


RESEARCH ARTICLE

Patterns of psychological health problems and family maltreatment among United States Air Force members

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Conflict of Interest Statement

The authors declare that they have no conflicts of interest related to the research described in this article.

Abstract

Objectives: We sought to identify subgroups of individuals based on patterns of psychological health problems (PH; e.g., depressive symptoms, hazardous drinking) and family maltreatment (FM; e.g., child and partner abuse).

Method: We analyzed data from very large surveys of United States Air Force active duty members with romantic partners and children.

Results: Latent class analyses indicated six replicable patterns of PH problems and FM. Five of these classes, representing ~98% of survey participants, were arrayed ordinally, with increasing risk of multiple PH problems and FM. A sixth group defied this ordinal pattern, with pronounced rates of FM and externalizing PH problems, but without correspondingly high rates/levels of internalizing PH problems.

Conclusions: Ramifications of these results for intervention are discussed.

KEYWORDS

child abuse, latent class analysis, partner abuse, psychological health, United States Air Force

1 | INTRODUCTION

A great deal of attention has been focused on individual (e.g., Hoge, Auchterlonie, & Milliken, 2006) and family (e.g., Foran, Slep, & Heyman, 2011) adjustment problems among US service members since military operations began in Iraq and Afghanistan in 2001. In this article, we identify broad patterns of psychological health problems (e.g., depression, substance abuse) and family maltreatment (e.g., intimate partner violence, child abuse) in an active duty (AD) United States Air Force (USAF) sample. Understanding naturally occurring constellations of psychological health problems and family maltreatment can suggest avenues to improve preventive and/or clinical interventions.

Population-based research, primarily with civilians, indicates consistently that maladaptive behaviors often co-occur. Those with high levels of any one psychological health problem (e.g., depression) also tend to have high

levels of other psychological health problems (e.g., substance abuse, antisocial behavior) (e.g., Kessler, Chiu, Demler, & Walters, 2005). Moreover, in families, emotional and physical forms of aggression tend to co-occur (e.g., Schumacher, Feldbau-Kohn, Slep, & Heyman, 2001), as do perpetration and victimization of intimate partner violence and parent-child aggression (e.g., Slep & O'Leary, 2005). Moreover, psychological health problems and family violence are often linked (e.g., Slep & O'Leary, 2009).

Given frequent co-occurrence of psychological health problems and family maltreatment, we sought to uncover meaningful subgroups of individuals whose overall patterns or profiles of psychological health and family maltreatment differ in meaningful ways from one another. Several studies have investigated typologies of co-occurrence of psychological health problems and family violence. In the literature on typologies of intimate partner violence, investigators have focused primarily on understanding subtypes of domestically violent men, rather than characterizing broad patterns of psychological health and family maltreatment across male and female samples (e.g., Fowler & Westen, 2011). This likely limits generalization to broader population. The literature on typologies of child maltreatment is even more limited, and is based on child abusing samples (e.g., Pears, Kim, & Fisher, 2008) and characteristics of child maltreatment itself (e.g., Armour, Elklit, & Christoffersen, 2014). In two exceptions, Dufour, Clément, Chamberland, and Dubeau (2011), in a large representative sample, found four subgroups of parents who differed both in characteristics of parent-child aggression, co-occurring intimate partner violence, and their views of violence. In another study, Slep and O'Leary (2009) focused on rationally identified subgroups, and found that partner-only, parent-child-only, dual partner- and parent-child-aggressive, and nonaggressive individuals differed in levels of risk factors that were not specific to family relationships (e.g., impulsivity and depression), as well as those that were (e.g., marital adjustment).

In this study, we take a person-centered approach to examine patterns of psychological health problems (hazardous drinking, prescription drug misuse, suicidal thoughts, suicide attempts, posttraumatic stress symptoms, and depressive symptoms), emotional and physical partner abuse, and child emotional and physical abuse. We hypothesize that respondents will show multiple patterns of individual, couple, and family problems. For example, some individuals might have no discernable problems in any area, some might have problems in a single facet of functioning (e.g., problem drinking), and others might have problems in multiple facets of functioning (e.g., problem drinking, depression, and child abuse).

Diverse forms of psychological health problems and family maltreatment might co-occur due to several mechanisms. First, clustering of symptoms in subgroups of individuals may reflect broader underlying dimensions of behavior (e.g., internalizing, externalizing) and/or specific disease entities (i.e., psychiatric conditions) (Krueger, 1999). Second, problems in one area of functioning may cause problems in others. For example, alcohol abuse may ameliorate symptoms of depression or posttraumatic stress (e.g., Conrod, Pihl, Stewart, & Dongier, 2000), while at the same time lessening inhibition of aggression toward family members (e.g., Freisthler & Gruenewald, 2013). Third, there may be shared environmental risk factors and/or genetic vulnerabilities that increase levels of multiple problem outcomes. For example, in military samples, trauma exposure may lead to posttraumatic stress disorder (PTSD) symptoms (e.g., Smith et al., 2008), aggression (e.g., MacManus et al., 2015), and compromised family relationships (e.g., Gewirtz, Polusny, DeGarmo, Khaylis, & Erbes, 2010). Fourth, there may be common neurobiological vulnerabilities that contribute to multiple forms of maladaptation (Goodkind et al., 2015). However, research investigating common and unique etiological pathways and interventions among subgroups with different problem clusters is not possible until exploratory investigations can identify the problem clusters themselves. Thus, this investigation focuses on discovery of problem clusters.

