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Borderline personality disorder symptoms and exposure to violence as risk factors for opioid use in adulthood

Thomas Wojciechowski

Michigan State University, School of Criminal Justice, 655 Auditorium Road, East Lansing, 48824

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ABSTRACT

Borderline personality disorder and exposure to violence are both risk factors for opioid use. While past research has identified these relationships, there has yet to be any study which investigates the potential that exposure to violence may help explain the relationship between borderline personality disorder symptoms and opioid use as a mediator. The present study used data from the Pathways to Desistance study to test these proposed relationships. Results indicated that greater levels of borderline personality disorder symptoms were associated with increased opioid use frequency. However, when exposure to violence variables were included in the model, the magnitude of this effect was attenuated by more than 20% and reduced to non-significance. These results indicate the importance of identifying and treating borderline personality disorder symptomatology and to provide increased oversight of the environments which juvenile offenders are exposed to upon reentry. Doing so may help to address the opioid crisis in the United States.

1. Introduction

Borderline personality disorder (BPD) is a DSM-5 mental disorder characterized by instability in self-image, emotions, identity, and relationships, and impulsive and self-injurious behavior (American Psychiatric Association, 2013). BPD has been also been found by prior research to be associated with increased risk for multiple forms of substance use (Carpenter et al., 2017, 2016; Trull et al., 2018). Considering the major issues associated with opioid use in the present-day United States of America, BPD's association with use of this class of drugs may be highly relevant (Bassir, 2018; Nevid et al., 2019; Vest and Tragesser, 2018). Another risk factor for opioid use that has been identified by prior research is exposure to violence (Khoury et al., 2010; Wojciechowski, 2019; Yantsides et al., 2017). Further, individuals who suffer from BPD demonstrate increased risk for experiencing exposure to violence (Alexander, 2009; Coolidge and Anderson, 2002). It may be that this elevated risk for exposure to this form of trauma may help explain why BPD symptomatology is related to elevated risk for opioid use. The present study sought to understand the interrelatedness of these three constructs among a population who are at elevated risk for substance use, exposure to violence, and mental illness; juvenile offenders (Baglivio et al., 2014; Underwood and Washington, 2016; Wojciechowski, 2018a).

1.1. Specific aims

The present study sought to accomplish several aims related to understanding the relationships observed by prior research. First, BPD symptomatology was examined as a predictor of opioid use frequency. It was expected that increased levels of BPD symptoms would exert a direct effect on opioid use, resulting in increased frequency of use. The other major of aim of this study was to examine how accounting for two forms of exposure to violence (witnessed violence and direct victimization) impacted this direct effect. If these three constructs were interrelated as expected, then it would result in an attenuation of the effect of BPD on opioid use frequency when exposure to violence variables were added to the model. Such attenuation would have numerous implications for the treatment of juvenile offenders presenting BPD symptoms.

1.2. Borderline personality disorder, risk for exposure to violence and opioid use

There are numerous characteristics of BPD which may lead to elevated risk for opioid use. Individuals with BPD generally demonstrate lower self-control (Critchfield et al., 2004; Dougherty et al., 1999), which is a robust risk factor for engagement in substance use (Daley, Egan, Quigley, Delaney, and Baumeister, 2016; Pratt and Cullen, 2000; Wills et al., 2015). The mood symptoms that are characteristic of BPD,

E-mail address: wojcie42@msu.edu.

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like depression, have also been found by past research to be associated with increased risk for substance abuse (Edlund et al., 2015; Liao et al., 2017; Zweig et al., 2015). Instability in interpersonal relationships are also a hallmark characteristic of BPD and evidence of a bidirectional relationship between this construct and substance use has also been identified (Fairbairn et al., 2018). All of these are unique ways in which BPD symptoms themselves lead to substance use, but it is also likely that these characteristics of BPD contribute to opioid use through a common mechanism. Exposure to violence provides one potential pathway for helping to understand the relationship between BPD symptoms and opioid use frequency.

