of clinical attention (Coker et al., 2012). Thus, research that better characterizes the heterogeneity of violence involvement is needed to enhance interventions for veterans.

Subtypes: IPV vs. NPV

Prior research has focused on samples characterized by IPV and identified subtypes (e.g., family only aggressors, borderline/dysphoric, generally violent/antisocial) (Holtzworth-Munroe et al., 2003; Walsh et al., 2010), that by design, did not include individuals who engage in only NPV. In SUD settings, research has shown some differential correlates for IPV and NPV (Chermack et al., 2000, 2010; Epstein-Ngo et al., 2014), suggesting potential subtypes exist, but few studies have employed person centered approaches to include multiple forms of IPV and NPV. Notable exceptions examining violence subgroups inclusive of both IPV and NPV provide an interesting foundation for understanding potential violence profiles in SUD treatment populations. Chermack et al., (2009) examined violence related injury among those in SUD treatment, and compared those: injuring partners only, non-partners only, or both; those injuring non-partners or both had more severe mood and substance problems. Another study found that correlates of violence were similar across victimization and aggression, but were differentiated by relationship type (IPV, NPV, or both) and gender (Walton et al., 2007).

Current study

The current study fills a gap in the literature by providing descriptive information (rates, frequencies) of multiple forms of violence and including both aggression and victimization across relationship types, among veterans seeking SUD treatment. Specifically, we include a comprehensive measurement of multiple forms of both NPV and IPV aggression and victimization (psychological, physical, injury) and use Latent Profile Analysis (LPA) to empirically derive violence subtypes. We hypothesized that at least three different profiles would emerge (consistent with Holtzworth-Munroe et al., 2003 and others) but did not make specific hypotheses about the characteristics of these groups given the lack of research on NPV. We also expected that groups with greater violence involvement would report more severe clinical characteristics. We chose potential clinical correlates variables based on biospychosocial models of violence and prior research (Chermack et al., 2009; Taft et al., 2007; Teten et al., 2009).

Methods

Participants and Procedures

Participants were 841 veterans initiating treatment or receiving treatment after a break in care from the Ann Arbor Veterans Affairs (VA) Healthcare System from 2012-2015. Participants were recruited as part of screening for a randomized controlled trial (RCT) of an intervention for substance use and violence prevention (based on Chermack et al., 2015). The data presented herewere obtained during screening for the RCT. Inclusion criteria for screening were: recent substance use and attendance in outpatient SUD or mental health clinics. Exclusion criteria for screening were: living outside the catchment area, inability to provide informed consent (e.g., cognitive difficulties), having a legal guardian, inability to speak/read English, current suicidal intent and plan, acute psychosis, and ongoing participation in another intervention study.

Participants were remunerated $10.00 for completing screening measures which included several surveys and was designed to be completed in approximately 30 minutes. Participants were mostly Caucasian (71.5%), male (93.5%), non-partnered (69.6%), non-employed (75.9%), low income (average $10,000 - $19,999), middle-aged ($M = 48.2$, $SD = 13.3$). Nearly two thirds of the sample served in Vietnam (29.4%) or served in Afghanistan and/or Iraq (OEF/OIF) (29.8%). Nearly 18% ($n = 147$) of participants were mandated or recommended to treatment by the criminal justice system. Data were collected under the supervision and approval of the Institutional Review Board of Ann Arbor VA and the trial is registered on ClinicalTrials.gov (#NCT01337973).

Measures

Past-year violence. Past year IPV and NPV aggression and victimization was assessed using a shortened version of the Revised Conflict Tactics Scale (CTS2; Straus et al., 1996). The CTS2 uses paired items to assess both aggression ("I hit my partner") and victimization ("My partner did this to me") on a frequency scale ranging from "0 – Never" to "6 – 20+ times" over the past year. Following convention, we computed frequency variables for each scale using the midpoint anchor of each selected range; alphas were generally acceptable (Table 1). For the NPV assessment we modified the CTS2 to assess NPV, e.g., "I kicked someone other than my partner" (Chermack et al., 2009; Murray et al., 2008). The parent intervention study focused primarily on reducing physical aggression (including injury) as measured by the CTS2. Given the need to also measure psychological symptoms in our screening battery we included a shortened version of the psychological aggression subscale (4 items were eliminated). The assessment of interpersonal violence excluded violence experienced as a result of combat.

Current depression symptoms. The 9-item Patient Health Questionnaire (PHQ-9) was used to assess past two-week symptoms (from 0 = "not at all" to 3= "nearly every day") of major depression consistent with the DSM-IV criteria. Items are summed to yield a depression severity score ranging from 0 to 27 (Kroenke and Spitzer, 2002); in this study, Cronbach's alpha was .90.

