

# Socially Optimized Learning in Virtual Environments (SOLVE): Developing, Evaluating, and Disseminating A Game HIV Prevention Intervention Nationally Over the Web

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NIAID R01AI052756



NIMH R01MH082671



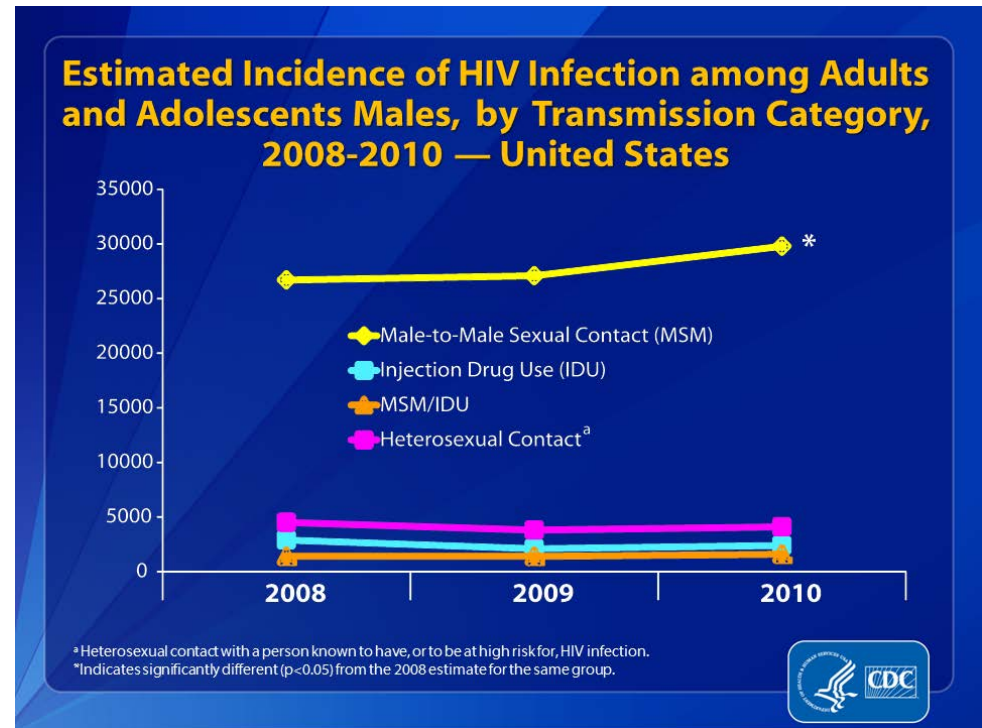
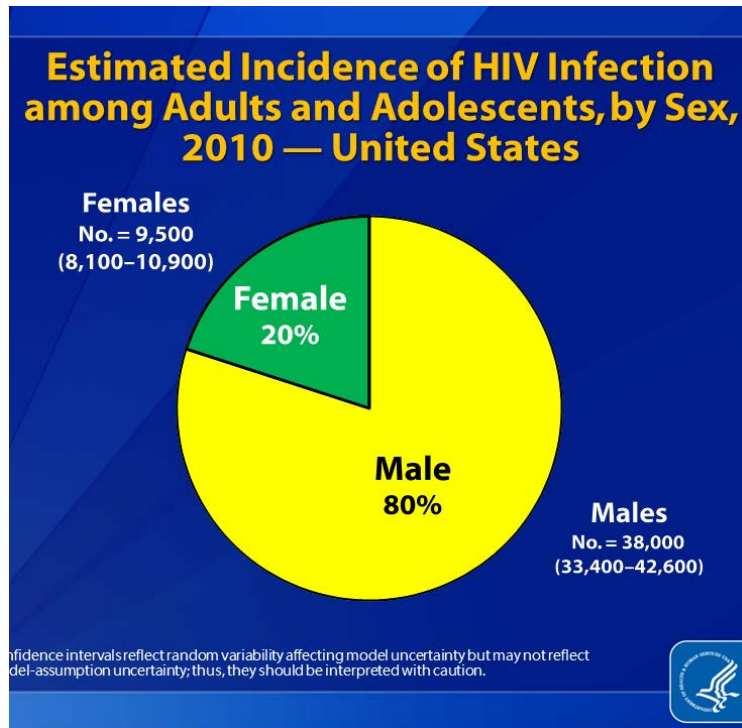
NIDA R01DA031626



