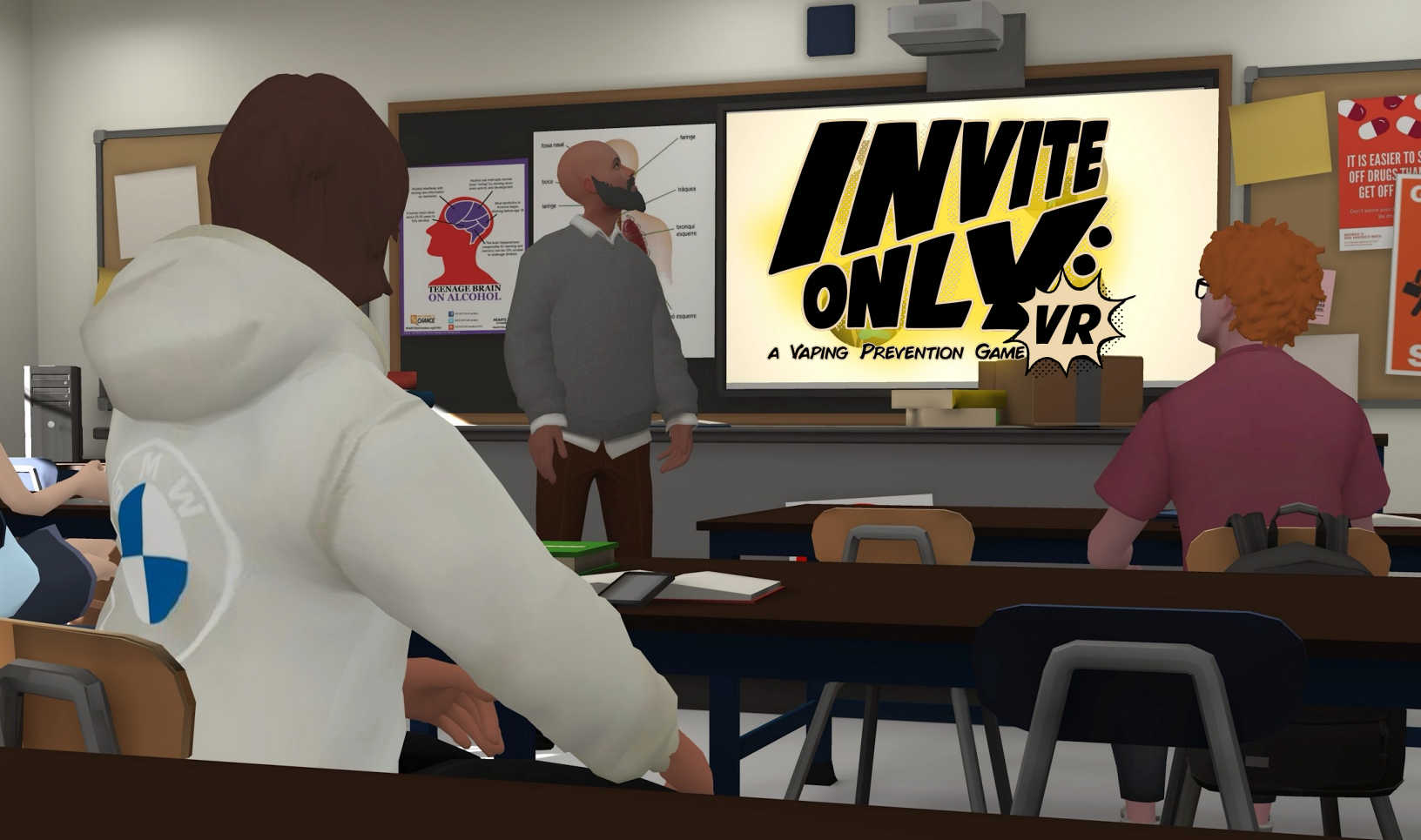




INVITE ONLY VR: A VAPING PREVENTION GAME

Project Summary and Findings

*Prepared by Researchers at the XR Pediatrics Lab
Yale School of Medicine*

**A Collaboration between
Yale School of Medicine's XR Pediatrics Lab, Connecticut
Department of Public Health, and Connecticut Public
Middle Schools**

September 8, 2026

CONTENT

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- A whiteboard with a blue border and a silver marker tray at the bottom. The tray contains four markers: pink, white, green, and blue. The whiteboard is mounted on a white stand.
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Game Development: We acknowledge **PreviewLabs, Inc.** for its contributions to the development of *Invite Only VR*.