Exposure to violence has not only been identified as a risk factor associated with the onset of BPD (Buckholdt et al., 2015; Bujalski et al., 2019; Kuo et al., 2015), but individuals suffering from BPD also demonstrate increased risk of exposure to violence after onset (Alexander, 2009; Coolidge and Anderson, 2002). Exposure to violence is a risk factor associated with opioid use (Wojciechowski, 2019; Yantsides et al., 2017), so this may help to explain the relationship between BPD and opioid use also. The symptoms of BPD may help to understand this increased risk for exposure to violence. Low self-control has been identified as a risk factor for exposure to violence because of the construct's relationship with risk-taking behavior. Individuals with low self-control engage in risky behavior that puts them at-risk for exposure to violence. The field of criminology has examined the potential bidirectional relationship between self-control and crime with research focused on the victim-offender overlap (Beckley et al., 2018; Flexon et al., 2016; Pratt et al., 2014). The mood symptoms of BPD may contribute to this increased risk for exposure to violence also, as anger and irritability may result in engagement in criminal behavior, thus, increasing risk for exposure to violence consistent with the victim-offender overlap (Connolly and Beaver, 2015; Wojciechowski, 2018b). Further, substance use due to the depressive symptoms of BPD may place them at increased vulnerability for exposure to violence (George and Thomas, 2000; Messman-Moore et al., 2008), resulting in a feedback effect spurring greater substance use. Finally, the instability in interpersonal relationships that is characteristic of BPD may further increase their risk exposure to violence. Conflict and instability are characteristic of intimate relationships of domestic violence victims (Capaldi et al., 2012; Carotta et al., 2018). It is for all these reasons that BPD sufferers may be at increased risk for exposure to violence. Because exposure to violence is also a risk factor for opioid use (Wojciechowski, 2019; Yantsides et al., 2017), it may be that at least a portion of the relationship between BPD and opioid use may be due to the fact that they experience exposure to violence at higher rates. The present study sought to examine the interrelatedness of these three concepts by examining the impact that accounting for exposure to violence has for modifying the magnitude of the effect that BPD symptoms have on opioid use frequency.

While identification of the main relationships is of paramount importance, it is also necessary to control for extraneous variables that may confound these relationships and ensure non-spuriousness. There are several important constructs in particular that could potentially confound these relationships. Gender is one of these, as research has indicated that opioid use may differ depending on male/female identity (Tetrault et al., 2008). Race is another of these constructs, as opioid use exists at elevated prevalence among Whites (Hetey and Eberhardt, 2018; Maxwell, 2015). Social class is also highly relevant, as use risk is stratified by class (Rigg and Monnat, 2015). Psychosocial variables also may be relevant, as association with antisocial peers, low self-control, and depression have all also been identified as risk factors related to substance use (Lee et al., 2016; Mason et al., 2017; Wojciechowski, 2019). Finally, it is also likely important to account for age differences in opioid use risk, as risk for engagement in antisocial behavior tends to decline following adolescence (Moffitt, 1993). Accounting for all of these influences would allow for the following hypotheses to be tested:

Hypotheses

Hypothesis 1. Increased BPD symptoms will be associated with increased frequency of opioid use, net of all covariates.

Hypothesis 2. Exposure to violence will be associated with increased frequency of opioid use and will reduce the magnitude of the impact of BPD symptoms on opioid use frequency when included in the model, net of all covariates.

2. Methods

2.1. Data

The present study utilized data from Wave 1 and 10 of the Pathways to Desistance study.[1] This was a panel study consisting of responses from 1354 juvenile offenders for the 84 months immediately following an adjudication for a serious offense, resulting in 11 total data points for each participant. Recruitment for the study took place in Maricopa County, AZ and Philadelphia, PA from 2000–2003. Qualifying adjudications comprised all felony offenses, as well as misdemeanor sexual assault and weapons charges. The qualifying offense leading to adjudication had to have been committed when participants were between 14 and 17 years of age to meet inclusion criteria. Attrition reached a peak of 16.2% at the final data point. The proportion of male drug offenders included in this purposive sample was capped at 15% in order to maintain sample heterogeneity at baseline. Of all juvenile offenders who met inclusion criteria who were approached for recruitment, 20% declined the opportunity.

