

The science behind student success: What research tells us about the role of digital games in education

Lynn E. Fiellin, M.D.

Director, play2PREVENT Lab

Professor of Medicine, Yale Child Study Center,
and Public Health

Founder of a sister organization to my Lab called Playbl, that focuses on the distribution of our videogame interventions.

HOW DID WE GET HERE?





Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep



Volume 43, Issue
Supplement_4
December 2006



The impact of buprenorphine/naloxone treatment on HIV risk behaviors among HIV-infected, opioid-dependent patients[☆]

E. Jennifer Edelman^{a,b,*}, Tongtan Chantararat^c, Sarah Caffrey^a, Amina Chaudhry^d, Patrick G. O'Connor^a, Linda Weiss^c, David A. Fiellin^{a,b}, Lynn E. Fiellin^{a,b}

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RESEARCH REPORT

doi:10.1111/j.1360-0443.2007.02056.x

Gender and non-medical use of prescription opioids: results from a national US survey*

Jeanette M. Tetraault^{1,2}, Rani A. Desai², William C. Becker², David A. Fiellin², John Concato^{1,2} & Lynn E. Sullivan²

Veterans Affairs Clinical Epidemiology Research Center, West Haven, CT, USA¹ and Yale University School of Medicine, New Haven, CT, USA²

Combining Rapid HIV Testing and a Brief Alcohol Intervention in Young Unhealthy Drinkers in the Emergency Department: A Pilot Study

E. Jennifer Edelman, An Dinh, Radu Radulescu, Bonnie Lurie, Gail D'Onc
Jeanette M. Tetraault, David A. Fiellin & Lynn E. Fiellin

JOURNAL ARTICLE

A Trial of Integrated Buprenorphine/Naloxone and HIV Clinical Care

Lynn E. Sullivan, Declan Barry, Brent A. Moore, Marek C. Chawarski, Jeanette M. Tetraault, Michael V. Pantalon, Patrick G. O'Connor, Richard S. Schottenfeld, David A. Fiellin

Clinical Infectious Diseases, Volume 43, Issue Supplement_4, December 2006, Pages S184–S190, <https://doi.org/10.1086/508182>

Published: 15 December 2006

Journal of Adolescent Health 52 (2013) 158–163



Original article

Previous Use of Alcohol, Cigarettes, and Marijuana and Subsequent Abuse of Prescription Opioids in Young Adults

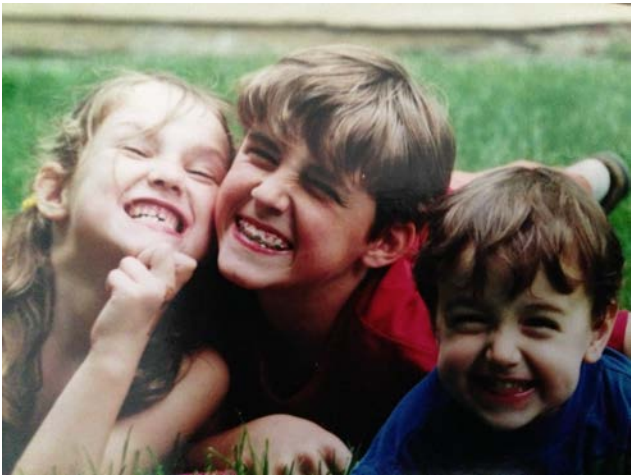
Lynn E. Fiellin, M.D.^{a,*}, Jeanette M. Tetraault, M.D.^a, William C. Becker, M.D.^a, David A. Fiellin, M.D.^a, and Rani A. Hoff, Ph.D.^{a,b}

^a Department of Internal Medicine, Yale University School of Medicine, New Haven, Connecticut

^b VISN1 Mental Illness Research Education and Clinical Care Center, VA Connecticut Healthcare System, West Haven, Connecticut

JOURNAL OF
ADOLESCENT
HEALTH

www.jahonline.org



A NEW DIRECTION

- A new method
 - Delivering messages for behavior change attractive to those at highest risk
 - Window of opportunity before risk starts
 - Primary risk reduction and prevention



GAMES: A NOVEL APPROACH TO EDUCATION, PREVENTION, AND WELLNESS

- 91% of all people on earth have a mobile phone
- 56% of people own a smart phone
- 80% of time on mobile devices is spent inside games or apps
- 97% of all teens play videogames; >50% play daily
- Serious videogames can impact health behaviors
 - Asthma
 - Diabetes
 - Nutrition/obesity
 - Physical activity
 - Smoking prevention
 - HIV/sexual risk





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Video Game to Help Urban Teens Avoid HIV Infection Focus of Nearly \$4 Million Grant To Yale

Published: September 24, 2009

New Haven, Conn. — Creating a video game to help teens avoid sex, drugs and alcohol use—behaviors that could lead to HIV infection—is the aim of a five-year, \$3.9 million research grant to Yale from the Eunice Kennedy Shriver National Institute of Child Health and Human Development. The grant, to be paid out over five years, will fund work by Lynn Fiellin, M.D., assistant professor of medicine at Yale School of Medicine.

Fiellin's study is designed to develop and test an interactive virtual reality-based video game called "Retro-Warriors" that will teach ethnically diverse adolescents how to make healthier choices. The research goes beyond the use of a game for education and proposes to create a world in which the game players can engage in role-playing to learn to avoid risky behaviors that could lead to HIV infection.

The study has far-reaching implications including the potential for this technology to become portable and global.

"The game could travel with the player—it could be used at home, on a console, a cell phone or a personal digital assistant," said Fiellin, who also points to international

[Print](#) [E-Mail](#) [Share](#)**PRESS CONTACT****Karen N. Peart**[Phone](#) 203-432-1326 [Email](#)**OTHER ARTICLES**[First Group Graduates from
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Develop, evaluate, & implement videogames that impact health behavior, social intelligence, and education in teens and young adults



PROBLEMS WE ARE SOLVING

EVERY YEAR IN THE US:

2M+ ADOLESCENTS STRUGGLE WITH SUBSTANCE MISUSE

5M YOUTH HAVE AT LEAST 1 MENTAL HEALTH ISSUE

10M ADOLESCENTS CONTRACT AN STI

SCARCITY OF SUPPORT:

1: 491 SCHOOL COUNSELOR TO STUDENT

1:1381 SCHOOL PSYCHOLOGIST TO STUDENT

THE RELATIONSHIP TO STUDENT SUCCESS

Mental health and academic success:

- **Individual-Level Results:**

- One meta-analysis reviewed 83 intervention studies and found:
 - Psychosocial interventions resulted in significant, positive academic impact
- Another review of recent research on student mental health and academic outcomes found:
 - 91% of studies demonstrated improved academic outcomes because of psycho-social interventions and positive effects persisted on average 150 weeks.

- **School-Wide Results:**

- At the school level, research supports the integration of positive behavior supports, a form of multi-tiered systems support in strengthening school-wide proficiency in math and reduced suspensions.
- One meta-analysis reviewed 213 studies and found:
 - Universal social and emotional-based programs had a significant, positive, school-wide impact on standardized tests in reading and math and in overall course grades.



RISK REDUCTION/
HIV PREVENTION



SMOKING & VAPING



MENTAL HEALTH &
WELLNESS



MENTAL HEALTH
AND OPIOID
MISUSE



HEALTH ADVOCACY
STI/HIV TESTING

BUILDING A PLATFORM





GAMES FOR HEALTH JOURNAL: Research, Development, and Clinical Applications
Volume 1, Number 4, 2012
© Mary Ann Liebert, Inc.
DOI: 10.1089/g4h.2012.0025



A Qualitative Study to Inform the Development of a Videogame for Adolescent Human Immunodeficiency Virus Prevention

Kimberly Hieftje, PhD^{1,5} Marjorie S. Rosenthal, MD, MPH^{2,3} Deepa R. Camenga, MD, MHS^{2,3}
E. Jennifer Edelman, MD^{1,3,4,5} and Lynn E. Fiellin, MD^{1,5}



