



Development of a Computer-Based Tailored Information Application to Improve HIV-Related Treatment Adherence

RL Ownby, D Waldrop-Valverde, A Acevedo,
RJ Jacobs, J Caballero

Nova Southeastern University, Fort Lauderdale FL
Emory University, Atlanta GA

Medication adherence in HIV

- Adherence needed to suppress viral replication = 80-95%
- Typical adherence = 60-70%
- Viral suppression → decreased risk of infecting others
- Viral suppression → better clinical outcomes

Health literacy

- Knowledge, abilities, and skills required to attain a desired state of health
- Related to multiple clinical variables
 - Disease control (diabetes)
 - Hospitalization (Medicare data)
 - Death (Medicare data)
 - Medication adherence (HIV)

IMB Model

- **I**nformation: How meds work, how to cope with side effects
- **M**otivation: Social support, depression, stigma, side effects
- **B**ehavioral Skills: How to remember to take medications, cope with obstacles

Goal

- Improve patients' health literacy as a way to improve their medication adherence
- How to improve health literacy?
 - Target elements of the IMB model
- Availability and clinician time?
 - A touch screen computer delivered tailored information intervention

Tailored Information & Interactivity

- Personalization
- Individualized feedback
- Enhanced perceived relevance
- Increased impact on patient behavior
- Interaction via teaching and questions
- Reviews as needed provided by the computer program

Development

- Content review
 - Patient information, popular books
- Multidisciplinary team
 - Medicine
 - Psychology
 - Pharmacy
 - Nursing
 - Social Work
- Usability and content testing with users

The intervention

HERE'S AN OVERVIEW OF THE PROGRAM:

The Basics

- Red and white blood cells
- The immune system

HIV

- The virus and how it affects your body
- What happens when you get HIV?

