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Qualitative Evaluation of the Relevance and Acceptability of a Web-Based HIV Prevention Game for Rural Adolescents

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Abstract

African Americans in the rural Southern United States continue to experience disproportionate increases in new HIV/AIDS infections. Electronic gaming interventions hold promise but the use of HIV prevention games is limited. The purpose of this study was to assess the acceptability and relevance of a web-based HIV prevention game for African American rural adolescents. Findings from focus groups conducted with 42 participants suggested that the game was educational and somewhat entertaining but lacking in real-life scenarios and player-control. Findings are congruent with self-efficacy literature and constructivist approaches to learning. Findings have implications for gaming intervention development and further research.

Keywords

Adolescent health; Gaming interventions; Sexual health; HIV prevention; Rural health; Qualitative research; Serious games; Minority health; Health disparities

African American Youth in the United States continue to experience a disproportionate increase in new HIV/AIDS infections despite the availability of HIV prevention interventions with demonstrated effectiveness. Although African American adolescents (ages 13–19) represent 17% of the U.S. adolescent population, they accounted for 68% of new AIDS diagnoses in this population in 2009 (CDC, 2011). The number of new cases of HIV/AIDS among adolescents is rapidly increasing in the Deep South and in the state of Alabama. The number of new cases of HIV among adolescents (15–24) accounted for the highest rate (24.8 per 100,000) of new infections compared to any other age group in Alabama in 2010 (Alabama Department of Public Health, 2011a). In addition, among 15–19 year olds, Alabama ranked among the top five states in the nation on rates of gonorrhea (193 per 100,000 compared to national rates of 106.3 per 100,000 nationally) and chlamydia (637.6 per 100,000 compared to the national rate of 262.2 per 100,000) (CDC, 2014). These high rates of sexually transmitted infections (STIs) and unintended pregnancies (73 per 1000 compared to the national rate of 29.4 per 1000) in the state (Alabama Department of Public Health, 2011b) point to the need for risk reduction interventions. Recent trends in national adolescent risk behavior suggest that gains made in the past decades in reducing adolescent sexual risk behavior may have slowed in the last decade (Kann, Lowry, Eaton, & Wechsler,

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2012). *For example among sexually active African American adolescents, condom use increased from 48.0% to 70.0% during 1991–1999 and then decreased to 65.3% during 1999–2011* (Kann et al., 2012). This has prompted calls for renewed prevention efforts that seek to delay onset of sexual activity and increase condom use among adolescents who are sexually active (Kann et al., 2012).

The role of social and contextual influences on HIV related disparities among adolescents is also increasingly being recognized (Akers, Gold, Coyne-Beasley, & Corbie-Smith, 2012; Williams, Wyatt, & Wingood, 2010). Research in disproportionately affected rural communities in the South suggests that HIV prevention interventions targeting these communities need to address contextual factors (situational, personal, interpersonal and environmental) that perpetuate health disparities (Akers et al., 2012; Cené et al., 2011; Coker-Appiah et al., 2009). Among other contextual factors, environmental conditions and perceived norms are strongly associated with sexual risk behavior among African American youth (Romero, Galbraith, Wilson-Williams, & Gloppen, 2011; Williams et al., 2010). Tailoring interventions that target relevant environmental and social factors should therefore be important considerations in designing or adapting interventions for use in populations that have not yet benefitted from existing HIV prevention programs.

Developments in neuroscience provide promising in-sights into how gaming approaches may be particularly useful with young adolescents under 16 (Dahl, 2004; Steinberg, 2007). With the increasingly earlier onset of puberty documented in recent decades, young adolescents face the potential of spending many years with a sexually mature body and ‘sexually activated brain circuits with relatively immature neurobehavioral systems’ necessary for anticipating the potential long-term consequences of early sex (Enah, Moneyham, Vance, & Childs, 2013; Rew & Bowman, 2008; Steinberg, 2007). Young adolescents, therefore, need venues to observe and reflect on the long-term consequences of current sexual risk behaviors. However, research involving the use of such strategies in HIV prevention efforts targeting adolescents is quite limited. In addition, the usefulness of games in educating adolescents on nutrition, exercise, diabetes management, and asthma management has been demonstrated in other studies (Baranowski, Buday, Thompson, & Baranowski, 2008; DeShazo, Harris, & Pratt, 2010; Peng & Liu, 2009). The systematic evaluation of health related gaming is however still in its infancy and only a few of the games that are available have been systematically evaluated. The potential impact of gaming interventions is enhanced by the inherent attractiveness to adolescents and the potential to increase access to geographically dispersed rural populations.

