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Typologies of adversity in childhood & adulthood as determinants of mental health & substance use disorders of adults incarcerated in US prisons[☆]

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ABSTRACT

Background: Incarcerated people have disproportionately high rates of adverse experiences, mental health and substance use disorders.

Objective: This study identifies typologies of adversity among adults incarcerated in US prisons. Typologies are used to predict mental health and substance use disorders. Disparities by gender, race and ethnicity are also examined.

Participants and Setting: Data come from the 2004 Survey of Inmates in State and Federal Correctional Facilities (SI-SFCF), a cross sectional survey of incarcerated adults (n = 18,185).

Methods: Bivariate statistics compared rates of adverse experiences, mental health and substance use disorders by gender, race and ethnicity. Latent class analysis was conducted using adverse experiences as indicators of latent classes of adversity. Using multinomial regression, latent class membership was predicted by gender, race and ethnicity. Finally, logistic regression predicted mental health and substance use disorders by latent classes.

Results: Incarcerated people identifying as either women or white experienced higher rates of nearly all types of adverse experiences, as compared to either men or non-white people. Women also had higher rates of mental health and substance use disorders, except for alcohol use disorder. Four typologies of adverse experiences were found: Class-1) low exposure, Class-2) moderate deprivation, high violence exposure, Class-3) high deprivation, low violence exposure, and Class-4) high exposure. As compared to the low exposure group, all other typologies predicted mental health and substance use disorders.

Conclusions: Given that incarcerated people experience high rates of adverse experiences, mental health and substance use disorders, findings can inform how to tailor services to typologies of adversity.

1. Introduction

Child abuse and other adverse experiences have been repeatedly shown to impact mental health/substance use disorders and contribute to the development of social problems, such as crime and incarceration (Felitti et al., 1998; Hughes et al., 2017; Jung,

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Herrenkohl, Klika, Lee, & Brown, 2015; Roos et al., 2016). Childhood traumas, or adverse childhood experiences, comprise of abuse, neglect and household deprivation. Child abuse includes physical, sexual and psychological abuse. Neglect is a failure to meet a child's basic needs and may stem from household deprivation which encompasses domestic violence as well as parental incarceration, divorce, mental health disorders or substance use (Felitti et al., 1998).

Decades of research have documented the causal link between adverse childhood experiences and mental health/substance use disorders. A meta-analysis of the effect of adverse childhood experiences on health describes the findings of 37 studies and presents the pooled risk of various health conditions. For people with four or more adverse childhood experiences, the risk of anxiety, depression and schizophrenia was found to be about four times higher, as compared to people who experienced less than four adverse childhood experiences (anxiety OR 3.70; depression OR 4.40 (Hughes et al., 2017), schizophrenia OR 3.60 (Matheson, Shepherd, Pinchbeck, Laurens, & Carr, 2013)). People with four or more adverse experiences were also at higher risk of alcohol and drug use with problematic alcohol use nearly six times higher (OR 5.84) and problematic drug use over 10 times as high (OR 10.22) (Hughes et al., 2017).

Most research on the relationship between adverse experiences and health has focused on childhood experiences without also examining the impact of adult experiences. However, the limited research that has been conducted in this area has demonstrated a similar relationship between adult adverse experiences and negative health/social consequences (Mersky, Janczewski, & Topitzes, 2018; Stumbo, Yarborough, Paulson, & Green, 2015; Timko, Sutkowi, Pavao, & Kimerling, 2008). For example, one study found that without continued adverse experiences in adulthood, the impact of childhood abuse and neglect on adult mental health is minimal (Horwitz, Widom, McLaughlin, & White, 2001). This research suggests the importance of including both childhood and adult experiences in future research.

Past research has also largely measured the impact of individual types of adverse experiences or used an additive measure of experiences (Scott-Storey, 2011). However, this approach does not account for the phenomenon that victimization often begets victimization (Smith, Davis, & Fricker-Elhai, 2004) or that isolated adverse experiences are uncommon (Finkelhor, Ormrod, Turner, & Hamby, 2005). Also, given that adverse experiences vary by individual characteristics, such as gender, race and ethnicity, more sensitive analyses of adverse experiences are needed (Scott-Storey, 2011).