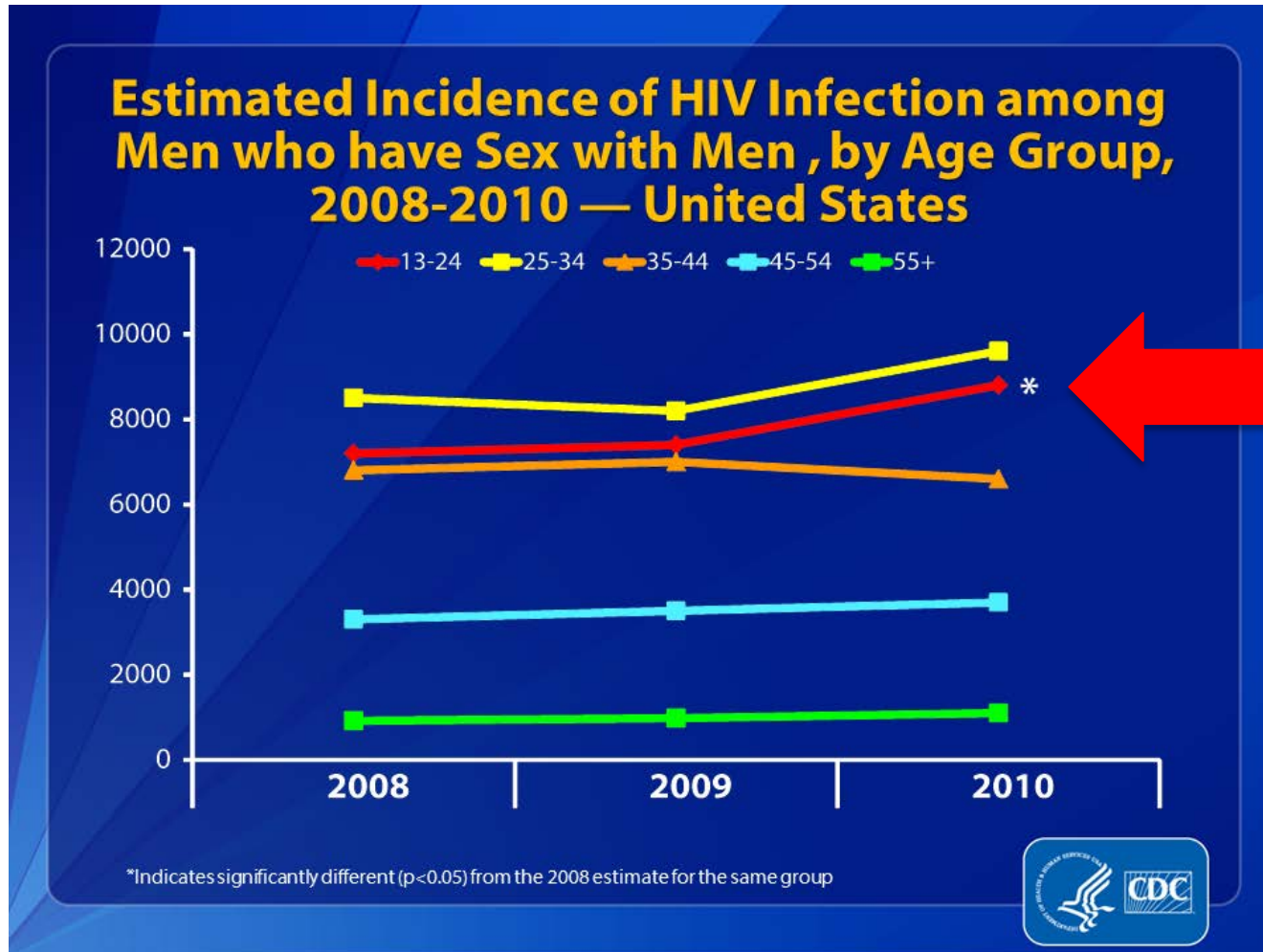
# HIV Incidence In US Still Highest

## Among Men

## Among MSM Among Men



# Incidence Raising Faster Among Youngest MSM

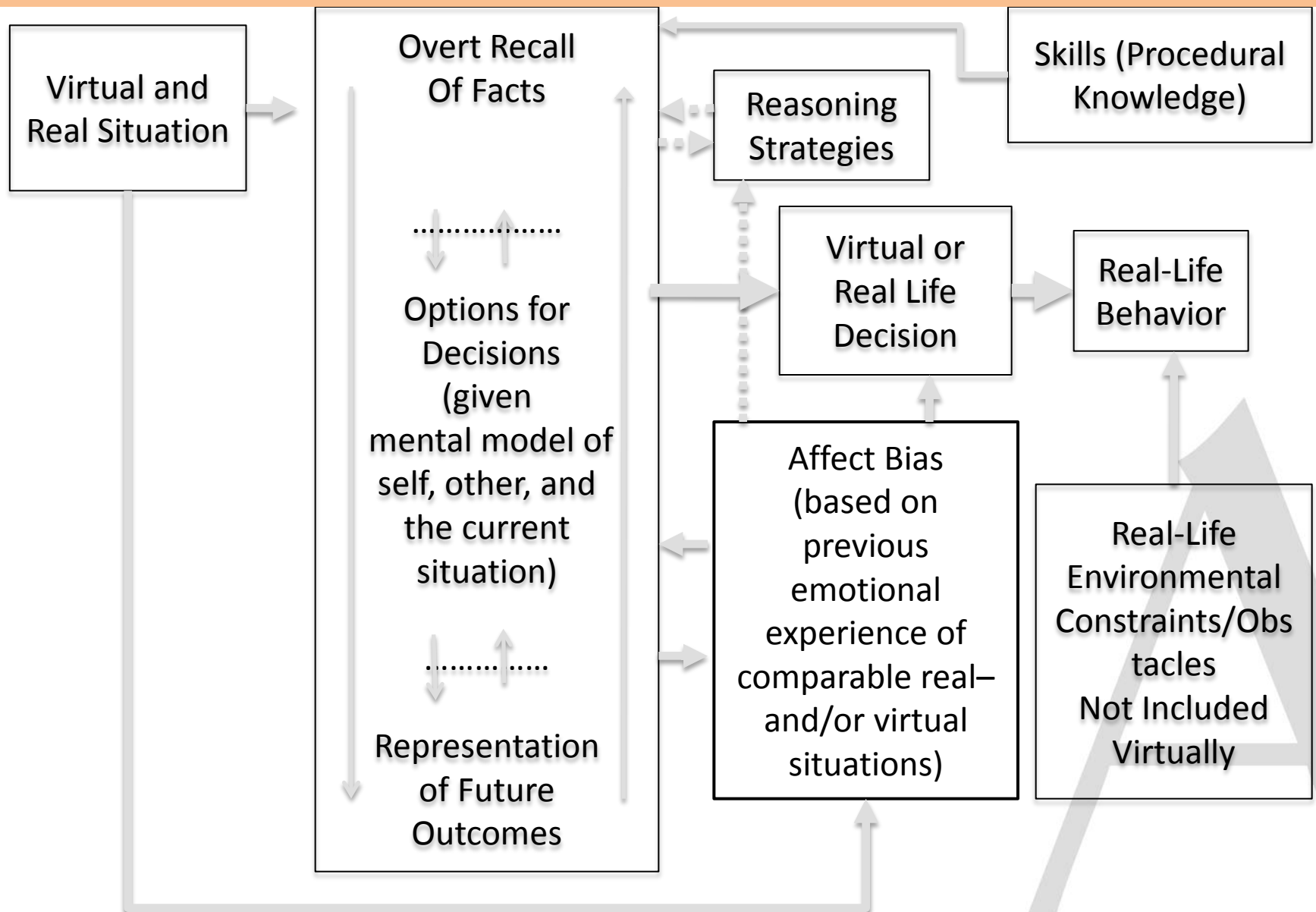


# Younger MSM may have “tuned out” of traditional HIV Prevention interventions

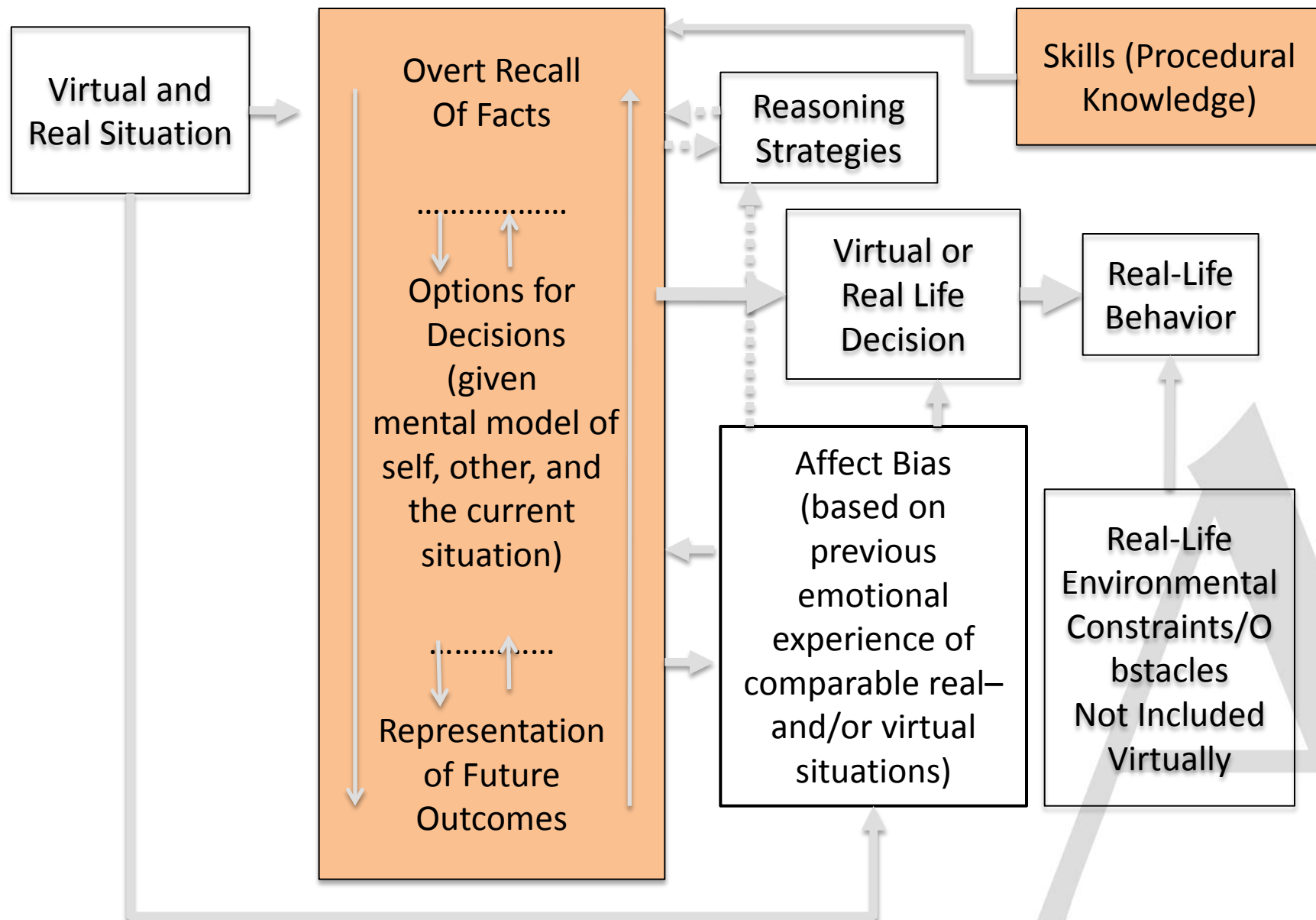
- As CDC noted: ***Need more engaging interventions*** (e.g., interactive media, games).
- **Traditional interventions** focus on changing skills and *deliberative* cognitive processes (e.g., beliefs, norms, intentions, self-efficacy); ***neglect affect*** that may “in the moment” lead to more *automatic* risk-taking despite one’s best intentions.



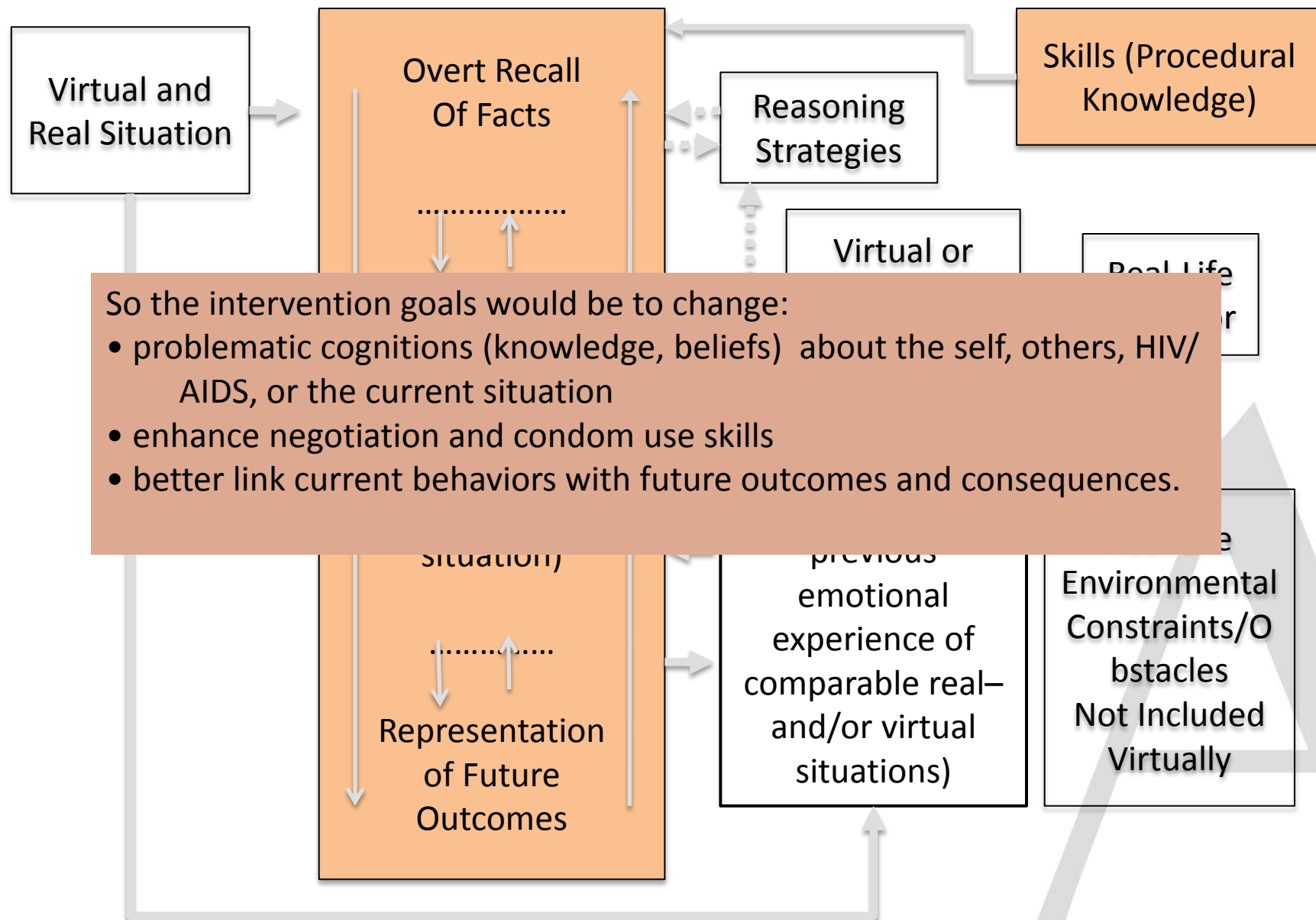
# Based on a Neuroscience Model of Decision-Making