Current PTSD symptoms. The PTSD Checklist (PCL) was used to assess PTSD symptoms. The PCL is a 17 item measure that ask participants to rate how frequently they have experienced each of the 17 PTSD symptoms corresponding to DSM-IV-TR criteria on a scale ranging from 1 ("not at all/never") to 5 ("extremely/daily or almost daily"). Item 17, "feeling jumpy or easily startled" was accidentally not administered. For the multivariate model we used a PCL cut-off score of 50 to conservatively estimate probable PTSD.

Past 28-day substance use. Substance use was assessed using items from the University of Arkansas Substance Abuse Outcomes Module (SAOM; Smith et al., 2006). Participants indicated the   number of days they drank any alcohol as well as the number of days they consumed five or more drinks (e.g., heavy episodic drinking, HED). Similarly, participants indicated the number of days that they used each of the following: marijuana, cocaine or crack, stimulants (prescribed to participant and non-prescribed), opiates (prescribed to participant and non-prescribed), sedatives (prescribed to participant and non-prescribed), and heroin.

Lifetime legal problems. Items from the legal subsection of the Addiction Severity Index (ASI) were administered (McLellan et al., 1992). Because we were interested in distinguishing between legal problems related to aggression or other behaviors, we used factor analysis and correlation to create two composite scales from ASI items. The non-aggressive offenses scale comprised 8 items (e.g., shoplifting, vandalism, drug offenses, burglary, etc.), and the aggressive offenses scale (assault, rape, homicide, etc.) comprised 5 items. Following our

analyses, the DUI item was retained individually as it did not covary with other items

significantly. To standardize the distribution, *z* scores were computed.

Statistical Analysis

LPA is a person-centered statistical approach that groups participants based on a set of

measured variables that are hypothesized to represent a set of unmeasured or latent variables. In

this analysis, twelve indicator variables (continuously scored), were used to include the three

forms of aggression and victimization (physical assault, injury, psychological) in both partner

and non-partner relationships separately.

We conducted the LPA in an exploratory fashion using Mplus (Version 6.11). Following

standard LPA approaches, a two profile model was examined first and profiles added to the

model until no additional statistical differences are found (Collins & Lanza, 2010). We evaluated

model fit using Bayesian Information Criteria (BIC) with lower values indicating better fit, and

entropy with values closer to 1.0 indicating better fit. The means of indicator variables within the

profiles were examined to characterize each profile. Finally, we evaluated the model with the

Vuong-Lo-Mendell-Rubin test and the Lo-Mendell-Rubin Adjusted Likelihood Ratio test to

ensure that the model selected best accounted for the data as compared to a more parsimonious

model, as indicated by *p* values greater than .05 for each of these tests. Drawing from the

available (although limited) literature, our study is likely well-powered indicating the validity of

the small groups extracted and model stability (Nylund, Asparouhov & Muthén, 2007).

To examine clinical correlates by profile, participants were assigned to their most likely

profile using the probabilities generated by the LPA. Average profile probabilities for mostly

likely profile membership for each class were: 1.00 for profile 1 (no-low violence), .97 for

profile 2 (predominantly IPV), .98 for profile 3 (predominantly NPV), and 1.00 for profile 4

(high general violence). Profile assignments were exported from MPlus to SPSS; multivariate analyses were conducted in SPSS. In terms of missing data, no variable exceeded 2% that was missing, and missing data listwise (31 missing cases) for the multinomial logistic regression was < 4%. Following, we did not conduct data imputation and utilized list-wise deletion.

Bivariate comparisons (i.e., chi-square tests, analysis of variance) were made to examine differences between the profiles on demographic characteristics and mental health correlates. Some demographic characteristics were highly intercorrelated (service era and age; living situation and marital status) and these variables were pared in final models. Finally, we conducted a multinomial logistic regression analysis to evaluate multivariable relationships between the mental health correlates identified and violence profiles while accounting for shared variance.

Results

Descriptive Information Regarding IPV and NPV

Table 1 provides details regarding measures of IPV and NPV aggression and victimization in the sample. Collapsing across all three forms of violence and including victimization and aggression, 75.6% of participants reported any NPV, 64.7% reported any IPV, with 86.3% reporting any violence across relationships. IPV victimization and aggression were highly intercorrelated, $r(841) = .89$, $p < .001$. This was also true for any form of NPV victimization or aggression, $r(841) = .76$, $p < .001$.

