Opioid Use in Pregnancy: Borderline Features and Hepatitis C Virus

(In press) *Personality Disorders: Theory, Research, and Treatment*

Gretchen Kurdziel-Adams[1], Jenny Macfie[2], Stephanie B. Kors[2], Kimberly B. Fortner[3], Craig V. Towers[3], & Ralph B. Lydic[2]

[1]Cambridge Health Alliance, Harvard Medical School, Boston, MA; [2] Psychology Department, University of Tennessee Knoxville; [3] Department of Obstetrics and Gynecology, University of Tennessee Medical Center, Knoxville, Tennessee

Abstract

This study examined the relationship between borderline personality disorder (BPD) assessed as self-reported borderline features (Morey, 1991), opioid use, and Hepatitis C virus (HCV) in pregnant women. There were 55 women in the opioid use group and 38 in the comparison group who were at high-risk due to medical issues that did not include drug use. Women were in their 2nd or 3rd trimester. All women received Medicaid and were racially representative of the geographic area (84% White). We assessed opioid use severity from medical records based on urine assays and prescriptions for opioids. The results revealed that women who scored in the clinical range of total borderline features, which is associated with a diagnosis of BPD (Trull, 1995), had 2.83 greater odds of being opioid users (prescribed and non-prescribed) than had individuals below the cut-off. The borderline features of affective instability, identity disturbance, negative relationships, and self-harm/impulsivity were significantly correlated with opioid use severity. Negative relationships and self-harm/impulsivity contributed significant variance in opioid use severity over and above affective instability and identity disturbance. Women in the clinical range of borderline features were more likely to have HCV than were women below the cut-off, and the borderline feature of negative relationships specifically was associated with HCV. We discuss implications for interventions to address negative relationships and self-harm/impulsivity, and interventions to help prevent opioid misuse in women before they become pregnant.

Key words: borderline features, opioid misuse, pregnancy, hepatitis C virus,

Introduction

Borderline Personality Disorder (BPD) is a severe, chronic disorder characterized by emotional instability, suicidal behavior, unstable and intense relationships, and impulsive behavior that may be self-damaging, e.g., substance misuse (American Psychiatric Association, 2013). In addition to a categorical diagnosis, BPD can be assessed with a self-report measure of borderline features along a continuum (affective instability, identity disturbance, negative relationships, self-harm/impulsivity; Morey, 1991). Borderline features are highly correlated with a BPD diagnosis (Kurtz & Morey, 2001) and a clinical cut-off score for the sum of all four features is associated with a diagnosis of BPD (Trull, 1995).

Between 1999 and 2014, the number of pregnant women who misuse opioids more than quadrupled (Haight, Ko, Tong, Bohm, & Callaghan, 2018). Moreover, BPD is frequently co-morbid with opioid use disorder (OUD; Sansone, Watts, & Wiederman, 2013; Trull, Sher, Minks-Brown, Durbin, & Burr, 2000). Our review of the literatures identified no studies on the association between BPD and opioid misuse in pregnancy. This is an important omission because BPD is largely a disorder of a woman's childbearing years, being first diagnosed in late adolescence or early adulthood and diminishing in severity by middle age (Paris, 2003). Co-morbid opioid misuse during this time may increase negative consequences not only for the mother but also for her infant. Moreover, pregnancy marks a critical time to intervene, as a mother-to-be is likely to seek medical care during prenatal appointments and may be motivated to address her drug misuse to safeguard her infant's well-being, including the prevention of Neonatal Opioid Withdrawal Syndrome (NOWS; Patrick et al., 2015).

BPD and Substance Use in Pregnancy

A diagnosis of BPD is a risk factor in pregnancy, which a co-morbid diagnosis of

substance use disorder (SUD) compounds. Women who have BPD approach pregnancy and delivery as traumatic (Blankley, Galbally, Snellen, Power, & Lewis, 2015) and are more likely to give birth prematurely and have newborns with low APGAR scores (Bandelow et al., 2005; Blankley et al., 2015; Pare-Miron, Czuzoj-Shulman, Oddy, Spence, & Abenhaim, 2016). Furthermore, women with BPD also have higher rates of unplanned and teenage pregnancies, and are at increased risk for developing an SUD while pregnant compared to pregnant women without the disorder (De Genna, Feske, Larkby, Angiolieri, & Gold, 2012).

BPD and co-morbid SUD are most common in patients who are younger and female (Wapp et al., 2015). Overall, 24.2% BPD patients have some SUD. Specifically, 18.5% of individuals with BPD also have an opioid use/dependence, compared to 14.3% for alcohol and 16.8% for cocaine (Trull et al., 2000). Importantly, however, the co-morbidity between BPD and OUD is not due to overlap in symptoms for each diagnosis (Trull et al., 2000). In the current study, we examined the relationship between BPD and opioid misuse in pregnancy. We expected that women above the clinical cut-off for borderline features associated with a diagnosis of BPD would be more likely to misuse opioids in pregnancy than would women below the cut-off.