# Like Many Health Theories Cognitions/Skills Matter



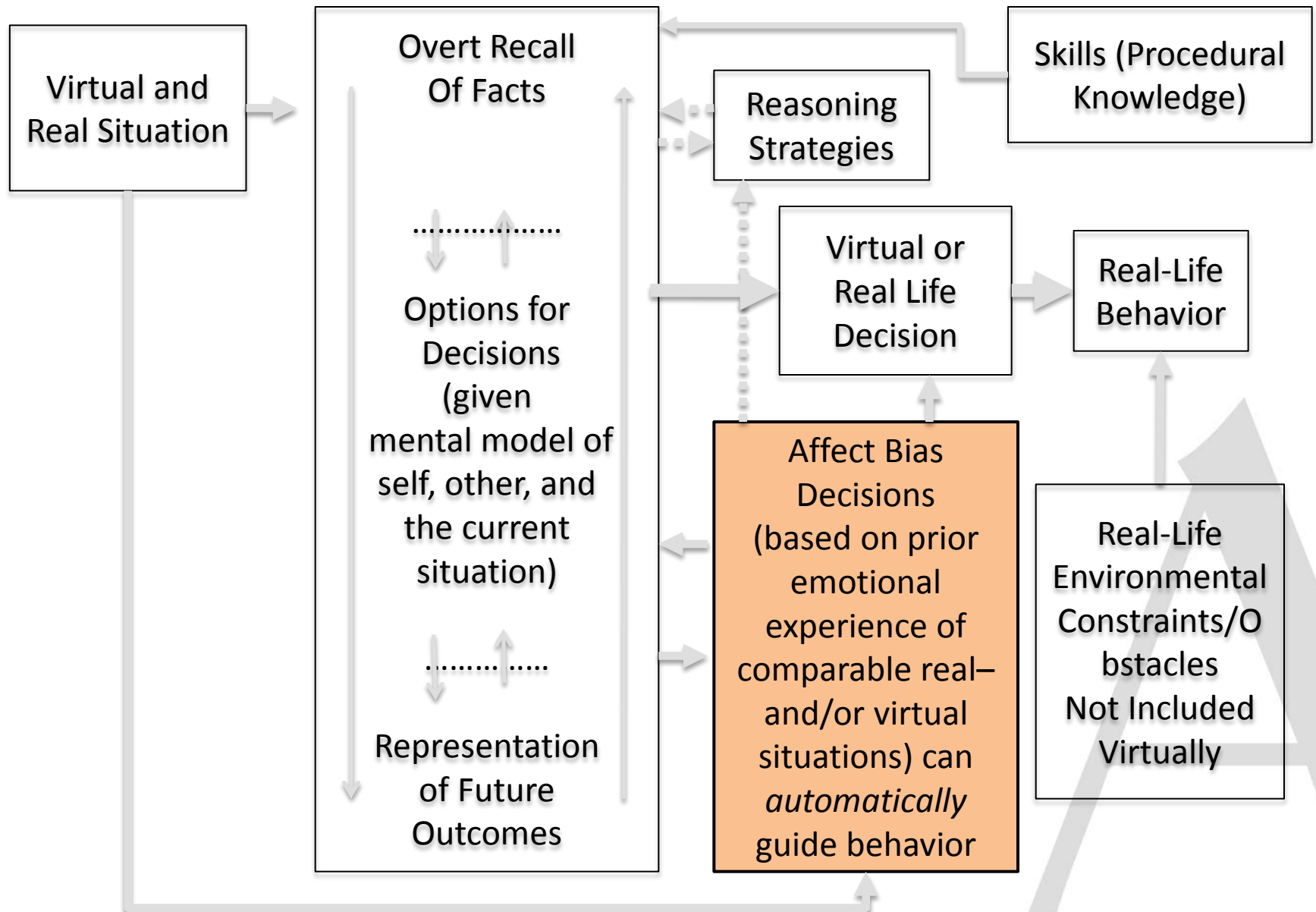
# Like Many Health Theories Cognitions/Skills Matter



So the intervention goals would be to change:

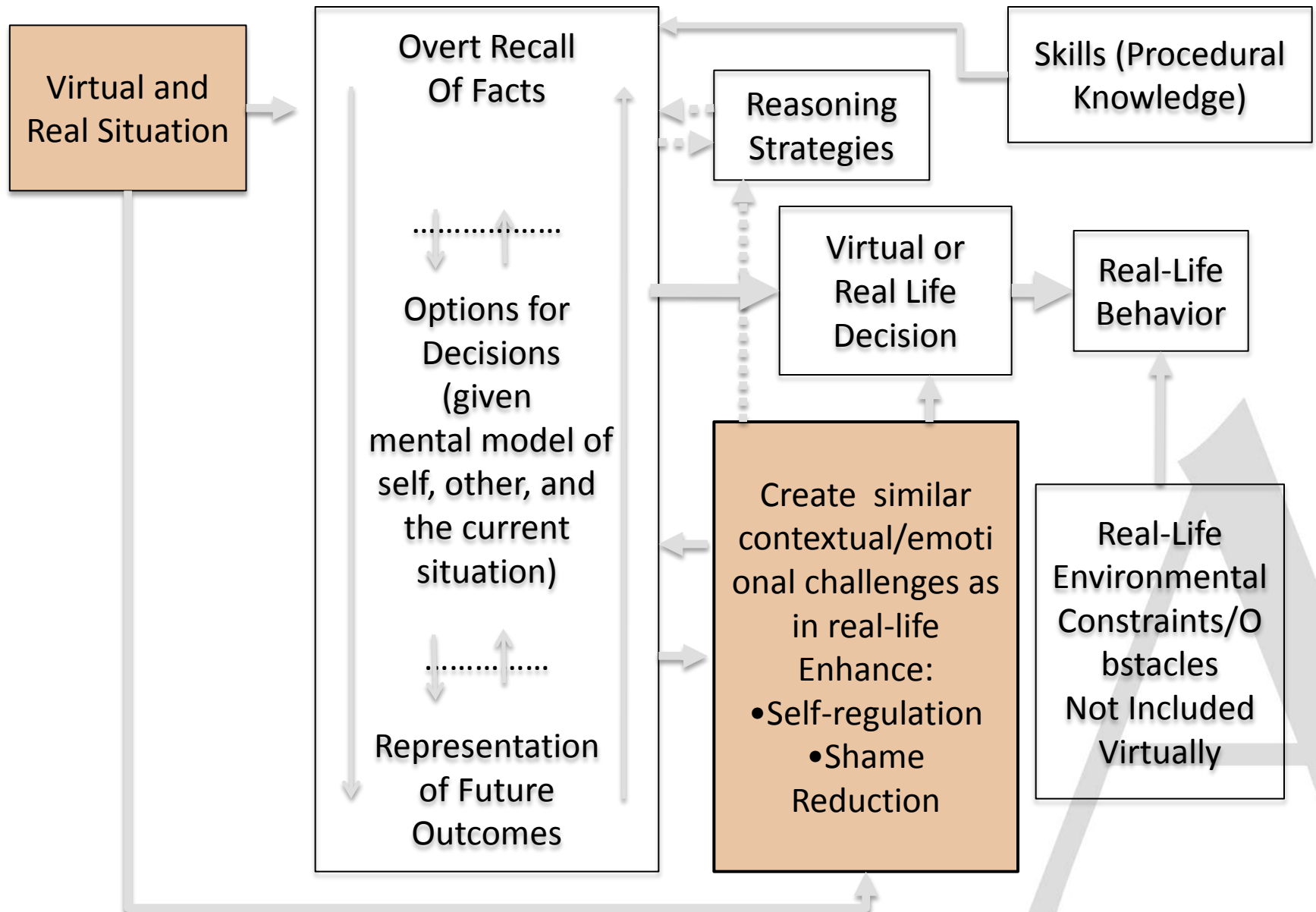
- problematic cognitions (knowledge, beliefs) about the self, others, HIV/AIDS, or the current situation
- enhance negotiation and condom use skills
- better link current behaviors with future outcomes and consequences.

