

Perinatal Mental Health Treatment in an Integrated Obstetric Behavioral Health Program: Birth Outcomes, Perinatal Depression, and the Moderating Role of Childhood Maltreatment

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Abstract

Purpose

Childhood maltreatment is associated with increased risk for perinatal depression and negative birth outcomes, yet the way mental health treatment interacts with childhood adversity to promote positive birth outcomes and improve perinatal depression is less well established. This study examined whether treatment dosage within an integrated obstetric behavioral health model was associated with gestational age, birth weight, and changes in depressive symptoms, and whether childhood maltreatment moderated these associations.

Methods

Participants (N = 204) were pregnant individuals receiving treatment in an integrated obstetric behavioral health program in a large urban hospital. Childhood maltreatment was assessed using the Adverse Childhood Experiences (ACEs) maltreatment subscale. Depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS) from pregnancy to 6 weeks postpartum. Treatment dosage was defined as the number of mental health contacts during pregnancy. Hierarchical linear regression analyses examined main and interaction effects while controlling for demographic and medical covariates.

Results

Higher treatment dosage was significantly associated with greater gestational age at birth ($\beta = .21, p = .012$) and higher birth weight ($\beta = .23, p = .007$). Childhood maltreatment was not directly associated with birth outcomes and did not moderate these relationships. Childhood maltreatment significantly moderated changes in depressive symptoms ($\beta = -.41, p = .015$), such that individuals with higher maltreatment exposure who received greater treatment dosage experienced the largest reductions in depression.

Conclusion

Engagement in perinatal mental health treatment in an integrated obstetric behavioral health model is associated with improved birth outcomes and greater reductions in depressive symptoms for individuals with histories of childhood maltreatment. These findings highlight the importance of integrating behavioral health services within obstetric care .

Article Highlights

- More mental health treatment was associated with increased gestational age and higher birth weights, both indicators of improved birth outcomes.
- Childhood maltreatment related to how depression symptoms changed over time: individuals with greater maltreatment histories showed the largest reductions in symptoms when they received higher levels of behavioral health treatment.
- The findings suggest that making mental health services easy to access as part of regular pregnancy care could have meaningful benefits, especially for those with histories of childhood maltreatment.

Introduction

Childhood maltreatment is a form of significant stress that endures and impacts perinatal mental and physical health (Felitti et al., 1998; Osofsky et al., 2021). Exposure to childhood maltreatment has been associated with increased rates of perinatal depression (Osofsky et al., 2021), pre-term birth, and low birthweight (BW) deliveries (Kern et al., 2022). Exposure to childhood trauma has been associated with increased risk for pregnancy complications, including gestational diabetes and hypertensive disorders (Keenan-Devlin et al., 2023; Lovett et al., 2025). Rates of childhood maltreatment reported by pregnant individuals vary greatly, from 17–70% (Svelnys et al., 2023), and are influenced by structural and systemic disparities, with children who have lower socioeconomic status experiencing higher rates of maltreatment.

Perinatal Mental Health Treatment Among Women with a History of Childhood Maltreatment

Given the associations among perinatal stress, depression, and birth outcomes, perinatal mental health treatment has been examined in relation to gestational age (GA) and BW. Among the general pregnant population, studies have found limited benefits of mental health treatment on birth outcomes (Brouwer et al., 2018, Subramanian et al., 2012). However, among populations facing higher levels of adversity, trauma-informed approaches to depression treatment have demonstrated positive impacts on birth outcomes. Engagement in a perinatal program focused on relationship skills and case management was associated with higher BW and increased GA at birth (Rhoades et al., 2022). Implementation of trauma-informed care within an integrated adolescent obstetric clinic was associated with decreased rates of low BW deliveries (Ashby et al., 2019). Further examination of these findings from Ashby and colleagues (2019) revealed that trauma-informed perinatal care decreased racial disparities for Black adolescent parents, who experience higher risk for negative birth outcomes (Noroña-Zhou et al., 2023). Further research is needed to examine the potential benefits of perinatal mental health treatment on birth outcomes for individuals with greater experiences of adversity, including childhood maltreatment.