INVOLVE OUR TEEN PARTNERS IN EVERY STEP OF THE DEVELOPMENT PROCESS

CREATIVE METHODS

Interviews/Focus Group
Discussions

Artwork: “Party Scene” Picture

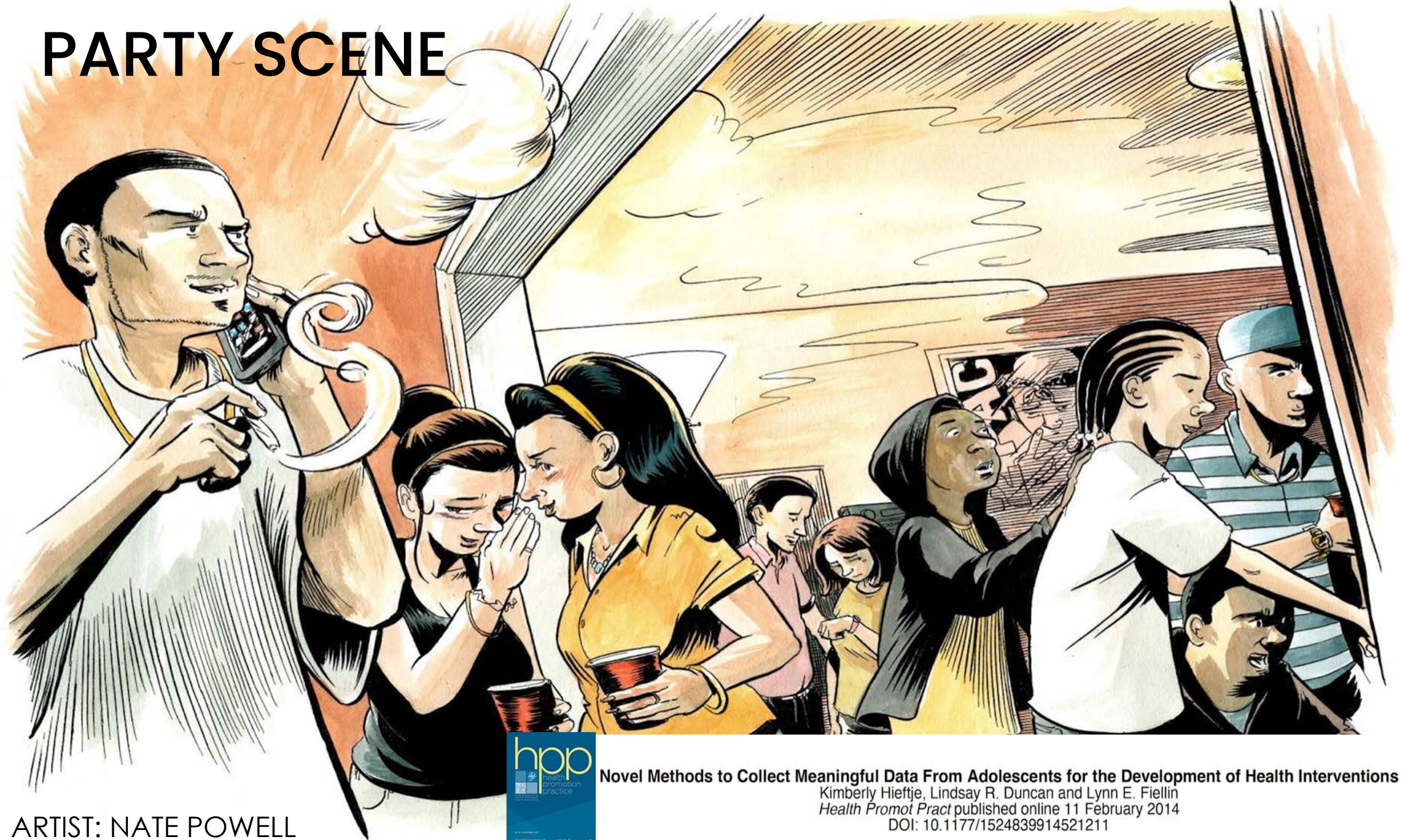
“My Life” Timeline

Poster Project: Message Framing

Photo Feedback Project



PARTY SCENE



ARTIST: NATE POWELL



Novel Methods to Collect Meaningful Data From Adolescents for the Development of Health Interventions

Kimberly Hieftje, Lindsay R. Duncan and Lynn E. Fiellin

Health Promot Pract published online 11 February 2014

DOI: 10.1177/1524839914521211

PHOTO FEEDBACK PROJECT



DESIGN INPUT



TOO OLD



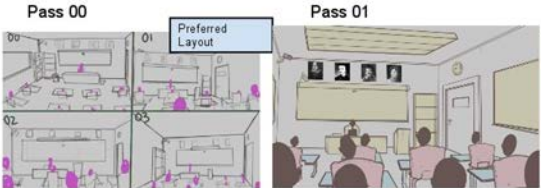
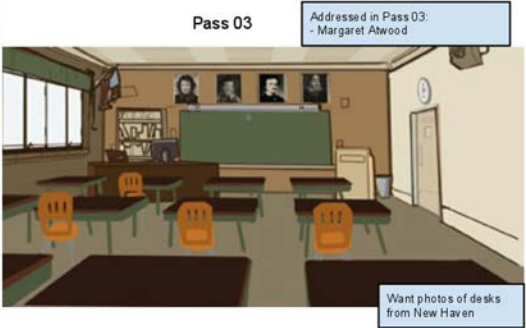
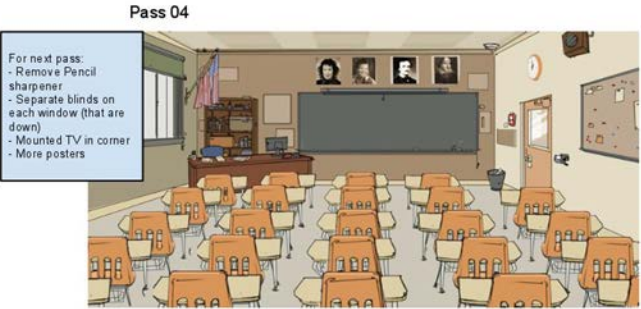
CLOTHES
TOO KID LIKE

NO TO THE
BAGGY PANTS

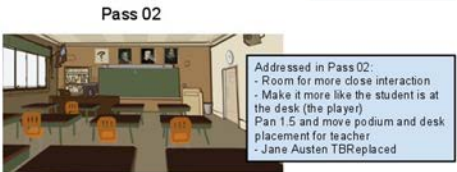


FAVORITE

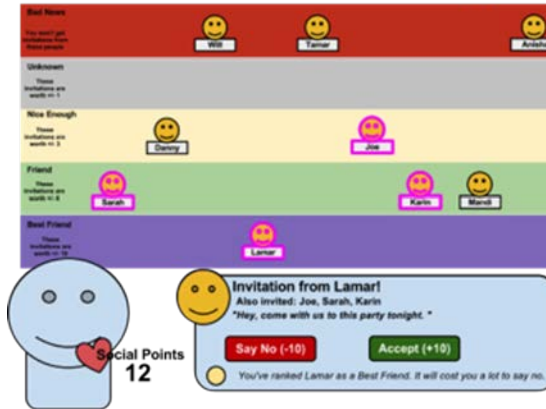
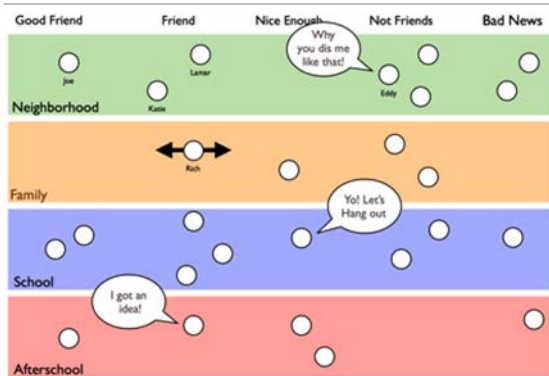
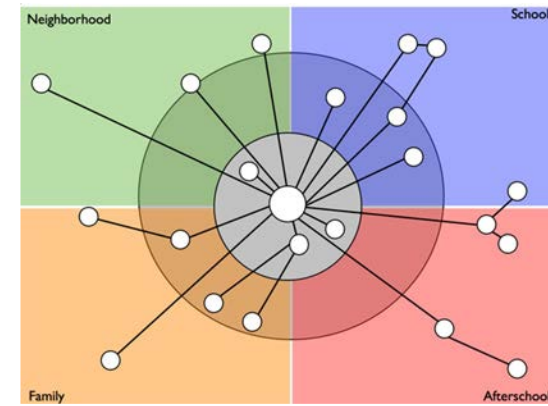
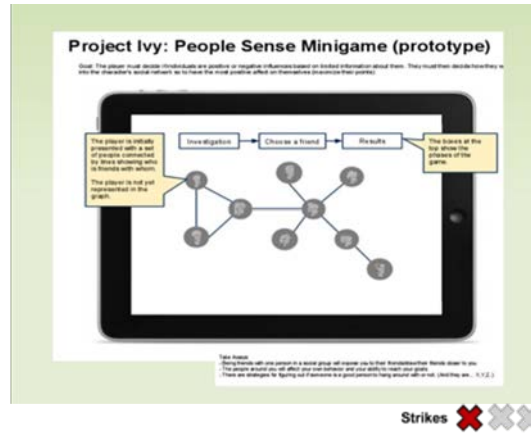
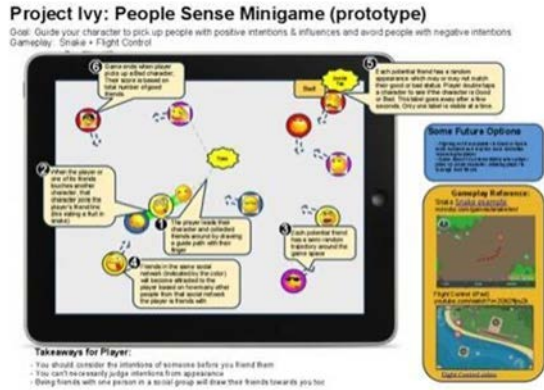
Scene - School - Classroom This scene blocking explores a english class location for the school environment.