# Unlike Many Health Theories Emotion Matters Too





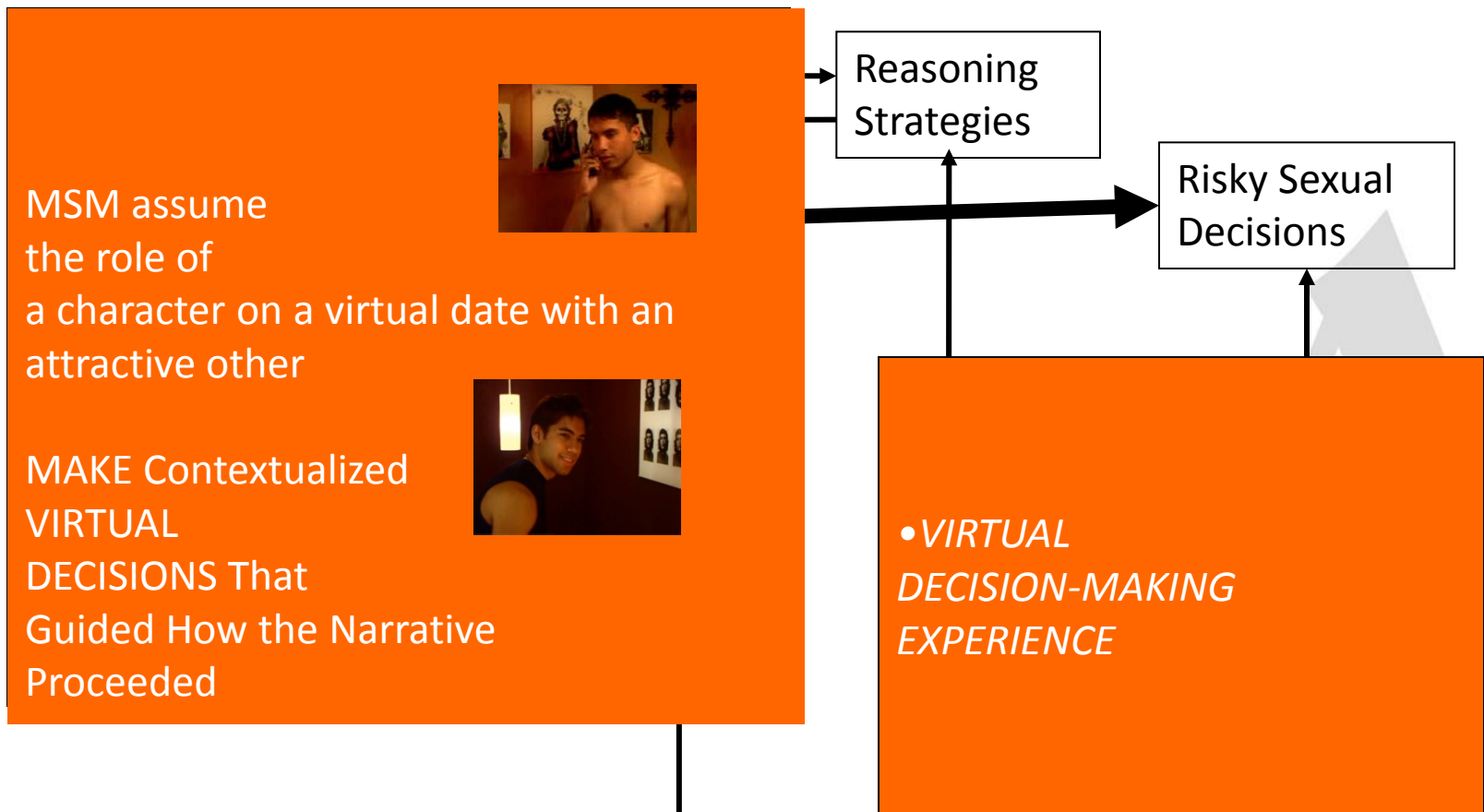
# Unique Goal: Create Sex Positive Intervention



# Why Unaddressed Shame Might Matter

- Men who have sex with men (MSM) often face *socially sanctioned disapproval of sexual deviance* from the heterosexual “normal.”
- Such *sexual stigma* can be internalized producing a painful affective state (i.e., *shame*).
- Although shame (e.g., due to addiction) can predict risk-taking (e.g., alcohol abuse), *sexual shame’s link to sexual risk-taking is unclear*.
- *Sexual shame likely to be activated* when MSM desire another man (but beliefs tell them that they shouldn’t) – *may often be immediately before deciding/not to use a condom*.
- Socially Optimized Learning in Virtual Environments (SOLVE) is an interactive game that was designed to reduce MSM’s sexual shame.

# In Earlier Work, We Developed Interactive Videos (IAV) for Latino, White, and Black Young (18-30) MSM



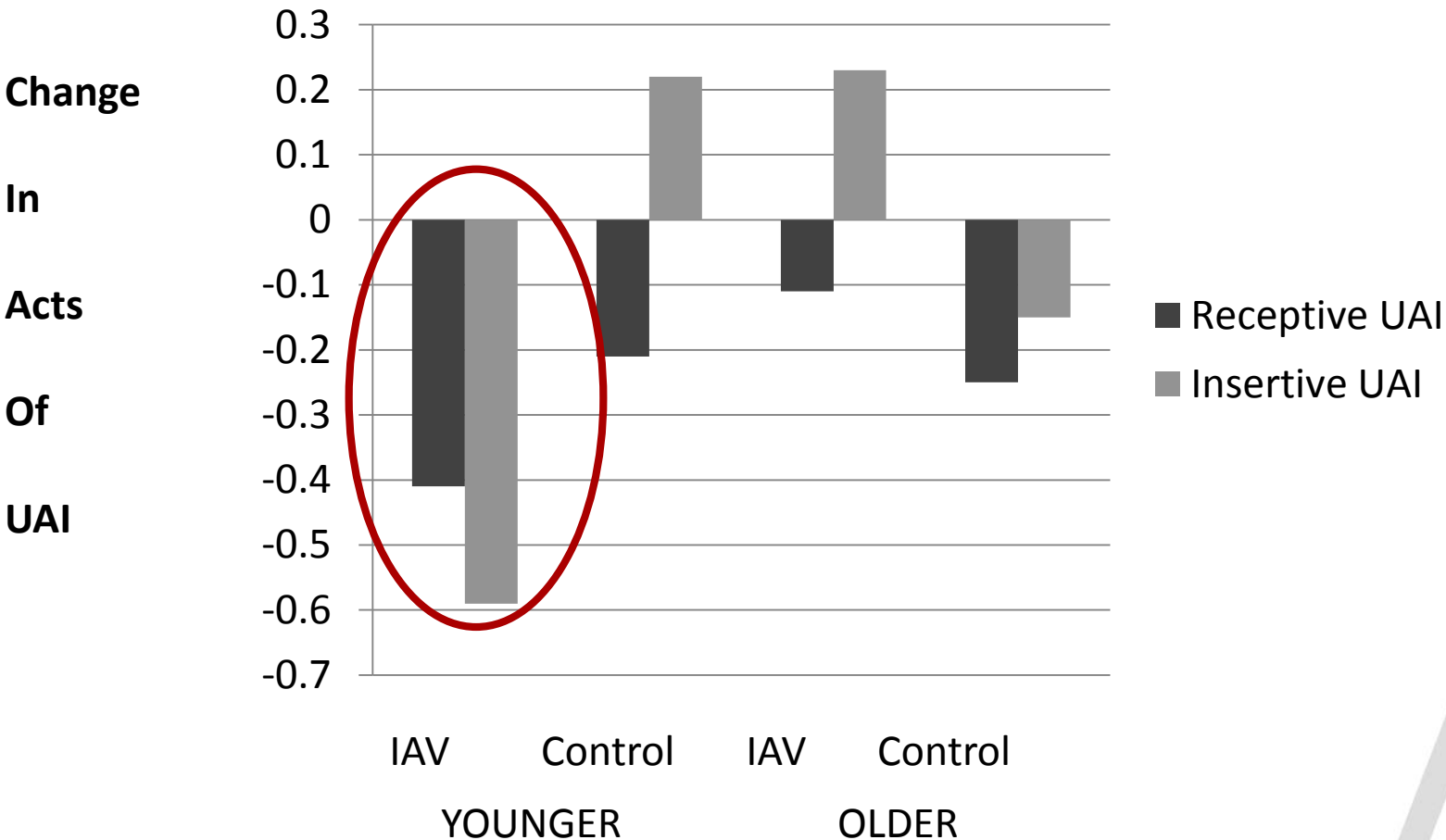
# SOLVE Interactive Video

*Ethnically matched **Virtual** Guides and Models (instead of face-to-face ones) in 3 separately developed IAV for each of three groups of MSM*

*Guides “Pop up” and guide user into safer choices when user makes a risky choice...*



# NIAID Results- Significant UAI *ACT REDUCTION* over 3-Months in IAV vs. Control, Only 18-24 Year Old MSM



A significant between-subjects interaction between age and condition,  $F(1, 346) = 4.4, p = .04$ . Follow-up tests revealed among younger MSM significant UAI reduction compared to control; not the case for older MSM. No ethnicity effects.

# What Significantly Changed Pre-Post Intervention in IAV vs. Control?

## Cognitions/Skills

- *HIV Risk Reduction Behavioral Intentions* (modified from Kelly and Kalichman, 1998)
- *Supplemental Behavioral Intentions Scale*
- *Methamphetamine beliefs and intentions*
- *HIV Beliefs and Knowledge*
- *Self-efficacy*

But, change in these cognitions (pre to post) did not predict change in UAI over time.