Considering physical assault only, rates were 33.8% (NPV) and 23.2% (IPV), with 42.3% reporting either IPV or NPV. IPV physical assault victimization and physical assault aggression were highly correlated, $r = .71$, as was physical assault for NPV victimization and aggression, $r = .80$, $p < .001$. Rates of injury-related aggression or victimization ranged from approximately

10% to 22%. IPV physical assault and injury aggression were highly intercorrelated, $r(841) =$ .85, p < .001 as were IPV physical assault and injury victimization, $r = .74$. Results were extremely similar for NPV. Finally, when including either IPV or NPV, over 48% reported involvement with physical assault, 31% with injury-related violence, and 86% for psychological abuse.

Latent Profile Analysis Findings

The means for each indicator variable in each profile are statistically different between each profile at $p < .001$; that is, for each of the twelve violence indicator variables, each profile is statistically unique from each other. A four profile solution best fit the data (BIC = 50596.47; entropy = 0.99). The Vuong-Lo-Mendell-Rubin test ($p = . 61$) and Lo-Mendell-Rubin Adjusted Likelihood ratio test ($p = .61$) indicated that the three profile solution was similar but had a higher BIC = 51713.07. The Vuong-Lo-Mendell-Rubin and Lo-Mendell-Rubin Adjusted Likelihood ratio tests indicated a five profile solution was not statistically different ($p = .43$) from the four profile model; thus the more parsimonious four profile solution was chosen. See Table 2 for fit indices.

Table 3 displays the profile means and standard deviations for each indicator variable included in the LPA; Figure 1 graphically displays these means. Notably, these figures represent estimated frequency counts for each type of behavior; these counts do not necessarily represent separate incidents as a single altercation may include multiple behaviors, for example, both name calling and punching, which would be counted separately.

No-low violence profile.

The largest and least violent profile ($n = 701$ or 83.4%), was characterized as the no-low violence profile (NLV), where participants reported low violence across all three violence forms

and both social domains. For participants in this profile, their relationships are characterized by infrequent physical (*M*'s = 1.5 IPV, 9.7 NPV) and psychological (*M*'s = 18.1 IPV, 7.4 NPV) violence and rare injury for both victimization and aggression. Among individuals with this profile the means for counts of victimization were very similar to those for counts of aggression in the IPV domain.

Predominantly IPV profile.

The second profile (*n* = 35, 4.2%) was characterized as the predominantly partner violence (PIPV) profile because these participants reported high levels of IPV, particularly victimization, compared to NPV (although the levels of NPV were still far greater than NPV levels in the no/low violence profile). Participants in this profile reported an average of 50.1 counts of IPV physical victimization in the past year and an average of 2.9 counts of NPV physical victimization. These participants reported asymmetric violence in the IPV variables, reporting much more victimization than aggression counts of psychological, physical, and injury related violence. Profile 2 participants also reported asymmetry in the NPV domain, but this pattern differed: greater physical aggression, equivalent injury-related violence, and greater physical victimization.

Predominantly NPV profile.

The next profile (*n* = 83, 9.9%) was characterized as the predominantly non-partner violence profile (PNPV) as these participants reported the opposite pattern with relatively high levels of NPV. Mean counts of NPV physical victimization was 13.3versus 4.0 for IPV physical victimization. In this profile, participants reported generally symmetric levels of violence within each relationship type, with the exception of NPV physical violence where they reported engaging in more aggression than victimization.

High general violence profile.

The final profile (*n* =22, 2.6%) was characterized as the high general violence (HGV) profile and reported moderate to high levels of IPV as well as high levels of NPV. Of note, the high general violence profile reported the highest level of injury-related violence, reporting means two to four times those of other profiles. Individuals with this violence profile also reported a greater number of NPV counts than IPV counts and the highest levels of violence in either relationship type compared to all other profiles. Participant with this profile reported high symmetry in the domain of IPV but less so in the NPV domain, with more aggression than victimization counts reported. Of note, there were no women in this profile.

Differences in Clinical Characteristics among the Profiles

Results of chi-square and ANOVA tests (shown in Table 4) revealed that individuals comprising the four profiles did not vary significantly by current employment status, income, or education level. However, there were significant profile differences on age, gender, service era, and marital status. In relation to mental health correlates, the groups differed by substance use (HED, marijuana, cocaine/crack, stimulants, sedatives/hypnotics), legal involvement, depression symptoms, and PTSD symptoms, but not heroin, or opioid use (Table 4).