The purpose of this study was to gather formative data using focus groups on the acceptability (within the realm of appropriate) and relevance (applicability to the target population) of an existing freely downloadable United Nations Educational and Cultural Organization (UNESCO) web-based HIV prevention game: “Fast Car: Travelling Safely around the World” for rural adolescents. This evaluation was conducted as part of the process of determining if adapting the game for use with rural African American adolescent was an alternative to the lengthy and costly process of developing a new HIV prevention game. *Prior to selecting the UNESCO game for evaluation in this study, the research team could not locate any HIV prevention games for adolescents developed within the United*

States. The game was previewed and determined adequate for use with the target population by a team of three local adolescent HIV prevention education specialists. Although HIV prevention games are available internationally (Enah et al., 2013), these games have not been formally evaluated with African American rural adolescents in the United States. In the UNESCO game, simulated car races take place in highways in different continents around the world. Players drive and avoid crashing the car while navigating obstacles that reflect the local traffic conditions (e.g. Camels on the road in North Africa or Kangaroos crossing the road in Australia). This simulated driving is punctuated by stopping points where HIV related questions are presented and must be answered within a specific timeframe. Correct responses are rewarded with points while wrong responses are followed with feedback providing the right response and the rationale for the right response. The virtual scenery of each racing segment displays UNESCO designated historical sites. In this study, participants took turns playing the game and participated in focus group discussions about their perceptions of the game in terms of relevance, acceptability, and potential changes that would make the game suitable for African American rural adolescents.

Methodology

Design

A focus group approach was used to gather formative data on rural adolescents' perceptions of the acceptability and relevance of the UNESCO web-based game. This evaluation was part of a series of studies in a user-centric approach to game development/adaptation, in which, potential users are engaged in a series of evaluations until all game components are judged to be adequate (Meneses & McNees, 2007). A focus group is a unique form of face-to-face interview that allows interactions among group participants and provides greater insight into why certain opinions or beliefs are held in a community or population (Sandelowski, 2000). In addition, the advantage of the focus group approach is the synergy created among group members that can: 1) foster the production of information that is difficult to elicit during individual interviews, 2) clarify issues and reveal diversity in perspectives, and 3) allow members to build on perspectives of others thus enriching the quality of data (Sandelowski, 2000).

Participants—The investigators' university institutional review board approved the study. A purposive sample of 42 adolescents participated in the study. Access to participants was obtained through an existing collaboration with a community based HIV/AIDS Service organization that serves eight rural counties in the heart of the Black Belt region of Alabama. The Black belt region is characterized by poverty, a high proportion of African Americans, and a poor health infrastructure. Adolescents aged 12–16 years of age were recruited to participate in one focus group sessions. The inclusion of two stages of adolescence; early and middle adolescent (Rew, 2005), was intentional and is guided by research findings that indicate that sexual debut in African American adolescents begins around age 14 (Cavazos-Rehg et al., 2009). In comparison with participants within the narrower age range of early adolescence, the target population for this study was anticipated to be more capable of providing experiential knowledge relevant to the acceptability of the web based game. Four focus groups were formed, each consisting of approximately 10

participants, and segmented by age group (12–14, 15–16) and gender (male, female) to form the following groups: 1) male, age 12–14; 2) male, age 15–16; 3) female, age 12–14; and 4) female, age 15–16. Participants were recruited if they met the following inclusion criteria: 1) African American adolescent, 2) age 12 to 16, 3) residence in a state-designated rural county, and 4) HIV negative or unknown status. Once potential participants were identified and screened, and completed written informed consent and assent, they were assigned to focus groups.

Measures—Demographic information was collected on all adolescents who evaluated the game to characterize the participants. A sociodemographic form was used to elicit information about age, educational level, living arrangement, household characteristics, primary sources of HIV prevention information, and perceived adequacy of information obtained.

A 10-item HIV prevention knowledge questionnaire was also completed by all participants. The knowledge questionnaire was adapted from the HIV-KQ AG questionnaire (Volpe, Nelson, Kraus, & Morrison-Beedy, 2007). The questionnaire was adapted (for age appropriateness and comprehension) with the help of adolescent health experts (three local adolescent HIV prevention education specialists and a high school health education teachers) from the community. The response options were true and false and were scored as 1 for correct responses and 0 for incorrect responses. The original questionnaire had demonstrated internal consistency across samples (.75–.89). In this sample the modified version's internal consistency (KR) was .61

Focus group sessions approximately 90 min long were implemented using a focus group implementation guide developed by the research team. The guide included a script and specific questions for conducting a group discussion after playing the game. A sample of questions that were included in the implementation guide is included in Table 1. Probes were used as needed to assist participants in providing details about their perspectives. Each focus group session discussed and provided feedback on: 1) the relevance and acceptability of the game, and 2) additional gaming design components needed to make the game more interesting to young AARAs. Participants received \$20 for their participation. Focus groups were conducted in private conference rooms at the collaborating agency. Focus group sessions were audio recorded and transcribed verbatim without any identifying information.