Data used in the present study were obtained via computer-assisted interview technology used to elicit self-reported responses from participants. Members of the research team provided participants with laptops during interview sessions which they could use to input responses to verbal prompts. It was believed that this method increased confidentiality in responding, thus, potentially increasing honesty in responding also. Interviews took place in locations that were convenient for participants, including, but not limited to: participants' homes, libraries, and criminal justice facilities.

2.2. Measures

2.2.1. Opioid use

The main dependent variable in the present study was frequency of opioid use at Wave 10. Opioid use frequency was measured using a nine-point ordinal scale (1 = Not at all, 2 = 1–2 times, 3 = 3–5 times, 4 = 1x per month, 5 = 2–3x per month, 6 = 1x per week, 7 = 2–3x per week, 8 = 4–5x per week, 9 = Every day) assessing the general frequency at which participants reported using opioids during the previous observation period. This variable was chosen as the dependent variable of interest because it was the only variable that was available for measuring opioid use in this dataset. Unfortunately, the Pathways to Desistance data does not make it clear that medical opioid use was omitted from analyses, so it must be assumed that measurement of this variable included both medical and non-medical opioid use.

2.2.2. Borderline personality disorder symptoms

The direct effect of BPD symptomatology was examined as a predictor of opioid use frequency in this study. BPD symptomatology was measured using the Personality Assessment Inventory. This is a validated scale (Douglas et al., 2001) used to assess the presence of personality disorders by asking individuals about the presence or absence of personality disorder symptoms. Raw scores are converted into T-scores based on standardization of from a census-matched general

[1] Wave 10 measures were used because this was the only wave at which BPD symptoms were measured. Wave 1 measures included in analyses were gender, race, socioeconomic status, and opioid use frequency at baseline.

population sample of 1000 general population individuals. The T-score measure of BPD symptom presence is used in the present study. This variable was measured at Wave 10.

2.2.3. Exposure to violence

Exposure to violence was examined as a risk factor for opioid use that could potentially account for some or all of the direct effect of BPD symptoms on opioid use frequency. Two exposure to violence variables were utilized in analyses: direct victimization and witnessed violence. Both of these variables were measured at Wave 10 and were binary, delineating participants who experienced each form of exposure to violence during the prior observation period from those participants who had not (0 = No; 1 = Yes).

2.2.4. Control variables

Several control variables were included in analyses in order to best mitigate the risk of biased estimation of effects of risk factors on opioid use frequency. The first of these variables was each participant's self-reported gender at baseline. This was because past research has indicated that there exists differing risk of use based on gender (Tetrault et al., 2008). Gender was measured as a binary variable, delineating male and female participants into each category (0 = Males; 1 = Females).

Another control variable included in analyses was participants' racial identification at baseline. This variable was included because past research has indicated increased risk for opioid use among White individuals (Hetey and Eberhardt, 2018; Maxwell, 2015). Race was measured as a nominal variable with four categories: White, Black, Hispanic, and Other Race. A series of dummy variables was computed so that participants from each racial group were delineated from all other participants for each category (ex: 1 = Black; 0 = All other participants). The dummy variable corresponding to White participants was excluded from analyses in order to have a reference group to interpret coefficient effects in relation to.

Socioeconomic status (SES) was also included in analyses as a control variable because past research as indicated the importance of this concept for understanding opioid use (Rigg and Monnat, 2015). SES was measured at baseline as a weighted mean of participants' parents' occupational prestige and educational attainment scores. If both parents were available for participants to provide data for, a mean of the two individual scores was calculated so that each participant was provided with a single SES score.

Participants' age was also included as a control variable because past research indicates the importance of age for understanding engagement in drug use. Age at Wave 10 was measured as an interval variable.

Low self-control has been identified by past research as important for understanding engagement in opioid use (Wojciechowski, 2019), necessitating its inclusion in analyses as a control variable. The Weinberger Adjustment Inventory was used to measure this concept utilizing a series of ordinal items asking participants about the degree to which eight hypothetical situations were true of their own behavior. Seven of the eight items were reverse coded so that lower scores corresponded to lower self-control. The Wave 10 measure of this construct was used in analyses.