It is well documented that mental health treatment decreases perinatal depressive symptoms in the general population (Bjertrup et al., 2025; Qi et al., 2025, Mwita et al., 2025, Dreux et al., 2025), but more

studies are needed to understand these effects for individuals with a history of adversity. Treatment effects may be more robust for individuals with no maltreatment history (Berry et al., 2021), although in a systematic review, there were differential effects of mental health treatment on depressive symptoms for individuals with a maltreatment history (Reuveni et al., 2021). One study found that survivors of childhood maltreatment may need longer treatment to reach depression remission compared to individuals without childhood maltreatment, whereas others found that women with a history of childhood maltreatment showed a greater symptom response to Interpersonal Psychotherapy than women without a history of maltreatment (Reuveni et al., 2021). For pregnant survivors of childhood sexual abuse, utilization of a trauma-informed approach was critical for therapeutic improvement of depressive symptoms (Stephenson et al., 2018), highlighting the importance of better understanding the role of mental health treatment for individuals with a history of childhood maltreatment.

Unfortunately, engagement in mental health treatment during the perinatal period remains low. Multiple barriers exist, including low completion of referrals for outside treatment, long wait times, inconsistent engagement in prenatal care, financial burden, and experiences of discrimination within OB and medical settings (Ashby et al., 2019; Dreux et al., 2025; Subramanian et al., 2012). There is a need to explore the potential benefits of integrated care models in OB settings designed to reduce these obstacles, especially for individuals with experiences of adversity for whom existing barriers to mental health treatment may be greater. In this paper, we use the term “integrated obstetric behavioral health” to refer to the embedded behavioral health care model within the obstetrics clinic, and “perinatal mental health treatment” to refer to the mental health services delivered to patients through this model (Bell et al., 2024).

Current Study

Although perinatal mental health treatment has promise in improving depression, less is known about the ways that perinatal mental health treatment relates to birth outcomes, and whether these associations differ based on an individual’s history of childhood maltreatment. The current paper examined the role of perinatal mental health treatment, provided in the context of an integrated obstetric behavioral health model, and childhood maltreatment on BW, GA at birth, and depression change. We hypothesized that greater engagement with mental health treatment would be associated with increased GA at birth, greater BW, and decreased symptoms of depression from pregnancy to 6 weeks postpartum. We also hypothesized that experiences of childhood maltreatment would moderate these associations, such that treatment would be associated with better birth outcomes and reductions in depressive symptoms among individuals with more experiences of childhood maltreatment (Reuveni et al., 2021).

Methods

Setting/Sample

The INTEGRATED CARE PROGRAM (ICP) utilizes an integrated behavioral health model that serves perinatal patients who receive prenatal care in the obstetric and midwifery clinics at a large urban hospital. The ICP offers a range of behavioral health services including in-the-moment integrated patient consultations during prenatal appointments and co-located virtual therapy and psychiatry appointments to patients during pregnancy and up to 6 months postpartum.

Obstetric providers refer to the ICP by placing a referral through the electronic medical record (EMR) or by direct communication with the ICP team verbally or via EMR secure chat. Patients are seen for an initial patient consultation in conjunction with their OB visit or are contacted over the phone. Patients can choose from ongoing patient consultations during OB visits, telehealth therapy or psychiatry appointments, referrals to community agencies, or no ongoing follow-up.

Procedures

Patients who scheduled therapy or psychiatry appointments received informed consent forms to participate in an IRB-approved research program and mental health screeners that assess mood symptoms and exposure to childhood adversity on the day of their first appointment via the EMR. Patients did not have to complete the consent and screeners to attend their visit.

Patients were also screened for depressive symptoms during their initial OB visit and when attending their 6-week postpartum visit. These screeners are assigned to patients through the EMR or are administered on paper and are completed as part of their check-in process for OB visits. Not all patients seen for their visits had valid symptom data in the EMR due to screeners not being administered or not being entered into the EMR.

