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Original article

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

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A B S T R A C T

Purpose: Adolescents are the age group that is least likely to know their HIV status and may unknowingly transmit the virus to others. A randomized controlled trial was conducted to evaluate the impact of the original video game intervention, PlayTest!, on behavioral antecedents for HIV testing and counseling (HTC).
Methods: Participants (N = 287 adolescents) were recruited between 2018 and 2020 and were 48% female, aged 14–18 years (mean age = 15.4 years), and 76% racial minorities. Participants were randomized 1:1 and assigned to either play PlayTest! or a set of control games, ~one session per week for an hour per session over 4–6 weeks (gameplay) after school. The primary outcome measure was participants' attitudes around HTC at 6 months, with intentions, knowledge, self-efficacy, and behaviors assessed as secondary outcomes.
Results: Two hundred and ninety-six participants were enrolled/randomized; nine were withdrawn due to incomplete parental consent forms, leaving 287 participants: 145 were randomized to PlayTest! and 142 to the control condition. Mixed between-within subjects ANOVAs assessed the impact of the study conditions on outcomes. Improvements were seen in the PlayTest! group in HTC attitudes ($p < .001$), intentions ($p < .001$), knowledge ($p < .001$), and self-efficacy ($p = .002$) at all time-points. At 6 months, for those who had access to HTC (N = 134; prior to COVID-19) and for those who did not have access to HTC (N = 261; during COVID-19), there were no differences in self-reported HTC between the two groups ($p = .289$ and $p = .074$, respectively).
Discussion: PlayTest! impacted important behavioral antecedents related to HTC and has the potential to broadly increase HTC rates in adolescents.

IMPLICATIONS AND CONTRIBUTIONS

PlayTest! is a novel video game intervention designed to help increase HIV testing rates among adolescents. Having demonstrated significant impact on important behavioral antecedents such as attitudes, intentions, and knowledge, *PlayTest!* has the potential to have a unique and significant impact on adolescent populations on a national and global level.

Conflicts of interest: Dr. Lynn Fiellin, a co-author on this manuscript, is a co-founder and equity holder of a new spin-out company from the play2-PREVENT Lab called Playbl that focuses on the marketing and distribution of our video game interventions. This relationship is extensively managed by Dr. Fiellin and Yale University. No other co-authors have financial or other relationships that might lead to a conflict of interest.

Trial Registration: This study is registered at ClinicalTrials.gov. (ClinicalTrials.gov Identifier: NCT03713034).

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Globally, in 2021, adolescents' ages 10–19 years old accounted for 160,000 new HIV cases [1]. The HIV incidence rate in the United States mirrors the global trend with 20% of new cases in 2020 occurring in adolescents [2]. Adolescents are the least likely of any age group to be aware of their HIV infection and may unknowingly transmit the virus to others [2], contributing to an increased incidence in this population. Many HIV prevention challenges exist among adolescents, including inadequate sex education, social and economic barriers, and stigma surrounding HIV [3]. To prevent adolescents from acquiring and/or transmitting HIV, it is important to provide them with information about HIV and foster optimal motivation and skills to minimize their risk and know their status. HIV testing and counseling (HTC) can connect adolescents who are HIV-negative to prevention resources and help establish early diagnosis and effective care for those who test positive [4]. In addition to the aforementioned barriers to prevention, an integrative review of adolescents found that many perceived many negative consequences associated with getting tested for HIV [5]. With only 9% of US high school students reporting ever being tested for HIV, there is a critical need for innovative approaches to promote HTC among adolescents [6].

School-based health centers (SBHCs) are novel health-care settings that are located in schools or on school grounds. SBHCs provide access to affordable health care for students and offer a range of services including medical, behavioral, visual, and dental care [7]. SBHCs can provide confidential and convenient sexual health services [8] for adolescents seeking HTC, helping to address some of the largest barriers among adolescents. Additionally, SBHCs highlight the opportunity to integrate the three Centers for Disease Control and Prevention-developed approaches for HIV/sexually transmitted infection (STI) prevention by providing health services, health education, and a safe and supportive environment [2].