Results of the multinomial logistic regression model are shown in Table 5. Only variables identified as significant in the bivariate analyses were retained for the regression analyses; due to high intercorrelation ($r = .76$) between age and service era status, only age was included in this model. The no-low violence profile was used as the reference group. Gender was excluded from this analysis because the perfect prediction of this variable on to profile 4 destabilized the estimates of other variables.

Compared to the no-low violence profile, the predominantly IPV profile was younger, used cocaine/crack more frequently, used prescription stimulants more frequently, and had more non-aggression related legal charges. In comparison to the no-low violence profile, the predominantly NPV profile was younger, engaged in HED more frequently, had more aggression-related legal charges, and higher PTSD symptoms. Finally, compared to the no-low violence profile, the high general violence profile was younger, engaged in HED more frequently, had more severe PTSD symptoms and more legal charges (both aggression and non-aggression).

Discussion

Violence involvement is associated with many deleterious consequences including poor mental and physical health (Resnick et al., 1997). This study is the first to provide comprehensive information on violence involvement across multiple forms and relationship types among a treatment-involved sample of veterans. We found higher rates of NPV involvement than IPV involvement; this is consistent with other research that has examined both domains of violence in other SUD treatment settings (Chermack et al., 2009). The rates of both IPV and NPV in this sample were somewhat lower than those found in community or justice-referred samples (Beck et al. 2013; Crane et al. 2014), likely due to the higher mean age (48 years) and lower number of married couples in the present sample. The common presence of IPV and NPV highlights the importance of comprehensive screening for violence involvement in VA treatment clinics. When both NPV and IPV victimization and aggression measures were considered, 48% of the sample was identified as being involved with physical violence, 31% with injury-related violence, and > 86% with psychological violence.

The present study is unique in applying an advanced quantitative methodology, latent profile analysis, to "subtype" or characterize violence involvement by incorporating all violence variables simultaneously. Such an approach is critical and necessary to more fully understand potential typologies of violence and associated treatment needs for veterans. Indeed, our results are markedly different from much past research in IPV subtyping, likely reflecting the sample of veterans seeking SUD treatment and our comprehensive measurement of violence (Holtzworth-Munroe & Stuart, 1994; Langhinrichsen-Rohling et al., 2012). We identified four profiles of veteran SUD treatment seekers who were characterized primarily by the relationship type and severity of violence involvement, the latter a key indicator in prior research (Ansara and Hindin, 2010; Beck et al., 2013). The severity of violence in the profiles spanned the entire range from relatively low severity in the no-low violence group, moderate severity in the predominantly IPV and NPV profiles, to severe levels in the high general violence profile. Two of the profiles were identified by asymmetry in violence victimization and aggression (predominantly IPV and predominantly NPV), while the other two profiles (no-low violence and high general violence) had similar involvement in victimization and aggression across IPV and NPV domains. Notably, this violence excludes combat exposure.

Interestingly, the form of violence (e.g., the presence of injury-related violence) was not a unique characteristic in any profile, which is contrary to other latent class/profile research examining IPV using only partner victimization data and including more women (Ansara & Hindin, 2010; Beck et al., 2013). This may be partially due to the very high intercorrelations between physical assault and injury ($r > .7$), but it remains interesting that psychological aggression/victimization did not differentiate profiles. Contrary to some characterizations of IPV, this study did not find support for the "intimate terrorist" model of IPV (i.e., a group with high

levels of partner aggression with low levels of partner victimization) (Johnson, 2005). This may

be partially due to our more comprehensive approach to measuring violence and the type of

sample (e.g., veterans with substance misuse seeking treatment as opposed to court ordered

domestic violence samples; our sample was older and less likely to be married than other

samples). However, it is also possible that our predominately male participants (particularly in

the high general violence profile) may have been reluctant to admit severe violence to or from

partners. Our results are consistent with studies of non-veteran samples have suggested that the

most common type of partner violence is "mutual aggression and victimization" (Straus, 2015).

Further research using data from dyads is recommended (Leonard et al., 2015), although married

dyads may not encompass all IPV given that such violence can occur in dating relationships and

in extra-marital relationships as well.

We used the LPA results to identify how clinical characteristics consistent with

biopsychosocial models of violence were differentially associated with the empirically derived

profiles. Demographically the high general violence profile, was markedly different from the

other groups. This group was the youngest and was entirely made up of men. Compared to the

no-low violence group, all three profiles were more likely to experience PTSD symptoms, use

substances, and be involved with the legal system. Notably, we were unable to determine

whether legal problems predated substance use or vice versa; 17.7% of our sample was

mandated/recommended to treatment but there was no significant difference between the

identified profiles on this variable, $\chi^2(841) = .70$, $p = .87$.