Eligibility

The study included 208 patients who attended an initial therapy or psychiatry visit during their pregnancy from October 2021 to November 2023 and who also consented to the IRB study and completed initial screeners for their first therapy or medication management visit. Four patients were excluded due to pregnancy loss, termination, or patient death, resulting in a total of 204 participants.

Coding Procedures

Patients' EMR were coded for demographic and key study variables by three ICP psychologists and a psychology post-doctoral fellow. Chart review was divided up evenly among the coders; questions were answered by the lead coder and disseminated to the larger team.

Coders used the demographics section in the EMR to determine patients age, self-endorsed race and ethnicity, date of birth, and insurance status. Patients' total number of pregnancies (gravida) and live births at the time of delivery (parity) were coded using the patient's pregnancy history. The number of

weeks at the patient's first scheduled mental health visit was recorded and designated as GA at intake. Charts were coded for the presence of pre-eclampsia, gestational diabetes, or gestational hypertension based on their presence on problem lists and in labor and delivery discharge notes. Number of treatment contacts, including therapy, medication, and consultation visits that occurred during pregnancy were counted by reviewing the EMR to determine treatment dosage. Coders recorded GA at birth in weeks and days and BW in grams from the delivery note.

Measures

Adverse Childhood Experiences (ACEs; Felitti et al., 1998) – Childhood Maltreatment (CM) Subscale

Each participant completed an ACEs questionnaire as part of their ICP mental health intake procedures. The ACEs questionnaire assesses participants' self-reported exposure to ten categories of adversity occurring before age 18, including emotional, physical, and sexual abuse; emotional and physical neglect; and household dysfunction such as parental separation, domestic violence, substance use, mental illness, or incarceration within the home. Each item was answered dichotomously (0 = no, 1 = yes), and responses were summed to create a total ACE score ranging from 0 to 10, with higher scores indicating exposure to a greater number of adverse experiences.

The ACES CM subscale assesses abuse and neglect experienced before age 18 across 5 domains (emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect). Each domain is scored dichotomously according to whether a person was exposed to that type of maltreatment. Scores are summed to produce a total maltreatment score ranging from 0 to 5, with higher scores indicating greater exposure to childhood maltreatment. This subscale has been linked to perinatal health outcomes, including risk of preterm birth, lower GA, and perinatal depression (Choi & Sikkema, 2016). A dose-response effect is commonly observed such that individuals reporting multiple maltreatment types are at greater risk for these adverse outcomes (Hughes et al., 2017).

Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987)

The EPDS is a 10-item self-report screening measure that is used to assess the intensity of depressive symptoms experienced over the last week for patients that are pregnant or postpartum. Responses are rated on a 4-point Likert scale (0–3), and total scores range from 0 to 30 (with higher scores indicating greater depressive symptom severity). Patients' depression change score was calculated by subtracting their initial EPDS score at OB intake from their postpartum EPDS score, and as such, a negative number represents a decrease in depression symptoms from intake to postpartum, and vice versa.

Data Analysis

Hierarchical linear regression analyses were conducted using IBM SPSS Statistics (Version 31). Variables were entered in theoretically informed steps to examine the incremental contribution of predictors above and beyond covariates. Covariates were selected based on prior literature examining the relation between demographic factors, physical health conditions, and their relation to childhood maltreatment, birth outcomes and depression scores. Covariates entered in Step 1 included age, gravida, parity, insurance status, race and ethnicity, preeclampsia, gestational diabetes, gestational hypertension, and GA at intake. Primary predictors entered in Step 2 included ACES maltreatment and treatment dosage, and the interaction term of ACES maltreatment by treatment dosage was entered in Step 3. Categorical independent variables were dummy coded, with groups representing the majority used as the reference group, including White race, private insurance, and the absence of pre-eclampsia, gestational diabetes, and gestational hypertension. Interaction terms were computed using the product of predictor variables. Statistical significance was evaluated at $\alpha = .05$. Model fit was assessed using R^2 and change in R^2 .