Serious video games, defined as video games developed for purposes other than solely entertainment [9], provide the unique opportunity to promote HTC among adolescents. Increasingly used for health education across varying populations [10], serious games are rooted in psychological and behavior change theories and have demonstrated applications in both domestic and international settings [11]. As a result of their evidence- and theory-based nature, serious games may change the attitudes, intentions, knowledge, and behaviors of players in an interactive environment [12–18] and have the potential to translate into real-world settings.

To date, some HIV interventions that have used serious games, demonstrated impact on AIDS knowledge [19], or been shown to increase knowledge, self-efficacy, and intentions around risk-avoidance strategies and sexual risk communication in younger populations (11–14) [20] have not explicitly focused on HTC.

In partnership with SBHCs, we conducted an randomized controlled trial (RCT) comparing the original video game *PlayTest*! to a set of control games to assess behavioral antecedents for HTC.

Methods

Changes in response to the COVID-19 pandemic

The originally proposed primary outcome for this study was the proportion of participants who engaged in HTC within the six-month study period. The original secondary outcomes were attitudes, intentions, knowledge, and self-efficacy related to HTC.

On February 12, 2020, the enrollment and randomization goals were completed for this study. However, during the latter part of March 2020, the emergence of COVID-19 closed all partner schools and affected the protocols for this study. For the remainder of the 2019–2020 and the beginning of the 2020–2021 school years, participants experienced significant barriers to accessing their SBHCs and the services they provide, such as HTC. Prior to the COVID shutdown, only 134 of the enrolled 287 participants had reached the time point (6 months) to be assessed for the primary outcome. Additionally, there has been a well-documented decline in outpatient clinic visits during the pandemic with pediatrics having the greatest reduction at 27% [21]. For this reason, the study's ability to effectively measure the original primary outcome of HTC was affected.

Due to the impact of COVID-19, our study team modified our primary and secondary outcomes (after conferring with the study's Data Safety Monitoring Board, the NIH program officer, and reporting to ClinicalTrials.Gov). After a thorough literature review [22–25] that highlighted the strongest predictors of our targeted behavior in our target population and prior to any data analysis, the team changed the primary outcome to measuring participants' attitudes around HTC at 6 months, with intentions, knowledge, self-efficacy, and behaviors assessed as secondary outcomes.

With this study, we were fortunate to have finished the implementation portion of the project (gameplay sessions) with most participants before the COVID pandemic closed schools. The follow-up data collection was most impacted by the closures, as they limited our ability to follow-up with the participants in person as well as their ability to utilize their SBHCs. For these participants, follow-up assessments were collected remotely.

A full ethical and human subjects research review was conducted and approved by the Pediatric Protocol Review Committee and the Institutional Review Board at the Yale School of Medicine. The protocol and all updates to the protocol were submitted to and approved by these entities.

Study design, setting, and participants

This RCT evaluated the efficacy of *PlayTest!* on improving attitudes, intentions, knowledge, self-efficacy, and behaviors around HTC. Participants were randomized 1:1 to either play *PlayTest!* or a set of attention/time control games containing no content around the targeted subject matter.

Study recruitment, enrollment, randomization, and gameplay sessions were completed from November 8, 2018, through October 1, 2020. Recruitment methods included posters with QR codes, school announcements, and in-person recruitment by the study team. Participants were recruited in waves (i.e., groups of participants enrolled at their respective school sites and followed together) to help study staff efficiently keep track of participants throughout the study. There were 19 waves over the duration of the study. All study activities occurred onsite at partner high schools. The intervention was implemented during after-school hours on-site at the participants' respective high schools. The study team would meet with students once or twice per week to conduct gameplay sessions on school property either in a classroom or library. Snacks and drinks were provided to all participants.