Addressed in Pass 01:
- See more of foreground students in view
- Portraits of William Shakespeare, Edgar Allen Poe, Maya Angelou and Jane Austen hanging over the blackboard



ITERATION, ITERATION, ITERATION





STORIES

We all have times when we have to make hard choices. Explore these stories and take charge of the future by changing poor decisions.

PLAYFORWARD Elm City Stories

7th Grade



8th Grade



9th Grade



10th Grade



11th Grade



12th Grade



Get more Power and Sense skill stars to change your Elm City story.

SKILLS



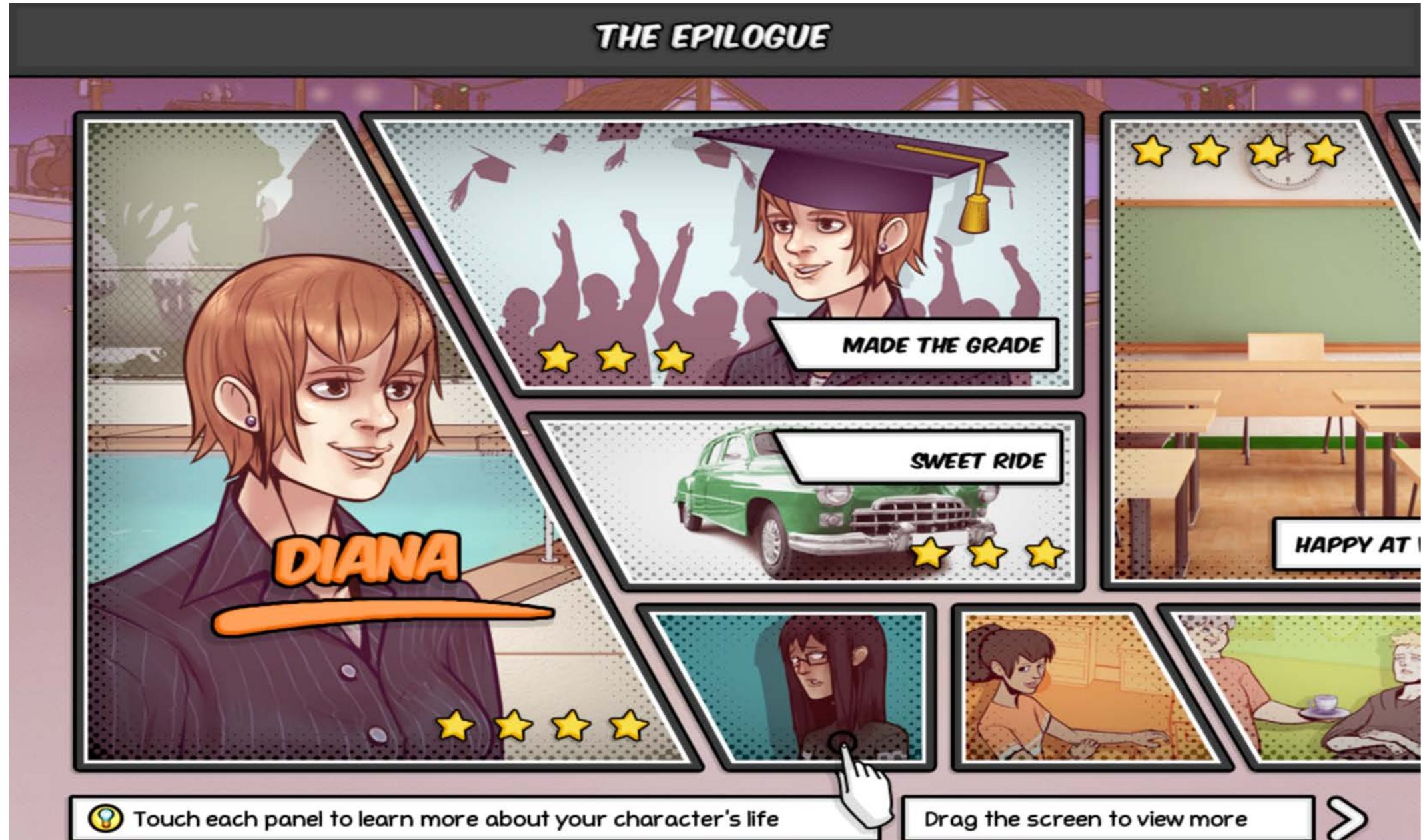
LULU



In Elm City Stories, the more you change, the better life can turn out. When you have made a lot of changes press Fast Forward to see your future...



GAME EPILOGUE



RANDOMIZED CONTROLLED TRIAL



11-14 YEAR OLD BOYS & GIRLS

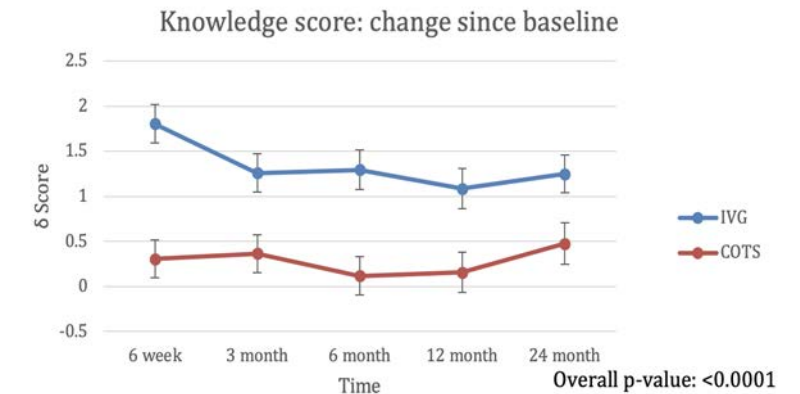
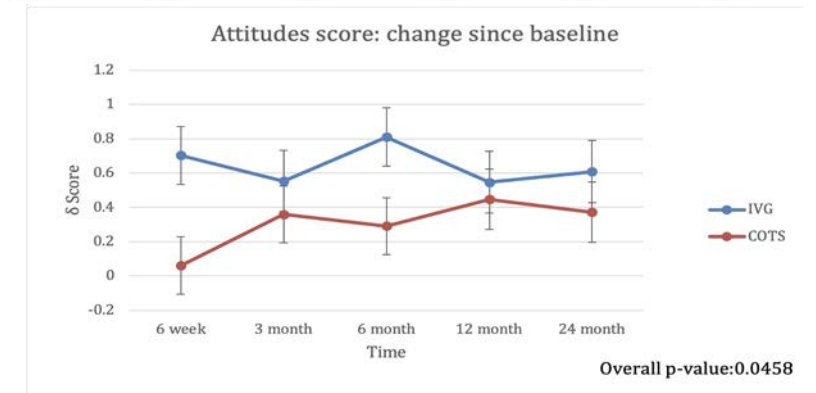
12 AFTER-SCHOOL, SCHOOL, SUMMER PROGRAMS

12 SESSIONS: 2 TIMES/ WEEK FOR 6 WEEKS

STANDARDIZED ASSESSMENTS: BASELINE, 6 WEEKS, 3, 6, 12, 24 MONTHS

FOCUS ON 12-MONTH OUTCOMES AROUND SEXUAL HEALTH

TIME-STAMPED DATA COLLECTED THROUGH GAME SOFTWARE KNOWN AS “EVENT LOG FILES”



Video Game Intervention for Sexual Risk Reduction in Minority Adolescents: Randomized Controlled Trial

Lynn E Fiellin^{1,2,3,4}, MD; Kimberly D Hieftje^{1,3,4}, PhD; Tyra M Pendergrass^{1,3,4}, MEM; Tassos C Kyriakides⁵, PhD; Lindsay R Duncan^{1,6}, PhD; James D Dziura⁵, PhD; Benjamin G Sawyer^{1,7}; Linda Mayes^{2,4}, MD; Cindy A Crusto^{3,4,8}, PhD; Brian WC Forsyth^{3,4}, MBChB, FRCPC; David A Fiellin^{1,3,4,5}, MD



PLAYTEST!