Self-harm/impulsivity, Negative Relationships and Opioid Misuse

Among borderline features, self-harm/impulsivity and negative relationships may be specifically associated with opioid misuse. Self-harm/impulsivity is characteristic of several psychiatric disorders including BPD and SUD (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001). Indeed, some researchers consider substance use to be a manifestation of impulsivity (Links, Heslegrave, & van Reekum, 1999; Martino et al., 2017). Risky drug use behavior (e.g. syringe sharing) may result from an impulsive decision based on current feeling and thinking,

together with an inability to foresee the consequences of a behavior in that present moment. Indeed, in college students, self-harm/impulsivity was significantly associated with higher levels of opioid misuse, more frequent opioid use, more serious consequences, and greater risk for dependence (Tragesser, Jones, Robinson, Stutler, & Stewart, 2013). In the current study, we therefore hypothesized that self-harm/impulsivity would be associated with severity of opioid misuse in pregnancy.

Negative interpersonal relationships are also associated with opioid misuse in women. In a community sample of non-treatment seeking individuals, women were more likely than were men to be motivated to misuse prescription opioids due psychological distress (Back, Payne, Simpson, & Brady, 2010), specifically interpersonal stress (Back, Lawson, Singleton, & Brady, 2011). Furthermore, in an epidemiological sample, victims of intimate partner violence were more likely to be women than men, and OUD was associated with victimization not perpetration (Smith, Homish, Leonard, & Cornelius, 2012). We hypothesized that in addition to self-harm/impulsivity, the borderline feature of negative relationships would also be associated with opioid misuse in pregnancy beyond the borderline features of affective instability and identity disturbance.

Opioid Misuse, BPD, and Hepatitis C

Hepatitis C virus (HCV) is the most common chronic bloodborne infection in the United States (Centers for Disease Control and Prevention, 2018). Symptoms are initially mild and unlikely to lead an individual to seek medical treatment. However, HCV is the leading cause of liver-related deaths (Westbrook & Dusheiko, 2014). Syringe sharing in the context of injection drug use is the most common means of HCV transmission in the United States (Centers for Disease Control and Prevention, 2018), leading to 53% of injection drug users contracting HCV

(Degenhardt et al., 2017). Moreover, 60% of pregnant women on opioid maintenance therapy were positive for HCV (Krans et al., 2016), 4-7% of whom will transmit the infection to their infants (Roberts & Yeung, 2002). Furthermore, there is no known intervention to reduce the risk of transmission (Cottrell, Chou, Wasson, Rahman, & Guise, 2013). Additionally, BPD is associated with syringe sharing (Mackesy-Amiti, Donenberg, & Ouellet, 2014). We expected that a clinical cut-off of borderline features associated with a diagnosis of BPD in pregnant women would be associated with HCV. Additionally, given the relationship between sharing syringes and HCV, and the relationship between self-harm/impulsivity and drug use reviewed above, we expected that the borderline features of negative relationships and self-harm/impulsivity specifically would be associated with HCV in pregnant women.

The Current Study

Previous research outlined above led us to evaluate four hypotheses. Specifically, we hypothesized that: 1) women above a clinical cut-off score for total borderline features associated with a diagnosis of BPD (Trull, 1995) would be more likely to use opioids compared to mothers scoring below the cut-off; 2) women's borderline features (affective instability, negative relationships, identity disturbance, self-harm/impulsivity) would be positively correlated with opioid use severity; 3) the borderline features of self-harm/impulsivity and negative relationships would contribute significant amounts of variance in opioid use severity over and above the borderline features of affective instability and identity disturbance; 4) women above the clinical cut-off for total borderline features would be more likely to have HCV; and 5) the borderline features of negative relationships and self-harm/impulsivity would be associated with HCV.

Method

Participants

We sampled women in a high-risk pregnancy clinic, some of whom were at high-risk due to use of opioids and others who were at "high-risk" due to non-substance use related medical issues such as obesity, high blood pressure, and cardio-pulmonary disease. We consented women in a high-risk pregnancy clinic who were over 18 years old and in their second trimester of pregnancy or beyond, and English literate. Women were referred to the clinic for substance use or other non-drug related factors (e.g., multiple pregnancy, high blood pressure, heart disease, morbid obesity). During patient intake, the receptionist asked the potential participant if she was interested in a 30-minute study on high-risk pregnancy. If the woman was interested and agreed to participate, the research assistant reviewed the Institutional Review Board approved consent form and procedures with her, and answered any questions the participant had. Once the questionnaire packet was complete, the participant received a nominal gift card. Fifty-five women were opioid users, and 38 were at high-risk due to medical factors.

