IMPACTS OF BIRTH MODALITY ON RATES OF POSTPARTUM DEPRESSION: AN EXPLANATORY SEQUENTIAL MIXED METHOD STUDY

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ABSTRACT: Postpartum Depression (PPD) is the most common mental illness after childbirth. It has long lasting and often severe effects on both birthing parents and offspring. Some modes of birth are associated with higher rates of PPD but the link is controversial and not well understood. The manner by which a person gives birth could have an impact on their well-being after delivery and may affect rates of PPD. This study seeks to understand if one of the causal factors for differing rates of PPD by birth modality is the anticipation of mode of delivery. Using an explanatory sequential mixed method design, the impact of birth modality on PPD will be examined. Phase one is a case control study that will examine quantitative data comparing PPD in people who experience anticipated and unanticipated birth modalities. Phase two will consist of phenomenological interviews that intend to uncover the emotional relationship between birth modality and PPD. Deepening the understanding of PPD causality and its connection to birth modality is imperative to direct future research as well as develop effective and innovative treatments.

Introduction

Postpartum depression (PPD) is a psychiatric illness that typically begins in the days and weeks following birth. The symptoms of PPD include irritability, anhedonia, anxiety, persistent discouragement, guilt, sleep disruptions, and more (Vieira, et al., 2018). PPD is the most common mental illness affecting postpartum (PP) people; it has a significant impact on the health and wellbeing of parents and infants, with issues extending far into their lives (Zhao & Zhang, 2020). PPD can have a negative effect on the parent-infant relationship contributing to poorer feeding outcomes, an increase in self-harm behaviors, and a higher risk for infanticide (Xu, et al., 2017). Long term, people who experience PPD are more likely to have another depressive episode, a lower quality of life, and a higher risk for chronic illnesses (Zhao & Zhang, 2020).

PPD & Infants

The effects of PPD on parents also impact the parent-child relationship, making the child susceptible to long-term health consequences. Infants have poorer health outcomes when their birthing parent is diagnosed with PPD, compared to infants whose parent was not (Beck, 1998). Infants impacted by PPD can exhibit "emotional, cognitive, and behavioral problems, and low social competence" (Xu, et al., 2017). Parents experiencing PPD have poorer breastfeeding outcomes, which impacts an infant's susceptibility to infection, childhood obesity, and diabetes, as well as intelligence (Victoria, et al., 2016).

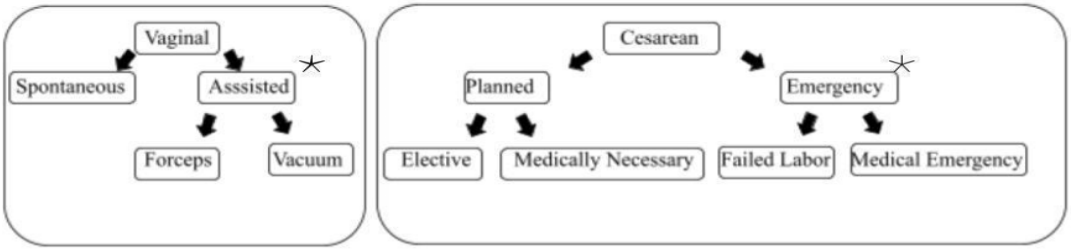
PPD Risk Factors

PPD is a serious psychiatric condition; some risk factors and protective factors have been identified, but much is still unknown. According to a meta-analysis done by Zhao and Zhang (2020) "violence and abuse, immigration status, gestational diabetes, cesarean section, depression history, vitamin D deficiency, obese and overweight, PP sleep disruption and poor PP sleep, lack of social support, traditional dietary pattern [...], multiple births, preterm and low-

birth-weight infants, PP anemia, negative birth experience" are potential risk factors. Having the most complete understanding of risk factors for PPD improves healthcare professionals' ability to screen for, diagnose, and treat it. This may reduce the severity of harmful effects and/or shorten the duration of symptoms.

Figure 1:

Modes of Delivery



Mode of Delivery & PPD

No matter how a person gives birth, each mode has its own set of long- and short-term risks and benefits. While cesarean sections (CS) were once considerably more dangerous than vaginal births, that is no longer the case (Gregory, et al., 2011). Many risks associated with CS stem from the fact that it is a major surgery. Some studies suggest that CS are associated with a higher rate of PPD due to the stress from complications and recovery associated such as infection, PP hemorrhage, injury to the ureter and bladder, uterine rupture, chronic pelvic pain, and gastrointestinal dysfunction (Sun, et al., 2020).