IMPACT OVER 6 MONTHS

(N=296) (NICHHD) (ALL P-VALUES < 0.05)

T.P. Boomer et al. / Journal of Adolescent Health xxx (2023) 1–8

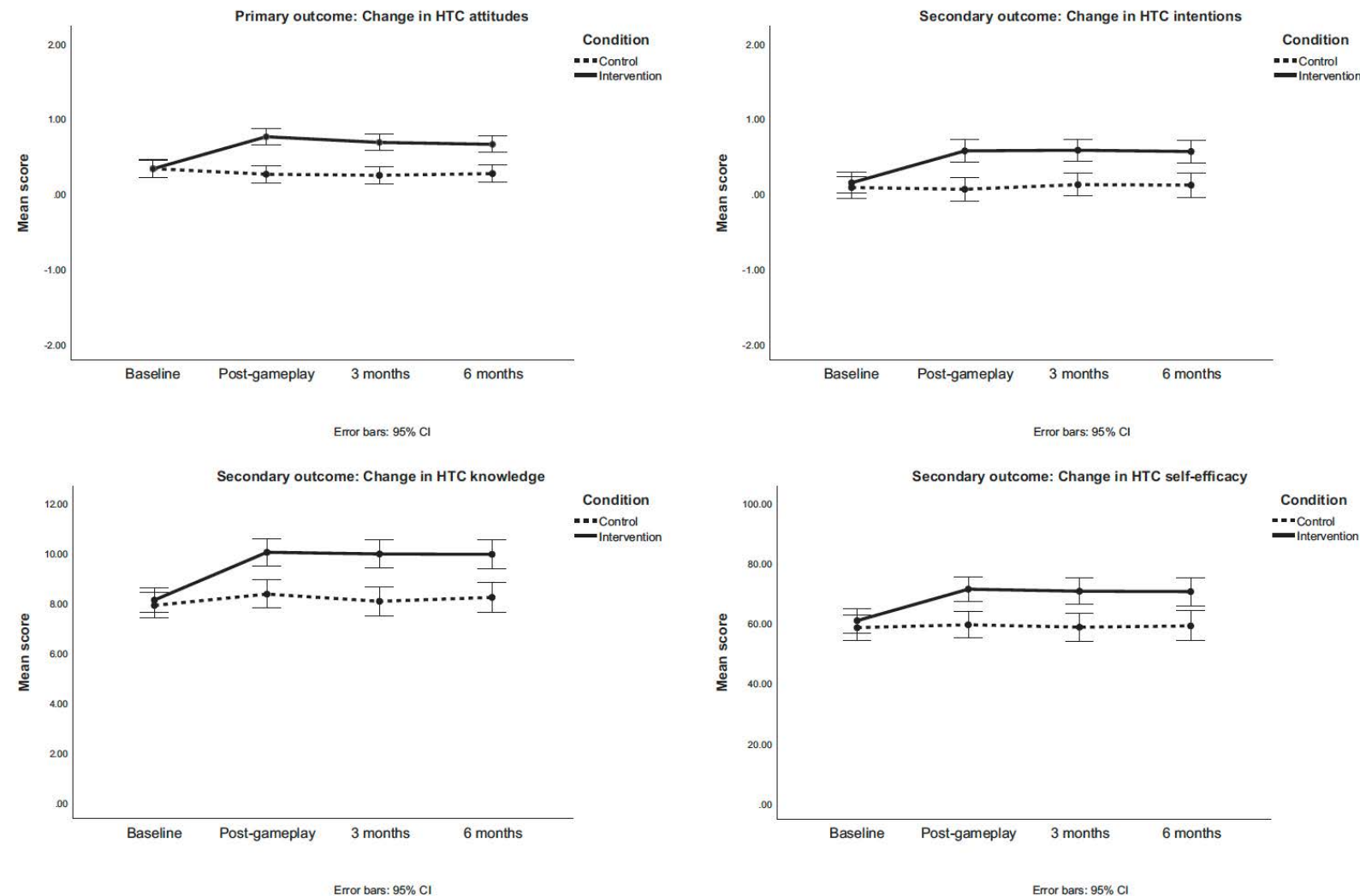


Figure 2. Changes in attitudes, intentions, knowledge, and self-efficacy by study condition.



Original article

A Serious Video Game Targeting HIV Testing and Counseling: A Randomized Controlled Trial

Tyra Pendergrass Boomer, M.E.M.^{a,*}, Kaitlyn Larkin^a, Lindsay R. Duncan, Ph.D.^b, Claudia-Santi F. Fernandes, Ed.D., L.P.C.^a, and Lynn E. Fiellin, M.D.^{a,c,d}

^aDepartment of Internal Medicine, PhysioREVENT Lab at the Yale Center for Health & Learning Games, Yale School of Medicine, New Haven, Connecticut

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^cYale Child Study Center, New Haven, Connecticut

^dYale School of Public Health, New Haven, Connecticut

Article history: Received January 20, 2023; Accepted August 15, 2023

Keywords: Adolescents; Technology intervention; HIV testing and counseling; Serious video game; Randomized controlled trial; Behavior change

SMOKESCREEN





#2

FRESH AIR

3

**HIDE THE TRUTH**

The words they use
really mean
something else...

JONAS

It's just one cigarette, it
won't kill you.

SELLIN' IT

They say how great
it will be for me...

MY PRIDE

They call me names:
weak, scared, mean,
uncool...

PLAY IT OFF

They play it off like
it's no big deal...

MY LOYALTY

They challenge my
friendship or love...

How is Jonas
trying to get me
to smoke?