Table 1
PlayTest! game description

Mini-game	Description	Theoretical applications
Know Sense	Builds player's knowledge about health-related topics and model how they could convey such information to their peers in a relevant way	Knowledge attainment
Persuasion Power	Players use conversational tactics to help their peers adopt newer and more accurate perspectives regarding their health without belittling them	Motivational interviewing
Me Power	Helps players think about who they are, what they care about, and what they want their future to look like	Social learning theory Self-efficacy Social modeling Message framing
Priority Sense	Teaches players how to balance the consequences of different decisions.	Social learning theory Self-efficacy Social modeling Message framing
Together Sense	Helps players navigate the relationships in their lives (i.e., peers, close as a crush, good friend, friend, or simply a classmate)	Social learning theory Self-efficacy Social modeling Message framing
Storyline	**Primary outcome**	
Ninth Grade (Party Game)	Teaches players how to detect unsafe actions that can jeopardize their health	
Ninth Grade (Juicy Gossip)	Addresses the stigma of HIV/STIs by normalizing HIV testing	
Tenth Grade (New Year's Eve)	Highlights the importance of HIV testing and honesty before engaging in sexual behavior	
Tenth Grade (Get Tested)	Emphasizes that health care professionals and trusted adults are valuable resources for teens to approach if they have questions or concerns about HIV/STIs	
Eleventh Grade (Privacy)	Shows how individuals can receive HIV testing at many places, from a school clinic to a third-party clinic as an alternative	
Eleventh Grade (Getting Serious)	Demonstrates the risks of not knowing about HIV status when engaging in intimate behavior, and models how to converse with a partner on status to maintain a safe relationship	
Twelfth Grade (Confide)	Increases an individual's self-efficacy and confidence to talk with trusted adults and partner about sexual health	
Twelfth Grade (Off to College)	Empowers individuals to become responsible of their own health and wellbeing, which includes scheduling regular appointments with the doctor	

STI = sexually transmitted infection.

Study participants were recruited from five high schools (three urban and two suburban) in Connecticut. Eligibility included: aged 14–18 years, English-speaking, not having been tested for HIV in the prior year, and agreeing to play on an iPad for approximately an hour each week, over 4–6 weeks. Additionally, participants had to already be enrolled in their school's SBHC or enroll before beginning participation in the study. All participants had to provide written assent, and those under the age of 18 also had to provide written parental consent.

Randomization

Eligible participants were randomized 1:1, using the online database system Oncore, to either play *PlayTest!* or a set of control games. Randomization was stratified by gender, race/ethnicity, and age.

Interventions

PlayTest! is an original web-based video game intervention with published pilot data, revealing promising results regarding using an evidence-informed video game intervention to promote HTC in adolescents [26]. In the game, the player creates an avatar to "travel" through their high school experience. The player learns skills to empower them to make safe choices and has opportunities to practice advocating for their health. *PlayTest!* incorporates evidence-based tools for behavior change including social learning theory and self-efficacy [27], message framing [28], and motivational interviewing [29] to identify the variables to increase HTC among adolescents (Table 1).

Participants randomized to the control condition were provided a menu of attention/time control games such as The Sims, Harry Potter, Subway Surfer, and Tetris. These control games contained no relevant content to the target outcomes.

Participants played their assigned game(s) for approximately one session per week for an hour per session onsite at their high school for a duration of 4–6 weeks (the number of weeks depended on school schedule). The study team brought iPads and headphones to each school for gameplay sessions and collected the materials after each one-hour gameplay session was complete. During gameplay sessions, research study staff recorded minutes played for each participant and also noted any auditory or observable reactions to the interventions.

Data collection

Over the course of the study, participants completed electronic assessment questions through Qualtrics software. Assessment questions were completed at baseline, "postgameplay" (immediately following completion of gameplay, at 4–6 weeks following baseline), 3-months, and 6-months. Follow-up assessments were completed in person or remotely. After completing their assessment questions at each timepoint, participants received a gift card as compensation for their efforts. Study participant responses were saved in the secure web-based system, Oncore. At the end of each month, SBHC staff checked clinic records to identify if participants who were enrolled in the

study had used the SBHC that month for HTC and recorded this information on a password-protected flash drive.

We optimized study retention by building significant and collaborative partnerships and relationships with both SBHC and school leadership and staff, who provided support and guidance throughout the study. We intentionally had the same research team member assigned to the same school site for consistency and familiarity with the participants. The research team used a dedicated cell phone to contact participants for reminders about gameplay and assessments.

To accommodate participant engagement, during the COVID pandemic, when follow-up assessments were collected remotely, participants were individually texted a link to the Qualtrics survey and their study ID. Finally, as mentioned previously, participants were provided a gift card when they successfully completed each assessment.