Results

Descriptive Statistics

Table 1 presents descriptive statistics for study variables. The frequencies of maltreatment types endorsed included emotional abuse (37.3%), emotional neglect (36.3%), physical abuse (27.5%), sexual abuse (23.5%), and physical neglect (18.0%). Approximately 46.1% of patients endorsed no maltreatment, 17.6% endorsed one maltreatment item, 10.3% endorsed two maltreatment items, and 13.2% endorsed four or five maltreatment items. The average treatment dosage was 5.57 ($SD = 3.74$, range = 1–23). The average GA at delivery was 38.42 weeks ($SD = 1.95$, Range = 27.0–41.1), with an average BW of 3138.11 grams ($SD = 505.20$, range = 920–4445), and the average change in EPDS from OB intake to 6 weeks postpartum was a decrease of 1.86 ($N = 138$, $SD = 5.53$, Range = -19, 11).

Table 1
Descriptive Statistics for Study Variables

Demographics	Mean	SD	Range	Frequency n (n %)
Age	30.53	5.70	17–44	
Gravidity	2.51	1.50	1–11	
Parity	1.72	1.00	1–6	
Race or Ethnicity				
Black				23 (11.3)
Latinx				39 (19.1)
Multiracial				15 (7.4)
White				120 (58.8)
Asian				3 (1.5)
Other or Unknown				4 (2.0)
Insurance Status				
Public				74 (36.3)
Private				130 (63.7)
Predictors				
Treatment Dosage	5.57	3.74	1–23	
ACEs Maltreatment	1.33	1.56	0–5	
Pre-Eclampsia				26 (12.7)
Gestational Diabetes				22 (10.8)
Gestational Hypertension				39 (19.1)
Gestational Age at Intake	23.17	8.34	8–39	
EPDS (initial)	8.91	5.91	0–25	
Outcomes				
Weeks Gestation	38.42	1.95	27.0–41.1	
Birth Weight (g)	3138.11	505.20	920–4445	
EPDS Intake ^a	8.91	5.91	0–25	

Demographics	Mean	SD	Range	Frequency n (n %)
EPDS Postpartum ^b	6.73	5.47	0–28	
Change in EPDS ^c	-1.86	5.53	-19, 11	

Note: N= 204, ^an=176, ^bn=160, ^cn=138

Impact of Treatment on Depression and Birth Outcomes

Gestational Age at Birth

In Step 1, the model with covariates was entered was significant, $F(11,192) = 2.80, p=.002$, accounting for 13.8% of the variance in GA at birth. Step 2 resulted in a significant increase in explained variance, $\Delta R^2 = .029, \Delta F(2, 190) = 3.32, p = .04$. The overall model remained significant, $F(13,190) = 2.93, p < .001$, explaining 16.7% of the variance. ACEs maltreatment was non-significant, $\beta = .004, p=.96$, whereas treatment dosage was a significant predictor of greater GA at birth, $\beta = .206, p=.012$. In Step 3, the interaction term ACEs maltreatment by treatment dosage was entered but did not account for additional variance, $\Delta R^2 = 0.0, \Delta F(1,189) = 0.0, p=.99$, and the interaction term was not significant, $\beta = <0.0, p = .99$. The main effects model was retained and is presented in Table 2.

Table 2
Regression of Gestational Age (Weeks) on Key Variables

N = 204	B	β	SE	p
Step 1				
Constant	37.88		1.10	0.00
Age	-0.02	-0.05	0.03	0.52
Gravidity	-0.09	-0.08	0.12	0.47
Parity	-0.07	-0.04	0.21	0.73
Insurance	-0.17	-0.04	0.31	0.58
Black	-0.53	-0.09	0.46	0.26
Other/ Unknown Race	-0.17	-0.03	0.44	0.71
Latinx	0.03	0.01	0.37	0.94
Pre-eclampsia	-1.08	-0.19	0.42	0.01
Gestational Diabetes	0.04	0.01	0.45	0.93
Gestational Hypertension	-0.80	-0.16	0.35	0.02
Gestational Age at Intake	0.06	0.23	0.02	0.00
Step 2				
ACES	0.01	0.00	0.09	0.96
Treatment Dosage	0.11	0.21	0.04	0.01