Measures

Demographics. We collected demographic information from women's medical records (See Table 1). We used receipt of Medicaid as a proxy for socioeconomic status. All women received Medicaid, which is a joint federal and state program to help with medical costs for those with limited income. Pregnant women qualify in the state in which the study took place if their income is below 160% of the federal poverty level ($38,880 for a family of four).

Opioid use severity. We assigned women to a score between 0 and 3 on an opioid use severity scale from medical records of urine toxicology assays and prescribed opioids within 30 days prior to participation in the study. There was a range of severity from no use (the high-risk

medical comparison group), to past but no current use, to prescribed use only, to current use of illicit drugs. We assigned "0" for "non-users" for women who did not produce a positive sample for opioids or another illicit drug who were at high-risk due to medical complications only (n = 38). We assigned a "1" for "opioid detoxification" if they produced negative urine samples for opioids and other drugs within 30 days and had previously been prescribed buprenorphine, buprenorphine plus naloxone, or methadone (n = 4); we assigned a "2" for "prescribed opioid use" if women who produced a positive urine sample within 30 days who were being prescribed buprenorphine, buprenorphine plus naloxone, or methadone, and who were not positive for other illicit drugs (n = 21); and we assigned a "3" for "non-prescribed opioid misuse" (n = 30) if women produced a positive urine sample for opioids which had not been prescribed for them within 30 days (buprenorphine, buprenorphine plus naloxone, or methadone), or if women produced a urine sample with traces of opioids other than those that they were prescribed, and who may have tested positive for other illicit drugs. The opioid use severity variable fell between acceptable limits for normality: skewness = -0.3, SE = .25; and kurtosis = -1.77, SE = .50 (George & Mallery, 2016).

Opioid use (yes/no). In addition to the opioid severity variable, we created a dichotomous variable for opioid use (yes/no): 55 women were in the user group and 38 women were in the non-user group.

Hepatitis C virus. HCV was assessed from medical records, specifically from blood tests, which indicated the presence/absence of the virus. In the current sample, 51% of our participants had HCV: 82% of opioid users and 18% of high-risk comparisons. Among the general population Center for Disease Control data indicate an HCV incidence rate of about 1% (Center for Disease Control, 2018).

Borderline features. The Personality Assessment Inventory- Borderline Features Scale (PAI-BOR) is a self-report measure (Morey, 1991) that includes four features of BPD: *affective instability* (mood swings and difficulty controlling anger); *identity problems* (identity instability and lack of sense of self); *negative relationships* (intense and unstable relationships); and *self-harm/impulsivity* (impulsivity in potentially harmful areas including risky sexual behavior, self-injury, substance misuse, or suicidal behaviors). The four subscales are summed to make a total borderline features score. The PAI-BOR shows high convergent validity with a BPD diagnosis from structured interviews (Kurtz & Morey, 2001) and has been used to assess borderline features in young adults diagnosed with the disorder with good test-retest reliability (Trull, 1995). Furthermore, the PAI-BOR and the DSM-IV criteria for BPD are significantly related (Stein, Pinsker-Aspen, & Hilsenroth, 2007). In the current sample, we calculated internal consistency with Cronbach's alpha: affective instability, α = .81; identity disturbance, α = .76; negative relationships, α = .79; self-harm/impulsivity, α =.79; and total borderline features, α = .78. We also used a clinical cut-off score to approximate a diagnosis of BPD. Trull (1995) found that a score ≥38 for total borderline was equivalent to a clinical diagnosis of BPD, measured by meeting diagnostic criteria for BPD in the Diagnostic Statistical Manual III-R (DSM-III-R). In the current sample, 34% of women scored at or above the cut-off for BPD.

Results

There was a significant group difference in women's age with mothers in the opioid misuse group being older than women in the comparison group. Maternal age was significantly correlated with HCV such that being older was more likely to be associated with HCV. We therefore controlled for age in all analyses.

Tests of Hypotheses

To test whether women above the clinical cut-off score for total borderline features would be more likely to be opioid users (Hypothesis 1), we conducted a binomial logistic regression. On Step 1, we entered maternal age as a covariate and opioid use as the dependent variable. The model was significant and explained 12 % of the variance (Nagelkerke R_2) in opioid use and correctly classified 80% of cases. On Step 2, we added the borderline features clinical cut-off variable. The model was again statistically significant, explained an additional 6% of the variance in opioid use, and correctly classified 76% of cases. As hypothesized, women above the clinical cut-off were more likely to be opioid users (prescribed and non-prescribed) than were individuals below the cut-off, with 2.83 times higher odds. See Table 2 for tests of significance and regression coefficients.

We then tested whether women's borderline features would be associated with their opioid use severity (Hypothesis 2) with partial correlations controlling for maternal age. Analyses supported our hypothesis. Affective instability, identity disturbance, negative relationships, and self-harm/impulsivity were all significantly correlated with opioid use severity. See Table 3 for correlation coefficients and significance.