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FUNDING & DISCLOSURE

Funding

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Conflict of Interest Disclosure

The Principal Investigator of this study, Dr. Kimberly Hieftje, has a significant financial interest and relationship with the videogame prototype company, PreviewLabs, Inc., the developer of the application used in this study, because her spouse has ownership interest in PreviewLabs. Given this conflict of interest, Dr. Hieftje was not involved in the recruitment, enrollment, consent of participants, or data analysis of this study. Questions regarding institutional or investigator interests may be directed to Dr. Deepa Camenga.

Disclaimer

The content of this report is solely the responsibility of the authors and does not necessarily represent the official views of Yale University, the Connecticut Department of Public Health, the National Institutes of Health and their subsidiaries.

Photographs and Images

Written informed consent for the acquisition and publication of student photographs was obtained from each student's parent or legal guardian.



THANK You!

All students, teachers, and staff who contributed to the development, evaluation, and implementation of Invite Only VR.

Connecticut Department of Public Health

- Manisha Juthani
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- Darcie Doyon
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INVITE ONLY VR OVERVIEW

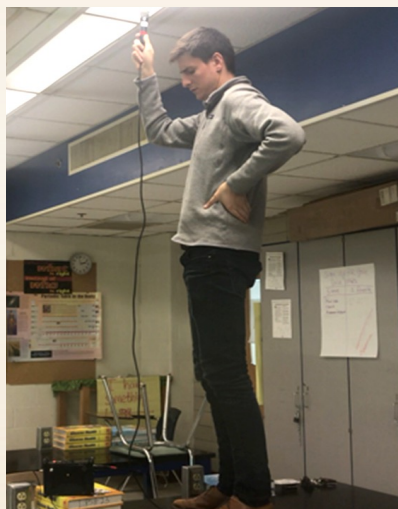
- *Invite Only VR* is a narrative-based virtual reality (VR) video game designed to help prevent nicotine and cannabis vaping among middle school students.
- Developed for adolescents aged 11–14 years, *Invite Only VR* is designed to complement existing school-based vaping prevention curricula.
- Players step into realistic school and social settings where they encounter common situations involving peer pressure to vape.
- Players learn about the health risks of vaping while practicing refusal skills and building emotion regulation skills and healthy coping strategies.
- The game is played on Meta Quest 2 VR headsets and takes 2–2.5 hours to complete.



XR PEDIATRICS LAB



At XR Pediatrics, our goal is to develop and evaluate evidence- and theory-based interventions focused on increasing healthy behaviors in youth and young adults.