Demographic and HIV knowledge questionnaire data were managed and analyzed using SPSS 20. Once transcripts were checked for accuracy, audiotapes were destroyed. Verbatim transcripts of the audiotapes and observation notes provided the primary qualitative data for analysis. The qualitative research software, QSR N-Vivo® 9 was used in coding and sorting data into categories. Qualitative content analysis was used to code and classify the data in relation to relevance, acceptability, and areas for improvement. Two members of the research team with qualitative research experience independently coded the data and met to validate the coding schema and reconcile differences in coding.

Findings

Sample Characteristics

A total of 42 rural adolescents played the game and participated in one of four follow up focus group discussion sessions to evaluate the game. The size of focus groups ranged from 10 to 11 participants. Approximately 60% of the participants were girls and the mean age of participants was 14.9 (+ 1.6) years. Half of the participants lived in households headed by their mothers with 30% reporting that they lived with both parents. Most parents/guardians completed high school or the equivalent (95%) and about 48% of parents/guardians were reported to have had some college preparation. Reported wage earners in the household were predominantly mothers (54%) and fathers (24%), with only 16% indicating that both parents were wage earners. A summary of demographic characteristics of the sample is presented in Table 2. Many participants (53.8%) indicated that their parents/guardians or family members were their primary source of HIV prevention information. Other participants reported the school (11.9%) or health care professionals (21.4%) as their primary sources for HIV prevention information.

HIV Prevention Knowledge

Only 15% of participants provided responses that were completely accurate on HIV prevention knowledge questions. On average, participants answered only 75% of the HIV prevention knowledge questions correctly. A majority of participants had accurate responses to questions focusing on HIV transmission by sharing a glass (76%), anal sex (88.1%), oral sex (88.1%), swimming pools (88.1%), coughing and sneezing (71.4%), during a women's period (88.0%), and while on antibiotics (78%). Areas where participants' knowledge scores were lowest included the manifestation of HIV immediately after infection (59.5% correct), mother-to-child transmission (57.1% correct), and the availability of a vaccine for HIV prevention (54% correct). A significant difference was found between the knowledge scores of participants in the younger (12–14) and older (15–16) age groups ($t = 4.1$, $\alpha < .005$) with older participants having higher accuracy scores.

Game Content and Design

Overall, participants found the concept of an electronic HIV prevention game appealing. In the four focus groups, the consensus was that using electronic gaming to address sexual health behaviors among adolescents was entertaining, and a creative and appealing way to educate adolescents. Table 3 presents a summary of participants' reports of the most appealing aspects of the game. However, participants argued that the UNESCO game could be enhanced by making it more game-like, changing the features of the game for more visual appeal, and improving the questions and point scoring system. Table 4 is a display of summarized findings of what participants found least appealing about the game. Four major findings that emerged from the qualitative data were: 1) HIV prevention games are desirable, 2) The UNESCO game was not as engaging as participants would have liked, 3) The game could be improved by designing it to be more reflective of adolescents' daily lives, player controlled, and visually appealing, 4) and tailoring to the individual user was essential in HIV prevention games.

HIV Prevention Games Are Desirable—Gaming for HIV prevention is suitable as the fun aspects of gaming keep players entertained and engaged. In all four focus groups, the consensus was that electronic gaming was a great way to provide much needed sexual health information to adolescents in a manner that was inherently interesting to them. This view was represented in the comments of a 16 year old male: “I thought the game was a very creative way to learn about HIV and sexually transmitted diseases, and I really liked the part where you get to drive and you get to gain points...” Another participant echoed these sentiments with the words: ‘I think the game is good for people because when they play games, they can think about what they gonna do next so they won’t get it [HIV].’ Challenges embedded in HIV prevention games were identified as a desired characteristic. For example a 14 year old female said: ‘The game was a great learning experience. The most interesting part was about the questions because you learned more.’ And another participant agreed with this view using the words: ‘I think that the checkpoint for the questions kind of help those who may have HIV and don’t know it and they go get checked out by a doctor with a blood test and if they don’t have HIV, they’ll know to be prepared for it when they’re ready to have sex.’