Birth Weight

In Step 1, the model with covariates was non-significant, $F(11,192) = 1.33$, $p = .206$ and accounted for 7.1% of the variance in BW. In Step 2, ACEs maltreatment and treatment dosage were added, resulting in a significant increase in explained variance, $\Delta R^2 = .029$, $\Delta F(2, 190) = 3.74$, $p = .03$. The overall model approached significance, $F(13,190) = 2.93$, $p = .056$, explaining 10.6% of the variance. ACEs maltreatment was non-significant ($\beta = -.03$, $p = .74$), whereas treatment dosage was a significant predictor of greater BW ($\beta = 0.23$, $p = .007$). In Step 3, the interaction term did not account for additional variance, $\Delta R^2 = .002$, $\Delta F(1,189) = 0.32$, $p = .571$ and was not significant, $\beta = -.08$, $p = .57$. The main effects model was retained and is presented in Table 3.

Table 3
Regression of Birth Weight (g) on Key Variables

N = 204	B	β	SE	p
Step 1				
Constant	3093.08		293.33	0.00
Age	-8.42	-0.10	7.47	0.26
Gravidity	-18.29	-0.06	32.34	0.57
Parity	-33.01	-0.07	56.82	0.56
Insurance	9.86	0.01	84.08	0.91
Black	-145.53	-0.09	123.86	0.24
Other/ Unknown Race	-121.27	-0.08	117.77	0.30
Latinx	-29.27	-0.02	98.15	0.77
Pre-eclampsia	-20.24	-0.01	111.30	0.86
Gestational Diabetes	24.31	0.02	120.07	0.84
Gestational Hypertension	-118.62	0.09	92.21	0.20
Gestational Age at Intake	12.79	0.21	5.01	0.01
Step 2				
ACES	-8.23	-0.03	24.90	0.74
Treatment Dosage	31.09	0.23	11.37	0.01

Depression Scores

Table 4 presents the results from the hierarchical linear regression analysis examining changes in EPDS depression change scores (postpartum - prenatal). The subsample of 131 patients with EPDS change-score data was compared with the full sample of 204 using chi-square tests for categorical variables (insurance status, race and ethnicity, pre-eclampsia, gestational hypertension, and gestational diabetes) and independent-samples *t*-tests for continuous variables (number of pregnancies, live births, age, and GA at intake, ACEs maltreatment, treatment dosage, BW, and GA at delivery). No statistically significant differences were observed across these variables (all *ps* > .05) except for the number of live births $t(202)=-2.39, p = 0.02$.

Table 4
Regression of Change in Depression on Key Variables

N = 138	B	β	SE	p
Step 1				
Constant	-10.55		3.86	0.01
Age	0.20	0.20	0.10	0.05
Gravidity	-0.20	-0.06	0.41	0.64
Parity	-0.96	-0.15	0.84	0.26
Insurance	0.60	0.05	1.24	0.63
Black	1.12	0.07	1.66	0.50
Other/ Unknown Race	0.08	0.00	1.60	0.96
Latinx	0.67	0.05	1.32	0.62
Pre-eclampsia	-0.14	-0.01	1.48	0.93
Gestational Diabetes	-1.49	-0.08	1.61	0.36
Gestational Hypertension	0.60	0.04	1.21	0.62
Gestational Age at Intake	0.16	0.24	0.06	0.01
Step 2				
ACES	0.40	0.12	0.48	0.40
Treatment Dosage	0.24	0.17	0.18	0.18
Step 3				
ACES x Treatment Dosage	-0.16	-0.41	0.07	0.02