Depressive symptoms have also been linked to increased opioid use (Lee et al., 2016), so this construct was included as another control variable. The Brief Symptom Inventory was used to measure depression. This validated scale measures several mental health constructs using a series of ordinal items assessing the degree to which individual symptoms had bothered participants in the previous week. The mean of all of the depressive symptom items was then calculated so that each participant had a single depressive symptom score. The Wave 10 measure of this construct was utilized in analyses.

The degree to which participants associated with antisocial peers was also included in analyses as a control variable. This is because this social influence has been identified as a risk factor for substance use (Mason et al., 2017). This construct was measured using a series of ordinal items assessing the general number of friends who participants report influence them to engage in seven different antisocial acts, with higher scores indicating having more peers attempting to influence engagement in antisocial behavior. A mean of all of these individual items was calculated for each participant so that a single score was provided for each participant. The Wave 10 measure of this construct was utilized in analyses.

The final variable included in analyses was opioid use frequency at baseline. This was because earlier opioid use may lead to continuity in the behavior. This variable was measured ordinally in the same manner as the main dependent variable described above.

2.3. Analytic strategy

A series of ordered logistic regression models were utilized to examine the effects of BPD symptoms and exposure to violence on opioid use frequency. This modeling choice was based on the ordinal measurement of the dependent variable of interest. Assumption of proportional odds is made when utilizing this method, as additions to the logarithmic odds of being assigned to each category are assumed to be the same. It is the further assumed that the odds of moving positively or negatively between categories of the dependent variable operate in a linear manner. Maximum likelihood estimation was used in modeling these effects. Coefficients are described as odds ratios (OR), indicating the effect that a one unit increase in an independent variable has on the odds of moving into a higher category on the dependent variable. This series of variables begins with Model 1 estimating the direct effect of BPD symptoms on opioid use frequency with control variables included in the model. Model 2 then estimates these same effects with exposure to violence variables included also in order to determine the impact that these additions have on the BPD-opioid use relationship.

3. Results

Table 1 provides descriptive statistics for variables included in analyses. Table 2 provides Model 1 estimates and Table 3 provides Model 2 estimates. Model 1 estimates indicated that having more BPD symptoms was associated with increased odds of reporting higher frequency opioid use (OR = 1.047). This indicates that for each additional BPD symptom that an individual reported, the odds of being in higher opioid use categories increased by 4.47%. In this model, Black participants used opioids significantly less frequently than White participants, net of all control variables (OR = 0.140). Lower self-control was also associated with more frequent opioid use in this model (OR = 0.490). Model 2 estimates indicated differences the effects observed in Model 1. The effect that BPD symptomatology exerted on opioid use frequency was reduced by a little more than 20% and was reduced to non-significance upon the inclusion of exposure to violence variables (OR = 1.038). Having witnessed violence in the previous observation period was associated with more frequent opioid use (OR = 3.743). This indicates a 374.298% increase in the odds of reporting higher frequency opioid use when experiencing this exposure to violence. Direct victimization did not exert a significant effect on opioid use frequency. Like Model 1, Black participants reported less frequent opioid use than White participants net of controls (OR = 0.107) and lower self-control was associated with increased opioid use frequency (OR = 0.508).

Post-hoc sensitivity analyses examined opioid use as a binary variable (0 = No; 1 = Yes) to examine whether or not the hypothesized processes also influenced odds of opioid use risk similarly. Results indicated that the relationships observed in the main analyses were robust. BPD symptoms predicted greater risk for opioid use, but this effect was reduced to non-significance when exposure to violence variables was accounted for in the model.

Table 1
Descriptive statistics.

	Mean/Proportion	Standard deviation	Minimum	Maximum
Opioid use frequency wave 10	0.112	0.717	0	8
Borderline personality disorder symptoms wave 10 (T-Score)	57.472	10.601	34	97
Direct victimization wave 10	0.129	0.335	0	1
Witnessed violence wave 10	0.395	0.489	0	1
Self-control wave 10	3.330	0.982	1	5
Depression wave 10	0.417	0.616	1	3.83
Deviant peer association wave 10	0.673	0.737	0	4
Opioid use frequency at baseline	0.107	0.682	0	7
Age at wave 10	22.026	1.146	20	25
Gender (0 = Males, 1 = Females)	0.136	0.343	0	1
Race (Reference = Whites)				
Black	0.414	0.493	0	1
Hispanic	0.335	0.472	0	1
Other race	0.048	0.214	0	1
SES at baseline	51.409	12.299	11	77

Table 2
Ordinal logistic regression modeling impact of covariates on opioid use frequency: Model 1.