The UNESCO Game Was Not as Engaging as Participants Would Have Liked—

The game had multiple characteristics that were judged to be not interesting and relatable to teenagers. Features of popular commercially available games were often used as the standard by many of the adolescents. As demonstrated in the following comments, participants wanted the game to look realistic: ‘I think it wasn’t enough effect to relate to the driving. Like, it wasn’t no sound. It wasn’t no trash on the road. It just seemed fake.’ And ‘I think they’ll [teenagers will] relate to the driving part, but at the cars, they be looking like some kind of old-fashioned stuff.’ Participants did not want the game to be overtly educational and wanted to control the progression of the game. As noted by some participants: ‘I believe the time should be taken out, especially when you’re answering the questions. You know, it makes me mad when they just go on and take the answer choice out before I read it.’ or ‘I think you just need to take the cars and animals out because it has nothing to do with STDs and HIVs.’ Others thought the reward system in the game was a weakness for example, a 15 year old boy stated: ‘I believe the time should be taken out and the minus five because it makes me think that all my hard work went to waste.’

Some of the adolescents felt that the game was not adequately ‘gamelike’, for example, a 14 year old girl said: ‘I mean, if you were playing this game, you would expect it to be more like, texting while driving or drinking and driving or something like that. It’s, like the game, you know, should be something related to HIV and STDs and stuff.” Others argued that the game did not appropriately focus on HIV prevention: “Well, in my opinion, I just feel like the game didn’t really have anything to do with the topic, besides the questions ...”

Participants Perceived That the Game Could Be Improved by Making It More Realistic, Player Controlled, and Visually Appealing—

Designing the game to be more real to life was a common suggestion in all focus groups; for example ‘Make it seem almost like real life.’ Some of the participants thought a game where they had avatars that were in real-life scenarios would improve the game. The avatars could go to the doctor or be

in a situation where they could get HIV/AIDS: “They need to add like avatars, like a man and a woman, and, like that.” Speed of presentation of question, reward system and poor graphics were identified as the least interesting aspects of the game. These sentiments were expressed in comments such: ‘I think they should add, like, better graphics and more cars to use.’ And ‘Instead of points, they should give you money.’ Or

‘I believe that this should be a game. The game should be based on your life, not for real fun, it should be based on your life..., like walking in people houses, there a little nurse telling them, asking them questions, sitting down going and talking to them – how they get it, when they got it, where they got it. I believe these kids are gonna have fun with it and I wanna have fun with the game too. But when they play it and they like it, it gonna be education to them because they can go back to somebody in their family or their parents and just tell them – teach their parents something. Like, hey mom, mom, mom, guess what, guess what? I learned how to prevent STDs and HIV!’

Many of the participants indicated that they liked the driving, but they felt that the game was elementary and they wish it had more options like being able to crash the car and adding curves to the highway.

Participants indicated that they wanted more player control in HIV prevention games with comments such as ‘Well, I think we should design it, you know, design our cars, put some wheels and stuff on it like that right there and we should put like, you know, stop getting them old-fashioned cars.’ And ‘You know, I would be like, walking around, regular talking to people about how to prevent HIV from happening or, if you tell that person if it affected their family member or that has HIV, you could tell that person and if they listen to you, they could tell that family member how they could prevent it from happening, and then you would earn, like, you know, points, money, or an achievement award for telling like 10 or 20 people how to prevent it’

Participants spent a considerable amount of time in focus group session discussing the questions in the game and the point system. Many of the participants identified the questions as their least favorite part of the game. They disliked the questions because they felt they did not have enough time to answer the questions and they felt the questions should use different terminology. They also suggested having hints if people are unsure of an answer to the question or having easy questions and hard questions and you get more points for answering harder questions correctly. Many participants suggested when they answered question correctly; instead of getting points they should get money. The money could then be used to unlock extra features of the game, where they could improve the appearance of their avatar or car. Participants suggested that other strategies to improve the game were to increase the visually appeal, add sound effects and music.