Specific patterns of substance use and legal issues varied between groups with the

predominantly IPV profile having a higher percent of women and being more likely to use a

range of substances, and the predominantly NPV and high general violence profiles more likely

to engage in HED. The distinction of the predominantly IPV profile in having a higher percent of

women and using a range of substances indicates there may be some unique treatment needs for

women veterans and/or IPV involvement. Consistent with hypotheses and prior research, profiles

with greater violence involvement also had more severe clinical characteristics, experiencing

more PTSD symptoms and using more substances (Shorey et al., 2012, 2014; Taft et al., 2007).

In terms of findings for substance use and violence across different relationship types, our

findings are similar to prior research showing the association of alcohol and specific drugs may

be different for partner and non-partner violence (Chermack et al., 2009; Chermack et al., 2010;

Epstein-Ngo et al., 2014). We were unable to examine trauma history which may be a

differentiating factor, particularly whether participants were exposed to early trauma or family

violence. Although we investigated some of the clinical correlates most common in SUD clinics,

we recommend future research investigate modifiable, individual difference variables in order to

inform tailored intervention programs. For example, we recommend future research on

constructs like trait anxiety, distress tolerance, and coping skills, which have been shown in prior

research to be related to clinical outcome (Lejuez et al., 2008; Bornovalova et al., 2012; Levin et

al., 2007).

Based on the different violence profiles identified in this paper, different types of clinical

intervention may be warranted. Given the cross-sectional nature of this data, we present the

following suggestions as potential hypotheses for future research. Our findings are clinically

significant in identifying differences in the severity and type of violence involvement among

veterans. Specific to each profile, the predominantly IPV profile may benefit from an

intervention that targets relationship violence [e.g., Behavioral Couples Therapy (BCT)

(O'Farrell & Schein, 2000), Strength at Home (Taft et al., 2013)] and poly-substance use; especially given evidence that violence remits as substance use remits (Chermack et al., 2015; Schumm et al., 2009). The predominantly NPV and high general violence group may benefit more from interventions more focused on alcohol and general violence prevention as well as case management given their legal problems. Prior studies suggest more positive SUD treatment outcomes with close coordination with the legal system (Friedmann et al., 2009; Crane et al., 2014). For example, the VA Veteran's Justice Outreach Program (e.g., coordinates substance use and mental health services and legal issues) shows positive clinical and legal outcomes (Slattery et al., 2013).

The present study has a number of limitations. First, participant reports of IPV, NPV or substance use were not able to be corroborated. Prior studies have tended to show acceptable concordance of participant and collateral reports of violence and substance use, with a general tendency for participants to under-report their own aggression (Epstein-Ngo et al., 2014; LaMotte et al., 2014; Murray et al., 2008b; Panuzio et al., 2006; Tharp et al., 2014); thus, it may be that the relationships identified in the present study are under-estimated. Future research should examine models in partnered vs. non-partnered participants to examine how relationship status may affect profile. Given the novelty of our findings and statistical approach, replication of these findings is required and longitudinal research needed to examine intervention outcomes as well as how profile membership may change over time and social context. We recommend future research improve typologies by including sexual violence, which may be relatively common in IPV involved couples and may be a differentiating factor (Bagwell-Gray et al., 2015). Finally, the present sample was veterans seeking treatment, with a relatively small percentage of women participants.

To summarize, the present study provides important and novel information regarding violence involvement (aggression and victimization) among veterans in VA treatment, including the identification of potential violence subtypes. Overall, violence involvement was common and those involved with more severe levels of violence had more severe clinical characteristics (substance use, PTSD symptoms, legal problems). Future research is needed to explore the impact of current and promising new approaches targeting violence prevention [e.g., Substance Abuse-Domestic Violence Treatment (Easton et al., 2007) and motivational interviewing/cognitive behavioral therapy (Chermack et al., 2015), etc.], including those that incorporate partners/families (BCT, Strength at Home), coordinate with the legal system when indicated, and/or require only the individual participant but target both IPV and NPV (which may have broader feasibility in clinical settings).