## Affect

### MSM's Reported Shame Reduction Was Greater in IAV

Furthermore, Change in Shame predicts 3-month change in receptive UAI for Younger MSM in IAV experimental ( $r_s = .22, p < .05$ ) but not in control.

# SOLVE Findings Promising But... Difficult to Migrate IAV Technology to the Web for National Dissemination...

So, with an NIMH grant, we Developed  
a SOLVE Game using **UNITY** – a game  
platform for cross-platform flexibility  
(can work with a variety of laptops,  
smartphones, tablets, etc.)

## What Does SOLVE Game DO?

1. Immerses MSM in virtual world simulating virtual date and many common challenges to safer sex where MSM must make decisions for their avatar as in real-life that affect how the action proceeds.





## What Does SOLVE Game DO?

**USER CREATES OWN CHARACTER**, and makes a series of choices in interacting with potential partners that affect how the action proceeds.

**USED REPRESENTATIVE DESIGN APPROACH:** The actions and scenarios are designed to be *representative of real life challenges* that are emotionally engaging (formative research).

## MSM Can Customize Self Character

- Skin Color
- Eye Color
- Hair Color
- Clothing Choices



# In SOLVE -- Social Guides are one tool for promoting behavior change

## In SOLVE-IAV

Guides/Mentors



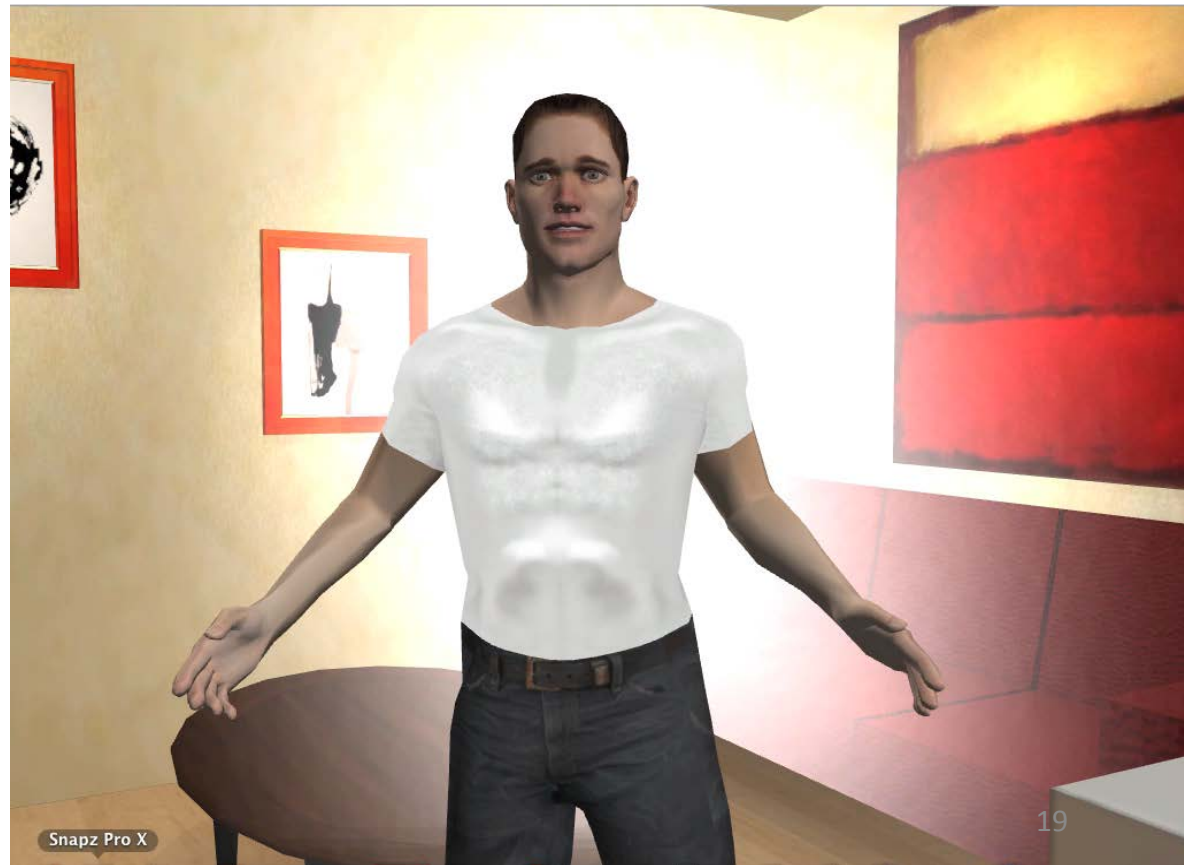
## In SOLVE-IT

- *Virtual Future Self (VFS)—aged version of player's self*
- Other Research (on retirement planning) suggests user will modify behavior more if a Future (Aged) Self is in the Game



# Virtual Future Self (VFS)

Acts as each MSM's  
Personalized Guide  
Scaffolding Changes in  
Cognitions, Skills, and  
Emotional Self-regulation



# How do we design SOLVE

## to reduce shame? Enhance self-regulation?

- *Careful design of characters, dialogue, storylines in the game to create a “sex positive intervention”*

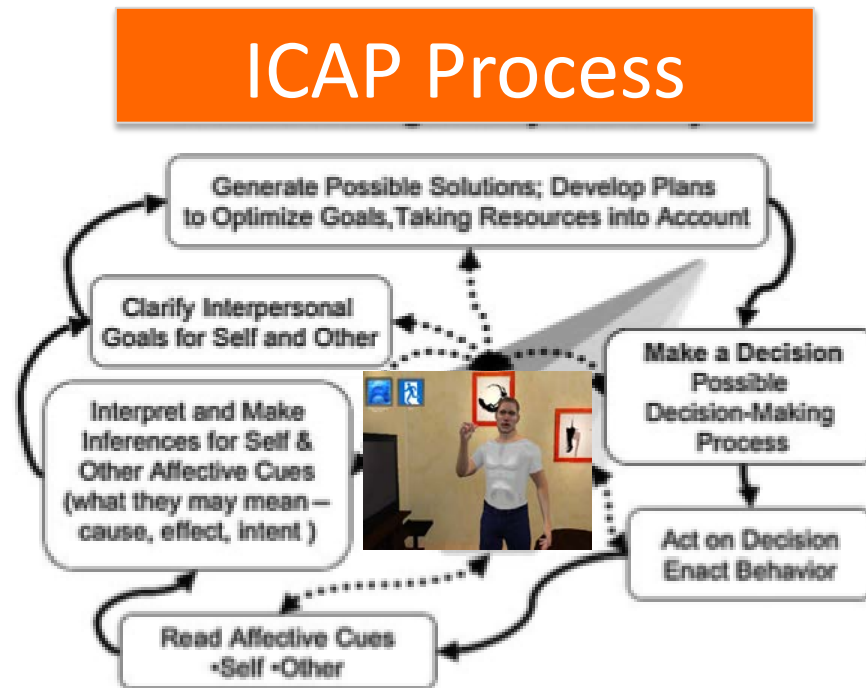
For example, **player’s avatar consistently models positive self-appraisals and comfort with his sexuality/desires.**

- *With our virtual future self as a “good parent” we encourage each MSM to acknowledge his emotions and desires as normal for him.*

To do this we use a **Self-regulatory Narrative Circuit** similar to the elements developmental psychologists point out that skilled parents often use to enhance self-regulation.

## In SOLVE

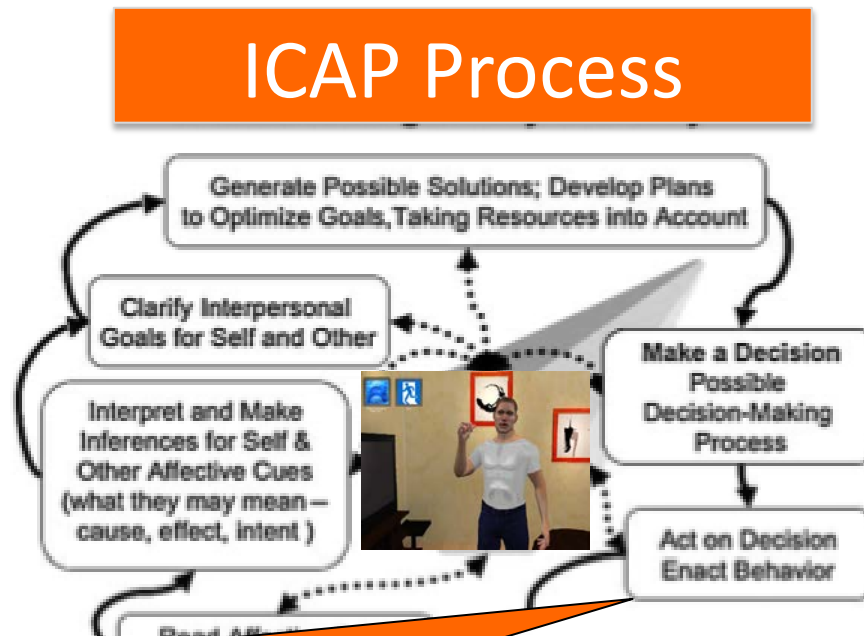
Self-Regulatory Narrative Circuit involves an:



Read, Miller, Appleby, Nwosu, Reynaldo, Lauren, & Putcha (2006)

## In SOLVE

Self-Regulatory Narrative Circuit involves an:

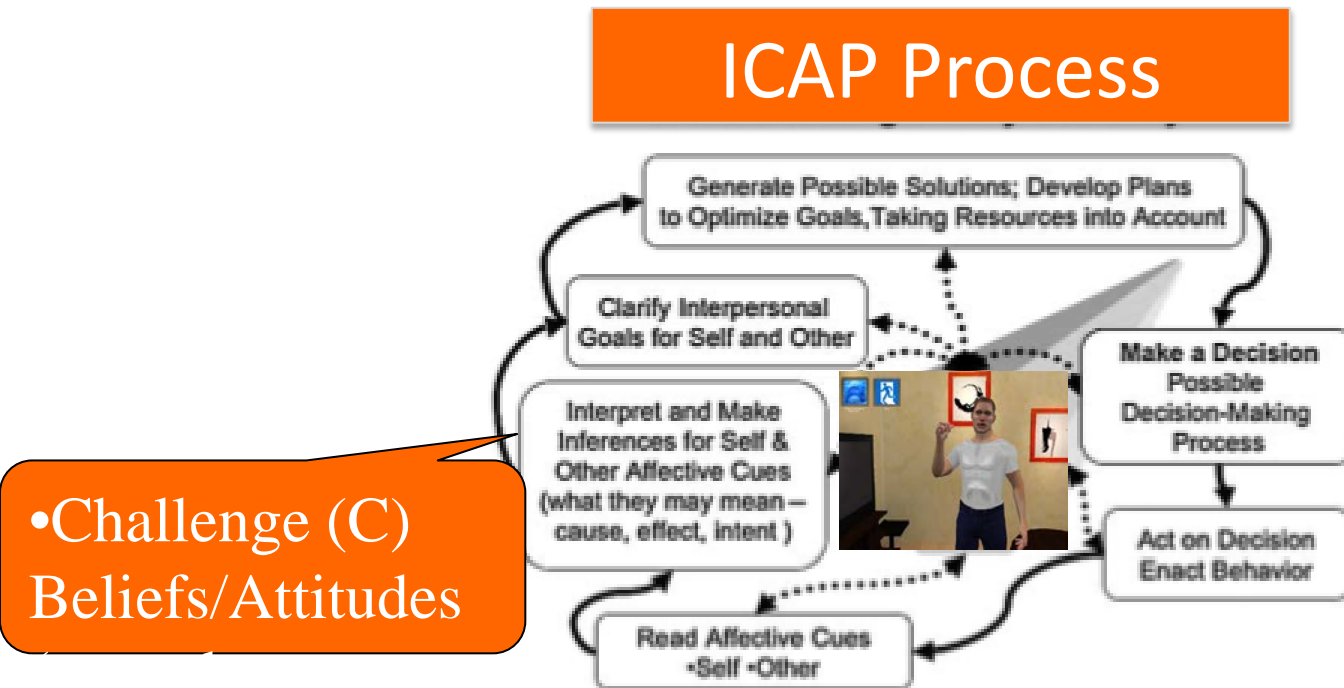


-- *Interrupt (I)* an automatic risky virtual choice and *challenge it* because it's risky

& Putcha (2006)

## In SOLVE

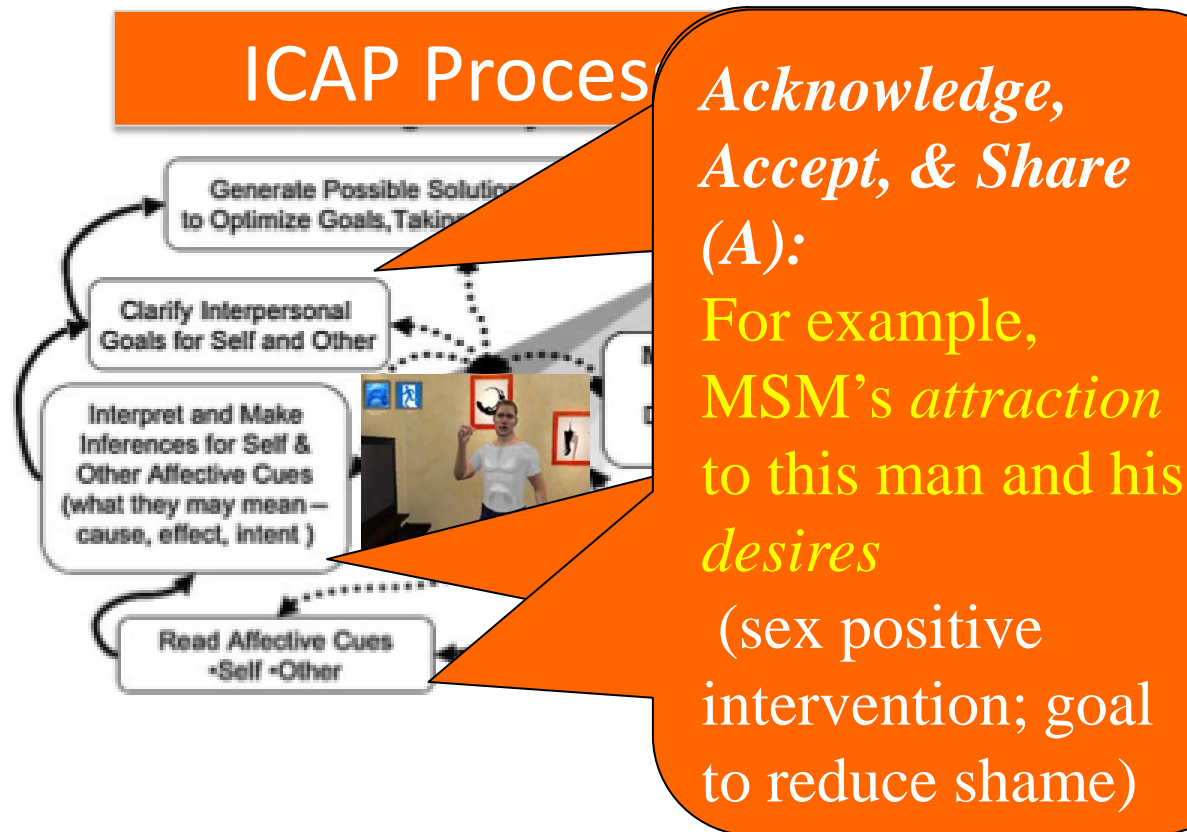
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## In SOLVE

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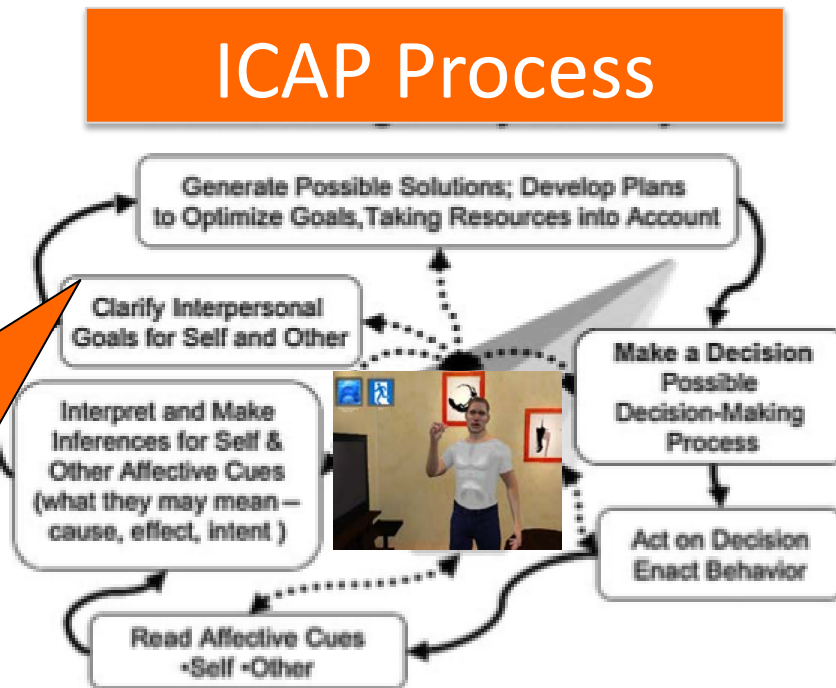
Read, Miller, Appleby, Nwosu, Reynaldo, Lauren, & Putcha (2006)



## In SOLVE

Self-Regulatory Narrative Circuit involves an:

- Acknowledge (A) & clarify multiple goals (e.g., intimacy desires; desire to avoid HIV).