Tailoring Is Essential in Web-Based Games to Increase Appeal to Different Types of Potential Players—Tailoring was also proposed by the majority of participants in all focus groups. This sentiment is summarized by the words of a 16 year old female: ‘I think you should have different types/versions of the game for kids between 10 and 11, 12 through 15, and 16 through 19. And you could choose a girl type or a boy type.’ Some

participants advocated for sections that focus on different sexual health topics such as teen pregnancy and players having the ability to choose the focus of the game. As noted by 15 year old female "... have a category like teen pregnancy, or HIV and you be able to choose"

Participants thought there was an overwhelming need of HIV prevention games focusing on rural adolescents because such games could provide knowledge addressing not only HIV/AIDs, but STD and teenage pregnancy. However, participant also thought HIV prevention games in general game should not be designed and advertised as overtly educational. In the focus groups discussions, popular entertainment games like Grand Theft Auto (a racing game) and SIMS (an avatar based game) were mentioned as games to model from. In one group (12–14), there was disagreement on whether electronic game should be advertised as an HIV educational game or not. Some thought that it should not be advertised as an educational game, and argued that the games should be advertised as a fun adventure and packaged in visually appealing colorfully designed packages. Others thought that these types of games should be advertised as educational because this was the strength of such games. The participants seemed to think that these games should be rated as designated by the Entertainment Software Rating Board as E (Everyone) or T (Teen), so it would have universal appeal for parents to buy it.

In all, adolescents recommended that HIV prevention games should be designed to reflect the everyday lives of the target population, and players should have control over the design of avatars and navigation paths in the game. In addition, HIV prevention games should not be designed or portrayed to be overtly educational. According to the participants, the fun aspects of gaming will attract adolescents to start and continue playing the game.

Discussion

The study demonstrates that web-based games designed to educate adolescents on HIV prevention are acceptable to rural adolescent participants. In general, participants described the UNESCO game as useful, educational, and somewhat entertaining. However, participants did not like the lack of player control, cartoon-like graphics, speed of presentation of some game components, and had specific recommendations on changes that needed to be made to enhance relevance. Findings of this formative evaluation strongly suggest the following: 1) Electronic gaming is an acceptable means of delivering HIV prevention interventions *to the target population*; 2) The UNESCO game in its current format is not optimally designed to suit the needs of most rural adolescents who have been exposed to well-designed adventure commercial games; 3) For HIV prevention games to be relevant and acceptable, such games must reflect the daily lives and struggles of rural adolescents; 4) Games must be designed to allow for player control and tailoring to potential users. Findings from this research can inform the development of relevant interventions aimed at reducing health disparities in HIV/AIDS, STDs and other sexual health risk that are experienced by African American rural adolescents.

Findings in this study regarding the usefulness and *appeal* of games for health messages targeting adolescents are similar to study findings on health behavior change games focused on educating adolescents on nutrition, exercise, diabetes management, and asthma

management (Baranowski et al., 2008; DeShazo et al., 2010; Peng & Liu, 2009). Findings on the need to design the HIV prevention game to be more reflective of the daily lives of participants are also congruent with health gaming literature. For example, using game characters and storyline perceived to be personally relevant by the target population is thought to increase depth of information processing (Baranowski et al., 2013; Petty & Cacioppo, 1986) and consequently create an environment for learning to occur (Baranowski et al., 2013). These findings are also congruent with suggestions on designing effective programs for rural population to address environmental factors that contribute to health disparities (Cené et al., 2011) and address norms (Romero et al., 2011).

Findings on making the game reflective of the daily lives of participants are congruent with constructivist learning theories that maintain that learning is the process of constructing meaning from experience. The French developmental psychologist Jean Piaget proposed that “children’s learning is a process of personal, individual, intellectual construction arising from their activity in the world” (Matthews, 1994, p. 138). The findings are also congruent with constructivist experiential and problem-based learning educational theories that advocate interactive learning. These educational theories provide the theoretical bases for the use of simulation; which has been demonstrated to enhance effective learning (Kneebone, 2005). Findings in this study suggest that a simulation approach in which scenarios are designed to reflect the lives of the target population can be a useful way to present HIV prevention information to teens. It is worth noting that while the educational theories that underpin simulation and gaming are similar, re-designing this HIV prevention game using simulation would be different from using a gaming approach. Prensky (2007) argues that the content and messages of a “simulation” and a “simulation game” can be exactly the same but the difference comes from the game’s engagement and challenges. The reward systems embedded in games and the player’s desire to win provide intrinsic motivation that is not found in simulation (Prensky, 2007). A possible area of future research would be to assess the differences in behavioral outcomes with a simulation-based intervention as opposed to a gaming intervention.

Findings also speak to the importance of building self-efficacy in gaming interventions. Self-efficacy can be described as confidence in one’s ability to perform actions needed to achieve a goal (Bandura, 1986). Self-efficacy can be enhanced when individuals experience successful completion of steps towards their goal, or when they learn to associate positive feelings or the absence of negative feelings with the new behavior (Bandura, 1986). Comments on ‘feeling like their hard work was wasted’ when points were deducted in the game point to the potential *reduction* of self-efficacy. In addition, the recommendations by participants for adequate time to answer questions in the game, appropriate reading levels in questions, and positive reward systems are all elements that could enhance self-efficacy. These findings are congruent with HIV prevention literature in which self-efficacy has been demonstrated in multiple research studies to be tied to behavior change (e.g. Klein & Card, 2011; Romero et al., 2011; Wingood et al., 2013). Intervention developers need to incorporate self-efficacy enhancing activities in interventions focused on behavior change.