A good deal of research has been done on how risk factors like pre-existing mental illness, stress, self-efficacy, and partner support affect PP outcomes (Silverman, et al., 2017). Little research has been done regarding the ways delivery and potential birth trauma affect the PP mental landscape. While a contentious link exists between some modes of delivery and PPD, the underlying causality has not been established. Understanding the reasons behind why certain modes of delivery like emergency CS are associated with higher risks of PPD is essential.

Cesarean Section

CS is a surgical procedure where the infant is delivered via an incision in the abdomen. It is the most common major surgery in the United States. Rates of CS in the USA have continuously increased since the inception of the procedure, with one in three deliveries now occurring via CS (Gregory, et al., 2011). This is partially associated with comorbid factors like increasing maternal age, higher rates of gestational diabetes and hypertension, and pre-eclampsia, but also more people electing to have CS (Gregory, et al., 2011). The decision to perform a CS is typically made by medical professionals, after assessing both absolute and relative indicators, to provide the safest birth possible (Mylonas & Friese, 2015).

Anticipated Cesarean Section

Anticipated CS are one's planned in advance by both the birthing parent and the medical team prior to the beginning of labor. There are a few types of anticipated CS. Elective CS are done at the request of the birthing parent but without medical indicators. This type of CS is often blamed for the increasing rates of the procedure but records show that only 11% of CS in the USA happen at the request of the birthing person (Mylonas & Friese, 2015). Elective CS that take

place for no medical reason are different from planned CS which are medically indicated and recommended for a safe delivery. Both planned and emergency CS take place due to medical necessity. Some circumstances that indicate the need for a CS happen prior to the onset of labor, resulting in a scheduled or planned CS.

Unanticipated Cesarean Section

CS that are unanticipated occur when neither the birthing parent nor the medical team know that a CS will happen beforehand. Emergency CS happen when complications spontaneously arise during the pregnancy or labor (intrapartum) resulting in the need to immediately perform the procedure (Mylonas et al., 2015). As mentioned, there are two categories of indicators for CS, absolute and relative. Absolute indicators are medical complications where a CS absolutely must take place. Relative indicators mean that a CS is likely necessary. Some absolute indicators include the small maternal pelvis, amniotic infection, maternal pelvic deformity, eclampsia, fetal asphyxiation, umbilical cord prolapse, placenta previa, and abnormal lie or presentation (Mylonas et al., 2015). Relative indicators include failure to progress during labor, prior CS, and pathological cardiotocography (CTG) (Mylonas, et al., 2015).

Cesarean Section Risks

While no method of birth is without complication, CS are associated with more severe maternal morbidities and mortality than vaginal births (Souza, et al., 2021). Emergency CS are associated with the highest adverse outcomes of any birth, whether they are due to failed vaginal labor or complications (Gregory et al., 2011). CS creates risks for people and infants and should only be performed when there is a clear benefit (Souza, et al., 2010). The short-term risks of CS include risk of infection, complications from surgery and anesthesia (including death), lower likelihood of breastfeeding, and febrile illness (Gregory, et al., 2011).

Cesarean Section & PPD

Some studies have found a contentious link between CS delivery and PPD, while others dispute it. A meta-analysis by Yokoyama, et al. (2021) evaluating delivery mode and PPD showed that observational studies often found a significant positive association with PPD and CS, but epidemiological studies had conflicting results with half finding no association. One gap that may be contributing to this conflict in findings is the difference between scheduled, elective, emergency, and failed labor CS.

Vaginal Delivery

About 70% of births occur vaginally (Gregory, et al., 2012). The rates of PPD in people who deliver vaginally are lower than in those who have a CS, although this link is contested (Sun, et al., 2020). While vaginal deliveries are associated with lower risk, no birth is risk free. Roughly 10% of people who have vaginal deliveries experience complications; most commonly tearing of the perineum and fecal or urinary incontinence (Gregory, et al., 2011). The risks to infants during vaginal delivery include birth trauma, primarily shoulder dystocia, asphyxia from delayed labor, and injury resulting from manipulations used during delivery like a vacuum or forceps (Gregory et al, 2011). The mode of delivery that is associated with the highest risk of complications for both infants and people is a failed labor delivery. This is where labor begins vaginally and then must be finished via an emergency CS (Gregory et al., 2011).

