Perinatal Depressive Symptoms, HIV Suppression, and the Underlying Role of ART Adherence: Prospective Evidence from IMPAACT P1025 Cohort

Florence Momplaisir MD MSHP FACP
Assistant Professor
Drexel College of Medicine
Disclosures

• I have no actual or potential conflict of interest
Depression among Women Living with HIV

• The prevalence of depression among women living with HIV (WLH) is double that of women without HIV and can be as high as 50% for pregnant and postpartum WLH%\textsuperscript{1-3}

• Life stress, unplanned pregnancies, prenatal HIV diagnosis, poor social support, and intimate partner violence have been associated with depressive symptoms in the prenatal period\textsuperscript{4,5}

\begin{figure}
\centering
\begin{tikzpicture}
\begin{axis}[
    ybar,\]
\addplot coordinates {
(8.5,1)
(17,2)
(42,3)
};
\end{axis}
\end{tikzpicture}
\end{figure}

Women without HIV \quad WLH \quad Pregnant and Postpartum WLH

WLH Experience Poor Retention and Poor Viral Suppression Postpartum

How much does depression contribute to these findings?

Adams, Brady, Michael, Yehia, Momplaisir. *Clinical Infectious Diseases* 2015.
Study Aims

The association between prenatal depressive symptoms and viral suppression at birth and postpartum has not been previously examined in a prospective study.

• **Aim 1**: Evaluate the association between prenatal depressive symptoms and viral suppression at delivery and postpartum.
• **Aim 2**: Evaluate the extent to which ART adherence mediates these associations.
Data Source

- P1025 is a multicenter observational U.S. study created to evaluate the safety and effectiveness of ART and other interventions intended to prevent perinatal transmission of HIV
- WLH, age≥13, with a viable pregnancy of ≥8-week gestation, enrolled during pregnancy or L&D, between 2002 and 2013
- n=2756 mother-infant pairs followed up to 1 year postpartum
- Analysis limited to women with a VL at L&D (n=1,367)
Methods

• Depressive symptoms were assessed in the 3\textsuperscript{rd} trimester using a five-item scale selected based on their face validity and consistency with DSM-5 depression criteria.

• The five items formed a single-factor solution in a principal components analysis that explained 48\% of the variance and had satisfactory internal consistency ($\alpha = 0.77$)
  
  • Have you felt down-hearted and blue?
  • Have you been a happy person?
  • Did you have enough energy to do the things you wanted to do?
  • Did you have trouble keeping your attention on any activity for long?
  • Did you feel tired?
Methods

• Participants rated the frequency of each item from 1 (“none of the time”) to 6 (“all of the time”) over the past month.
• For our main analysis, we converted participants’ scores into z scores with a mean of zero and a SD of 1 to facilitate modeling and interpretation.
• In secondary analysis, we categorized the raw scores into tertiles.
## Methods

<table>
<thead>
<tr>
<th><strong>Outcome: Viral Suppression</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>VL&lt;400 copies/ml, measured within 14 days from L&amp;D and at 24 weeks postpartum (using the closest VL)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Mediator: Prenatal adherence</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of missed doses in the previous month; categorized as inconsistent (≥ 1 missed dose) or consistent (no missed doses), assessed in 3rd trimester</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Co-variates</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age: &lt;21, 21-29, 30-35, &gt;35</td>
</tr>
<tr>
<td>Multiparity: having ≥ 1 birth prior to current pregnancy</td>
</tr>
<tr>
<td>Race: White, non-Hispanic; Black, non-Hispanic; Hispanic</td>
</tr>
<tr>
<td>Education: &lt;11th grade; High school diploma; some college or more</td>
</tr>
<tr>
<td>Substance use: Any prenatal use of tobacco, alcohol, marijuana or other substances</td>
</tr>
</tbody>
</table>
Data Analysis

• We used multiple imputation using chained equations (MICE) to impute missing data for depressive symptoms (22%)

• We employed two complementary approaches for our data analysis
  1) logistic regression models, which examined the adjusted associations of depressive symptoms on viral suppression (models with and without ART adherence)
  2) path analysis, that allows for exploring multiple relationships over multiple time points

• Both approaches allowed for examination of the mediating effects of ART adherence
## Results