1.1 | Hypotheses

We hypothesize that there will be interpretable patterns (latent classes) of maladaptation across partner and child emotional and physical abuse, as well as hazardous drinking, prescription drug misuse, suicidal thoughts and attempts, posttraumatic stress, and depressive symptoms. Class structure was investigated with archival data from large scale surveys of USAF AD personnel conducted in 2008 and 2011. We were particularly interested in identifying classes

with elevated rates of clinically significant problems. Existence of such classes might have implications for population screening and preventive intervention. For that reason, where the data permitted, we operationalized variables as dichotomous indicators of clinically significant maladaptation. We studied presence/absence of multiple forms of clinically significant partner and child abuse (physically or emotionally aggressive acts causing significant harm or an inherently high potential for significant harm; Heyman & Slep, 2006) rather than the extent of intimate partner violence and parent-child aggression. Similarly, we studied presence/absence of hazardous drinking and significant suicidality (more than rare thoughts of, serious contemplation of, or planning suicide) rather than the extent of drinking problems and suicidality.

2 | METHODS

Research reported in this article was approved by the Institutional Review Boards of New York University and Stony Brook University. All procedures were consistent with the Code of Ethics of the World Medical Association. Informed consent was obtained from research participants after research procedures were explained.

2.1 | Participants

We analyzed data from 2008 and 2011 USAF Community Assessments (CA), Internet-based surveys of AD members. In each survey year, invitations were distributed to a stratified random sample of approximately one third of AD members. Surveys were completed anonymously, with no way to link individuals who may have participated in both years. However, considering the one in three chance of being selected at random, the 48.97% (2008) and 38.41% (2011) response rates, and the fact that fewer than half of the AD members in 2011 were in the USAF in 2008 (Air Force Personnel Center, 2016), overlap between the 2008 and 2011 survey samples is small.

Our investigation was limited to AD members who were in romantic relationships (married or cohabiting with a partner) and had one or more children living in the same household, given our interest in patterns involving partner and child abuse. The 2008 sample included 26,590 qualifying AD members from 82 installations. Among them, 1,305 (4.7%) were excluded from further analyses because they omitted all family maltreatment and psychological health measures. Most were males (81.8%) between ages 21 and 45 years (91.9%), and married (94.9%), with between 1 and 5 (mean [M] = 2.16, standard deviation [SD] = 0.87) children. Very few (2.5%) were deployed at the time of the survey.

The 2011 sample included 30,100 qualifying AD members from 91 installations. Among them, 741 (2.4%) were excluded because they contributed no information on any family maltreatment or psychological health measure. Similar to the 2008 sample, most were males (84.6%) between ages 21 and 45 years old (94.6%), and married (95.8%), with between 1 and 4 (M = 1.91, SD = 0.88) children. Somewhat more were currently deployed (7.5%) at the time of the 2011 survey.

2.2 | Procedure

In both 2008 and 2011, randomly selected AD members of USAF installations worldwide were invited to complete the anonymous, web-based USAF CA survey. Weekly e-mails were sent reminding all selected AD members to participate. Each base conducted its own community-wide campaign encouraging participation. The survey took approximately 20–45 min and could be completed across multiple sessions. To account for oversampling at small installations and differential response rates, we developed and applied post-stratification weights via iterative ranking on pay grade (i.e., military rank) groupings and sex.

2.3 | Measures

2.3.1 | Family maltreatment

Reliable and valid criteria for clinically significant physical and emotional abuse of intimate partners and children (Heyman & Slep, 2006; Heyman, Slep, & Foran, 2015) were operationalized in the Family Maltreatment Measure (FM; Heyman, Slep, & Snarr, 2017). Convergent validity is indicated by associations with independent narrative reports of maltreatment incidents (Heyman et al., 2017), and concordance with reports on other family maltreatment questionnaires (Straus, Hamby, Boney-McCoy, & Sugarman, 1996; Straus, Hamby, Finkelhor, Moore, & Runyan, 1998).

