IS THE INVESTMENT OF DEVELOPING A SMARTPHONE APPLICATION BASED INTERVENTION PROMOTING HPV VACCINE UPTAKE AND COMPLETION AMONG YOUNG ADULT, AFRICAN AMERICAN WOMEN WORTHWHILE? FEASIBILITY ASSESSMENTS OF AN INTERNET COMMUNITY COMPARED TO AN EMERGENCY DEPARTMENT BASED POPULATION

OVERVIEW

1. Significance of HPV disease to public health
2. Cost of building a smartphone application
3. Cost benefit analysis of building a smartphone application for sexually transmitted disease prevention
4. Study findings assessing the willingness of the target population to engage in a smartphone application based prevention intervention
5. Evaluation of whether the investment in smartphone technology for research purposes is worthwhile

Significance of HPV disease to public health

- Disproportionate burden of disease to African American women
  - African American women with a human papillomavirus (HPV) infection develop cervical cancer 20% more than Caucasian American women [1-5]
- Disproportionate burden of disease to adolescents/young adults
  - Genital HPV infects 90% of adolescents and young adults, contributing to 20 million new cases annually in the US [6]
  - 74% (4.6 million of 6.2 million) of new HPV cases were among youth (15-24 years) who account for 48% of sexually transmitted infections (STI) [7-9]
- Higher morbidity/mortality among African American women
  - two times more likely to die from cervical cancer than Caucasian women [1-5]
  - have the highest national HPV rates among young adults [10]
  - 2 times more likely to develop cervical cancer amidst an HPV infection than their Caucasian female, young adult counterparts [1-4]

Available funding mechanisms

- Inter-institutional pilot awards
  - $30–$50K annually
- NIH level pilot awards
  - R03 (pilot/feasibility award): $100K over 2 years
  - R21 (high risk research award): $275K over 2 years

Cost of building a smartphone application

- Average app developer in US: $100/hour
- Average cost to develop an app:
  - Small apps: $3K–$8K
  - More complex and recognized brand apps: $50K - $150K
  - iPad app: $12K–$150K or more
- Given the goal of the research, which is to develop a culturally sensitive, interactive application, the cost is expected to be $50K/year for the app alone
Majority of funding mechanisms are not enough to cover all funding associated areas:

- **Direct Costs**
  - Personnel
  - Travel
  - Resources (app development) and other supplies

- **Indirect Costs**
  - Office space
  - Equipment – laptops, paper, copies, etc.

Cost benefit analysis - Costs

- Costs:
  - Building the application: $50K-$150K + associated research costs
  - Health care associated costs per patient of cervical cancer care/treatment per year among Medicaid beneficiaries younger than 65 years of age:
    - At 6 months: $3,807, $23,187, $35,853, and $45,028 for in situ, local, regional, and distant cancers, respectively.
    - Incremental costs: $13,935 and $26,174 for local and regional cancers
    - At 12 months: $15,868 and $30,917

Limitations presented by funding mechanisms

- Cross sectional, observational pilot study
- N=41 young adult, African American women ages 18-26 years
- Setting:
  - Online (n=22)
  - Local Emergency Department (n=19)
- Survey composed of 30 questions
- Variables assessed included:
  - Demographics
  - Sexually based
  - Smartphone based
  - HPV knowledge based

Cost benefit analysis - Benefits

- Does the potential benefit of building a smartphone application for sexually transmitted disease prevention justify the cost?
  - Potential benefits:
    - Changes to the epidemic:
      - Significant decrease in the transmission of HPV to uninfected persons
      - Significant decrease in new cervical cancer cases among African American women
      - Significant decrease in mortality caused by cervical cancer among African American women
    - Changes to research modalities:
      - Ability to capture layered information in a person’s life ‘real-time’
    - The ability to motivate and influence health behavior change

Table 1: Frequency Analysis of Demographic Variables (N=40)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories of Variable</th>
<th>Total (N=40)</th>
<th>Urban (N=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18-20 years</td>
<td>19 (48.7)</td>
<td>8 (80.0)</td>
</tr>
<tr>
<td></td>
<td>21-24 years</td>
<td>12 (30.0)</td>
<td>3 (30.0)</td>
</tr>
<tr>
<td></td>
<td>25-29 years</td>
<td>9 (22.5)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Income</td>
<td>Less than $1,000</td>
<td>13 (32.5)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td></td>
<td>$1,001-$2,000</td>
<td>13 (32.5)</td>
<td>5 (50.0)</td>
</tr>
<tr>
<td></td>
<td>$2,001-$3,000</td>
<td>6 (15.0)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td></td>
<td>$3,001-$4,000</td>
<td>5 (12.5)</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td></td>
<td>$4,001 and over</td>
<td>3 (7.5)</td>
<td>1 (10.0)</td>
</tr>
<tr>
<td>Education</td>
<td>Less than high school</td>
<td>13 (32.5)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td></td>
<td>High school or GED</td>
<td>11 (27.5)</td>
<td>3 (30.0)</td>
</tr>
<tr>
<td></td>
<td>Some college or college</td>
<td>13 (32.5)</td>
<td>4 (40.0)</td>
</tr>
<tr>
<td></td>
<td>Graduate school</td>
<td>3 (7.5)</td>
<td>1 (10.0)</td>
</tr>
</tbody>
</table>

