Title: Digital Star: HIV Prevention for Youth in Mental Health Treatment

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SPECIFIC AIMS: Digital STAR: HIV prevention for youth in mental health treatment

Adolescents in mental health treatment are at greater risk for HIV and other STIs than their peers due to an earlier age of onset of sex, less protected sex, more sexual partners and more frequent substance use. This greater risk is due to multiple factors including cognitive misperceptions, affect dysregulation, and less self efficacy. Our Program, STAR (Safe Thinking and Affect Regulation), is the sole HIV prevention intervention developed to specifically address the needs of youth in mental health treatment. This group intervention successfully targeted affect regulation and cognitive monitoring in sexual situations as the key, novel elements to improving sexual safety for youth with mental health issues. STAR reduced sexual risk for six months following the intervention in a randomized trial. The resulting Project STAR intervention outcome paper received the Rieger Award for Scientific Achievement from the American Academy of Child and Adolescent Psychiatry in October 2012.(1) This efficacious intervention was designed to be delivered in any agency that serves adolescents in mental health treatment such as, hospitals, partial programs, outpatient clinics, therapeutic schools, group homes, residential treatment centers or after-care facilities.

STAR will have its maximal impact on the largest number of adolescents with mental health needs if it can be easily and consistently put into practice. This SBIR project will create Digital STAR (D*STAR), an implementation package suitable for widespread dissemination to care agencies and mental health treatment facilities. This **Phase I/II Small Business Innovation Research (SBIR) Fast Track** application is in response to PA-11-133, with a specific emphasis on the *Tools/Platforms to Improve the Dissemination and Implementation of Evidence-Based Mental Health Interventions.* We have specifically chosen a Fast Track application as our proposal addresses a pressing public health problem and this track reduces the time to bring a product to market. Moreover, Phase I focuses on creating a prototype of D* STAR with capabilities and technologies that Virtually Better has successfully refined during the last 15 years of effective SBIR/STTR projects. The collaborative, multidisciplinary team described in this application is comprised of experts in adolescent HIV prevention, and industry leaders in computer modeling, simulation, product development and marketing. Therefore, we are confident in our successful Phase I completion and transition to Phase II. Finally, we are focused on capitalizing on the market size allocated for HIV-related prevention opportunities in this digital era.

Phase 1: Specific Aims

1. To develop and refine digital versions of core sessions of STAR that introduce affect regulation and cognitive monitoring in sexual situations, and provide basic sexual health skills and education. These sessions represent essential content areas and modalities of the D*STAR intervention.

2. To conduct qualitative evaluations of the feasibility, utility, and acceptability of the sessions. There will be focus groups with approximately 10 community stakeholders comprised of parents of youth in mental health treatment and mental health treatment center staff. There will also be focus groups with approximately 15 adolescents and two individual interview sessions with approximately 15 adolescents in mental health treatment (13-20 years old)

Hypothesis: The digital sessions will be rated by youth and our community stakeholders as enjoyable, useful and easy to implement.

3. To conduct an open trial of the D*STAR sessions with approximately 30 adolescents to determine its preliminary impact.

Hypothesis: In a pre-posttest design, participants will show improvements in relevant HIV cognitions and attitudes.

Phase 2:Specific Aims

1. To develop and refine digital versions the remaining sessions of STAR and a digital general health promotion (HP) intervention, building upon the essential content areas and refinements developed in Phase I.

2. To conduct qualitative evaluations of the feasibility, utility, and acceptability of D*STAR and the digital HP intervention with adolescents in mental health treatment, and community stakeholders, which may include parents of youth in mental health treatment, staff from mental health facilities, and staff from relevant community organizations serving youth. Hypothesis: Both digital interventions (HP and D*STAR) will be rated by youth and community stakeholders as enjoyable, useful and easy to implement.

3. To conduct a randomized control trial of D*STAR compared to the time matched digital HP intervention among 120 adolescents ages 13 to 20 in mental health treatment.

Hypothesis: Participants in D*STAR will report safer sexual behaviors, greater HIV knowledge and greater self-efficacy for HIV prevention skills than participants in digital HP at three months follow-up.