Some recent studies have used latent class analysis to describe patterns of adversity as predictors of mental health and substance use disorders among women veterans (Gaska & Kimerling, 2018) and justice involved youth (Ford, Grasso, Hawke, & Chapman, 2013). One study used factor analysis to identify patterns of adversity among women detained in US jails. This study identified three factors which also predicted mental health disorders. The identified factors included family dysfunction, interpersonal violence, and external events (Green et al., 2016). Another study of incarcerated men in Poland identified a connection between latent classes of adversity and both personality traits and self-esteem (Debowska & Boduszek, 2017).

Extending this line of research to examine both men and women incarcerated in US prisons is important because they are disproportionately impacted by adverse experiences (Briere, Agee, & Dietrich, 2016), mental health and substance use disorders (James & Glaze, 2006; Mumola & Karberg, 2006; Prins, 2011; Steadman, Osher, Robbins, Case, & Samuels, 2009). Given the differential underlying risk and health factors of incarcerated people, it is possible that the impact of adverse experiences on the mental health and substance use disorders of incarcerated people differs from that of the general population. Since the US has the highest rate of incarceration in the world (Dumont, Brockmann, Dickman, Alexander, & Rich, 2012; Wildeman & Wang, 2017) it is important that the incarcerated population be better understood. Additionally, there is also a need to expand on the research of adverse experiences among incarcerated people, as victimization during incarceration is fairly common (Wolff & Shi, 2012).

1.1. Study aims

This study is grounded in ecosocial theory. Ecosocial theory describes how socio-economic, cultural and environmental conditions are systemic factors that affect negative outcomes. Underlying these systemic factors are relationships and individual factors such as genetic makeup, biological conditions, gender, sex and age. This theory informs how people with different gender, racial and ethnic identities may experience different types of adverse experiences, and how those experiences would be physically embodied to shape having different types of mental health and substance use disorders (Krieger, 2001).

This study expands on previous literature by focusing on adults incarcerated in US prisons. Rather than generating an additive construct for the adverse experiences, this study uses these experiences to determine assignment to latent classes of adversity. In addition, this study also includes adversity experiences during adulthood and examines the impacts of gender, race and ethnicity. The overarching research question and aims that this study will answer are as follows:

Research Question: For adults incarcerated in US prisons, do adverse experiences occur in latent classes? (Adverse experiences include: homelessness, foster care placement, caretaker alcohol/drug misuse, parental/familial incarceration, sexual abuse, military combat experience and physical abuse)

Aim 1: Do gender, race and Hispanic ethnicity impact the type of latent classes experienced? (Gender = man/woman, race = white, black, Native American/Alaskan Native, Asian/Hawaiian/Pacific Islander and other)

Aim 2: Do latent classes of adverse experiences predict 1) serious mental illness, 2) any other mental health disorder, 3) alcohol use disorder, or 4) substance use disorder?

2. Methods

2.1. Data

Data come from the 2004 Survey of Inmates in State and Federal Correctional Facilities (SI-SFCF). The SI-SFCF is a cross sectional survey of adults incarcerated in US prisons. The survey was administered via a computer assisted personal interview conducted via telephone. The response rate was 89.1 % in state prisons and 84.6 % in federal prisons (n = 18,185). The state and federal samples were combined in analysis. The survey used a two-stage clustered sampling design, where prisons were randomly selected from pre-identified clusters in the first stage and participants within selected prisons were randomly selected in the second stage. Before making the survey publicly available, survey administrators imputed some missing variables. Hispanic origin and race were imputed via hot deck imputation where a participant's missing value for Hispanic origin was imputed from its "nearest neighbor" in the same prison and sampling stratum. Missing values for sex were assigned in the dataset based on the facility of residence. After imputation, variables of interest for this study had a low rate of missing (< 5 %). However, even before imputation, imputed variables were missing less than 1 % of the time (United States Department of Justice, 2016).