Significance and Rationale

Delivery can be a frightening and stressful experience, especially when it does not go as planned. Understanding the aspects of delivery that contribute to PPD is essential. While research has begun to parse out a connection between mode of delivery and PPD, it has not yet sought to understand what aspects of each mode of delivery are risk factors. PPD is both a common and serious mental illness,

yet the complete etiology remains unknown. Identifying risk factors is an important step in protecting the health of birthing people and infants (Zhao & Zhang, 2020). PPD can lead to a myriad of adverse health effects on people and children.

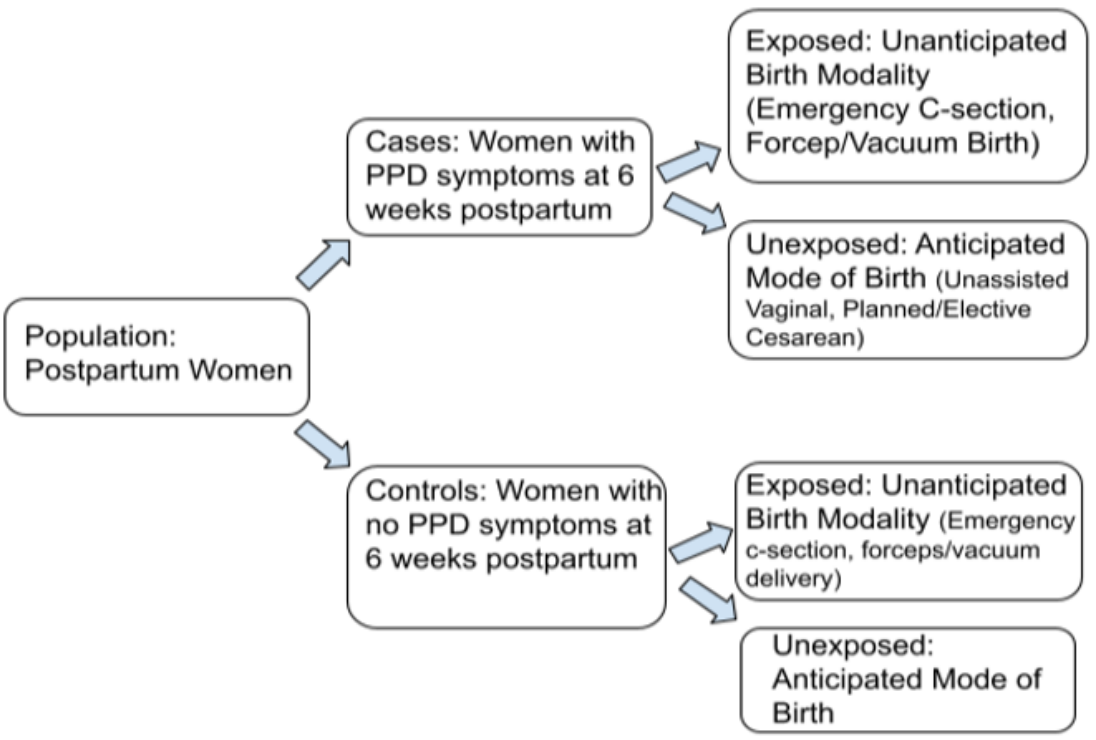
The effects of PPD on birthing people are extensive, affecting everything from how they interact with their children, how they feed them, to an increase in self-harm behaviors, suicidal ideation, and even infanticide (Xu, et al., 2017). The effects on infants are also extensive, including higher risk for emotional, cognitive, and behavioral problems, as well as low social competence (Xu, et al., 2017). Understanding how the process of delivery is related to PPD could be an important tool in both identifying and treating it. If people who experience an unanticipated mode of birth have a higher risk for PPD then their decisions about future childbirth and follow-up care may be impacted. Identifying what aspects of delivery are related to PPD allows providers and parents alike to participate in early interventions and gain greater understanding. If certain modes of delivery are a risk factor, adjustments can be made to expectations and approaches during the tenuous period after delivery when PPD often develops.

Research Question and Hypothesis

Birth modality is an underexplored risk factor in PPD. Understanding how the experience of delivery affects the wellbeing of birthing parents is essential for developing effective treatments and furthering studies of PPD etiology. This study will consider whether PP people who have experienced an unanticipated mode of delivery (failed labor CS, emergency CS, or forcep/vacuum vaginal delivery) have an

Figure 2:

Phase 1: Quantitative Retrospective Case Control



increased chance of developing PPD in the first six weeks after giving birth compared to people who had a planned birth experience (elective CS, planned CS, or spontaneous vaginal birth). It is hypothesized that delivery via an unanticipated modality will be associated with a higher rate of PPD six weeks PP compared with the experience of an anticipated modality in the same time frame. The study will then seek to gather information on the emotions, feelings, and cognition behind this increased risk.