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A. SIGNIFICANCE

Project STAR (Safe Thinking and Affect Regulation). STAR is an efficacious HIV prevention program for adolescents in mental health treatment that received the **Rieger Award for Scientific Achievement** from the American Academy of Child and Adolescent Psychiatry. STAR was shown to be efficacious in reducing sexual risk among youth in mental health treatment for six months following the intervention in a randomized trial.(1) STAR's fourteen session group intervention is uniquely tailored for youth with mental health needs and targets affect regulation and cognitive monitoring in sexual situations as the key and novel elements to improve sexual safety. Efficacious HIV prevention programs exist for a variety of subgroups of adolescents including African- American youth, homeless youth, and those in traditional schools or detention facilities.(19-31) However, no other intervention besides STAR is designed and tailored for the unique needs of youth in mental health treatment and no intervention has rigorously analyzed the intervention's longitudinal impact on this group of youth. This SBIR project will create Digital STAR (D*STAR), a stand-alone computerized efficacious intervention that will be available for utilization by a wide range of mental health agencies and treatment facilities that serve youth with mental health needs.

HIV prevention for youth in mental health treatment is imperative because these adolescents have an earlier age of onset of sex, less protected sex, and more sexual partners.(32-41) Subsets of youth with psychiatric illness are at particular risk. For example, lesbian, gay, bisexual, transgender, queer and questioning (LGBTQQ) youth are at substantial risk for HIV and STIs due to higher rates of emotional distress and psychiatric illness. Research has established a strong relationship between emotional distress and risky sexual behavior among adolescents and multiple studies and meta-analyses show that LGBTQQ youth are more vulnerable to mental health problems such as depression, anxiety, substance abuse, and suicide. This emotional distress is a function of social stressors such as negotiating coming out, fear of or actual familial disapproval and rejection, victimization, and the chronic stress often associated with having a stigmatized sexual identity.(42-44) Youth in mental health treatment are also frequently exposed to traumas, especially sexual abuse and dating violence, which are again associated with greater sexual risks.(45-47) Because of these unique needs and circumstances, youth with psychiatric illness require specialized, sensitive, and inclusive HIV Prevention interventions such as STAR.

Role of Emotions and Cognitions in Sexual Health. Important factors that are associated with adolescent risk behavior, especially for those in mental health treatment, are dysfunctional cognitions (such as risk misperception) and affect dysregulation (such as anxiety at the time of sex interfering with safe behavior). These two core, dynamic behavioral concepts are successfully targeted by the STAR HIV Prevention intervention. **Affect dysregulation:** Emotional stress results in risk behaviors when affect is not well regulated and cognitions are not supportive of healthy decision making.(48-50) STAR targets affect regulation which is defined as the ability to respond to the demands of one's environment with a range of emotions in a way that allows one to react spontaneously while still suppressing immediate and impulsive reactions when necessary.(49) When adolescents experience high levels of emotion, they act impulsively in attempts to decrease the intensity of the emotion. This impulsivity is thought to serve as a common link between affective states and risk behavior.(51-55) Our recent paper found that among youth in mental health treatment, those with the most affect dysregulation reported more recent unsafe sex and substance use. Dysregulation was not limited to those with affective disorders but was prominent among adolescents with conduct and behavioral problems, signifying that affect dysregulation is a common issue for adolescents in mental health treatment. (48) This affect regulation - risk behavior relationship exists because difficulties with affect management increase the likelihood that adolescents will engage in self-soothing behaviors, such as substance use or risky sex, which ultimately increase their odds for HIV infection.(48-56) The STAR Intervention affect regulation techniques are informed by the principles of Dialectical Behavior Therapy (DBT), which emphasizes correctly recognizing emotions and utilizing distress tolerance skills. (57) **Dysfunctional cognitions.** Distorted thoughts in sexual situations result in feelings of powerlessness, guilt or self-blame, resulting in risk behavior. Dysfunctional thinking can occur in the context of sexual abuse or trauma, chronic low self-esteem, family dysfunction, and non-supportive life circumstances.(58-60) For example, adolescents with a history of sexual

abuse often feel powerless and "defective" and have greater rates of unprotected sex and decreased self efficacy for protective behaviors such as condom use.(45-47). Fortunately, there is an extensive history of the use of Cognitive Behavior Therapy (CBT) techniques to address maladaptive cognitions and this is a focus of our intervention.(58) The CBT techniques utilized in STAR are designed to focus on identifying automatic thoughts, modify dysfunctional thinking, and promote more realistic adaptive patterns of thinking and behavior that will contribute healthy and safe sexual decision making.