Read, Miller, Appleby, Nwosu, Reynaldo, Lauren, & Putcha (2006)

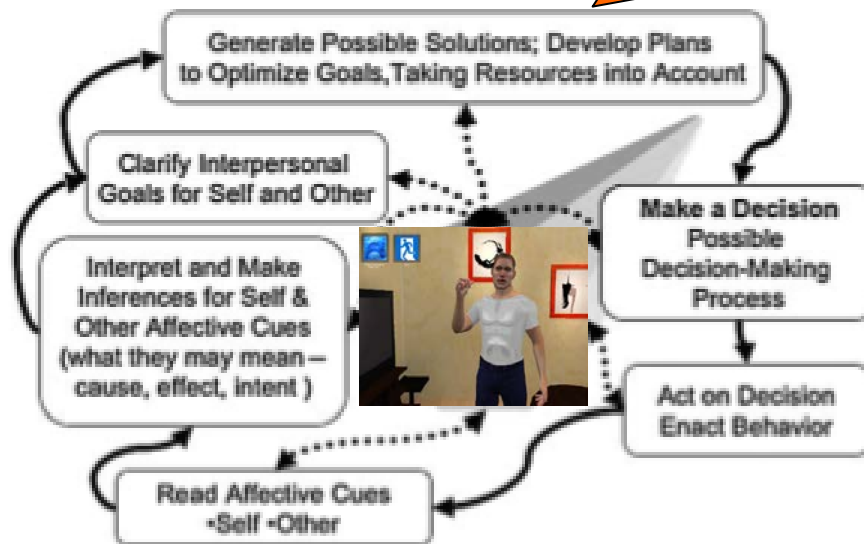
# In Self-Regulatory Narratives

## Self-Regulatory Narratives

*Provide (P):*

*A means to deal with these various goals/motives and emotions with more positive outcomes (e.g., have anal sex with a condom)*

### ICAP Process



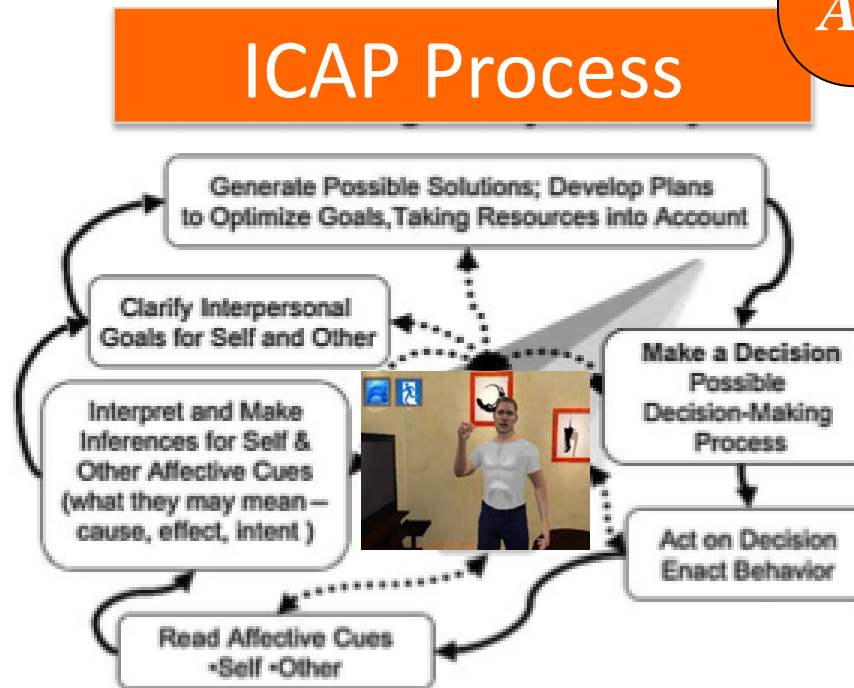
Read, Miller, Appleby, Nwosu, Reynaldo, Lauren, & Putcha (2006)

# In SOLVE

## Self-Regulatory Narrative Circuit

*Then User has a 2<sup>nd</sup>  
Chance Choice To be  
Risky or Safe*

*All choices recorded*



Read, Miller, Appleby, Nwosu, Reynaldo, Lauren, & Putcha (2006)

***SOLVE* promote changes in cognitions and emotions in many ways including using the VFS to:**

- **interrupt risky choices**
- **offer advice (e.g., to remember to take condoms on a date)**
- **at end of date VFS guides recap risky choices and illustrate/ model what user could have done otherwise to have fun but still stay safe. Let's illustrate this last use of different VFS clips at the end depending upon the user's choices in SOLVE.**

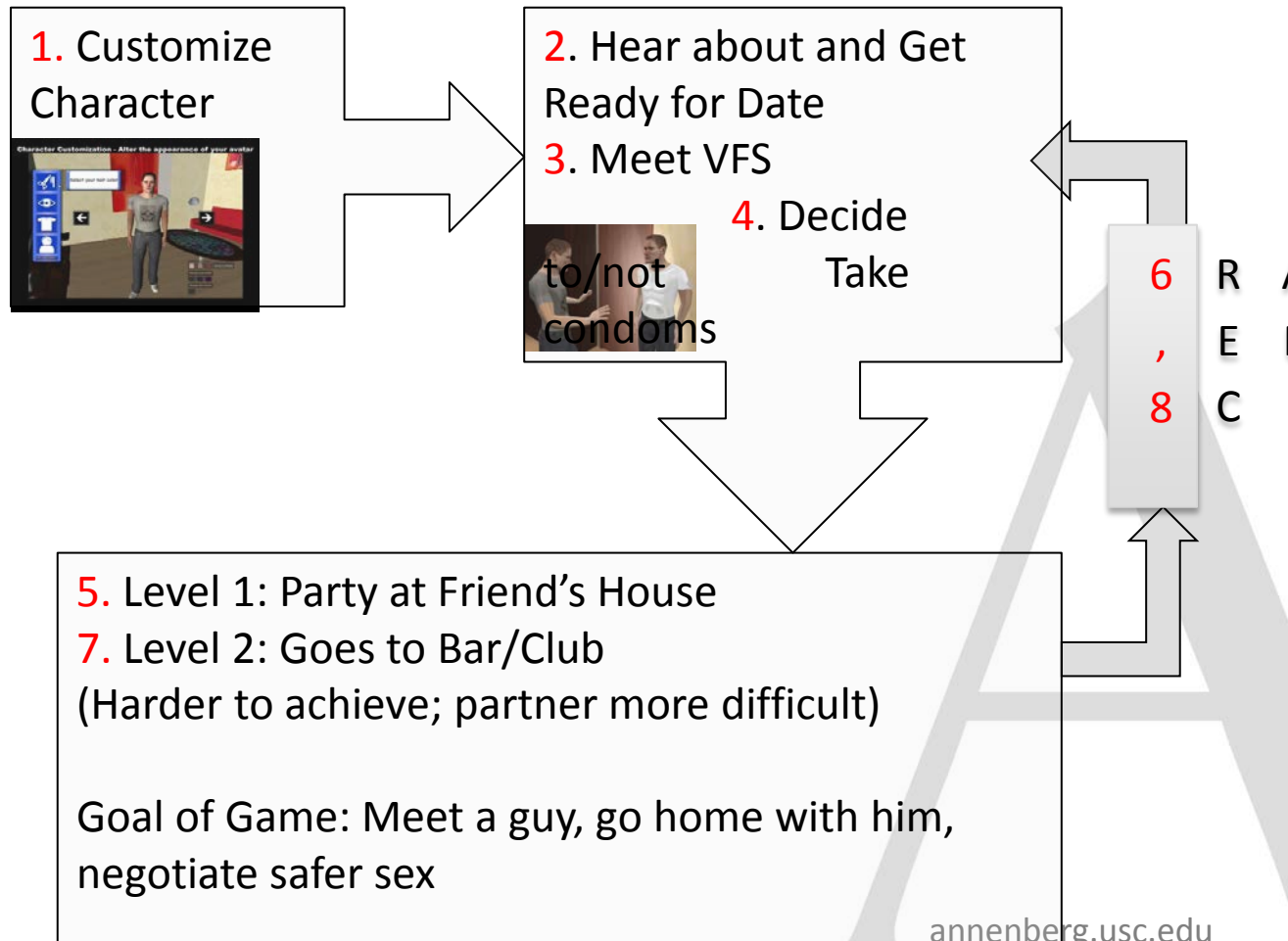
Virtual Future  
Self (VFS) Acts as  
MSM's Guide  
Scaffolding  
Changes in  
Cognitions, Skills  
(Self-character  
Aged)



# OVERVIEW Of GAME

## Post-Baseline Measures

- VFS Guide Interrupts Risky Choices **With an ICAP** (Interrupt-Challenge-Acknowledge-Provide Messages Based on **Message Framing** Pilot Work)



# Evaluating Game: National Recruitment & Data Collection in a Randomized Controlled Trial On-line

- Advertisements:  
Clickable Banner Ads on Targeted Population Frequented Websites & Other Sites (e.g., Craigslist)
- Incentives:  
lottery drawing at
  - baseline with 1:40 chance of \$100 gift card
  - 3-month, MSM offered \$25 gift card

## ***Eligible Participants:***

- *HIV negative*
- *Self-identified African-American, Latino, or White MSM*
- *18 to 24 years of age*
- *Had had UAI with a non-primary/casual partner in the past 3 months*

# Methods: National Recruitment and Data Collection On-line

- Advertisements: Clickable Banner Ads on Targeted Population Frequented Websites & Other Sites (e.g., Craigslist)

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Screener: Eligible MSM Randomized into Intervention or Control



Baseline Measures (including UAI, Shame)



SOLVE Intervention Game OR Wait List Control (WLC)



Immediate Post-Intervention Measures (e.g., shame)



3-Month Follow-up Measures (e.g., UAI)



# Methods: National Recruitment and Data Collection On-line

- Advertisements: Clickable Banner Ads on Targeted Population Frequented Websites & Other Sites (e.g., Craigslist)
- Incentives: lottery drawing at
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## Analysis:

Data from 921 MSM at Session I (484 WLC; 437 SOLVE) Missing Data Multiply Imputed