POWER
110POWER
80

1 THINK

2 PREPARE

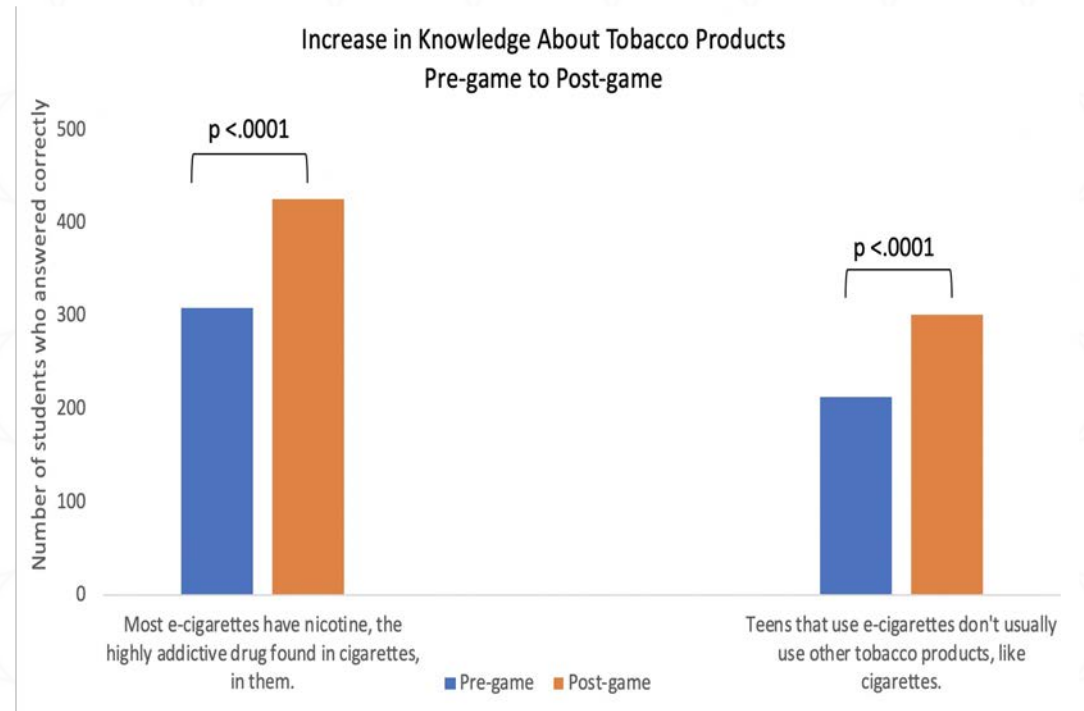
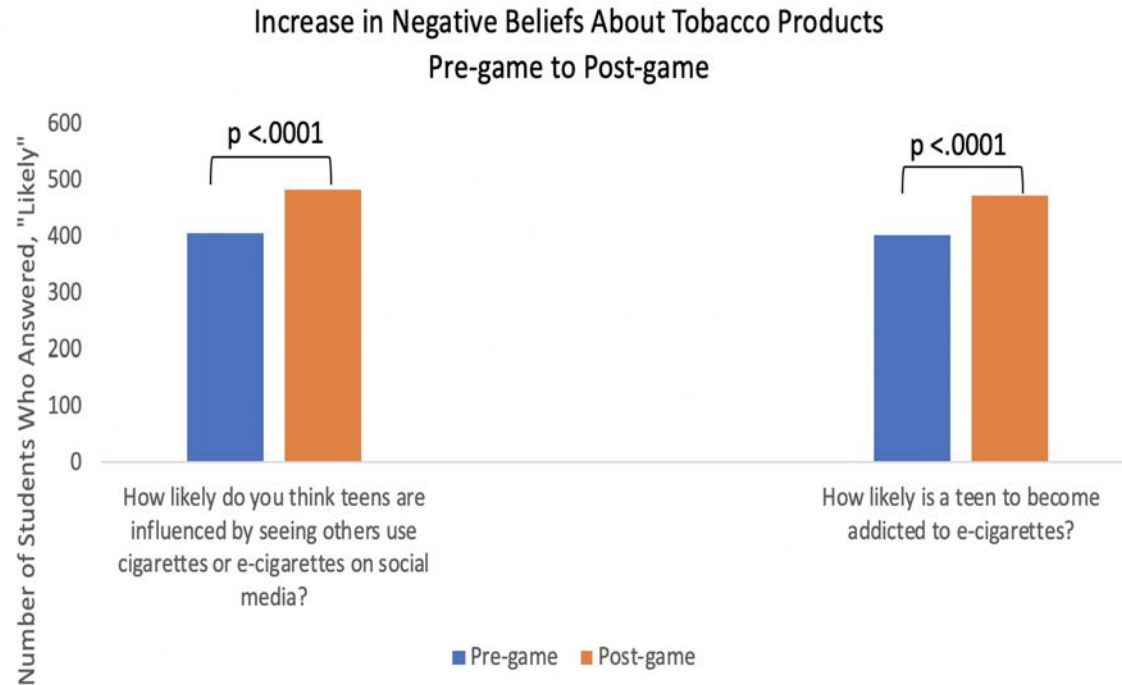
3 REFUSE



What kind of pressure is going on here?

SMOKESCREEN FIELD STUDY

(N=560) (CVS HEALTH)



Effectiveness of a web-based tobacco product use prevention videogame intervention on young adolescents' beliefs and knowledge

Kimberly D. Hieftje, Claudia-Santi F. Fernandes, I-Hsin Lin & Lynn E. Fiellin

OUR IMPACT

EVIDENCE-BASED RESOURCE GUIDE SERIES

Reducing Vaping Among Youth and Young Adults



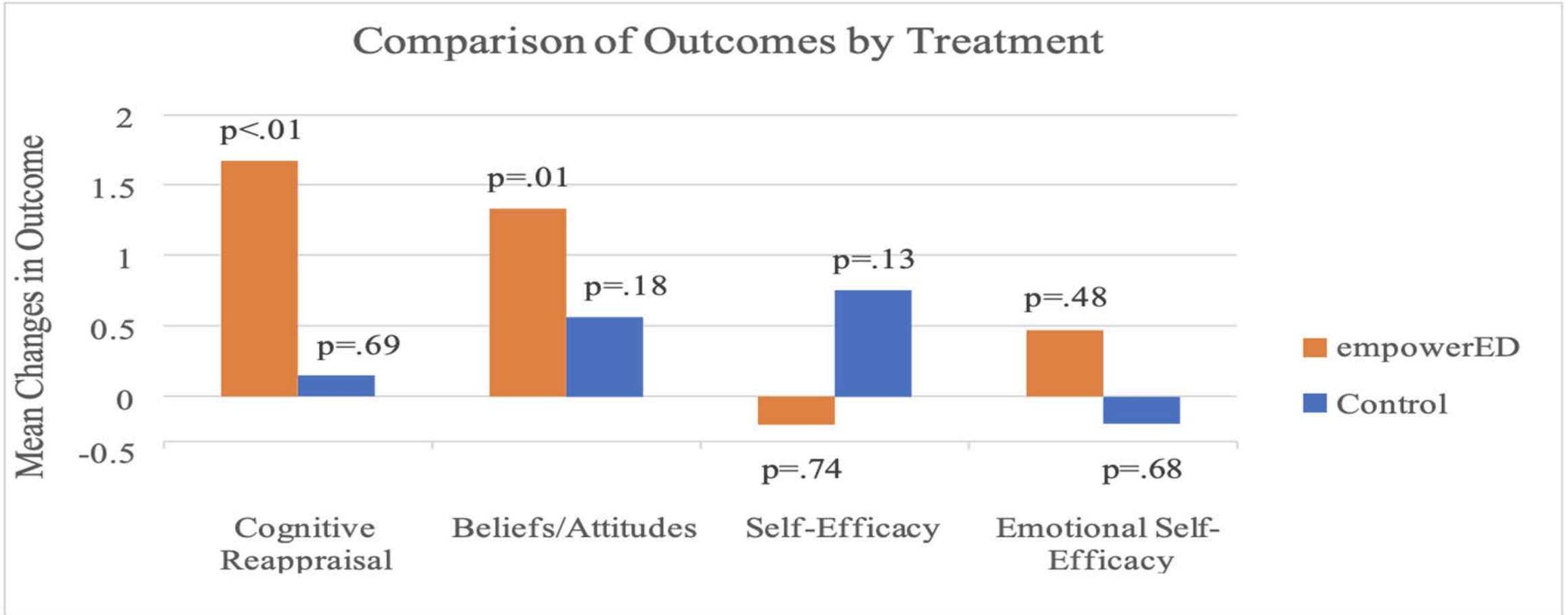
**Reducing Vaping Among Youth and Young
Adults**



empowered:
Think it Through
Digital Stories

EMPOWERED PILOT STUDY

(N=100) (CZI)



A Pilot Randomized Controlled Trial to Evaluate a Cognitive Behavioral Videogame Intervention: *empowerED*

Claudia-Santi F. Fernandes , Yanhong Deng, Alvin H. Tran, Kimberly D. Hieftje, Tyra M. Pendergrass Boomer, Carolyn K. Taylor, and Lynn E. Fiellin