Outcomes measures

All assessment measures for this study (except for the one measuring self-efficacy) were piloted in our prior study or adapted from measures used in that pilot study [26]. The primary outcome was participants' attitudes around HTC (7 items, maximum score = 10, Cronbach alpha = 0.68; e.g., "I feel it is important for me to get tested for HIV"). The items were scored on a 5-point scale ranging from −2 (strongly disagree) to +2 (strongly agree) with positive values indicating more favorable attitudes toward HTC. We examined the impact of age and gender on HTC attitudes.

Secondary outcomes included intentions to get HTC (7 items, maximum score = 14, Cronbach's alpha = 0.89; e.g., "I intend to get tested for HIV at some point in the next 3 months" and "I intend to use a school-based health center to get tested for HIV"). Items were scored on a 5-point scale ranging from −2 (strongly disagree) to +2 (strongly agree) with positive values indicating more favorable intentions. Participants' HTC knowledge was assessed with 12 true/false/not sure items (maximum score = 12). Answers were scored as either correct or incorrect, with "not sure" being categorized as incorrect. This assessment measure was adapted for this study to align with the knowledge content specifically included in the game, ultimately contributing to the content validity of the assessment (Cronbach's alpha = 0.87). HTC self-efficacy was examined using an adapted version of an assessment measure [30,31] (4 items, rated on a 100% confidence scale, maximum score = 100, Cronbach's alpha = 0.86; e.g., "How confident are you that you could find information about how and where you can get STI and/or HIV testing?"), with higher scores indicating higher self-efficacy for HTC. For self-reported HTC behavior, participants indicated whether they had ever been tested for HIV with the response options: yes, no, not sure, and decline to answer. HTC behavior was also assessed through testing records kept by SBHC staff. Reasons not to get tested were assessed with 15 items [32] (e.g., "I don't know where to go," and "The test might be painful or uncomfortable"), where participants could select all that applied.

Statistical analysis

Analysis was performed on an intention-to-treat basis. For the original primary outcome of HTC rates at 6 months, a sample size calculation was done using the G*Power software. An effect size of 0.27 was estimated (conservatively) based on previous research [33]. With equal numbers of subjects in each group and alpha = 0.05, to provide 85% power to detect a difference in HTC rates at 6 months, controlling for history of testing, sex, and ethnicity, a sample of 118 per group (total N = 236) was required. Based on adherence rates from another RCT where we tested the efficacy of the *PlayForward* game, we assumed 80% retention at 6-months for this project [21]. To account for the 20% dropout, we sought to enroll 296 participants.

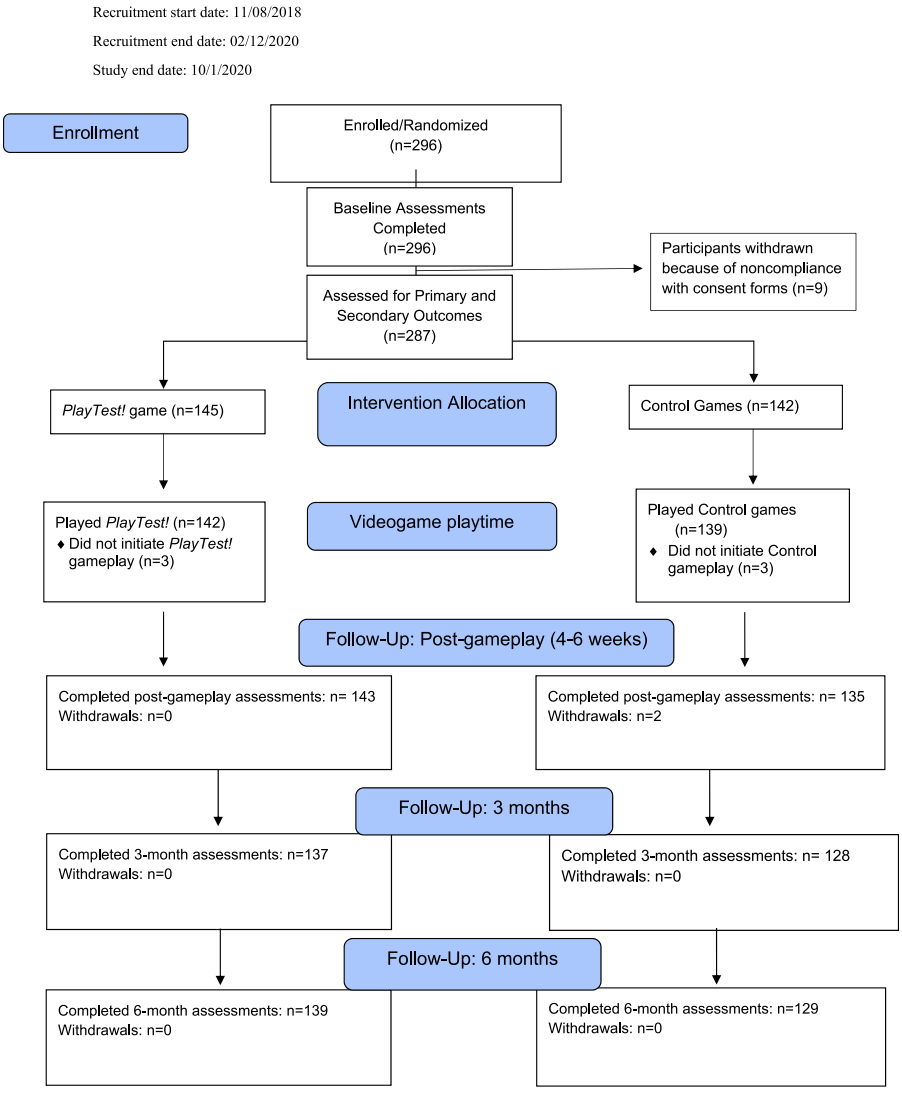
Due to COVID-19, the primary outcome of participants who got tested for HIV was modified to analyze attitudes around HTC at 6 months. No a priori sample size calculation was conducted for this outcome; however, the statistical analyses conducted on this outcome show an observed power of 100% indicating that the sample size was adequate.