The FM comprises four modules, which assess clinically significant (1) partner physical abuse perpetration and victimization, (2) partner emotional abuse victimization, (3) child physical abuse perpetration, and (4) child emotional abuse perpetration. Each asks about (a) 12-month occurrence of acts in specific categories—partner emotional aggression (e.g., put downs, humiliation; nine items) and physical aggression (e.g., slamming the partner against a wall; 14 items), and child emotional aggression (e.g., mocking the child; putting the child down in front of others; nine items) and physical aggression (e.g., hitting the child with a fist; 18 items); and (b) effects of the acts (e.g., injury, fear, and depression). Separate sets of partner physical aggression items measure perpetration and victimization. Partner emotional aggression items are limited to victimization. All child aggression items reflect perpetration. To be classified as abusive by emerging international diagnostic criteria (see Heyman et al., 2015; Slep, Heyman, & Foran, 2015), individuals need to report (a) one or more acts of physical or emotional aggression and (b) significant harm (e.g., fear, injury) or a high potential for harm (e.g., choking, using a weapon).

2.3.2 | Hazardous drinking

Hazardous drinking was assessed with the 10-item Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Scores range from 0 to 40. Following World Health Organization recommended guidelines, individuals who score eight or greater on the AUDIT were classified as above the cutoff for hazardous drinking (Rumpf, Hampke, Meyer, & John, 2002).

2.3.3 | Prescription drug misuse

Participants completed a checklist of a wide variety of controlled prescription drugs (e.g., opiates, amphetamines). For each drug checked, respondents indicated (a) frequency of use without a prescription and (b) frequency of use at a dosage greater than prescribed. Prescription drug misuse was scored as present versus absent.

2.3.4 | Suicidality

Suicidality in the last 12 months was assessed with four items from the Center for Disease Control and Prevention Youth Risk Behavior Surveillance System (Brener et al., 2002). Concurrent validity in adult samples is indicated by associations with commonly comorbid conditions (e.g., depression; Langhinrichsen-Rohling, Snarr, Slep, Heyman, & Foran, 2011). Respondents were classified as positive for suicidal thoughts if they reported, during the past year, (a) thoughts of ending their lives (sometimes or frequently), (b) seriously considering attempting suicide (rarely, sometimes, or frequently), or (c) planning suicide. They were classified as positive for suicide attempts if they reported attempting suicide in the past year.

2.3.5 | Depressive symptoms

A seven-item version of the Center for Epidemiological Studies Depression Scale (CES-D; Mirowsky & Ross, 1992) assessed how many days respondents experienced depressive symptoms over the past week (e.g., “felt you couldn’t shake the blues”). The CES-D exhibits reliability and convergent validity in various populations (Olino et al., 2013). Scores were averaged across items and ranged from 1 to 4. Depressive symptoms were standardized across the entire sample before analysis to aid in interpretation of class solutions. Mean 2008/2011 Cronbach’s $\alpha = .84$.

2.3.6 | Posttraumatic stress

The Primary Care PTSD Screen (four items; Prins et al., 2003) was used to screen for symptoms of PTSD. The PTSD screen exhibits discriminant validity in military samples (Bliese et al., 2008), and was scored as a symptom count. Mean 2008/2011 $\alpha = .81$. Endorsement of ≥ 3 symptoms was classified as problematic as per Prins et al. (2003).

2.4 | Analytic strategy

Latent class analyses (LCA) were conducted separately in the 2008 and 2011 samples (see online supplement). LCA is a person-centered analytic approach that identifies, within a larger distribution, subgroups of people (latent classes) who share similar characteristics. We used Mplus version 7 software (Muthén & Muthén, 2012) with robust maximum likelihood estimation to handle missing values and distributional nonnormality. To account for hierarchical nesting of participants within USAF bases, clustered analyses were implemented. Per best practice recommendations (Nylund, Asparouhov, & Muthén, 2007), we determined the optimal number of classes based on several criteria: (1) Akaike and Bayesian information criteria, (2) Lo–Mendel–Rubin adjusted likelihood ratio test, (3) entropy, (4) theoretical and practical relevance of classes, and (5) replication of LCA solution across the 2008 and 2011 samples.

In interpreting LCA solutions, we emphasized effect size over statistical significance, given exceptionally high power associated with these sample sizes. In addition to reporting rates of psychological health problems and family maltreatment in each class, we report comparisons of these rates to overall sample prevalences—a quantity similar to relative risk that we will refer to as deviance ratio (*DR*). For binary variables (e.g., partner physical abuse in 2008; $DR = \text{class rate}_{2008} / \text{sample rate}_{2008}$), we followed Ferguson's (2009) heuristic relative risk interpretive guidelines and used DRs (or the inverse of DR) of 2.0, 3.0, and 4.0 as thresholds for small, medium, and large effects. For the single continuous variable, depressive symptoms, we followed Cohen's guidelines of 0.2, 0.5, and 0.8 standard deviation units (*SD*)—comparing a class mean compared to the overall sample mean (*z*-score)—to represent small, medium, and large effect sizes (Cohen, Cohen, West, & Aiken, 2003).