To test the hypothesis that women's borderline features of self-harm/impulsivity and negative relationships would account for significant variance in opioid use severity over and above affective instability and identity disturbance (Hypothesis 3), we conducted a hierarchical linear regression. On Step 1, we entered age as a covariate. The overall model was significant. On Step 2, we added borderline features of affective instability and identity disturbance. The overall model was significant and accounted for a significant additional 8% of variance in opioid use severity. Neither affective instability nor identity disturbance accounted for significant variance. On Step 3, we added negative relationships and self-harm/impulsivity, which

accounted for an additional 8% of variance. In support of our hypothesis, both self-harm/impulsivity and negative relationships contributed significant variance in opioid use severity over and above affective instability and identity disturbance. See Table 4 for regression coefficients and tests of model significance.

We next tested the hypothesis that women above the clinical cut-off for total borderline features would be more likely to have HCV (Hypothesis 4) with a second binomial logistic regression. On Step 1, we entered maternal age as a covariate and HCV as the dependent variable. The model was significant and explained 15 % of the variance (Nagelkerke R_2) in HCV and correctly classified 61% of cases. On Step 2, we added the clinical cut-off variable for borderline features. The model was again statistically significant, explained an additional 8% of the variance in opioid use, and correctly classified 67% of cases. As hypothesized, women above the clinical cut-off were more likely have HCV than were individuals below the cut-off, with 3.4 times higher odds. See Table 5 for tests of significance and regression coefficients.

To test the hypothesis that the borderline features of negative relationships and self-harm/impulsivity would contribute significant variance to HCV (Hypothesis 5), we conducted a third binomial logistic regression. On Step 1, we entered maternal age as a covariate and opioid use as the dependent variable. The model was significant and explained 15% of the variance (Nagelkerke R_2) in opioid use and correctly classified 61% of cases. On Step 2, we added the borderline features of negative relationships and self-harm/impulsivity. The model was again statistically significant, explained an additional 13% of the variance in HCV, and correctly classified 69% of cases. As hypothesized, negative relationships were associated with HCV with 1.14 higher odds, but contrary to hypothesis, self-harm/impulsivity was not. See Table 6 for tests of significance and regression coefficients.

Discussion

We examined relationships between borderline features and HCV in women who misused opioids in pregnancy and in women in high-risk pregnancies due to medical factors other than drug misuse. We found that women who scored above the cut-off for total borderline features associated with a diagnosis of BPD (Trull, 1995) were more likely to use opioids in pregnancy than women below the cut-off and were more likely to have HCV. The borderline features of affective instability, identity disturbance, negative relationships, and self-harm/impulsivity were all related to opioid use severity. However, in multivariate analyses, self-harm/impulsivity and negative relationships contributed to opioid use severity over and above affective instability and identity disturbance; and negative relationships specifically (but not self-harm/impulsivity as we had also hypothesized) were associated with HCV.

Implications for Primary Interventions

How might interventions target self-harm/impulsivity? One way would be to help pregnant women abstain from opioid misuse. Indeed, pregnant women who misuse opioids may be motivated to abstain for their own and their infants' health, and to avoid the guilt and shame associated with NOWS (Cleveland & Bonugli, 2014). For some women, change may include tapering off opioids entirely during pregnancy thus avoiding NOWS (Bell et al., 2016). For others, change may include replacing illicit opioids with maintenance doses of prescribed opioids to reduce cravings. Either abstinence or medically assisted treatment would reduce self-harm/impulsivity in pregnant women.

How might interventions target negative relationships? In a randomized clinical trial, Dialectical Behavior Therapy (DBT; Linehan, 1993), which includes a module on interpersonal effectiveness, was more effective in individuals with BPD and co-morbid SUD than was

treatment by non-behavioral therapists who were nominated as experts in working with difficult patients (Harned et al., 2008). Furthermore, treatment focused on improving the ability to make sense of others and oneself in terms of mental states, termed reflective functioning (Bateman, Fonagy, & Allen, 2009) may also reduce negative relationships. In a randomized clinical trial, 18 months of reflective functioning-based treatment improved social and interpersonal functioning in women with BPD (Bateman & Fonagy, 2009). Furthermore, in a randomized clinical trial, mothers in treatment for SUD in the reflective functioning-based therapy condition improved their reflective functioning capacity, which improved relationships with their children age 11—60 months (Suchman et al., 2017). A combination of DBT and reflective functioning-based therapy might be ideal to target negative relationships (Edel, Raaff, Dimaggio, Buchheim, & Brüne, 2017).

Implications for Preventive Interventions

Interventions with pregnant women who misuse opioids may be too late to prevent HCV transmission to infants, or NOWS. Ideally, prevention of initiation of opioid misuse needs to take place prior to pregnancy. In pregnant women who misuse opioids 62% reported that their drug use originated following childhood maltreatment: 40% reported sexual abuse (half occurring before age 13), 18% reported physical abuse without sexual abuse, and 4% who reported verbal abuse (Towers et al., 2018). Addressing childhood maltreatment may be a fruitful target of preventive intervention.