	Odds Ratio	p-Value	95% Confidence Intervals
Borderline personality disorder symptoms	1.047	0.018	1.008–1.088
Gender (0 = Males, 1 = Females)	0.330	0.145	0.074–1.467
Race (reference = White)			
Black	0.140	0.003	0.038–0.516
Hispanic	0.552	0.178	0.233–1.311
Other Race	1.344	0.619	0.419–4.315
Socioeconomic status	1.027	0.122	0.993–1.062
Age	1.037	0.832	0.732–1.449
Self-control	0.490	0.004	0.301–0.799
Depression	0.995	0.986	0.603–1.643
Deviant peer association	1.138	0.554	0.741–1.748
Baseline opioid use frequency	0.945	0.824	0.573–1.557

Table 3
Ordinal logistic regression modeling impact of covariates on opioid use frequency: Model 2.

	Odds Ratio	p-Value	95% Confidence Intervals
Borderline personality disorder symptoms	1.038	0.064	0.998–1.079
Direct victimization (0 = No;1 = Yes)	1.792	0.168	0.783–4.105
Witnessed violence (0 = No; 1 = Yes)	3.743	0.004	1.512–9.265
Gender (0 = Males, 1 = Females)	0.496	0.371	0.107–2.303
Race (reference = White)			
Black	0.107	0.001	0.029–0.403
Hispanic	0.452	0.082	0.185–1.105
Other Race	1.335	0.642	0.395–4.506
Socioeconomic status	1.030	0.093	0.995–1.065
Age	1.011	0.950	0.719–1.423
Self-control	0.508	0.007	0.311–0.831
Depression	0.900	0.694	0.532–1.523
Deviant peer association	0.925	0.737	0.585–1.461
Baseline opioid use frequency	1.001	0.997	0.600–1.669

4. Discussion

The present study provided unique insight into the interrelated nature of BPD, exposure to violence, and opioid use. While greater levels of BPD symptoms were associated with increased opioid use frequency, this effect became non-significant following the inclusion of exposure to violence variables in the model. This indicates that a portion of the effect BPD was exerting on opioid use was because of increased risk of being exposed to violence. Both hypotheses posited by this study were supported by these results. There are numerous important implications that stem from these highlighted findings.

One important finding from this study was that elevated levels of BPD symptoms were associated with increased frequency of opioid use. While past research has also identified this relationship (Bassir, 2018; Nevid et al., 2019; Vest and Tragesser, 2018), the present study is the first to identify this relationship among a sample of juvenile offenders. Considering that juvenile offenders are at-risk for the development of mental illness (Underwood and Washington, 2016), understanding that the development of BPD symptomatology specifically is related to opioid use frequency among this population may help criminal justice officials focused on reducing use of these drugs target individuals for intervention. This indicates that the symptom presentation that does not meet clinical significance remains an important risk factor for opioid use. This puts increased impetus on psychiatrists working within the criminal justice system to report not only on clinically significant BPD diagnosis, but also on subthreshold symptoms that could function as a risk factor for opioid use. Considering that BPD cannot be diagnosed until adulthood by definition (American Psychiatric Association, 2013), symptoms that could develop into disorder are all that could be identified in childhood and adolescence by juvenile justice psychiatric professionals anyway. This should indicate the importance of identifying these symptoms among juvenile offenders during these periods of the life-course, so that preventative measures may be taken to stop further development of BPD symptoms as they enter adulthood and may influence opioid use. Beyond the direct effect of BPD symptomatology on opioid use frequency, exposure to violence was also highly relevant for understanding this identified relationship.