2.2. Latent class indicators

Indicator variables, used to derive latent classes of adverse experiences, come from dichotomous survey questions which ask if the respondent had a particular experience prior to their incarceration (United States Department of Justice, 2016). Indicators include: 1) ever homeless, 2) as a child, lived in foster care or an institution, 3) as a child, caretakers "abused" alcohol or drugs, 4) parental incarceration, 5) other familial incarceration, including children, brothers, sister or spouse(s), 6) sexual assault that occurred more than once, 7) sexual abuse that occurred only once as a child, 8) sexual assault that occurred only once as an adult, 9) military combat experience and 10) physical abuse ever. Indicators were selected based on use in previous studies (Felitti et al., 1998; Gaska & Kimerling, 2018; Hughes et al., 2017; Jung et al., 2015; Mersky et al., 2018; Roos et al., 2016; Stumbo et al., 2015; Timko et al., 2008).

2.3. Covariates

Covariates include gender (man or woman), race (white, black, Native American/Alaskan Native, Asian/Hawaiian/Pacific Islander, and other) and ethnicity (Hispanic or non-Hispanic). The survey did not collect information on additional related demographic categories such as transgender, sexual orientation or additional racial and ethnic identities, such as the ability to select more than one race and ethnicities other than Hispanic.

2.4. Dependent variables

Mental health and substance use disorder variables include ever having a: 1) serious mental illness or 2) any other mental health disorder; and in the year prior to incarceration having an: 3) alcohol use disorder, or 4) substance use disorder. Mental health diagnoses come from the following questions where the respondent was asked if they were ever diagnosed with: bipolar disorder, schizophrenia, any depressive disorder, post-traumatic stress disorder, any anxiety disorder, any personality disorder, or any other mental condition. Bipolar disorder and schizophrenia were condensed into a single category of "serious mental illness", while all other diagnoses were condensed into another category of "any other mental health disorder." Participants could report multiple diagnoses and therefore could be in multiple categories.

Alcohol use disorder and substance use disorder variables were created via an index made from affirmative responses to multiple questions relating directly to the diagnostic criteria of alcohol and substance use disorders. All relevant diagnostic questions were included in the survey except the question pertaining to alcohol use disorder that asks: "Have you wanted a drink so badly couldn't think of anything else" (National Institute on Alcohol Abuse & Alcoholism, 2016). Exclusion of this question may lead to under detection of the presence of alcohol use disorder. However, the impact of this under detection is likely low as 10 of the 11 questions are still included and a diagnosis only requires an affirmative response to two questions (National Institute on Alcohol Abuse & Alcoholism, 2016).

Use of self-reported mental health diagnosis in research is common and has been done repeatedly with the survey data used in this study (Daquin & Daigle, 2018; Schnitker & Bacak, 2016). Additionally, research which examined the accuracy of self-report of mental health diagnosis in survey research of incarcerated people has found high concordance between self-report and administrative data (Wolff, Maschi, & Bjerklie, 2004). Survey based use of the diagnostic criteria as a tool to measure alcohol use disorder and substance use disorder is an extremely reliable and valid measure. Research of a survey which used a similar approach found excellent concordance between survey based diagnoses and clinician-administered diagnoses (Hasin et al., 2015).

2.5. Analysis

Analysis was conducted in four steps. First, bivariate statistics (frequencies and t-tests) compared group rates of adverse experiences, mental health and substance use disorders by gender, race and ethnicity. Next latent class analysis was conducted using indicators to create latent classes of shared adverse experiences. Then after latent classes were established, multinomial regression

Table 1
Demographic Description of the Sample.

		N	%
Gender	Men	14,297	78.6
	Women	3,888	21.4
Race	White	9,002	49.7
	Black	7,770	42.9
	Native American/Alaskan	995	5.5
	Asian	196	1.1
	Hawaiian/Pacific Islander	143	0.8
	Other	721	4.0
Ethnicity	Hispanic	3,438	18.6

Note: Missing not included in calculations; missing < 5%.

was conducted, using gender, race and ethnicity to predict latent class membership to provide additional information about associations between member characteristics and class membership. Finally, logistic regression was used to predict mental health and substance use disorders based on the latent classes. In the final logistic regression models gender, race, and ethnicity were included as covariates. Stata 15 was used for all analyses (StataCorp, 2017).