<table>
<thead>
<tr>
<th>Characteristics, n=1,367</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, &lt;21, n (%)</td>
<td>151 (11)</td>
</tr>
<tr>
<td>21-29</td>
<td>650 (48)</td>
</tr>
<tr>
<td>30-35</td>
<td>332 (24)</td>
</tr>
<tr>
<td>&gt;35</td>
<td>234 (17)</td>
</tr>
<tr>
<td>&gt;1 previous birth, n (%)</td>
<td>196 (14)</td>
</tr>
<tr>
<td>Black n (%)</td>
<td>797 (58)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>418 (31)</td>
</tr>
<tr>
<td>White</td>
<td>152 (11)</td>
</tr>
<tr>
<td>&lt;11&lt;sup&gt;th&lt;/sup&gt; grade, n (%)</td>
<td>516 (38)</td>
</tr>
<tr>
<td>High school, GED</td>
<td>575 (42)</td>
</tr>
<tr>
<td>some college or more</td>
<td>276 (20)</td>
</tr>
<tr>
<td>Substance use, n (%)</td>
<td>58 (4)</td>
</tr>
<tr>
<td>Depressive symptoms, average (SD)</td>
<td>12.6 (4.6)</td>
</tr>
</tbody>
</table>
Adherence by Prenatal Depressive Symptoms

### Adherence During Pregnancy

- Total: 65% (Lowest tertile), 76% (Middle tertile), 66% (Highest tertile)
- P < 0.001

### Adherence Postpartum

- Total: 42% (Lowest tertile), 51% (Middle tertile), 42% (Highest tertile)
- P < 0.001
Viral Suppression by Prenatal Depressive Symptoms

Viral Suppression During Pregnancy

- Overall: 72% (Lowest tertile), 78% (Middle tertile), 64% (Highest tertile)
- P < 0.001

Viral Suppression Postpartum

- Overall: 47% (Lowest tertile), 52% (Middle tertile), 50% (Highest tertile)
- P < 0.001
<table>
<thead>
<tr>
<th></th>
<th>Viral Suppression at L&amp;D</th>
<th>Viral Suppression Postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AOR [95% CI]</td>
<td>AOR [95% CI]</td>
</tr>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 1</td>
</tr>
<tr>
<td></td>
<td>Model 2 (with adherence)</td>
<td>Model 2 (with adherence)</td>
</tr>
<tr>
<td><strong>Depressive Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z score</td>
<td>0.83† [0.72,0.97]</td>
<td>0.86†[0.73,1.00]</td>
</tr>
<tr>
<td>≥ 1 missed dose in past 4 weeks</td>
<td>1.44‡[1.02,2.01]</td>
<td>2.17‡ [1.45,3.26]</td>
</tr>
</tbody>
</table>

* p<0.10, † p<0.05, ‡ p<0.01

Prenatal adherence mediates 15% of the effect of depressive sx on suppression at L&D
Prenatal adherence mediates 36% of the effect of depressive sx on suppression at 24 weeks postpartum
Path Model Predicting Viral Suppression at L&D and postpartum

Figure 2: Path model predicting viral suppression at labor and delivery and postpartum.

Note. Standardized estimates are reported. Model fit indices: $\chi^2(63) = 207.06, p < .001$; RMSEA = .041, CI [0.035, 0.047]; CFI = .970. * $p < .05$. ** $p < .01$. *** $p < .001$.

Prenatal adherence mediates 17% of the effect of depressive symptoms on suppression at L&D and 37% of the effect of depressive symptoms on suppression at 24 weeks postpartum.
Strengths and Limitations

Strengths:
• Prospective design
• Use of a multi-ethnic sample
• Corroboration of our findings across modeling approaches

Limitations:
• Participants limited to women in care, findings not generalized to all pregnant WLH
• Missing data for depressive symptoms, addressed with multiple imputation
• Depressive symptoms measure could have been more comprehensive
Conclusions

• WLH with higher prenatal depressive symptoms were less likely to be virally suppressed at L&D and postpartum compared to WLH with fewer depressive symptoms
• This association was partially mediated by ART adherence in regression and path analyses
• Depression screening and treatment can potentially have a beneficial impact on viral suppression through ART adherence
• Missed opportunity to making investments in the prenatal period since many women drop out of care postpartum
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• Shirley Traite, MSW
• P1025 patients