The Importance of Efficacious Programs utilizing new Technologies. Advances in technology have enabled a new wave of novel computer delivered health promotion interventions. Efficacious, face-to-face group interventions have been successfully translated into computer delivered interventions and tested.(61-70) For example, a randomized controlled trial of a 2-hour computer-delivered adaptation of a CDC-DEBI evidence-based group HIV prevention intervention for women found that the intervention resulted in a significantly higher percentage of condom protected sex acts (85.% vs. 52.8%, p = .03) (61,62). Another project translated the group intervention SiHLE (Sisters Informing Healing Living and Empowering), a four-session CDC-DEBI for adolescent African American females, into a 2-hour computer-delivered individual intervention. This trial found that the computer intervention significantly improved the proportion of condom use acts as well.(69) These studies, as well as a comprehensive 2009 meta-analysis by Noar, Black, and Pierce, suggest that computer-delivered interventions, including in person interventions that have been translated and digitized, have the potential to be at least as effective as human-delivered interventions in influencing HIV behaviors.(64) Importantly, adolescents are receptive to computer-delivered interventions and, as a result, they are increasingly being advocated for and adopted in the fields of health education and prevention.(70,71) Digitized interventions are also cost effective, as less training, preparation and staff time are required than in human-delivered interventions.(63,70) Computerized interventions are consistently delivered, improving fidelity.(71, 72, 73) and computer audio and graphics components can reach individuals with limited literacy skills, improving the intervention's reach.(70,74)

Need for Behavioral Interventions in an Era of PreP and PEP. Current and future HIV prevention interventions will require a combination of behavioral, biomedical, and structural strategies since biomedical interventions, on their own will not eradicate HIV.(75) Biomedical interventions, such as male circumcision (MC), barrier methods (condoms, diaphragm), antimicrobial products, STI treatment, antiretroviral medication for treatment as prevention, and pre- and post-exposure prophylaxis have all shown efficacy in reducing transmission risk. No one method is 100% effective in preventing HIV, and all have the potential for behavioral breakdown.(76-79) Thus, like other long-standing-cornerstones for HIV prevention (i.e., male condoms and HIV tests), all biomedical innovations will require a behavioral intervention component to support utilization, adherence, and maintenance.(75,79) D*STAR will be developed as an efficacious behavioral intervention with the flexibility and technological capability for integration with present and future biomedical intervention methods.

Dissemination of Evidence-based Interventions. Our proposal is highly responsive to NIH's PA-11-133, with a specific emphasis on the *Tools/Platforms to Improve the Dissemination and Implementation of Evidence-Based Mental Health Interventions.* It also addresses the Centers for Disease Control and Prevention (CDC), High-Impact Prevention approach, in which priority is placed on interventions that are practical to implement on a large scale, at reasonable cost and that offer more broad coverage of key risk populations. This contribution will be significant because it addresses a critical need for effective risk reduction interventions for those engaged in mental health treatment, delivered through low-cost, widely utilized technology mediums (e.g., PCs, tablet devices). D*STAR will be engaging, interactive, easy to deliver and manage, and affordable for organizations. It will be an efficacious risk-reduction program that can straightforwardly be incorporated to existing mental health services. This will result in widespread dissemination.

B. INNOVATION

In light of the vast number of computer-delivered assessment and intervention products on the market, we recognize that simply digitizing a best practices approach is not innovative on its own merit. The innovation within D*STAR begins with the ability to create an **automated, systematically delivered intervention that remains true to its original efficacious design**. D*STAR will include **highly interactive, visually appealing technology solutions designed by leaders in the field of modeling, animation, and game design**. Innovation is also infused into D*STARS's architecture and technology delivery methods, which maximize the

capabilities of mobile devices, PCs, and tablets. These devices are becoming increasingly commonplace in mental health programs, so D*STAR will fit easily into these settings.(95-99)

