Depressive symptoms mediate the influence of HIV-related symptoms on adherence to antiretroviral medications

Moka Yoo, BS, BSN, RN
Background

• Possibly interactive relation among disease symptoms and side effects, mood, and medication adherence
• Symptoms and side effects may decrease adherence
• Symptoms and side effects may increase depressive symptoms
• Level of depression inversely related to adherence
Background

• Mechanisms underlying the relation of symptoms to adherence is unclear
• Whether there are specific groups of symptoms and side effects that influence lower adherence is unknown
Purpose

• To identify groups of HIV symptoms and side effects in a widely-used questionnaire, and

• To evaluate relations among groups of symptoms and side effects, depressive symptoms, and antiretroviral medication adherence
Methods

• 124 persons living with HIV (PLWH) who completed baseline self-report measure via ACASI for a larger multi-visit intervention study

• Study variables included HIV-related symptoms and side effects, depression, and medication adherence
  – Covariates: cognitive function, memory, race, age, gender
HIV Symptoms and Side Effects

- 20-item HIV Symptom Index (Justice et al., 2001)
  - Symptoms: fatigue, fever, dizziness, hand/foot pain, memory loss, n/v, diarrhea, sadness, anxiety, sleep difficulty, rash, cough, HA, loss of appetite, bloating/gas, muscle/joint pain, low libido, body image, weight/hair loss
  - A 5-point Likert scale to indicate whether the symptom is present and if present, how bothersome the symptom has been
  - Symptoms were considered if they occurred during the past 4 weeks
Symptoms of Depression

- Seven items drawn from the CES-D (Radloff, 1977)
  - Respondents were asked:
  - “In the past week how often did you...”
    - “Feel like you couldn’t shake off the blues even with help from your family and friends?”
    - “Have trouble keeping your mind on what you were doing?”
    - “Feel that everything you did was an effort?”
    - Have trouble sleeping?”
    - “Feel lonely?”
    - “Feel sad?”
    - “Feel like you just couldn’t ‘get going’?”
  - Items were rated on a 0 – 3 scale
Medication Adherence

• Medication Event Monitoring System System (MEMS, Aardex Group Ltd, Sion Switzerland)
  – Records date and time of bottle opening
  – Percentage of doses taken correctly during each 24-hour period over the 30 days following the baseline
# Description of the sample

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>124</td>
<td>20</td>
<td>67.00</td>
<td>47.10</td>
<td>8.69</td>
</tr>
<tr>
<td>CD4+ T cell(^a)</td>
<td>124</td>
<td>62</td>
<td>1734.00</td>
<td>501.23</td>
<td>289.29</td>
</tr>
<tr>
<td>Viral Load(^b)</td>
<td>124</td>
<td>0(^c)</td>
<td>2321K</td>
<td>23K</td>
<td>21K</td>
</tr>
<tr>
<td>Years Since First</td>
<td>123</td>
<td>0.25</td>
<td>24.00</td>
<td>11.60</td>
<td>7.18</td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV Meds Doses Per Day</td>
<td>124</td>
<td>1</td>
<td>8.00</td>
<td>2.83</td>
<td>1.50</td>
</tr>
<tr>
<td>MEMS Correct (%)</td>
<td>118</td>
<td>6.9</td>
<td>100.0</td>
<td>81.46</td>
<td>20.95</td>
</tr>
</tbody>
</table>

\(^a\) CD4+ T cell count was measured in cells/mm\(^3\)
\(^b\) Viral load was measured in copies/mL
\(^c\) Undetectable level
### Description of the sample

#### How participant became infected

<table>
<thead>
<tr>
<th></th>
<th>Men N = 88</th>
<th>Women N = 36</th>
<th>Blacks N = 78</th>
<th>Whites N = 45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex with man</td>
<td>47</td>
<td>29</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Sex with woman</td>
<td>37</td>
<td>6(^b)</td>
<td>37</td>
<td>6</td>
</tr>
<tr>
<td>Shared needles</td>
<td>16</td>
<td>4</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Transfusion</td>
<td>9</td>
<td>6</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>2</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>21</td>
<td>11</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td><strong>Totals(^a)</strong></td>
<td><strong>139</strong></td>
<td><strong>58</strong></td>
<td><strong>133</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>

\(^a\) Totals exceed sample size due to several participants indicating multiple risk factors.