Latent class analysis is a statistical method which allows for underlying clusters or subpopulations to be identified by patterns in observed characteristics (Collins & Lanza, 2013). In this study, latent class analysis was used to determine if there are underlying patterns or typologies of adversity among people incarcerated in US prisons. Latent class analysis identifies underlying subpopulations by estimating the optimal number of distinct latent classes and the likelihood of membership in each class. As a consequence of this analysis, the prevalence of the latent classes (Asparouhov & Muthén, 2014) will also be calculated. The number of latent classes was determined via bootstrap likelihood ratio test, which has been shown to outperform other measures of model fit in selecting the number of classes (Nylund, Asparouhov, & Muthén, 2007). A two-class model was initially fit and additional classes were systematically added while comparing fit until the addition of more classes does not improve the model (Cloitre, Garvert, Weiss, Carlson, & Bryant, 2014).

The final step of analysis used latent classes to predict mental health and substance use disorders via logistic regression. To do this, each person was assigned membership to the latent class where their likelihood of membership was highest. Logistic regression models were then used to predict the following based on latent class membership, with gender, race and ethnicity as covariates: 1) having a serious mental illness (ever), 2) having any other mental health disorder (ever), 3) having an alcohol use disorder (in the 12 months prior to incarceration), and 4) having a substance use disorder (in the 12 months prior to incarceration).

3. Results

The sample was predominantly men (78.6 %) but had a large number of women respondents (3,888) (Table 1). About half of the sample identified as white (49.7 %). A large majority of the remainder of the sample identified as black (42.9 %), but there were high numbers of respondents who identified as Native American or Alaskan (995), Asian (196), Hawaiian or Pacific Islander (143) and Other (721). Additional information about what races might be included in the Other category was not available. Finally, about a fifth (18.6%) of the sample identified as Hispanic.

As shown in Table 2, rates of adverse experiences were high across the sample. The most frequently reported adverse experience

Table 2
Bivariate Analysis of Adverse Experiences, Mental Health and Substance Use Disorders by Gender and Race.

Description		Total % Yes	Men %	Women %	White %	Non-White %	
			78.6	21.4	49.7	51.3	
Adverse Experiences	Ever Homeless	8.2	7.5	10.7	* 9.0	7.3	*
	As child, lived in foster care or institution	11.8	11.7	12.0	13.3	10.2	*
	As child, caretakers “abused” alcohol/drugs	32.8	31.2	38.9	* 36.1	29.7	*
	Parents incarcerated	19.8	19.2	22.2	* 18.9	20.7	*
	Children, brothers, sisters or spouse(s) incarcerated	38.0	36.3	44.3	* 33.7	42.4	*
	Sexually assaulted > once	8.7	3.7	27.0	* 11.3	6.1	*
	Sexually assaulted only once, occurred when child	2.4	1.5	5.7	* 2.9	1.8	*
	Sexually assaulted only once, occurred when adult	1.5	0.4	5.6	* 1.8	1.2	*
	Military Combat Veteran	1.9	2.4	0.1	* 2.4	1.4	*
	Physically abused	19.9	12.6	46.7	* 25.6	14.2	*
	Diagnoses	Serious Mental Illness	12.6	9.7	23.3	* 16.0	9.3
Other Mental Health Disorder		25.5	20.9	42.1	* 32.0	19.0	*
Alcohol Use Disorder		32.6	33.8	28.3	* 34.3	30.7	*
Substance Use Disorder		43.6	42.0	49.4	* 47.8	39.4	*

Note: Missing not included in calculations; missing < 5%; * indicates $p < 0.05$ using two-samples *t*-test.

Table 3
Comparison of Latent Class Solutions.

Model	df	LL	BIC	AIC
Class-1	10	62589.7	125277.5	125199.5
Class-2	21	54238.1	108680.1	108518.2
Class-3	32	53791.1	107892.8	107646.1
Class-4	43	53622.5	107662.5	107331.0
Class-5	54	53589.9	107704.2	107287.9
Class-6	62	53592.5	107787.1	107309.1

was immediate familial (children, brothers, sisters, spouse) incarceration (38.0 %), followed by parental substance use (33.8 %). Nearly a fifth of people reported parental incarceration (19.8 %) or physical abuse. About a tenth of people reported having ever lived in foster care (or an institution) (11.8 %), being sexually assaulted more than once (8.7 %) or ever being homeless (8.2 %). Rates of other experiences (sexually assaulted only once and military combat veteran) were less than 3.0 %.