In Step 1, the model was non-significant, $F(11,126) = 1.69, p=.082$ and accounted for 12.9% of the variance in change in depression scores. In Step 2, ACEs maltreatment and treatment dosage were added, resulting in a non-significant increase in explained variance, $\Delta R^2 = .015, \Delta F(2, 124) = 1.11, p = .33$. The overall model was also non-significant, $F(13,124) = 1.61, p=.092$ explaining 14.4% of the variance. In Step 3, the interaction term ACEs maltreatment by treatment dosage was entered and accounted for significantly more variance, $\Delta R^2 = 0.04, \Delta F(1,123) = 6.12, p=.015$. The model was significant $F(14,123) = 1.99, p=.024$, as were the interaction term of ACEs maltreatment and treatment dosage ($\beta = -.41, p = .015$).

To facilitate interpretation, ACEs and treatment dosage were categorized into low, medium, and high groups, and mean change in EPDS scores was plotted across these levels (see Fig. 1). Reductions in EPDS scores were greatest among participants with higher ACEs maltreatment scores who received

higher levels of treatment dosage. Participants with lower ACEs scores or lower treatment dosage exhibited comparatively smaller changes in depressive symptoms.

Discussion

The present study examined the impact of perinatal mental health treatment offered in the context of integrated obstetric behavioral health services on depression symptoms and birth outcomes, with particular attention to the moderating role of childhood maltreatment. Contrary to expectations based on prior literature linking the childhood maltreatment subtype of ACEs to poor obstetric outcomes, these variables were not associated in this sample. All participants received some level of mental health treatment, suggesting that access to integrated obstetric behavioral health services may mitigate the risks typically associated with early-life adversity. This null finding may support the idea that integrated mental health treatment may help reduce disparities in birth outcomes among individuals with elevated psychosocial risk (Racine et al., 2018).

Higher levels of engagement in perinatal mental health treatment during pregnancy were associated with more favorable birth outcomes. These results suggest that treatment dosage may be a critical factor in promoting healthier pregnancies and support the clinical importance of both screening for perinatal mental health conditions and facilitating ongoing engagement in treatment throughout pregnancy. Importantly, treatment dosage was associated with better birth outcomes regardless of childhood maltreatment, indicating that accessible perinatal mental health services benefitted all patients. Improvements in perinatal mental health, stress regulation, social support, and engagement with prenatal care may collectively contribute to these observed benefits, aligning with biopsychosocial frameworks of perinatal health (Duberstein et al., 2021).

Compared to patients with lower ACEs CM, patients with high ACEs CM who received more mental health treatment demonstrated greater improvements in depression symptoms from pregnancy to six weeks postpartum. This finding aligns with our original hypothesis that patients with more exposure to childhood maltreatment would show greater reductions in depressive symptoms (Reuveni et al., 2021), thereby highlighting the potential impact that supportive and accessible mental health treatment can have for populations with a history of adversity.

Limitations

Several limitations should be acknowledged. The data set was limited to those patients that completed their screeners at their initial mental health visit during pregnancy. This study did not examine specific treatment modalities, therapeutic content, or quality of care, which may differentially influence outcomes. Childhood maltreatment was assessed retrospectively, and depression outcomes were only assessed through six weeks postpartum, limiting conclusions about longer-term effects. Unmeasured factors such as external social support, readiness to engage in treatment, or other medical complications may have contributed to observed associations. The relatively low representation of

birthing individuals known to experience disproportionate obstetric risk underscores the importance of examining these relationships in racially and socioeconomically diverse populations (CDC, 2024; ACOG, 2024).

Implications

The findings suggest that engagement in mental health treatment offered as part of integrated obstetric behavioral health services is associated with positive birth outcomes. Additionally, findings indicate that birthing individuals with histories of childhood maltreatment benefit from increased engagement in mental health treatment to improve depression, underscoring the importance of higher dosage of intervention during pregnancy. Future research should examine how the benefits of integrated obstetric behavioral health models for perinatal people with trauma and maltreatment histories compare with no treatment supports in a similarly matched control group. By mitigating risks associated with early-life adversity and promoting well-being during pregnancy, integrated behavioral health care models represent a powerful strategy for supporting physical and mental health during the perinatal period.