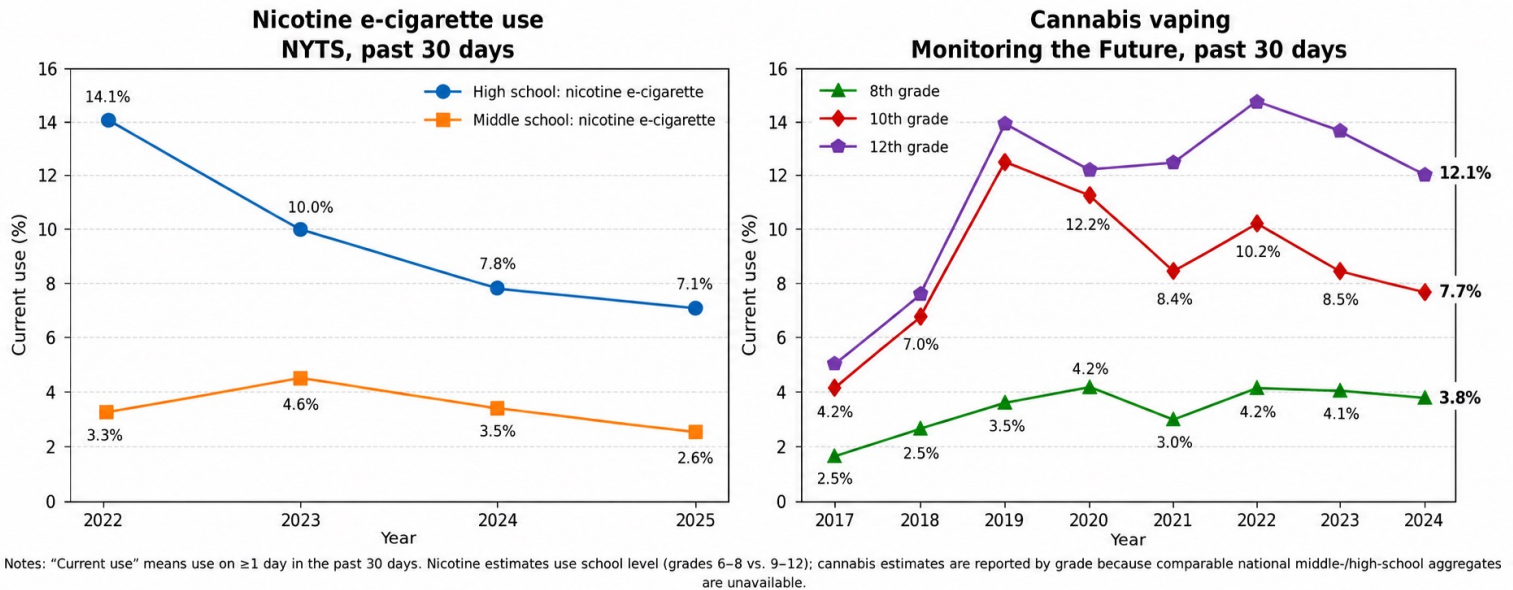


Invite Only VR was developed through a user-centered design process involving more than 200 adolescents from Connecticut, who contributed to the game's storyline, characters, scripts, voice acting, and iterative playtesting.



WHY FOCUS ON TEEN VAPING?

U.S. Adolescent Nicotine E-cigarette and Cannabis Vaping Use



Nicotine and cannabis vaping remain important public health concerns among U.S. adolescents. [National Youth Tobacco Survey](#) data show that current e-cigarette use declined from 14.1% to 7.1% among high school students and from 3.3% to 2.6% (n=300,000) among middle school students between 2022 and 2025.

[Monitoring the Future](#) data also show that cannabis vaping remains common, particularly among older adolescents; in 2024, past-30-day use was reported by 3.8% of 8th graders, 7.7% of 10th graders, and 12.1% of 12th graders.

These risks highlight the continued need for evidence-based prevention programs that help adolescents build knowledge, refusal skills, emotion regulation skills, and healthy coping strategies.

WHAT WE DID: THE VAPING PREVENTION STUDY

In Fall 2025, we enrolled 64 students in 6th through 8th grade from three middle schools in the East Haven, Monroe, and Stamford school districts to participate in this pilot study.

Students with parent or guardian consent participated during their regular health or PE classes. They completed a confidential survey before and after playing *Invite Only VR* over three class periods using Meta Quest 2 headsets. The surveys measured students' knowledge and perceptions of nicotine and cannabis vaping, as well as their experience with the videogame intervention.

We thank the students, teachers, school staff, and the East Haven, Monroe, and Stamford school districts for partnering with us and providing valuable feedback throughout this project.