Independent sample t-tests (for continuous variables) and chi-square tests (for categorical variables) were conducted to confirm no between-group differences on demographic variables at baseline. Correlations between demographic and outcome variables at baseline were conducted to determine relevant co-variates for subsequent analyses. Age, gender, and sexual activity status were correlated with the outcome variables; however, including these as covariates had negligible impact on the results. Mixed between-within subjects ANOVAs were conducted to assess the impact of the study conditions (intervention vs. control) on changes in HTC attitudes (primary outcome), intentions, knowledge, self-efficacy, and behaviors (secondary outcomes) across the four study time points (baseline, postgameplay, 3-months, 6-months). For HIV testing tracked through SBHC records, chi-squared analyses were performed on the sample (N = 134) that would have had access to HTC at the six-month time point (not affected by COVID-19) and on the sample (N = 261) that included those who did not have access to HTC at the six-month time point (affected by COVID-19). Chi-square analyses were also performed to compare the intervention to control participants on the 15 reasons not to get tested.

Results

In this RCT, 296 participants were enrolled and randomized. Nine participants were withdrawn by research staff due to incomplete parental consents (after randomization and completion of their baseline assessments; five from the *PlayTest!* group and four from the control group); those participants' data are not included in the analysis at any timepoint. This left 287 participants for analysis. Additionally, two participants withdrew themselves after randomization and baseline assessments were completed but before their postgameplay assessments due to lack of interest in the study (both participants were from the control group). Four participants did not participate in any gameplay (two from the *PlayTest!* group and two from the control group). Because of the intention-to-treat approach, these last two groups of six participants were included in the analyses.

One hundred and 45 participants (51%) were randomized to the *PlayTest!* group and 142 (49%) to the control group. For follow-up assessment completion: 278/287 (97%) at post-gameplay; 270/287 (94%) at 3-months; and 270/287 (94%) at 6-months (Figure 1). Of those randomized, 137 (48%) were female, 218 (76%) were racial minorities, and the mean age was 15.4 years (one participant was 19 years old and allowed to participate because they were 18 when their consent was signed)



Note: Assessment refers to questions that were answered by study participants at each time point. Participants who did not initiate game play were still considered active and assessed for study outcomes. Participants were still considered active in the study unless they officially withdrew themselves or withdrawn by research staff.