We then evaluated replication of latent classes across the 2008 and 2011 samples in terms of both size (proportion of sample) and characteristics (patterns of rates and means of psychological health problems and family maltreatment). As noted above, the number of unique and overlapping individuals in the 2008 and 2011 samples is unknown but small. Nevertheless, the samples are not fully independent, which prevents statistical comparisons with *p*-values. Since there are no established guidelines for non-statistical group comparisons in LCA, we adopted a descriptive approach in comparing the 2008 versus 2011 LCA solutions. In comparing the size of a given class in 2008 versus 2011, we considered absolute differences greater than 5% be noteworthy. Within each class, we compared rates of a given psychological health or family maltreatment problem in 2008 versus 2011 in two ways: A deviance ratio quotient was calculated as DR_{2011} / DR_{2008} . The DR quotient exceeds 1.0 if the rate of a given problem is more extreme relative to the sample wide prevalence in 2011 than 2008; DR quotients below 1.0 indicate the opposite. The absolute value of the rate (*rate difference* = $\text{rate}_{2011} - \text{rate}_{2008}$) was calculated and judged relative to the 5% difference threshold noted above. To compare 2008 versus 2011 levels of depressive symptoms within each class, a *z*-score difference was calculated as $z_{2011} - z_{2008}$. The *z*-score difference is positive if the depressive symptoms mean is more extreme relative to the sample-wide mean in 2011 than in 2008 in a given class. Sizes of DR quotients, rate difference, and *z*-score differences were evaluated based on interpretive guidelines for DRs and mean differences stated in the previous paragraph. We considered both (1) a DR quotient \geq small size, and (2) absolute value of rate difference \geq 5% or absolute *z*-score difference \geq 0.20 to be noteworthy.

3 | RESULTS

3.1 | Class structure

LCA results suggested a replicable six-class solution, with classes distinguished by clinically significant (CS) internalizing (Int; PTSD, depressive symptoms, and suicidality) and externalizing (Ext; family maltreatment, hazardous

drinking, and prescription drug misuse) behaviors. We based the Int and Ext groupings on findings from the adult psychopathology literature (e.g., Wright et al., 2013).

3.1.1 | 2008 sample

Rates/means of family maltreatment and psychological health problems from the six-class LCA model in the 2008 sample are presented in the first row of Table 1. The six classes were labeled very low CS-Int/Ext (61.6%), low CS-Int/Ext (21.8%), moderate CS-Int/Ext (9.7%), High CS-Int/Ext (3.7%), very high CS-Int/Ext (1.1%), and extremely high CS-Ext (2.1%). Class 1 (very low CI-Int/Ext; posterior [model-implied] $n = 16,376$), was characterized by below sample rates/means across all variables (Tables 1 and 2); i.e., all DRs were lower than 1.0. To illustrate, their partner physical and emotional abuse, suicidal thoughts, and PTSD symptoms were only around one tenth of the overall sample rate, child abuse was 0.52–0.77 times the sample rate, and no one reported suicide attempts.

In Class 2 (low CS-Int/Ext; $n = 5,792$), rates/levels of family maltreatment and psychological health problems fell just above or below the sample mean. All DRs for this class were in the small range and no one endorsed partner physical abuse or suicide attempts.

In Class 3 (moderate CS-Int/Ext; $n = 2,585$), partner physical and emotional abuse rates ranged from 2.36 to 3.43 times their respective sample rates (small to medium DRs). They also had 1.88 times the sample rate of child emotional abuse but only 1.24 times the sample rate of child physical abuse; effect sizes below the a priori threshold of $DR \geq 2.0$ for a small effect. Their rates of psychological health problems ranged from 2.0 to 3.0 times their respective sample rates (small DRs); their depressive symptoms mean was 1.35 SDs above the sample mean (large effect).

Class 4 (high CS-Int/Ext; $n = 994$) had elevated rates of all forms of family maltreatment—ranging from 2.97 to 4.78 times their respective sample rates (medium to large DRs)—with the exception of child physical abuse (1.38 times the sample rate). They had elevated rates of all psychological health problems, ranging from 2.80 to 10.50 times their respective sample rates (small to large DRs), and mean depressive symptoms 2.73 SDs above the sample mean (large effect).

Class 5 (very high CS-Int/Ext; $n = 286$) had elevated rates of all family maltreatment forms—ranging from 2.79 to 5.80 times their respective sample rates (small to large DRs)—with the exception of child physical abuse (1.50 times the sample prevalence). Their PTSD symptoms, suicidal thoughts, and suicide attempts were the highest among the classes, at 13.42 to 24.00 times their respective sample rates (large DRs); they were also the most depressed, at 4.42 SDs above the sample mean (large effect).

Class 6 (extremely high CS-Ext; $n = 556$) had the highest rates of all forms of family maltreatment, ranging from 2.98 to 27.18 times their respective sample rates (small to large DRs). They also exhibited elevated rates of some psychological health problems (ranging from 2.63 to 15.0 times their respective sample rates; small to large DRs). Their suicide attempts were the 2nd most elevated among classes. In contrast, their PTSD symptoms were moderately elevated (1.63 times the sample rate) and their depressive symptoms mean was 0.10 SDs below the sample mean.