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Table 1

Descriptive Statistics for Violence Variables, n = 841

Violence Form & Social Domain	Prevalence: % of sample	Mean, SD	Non-Zero Median	Range
IPV-PV, α=.89	26.6%	4.2(16.8)	4.0	0 – 225.0
IPV-IV α=.50	12.5%	0.9(3.8)	4.0	0 – 40.0
IPV-PsyV α=.77	61.0%	13.1(19.8)	11.0	0 – 100.0
IPV-PA α=.89	23.2%	2.7(12.6)	3.0	0 – 250.0
IPV-IA α=.71	9.5%	0.4(1.6)	2.0	0 – 58.0
IPV-PsyA α=.73	62.2%	13.0(18.7)	11.0	0 – 100.0
NPV-PV α=.84	30.1%	3.0(9.3)	4.0	0 – 110.0
NPV-IV α=.69	21.9%	1.5(5.3)	3.0	0 – 60.0
NPV-PsyV α=.70	68.3%	9.7(14.5)	7.0	0 – 83.0
NPV-PA α=.90	33.8%	4.4(13.7)	4.0	0 – 162.0
NPV-IA α=.84	18.5%	1.6(6.9)	3.0	0 – 108.0
NPV-PsyA α=.76	74.9%	13.4(18.5)	9.0	0 – 100.0

Note. IPV = intimate partner violence, NPV = non-partner violence, PV = physical violence victimization, IV = injury victimization, PsyV = psychological victimization, PA = physical violence aggression, IA = injury aggression, PsyA = psychological aggression

Table 2
Fit indices for latent profile models

Number of Profiles in Model	BIC	SSA-BIC	VLMR LRT	LMR LRT	Entropy
3-profile	51713.07	51554.29	-26515.19	1635.36	.99
4-profile	50596.47	50396.40	-25688.17	1190.55	.99
5-profile	49570.77	49329.42	-25086.10	1100.68	.99

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, SSA-BIC = sample size adjusted BIC, VLMR = Vuong-Lo-Mendell-Rubin, LMR = Lo-Mendell-Rubin, LRT = likelihood ratio test

Table 3

Means and Standard Deviations by Violence Domain and Latent Profile

Form of Violence	Profile 1 – NLV N = 701, 83.4%	Profile 2 – PIPV N = 35, 4.2%	Profile 3 – PNPV N = 83, 9.9%	Profile 4 – HGV N = 22, 2.6%
		Intimate Partner		
Victimization				
Physical violence	0.92(2.97)	50.14(47.79)	4.04(11.88)	37.41(40.67)
Injury	0.14(0.74)	9.34(9.90)	1.41(4.73)	8.50(10.96)
Psychological	8.99(13.76)	59.86(24.61)	17.33(20.11)	52.91(28.32)
Aggression				
Physical violence	0.59(1.98)	19.97(24.50)	4.39(9.62)	34.36(56.47)
Injury	0.10(0.61)	3.71(6.68)	0.95(2.21)	6.95(13.68)
Psychological	9.09(14.05)	43.74(21.82)	23.42(23.40)	50.72(12.07)
		Non-partner		
Victimization				
Physical violence	0.56(1.66)	2.91(4.43)	13.27(11.43)	40.95(26.13)
Injury	0.28(1.33)	1.03(2.09)	6.16(5.25)	25.14(15.49)
Psychological	6.66(10.69)	16.00(16.05)	24.93(19.44)	40.41(20.36)
Aggression				
Physical violence	9.16(13.30)	18.89(21.35)	35.17(20.94)	58.27(26.05)
Injury	0.14(0.62)	1.14(2.38)	5.81(5.15)	33.27(24.44)
Psychological	0.71(1.72)	6.20(9.16)	17.25(11.76)	70.00(32.95)

Note. All variable are significantly different in each individual profile at $p < .001$
NLV = no-low violence, PNPV = predominantly non-partner violence, PIPV = predominantly intimate partner violence, HGV = high general violence.