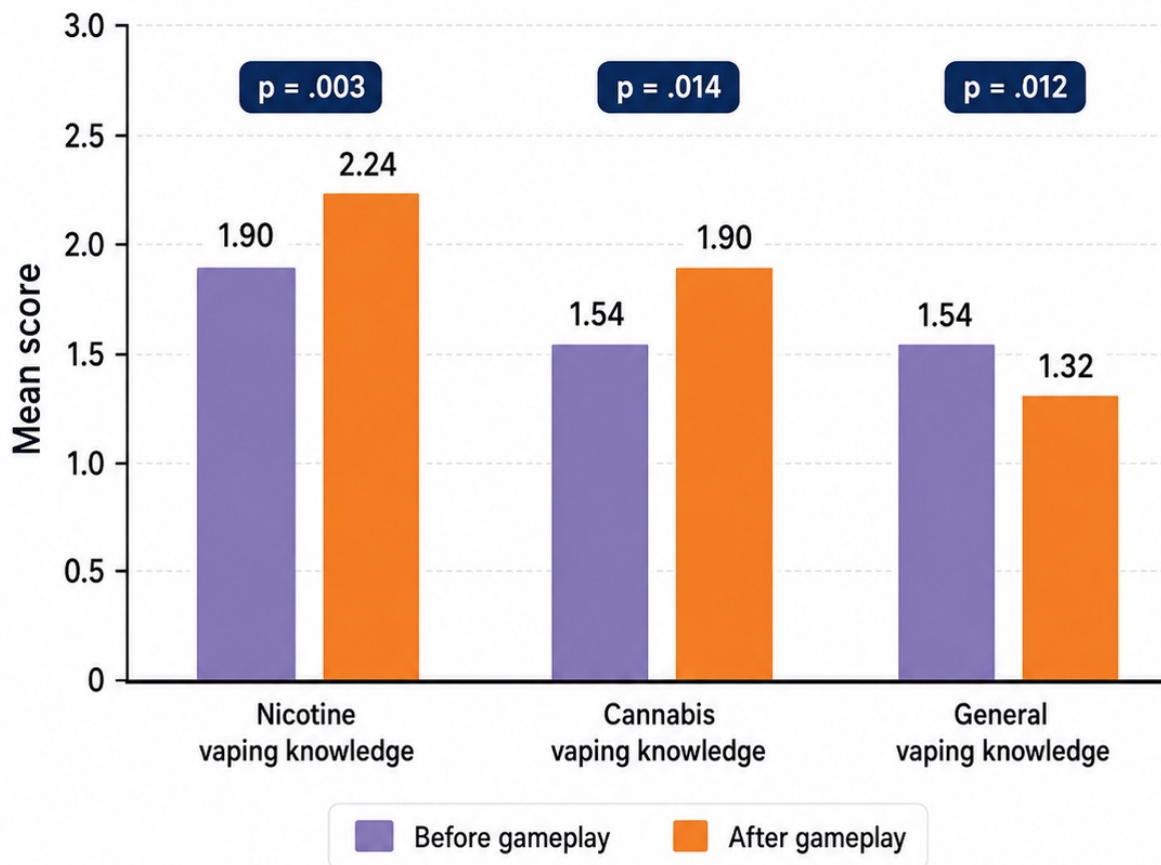
We look forward to continuing this collaboration as we improve *Invite Only VR* and prepare for a larger NIH-funded clinical trial involving approximately 1,300 eighth-grade students across 20 middle schools in Connecticut and Massachusetts. Participating schools will receive 10 Meta Quest 2 virtual reality headsets to support implementation of the program.

Written informed consent for the acquisition and publication of student photographs was obtained from each student's parent or legal guardian.