In a statewide intervention for children who had experienced trauma, the Attachment, Self-Regulation, and Competency Intervention (Blaustein & Kinniburgh, 2010; Kinniburgh, Blaustein, Spinazzola, & Van der Kolk, 2005), Trauma Focused Cognitive Behavioral Therapy (Cohen, Mannarino, Kliethermes, & Murray, 2012), and, to a lesser degree, Child-Parent

Psychotherapy (Lieberman, Van Horn, & Ippen, 2005), all improved children's behavior problems and post-traumatic stress disorder symptoms (Bartlett et al., 2018). Future research might assess initiation of drug misuse as an outcome measure for these interventions. Statewide interventions to address childhood trauma may reduce the rate of HCV, opioid misuse in pregnancy, and NOWS.

Strengths and Limitations

This was the first study to examine BPD and opioid use in a sample of pregnant women. Thirty-four percent of the women scored above the clinical cut-off score that is consistent with a diagnosis of BPD (Trull, 1995), which indicates significant pathology. We assessed opioid use using urine assays and records of prescribed opioids rather than depending on self-report, which likely would be inaccurate, for example, if women feared having their newborn removed from their care. However, the study design, sampling, and opioid misuse assessment, each had limitations. First, the study design was cross-sectional, so the direction of effects and bi-directionality remain unclear, for example, between borderline features and opioid misuse. Additionally, there were important covariates omitted that ideally would have been included. We did not control for the presence of a mood disorder (e.g., depression, bipolar disorder), other psychiatric conditions (e.g., anxiety), history of substance misuse, or risk-taking more generally. This greatly limited our ability to conclude that it was solely borderline features that were associated with opioid use and HCV. Second, our sample's racial background was majority White and from low socio-economic backgrounds, limiting generalizability of findings to other populations. Third, even with urine assays and records of prescribed opioids it was not possible to definitively assess drug misuse, in part due to the short half-lives of opioid drugs (from 6-46

hours) and to the fact that other drugs (e.g., alcohol) that cannot be detected in urine after passing through the digestive system.

Conclusion

Misuse of opioids in pregnancy may have serious implications for women and for their infants. For example, even though NOWS is considered a short-term and treatable condition (ACOG, 2017) there may be long-term effects. For example, a large prospective study found that infants born with NOWS (87% of whose mothers were undergoing opioid medication-assisted treatment), had a significantly smaller head circumference than did infants whose mothers were not taking opioids, which was not accounted for by use of other drugs: 30.1% of infants had a head circumference less than or equal to the 10th percentile, and 8.2% less than or equal to the 3rd percentile (Towers et al., 2019). Because head circumference may serve as a proxy for brain size, more research is needed on long-term outcomes for these infants. Helping women to detoxify from opioids during pregnancy (Bell et al., 2016), or intervening to prevent opioid misuse in the first place following the experience of childhood trauma may better protect not only young women but also their infants.

References

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders. In (5th ed.). Washington, DC: Author.

Back, S. E., Lawson, K. M., Singleton, L. M., & Brady, K. T. (2011). Characteristics and correlates of men and women with prescription opioid dependence. *Addictive Behaviors, 36*(8), 829-834. doi:http://dx.doi.org/10.1016/j.addbeh.2011.03.013

Back, S. E., Payne, R. L., Simpson, A. N., & Brady, K. T. (2010). Gender and prescription opioids: Findings from the National Survey on Drug Use and Health. *Addictive Behaviors, 35*(11), 1001-1007. doi:http://dx.doi.org/10.1016/j.addbeh.2010.06.018

Bandelow, B., Krause, J., Wedekind, D., Broocks, A., Hajak, G., & Rüther, E. (2005). Early traumatic life events, parental attitudes, family history, and birth risk factors in patients with borderline personality disorder and healthy controls. *Psychiatry Research, 134*(2), 169-179. doi:http://dx.doi.org/10.1016/j.psychres.2003.07.008

Bartlett, J. D., Griffin, J. L., Spinazzola, J., Fraser, J. G., Noroña, C. R., Bodian, R., . . . Barto, B. (2018). The impact of a statewide trauma-informed care initiative in child welfare on the well-being of children and youth with complex trauma. *Children and Youth Services Review, 84*, 110-117. doi:http://dx.doi.org/10.1016/j.childyouth.2017.11.015

Bateman, A., & Fonagy, P. (2009). Randomized controlled trial of outpatient mentalization-based treatment versus structured clinical management for borderline personality disorder. *The American Journal of Psychiatry, 166*(12), 1355-1364. doi:http://dx.doi.org/10.1176/appi.ajp.2009.09040539

Bateman, A., Fonagy, P., & Allen, J. G. (2009). *Theory and practice of mentalization-based therapy*: American Psychiatric Publishing, Inc., Arlington, VA.