3.1.2 | 2011 sample

Rates/means of family maltreatment and psychological health problems from the six-class LCA model in the 2011 sample are presented in Tables 1 and 2. Results were very similar to those from the 2008 sample. The very low (63.3%), low (19.6%), moderate (9.8%), high CS-Int/Ext (3.7%), and very high CS-Int/Ext (1.1%) classes showed ordinal increasing levels of all psychological health and most family maltreatment indicators. The extremely high CS-Ext class (2.6%) had the highest family maltreatment levels, and moderate elevations on some psychological health problems (e.g., hazardous drinking), but notably not PTSD and depressive symptoms.

3.2 | Comparison of class structure between the 2008 and 2011 samples

Latent class prevalences of the six-class solutions were highly comparable in 2008 and 2011. Differences among estimated sizes between samples ranged from 0.04% (Class 3; moderate CS-Int/Ext) to 1.7% (Class 1; low CS-Int/Ext). We

TABLE 1 Descriptive statistics for the sample and latent classes in 2008 and 2011 (6-Class solution)

Sample	Class	Partner		Partner		Child		Child		Haz		Rx		Suicide		PTSD		Depressive Sx (z)	
		Emot	Abuse Vict	Physical	Abuse Perp	Emot	Abuse	Physical	Abuse	Drinking	Misuse	Thoughts	Attempts	Sx					
2008																			
Sample	-	7.2%	1.1%	2.0%	1.1%	3.3%	9.2%	9.2%	5.6%	1.9%	2.6%	0.2%	3.8%	0.00					
1. Very low CS-I/E	61.6%	0.9%	0.1%	0.1%	0.1%	1.7%	7.1%	7.1%	3.0%	0.9%	0.3%	0.0%	0.3%	-0.58					
2. Low CS-I/E	21.8%	7.4%	0.0%	0.2%	3.8%	11.7%	11.7%	6.6%	6.6%	2.2%	1.9%	0.0%	3.5%	0.36					
3. Moderate CS-I/E	9.7%	24.7%	2.6%	5.6%	6.2%	11.4%	11.4%	11.5%	11.5%	3.8%	6.8%	0.5%	11.4%	1.35					
4. High CS-I/E	3.7%	34.4%	3.9%	6.3%	9.8%	12.7%	12.7%	15.7%	15.7%	6.4%	18.4%	2.1%	28.0%	2.73					
5. Very high CS-I/E	1.1%	37.9%	5.4%	11.6%	9.2%	13.8%	13.8%	19.1%	19.1%	12.9%	34.9%	4.8%	52.4%	4.42					
6. Extremely high CS-E	2.1%	44.2%	29.9%	46.7%	17.5%	27.4%	27.4%	18.4%	18.4%	5.0%	16.3%	3.0%	6.2%	-0.1					
2011																			
Sample	-	7.0%	0.5%	1.4%	0.5%	3.3%	12.8%	12.8%	8.3%	4.7%	2.3%	0.1%	6.3%	0.00					
1. Very low CS-I/E	63.3%	0.9%	0.1%	0.3%	0.1%	2.2%	10.9%	10.9%	5.7%	3.0%	0.2%	0.0%	1.1%	-0.55					
2. Low CS-I/E	19.6%	4.0%	0.0%	0.1%	4.0%	16.1%	16.1%	8.2%	8.2%	6.0%	1.0%	0.0%	6.9%	0.34					
3. Moderate CS-I/E	9.8%	56.1%	1.5%	3.1%	5.4%	14.4%	14.4%	16.3%	16.3%	8.3%	6.3%	0.2%	18.4%	1.34					
4. High CS-I/E	3.7%	43.3%	1.2%	4.2%	6.2%	15.6%	15.6%	17.7%	17.7%	11.8%	20.2%	0.9%	38.5%	2.75					
5. Very high CS-I/E	1.1%	35.5%	3.7%	6.1%	8.3%	12.5%	12.5%	25.0%	25.0%	15.3%	36.3%	2.5%	54.7%	4.58					
6. Extremely high CS-E	2.6%	57.6%	9.2%	24.7%	11.4%	17.7%	17.7%	19.9%	19.9%	8.6%	14.4%	1.0%	15.0%	0.04					

Notes: Prev, prevalence; Emot, emotional; Vict, victimization; Perp, perpetration; Haz, hazardous; Rx, prescription; Sx, symptoms; CS, clinically significant; I, internalizing; E, externalizing.