Feasibility Study

- A Smartphone application based intervention promoting HPV vaccine uptake and completion among young adult, African American women

Table 1: Frequency Analysis of Demographic Variables (N=40)
Table 1: Frequency Analysis of Demographic Variables (N=40) continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories of Variable</th>
<th>Total N (%)</th>
<th>Total (N%) Emergency Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual preference</td>
<td>Women</td>
<td>20 (50)</td>
<td>0 (0) 20 (50)</td>
</tr>
<tr>
<td></td>
<td>Men</td>
<td>20 (50)</td>
<td>19 (75) 1 (25)</td>
</tr>
<tr>
<td>Contraception use</td>
<td>Yes</td>
<td>7 (17.5)</td>
<td>4 (21.1) 3 (78.9)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>33 (82.5)</td>
<td>15 (84.8) 8 (15.2)</td>
</tr>
</tbody>
</table>

Summary of research populations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Online Community</th>
<th>Emergency Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at sexual debut</td>
<td>18 years (45%)</td>
<td>16 years (50%)</td>
</tr>
<tr>
<td>Existing health insurance coverage</td>
<td>Priv/Medicaid (45.2%)</td>
<td>Med/Medicaid (47.9%)</td>
</tr>
<tr>
<td>No source of income</td>
<td>9.3%</td>
<td>26.3%</td>
</tr>
<tr>
<td>Previously had a sexually transmitted infection</td>
<td>10%</td>
<td>43.5%</td>
</tr>
<tr>
<td>Lacked a consistent sexual partner</td>
<td>67.6%</td>
<td>32.4%</td>
</tr>
<tr>
<td>Reported two sexual partners</td>
<td>11.2%</td>
<td>31.6%</td>
</tr>
<tr>
<td>Reported receipt of the HPV vaccine</td>
<td>11.2%</td>
<td>21.1%</td>
</tr>
<tr>
<td>Belief that HPV can be transmitted via skin-to-skin contact in the genital area</td>
<td>57.4%</td>
<td>35.5%</td>
</tr>
<tr>
<td>Belief that a smartphone based intervention would be effective at improving HPV vaccine uptake</td>
<td>67.7%</td>
<td>47.4%</td>
</tr>
</tbody>
</table>

Table 2: Bivariate Analysis on willingness to participate in a Smartphone based intervention

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Stratification</th>
<th>Online</th>
<th>Emergency Department</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort with HPV messages on mobile phone</td>
<td>Not comfortable</td>
<td>3.75</td>
<td>2.75</td>
<td>0.036*</td>
</tr>
<tr>
<td></td>
<td>A little more comfortable</td>
<td>3.75</td>
<td>2.75</td>
<td>0.036*</td>
</tr>
<tr>
<td></td>
<td>Somewhat more comfortable</td>
<td>3.75</td>
<td>2.75</td>
<td>0.036*</td>
</tr>
<tr>
<td></td>
<td>More comfortable</td>
<td>3.75</td>
<td>2.75</td>
<td>0.036*</td>
</tr>
<tr>
<td></td>
<td>Much more comfortable</td>
<td>3.75</td>
<td>2.75</td>
<td>0.036*</td>
</tr>
</tbody>
</table>

Discussion

- Significant differences among emergency department participants:
  - Comfort with HPV messages on mobile phone
  - Participants who received the HPV vaccine
  - Use of contraception

Based upon costs and research findings...
The investment is worthwhile because…

- Innovative:
  - Behavioral science is need of relevant methods to reach populations most adversely affected by STI related epidemics.
- Ease of Use:
  - Members of the target population readily have access to the intervention instrument – smartphones.
- Reasonable costs:
  - Costs of development via a funding mechanism is feasible if employing an app developer as part of the research team at a percent effort.
- Realism surrounding potential for behavior change:
  - The ability to exchange information in ‘real time’ creates utility of the ‘teachable moment’, whereby, the transfer of information designed to inform sexual decisions is promptly assessed.