Bell, J., Towers, C. V., Hennessy, M. D., Heitzman, C., Smith, B., & Chattin, K. (2016). Detoxification from opiate drugs during pregnancy. *American Journal of Obstetrics and Gynecology, 215*(3), 374.e371-376. doi:10.1016/j.ajog.2016.03.015

Blankley, G., Galbally, M., Snellen, M., Power, J., & Lewis, A. J. (2015). Borderline personality disorder in the perinatal period: Early infant and maternal outcomes. *Australasian Psychiatry, 23*(6), 688-692. doi:http://dx.doi.org/10.1177/1039856215590254

Blaustein, M. E., & Kinniburgh, K. M. (2010). *Treating traumatic stress in children and adolescents: How to foster resilience through attachment, self-regulation, and competency*: Guilford Press, New York, NY.

Centers for Disease Control and Prevention. (2018). Viral hepatitis surveillance: United States, 2016. Retrieved from https://www.cdc.gov/hepatitis/statistics/2016surveillance/index.htm

Cleveland, L. M., & Bonugli, R. (2014). Experiences of mothers of infants with neonatal abstinence syndrome in the neonatal intensive care unit. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 43*(3), 318-329. doi:10.1111/1552-6909.12306

Cohen, J. A., Mannarino, A. P., Kliethermes, M., & Murray, L. A. (2012). Trauma-Focused CBT for youth with complex trauma. *Child Abuse & Neglect: The International Journal, 36*(6), 528-541. doi:http://dx.doi.org/10.1016/j.chiabu.2012.03.007

Cottrell, E. B., Chou, R., Wasson, N., Rahman, B., & Guise, J. M. (2013). Reducing risk for mother-to-infant transmission of hepatitis C virus: a systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med, 158*(2), 109-113. doi:10.7326/0003-4819-158-2-201301150-00575

De Genna, N. M., Feske, U., Larkby, C., Angiolieri, T., & Gold, M. A. (2012). Pregnancies, abortions, and births among women with and without borderline personality disorder. *Womens Health Issues, 22*(4), e371-377. doi:10.1016/j.whi.2012.05.002

Degenhardt, L., Peacock, A., Colledge, S., Leung, J., Grebely, J., Vickerman, P., . . . Larney, S. (2017). Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review. *Lancet Glob Health, 5*(12), e1192-e1207. doi:10.1016/s2214-109x(17)30375-3

Edel, M. A., Raaff, V., Dimaggio, G., Buchheim, A., & Brüne, M. (2017). Exploring the effectiveness of combined mentalization-based group therapy and dialectical behaviour therapy for inpatients with borderline personality disorder—A pilot study. *British Journal of Clinical Psychology, 56*(1), 1-15. doi:http://dx.doi.org/10.1111/bjc.12123

George, D., & Mallery, P. (2016). *IBM SPSS Statistics 23 Step by Step* (14 ed.). New York, NY: Routledge.

Haight, S. C., Ko, J. Y., Tong, V. T., Bohm, M. K., & Callaghan, W. M. (2018). Opioid use disorder documented at delivery hospitalization--United Staes, 1999-2014. *Center for Disease Control. Morbidity and Mortality Weekly Report, 67*(31), 845-849.

Harned, M. S., Chapman, A. L., Dexter-Mazza, E. T., Murray, A., Comtois, K. A., & Linehan, M. M. (2008). Treating co-occurring Axis I disorders in recurrently suicidal women with borderline personality disorder: A 2-year randomized trial of dialectical behavior therapy versus community treatment by experts. *Journal of Consulting and Clinical Psychology, 76*(6), 1068-1075. doi:http://dx.doi.org/10.1037/a0014044

Kinniburgh, K. J., Blaustein, M. E., Spinazzola, J., & Van der Kolk, B. A. (2005). Attachment, self-regulation, and competency: a comprehensive inervention framework for children with complex trauma. *Psychiatric Annals, 35*(5), 424-430.

Krans, E. E., Zickmund, S. L., Rustgi, V. K., Park, S. Y., Dunn, S. L., & Schwarz, E. B. (2016). Screening and evaluation of hepatitis C virus infection in pregnant women on opioid maintenance therapy: A retrospective cohort study. *Substance Abuse, 37*(1), 88-95. doi:http://dx.doi.org/10.1080/08897077.2015.1118720

Kurtz, J. E., & Morey, L. C. (2001). Use of structured self-report assessment to diagnose borderline personality disorder during major depressive episodes. *Assessment, 8*(3), 291-300. doi:http://dx.doi.org/10.1177/107319110100800305

Lieberman, A. F., Van Horn, P., & Ippen, C. G. (2005). Toward evidence-based treatment: Child-Parent Psychotherapy with preschoolers exposed to marital violence. *Journal of the American Academy of Child and Adolescent Psychiatry, 44*(12), 8-1241.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*: Guilford Press, New York, NY.