WHAT WE FOUND: VAPING KNOWLEDGE INCREASED SIGNIFICANTLY

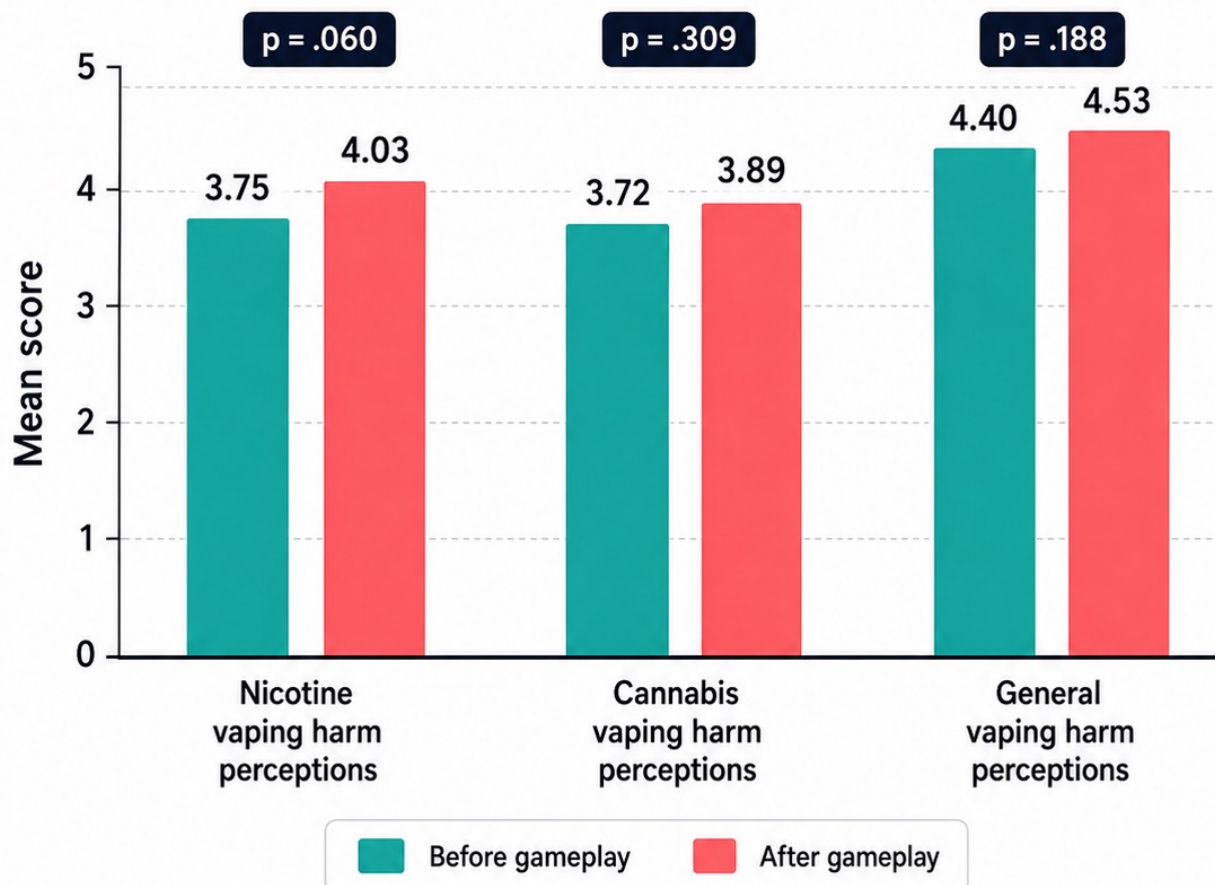
Changes in Vaping Knowledge After Invite Only VR



- **Nicotine vaping knowledge increased significantly. (Range 0-3)**
 - Example item: “E-cigarettes (vapes with nicotine) contain only water vapor.” (*True, False, I don’t know*)
- **Cannabis vaping knowledge increased significantly. (Range 0-3)**
 - Example item: “Cannabis is addictive.” (*True, False, I don’t know*)
- **General vaping knowledge was already strong overall. (Range 0-2)**
 - The reduced score suggests opportunities to improve survey clarity and reinforce general vaping concepts in the upcoming clinical trial.
 - Example item: “The minimum legal age to purchase vaping products is 21.” (*True, False, I don’t know*)