Rates of adverse experiences also varied significantly ($p < 0.05$) by both gender and race. Women experienced significantly higher rates of all types of adverse experiences except military combat, (which men experienced at a higher rate; 2.4 % versus 0.1 %) and foster care (where there was no difference). Notably, 27.0 % of women reported being sexually assaulted more than once, as compared to 3.7 % of men; additionally, 46.7 % of Women reported being physically abused, as compared to 12.6 % of men. Incarcerated people identifying as white reported significantly higher rates of all adverse experiences, except familial and parental incarceration, of which non-white participants reported higher rates.

Incarcerated people reported high rates of ever experiencing a serious mental illness (12.6 %) or any other mental health disorder (25.5 %). Rates of having experienced an alcohol or substance use disorder in the year before their incarceration were also high (32.6 % and 43.6 % respectively). However, these rates also varied by gender and race. Women experienced significantly higher rates of all mental health and substance use disorders, except alcohol use disorder, of which men had significantly higher rates. Incarcerated people who identified as white, as compared to non-white, reported significantly higher rates of all mental health and substance use disorders.

Latent class analysis revealed that a four-class solution was the best fit for the data. While the five-class solution demonstrated slightly better fit indices than the four-class, according to the AIC index, it fit worse than the four-class model according to the BIC index. However, the classes within the five-class solution did not differ significantly or conceptually from the four-class solution. Therefore, a four-class solution was determined to be the one to accept as optimal (Table 3).

As shown in Fig. 1, the derived classes from the 4-class solution display very different adverse experience profiles. Members of Class-1 had the lowest likelihoods of exposure to all adverse experiences except combat veteran experiences where they had the highest. Members of Class-2 were likely to have moderate exposure to deprivation, but higher exposure to violence. Members of Class-3 were likely to have high exposure to deprivation, but low exposure to violence, and members of Class-4 were likely to have high exposure to all adverse experiences, other than sexual assault and combat.

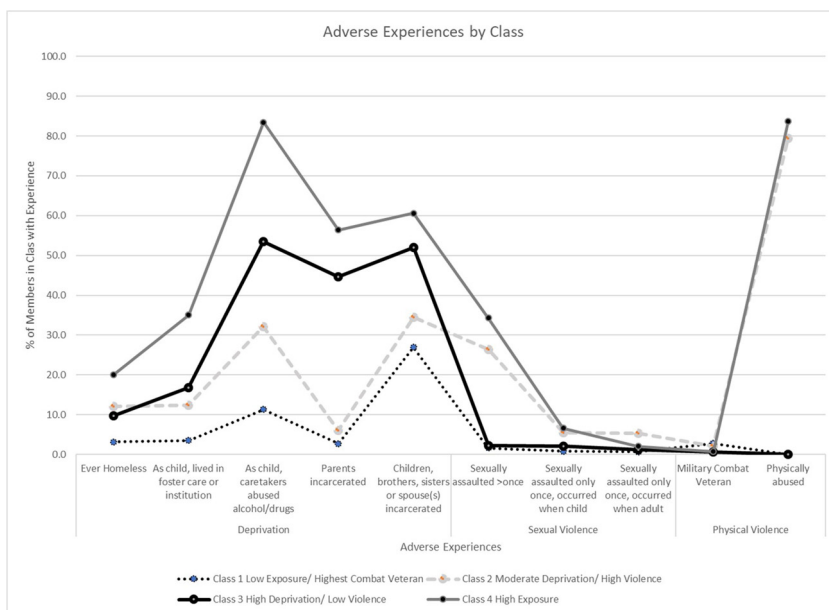


Fig. 1. Adverse Experiences by Class.

Table 4
Multinomial Logistic Regression Predicting Class Membership by Demographic Group.