Links, P. S., Heslegrave, R., & van Reekum, R. (1999). Impulsivity: Core aspect of borderline personality disorder. *Journal of Personality Disorders, 13*(1), 1-9. doi:http://dx.doi.org/10.1521/pedi.1999.13.1.1

Mackesy-Amiti, M. E., Donenberg, G. R., & Ouellet, L. J. (2014). Psychiatric correlates of injection risk behavior among young people who inject drugs. *Psychology of Addictive Behaviors, 28*(4), 1089-1095. doi:10.1037/a0036390

Martino, F., Spada, M. M., Menchetti, M., Lo Sterzo, E., Sanza, M., Tedesco, P., . . . Berardi, D. (2017). Substance-related and addictive disorders as mediators between borderline

personality disorder and aggressive behavior. *Clinical Psychologist*. doi:http://dx.doi.org/10.1111/cp.12115

Moeller, F. G., Barratt, E. S., Dougherty, D. M., Schmitz, J. M., & Swann, A. C. (2001). Psychiatric aspects of impulsivity. *American Journal of Psychiatry, 158*(11), 1783-1793. doi:10.1176/appi.ajp.158.11.1783

Morey, L. C. (1991). *Personality assessment inventory*. Odessa, FL: Psychological Assessment Resources.

Pare-Miron, V., Czuzoj-Shulman, N., Oddy, L., Spence, A. R., & Abenhaim, H. A. (2016). Effect of borderline personality disorder on obstetrical and neonatal outcomes. *Womens Health Issues, 26*(2), 190-195. doi:10.1016/j.whi.2015.11.001

Paris, J. (2003). Personality disorders over time: Precursors, course and outcome. *Journal of Personality Disorders, 17*(6), 479-488. doi:http://dx.doi.org/10.1521/pedi.17.6.479.25360

Patrick, S. W., Dudley, J., Martin, P. R., Harrell, F. E., Warren, M. D., Hartmann, K. E., . . . Cooper, W. O. (2015). Prescription opioid epidemic and infant outcomes. *Pediatrics, 135*(5), 842-850. doi:10.1542/peds.2014-3299

Roberts, E. A., & Yeung, L. (2002). Maternal-infant transmission of hepatitis C virus infection. *Hepatology, 36*(5 Suppl 1), S106-113. doi:10.1053/jhep.2002.36792

Sansone, R. A., Watts, D. A., & Wiederman, M. W. (2013). The misuse of prescription pain medication and borderline personality symptomatology. *Journal of Opioid Management, 9*(4), 275-279. doi:10.5055/jom.2013.0169

Smith, P. H., Homish, G. G., Leonard, K. E., & Cornelius, J. R. (2012). Intimate partner violence and specific substance use disorders: Findings from the National Epidemiologic Survey

on Alcohol and Related Conditions. *Psychology of Addictive Behaviors, 26*(2), 236-245. doi:http://dx.doi.org/10.1037/a0024855

Stein, M. B., Pinsker-Aspen, J. H., & Hilsenroth, M. J. (2007). Borderline pathology and the Personality Assessment Inventory (PAI): An evaluation of criterion and concurrent validity. *Journal of Personality Assessment, 88*(1), 81-89. doi:http://dx.doi.org/10.1207/s15327752jpa8801_11

Suchman, N. E., DeCoste, C. L., McMahon, T. J., Dalton, R., Mayes, L. C., & Borelli, J. (2017). Mothering From the Inside Out: Results of a second randomized clinical trial testing a mentalization-based intervention for mothers in addiction treatment. *Development and Psychopathology, 29*(2), 617-636. doi:http://dx.doi.org/10.1017/S0954579417000220

Towers, C. V., Hyatt, B. W., Visconti, K. C., Chernicky, L., Chattin, K., & Fortner, K. B. (2019). Neonatal head circumference in newborns with Neonatal Abstinence Syndrome. *Pediatrics, 143*(1). doi:10.1542/peds.2018-0541

Towers, C. V., Katz, E., Liske, E., Howard, B. C., Wolfe, L., & Fortner, K. B. (2018). Psychosocial background of pregnant women with opioid use disorder (OUD). *American Journal of Obstetrics and Gynecology, 218*, S489-490.

