Design and Impact of *Positive Links*: A Mobile Platform to Support People Living with HIV in Virginia

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Associate Professor of Medicine
With Gratitude

• To the patients, staff, and providers at the UVa Ryan White Clinic for inspiring and supporting this work.

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  – Anna Greenlee
  – Mahlatse Modipane
HIV Care Challenges in (Rural) VA

- Poverty

Mobile technology (mHealth) can facilitate interventions addressing one or more challenges to living well with HIV when and where clients want and need it.

challenges
“It feels good that I can actually talk to someone every day about it. Even if it’s a machine, it feels great to know that there's someone there to affirm to me that this is a good and right thing. “congratulations” sounds good, you know?”

“It gave me more positive feeling about myself that I’ve done something good that day for me. Having somebody at your back is a positive thing.”

## App vs Text Interventions

<table>
<thead>
<tr>
<th>Text</th>
<th>App</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Better studied</td>
<td>• More secure</td>
</tr>
<tr>
<td>• Phones are cheaper</td>
<td>• Can send more messages without added cost</td>
</tr>
<tr>
<td>• Harder to crack phone screens when dropped</td>
<td>• Rich media views, videos and community functions</td>
</tr>
<tr>
<td></td>
<td>• May facilitate overcoming other barriers to engagement (smart phone)</td>
</tr>
</tbody>
</table>
Our App Development Strategies

- User-based design
- Self-monitoring
- Shrink “distance”
Self-Monitoring
“The questions make me focus on my mood and my stress and makes me more in touch with myself you can say. When it pops up, it makes me stop and think. I usually don’t think about that kind of thing.”
Dashboard Medication Adherence

Daily Meds Adherence

Weekly Meds Adherence

Weekly Summary for December 1

Are you reaching your health goals? If not, let the Positive Links Team know how we can help.

OK

Sent: Thursday December 1, 2016 - 9:35 AM
Shrinking the “Distance”
“You get to talk to people who are going through exactly what you are going through. When you are down somebody uplifts you, when somebody else is down you can uplift them, it’s basically like one big family” (Participant 31295).
PL Enrollment Process

111 Approached
- Referred by Clinic Providers; Participating ASOs; Testing sites
- Top specified reasons for disinterest: already have a cell phone; not enough time to enroll

87 Interested
- 4 with Literacy Level below threshold
- 6 did not complete enrollment

77 Enrolled
- Provided with Android Phone and Voice/Data Plan
- Assessments at 6/12/18 months
The Positive Links Cohort was enrolled from 9/13 - 5/15 and followed for 12 months. 77 participants used the app.

<table>
<thead>
<tr>
<th>Participant Characteristics</th>
<th>Percent (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>63% (47)</td>
</tr>
<tr>
<td>MSM (Men who have sex with men)</td>
<td>41% (31)</td>
</tr>
<tr>
<td>Incomes below 100% FPL</td>
<td>74% (56)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>44% (33)</td>
</tr>
<tr>
<td>Homeless or unstably housed</td>
<td>26% (19)</td>
</tr>
<tr>
<td>Food insecure</td>
<td>37% (28)</td>
</tr>
<tr>
<td>Poor transportation access</td>
<td>23% (17)</td>
</tr>
</tbody>
</table>
## Engagement with App

24,571 screen views/12months
Mean: 327 (SD: 347)
Median: 187

### App Actions =36,374

- Med Responses
- Stress Responses
- Mood Responses
- Quiz Responses
- CMB Posts

<table>
<thead>
<tr>
<th>PL Participant App Utilization</th>
<th>6 Months</th>
<th></th>
<th>12 Months</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Med query response rate</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td>36%</td>
<td>41%</td>
<td>36%</td>
</tr>
<tr>
<td>Mood query response rate</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>47%</td>
<td>36%</td>
<td>39%</td>
<td>36%</td>
</tr>
<tr>
<td>Stress query response rate</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>47%</td>
<td>36%</td>
<td>39%</td>
<td>36%</td>
</tr>
<tr>
<td>Quiz response rate</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>44%</td>
<td>34%</td>
<td>36%</td>
<td>33%</td>
</tr>
<tr>
<td>Total CMB posts</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>12.2</td>
<td>22.0</td>
<td>19.4</td>
<td>37.5</td>
</tr>
<tr>
<td>Total app screen views</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td>189</td>
<td>183</td>
<td>328</td>
<td>349</td>
</tr>
</tbody>
</table>
Who Uses the CMB?