The lack of sustained interest in the UNESCO game could be due to a number of factors. The main factor identified by study participants was that the game was not immersive

enough. Immersiveness in the story embedded in games has been identified as key to increasing the player's potential to adopt desired health behaviors (Lu, Baranowski, Thompson, et al., 2012). The participants could not relate to what they described as 'fake and elementary'. In focus group discussion it was obvious that participants were used to playing more sophisticated video games as most of them wanted the HIV prevention game to be modeled after popular commercial games such as Sims or Grand Theft Auto. The UNESCO game was developed for adolescents in low resource countries and is probably more acceptable and relevant to an intended audience that may not be as exposed to the highly entertaining games that are available to adolescents in the United States. The programming changes that would be needed to make the game more 'gamelike' (visually appealing, include sound effects), and introduce some level of tailoring would require substantial time and resources that may be better used in developing a new game that specifically targets rural adolescents. As such findings from this study along with additional formative work are being used to inform the development of a game prototype for HIV prevention for African American adolescents that is in progress.

Games for health behavior change should use technology platforms (such as desktop, laptops, tablets, mobile game systems, smartphone or console game systems) that have the widest reach to the target audience (Baranowski et al., 2013). In rural areas where internet access is not always reliable, purely web-based games like Fast Car: Travelling Safely around the World may not be the best approach to delivering HIV prevention interventions. Games that can be accessed using multiple formats such as game consoles and mobile devices need to be explored and harnessed.

This formative work uncovered important insights into issues of readability of content of the gaming intervention and relatable storylines. In addition to views expressed in focus group discussion regarding the lack of familiarity with the vocabulary used in the game, many participants were observed encountering problems with the vocabulary and the type of storyline used in the game. Research findings have some implications for gaming intervention developers targeting African American rural adolescents. Involving the target population early in the process of development and working with the target population in a reiterative process of evaluating components that have been developed for refinements would enhance acceptability and relevance. In addition, tailoring interventions to the age/developmental stage and sexual experience level of members of the target population is important. As indicated by participants, the informational needs of a young adolescent 12 year old sexually inexperienced boy would be different for the needs of a middle adolescent 16 year old sexually active girl. Including different levels in an HIV prevention game that are accessed based on characteristics (i.e., sex, age, level of sexual experience) identified in the game and build on feedback from the individual player would enhance relevance (Enah et al., 2013). In more general terms, gaming intervention developers need to carefully consider the balance between potential user's needs for information, desire for entertainment and the goal of the game to enhance health.

Study Limitations

Because resources and time are constrained, this study is limited to generating in-depth knowledge from the study participants. Although data *were* obtained from males and females ages 12–16 years, other factors that could improve the game may not be reported by study participants. The study is limited to the perceptions of adolescents and does not include significant adults (parents/guardians, teachers, workers in service organizations targeting adolescents) that are part of these adolescents' lives. In future work, it may be necessary to include the perceptions of these adults to obtain a deeper understanding of the relevance of these types of gaming interventions. In addition, given that the majority of participants in this study identified parents as their primary source of HIV prevention information, future research efforts may need to include parents. The study is also limited to a small sample of participants and does not necessary reflect other populations of adolescents.

Conclusions

In general, participants described the game as useful, educational, and somewhat entertaining. However, participants did not like the lack of player control, cartoon-like graphics, speed of presentation of some game components, and had specific recommendations on changes that needed to be made to enhance relevance. While the UNESCO game in its current format was not found to be the best approach to HIV prevention with the target population, using games for HIV prevention was found to be appealing and acceptable. Such games should be designed to reflect the daily lives of the target population and should involve a sample of potential players of the game at every phase of the development process [Chen et al., 2010; Noar et al., 2009; Raney et al., 2006; Roberto et al., 2007; Roberts et al., 2005].