Withdrawal cases:

- ▪ PT114- Incomplete Consent forms; withdrawn by research staff
- ▪ PT125- Incomplete Consent forms; withdrawn by research staff
- ▪ PT103- Incomplete Consent forms; withdrawn by research staff
- ▪ PT127- Incomplete Consent forms; withdrawn by research staff
- ▪ PT097- Incomplete Consent forms; withdrawn by research staff
- ▪ PT132- Incomplete Consent forms; withdrawn by research staff
- ▪ PT122- Incomplete Consent forms; withdrawn by research staff
- ▪ PT120- Incomplete Consent forms; withdrawn by research staff
- ▪ PT082- Incomplete Consent forms; withdrawn by research staff
- ∇ PT232-Participant withdrew themselves from project before 4-week assessments
- ∇ PT205- Participant withdrew themselves from project before 4-week assessments

Reasons for no gameplay initiation:

- ♦ PT042-Stopped attending after school programs
- ♦ PT068- Stopped attending after school programs
- ♦ PT079- Stopped attending after school programs
- ♦ PT232- Stopped attending after school programs
- ♦ PT292-Family and job commitments after school
- ♦ PT225-Trouble with transportation after school

Figure 1. Enrollment and follow-up flow diagram for video game intervention trial for HIV testing and counseling.

(Table 2). There were no significant baseline demographic differences between the *PlayTest!* and control groups. Participants in the *PlayTest!* group played on average 230 minutes and the control group on average 271 minutes, and this was consistent whether a specific school site offered gameplay over a four- or a 6-week period.

Primary outcome

For the primary outcome of HTC attitudes, there was an interaction between condition and time: Wilks' lambda = 0.86, F (3, 249) = 13.89, $p < .001$, partial eta squared = 0.14 (large). The pattern of means indicates that for the intervention group, there was a substantial increase in attitudes from baseline to post-gameplay that was maintained at three- and six-months. For the control group, the mean scores remained consistent across time (Figure 2). We examined the impact of gender and age on attitudes around HTC, and there are no differences by gender, and while there are slight differences by age, this would not be considered a significant moderator.

Secondary outcomes

For intentions to get HTC, there was an interaction between condition and time, Wilks' lambda = 0.92, F (3, 249) = 7.61, $p < .001$, partial eta squared = 0.08 (moderate). For HTC knowledge, there was an interaction between condition and time, Wilks' lambda = 0.90, F (3, 250) = 9.79, $p < .001$, partial eta squared = 0.11 (large). For self-efficacy for HTC, there was an interaction between condition and time, Wilks' lambda = 0.94, F (3, 248) = 9.42, $p = .002$, partial eta squared = 0.06 (moderate). The patterns of means for intentions, knowledge, and self-efficacy indicate that for the intervention group there was a substantial increase in each of these outcomes from baseline to post-gameplay that was maintained at three- and six-months. For the control group, the mean scores remained consistent across time (Figure 2).

For the outcome of actual HIV testing that was tracked through the SBHC for the sample who had access to HTC through their SBHC at the six-month time point (N = 134) (not affected by COVID-19), there were no differences in self-reported HTC rates between the intervention and control groups ($p = .289$). For the larger sample including those who did not have access to HTC through their SBHC at the six-month time point (N = 261) (affected by COVID-19), there were no differences in self-reported HTC rates between the intervention and control groups ($p = .074$).

For the outcome of reasons not to get tested, differences between the experimental and control groups were found at each time point (with fewer intervention than control participants reporting the following as a reason not to get tested) for the questions: "I don't know where to go" (all p values $< .004$); "It costs too much" (all p values $< .001$); and "The test might be painful or uncomfortable" (all p values $< .001$).