Statements and Declarations

Compliance with Ethical Standards: The authors have no conflicts of interest to disclose. This project was approved by the Colorado Multiple Institution Review Board 25-2802 and was conducted in accordance with the Declaration of Helsinki.

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Figures

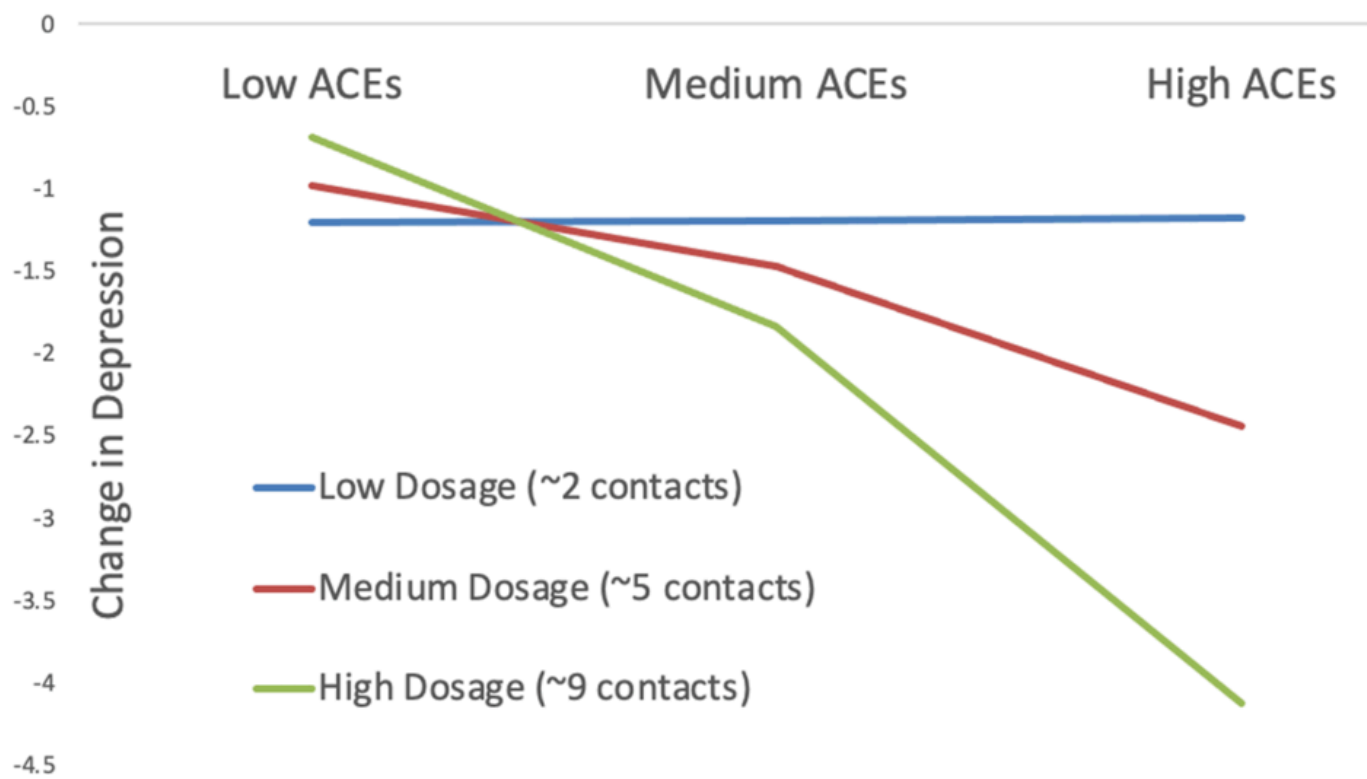


Figure 1

Change in Depression Scores by Low, Medium, and High ACES Maltreatment