\(^b\) Of women reporting sex with another woman as a risk factor, only one did not report another risk factor, such as sex with a man or sharing needles.
Description of the sample

<table>
<thead>
<tr>
<th>Education</th>
<th>Men</th>
<th>Women&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Blacks</th>
<th>Whites&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>11th grade or less</td>
<td>29</td>
<td>17</td>
<td>42</td>
<td>4</td>
</tr>
<tr>
<td>HS or GED</td>
<td>30</td>
<td>15</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>2 years college/AA/Tech</td>
<td>17</td>
<td>1</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>College graduate</td>
<td>9</td>
<td>2</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Master degree or greater</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: HS=high school; GED=General Educational Development; AA=Associate of Arts Degree.

a. Test of the association of gender and educational status: $\chi^2 = 8.12$ (df = 4) $p = 0.09$.
b. Test of the association of race and educational status: $\chi^2 = 28.31$ (df = 4) $p < 0.001$. 
Analysis

- Factor analysis to evaluate groups of side effects and symptoms on the HIV Symptom Index scale
- Bifactor model
  - One general factor
  - One specific factor reflects GI symptoms
- Structural equation model (SEM)
  - Allows exploration of relation among symptoms, depression, and adherence
Results

• SEM showed that
  – both general HIV symptoms and GI symptoms were related to higher levels of depressive symptoms, and
  – higher levels of depressive symptoms were related to lower levels of medication adherence.
  – general HIV symptoms were not directly associated with adherence,
  – they were indirectly associated with adherence via depression
## Structural Model

<table>
<thead>
<tr>
<th>Predicted Variable</th>
<th>Predictor Variables</th>
<th>Coefficient</th>
<th>SE</th>
<th>Z score</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>CES-D</td>
<td>General symptoms</td>
<td>0.44</td>
<td>0.12</td>
<td>3.75</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>GI Symptoms</td>
<td>0.39</td>
<td>0.13</td>
<td>2.95</td>
<td>.003</td>
</tr>
<tr>
<td>Adherence</td>
<td>General symptoms</td>
<td>2.91</td>
<td>2.06</td>
<td>1.41</td>
<td>.16</td>
</tr>
<tr>
<td></td>
<td>GI Symptoms</td>
<td>0.70</td>
<td>2.35</td>
<td>0.3</td>
<td>.77</td>
</tr>
<tr>
<td>CES-D</td>
<td>-5.16</td>
<td>2.10</td>
<td>-2.46</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.32</td>
<td>0.22</td>
<td>1.45</td>
<td>.15</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-4.11</td>
<td>4.67</td>
<td>-0.88</td>
<td>.38</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>-5.77</td>
<td>4.45</td>
<td>-1.3</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>Crystallized Abilities</td>
<td>-0.43</td>
<td>0.48</td>
<td>-0.91</td>
<td>.36</td>
<td></td>
</tr>
<tr>
<td>Fluid Abilities</td>
<td>0.45</td>
<td>0.55</td>
<td>0.82</td>
<td>.41</td>
<td></td>
</tr>
<tr>
<td>WMS Delayed Recall</td>
<td>0.39</td>
<td>0.69</td>
<td>0.57</td>
<td>.57</td>
<td></td>
</tr>
</tbody>
</table>
Relations among variables

Depression (CES-D)
- Via Depression: $p = 0.04$

General HIV Symptoms
- $<0.001$

GI Symptoms
- 0.003
- N.S.

Adherence
- 0.017
- N.S.

Covariates: General Cognitive Functioning, Memory, Age, Gender, and Race (none is significant)
Conclusion

• HIV symptoms and side effects may influence adherence via depressive symptoms
• Depressive symptoms may be one mechanism by which symptoms are related to lower adherence
• Importance of early recognition and evaluation of symptoms of depression to improve medication adherence
Limitations

• Convenience sample
• Cross-sectional study
  – But note that data on adherence were collected 30 days after data on symptoms and mood
• Secondary data analysis
• Self-report measures
• Small sample size
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