Published Online: 8 Nov 2022 | <https://doi.org/10.1089/g4h.2021.0118>



Information
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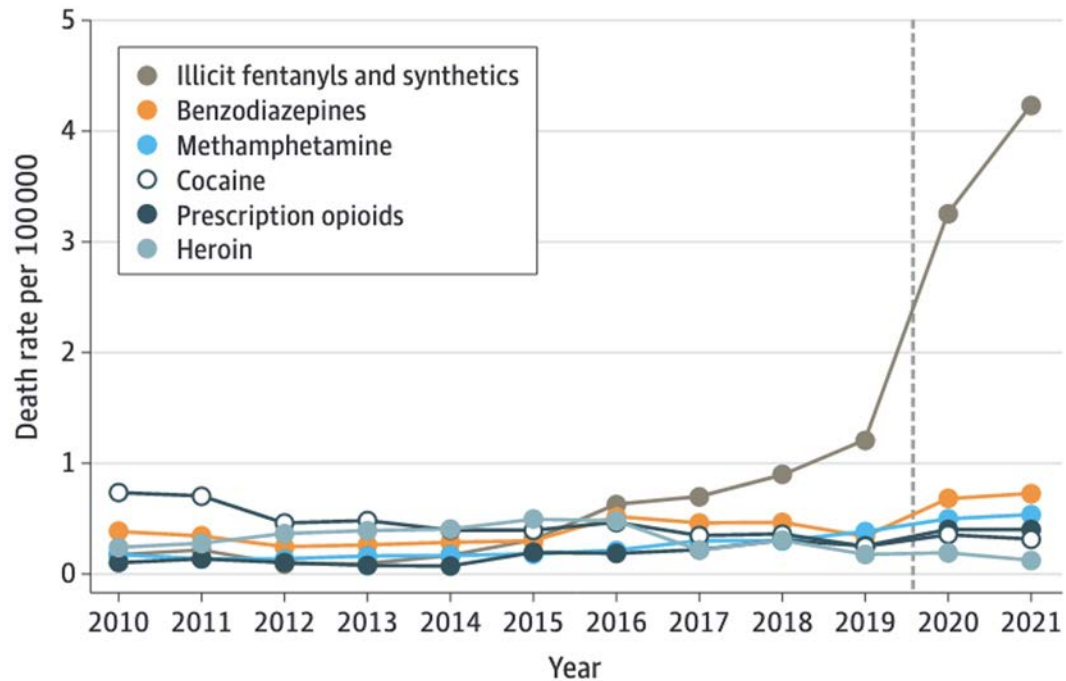


PLAYSMART

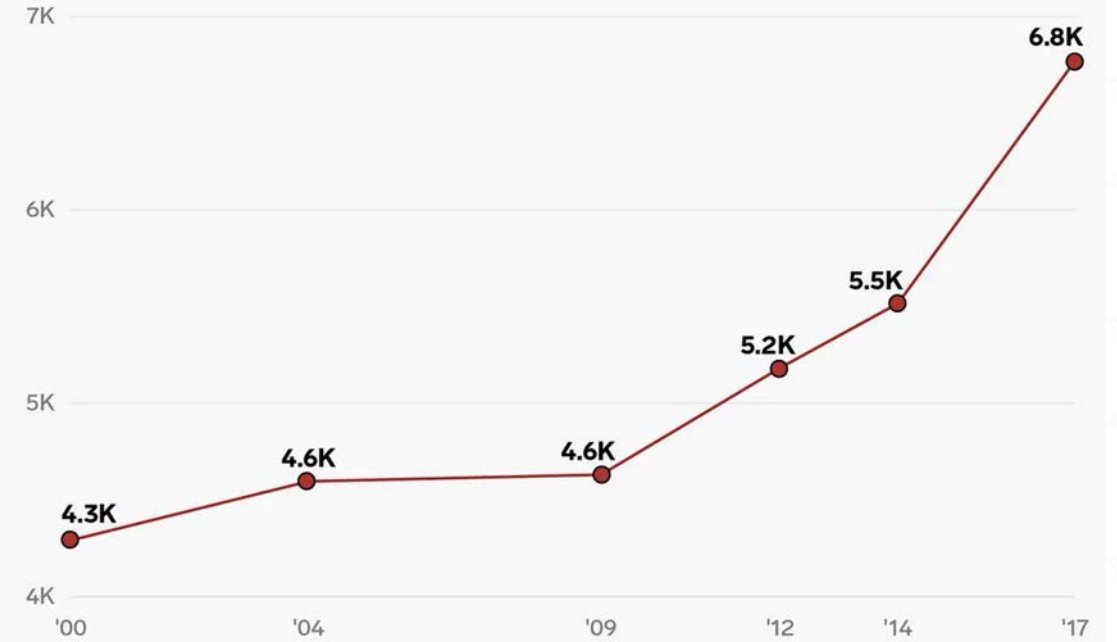
Click anywhere to start

CRITICAL HEALTH CRISES IN TEENS: SUBSTANCE MISUSE AND MENTAL HEALTH

A Overdose mortality among adolescents by substance type



Number of overall deaths by suicide among 10–24 year olds



STORIES

We all have stories where we made wrong choices. Explore these stories. Take charge of the mistakes and fix them.

SKILLS



10
RISK SENSE



10
REFUSAL POWER



10
SOCIAL MEDIA SENSE



10
STRESS SENSE



10
KNOW POWER

PLAYSMART DESIGN



Formative Work: Feb-Jun 2020

We conducted:

- 7 focus groups with opioid-naïve adolescents (n=37)
- 6 interviews with treatment providers of individuals with opioid use disorder (n=6)
- 1 focus group with prevention specialists (n=6)
- 5 focus groups with implementation partners, School-Based Health Alliance (SBHA) adult affiliates (n=26)
- 3 focus groups with SBHA youth (n=15)



Salient themes identified:

1. Opioid Identification
2. Perceived Risk of Harm
3. Prescription Opioids
4. Mode of Learning
5. Opioid Accessibility
6. Reasons to Misuse Opioids
7. Mental Health
8. Support Systems
9. Videogame Application

PLAYSMART DEVELOPMENT

Storylines (Content):

Trading Wisdom

A Friend in Need

Lean on Me

Grandma's Pills

Tough Love

A New Direction

Mini-games (Skill Development):

Risk Sense

Know Power

Social Media

Future Sense

Refusal Power

Stress Sense



PLAYSMART EFFICACY STUDY

- **Setting:** 10+ CT schools
- **Population:** 532 adolescents ages 16–19 who are at higher risk
- **Intervention:** PlaySmart
- Videogame aims to prevent opioid initiation and promote mental health in older adolescents
- Adolescents at higher risk for opioid use will be assigned to either the PlaySmart game or attention/time control games
- Assessment measures collected at baseline, 6 weeks, 3, 6, 12 months; primary outcome = perception of risk of harm of opioid misuse at 3 months



PLOS ONE

STUDY PROTOCOL

A digital health game to prevent opioid misuse and promote mental health in adolescents in school-based health settings: Protocol for the *PlaySmart* game randomized controlled trial

SO WHAT SETS US APART?
WHAT MAKES OUR GAMES DIFFERENT?

USER-CENTRIC APPROACH AT EVERY STEP



EVIDENCE FOR THE IMPACT OF OUR GAMES

Attitudes score: change since baseline

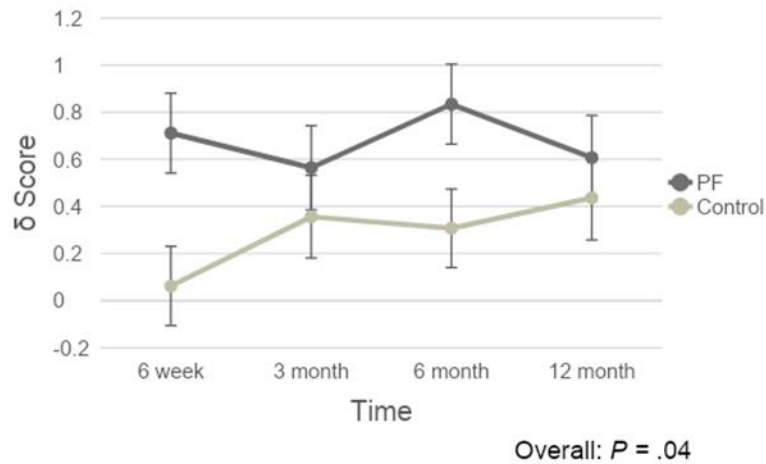
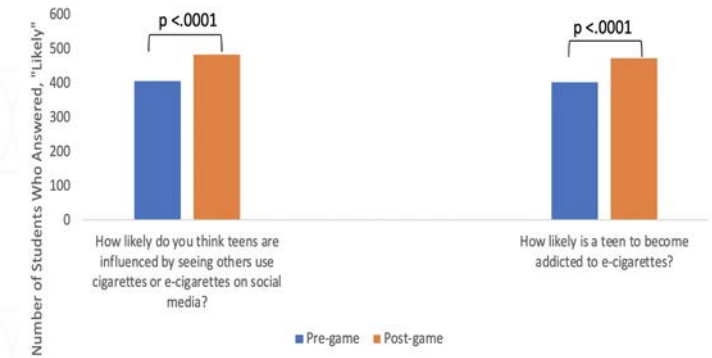


Table 3. Association of game play with gains in substance use knowledge.