TABLE 2 Class rates of psychological health problems and family maltreatment compared to sample prevalences in the six-class model in 2008 and 2011

	Partner		Partner		Child		Child		Haz		Rx		Suicide		PTSD		Depressive	
	Emot	Abuse Vict	Physical	Abuse Perp	Physical	Abuse	Emot	Abuse	Drinking	Misuse	Drug	Thoughts	Attempts	Sx	Sx (z) ^a			
2008																		
1. Very low CS-I/E	0.13	0.09	0.05	0.05	0.77	0.54	0.52	0.77	0.54	0.47	0.12	- ^b	0.08	-0.58				
2. Low CS-I/E	1.03	- ^b	0.10	0.10	1.27	1.18	1.15	1.27	1.18	1.16	0.73	- ^b	0.92	0.36				
3. Moderate CS-I/E	3.43	2.36	2.80	2.80	1.24	2.05	1.88	1.24	2.05	2.00	2.62	2.50	3.00	1.35				
4. High CS-I/E	4.78	3.55	3.15	3.15	1.38	2.80	2.97	1.38	2.80	3.37	7.08	10.50	7.37	2.73				
5. Very high CS-I/E	5.26	4.91	5.80	5.80	1.50	3.41	2.79	1.50	3.41	6.79	13.42	24.00	13.79	4.42				
6. Extremely high CS-E	6.14	27.18	23.35	23.35	2.98	3.29	5.30	2.98	3.29	2.63	6.27	15.00	1.63	-0.10				
2011																		
1. Very low CS-I/E	0.13	0.20	0.21	0.21	0.67	0.69	0.67	0.85	0.69	0.64	0.09	- ^b	0.17	-0.55				
2. Low CS-I/E	0.57	- ^b	0.07	0.07	1.21	0.99	1.21	1.26	0.99	1.28	0.43	- ^b	1.10	0.34				
3. Moderate CS-I/E	8.01	3.00	2.21	2.21	1.64	1.96	1.64	1.13	1.96	1.77	2.74	2.00	2.92	1.34				
4. High CS-I/E	6.19	2.40	3.00	3.00	1.88	2.13	1.88	1.22	2.13	2.51	8.78	9.00	6.11	2.75				
5. Very high CS-I/E	5.07	7.40	4.36	4.36	2.52	3.01	2.52	0.98	3.01	3.26	15.78	25.00	8.68	4.58				
6. Extremely high CS-E	8.23	18.40	17.64	17.64	3.45	2.40	3.45	1.38	2.40	1.83	6.26	10.00	2.38	0.04				

Notes. Coefficients are deviance ratios (DR = class rate/sample rate); ^abecause depressive symptoms is a continuous variable, deviance ratio was calculated as a z-score $(M_{\text{class}} - M_{\text{sample}}) / SD_{\text{sample}}$; ^bDR was not computed when class rate was 0; Emot, emotional; Vict, victimization; Perp, perpetration; Haz, hazardous; Rx, prescription; Sx, symptoms; CS, clinically significant; I, internalizing; E, externalizing.

next compared the 2008 versus 2011 family maltreatment and psychological health problem rates and levels across classes via DR quotients, rate differences, and z-score differences described above in the Analytic Strategy section (Table 3). The very low, low, high, and very high CS-Int/Ext classes (Classes 1, 2, 4, and 5) replicated closely across samples. Compared to 2008, in 2011 the moderate CS-Int/Ext group (Class 3) had a somewhat higher partner emotional abuse rate (small effect size difference). The extremely high CS-Ext group (Class 6) in 2011 had a lower rate of child physical abuse (small effect size difference). Finally, within class differences in depressive symptoms (a continuous variable) in 2008 versus 2011 were all smaller than 0.2. Overall, the LCA results are consistent across the 2008 and 2011 samples.

4 | DISCUSSION

Our findings suggest that psychological health problems and family maltreatment are characterized primarily by a gradient of increasing frequency/severity and decreasing commonality in the USAF AD population. LCA yielded six replicable patterns of psychological health problems and family maltreatment. Five of these (~98% of the 2008 and 2011 samples), were arrayed ordinally, with increasing partner and child abuse, substance use problems, and suicidality, and greater posttraumatic stress and depressive symptoms. Note that mixture modeling techniques sometimes identify spurious “cut points” (i.e., over-extract classes) along dimensional constructs, leading to solutions in which classes differ quantitatively, rather than qualitatively—the so called “salsa pattern” (mild, medium, and hot; Hallquist & Wright, 2014). Thus, the five ordinally arrayed groups that we identified may not be categorically distinct.

Among these ordinally arrayed groups, the group of AD members with the most extreme scores on psychopathology, which comprised roughly 1.1% of the sample, is of particular clinical significance. The very high CS-Int/Ext class was named for its members' substantially elevated rates of nearly every measured form of family maltreatment and psychological health problem. Their depressive and posttraumatic stress symptoms, and their suicidality and prescription drug misuse, were the highest among all classes, and distinguished this group strongly from their peers. More than half of group members exhibited PTSD symptoms that met or exceeded the clinical significance threshold. This places them in the top 3% of these military samples. Furthermore, their depressive symptoms were more than four *SDs* above the overall USAF mean. More than one-third also reported suicidal thoughts. Although a minority (<5%) reported suicide attempts, this rate is many times higher than sample wide rate of a fraction of 1%. They misused prescription drugs at a rate about three to seven times the overall USAF prevalence. Their rates of family maltreatment and psychological health problems were elevated as well (e.g., more than one-third reported partner emotional abuse victimization).