Demographic Variable	Class 2 Moderate Deprivation/ High Violence			Class 3 High Deprivation/ Low Violence			Class 4 High Risk		
	RR	Beta	<i>p</i>	RR	Beta	<i>p</i>	RR	Beta	<i>p</i>
Male	0.13	−2.03	*	1.02	0.02		0.34	−1.08	*
White	2.80	1.02	*	1.15	0.14		1.50	0.41	*
Black	1.13	0.13		1.44	0.37	*	1.00	−0.01	
Native American	1.95	0.67	*	1.50	0.40	*	2.30	0.83	*
Asian	1.48	0.39		0.33	−1.12	*	0.87	−0.14	
Hawaiian/Pacific Islander	1.17	0.15		0.84	−0.18		1.15	0.14	
Other	2.74	1.01	*	1.33	0.28		1.44	0.36	*
Hispanic	0.50	−0.69	*	0.80	−0.22	*	0.67	−0.40	*
Intercept	0.40	−0.92	*	0.29	−1.24	*	0.65	−0.43	*

Note: Comparison Group was Class 1 “Low Risk”; * *p* < 0.05.

Over half (52.1 %) of incarcerated people fell into Class-1 (low exposure to adverse experiences, but highest combat veteran experiences). Members of this class had a less than 4% probability of the included adverse experiences, with the exception of familial incarceration (26.9 %) and caretaker substance use (11.3 %). However, even though these two experiences had a higher probability, they were still much lower than in other classes.

Class-2 (moderate exposure to deprivation, but high exposure to violence) represented 12.7 % of incarcerated people. People in this class had a very high probability of experiencing physical abuse (79.4 %) and multiple sexual assaults (26.4 %). They also had comparatively high probabilities of having a single sexual assault (5.5 % and 5.3 %) or being a combat veteran (2.1 %). Overall, this class experienced higher probabilities of deprivation related adverse experiences as compared to Class-1, but lower probabilities than Classes-2 or 3.

About a quarter (24.7 %) of incarcerated people were members of Class-3 (high exposure to deprivation, but low exposure to violence). This class had the opposite profile of Class-2, whereby people in Class-3 had relatively low rates of exposure to violence, but relatively higher rates of deprivation. Only about a tenth (10.5) of incarcerated people belonged to Class-4 (high exposure to adverse experiences). However, members of this class experienced the highest probability of nearly all adverse experiences (Fig. 1).

Table 4 depicts results of a multinomial logistic regression, which examined if gender, race and ethnicity variables predicted membership in the three higher latent classes (with “Low Risk” Class 1 as comparison group). As shown in the table, men and incarcerated people identifying as other race, had significantly lower relative risk of belonging to Class-2 or 4, as compared to Class-1. Incarcerated people identifying as white had significantly higher relative risk of belonging to Class-2 or 4. Native American or Alaskan Natives had significantly higher relative risk of belonging to Classes-2, 3 or 4, with the highest risk of belonging to Class-4. Incarcerated people identifying as Hispanic had significantly lower relative risk of belonging to Classes-2, 3 or 4, as compared to Class-1. Incarcerated people identifying as Asian had significantly lower relative risk of belonging to Class-3. Finally, incarcerated people identifying as black had significantly higher relative risk of belonging to Class-3, as compared to Class-1.

As compared to Class-1, members of Classes 2, 3 or 4 had significantly higher odds of ever having a serious mental illness or other mental health disorder or having an alcohol or substance use disorder (in the year prior to their incarceration). Odds of having any of the diagnoses were highest for members of Class-4 (high exposure). Members of this class were at 3.73 greater odds of having a serious mental illness, 3.29 greater odds of having any other mental health disorder, 1.86 greater odds of having an alcohol use disorder, and 2.20 greater odds of having a substance use disorder. The class with the next highest odds of having a serious mental illness or other mental health disorder, was Class-2 (moderate deprivation/ high violence), who had about three times greater odds of ever having either diagnosis. Members of Class-3 still had greater odds of having a serious or other mental health disorder, as compared to members of Class-1, however the odds were only about 1.5 times higher. For both alcohol and substance use disorders there was a slight increase in the odds of diagnoses from Class-2 to three (Table 5).