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References

- Akers A, Gold M, Coyne-Beasley T, Corbie-Smith G. A qualitative study of rural black adolescents' perspectives on primary STD prevention strategies. *Perspectives on Sexual and Reproductive Health*. 2012; 44:92–99. <http://dx.doi.org/10.1363/4409212>. [PubMed: 22681424]
- Alabama Department of Public Health. HIV and AIDS cases by age group and transmission category. 2011a. Retrieved November 5 2012 from. http://www.adph.org/aids/assets/HIV_AIDS_Report_4th_Quarter_2010.pdf
- Alabama Department of Public Health. Sexually transmitted diseases statistics. 2011b. Retrieved November 16 2012 from. <http://www.adph.org/STD/Default.asp?id=1076>
- Bandura, A. *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall; 1986.
- Baranowski T, Buday R, Thompson D, Baranowski J. Playing for real: Videogames and stories for health-related behavior change. *American Journal of Preventive Medicine*. 2008; 34:74–82. [PubMed: 18083454]

- Baranowski T, Buday R, Thompson D, Lyons E, Lu A, Baranowski J. Games for health journal. 2013; 2:183–190. [PubMed: 24443708]
- Cavazos-Rehg P, Krauss M, Spitznagel M, Schootman M, Bucholz K, Peipert J, et al. Age of sexual debut among US adolescents. *Contraception*. 2009; 80:158–162. <http://dx.doi.org/10.1016/j.contraception.2009.02.014>. [PubMed: 19631791]
- Cené C, Akers A, Lloyd S, Abritton T, Hammond W, Corbi-Smith G. Understanding social capital and HIV risk in rural African American communities. *Journal of General Internal Medicine*. 2011; 26:737–744. <http://dx.doi.org/10.1007/s116-011-1646-4>. [PubMed: 21311999]
- Centers for Disease Control and Prevention. HIV surveillance report. 2011; 21 Retrieved November 16, 2011 from. <http://www.cdc.gov/hiv/surveillance/resources/reports/2009report/index.htm>.
- Centers for Disease Control and Prevention. Sexually transmitted disease surveillance 2012. Atlanta: U.S. Department of Health and Human Services; 2014. Retrieved August 2014 from <http://www.cdc.gov/std/stats12/Surv2012.pdf>
- Chen C, Thompson E, Morrison-Beedy D. Multi-system influences on adolescent risky behaviors. *Research in Nursing and Health*. 2010; 33:512–527. [PubMed: 21053385]
- Coker-Appiah D, Akers A, Banks R, Albritton T, Leniek K, Wynn M, et al. In their own voices: Rural African American youth speak out about community-based HIV prevention interventions. *Progress in Community Health Partnerships: Research, Education and Action*. 2009; 3:301–312.
- Dahl R. Adolescent brain development: A period of vulnerability and opportunities. *Annals of the New York Academy of Sciences*. 2004; 1020:1–22. [PubMed: 15208178]
- DeShazo J, Harris L, Pratt W. Effective intervention or child's play? A review of video games for diabetes education. *Diabetes Technology and Therapeutics*. 2010; 12:815–822. <http://dx.doi.org/10.1089/dia.2010.0030>. [PubMed: 20807119]
- Enah C, Moneyham L, Vance DE, Childs G. Digital gaming for HIV prevention with young adolescents. *Journal of the Association of Nurses in AIDS Care*. 2013; 24:71–80. [PubMed: 22871481]
- Kann L, Lowry R, Eaton D, Wechsler H. Trends in HIV-related risk behaviors among high school students—United States, 1991–2011. *Morbidity and Mortality Weekly Report*. 2012; 61:556–560. [PubMed: 22832937]
- Klein C, Card J. Preliminary efficacy of a computer-delivered HIV prevention intervention for African American teenage females. *AIDS Education and Prevention*. 2011; 23:564–576. [PubMed: 22201239]
- Kneebone R. Evaluating clinical simulations for learning procedural skills: A theory-based approach. *Academic Medicine*. 2005; 80:549–553. [PubMed: 15917357]
- Baranowski, Lu, Thompson, Lu, et al. Story immersion of video games for youth health promotion: A review of literature. *Games for Health Journal*. 2012; 1:99–204.
- Matthews, MR. Science teaching: The role of history and philosophy of science. New York: Routledge; 1994.
- Meneses K, McNees P. Transdisciplinary integration of electronic communication technology and nursing research. *Nursing Outlook*. 2007; 55:242–249. [PubMed: 17950118]
- Noar S, Black H, Pierce L. Efficacy of computer technology-based HIV prevention interventions: A meta-analysis. *AIDS*. 2009; 23:107–115. [PubMed: 19050392]
- Peng, W., Liu, M. An overview of using electronic games for health purposes. In: Ferdig, R., editor. *Handbook of research on effective electronic gaming in education*. Hershey, PA: IGI Global; 2009. p. 388-401.
- Petty, R., Cacioppo, J. Communication and persuasion: Central and peripheral routes to attitude changes. New York: Springer; 1986.
- Prensky, M. Digital game-based learning. St Paul, MN: Paragon House; 2007.
- Raney, A., Smith, J., Baker, K. Adolescents and the appeal of video games. In: Vorderer, P., Bryant, J., editors. *Playing video games: Motives, responses, and consequences*. Mahwah, NJ: Lawrence Erlbaum Associates; 2006. p. 165-180.
- Rew, L. Adolescent health: A multidisciplinary approach to theory, research, and intervention. Thousand Oaks: Sage; 2005.