Given the low base rate and extremity of this group, we suspect that many of them would meet criteria for comorbid mood and anxiety disorders, particularly major depression and PTSD. A substantial minority likely to have comorbid substance abuse disorders and are perpetrators and/or victims of partner or child abuse. As we noted earlier, comorbidity rates are extremely high for these clinical diagnoses (see Beauchaine & Cicchetti, 2016).

A sixth group, which comprised between 2.1% and 2.6% of AD members, defied the ordinal pattern observed for the other classes. This group may be categorically distinct from the others. We labeled this class extremely high CS-Ext for its pronounced rate of clinically significant externalizing behaviors in absence of correspondingly high internalizing problems. Partner physical abuse perpetration and victimization were exceptionally common in this group, perhaps their most distinctive characteristic, with rates approximately 20-fold the prevalence observed in the USAF more broadly. Their rate of child emotional abuse was also the highest among classes, and was three to five times that observed in the USAF. Members of the extremely high CS-Ext class also exhibited the second highest rate of suicide attempts—10–15 times the overall sample prevalence. At first glance, this finding may seem counterintuitive given their low levels of depressive symptoms. However, high rates of suicide have long been observed among those who score high on externalizing behavior (see e.g., Beauchaine, Zisner, & Sauder, 2017). Other problem behaviors in this class, although elevated compared with their respective sample prevalences, did not so clearly distinguish them from their peers with elevated CS-Int: hazardous drinking, prescription drug misuse, and suicidal thoughts.

TABLE 3 Comparison of the six-class solutions between 2008 and 2011

2011 versus 2008 comparisons	Partner		Partner		Child		Child		Haz		Rx		Suicide		PTSD		Depressive	
	Emot	Abuse Vict	Physical	Abuse Perp	Physical	Abuse Vict	Emot	Abuse	Drinking	Misuse	Drug	Misuse	Thoughts	Attempts	Sx	Sx	Sx (z) ^a	Sx (z) ^a
Deviance ratio quotient																		
1. Very low CS-I/E	1.03		2.20		4.29		1.29	1.10	1.28	1.35	1.35	0.75	- ^b		2.21	-		
2. Low CS-I/E	0.56		- ^b		0.71		1.05	0.99	0.84	1.10	1.10	0.59	- ^b		1.19	-		
3. Moderate CS-I/E	2.34		1.27		0.79		0.87	0.91	0.96	0.88	0.88	1.05	0.80		0.97	-		
4. High CS-I/E	1.29		0.68		0.95		0.63	0.88	0.76	0.75	0.75	1.24	0.86		0.83	-		
5. Very high CS-I/E	0.96		1.51		0.75		0.90	0.65	0.88	0.48	0.48	1.18	1.04		0.63	-		
6. Extremely high CS-E	1.34		0.68		0.76		0.65	0.46	0.73	0.70	0.70	1.00	0.67		1.46	-		
Rate or z difference																		
1. Very low CS-I/E	0.0%		0.0%		0.2%		0.5%	3.8%	2.7%	2.1%	2.1%	-0.1%	0.0%		0.8%	0.03		
2. Low CS-I/E	-3.4%		0.0%		-0.1%		0.2%	4.4%	1.6%	3.8%	3.8%	-0.9%	0.0%		3.4%	0.02		
3. Moderate CS-I/E	31.4%		-1.1%		-2.5%		-0.8%	3.0%	4.8%	4.5%	4.5%	-0.5%	-0.3%		7.0%	0.01		
4. High CS-I/E	8.9%		-2.7%		-2.1%		-3.6%	2.9%	2.0%	5.4%	5.4%	1.8%	-1.2%		10.5%	0.02		
5. Very high CS-I/E	-2.4%		-1.7%		-5.5%		-0.9%	-1.3%	5.9%	2.4%	2.4%	1.4%	-2.3%		2.3%	0.16		
6. Extremely high CS-E	13.4%		-20.7%		-22.0%		-6.1%	-9.7%	1.5%	3.6%	3.6%	-1.9%	-2.0%		8.8%	0.14		

Notes: Deviance ratio quotient = DR_{2011}/DR_{2008} ; rate difference = $rate_{2011} - rate_{2008}$; z-score difference $z_{2011} - z_{2008}$; Emot., emotional; Vict., victimization; Perp., perpetration; Haz, hazardous; Rx, prescription; Sx, symptoms; CS, clinically significant; I, internalizing; E, externalizing; Abuse Vict, depressive symptoms is a continuous variable, thus only the z difference was computed; ^aDR quotient was not computed in that the class rates in both 2008 and 2011 were 0.