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Odds Ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, non-Hispanic</td>
<td>0.20 (0.05-0.84)</td>
<td>0.028*</td>
</tr>
<tr>
<td>Private Insurance</td>
<td>0.07 (0.01-0.41)</td>
<td>0.003*</td>
</tr>
<tr>
<td>Unsuppressed VL (VL&gt;50)</td>
<td>5.13 (1.13-23.30)</td>
<td>0.034*</td>
</tr>
</tbody>
</table>

Non-white, uninsured PLWH who have *detectable* viral loads are statistically most likely to post on the community message board. Literacy level, socioeconomic status, and HIV risk factor were not significant predictors.

Social Support on the CMB

Distribution of CMB Posts Seeking and Providing Support

Hey [X] ... it will make you feel better to talk to someone close to you. I had to do the same it was hard but once I got it out I felt better.

Flickinger, Debolt et al. AIDS and Behavior Nov. 2016
Participation in PL Improved Engagement in Care

HRSA-1: % With at least 2 visits separated by 90 days within one year

Visit Constancy (per 4 month period)

- No visits
- 1 visit
- 2 visits
- 3 visits

P<0.001 (McNemar’s)
The **Positive Links Program** resulted in significant *increases* in CD4 count (top) and in HIV viral load suppression (bottom) over one year of follow-up. (n=56)
PL Recipe for Warm Technology

• Design Strategies
  • Secure!
  • Evidence-based
  • User-based design and participant ownership
  • Anticipated low literacy
  • Rigorous Evaluation

• Main Features
  • Coordination of Care
  • Self-monitoring
  • Social Support
I don’t know if many of you realize it, but each and every one of us who uses this app is making a difference in someone else’s life battling every day of this new journey... We all are making a difference together one day, one app, and one click at a time.

(PL Participant)
What is PositiveLinks?

PositiveLinks is a clinic-centered engagement in care program that employs a tailored smartphone app with an embedded private social network to support people living with HIV and their care goals.

WATCH THIS SPACE:
https://www.positivelinks4ric.com/
Next Steps and Challenges

- Development of Provider App
- Co-deployment with telemedicine care
- Translation
- Document upload
- Replication/Adaptation

- Keeping it fresh
- Preserving the feel and functionality
- Scaling
- Evaluation at Scale
- Sustainability
Questions? Suggestions? Comments?

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WATCH THIS SPACE:
https://www.positivelinks4ric.com/
# Economic Analysis

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of clients seen</th>
<th>Cost analysis (Societal perspective)</th>
<th>Cost per client (Societal perspective)</th>
<th>Cost-saving threshold</th>
<th>Cost-effective threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Virginia (UVA) (12 months)</td>
<td>54 clients 33,216 contacts</td>
<td>$170,635</td>
<td>$3,160</td>
<td>0.48 transmissions</td>
<td>1.71 QALYs</td>
</tr>
<tr>
<td>The Open Door (12 months)</td>
<td>27 clients 405 contacts</td>
<td>$47,919</td>
<td>$1,775</td>
<td>0.14 transmissions</td>
<td>0.48 QALYs</td>
</tr>
<tr>
<td>Christie’s Place (6 months)</td>
<td>103 clients 2,696 contacts</td>
<td>$162,620</td>
<td>$1,579</td>
<td>0.45 transmissions</td>
<td>1.63 QALYs</td>
</tr>
</tbody>
</table>