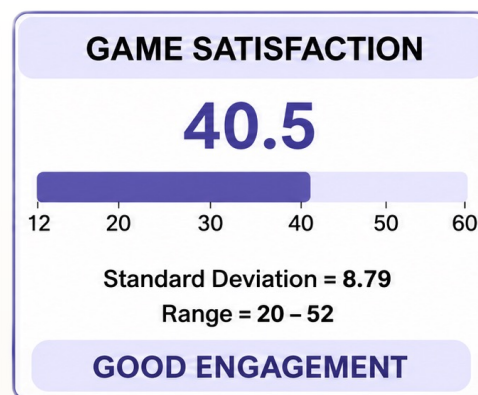
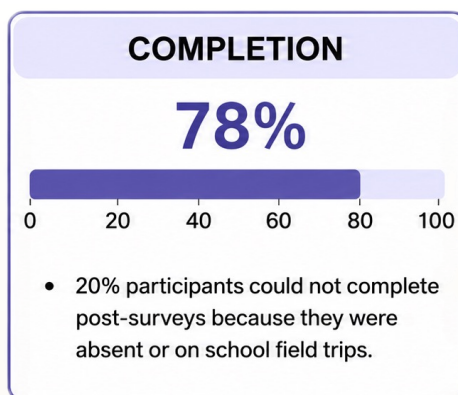
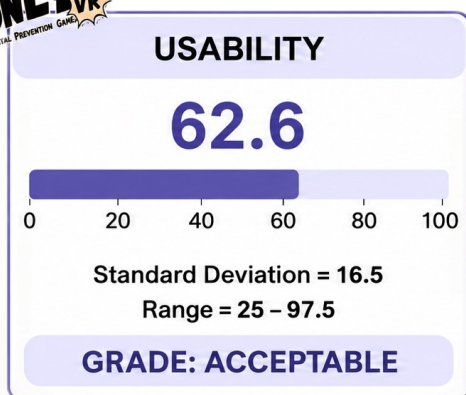
WHAT WE FOUND: VAPING HARM PERCEPTIONS REMAINED STRONG

Changes in Vaping Harm Perceptions After Invite Only VR



- **Nicotine, cannabis, and general vaping harm perceptions (Range 1 – 5)**
 - Example items:
 - “How harmful do you think vaping nicotine is for your mental health?”
 - “How harmful do you think vaping cannabis is for your mental health?”
 - “How harmful do you think it is to use vaping as a way to cope with stress?”
 - 1 = Not at all harmful to 5 = Extremely harmful
- **High baseline awareness may have limited measurable change.**

INVITE ONLY VR IS ENJOYABLE AND USABLE WITH SOME AREAS FOR IMPROVEMENT



Gameplay satisfaction (40.5 / 60)

Sample Items	Mean (out of 5)
I made decisions like I would in real life	3.96 / 5
I felt responsible for my choices	3.90 / 5
I enjoyed playing the game	3.84 / 5
I enjoyed moving around in the game	3.84 / 5
I would recommend this game to friends	2.80 / 5

System Usability (62.6 / 100)

Sample Items	Mean (out of 5)
I felt confident playing the game	3.82 / 5
The game was easy to play	3.58 / 5
The game's features worked well together	3.48 / 5
The game was unnecessarily complex*	2.52 / 5

*Lower scores indicate better usability.

LOOKING FORWARD

What's Next for *Invite Only VR*?

- In the coming months, we'll use your feedback to improve *Invite Only VR*'s gameplay, narrative, mini-games, and overall experience while developing practical resources for teachers and schools.



- Over the next four years, our team will conduct a large NIH funded clinical trial (IRB# 2000039342) to evaluate the optimized game with **approximately 1,300 8th graders across 20 middle schools in Connecticut and Massachusetts.**
- We are assessing the videogame intervention's immediate and long-term impact on vaping prevention, e-cigarette initiation, emotion regulation and healthy coping skill building with follow-ups at 3, 6, and 12 months.

- **Teachers** will receive training and ongoing implementation support.
- **Each participating school** will receive 10 Meta Quest VR headsets at the completion of the study.
- We hope to continue working with our partner schools in **Connecticut**, and we warmly invite you to join us in this exciting next phase of *Invite Only VR*!

PUBLICATIONS & COMMUNITY ENGAGEMENT

Peer-Reviewed Publications

Camenga, D. R., Weser, V., Kurade, P., Van, S., Shaker, J., Schuster, R. M., DeTore, N. R., & Hieftje, K. (under review). From insight to impact: Novel qualitative approaches in the design of virtual reality videogames for substance use prevention. *Prevention Science*.