Method

An explanatory sequential mixed method design will be used, combining quantitative case control study as outlined in Figure 2, followed by qualitative phenomenological interviews.

The quantitative portion will involve taking a sample portion of PP people and breaking them into cases and controls. The cases will be experiencing PPD symptoms at six weeks PP, the controls will have no significant symptoms of PPD. The cases will then be divided into two groups, those who were 'exposed' and experienced an unanticipated birth modality and those who were not and had an anticipated birth. The process will be repeated with the controls. If the hypothesis is correct the cases will more often have had an unanticipated delivery mode than the controls. This leads into the qualitative phase where interviews will be used to identify the emotional and cognitive connections between birth modality and PPD.

Phase 2: Qualitative Phenomenological Interviews

Utilizing the data from the case-study in combination with the qualitative information gathered during the interviews will create a more complete picture of how delivery relates to PPD. A cohort of people who experienced an unanticipated mode of birth will be interviewed about their birth experiences and how that affected their feelings in the days and weeks after bringing their child home. The mode of birth can be either vaginal or surgical as long as it was unexpected. Each cohort of interviewees should include people who experienced vaginal as well as surgical births. This will ideally allow researchers to begin to establish if the unanticipated aspect of mode is a factor in the presence of PPD, rather than being tied to CS versus vaginal birth. Another cohort of people whose delivery mode was predicted will be interviewed about their experiences and feelings after bringing their child home to see if the themes between the groups differ.

Sampling

This study will use the health records of 500 obstetrics patients from the University of Washington (UW) Women's Health Center attending PP follow-up appointments six weeks after delivery. Included participants are cisgendered women between the ages of 20 and 35, English speaking, American citizens, who delivered their first child full-term. Participants should be on their first birth, with no previous known pregnancies whether they resulted in a child, miscarriage, or abortion. The births should all be singleton and full-term, meaning the fetus reached 37 weeks' gestation. The inclusion criteria for this study are stringent because the delivery experience may be affected by the differential access to healthcare experienced by many marginalized groups. They may have negative birth experiences that are not the result of birth modality and could confound the results of this study. Excluded are also those who did not have their first child, have a previous diagnosis of depression, anxiety, or PTSD, who delivered preterm, or who had significant gestational complications. The study will take a non-probability simple random sample of health records to determine the cases and controls.

The sample for Phase 2 will be taken from the population used in Phase 1, the inclusion and exclusion criteria are the same. The study will conclude with a qualitative portion, asking participants to describe their birth experiences and the emotions that developed during and after birth. This will be done by selecting people

from each group and conducting semi-structured phenomenological interviews. During their six-week follow-up appointments, participants will indicate whether they are open to participating in an interview; those who do will leave either their phone number or email address for researchers to follow up. A computer generator will randomly select ten willing participants from each of the four categories. Interviews will be 30-60 minutes and can be conducted in person or via a video conference.

Operationalization & Measurement

The independent variable is the mode of delivery. Anticipated deliveries are ones that the birthing parent knew would occur prior to the birth, see figure 1. Anticipated birth modality may not necessarily be preferred, but it is known ahead of time. Unanticipated deliveries are ones that the parent did not know were going to happen prior to the occurrence. It is hypothesized that the nature of unanticipated births will negatively affect feelings and contribute to higher rates of PPD.

Anticipated Deliveries

Spontaneous vaginal delivery is a delivery that happens without medical intervention to extract the infant. These infants are born by being pushed through the parent's birth canal and do not need medical tools for the extraction. Elective CS is a surgical birth done at the behest of the birthing parent not out of medical necessity. Planned CS is a surgical birth that is medically indicated but not an emergency; these births are scheduled in advance, however, this may not be their preferred mode of delivery. Reasons for a planned CS could include, breech presentation, small maternal pelvis, placenta previa ,and others.