Table 2
Participant baseline demographic characteristics

	Control (n = 142)	PlayTest! (n = 145)	Total (N = 287)	*p* value
Gender identity				.901
Male (n,%)	68 (48%)	73 (50%)	141 (49%)	
Female (n,%)	69 (49%)	68 (47%)	137 (48%)	
Self-described	5 (3%)	4 (3%)	9 (3%)	
Age, years (mean ± SD)	15.45 (1.25)	15.39 (1.24)	15.42 (1.24)	
Age group, n (%)				.861
13	0 (0%)	1 (1%)	1(1%)	
14	44 (31%)	45 (31%)	89 (31%)	
15	31 (22%)	34 (23%)	65 (22%)	
16	33 (23%)	34 (23%)	67 (23%)	
17	27 (19%)	25 (17%)	52 (18%)	
18	7 (5%)	5 (4%)	12 (4%)	
19	0 (0%)	1 (1%)	1 (1%)	
Race, n (%)				.956
White	35 (25%)	34 (23%)	69 (24%)	
Black or African American	58 (41%)	57 (39%)	115 (40%)	
Asian or Pacific Islander	5 (3%)	8 (6%)	13 (5%)	
American Indian or Native American	4 (3%)	4 (3%)	8 (3%)	
Multiracial	17 (12%)	15 (10%)	32 (11%)	
Other	23 (16%)	27 (19%)	50 (17%)	
Ethnicity, n (%)				.820
Hispanic	54 (38%)	53 (37%)	107 (37%)	
Non-Hispanic	88 (62%)	92 (63%)	180 (63%)	

Discussion

This study evaluated the efficacy of a theory-based, evidence-informed video game that promotes HTC in adolescents. *PlayTest!* not only had an impact on our primary outcome of modifying HTC attitudes but also increased intentions, knowledge, and self-efficacy around HTC. These results support *PlayTest!* as a potentially effective intervention for increasing HTC rates in adolescents, given that attitudes, intentions, knowledge [34], and self-efficacy [35,36] have been found to be antecedents of actual health behaviors. Although we were underpowered to detect a difference in those who reported getting tested for HIV between study conditions in the subgroup that were not affected by COVID-19 (N = 134), the game demonstrated the potential to impact those outcomes related to the desired behavior. As described, our ability to detect a difference was impacted by the COVID-19 pandemic in several ways including schools/SBHCs closing, limiting access to HTC, and the report from the majority of our study participants indicating that, because of the social isolation of the pandemic, they were not engaging in activities that would put them at risk for acquiring HIV, such as being sexually active. Therefore, they might have felt that there was little need to get tested, as their perception of their risk for acquiring HIV was low.

Other results from our study demonstrated changes in participants' reasons for why they would not get tested related to knowing where to go, the cost, and how the test is administered. In one storyline of *PlayTest*!, the player has a conversation with a medical professional who explains the procedure for getting tested for HIV and how it can be done in an SBHC for free. This significant change in certain perceived barriers to HTC may be directly linked to content that participants encountered in the game and highlights that players were able to make these direct connections between the content in the game and the real-world application of that information.

Although there are effective HIV and STI prevention programs, challenges in their implementation and fidelity exist. Barriers to implementation include access to adequately trained providers, resource constraints, and fidelity. There is a considerable range in both the quantity and quality of education