Medicines

- How medicines work
- Ways to remember to take your medicines

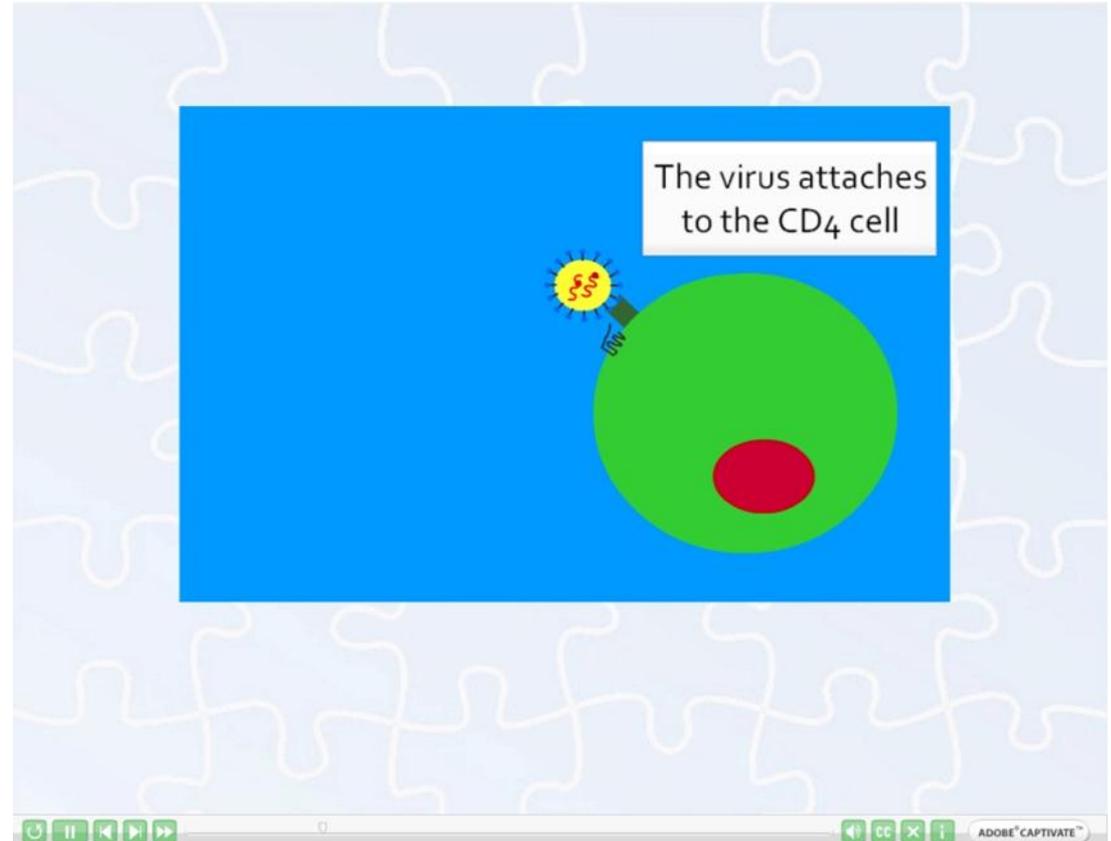
Go Back

Continue

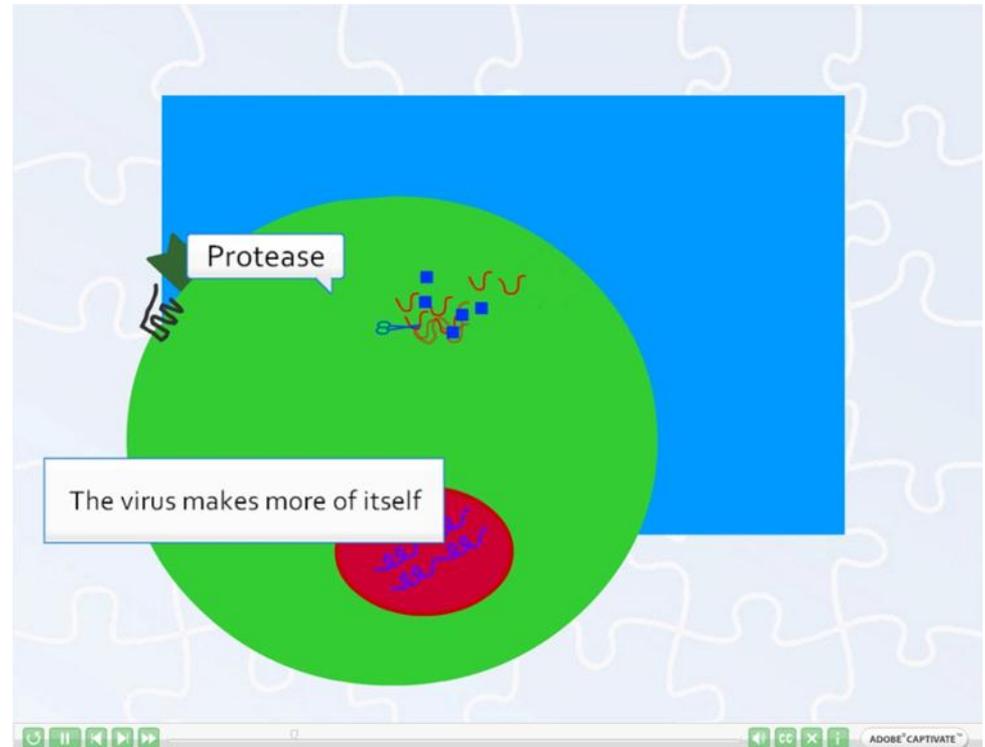


ADOBE CAPTIVATE™

- A Flash animation provides a preliminary overview of the virus life cycle



- The animation emphasizes specific stages in the viral life cycle
- These stages are later reviewed in discussion of how medications work



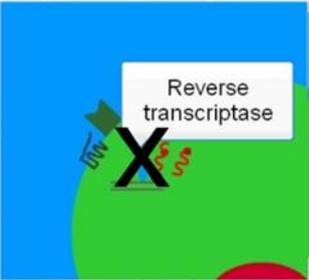
- A key aspect of the intervention is interactivity
- Participant learning is assessed with questions
- If needed, program content is automatically retaught

Medicines that block the virus from making new copies of its RNA are:

- A) Co-receptor blockers
- B) Integrase inhibitors
- C) Protease inhibitors
- D) Reverse transcriptase inhibitors

Question 9 of 18

Clear Check



The diagram shows a green virus particle with a red base and a black 'X' over its RNA. A white box labeled 'Reverse transcriptase' is positioned above the virus, with a green arrow pointing towards the virus. The background is blue and green.



The key to staying well if you have HIV is to get the treatment you need.

The doctor can tell you what medicines you need by finding out two things:

(1) The doctor needs to know how many CD4 or T cells you have.

(2) He or she needs to know how much virus is in your blood.

You need a blood test to find out these things.

Go Back

Continue



How You Feel

Sometimes people feel very bad about having HIV. They think that they got it because they were bad. They feel guilty. If you feel this way, it may make you feel like you shouldn't get treatment.

If you feel this way, talk to someone. Someone at the clinic, or a friend may help you feel better. ***Talking about how you feel can help you feel better.***



Go Back

Continue



You have to be very good at taking your medicine if you want to stay healthy.