Unanticipated Deliveries

Forceps delivery is a vaginal delivery that requires the use of medical intervention via forceps to extract the infant. Vacuum delivery is a vaginal delivery that requires the use of a vacuum to extract the infant. Emergency CS are deliveries that happen unexpectedly due to medical necessity. They can happen prior to the onset of labor or during labor (intrapartum). Some medical indications for an emergency CS would be eclampsia, asphyxiation, umbilical cord prolapse, placenta previa, and infection (Mylonas, et al., 2015). Failed labor CS differ from emergency CS in that they occur intrapartum and happen when labor fails to progress. This can happen at any point during labor. Often it is first treated with inducing drugs and, if labor continues to fail to progress, delivery occurs via CS.

PPD Assessment

To assess the dependent variable, PPD, the Edinburgh Postnatal Depression Scale (EPDS) will be used (Cox, et al., 1987). The EPDS consists of ten questions with four possible answers given to each question. Using this measurement tool at six weeks PP is the standard of care for the assessment of PPD. The answers are ranked from 0-3 with increasing severity. The maximum possible score is 30, and a score greater than 10 indicates the presence of depression (Cox, et al., 1987). All people with scores greater than 10 will be included in the cases group, and all people with scores less than 10 as controls.

Interview

The qualitative portion of the study will evaluate the feelings and emotions of participants regarding delivery, assessing them for PPD connections. Responses about birth will be coded for self-efficacy, confidence, perceived failure and sense of control or lack thereof. Responses about PPD will be coded for feelings of hopelessness, sadness, anger, confusion, sleep troubles, fear, anhedonia, and exhaustion. Any other themes that arise that have not been predicted will also be coded and evaluated.

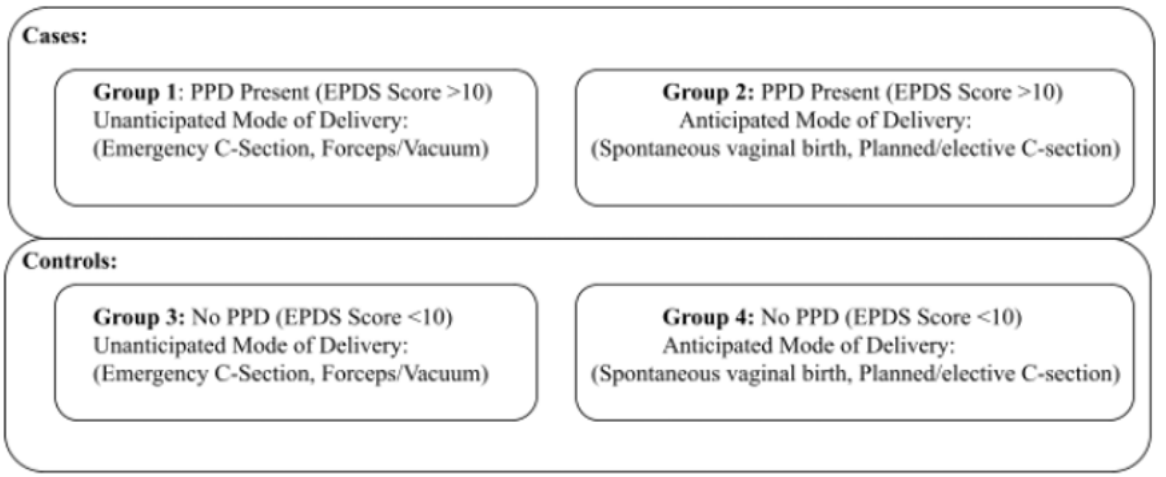
Data Collection

Health records from the sample population will indicate their EPDS score six weeks after delivery, following the standard of care.

Results from the EPDS will determine cases and controls. The cases include those who have scores greater than ten, indicating at least moderate symptoms of PPD are present. The controls will have a score less than ten indicating that PPD symptoms are either not present or not significant. Both the EPDS score and birth modality will be obtained via the participants' health records provided by their OB/GYN. The participants will be divided into four groups to analyze the relationship between birth modality and PPD symptoms, see figure 3.

Figure 3:

Data grouping for PPD & Birth Modality



After the interviews with each of the four groups have been conducted, they will be evaluated to see if specific themes emerge around the birthing experience and birth modality. The interviews will be conducted by birthing professionals, ideally either an experienced labor and delivery nurse or a certified midwife. The interviews will be led by the women, but questions will be designed to interrogate feelings of self-efficacy, control, and whether the perception of success or failure during birth contributed to long term emotional stability. As part of the inclusion criteria participants should be proficient in English but in case issues arise around medical terminology interviewers should be adept at explaining the processes and terms used in birth.