Substance use knowledge	B	SE	β	t_{102}	P
3 Month					
Number of levels beaten	.31	0.06	.49	5.12	.001
Number of hours playing game	-.07	0.07	-.09	-1.00	.32
Baseline knowledge	.35	0.10	.28	3.47	.001
Age	.38	0.18	.16	1.85	.07
6 Month					
Number of levels beaten	.11	0.05	.18	2.19	.03
Number of hours playing game	-.02	0.05	-.03	-0.35	.71
3-month knowledge	.72	0.07	.74	10.23	.001
Age	-.13	0.13	-.06	-0.98	.33

Increase in Negative Beliefs About Tobacco Products
Pre-game to Post-game



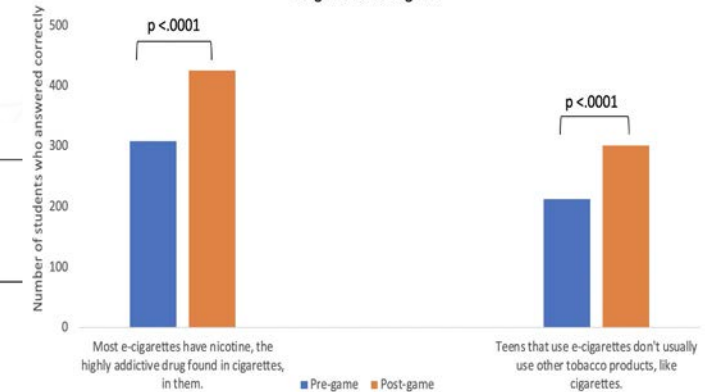
Using Videogame Apps to Assess Gains in Adolescents' Substance Use Knowledge: New Opportunities for Evaluating Intervention Exposure and Content Mastery

Erika Montanaro¹, PhD (HK), M Paed De; Lynn E Fiellin², MD; Tamer Fakhouri¹, MD; Tassos C Kyriakides¹, PhD (HK), M Paed De; Lindsay R Duncan¹, PhD (HK), M Paed De

Table 2 Evaluation of assessment validity

	Scores baseline, mean (SD)	Scores (post-gameplay, 3 weeks), mean (SD)	Scores (follow-up, 6 weeks), mean (SD)	Number of participants tested for HIV (baseline)	Number of participants tested for HIV (post-gameplay, 3 weeks)	Number of participants tested for HIV (follow-up, 6 weeks)	P value
Intentions	2.81 (0.89)	3.28 (0.92)	3.15 (0.81)	—	—	—	.0037
Knowledge	17.44 (4.30)	21.13 (3.83)	21.13 (2.85)	—	—	—	.0025
Perceived Susceptibility	0.06 (0.24)	0.22 (0.55)	0.11 (0.32)	—	—	—	0.390
Attitudes	2.18 (0.77)	2.30 (0.60)	2.19 (0.58)	—	—	—	0.323
Behavior	—	—	—	0	0	2	0.135

Increase in Knowledge About Tobacco Products
Pre-game to Post-game



Video Game Intervention for Sexual Risk Reduction in Minority Adolescents: Randomized Controlled Trial

Lynn E Fiellin^{1,2,3,4}, MD; Kimberly D Hieftje^{1,3,4}, PhD; Tyra M Pendergrass^{1,3,4}, MEM; Tassos C Kyriakides¹, PhD; Lindsay R Duncan^{1,6}, PhD; James D Dziura⁵, PhD; Benjamin G Sawyer^{1,7}; Linda Mayes^{2,4}, MD; Cindy A Crusto^{3,4,8}, PhD; Brian WC Forsyth^{1,4}, MBChB, FRCP; David A Fiellin^{1,3,4,7}, MD

TP Boomer et al. / Journal of Adolescent Health xxx (2023) 1–8

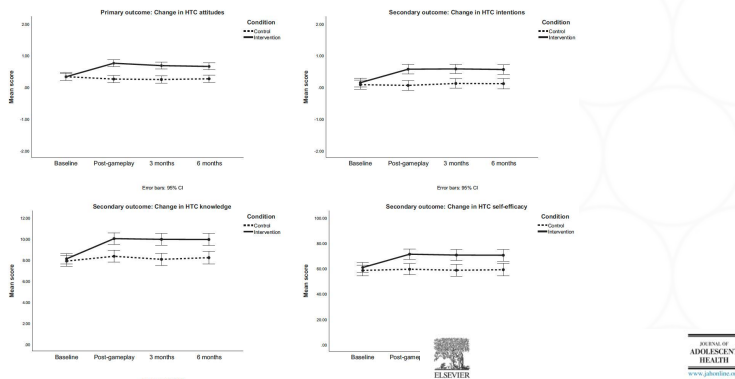


Figure 2. Changes in attitudes, intentions, knowledge, and self-efficacy by study condition.

Original article
A Serious Video Game Targeting HIV Testing and Counseling: A Randomized Controlled Trial

Tyra Pendergrass Boomer, MEd¹; Kimberly Larkin¹; Lindsay R Duncan, PhD¹; Claudia-Santi F. Fernandes, EdD, LPC¹; and Lynn E. Fiellin, MD¹

¹Department of Preventive Medicine, Yale School of Medicine, New Haven, CT, USA; ²Department of Psychiatry, Yale School of Medicine, New Haven, CT, USA; ³Department of Epidemiology, Yale School of Medicine, New Haven, CT, USA; ⁴Department of Behavioral Science, Yale School of Medicine, New Haven, CT, USA; ⁵Department of Psychology, Yale University, New Haven, CT, USA; ⁶Department of Educational Psychology, Yale University, New Haven, CT, USA; ⁷Department of Psychiatry, Yale University, New Haven, CT, USA; ⁸Department of Psychiatry, Yale University, New Haven, CT, USA

Article history: Received January 20, 2023; Accepted August 15, 2023

Keywords: Adolescents; Technology intervention; HIV testing and counseling; Serious video game; Randomized controlled trial; Behavior change



Videogame intervention to encourage HIV testing and counseling among adolescents

Tyra Pendergrass¹, Kimberly Hieftje², Lindsay Duncan¹, Lynn Fiellin¹

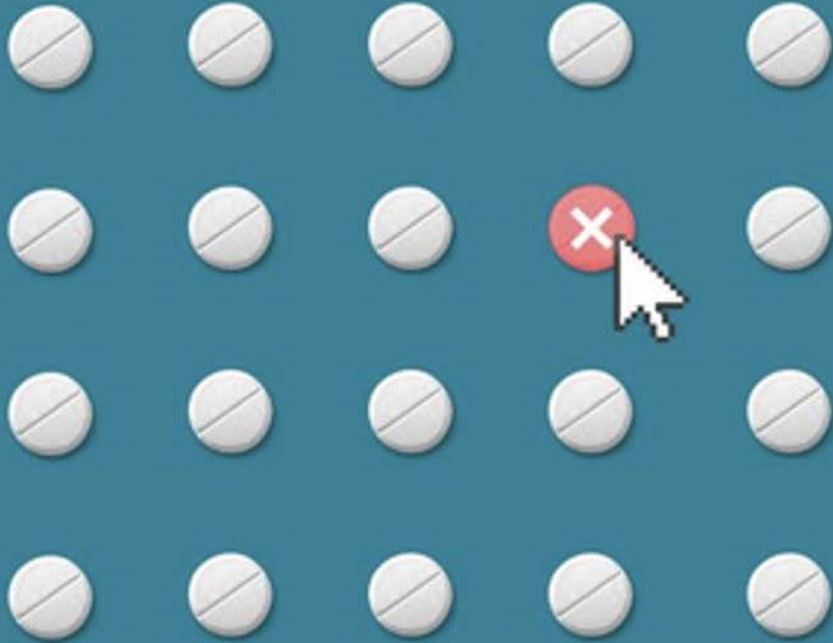
¹Yale Center for Health and Learning Games, Yale School of Medicine, New Haven, CT, USA; ²Department of Kinesiology and Physical



Effectiveness of a web-based tobacco product use prevention videogame intervention on young adolescents' beliefs and knowledge