Studies show that people who take their medicine almost all of the time are more likely to have undetectable viral loads.

When the viral load is very low, most people feel good and can get on with their lives.



You can only miss one or two doses, just like on this calendar.



Go Back

Continue



ADOBE® CAPTIVATE™

MEMS

- **Medication Event Monitoring System**



- Adherence indices
 - Taken (e.g., 30 pills in 30 days)
 - Correct (e.g., 1 pill/24 hours)
 - Scheduled (e.g., +/- 2 hours)



Design

- Three visits:
 - 1: Baseline
 - 2: Intervention, 30 days later
 - 3: Post intervention, 30 days after intervention
- Enrolled = 124; completed = 118
- 29% women and 71% men
- 64% black and 36% white
- 37% 11th grade education or less
- 36% High school or GED

Sample (n = 124)

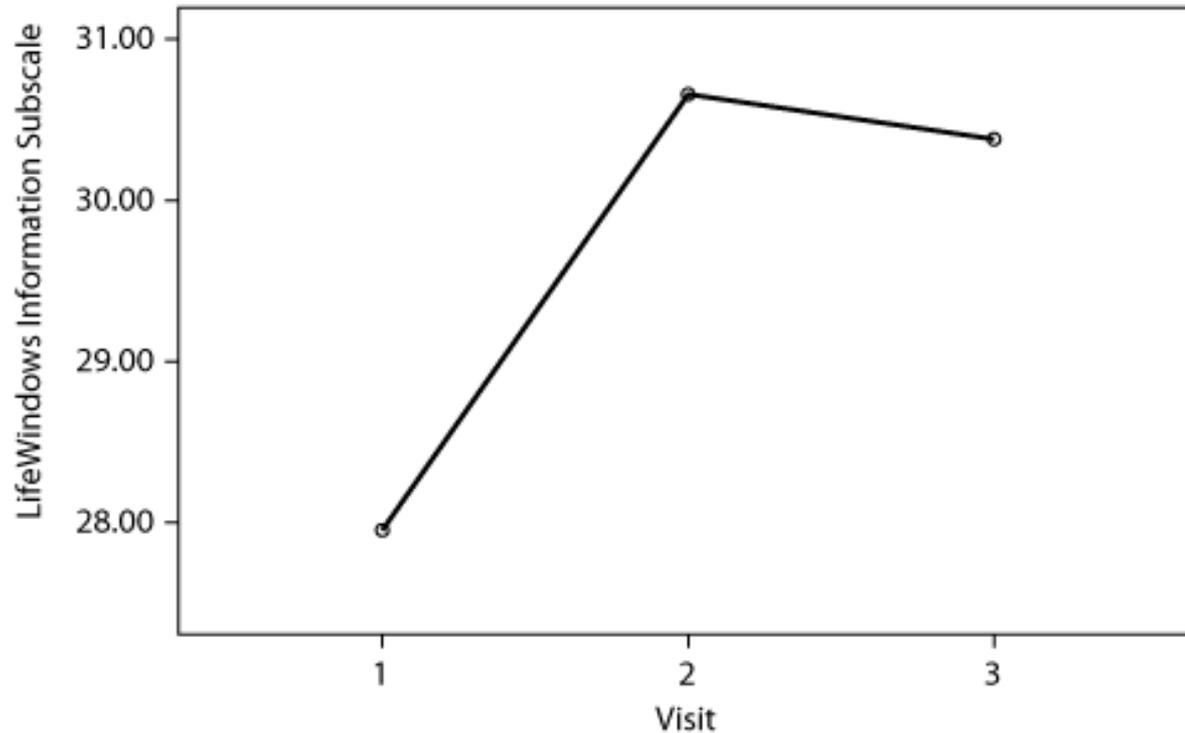
	Mean	SD
Age in Years	47.10	8.69
CD4	501.03	289.29
HIV Meds Doses/Day	2.83	1.50
Other Meds Doses/Day	2.60	2.54
All Meds Doses/Day	5.43	3.32
Years Since Diagnosis	15.64	7.92
Years of Treatment	11.70	7.24

User ratings of the Intervention

	Mean	SD
The program taught me new information	5.45	1.114
The program helped me understand why taking my medicines is important	5.58	1.082
The program helped me know what to do about side effects	5.28	1.298
The program helped me work better with my doctor	5.22	1.306
My interaction with the computer program has been clear and understandable.	5.62	.711
Overall, the computer program is easy to use.	5.67	.712
I had fun using the program	5.51	.789
If it were available, I would use the program to learn about another health problem	5.49	.789

Rating scale was 0 (“strongly disagree”) to 6 (“strongly agree”).