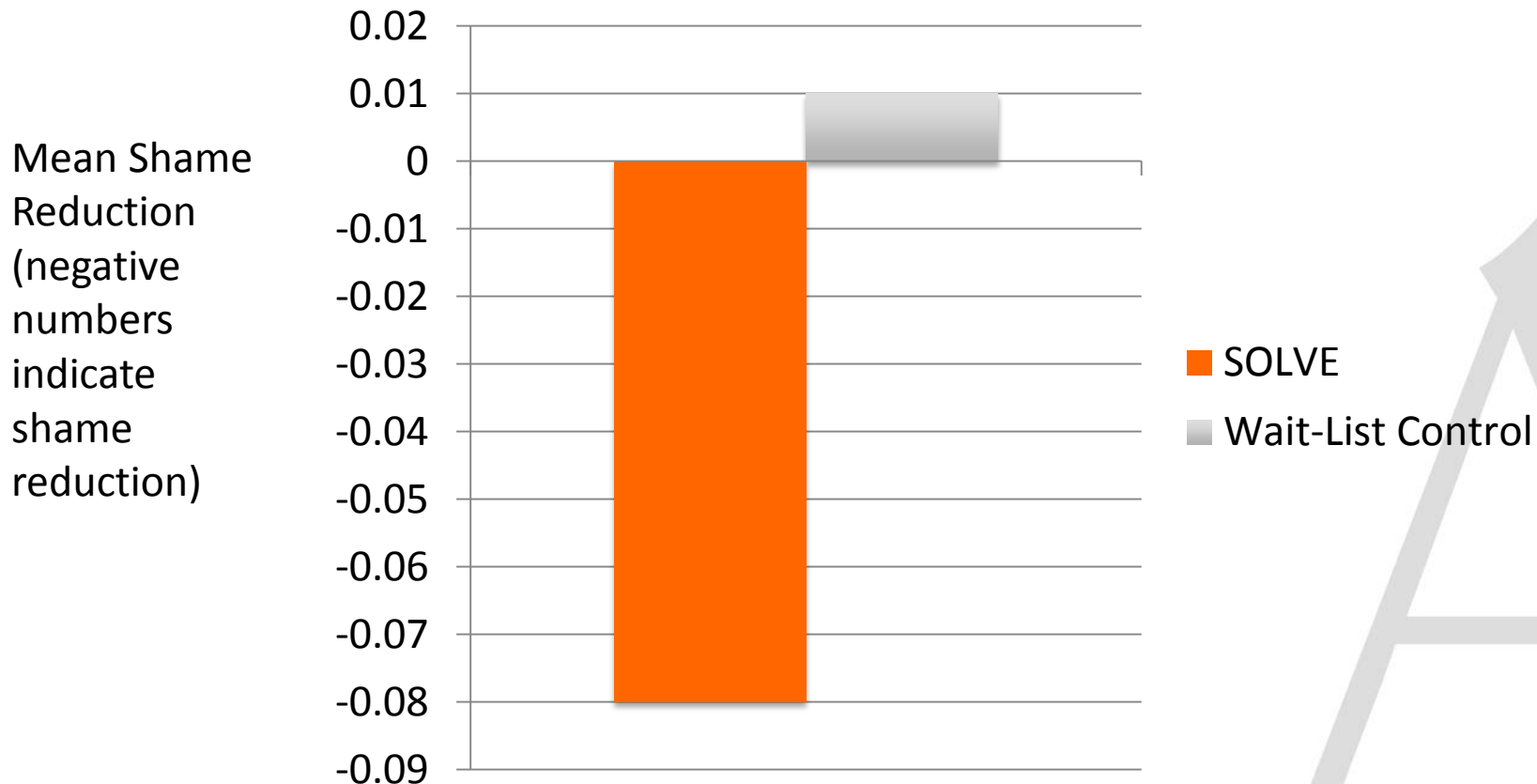
Session II (3-month follow-up) 69% Retention

# Results by Hypothesis

H<sub>1</sub>: MSM's reported past unprotected anal intercourse (UAI) is related to shame.

✓  $r_s = .21, p < .001, 95\% \text{ CI } [.15-.27].$

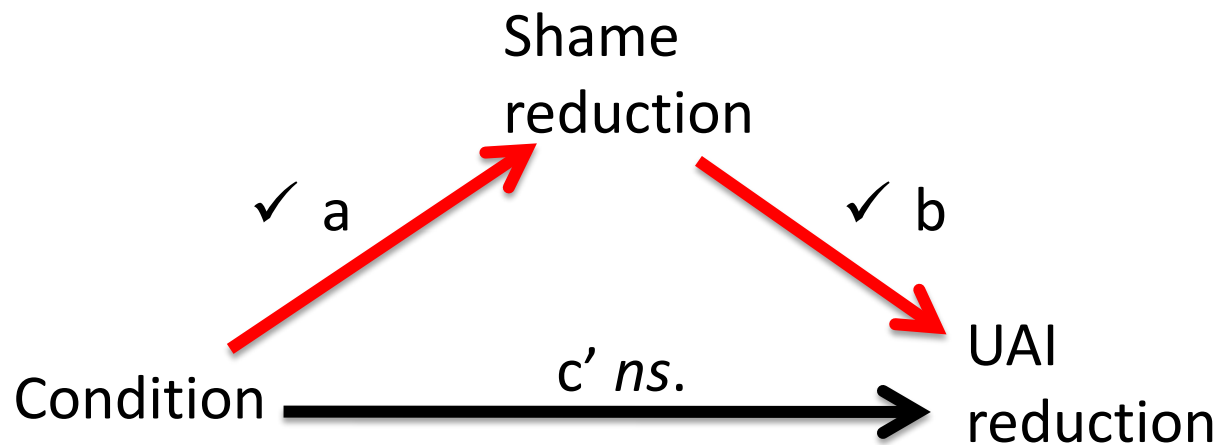
- ✓ H<sub>2</sub>: MSM's exposed to SOLVE would show more shame reduction (from baseline to immediate post-intervention) than MSM in a wait-list control (WLC) condition



# Results by Hypothesis

✓ H<sub>3</sub>: Shame reduction, due to an intervention, is predictive of UAI reduction over 3 months.

We used a bootstrapping approach to assess the effect of condition on UAI change indirectly through shame change.



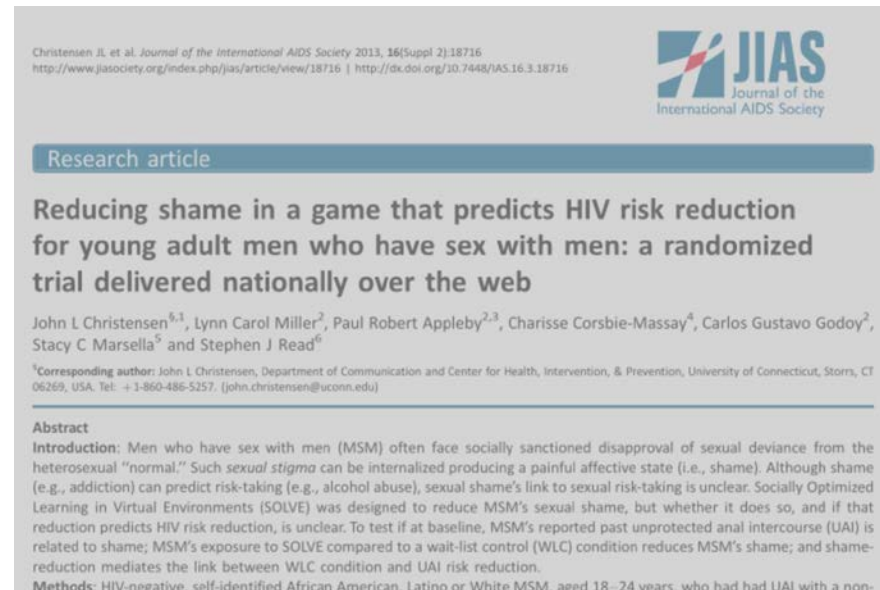
As predicted, ***the indirect effect was negative and significantly different from zero.*** Participants in SOLVE treatment condition reported greater reduction in shame, which in turn influenced reduction in UAI at 3 month follow-up.

## **SOLVE is the first intervention to:**

- (1) Significantly reduce shame for MSM
- (2) Demonstrate that shame-reduction due to an intervention, is predictive of risk (UAI)reduction over time

SOLVE demonstrates the promise of developing, testing, and rapidly disseminating mobile technologies for changing risky sexual decision-making for MSM Nationally

## **These findings recently published in JIAS**



# Future Directions

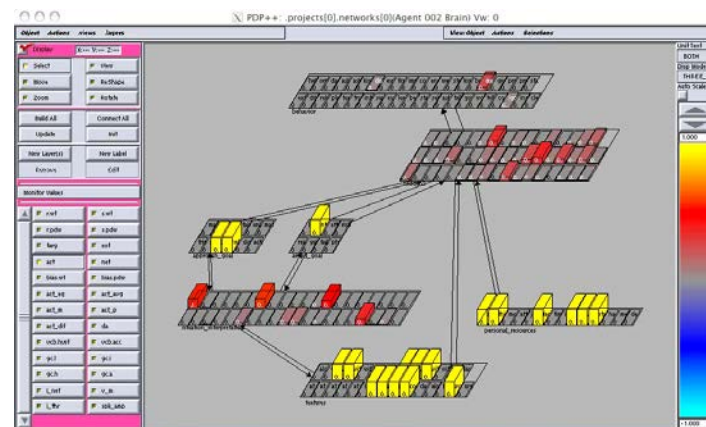
1. Still Analyzing Data (now 6 month data as well)...
2. Other work using game in scanner to examine differences in neural patterns while playing the game comparing different high and low risk groups of MSM

# Read, Bechara, Lu, Miller, & Appleby (NIDA Funded R01 Grant)

User in fMRI scanner playing game (examining brain patterns for high vs. lower risk MSM)



Simultaneously Modeling  
Decision-Making of User using  
our Biologically-Inspired  
Computational Model of  
Personality



Read et al. *Psych Review* Computational Model of Biologically-Inspired Personality (2010)

# THANK YOU!