- Rew L, Bowman K. Protecting youth from early and abusive sexual experiences. *Pediatric Nursing*. 2008; 34:19–26. [PubMed: 18361083]
- Roberto A, Zimmerman R, Carlyle K, Abner E. A computer-based approach to preventing pregnancy, STD, and HIV in rural adolescents. *Journal of Health Communication*. 2007; 12:53–76. [PubMed: 17365349]
- Roberts, D., Foehr, U., Rideout, V. *Generation M: Media in the lives of 8–18 year-olds*. Menlo Park, CA: Kaiser Family Foundation; 2005.
- Romero L, Galbraith J, Wilson-Williams L, Gloppen K. HIV prevention among African American youth: How well have evidence-based interventions addressed key theoretical constructs. *AIDS and Behavior*. 2011; 15:976–991. <http://dx.doi.org/10.1007/s10461-010-9745>. [PubMed: 20635131]
- Sandelowski M. Focus on research methods: Whatever happened to qualitative description? *Research in Nursing and Health*. 2000; 23:334–340. [PubMed: 10940958]
- Steinberg L. Risk-taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science*. 2007; 20:55–59.
- Volpe EM, Nelson LE, Kraus RA, Morrison-Beedy D. Adaptation and refinement of the HIV knowledge questionnaire for use with adolescent girls. *Journal of the Association of Nurses in AIDS Care*. 2007; 18:57–63. [PubMed: 17889326]
- Williams JK, Wyatt GE, Wingood G. The four Cs of HIV prevention with African Americans: Crisis, condoms, culture, and community. *Current HIV/AIDS Reports*. 2010; 7:185–193. <http://dx.doi.org/10.1007/s11904-010-0058-0>. [PubMed: 20730512]
- Wingood G, Robinson L, Braxton N, Er D, Conner A, Renfro T, et al. Comparative effectiveness of a faith-based HIV intervention for African American women: Importance of enhancing religious social capital. *American Journal of Public Health*. 2013; 103:2226–2233. <http://dx.doi.org/10.2105/AJPH.2013.301386>. [PubMed: 24134367]

Table 1

Sample focus group questions.

Aims	Sample of Focus Group Questions	
Acceptability and Relevance of the electronic HIV prevention game	1	What did you think of the game?
	2	Would adolescents relate to the content of the game?
	3	Would you recommend the game to friends your age?
	4	What would teenagers your age think about a gaming format for HIV prevention?
Essential design elements	1	What design elements would need to be included in the game (characters, stories, colors, etc.) to make it attractive to teenagers?
	2	How could information about prevention be presented to boys/girls your age to make it more fun?

Table 2Frequency and percentages of demographic information ($N = 42$).

Characteristic	Frequency	Percentage
Age		
12–14 years	19	45.2
15–16 years	23	54.8
Gender		
Boys	20	47.6
Girls	22	52.4
Living with		
Both parents	16	38.1
Mother	21	50
Other relative/guardian	3	11.9
Highest Household Educational Level (parents/guardians)		
Did not complete high school	2	4.7
High school graduate	13	31
Completed college or professional school	27	64.3
Household Primary Wage Earner		
Father	6	14.3
Mother	27	64.3
Both parents	4	9.5
Other relative/guardian	5	11.9

Table 3

Participants' coded responses to "What did you like most about the game?" (N = 42).

	Frequency	Percent
Simulated Driving	17	40
Fun Aspects of Gaming (challenges and rewards)	19	45
Learning from the Questions and Feedback	16	38
Different type of obstacles	5	11

Note: The frequency sums up to more than 42 because some participants mentioned more than one characteristic that they liked most about the game.

Table 4

Participants' coded responses to 'What they liked least about the game?' (N = 42).

	Frequency	Percentage
Timed questions	19	45
Reward System (Accumulation and subtraction of points)	18	42
Old and Slow Cars	15	36
Difficulty/vocabulary level of questions	11	26
Driving conditions (Poor graphics and obstacles)	11	26

Note: The frequency sums up to more than 42 because some participants mentioned more than one characteristic that they liked least about the game.