Weser, V. U., Hieftje, K., Shaker, J., Antwi, D., Singh, K. P., Schuster, R., & Camenga, D. (2026). School staff experiences with vaping disciplinary procedures in Connecticut schools: a qualitative study of middle school staff. *Nicotine and Tobacco Research*, 28(5), 809-816. [Link](#)

Weser, V. U., Duncan, L. R., Sands, B. E., Schartmann, A., Jacobo, S., François, B., & Hieftje, K. D. (2021). Evaluation of a virtual reality e-cigarette prevention game for adolescents. *Addictive Behaviors*, 122, 107027. [Link](#)

Weser, V. U., Duncan, L. R., Pendergrass, T. M., Fernandes, C. S., Fiellin, L. E., & Hieftje, K. D. (2021). A quasi-experimental test of a virtual reality game prototype for adolescent e-cigarette prevention. *Addictive Behaviors*, 112, 106639. [Link](#)

Oral Presentations

Kurade, P., Hieftje, K., Weser, V., Shaker, J., Schuster, R. M., & Camenga, D. R. (2026). Vaping to cope: Middle school students' perceptions of the mental health impacts of nicotine and cannabis vaping. Society for Research on Nicotine and Tobacco Annual Meeting.

Weser, V. U., Hieftje, K., Shaker, J., Schuster, R., & Camenga, D. R. (2024). Nicotine and cannabis vaping on school grounds: Perceptions of Connecticut middle school teachers, administrators, and staff. Society for Prevention Research (SPR) 32nd Annual Meeting, Washington, DC, United States.

Poster Presentations

Hieftje, K., Camenga, D. R., Weser, V., Bartush, S., & Shaker, J. (2026, May 26–29). Virtual reality for vaping prevention in middle schools: A CFIR-based assessment of implementation readiness. SPR.

Kurade, P., Camenga, D. R., Weser, V. U., Shaker, J., Schuster, R. M., DeTore, N. R., & Hieftje, K. (2026, May 26–29). Evaluation and optimization of a virtual reality game for nicotine and cannabis e-cigarette prevention among middle school students. [Poster presentation]. SPR and SRNT.

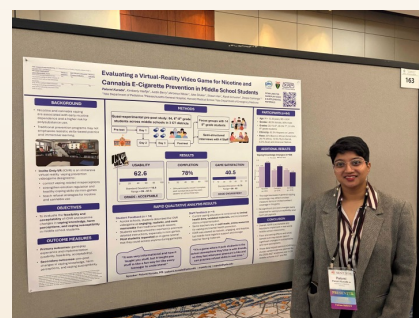
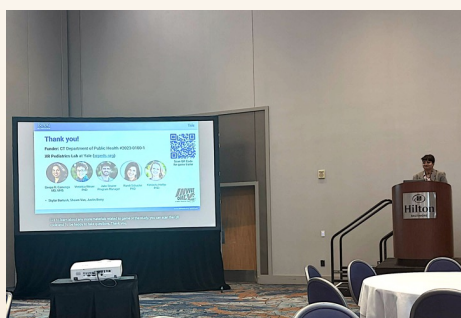
Conyers, S. G., Hieftje, K. D., Weser, V. U., Shaker, J., Kurade, P., Van, S., & Camenga, D. R. (2025). Exploring the duality of adolescent vaping discourse: A qualitative study of middle school students' perceptions of nicotine and cannabis use in schools and communities. Yale Pediatrics Research Forum.

Technology Demonstration

Camenga, D. R., Weser, V. U., Bartush, S., Shaker, J., Schuster, R. M., & Hieftje, K. (2026, May 26–29). Youth prevention through immersive technology: Invite Only VR. [Technology demonstration]. SPR.

Workshop

Camenga, D. R., Hieftje, K., & Kurade, P. (2026). Immersive technology-driven strategies to incorporate healthy coping and emotion regulation skills into cannabis and nicotine vaping prevention curricula. 7th Annual Cannabis (and Other Drugs) Awareness & Prevention Conference, Halpern-Felsher REACH Lab, Stanford Medicine.



CONTACT INFO

For questions about *Invite Only VR*, this project, or other XR Pediatrics video game interventions, please contact us or visit:

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Thank you very much for your partnership and support!
We look forward to staying connected and hearing from you
as we continue to improve and expand *Invite Only VR*.