Exposure to violence was found to reduce the impact of BPD symptomatology on opioid use frequency by about 20% and reduce the relationship to non-significance altogether when accounted for in the model. This indicates that a good deal of the influence that BPD symptoms have on opioid use frequency is due to the increased risk for experiencing exposure to violence by individuals demonstrating these symptoms. This indicates that the hallmark characteristics of BPD place individuals at greater risk for experiencing exposure violence and that such exposures may lead to opioid use. The instability in relationships that is characteristic of BPD could help to confer that increased risk for exposure to violence, as this may lead to selection into relationships with violent individuals who may victimize individuals demonstrating BPD symptoms or others. This finding indicates the importance of providing additional oversight upon release from incarceration for juvenile offenders released into the community who demonstrate BPD symptoms, as reentry environments for these individuals may be rife with potential exposure to violence which may impact opioid use frequency. While this increased risk for exposure to violence may also exist

during incarceration, oversight by agents who may intervene will be greater and opportunity for opioid use is likely to be lower. Future research should investigate the degree to which additional attention to the contexts which juvenile offenders exhibiting BPD symptoms return impacts their exposure to violence and opioid use.

While the present study provided unique insight into the relationships between BPD, exposure to violence, and opioid use; there were also numerous limitations of this study. The first limitation related to the BPD symptoms measure utilized in analyses. It would have been useful to have been able to utilize a measure which delineated individuals who met clinical thresholds for full BPD diagnosis from those who did not to provide additional understanding about how BPD relates to opioid use risk. While such a measure did exist, very few participants actually met criteria for BPD diagnosis ($N = 4$); making analyses with this measure impossible. This is relatively unsurprising, as BPD exists at much higher prevalence among females and only 13.59% of the Pathways to Desistance sample were female. Future research should examine these relationships among a sample where the use of a diagnostic measure is possible to provide more complete understanding how BPD predicts opioid use. Another limitation of this study relates to the Pathways to Desistance sample being solely comprised of juvenile offenders. The indicated nature of this sample is likely to lead to issues with generalizability of these results beyond this population of individuals. For this reason, any extrapolation of results beyond the current study should be done with extreme caution. These results may be meaningful for understanding these relationships among serious juvenile offenders, but their meaning for populations beyond that is highly questionable. Future research should seek to test the robustness of the obtained results among a random sample of the general population. Another limitation relates to the opioid use frequency variable used as the outcome in analyses. While this variable was chosen due to it being the only available measure of opioid use, alternative measures may have been more meaningful for understanding seriousness of opioid use. Frequency of use is not identified as a criterion for opioid use disorder in the DSM-5 (American Psychiatric Association, 2013). Instead, this disorder focuses more on the social implications of use and disruptions to social functioning caused by use. Considering that this is the main model for understanding addiction that holds hegemony in contemporary science, a diagnostic measure may have been more useful. Future research should seek to test the robustness of these results using such a measure. A final limitation of this study relates to the opioid use measure examined as the dependent variable. While using a holistic measure capturing use of this class of drugs is useful, a measure which delineated different types of opioids (heroin, codeine, oxycontin, Vicodin, etc.) would also be useful as these different types of drugs vary considerably in their legal status. Future research should seek to examine the relationship between prescription and non-prescription opioids and BPD and exposure to violence.

The limitations highlighted above temper the results of this study, however, there remain important insights. Increased BPD symptoms were found to be related to increased frequency of opioid use among juvenile offenders. This indicates the importance of identification of even subthreshold symptoms of the disorder among this population in order to help reduce opioid use among this segment of the population. Future research should examine how clinical levels of BPD influence opioid use among this population. Another major finding of this study was the relatively large reduction in the impact of BPD on opioid use when exposure to violence was accounted for in the model. Inclusion of exposure to violence variables led to the reduction of the impact of BPD on opioid use to non-significance. This indicated the increased risk that individuals demonstrating elevated levels of BPD symptoms have for exposure to violence and how this increased risk for such exposures can lead to opioid use. Future research should seek to test the robustness of these results among a general population sample to determine the degree that these results may be extrapolated. If generalizability of results is found to be high, then the potential to cater programs for individuals demonstrating BPD symptoms that function to reduce risk for exposure to violence may help to reduce opioid use among individuals entering adulthood.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.112549.

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