4. Discussion

Findings demonstrate that incarcerated people, and in particular those identifying as a woman or white, have substantial histories of adverse experiences as well as mental health and substance use disorders. Latent class analysis from this study found four distinct typologies of adverse experiences among people incarcerated in US prisons, which included: Class-1) low adversity exposure, Class-2) moderate deprivation/high violence exposure, Class-3) high deprivation/low violence exposure, and Class-4) high adversity exposure. Previous studies that described typologies of adverse experiences among people who are not incarcerated, found similar results in relation to both the number of existing latent classes and class type.

For example, a nationally representative study of non-institutionalized US adults found five latent classes, four of which were similar, although not identical, to those described in this study. The fifth latent class described in that study was characterized by high childhood exposure to caretaker substance use, emotional abuse and domestic violence (Roos et al., 2016). I was unable to include emotional abuse and domestic violence in this study due to the lack of questions within the survey related to these issues. In addition, comparison of the two studies reveals clear similarities between the typologies of adversity experienced by incarcerated people and the general population, although admittedly, the rates of exposure to the adverse experiences have been found to be much higher in

Table 5

Results of Logistic Regression Predicting Mental Health and Substance Use Disorders: Odds Ratios for Latent Class Membership and Demographic Characteristics.

	Serious Mental Illness (ever)			Other Mental Health Disorder (ever)			Alcohol Use Disorder (in past year)			Substance Use Disorder (in past year)		
	OR	Beta	<i>p</i>	OR	Beta	<i>p</i>	OR	Beta	<i>p</i>	OR	Beta	<i>p</i>
Class 2	3.06	1.10	*	3.17	1.15	*	1.57	0.45	*	1.65	0.50	*
Class 3	1.68	0.52	*	1.58	0.46	*	1.75	0.56	*	2.03	0.71	*
Class 4	3.73	1.31	*	3.29	1.19	*	1.86	0.62	*	2.20	0.79	*
Male	0.51	-0.66	*	0.51	-0.67	*	1.53	0.43	*	0.87	0.13	*
White	1.74	0.56	*	1.84	-0.61	*	0.80	0.22	*	1.24	0.14	
Black	1.01	0.01		0.90	-0.11		0.62	0.48	*	0.78	0.24	*
Native	1.33	0.29	*	1.32	0.28	*	1.08	0.07		0.94	0.06	
Asian	0.98	-0.02		0.87	-0.13		0.72	0.32		0.69	0.37	*
HPI	0.83	-0.19		1.05	0.05		0.71	0.35		0.95	0.05	
Other	1.18	0.17		1.50	0.41	*	0.76	0.27		0.87	0.14	
Hispanic	0.47	-0.75	*	0.49	-0.71	*	0.76	0.28	*	0.75	0.29	*
Intercept	0.11	-2.20	*	0.29	-1.24	*	0.37	0.98	*	0.68	0.38	*

Note: Comparison Group was Class 1 "Low Risk"; * $p < 0.05$.

the prison population (Briere et al., 2016).

Another study used latent class analysis to identify typologies of adversity among justice involved youth. This study identified only three classes of adversity which included poly-victim (high), moderate and low adversity typologies (Ford et al., 2013). While my study found four classes of adversity, there is substantial thematic overlap between the thematic range of classes identified between the two studies. The study of justice involved youth also identified differences in class membership by gender and race which are similar to the trends documented in my study where women and people identifying as white were more likely to be in classes of more severe adversity.

In addition, two studies of US military veterans identified similar latent classes based on adverse experiences. One of these studies, which included both men and women, found essentially the same four latent classes as described in my study (Ross, Waterhouse-Bradley, Contractor, & Armour, 2018). The other study focused on women veterans and found five latent classes, with the fifth class representing exposure to military trauma (Gaska & Kimerling, 2018). My study also adds to the research literature on the experiences of incarcerated people by identifying latent class differences, which reveal themselves during adulthood. Findings from my study indicate, for example, that the experience of homelessness and experiencing sexual assault (once) as an adult differed across typologies.

My study also linked typologies of adversity to mental health and substance use disorders. As compared to having low exposure to adversity, all other typologies of adversity were found to significantly predict having mental health and substance use disorders. The only other study to do this was the aforementioned study of women military veterans. Findings from that study indicated that as compared to the low adversity class, the military trauma, moderate and high exposure classes had significantly higher odds of having a mental health or substance use disorder. Odds were highest for the high exposure class (Gaska & Kimerling, 2018). Findings in my study also found that the high adversity class had the highest odds of having mental health and substance use disorders. In my study, military combat veterans were likely to have been in the lower risk classes, although to be clear, the rate at which incarcerated people experienced this form of adversity was low (< 2%). However, my findings suggest that incarcerated people with military experience may be substantially different than those without military experiences.