Taking the behavioral profile of the extremely high CS-Ext class as a whole, they appear to represent a group of USAF AD members with significant disinhibitory psychopathology. This group is marked by extremely high rates of aggressive behavior and elevated suicidality in the absence of elevations in general dysphoric affect. Suicidality is typically considered in conjunction with internalizing psychopathology, but is frequently elevated in those with significant externalizing behavior patterns (e.g., Hills, Afifi, Cox, Bienvenu, & Sareen, 2009). Impulsivity could be a mechanism that explains this link (Verona, Sachs-Ericsson, & Joiner, 2004). Impulsivity is a core component of all externalizing disorders (Beauchaine et al., 2017) and is also linked to suicidality (Brezo, Paris, & Turecki, 2006). We therefore suspect elevated impulsivity in the extremely high CS-Ext group. This conjecture would need to be verified in a future study as measures of impulsivity were not available in the data we used.

We have weighted this discussion toward the two aforementioned subgroups given our a priori interest in classes with clinically elevated problems. However, our results are also interesting in suggesting that about two-third of USAF AD members appear to be well adjusted, with below average rates and levels of family maltreatment and psychological health problems (the very low CS-Int/Ext classes). Although the very high CS-Int/Ext and extremely high CS-Ext classes may be of greatest clinical importance given their very high rates/levels of problem behavior, many others also reported elevated rates of partner and child abuse, substance use problems, and suicidality, as well as greater post-traumatic stress and depressive symptoms—problems that likely compromise their personal, family, and occupational functioning, including military readiness. Such behavior patterns are also worthy of prevention and treatment.

4.1 | Limitations

At least five limitations are important to consider in interpreting our results. First, in the tradeoff between survey depth, breadth, and participant burden, measures were brief. Although these shortened instruments were selected based on prior evidence of psychometric quality, shorter measures are typically less reliable than more extensive ones. Longer, more reliable measures may have led to more precision in assigning individuals to latent classes.

Second, both the 2008 and 2011 surveys were anonymous. There was no way to link individuals who participated in both. Thus, some individuals may have completed both surveys. However, based on a joint consideration of the surveys' random sampling and response rates, as well as personnel turn-over in the AF, nonindependence is a minimal threat in the replication of latent classes we found (see details in the Method section).

Third, in anonymous online surveys, some participants respond problematically (e.g., carelessly; Meade & Craig, 2012). The degree to which data quality in the present research was affected by such individuals is unknown.

Fourth, generalizability to the present USAF population is unknown. Response rates averaged only 43.7%. Moreover, since 2011, there have been substantial drawdowns of US forces from major engagements in Iraq and Afghanistan. There has been a commensurate drop in combat missions, though operation tempos remain high. These changing circumstances could influence patterns of psychological health problems and family maltreatment. There is no guarantee that the latent categorical structure of psychological health problems and family maltreatment has survived or will survive contextual changes in subsequent years. Moreover, the generalization to other military branches, or to the broader US population, cannot be assured.

Fifth, the present participants were not drawn from a clinical population. Thus, the patterns we observed may not generalize to the types of clients or patients encountered in clinical practice. To illustrate, people with particular constellations of behavior (e.g., hazardous drinking, child abuse, and depression) may be more likely than others (e.g., prescription drug misuse and intimate partner violence) to actively seek out, or become court mandated to receive, treatment.

4.2 | Implications for intervention

Treatment and prevention of psychological health problems and family maltreatment is often siloed. To illustrate, in the USAF, there are separate agencies charged with treatment and prevention of each problem measured in this survey (e.g., Alcohol and Drug Abuse Prevention and Treatment Program; Family Advocacy Program). Our results suggest

that maladaptation cuts across multiple psychological health problems and forms of family maltreatment. Thus, there is a mismatch between the nature of problems and the way services are typically segmented and delivered. Such segmentation may result in missed opportunities to address problem behaviors that are not the focal reason for assistance.

Our results suggest that health agencies might better serve clients by screening for and intervening to prevent disturbances of multiple forms of personal and family functioning, side-by-side. Community-wide prevention that simultaneously targets an array of interrelated problems (e.g., Slep & Heyman, 2008) may be particularly crucial, since over a third of our two samples reported clinically-elevated psychological health concerns, and psychological health problems and family maltreatment tend to go undetected and therefore untreated (Heyman, Slep, & Nelson, 2011). Although integrative prevention programs are common in early childhood (e.g., Olds, Sadler, & Kitzman, 2007), they are less often used among adults. Identification of shared and unique vulnerabilities and risk factors for the patterns of psychological health problems and family maltreatment found in this study would help to identify candidate proximal change targets of such a program. The implications of our findings for clinical practice are less clear given the fact that the present sample was not treatment-seeking or mandated to receive treatment.

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How to cite this article: Lorber MF, Xu S, Heyman RE, Slep AMS, Beauchaine TP. Patterns of psychological health problems and family maltreatment among United States Air Force members. *J Clin Psychol*. 2018;1–14. <https://doi.org/10.1002/jclp.22594>