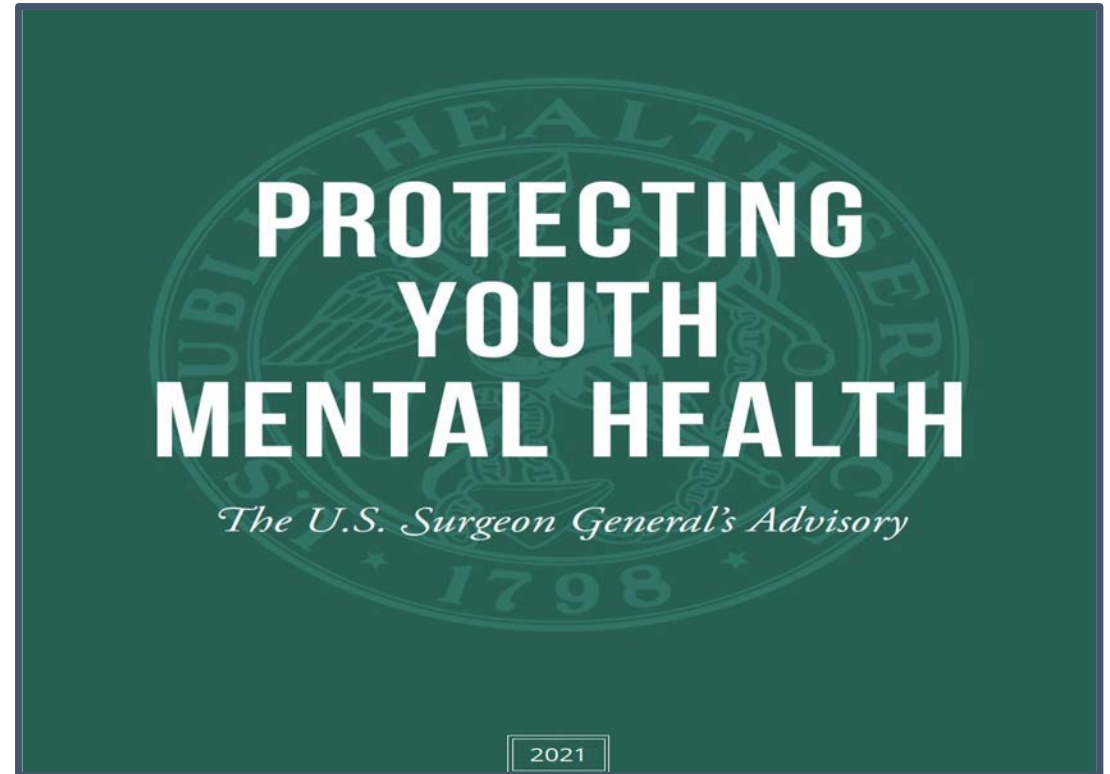
Kimberly D. Hieftje, Claudia-Santi F. Fernandes, I-Hsin Lin & Lynn E. Fiellin

OUR IMPACT



A Yale doctor is using a video game to fight the opioid crisis

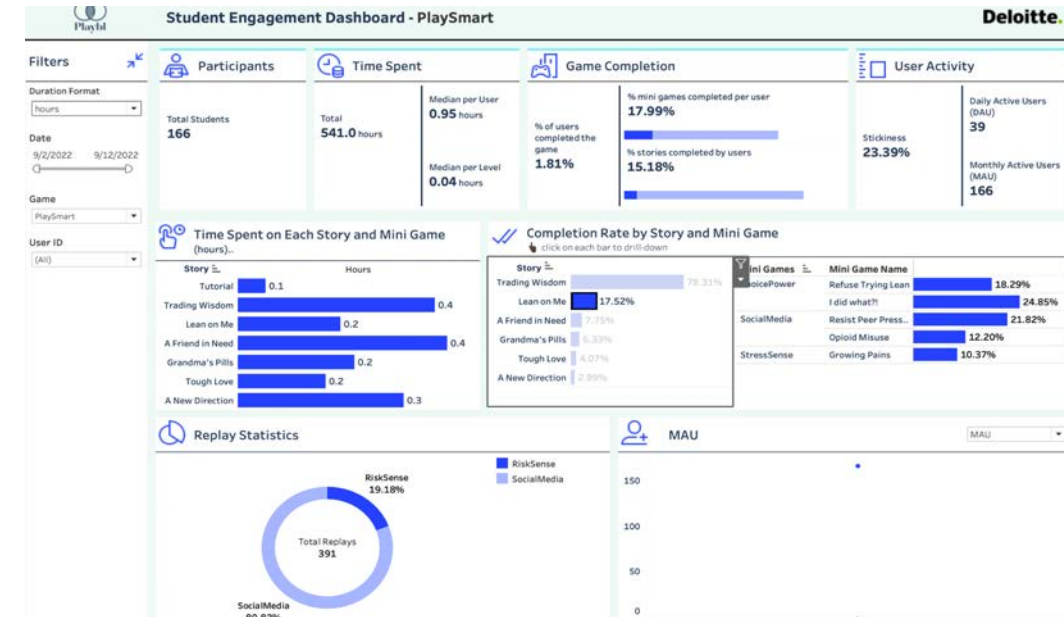
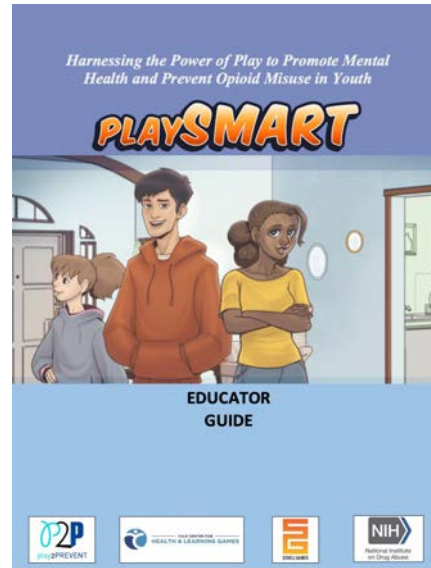
Washington Post



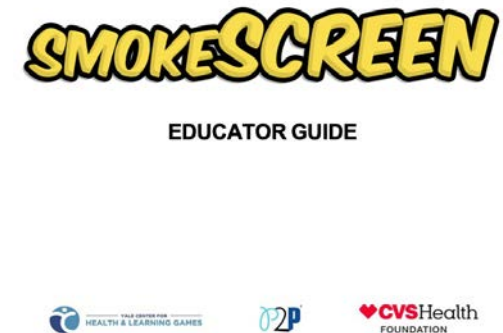
- Designed to meet the National Health Education Standards
- Map to the Healthy and Balanced Living Curriculum Framework Standards

IMPLEMENTATION SUPPORT RESOURCES

- **Guides:**
 - Educator
 - Peer-to-Peer
 - Parent
 - Healthcare Provider
- **Pre-post surveys**
- **User Engagement Data Dashboard**
- **Professional Development**



empowerED: Think it Through Digital Stories



WHAT WE ARE HEARING

"By using PlaySmart interactive games as part of our curriculum with my high school health students, I have been able to find better ways to present opioid and drug related topics and dangers to my students that are more relatable to their experiences. The games have sparked deeper conversations and an interest in students wanting to learn more."

High School Educator – Illinois

"The character I chose with the little sister and having friends who don't make the greatest decisions, I put myself in the character's shoes. It helped me figure out things about myself. It sounds very deep, and it was a little revelation."

High School Student, Connecticut

"As a school social worker we're always looking for resources to help hone in on the skills that we're trying to teach just kind of making it real for them because we talk about it in an office, but they don't have any opportunity to practice that or see where that decision would take them."

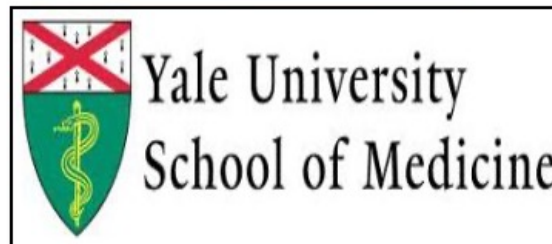
School Social Worker, New Haven, CT

"My middle school classes had the opportunity to play smokeSCREEN while simultaneously learning about the adolescent brain and substance use, abuse, and addiction. Several students even asked if they could continue playing outside of school! As a health teacher, I am always looking for opportunities to influence behaviors that promote health and wellbeing. This game did just that! In addition to providing information for students to gain knowledge, smokeSCREEN guided students to think more critically about the real-life decisions they are already faced with or will be in the future."

Director, Health & Wellness, Chattanooga, TN



YALE CENTER FOR
HEALTH & LEARNING GAMES



Center for **Technology**
and **Behavioral Health**
Innovate · Evaluate · Disseminate

THANK YOU!

**“We do not stop playing because we grow old,
we grow old because we stop playing!”**

– Benjamin Franklin

For information on our research:

<https://www.play2prevent.org/>

For more information on accessing our games:

[https://playbl.com/
hello@playbl.com](https://playbl.com/hello@playbl.com)



www.playbl.com

HARNESSING THE POWER OF PLAY
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