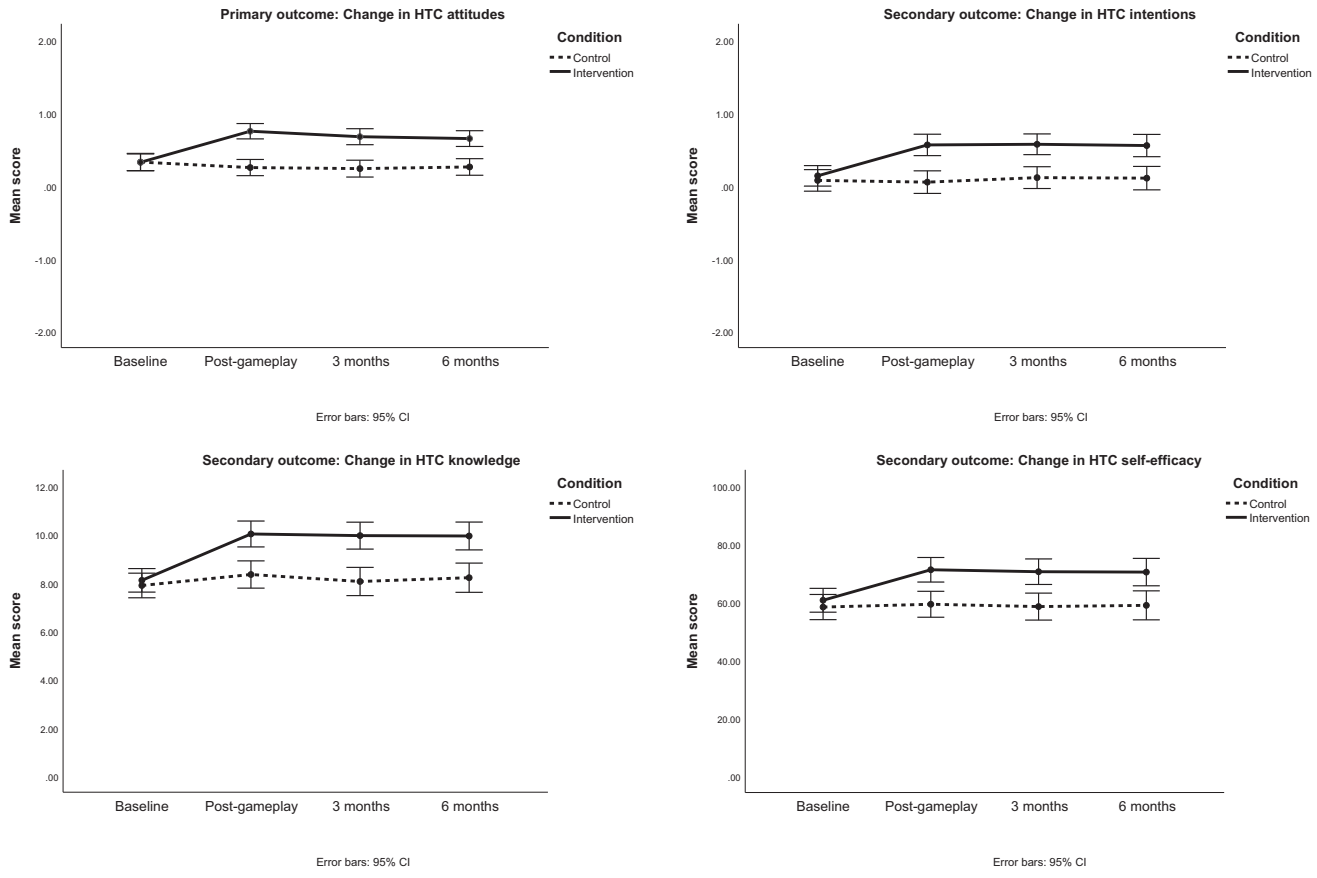


Figure 2. Changes in attitudes, intentions, knowledge, and self-efficacy by study condition.

around sexual health for adolescents, as only 30 states and the District of Columbia require that public schools teach sex education [37]. To our knowledge, our study is the first intervention to use a video game in a school/SBHC setting to address HTC rates in adolescents.

Previous HIV testing interventions incorporated peer-to-peer designs, social network campaigns, health education curricula [38], and videos or computer-assisted curricula [39], but not video games to promote HTC in adolescents. Additionally, the settings where these interventions took place were not in schools and did not use SBHCs as a resource. *PlayTest!* offers potential implementation advantages over other school-based interventions as it does not involve intensive training requiring significant human and financial resources and provides a level of fidelity in the delivery of content.

Strengths and limitations

This study has strengths, including its multisite design and its use of SBHCs as study sites. Another strength of this study is that despite COVID-19, the implementation of the intervention was completed, and the assessment completion rates at each time point were extremely high: 97%, 94%, and 94% for post-gameplay, 3-months, and 6-months, respectively. COVID introduced numerous limitations to the study. Although our enrollment and randomization goals were met before schools shutdown, some participants were not able to complete their gameplay sessions, many participants were not able to access their SBHCs for testing, and many follow-up assessments were completed remotely. To strengthen the evidence that video game interventions are effective at promoting specific health behaviors, including HTC, future studies conducted while adolescents are regularly attending school and engaged in out-of-school activities will better be able to capture the impact on actual behaviors in addition to antecedents of the behavior.

Conclusions

This RCT evaluating the video game *PlayTest!* yielded highly favorable results for impacting adolescents' attitudes, intentions, knowledge, and self-efficacy related to HIV testing and counseling. *PlayTest!* has the potential to be an impactful intervention for increasing HIV testing rates among adolescents. *PlayTest*! is both highly adaptable and accessible and has the potential for unique and significant impact, given that it not only promotes HIV testing and counseling but can also be an effective mechanism in the HIV prevention sphere.

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Supplementary Data

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