A Multi-Level Gaming Adherence Intervention for HIV+ Youth

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Overview

• This project developed and tested the preliminary efficacy of an iPhone gaming intervention to improve adherence to ART

• An electronic, portable medication dispenser measures adherence and guides game related text messages
Background

• Youth living with HIV (YLWH) poor rates of retention in care and youth are more at risk than adults for being lost to follow-up

• Studies show that adherence to ARV ranges from 50-75% among YLWH, and higher adherence is needed for optimal health outcomes
Background

Advantages to using a Mobile Game:

• > 90% of those 15-24 yrs own a mobile phone
• More than half of all video gaming occurs on portable devices
• A unique opportunity to deliver health education during leisure time, outside of the clinic, cost effective, scalable.
Background

- Games have been shown to be efficacious with youth in:
  - Promoting fitness
  - Improving weight management
  - Improving safer sex skills
  - Improve self-management skills for coping with chronic diseases in youth such as asthma, diabetes, and cancer

(65,66,67,68,69)
Qualitative Feedback

30 YLWH (20 from Rhode Island; 10 from Mississippi)

- Desire to enhance future orientation, improve perceived social support, increase personal relevance of HIV care, reinforcement positive influences from doctors, partners, and friends
Qualitative Feedback

• Desire to “fight off” or “destroy” HIV in the body with weapons
• Earn points for “taking” or “swallowing” pills
• 7 day pill organizer
• Text messages with gaming graphics to engage gamers in play
BattleViro

choose your character

Vector

ok
BattleViro
BattleViro

Skip
Incoming Message: skin. Our preliminary scans have indicated the presence of mutated flies and dustmites. Destroy all potential threats. 
BattleViro
BattleViro
BattleViro

*Incoming Message:*

The Patient's Vital signs are...
Health Fact:
The liver removes toxins from your body. If damaged by HIV it cannot do its job and these toxins harm other organs. Medication protects the liver.
BattleViro

HINT:
Stand on Healthy brain tissue to Avoid Cryptococcal Storm
BattleViro
BattleViro

It's OK to skip your medicine once in awhile.

1. TRUE
2. FALSE

Alert: The correct answer is FALSE

Skipping your medicine will make the virus stronger.

Incoming Message:
BattleViro

![Image of a smartphone displaying a game interface with mission complete details: Objectives Completed 1000, Virus Destroyed 0, Time Bonus 2790, Pills Collected 550, Level Score 4335, Best Level Score 4335.]
Adherence Related Text Messages

Get back in battle! Take your dose 💪💪💪
RCT Phase

RCT was done in Jackson, MS due to high rate of HIV infection and included 61 YLWH.

Examined the preliminary efficacy of BattleViro ($n=31$) compared to a non-HIV related game ($n=30$) on improving:

- Information, motivation, behavioral skills for ART
- Adherence measured by an electronic pill monitoring cap (Wisepill)
- Plasma viral load
### RCT: Demographic Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Sample (n=61)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>22</td>
</tr>
<tr>
<td>Gender - % Male</td>
<td>79%</td>
</tr>
<tr>
<td>Race - % African American</td>
<td>97%</td>
</tr>
<tr>
<td>Sexual Orientation - % Non-heterosexual</td>
<td>74%</td>
</tr>
<tr>
<td>Started ARV in past 3 months - % Yes</td>
<td>36%</td>
</tr>
<tr>
<td>Gaming Status - % Daily or almost daily</td>
<td>36%</td>
</tr>
</tbody>
</table>
RCT Results

• Outcomes were not significantly different between conditions at post test (16 weeks)

• However, effect size differences between conditions indicated sizable improvements for the intervention in HIV-related knowledge ($d=0.50$), ART knowledge ($d=0.42$), and social support ($d=0.62$)
RCT Results (continued)

• **Moderator Analyses**: we explored the interaction between various factors and intervention condition in separate ANCOVAs, controlling for baseline scores. Factors included gender, sexual orientation, age, newly starting ART, and gaming frequency.

• Only time on ART (participants newly starting ART, in last 3 mos) showed interaction effects.
Moderator Results

Those in BattleViro arm experienced a **0.96 log greater decrease in viral load** compared to those in the control (F=4.33, *p*=0.04 for the interaction, entire sample)

![Log Viral Load by Intervention Condition by Newly Starting ART](image)
RCT Results (continued)

Those newly starting ART in BattleViro condition had **Better adherence as measured by Wisepill**, than those in control

At posttest adherence in Battle Viro was 71% compared to 48% in control ($d=1.18,; F=3.20, p=0.05$ for the interaction)
**WISEPILL ADHERENCE (PAST 7-DAY) BY INTERVENTION CONDITION BY NEWLY STARTING ART**

- **New to ARV and Received Battle Viro Game**
- **New to ARV and Received Control Game**
- **Not new to ARV and Received Battle Viro Game**
- **Not new to ARV and Received Control Game**
RCT Results (continued)

Among those newly starting ART, BattleViro also demonstrated improved:

- HIV-related knowledge (effect size difference of 0.90)
- ART-related knowledge (effect size difference of 0.72)
Conclusions

These findings suggest that the intervention was most effective with those new to ART:

- Decreasing Viral load
- Sustaining medication adherence
- Improving HIV knowledge, ART knowledge

A larger trial is needed to verify and further explore these findings.
Discussion

So, why was the game most effective for those newly starting ART?

• Clinical period of ART initiation could be a critical teachable moment
• Opportunity to build initial skills and maintain skills, rather than correcting sub-optimal adherence
• Fighting off HIV (gamification) could be empowering for a group adjusting to new diagnosis
• Barriers for those new to ART may be easier to intervene upon using a game (e.g. HIV/ART knowledge may be learned in a game and most needed for those newly starting ART).

Our data suggests that building motivation and knowledge for self-care at this early transition point can be leveraged to increase the effectiveness of adherence interventions for YLWH
Thank you:
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