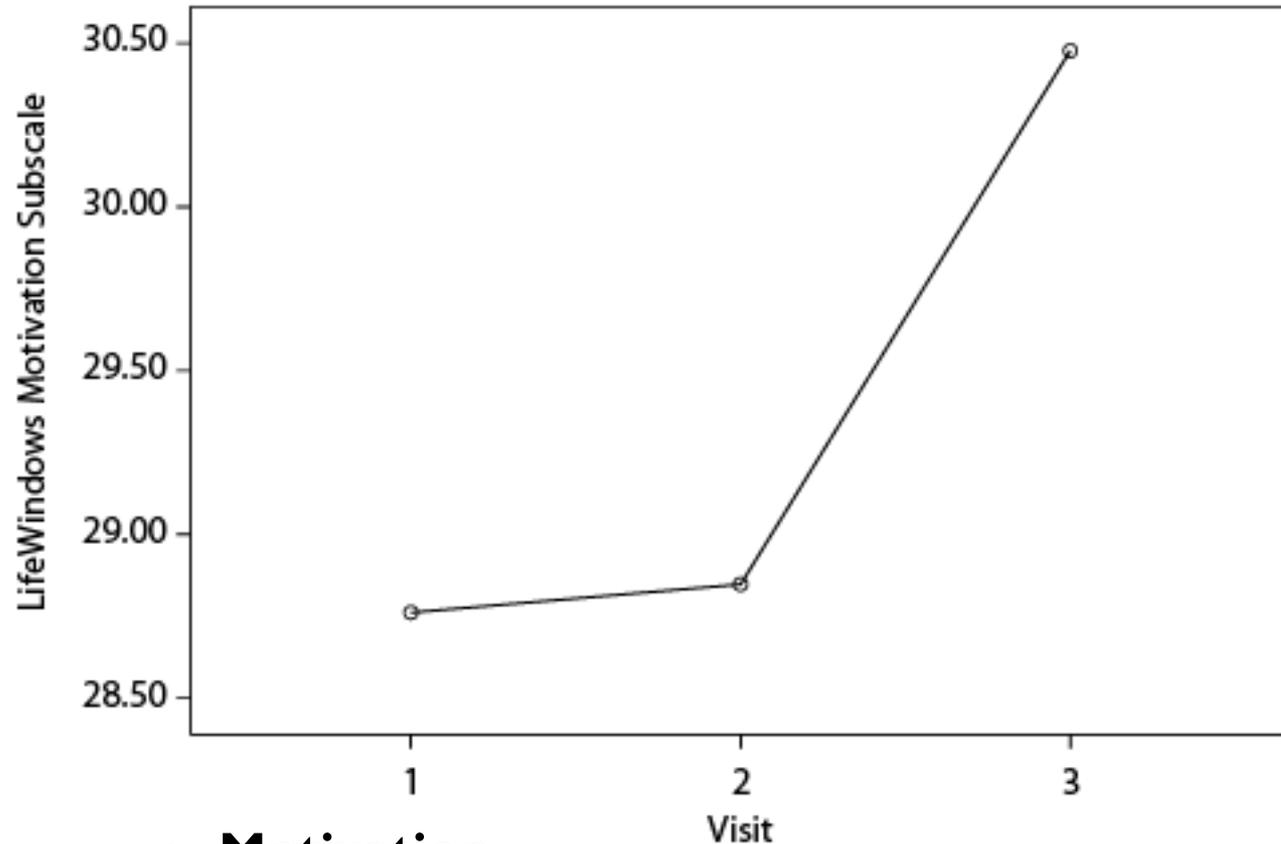
LifeWindows IMB Scale: Information



- **Information**

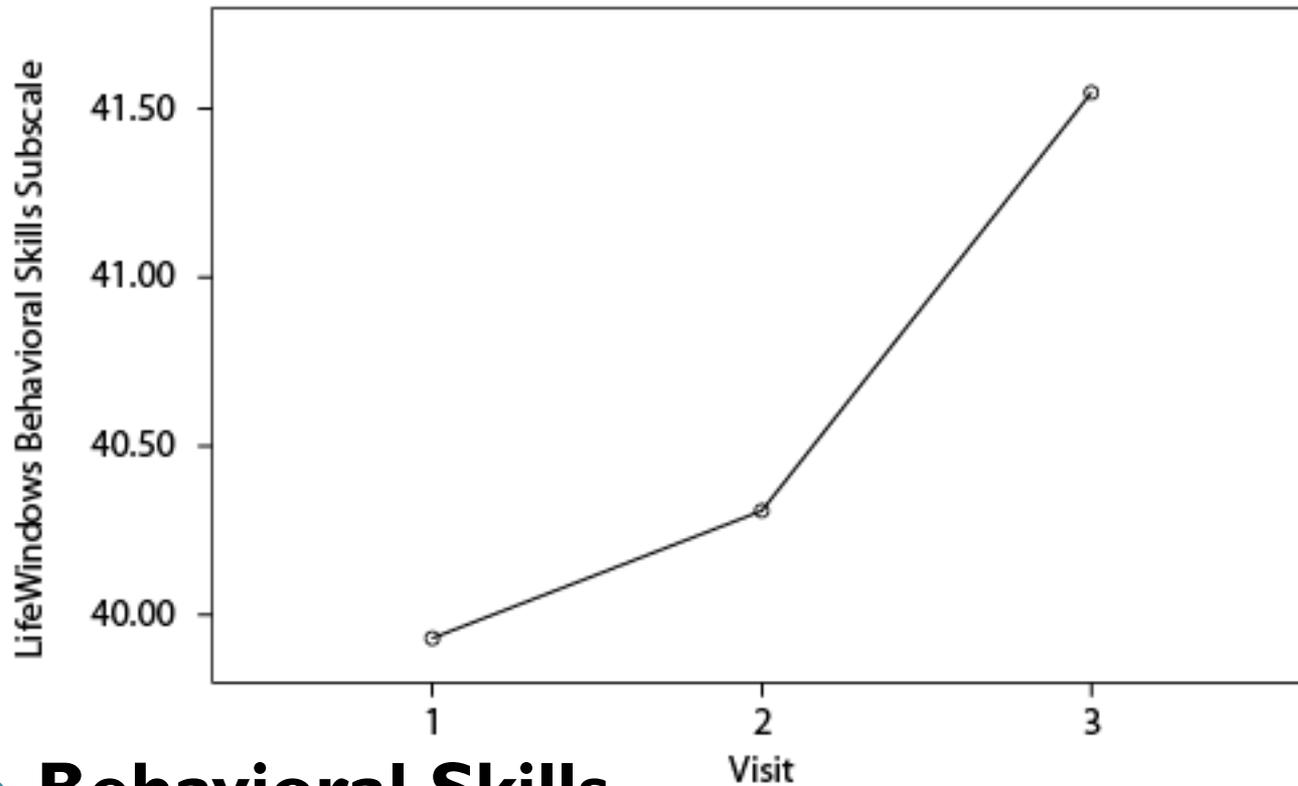
- Repeated Measures ANCOVA
- $F = 7.141, p = 0.001$

IMB Scale: Motivation



- **Motivation**
 - Repeated Measures ANCOVA
 - $F = 0.83, p = 0.44$

IMB Scale: Behavioral Skills



- **Behavioral Skills**

- Repeated measures ANCOVA
- $F = 5.10, p = 0.007$

Depression and Self Efficacy

- Significant increase in self-efficacy
 - General health self-efficacy scale
 - E.g., “I am in control of my healthcare”
 - $t = 2.72, p = 0.008$
- Small but nonsignificant decrease in depression
 - Center for Epidemiological Studies – Depression Scale (CES-D)
 - Decrease in mean ~ 2 on CES-D total
 - $t = 1.48, p = 0.14$

Results: Adherence

- Poisson GEE model
- Results for complete sample
 - No change (mean adherence at 83%)
 - MEMS Percent Correct
- Baseline adherence < 85% (n = 35)
 - Chi-square ($df = 1$) = 13.34, $p < 0.001$
 - 59.8% vs. 66.9%

Limitations

- No comparison group
- Small sample
- Many participants with high levels of adherence
- Medium effect sizes suggest need for multiple interventions for optimal adherence

Conclusions

- The computer-based intervention is usable and acceptable to persons treated for HIV infection
 - Positive ratings on multiple dimensions
 - Usable, helpful, fun
 - Spontaneous positive comments
 - “I never understood this before”
 - “No one ever explained this to me before”

Conclusions

- Participation in the intervention is associated with improved
 - Information
 - Behavioral skills
 - Adherence in those with less than 85% baseline adherence
 - Health-related self-efficacy
 - Possibly depression

Future development

- Elements of motivation
 - Depression
 - Stigma
- Cultural and linguistic adaptation
- Transition to mobile application
- Combine with interventions to maintain gains over time

Support:

- Support for this study was provided by grant R21MH086491 to Dr. Ownby from the National Institute of Mental Health.