Table 4

Profile Differences in Clinical Characteristics, N = 841

Variables	NLV (1) N = 701, 83.4%	PIPV (2) N = 35, 4.2%	PNPV (3) N = 83, 9.9%	HGV (4) N = 22, 2.6%	Statistical Test (omnibus)
Age (*M*, *SD*)	49.51(13.09)[abc]	42.37(12.90)[b]	42.07(12.64)[a]	39.00(12.57)[c]	$F(3, 837) = 14.49, p < .001$
Gender (% women)	6.3%	20.0%	4.8%	0%	$\chi^2(3, 841)=12.40, p = .006$
Marital Status (dichotomous, % married)	26.0%	17.1%	14.5%	9.1%	$\chi^2(3, 841)=9.20, p = .03$
OEF/OIF/OND Era	26.7%	45.7%	45.8%	45.5%	$\chi^2(3, 841)=20.20, p < .001$
Numbers of days HED (*M*, *SD*)	8.59 (11.26)	7.11(9.55)	11.60(11.77)	12.76(11.11)	$F(3, 828) = 2.85, p = .04$
Number of days marijuana (*M*, *SD*)	3.99(8.87)[a]	8.29(12.09)[a]	5.93(10.30)	5.59(10.14)	$F(3, 834) = 3.42, p = .02$
Number of days cocaine/crack (*M*, *SD*)	1.48(5.21)[a]	4.63(9.41)[a]	2.58(6.23)	3.82(8.83)	$F(3, 835) = 5.13, p = .002$
Number of days stimulants – prescribed (*M*, *SD*)	.51(3.53)[a]	2.63(8.51)[a]	.68(3.70)	2.05(7.01)	$F(3, 832) = 4.03, p = .007$
Number of days sedatives/hypnotics – not prescribed (*M*, *SD*)	.52(3.31)[a]	2.17(6.64)[a]	1.39(4.08)	1.36(6.40)	$F(3, 835) = 5.58, p = .01$
Legal – aggressive charges (ZM, ZSD)	-.18(2.46)[ab]	.07(2.13)	.67(3.02)[a]	3.01(6.93)[b]	$F(3, 830) = 11.74, p < .001$
Legal – non aggressive charges (ZM, ZSD)	-.14(2.07)[a]	.88(5.63)	.06(1.21)	2.84(6.65)[a]	$F(3, 829) = 11.90, p < .001$
Legal – DUI (ZM, ZSD)	-.03(1.37)[a]	-.20(.64)	.03(1.02)	1.26(3.29)[a]	$F(3, 830) = 6.30, p < .001$
Depression symptoms (*M*, *SD*)	10.48(6.92)[abc]	15.20(5.85)[a]	13.21(5.50)[b]	16.45(6.38)[c]	$F(3, 837) = 13.65, p < .001$
PTSD total score (*M*, *SD*)	16.38(.62)[abc]	53.91(14.75)[a]	54.89(12.87)[b]	61.09(14.74)[c]	$F(3, 837) = 25.30, p < .001$

Note. OEF/OIF/OND = Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn, NLV = no-low violence, PNPV = predominantly non-partner violence, PIPV = predominantly intimate partner violence, HGV = high general violence. Z = Z score. HED = heavy episodic drinking, PTSD = posttraumatic stress disorder.

Superscripted pairs of letters indicate differences in group comparisons.

In the entire sample, the number of participants that reported any level of the following substances were: HED, *n* = 458; marijuana, *n* = 263; cocaine/crack, *n* = 133; stimulants – prescribed, *n* = 36; sedatives/hypnotics – not prescribed, *n* = 59.

Table 5

Multinomial Regression Analysis of Clinical Characteristic by Profile Compared to the No-Low Violence Profile

| Variable	Profile 2 – PIPV Exp(B)[95% CI]	Profile 3 – PNPV Exp(B) [95% CI]	Profile 4 – HGV Exp(B) [95% CI]
Age	**.96[.93, .99]**	**.95[.93, .97]**	**.91[.87, .96]**
Marital status	.55[.21, 1.46]	.56[.28, 1.14]	.49[.10, 2.32]
# days HED	1.00[.96, 1.03]	**1.03[1.01, 1.05]**	**1.05[1.00, 1.09]**
# days marijuana	1.03[.99, 1.06]	1.01[.99, 1.04]	.98[.93, 1.04]
# days cocaine or crack	**1.05[1.00, 1.09]**	1.03[.99, 1.07]	1.02[.96, 1.10]
# days prescribed stimulants	**1.06[1.00, 1.12]**	1.00[.93, 1.07]	1.06[.99, 1.14]
# days NP sedatives or hypnotics	1.04[.97, 1.10]	1.05[.99, 1.10]	1.04[.95, 1.15]
Legal Charges – Aggression	1.00[.85, 1.17]	**1.11[1.03, 1.20]**	**1.21[1.09, 1.34]**
Legal Charges – Non-aggressive	**1.10[1.00, 1.21]**	1.01[.91, 1.13]	**1.12[1.01, 1.24]**
DUI	.80[.53, 1.21]	1.00[.82, 1.22]	1.07[.88, 1.30]
Depression Symptoms	1.06[.99, 1.14]	.98[.94, 1.03]	1.05[.96, 1.15]
PTSD	2.08[.84, 5.15]	**4.42[2.31, 8.46]**	**5.12[1.28, 20.51]**

Note. Bolded values indicate statistically significant differences at the p <.05 level or greater.