Analysis

Individuals are used as the unit of analysis in order to aggregate data about the potential differences in PPD for people who encounter different birth modalities. First, a univariate analysis will be used to determine the mean EPDS score and the standard deviation for each of the four groups. A multivariate analysis will be performed to account for confounding factors in PPD symptoms. The multivariate analysis will use race, partnership status, insurance, age, education level, and income level. For the qualitative evaluation of the phenomenological data, a cross-case analysis will be performed. Interviews will be recorded and transcribed so researchers can familiarize themselves with the dialogue and then code them for themes to understand connections between feelings about birth modality and overall emotional wellbeing and feelings of depression.

Ethical Considerations

This study will have approval from an institutional review board, and all participants will have signed and understood an informed consent document. All PP people will be

experiencing massive lifestyle, hormone, and emotional shifts due to the nature of their situation, making them a vulnerable population. People who have self-reported PPD may be an even more vulnerable group. It is important to note that those who will be participating in this study will have already reported their PPD symptoms to their OB/GYN and will be given the option to receive treatment with their medical providers. Interviews must be respectful of the participant's vulnerable status and avoid asking prying questions. Participants should guide the conversation and be frequently reminded that they can opt to skip questions and are under no obligation to stay until the end of the interview. Interviews should be conducted by skilled interviewers, and mental health professionals should be present during the interview. After the interview participants should have the option to follow up with a mental health counselor if they are feeling uncomfortable or need additional support. Maintaining the confidentiality of participants in the study is paramount. Participants likely will not be able to remain anonymous since follow-up interviews will be conducted with participants, so protecting their confidentiality is of the utmost importance.

Significance

As rates of PPD continue to rise in the United States, understanding how modes of delivery affect not just the physical body but the emotional and psychological landscape can help people make informed decisions about their birthing experience. Understanding the connections between birth modality and PPD may also assist clinicians in screening and identifying PPD. There may also be implications for treatment if birth trauma is correlated with PPD. If people know that there is an increased risk of PPD due to their delivery experience they may be more inclined to seek treatment earlier, feel less stigma about their diagnosis, and be better able to address the illness. Doctors and other healthcare professionals could recommend further follow up care or earlier interventions.

Limitations

This study is limited in scope; future research must account for the birth experiences of those not included. Understanding the connection between birth modality and PPD will be important in parents who are transgender, non-binary, or gender nonconforming. This research is meant to be a foundation to expand out to include the experiences of all birthing persons. The people who choose to participate may not be representative of the whole population. The sample of people will be from those receiving medical follow-ups; not all people have access to these or choose to attend them. Those experiencing PPD may be less likely to attend their follow-up appointments. The EPDS is not a perfect measurement tool, it may not catch every person experiencing PPD. It requires authentic evaluation on the part of the person taking it which may not always be possible. The study cannot take into account other PP mood disorders like anxiety or psychosis. There are aspects of delivery that are beyond the scope of this study but may affect the birthing experience. Some of these may be whether or not the birthing person was administered oxytocin, a medication to induce labor, or the presence of anesthetics like a spinal tap or epidural. The delivery experiences of people who delivered at the UW medical center in Seattle may not be reflective of every population. They gave birth in a hospital in an urban area, likely with some type of health insurance. Results may not be generalizable to people who gave birth in different settings or without insurance.

Future Research

Further studies should explore the relationship between birth modality in underserved or marginalized groups who historically experience differential treatment in healthcare. This would include people of color, transgender birthing persons, immigrants, and non-English speakers whose delivery experiences may be disproportionately negative due to the history of discrimination and racism in America. If birth

modality is shown to impact PPD then studies should also be done using a larger population size. Additional studies could be done to see if the relationship between birth modality and PPD experiences changes with the presence of medications administered during labor, like oxytocin to induce labor, epidurals to block pain, or narcotics.

Understanding that delivery is a crucible with lasting consequences for many is vital in assisting PP people navigating the intense PP period. If an unanticipated mode of delivery is a risk factor for PPD there are many treatment implications. Eye Movement Desensitization and Reprocessing (EMDR) therapy, a treatment typically used for PTSD symptoms, is just beginning to be studied in people who have experienced a traumatic or life-threatening birth. If delivery mode connects to birth trauma it may be possible to expand EMDR therapy to treat people whose delivery contributes to their PPD (Hendrix, et al., 2021). Other therapies for PPD like talk therapy and medication, may be improved upon by further understanding risk factors and causality including the role that is played by birth modality (Brummelte & Galea, 2016).

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