Unlike previous studies, this study also examined how gender, racial and ethnic identity associate with latent class membership. Findings in this area highlight how identity can affect a person's risk of experiencing a particular typology of adversity. For example, incarcerated people identifying as Native American/Alaskan had more severe and extreme experiences of adversity typology, which is consistent with other studies that describe high rates of adversity among Native populations (Koss et al., 2003). In comparing findings between incarcerated people identifying as either white or black, there is a pattern where white people have higher relative risk for typologies marked by violence, but not deprivation, while black people have a higher relative risk for typologies marked by deprivation, but not violence. This finding could indicate that pathways to prison for people who identify as black may be marked more strongly by systemic factors, such as poverty or racism, while white people's pathways may be marked more strongly by individual experiences of adversity. A similar pattern is seen across gender, where women are at a higher risk of experiencing violent typologies, as compared to men. These patterns add to previous research, which identifies gendered (Salisbury & Van Voorhis, 2009) and racially divergent pathways to incarceration (Mears, Cochran, & Lindsey, 2016).

However, another explanation for the disparities by race and ethnicity is that they stem from disparities in access to mental health and substance use treatment. Since diagnosis is reliant on having been evaluated, these disparities could simply be a proxy for the existing disparities in services utilization (Hatzenbuehler, Keyes, Narrow, Grant, & Hasin, 2008). Given that the sample used in this study is incarcerated this is likely to be a less salient factor, since universal mental health and substance use screening in common in prisons (Martin, Colman, Simpson, & McKenzie, 2013). However, further research should explore these findings in greater detail.

Limitations of this study included use of self-reported mental health diagnosis. While it would be preferable to use diagnosis obtained via structured clinical interview, this information was not available in the data. However, based on previous research,

incarcerated people have been found to accurately self-report past mental health diagnosis (Wolff et al., 2004). Additionally, any response bias in self-report would likely lead to underreporting, which would make the results of this study a conservative estimate.

Another limitation is an inability to include all relevant types of adversity. For example, the survey did not include questions on neglect, emotional or psychological abuse, or other forms of physical abuse in adulthood. However, it still includes a broad range of adverse experiences. Future studies could build on this work through the inclusion of additional indicators.

Another limitation is the age of the data (2004). While this is still the most recently available large survey of people incarcerated in the US, it is still somewhat old. However, given the nature of the research questions examined in this study, it is unlikely that there would be significantly different results. For example, a study of the health impacts of adverse childhood experiences that looked at birth cohorts over a nearly 100-year time span, found no differences in the health effects of childhood adversity by birth cohort. The authors concluded that social and secular changes have little impact on how adversity impacts health (Dube, Felitti, Dong, Giles, & Anda, 2003). Given the much shorter look back period in my study, these findings support my belief that the findings are still relevant today.

5. Conclusion

In conclusion, this study adds to the literature by describing typologies of adverse experiences for men and women incarcerated in US prisons and the association between adversity experiences and current mental health and substance use disorders. Similarities were found between the typologies of adverse experiences between this population and other previously studied groups. This study also provided details about gender, racial and ethnic differences in adverse experience typologies that helps understand the prevalence of mental health and substance use disorders for people incarcerated in US prisons. Given the high rates of incarceration in the US, a better understanding of the unique experiences and health issues of incarcerated people is critical to addressing the problem of mass incarceration. This study provides important information to inform policymakers and practitioners of the unique typologies of adverse experiences of incarcerated people. Furthermore, it also links these typologies to mental health and substance use disorders. Details from this study can be helpful in guiding policy and program development to address the range of experiences of incarcerated people, rather than using a one-sized fits all approach. For example, differences in adversity typologies by gender can inform the range of programming that is provided within gender specific prisons. By providing services that focus on the types of adversity experienced by the population, providers can be more responsive to the specific needs of the population.

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