R^2 = .18 (Cox & Shell), .26 (Nagelkerke); Model $\chi^2(39)$ = 163.63, *p* < .001

NP = non-prescribed. PNPV = predominantly non-partner violence, PIPV = predominantly intimate partner violence, HGV = high general violence. HED = heavy episodic drinking, PTSD = posttraumatic stress disorder.

Figure 1

Means by Violence Domain and Latent Profile
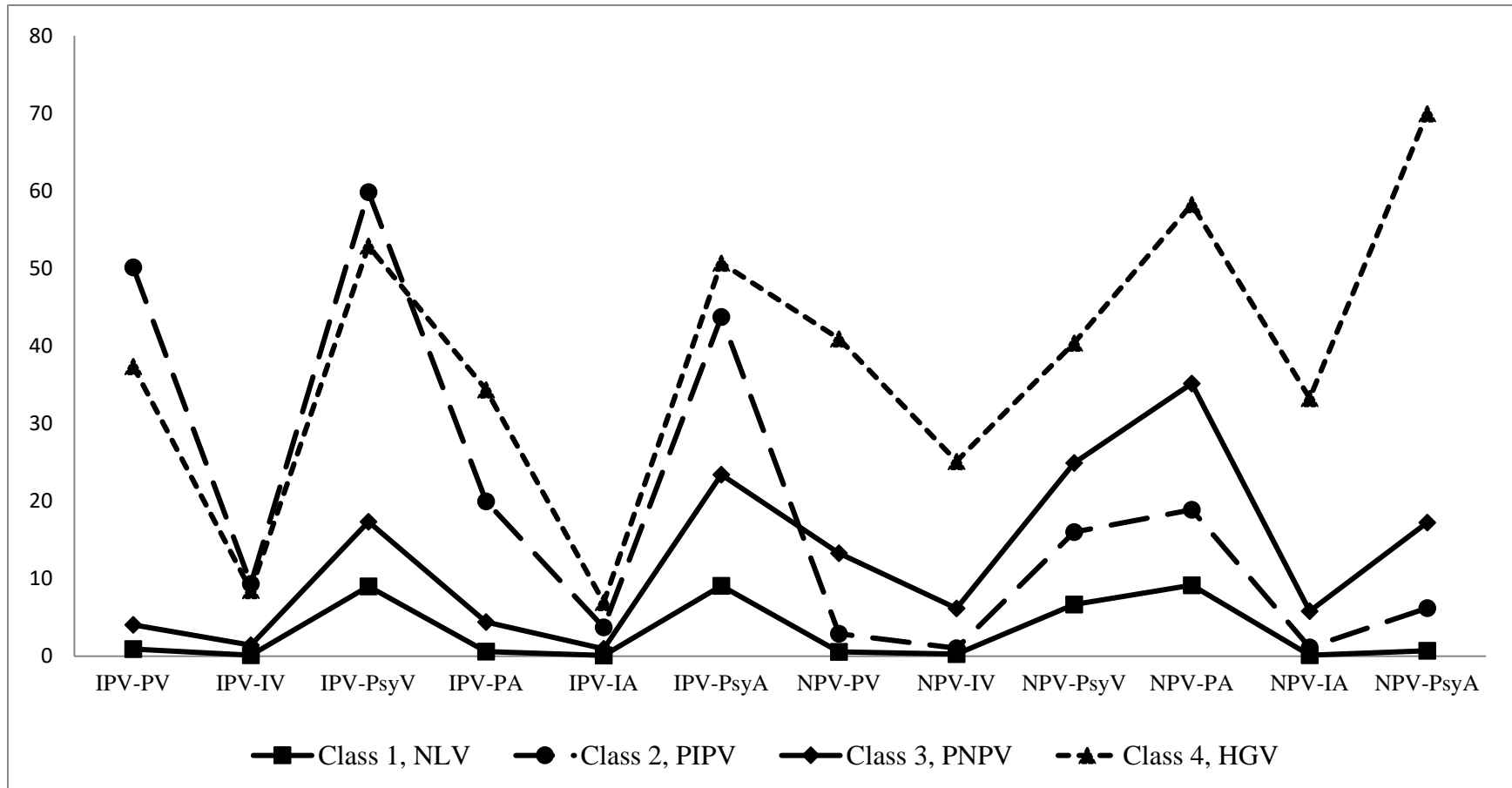
Note. IPV = intimate partner violence, NPV = non-partner violence, PV = physical violence victimization, IV = injury victimization, PsyV = psychological victimization, PA = physical violence aggression, IA = injury aggression, PsyA = psychological aggression, PNPV = predominantly NPV, PIPV = predominantly IPV, HGV = high general violence, NLV = no-low violence