Tragesser, S. L., Jones, R. E., Robinson, R. J., Stutler, A., & Stewart, A. (2013). Borderline personality disorder features and risk for prescription opioid use disorders. *Journal of Personality Disorders, 27*(4), 427-441. doi:http://dx.doi.org/10.1521/pedi_2013_27_094

Trull, T. J. (1995). Borderline personality disorder features in nonclinical young adults: 1. Identification and validation. *Psychological Assessment, 7*(1), 33-41. doi:http://dx.doi.org/10.1037/1040-3590.7.1.33

Trull, T. J., Sher, K. J., Minks-Brown, C., Durbin, J., & Burr, R. (2000). Borderline personality disorder and substance use disorders: A review and integration. *Clinical Psychology Review, 20*(2), 235-253. doi:http://dx.doi.org/10.1016/S0272-7358(99)00028-8

Wapp, M., van de Glind, G., van Emmerik-van Oortmerssen, K., Dom, G., Verspreet, S., Carpentier, P. J., . . . Moggi, F. (2015). Risk factors for borderline personality disorder in treatment seeking patients with a substance use disorder: An international multicenter study. *European Addiction Research, 21*(4), 188-194. doi:http://dx.doi.org/10.1159/000371724

Westbrook, R. H., & Dusheiko, G. (2014). Natural history of hepatitis C. *Journal of Hepatology, 61*(1 Suppl), S58-68. doi:10.1016/j.jhep.2014.07.012

Table 1

Demographic and Gestation Differences between the Opioid User and High-risk Comparison Groups

	Whole sample (N = 93)	Opioid (n = 55)	Comparison (n = 38)	Opioid vs. Comparisons
Maternal variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*t*
Age (years)	27.19 (4.26)	28.22 (4.37)	25.68 (3.64)	2.94*
Gestation	26.81 (7.9)	27.56 (7.89)	25.68 (7.89)	1.08
	%	%	%	λ_2
Ethnic Background				10.78
White	84	93	71	
Black	8	6	10	
Biracial	2	0	5	
Middle Eastern	3	0	3	
Not specified	3	0	8	
Hispanic	2	2	2	
Employed	17	15	21	0.69
Has partner	38	36	39	0.09
Receiving Medicaid	100	100	100	0.00

*$p < .05$.

Table 2

Bivariate logistic regression predicting opioid use based on the borderline features cut-off, controlling for maternal age

	Nagelkerke R^2	χ^2	*B*	*SE*	Wald	*df*	Odds Ratio	95% CI for Odds Ratio
Step 1	.12	8.49**				1		
Maternal age			0.16	0.06	7.53**	1	1.17	1.05-1.31
Step 2	.18	4.60*				1		
Maternal age			0.17	0.06	8.43**	1	1.19	1.06-1.33
Borderline features clinical cut-off			1.04	0.50	4.30*	1	2.83	1.06-7.55

* $p < .05$; ** $p < .01$

Table 3.

Bivariate partial correlations between borderline features and opioid use severity in pregnant women, controlling for maternal age.

	Borderline features			
	Affective instability	Identity disturbance	Negative relationships	Self-harm/impulsivity
Opioid use severity	.25*	.28*	.36**	.34**

* $p < .05$; ** $p < .01$

Table 4

Hierarchical linear regression testing the association between pregnant women's borderline features and opioid use severity

Step	Independent variables	ΔR_2	*B*	*β*	*t*	R_2 (adj.)	*F*	*df*
1	Maternal age		0.09	.30	2.96**	.09(.08)	8.74**	1,91
2	Maternal age	.08*	0.10	.34	3.45*	.17(.14)	5.95**	3,89
	Affective instability		0.04	.11	0.92			
	Identity disturbance		0.06	.20	1.62			
3	Maternal age	.08*	0.08	.25	2.56*	.24(.20)	5.58***	5,87
	Affective instability		-0.02	-.07	0.54			
	Identity disturbance		-0.01	-.03	-0.19			
	Negative relationships		0.09	.29	2.01*			
	Self-harm/impulsivity		0.08	.24	2.09*			

* $p < .05$; ** $p < .001$; ***$p < .001$.

Table 5

Bivariate logistic regression predicting HCV based on the borderline features cut-off, controlling for maternal age

	Nagelkerke R^2	χ^2	*B*	*SE*	Wald	*df*	Odds Ratio	95% CI for Odds Ratio
Step 1	.15	11.44**				1		
Maternal age			0.18	0.06	9.74**	1	1.20	1.07-1.34
Step 2	.23	6.43*				1		
Maternal age			0.29	0.06	11.03**	1	1.23	1.09-1.38
Borderline features clinical cut-off			1.22	0.50	5.99*	1	3.40	1.28-9.08

* $p < .05$; ** $p < .01$

Table 6

Bivariate logistic regression predicting HCV from the borderline features of negative relationships and self-harm/impulsivity

	Nagelkerke R^2	χ^2	*B*	*SE*	Wald	*df*	Odds Ratio	95% CI for Odds Ratio
Step 1	.15	11.44**				1		
Maternal age			0.18	0.06	9.74**	1	1.20	1.07-1.34
Step 2	.23	6.43*				1		
Maternal age			0.19	0.06	9.17**	1	1.21	1.07-1.36
Negative relationships			0.13	0.07	4.07*	1	1.14	1.00-1.30
Self-harm/impulsivity			0.08	0.07	1.50	1	1.08	0.95-1.23

* $p < .05$; ** $p < .01$