D*STAR will be delivered in a systematic way with no training required by the participants or the trained Rhode Island Hospital research assistant managing the intervention. To replace the traditional in-person, costly, and highly trained facilitators used in Project STAR, D*STAR will be incorporating a virtual facilitator, who follows the script and protocol in a very similar manner to STAR. This virtual facilitator will have the ability to provide both group and individualized feedback depending on the type of activity and teaching method per exercise. Virtually Better has been developing automated, virtual interventions for several years, and is currently funded to do so in interventions to treat social phobia (1R41MH094019-01, 5R41MH094019-02), childhood and family anxiety (R43MH098470-01) and adult obesity (R41HL114046-01). We will be leveraging the knowledge and tools acquired in these current and past projects in order to maximize the efficacy and appeal of D*STAR. The simulation-based, automated technology in D*STAR will be used to enhance the learning of cognitive and affect management skills. These enhancements will occur while providing key advantages over in person intervention delivery. For example, during role play exercises, our virtual facilitator will provide a more standardized experience that can deliver content that is consistent and also tailored to group member's interactions with the program.

D*STAR will be a synchronous, multi-user, multi-device intervention that utilizes the most innovative technological architecture and delivery methods. Participant will have their own instance of the client software running on a mobile device. The client version of the software will connect to the server over a standard Wi-Fi network giving the participants a virtual presence in the simulation. Finally, the architecture of the software and hardware delivery format offers several modes of interaction and learning for the user, maximizing the best of group and individual learning formats, as well as visual and audio learning styles. The participant will at times be passively receiving information and instruction from the virtual facilitator on the shared screen. At other times the participant will be interacting individually or in pairs with content on their mobile device that provides information directly back into the server. The last type of interaction will be mixed mode in which synchronous content is displayed on a shared screen and the mobile device to simulate group interaction between the participants and the virtual facilitator. This software program will be built to securely collect, manage, and interpret user data in real-time (synchronous), all managed with an onsite server.

Technological innovations include the utilization of individualized pictures and videos from mobile devices' built-in cameras, resulting in personalized media footage that can be used throughout the intervention. This will allow for role plays to be recorded, reviewed, and discussed by the group in a simple playback format on the shared screen. Photos of each participant will be taken on their mobile device at D*STAR initiation and uploaded to the secure server to be integrated into the intervention. This photo, at times, will reappear during exercises, games and role plays to create a more personalized experience. Particular focus on aesthetic and interactive elements will increase the motivation and engagement of the adolescent user as shown in **Session Examples in Approach and the Appendix. (Appendices B-** Innovative capabilities, derived from gaming and interactive learning tools, include Bump, a free application created by Bump Technologies for the Apple's iOS and Google's Android operating systems. It allows two smartphone users to bump their devices together to transfer information, photos, and other objects to each other over an Internet connection. D* STAR will also include digital drawing tools for various interventions, including those in which misconceptions are addressed about symptoms of HIV**.** Several sessions will include uploaded content from participant devices to the shared screen as well as shuffle animations to facilitate individual and group creation and sharing of ideas and content. Using puzzles and visual tools, D*STAR will task participants to identify healthy/unhealthy reactions (e.g., thoughts, emotions), rate emotional reactions to various stimuli (i.e., to increase emotional insight) or rank order steps that lead to safer sex (e.g., safe condom use and sexual negotiation skills). These innovations will maintain emotional engagement and interactivity.

This is not a traditional internet-based psychoeducational program. The innovation of this program resides in its conception, architecture, design, and implementation to recreate what Project STAR initially provided, but now in a more streamlined, cost-efficient, interactive, and easily implemented manner. The advanced technologies incorporated in D*STAR are consistent with NIH's emphasis on innovation and the expectation that "*the dissemination platform be state of the art, considering the latest electronic technologies, so as not to develop a tool that becomes obsolete during the commercialization phase."*

C. PRELIMINARY STUDIES

Project STAR: Safe Thinking and Affect Regulation (R01 MH 61149) was a randomized controlled trial for 185 youth ages 13 to 18 in therapeutic schools that evaluated the efficacy of STAR relative to a brief HIV/sexual knowledge program in increasing safer sexual behavior at three, six, and nine months post intervention.(1) STAR was designed for youth with mental health issues and emphasized techniques of cognitive monitoring and affect regulation in sexual situations (manual in **Appendix A**).

STAR Theoretical Framework, Content and Delivery. The STAR Intervention techniques were informed by the principles of Cognitive Behavioral Therapy and Dialectical Behavior Therapy, which emphasize recognizing maladaptive thoughts and utilizing distress tolerance skills.(57,58) These therapeutic approaches were modified to be developmentally appropriate for adolescents and to be relevant to sexual situations.(1,80). The focus of affect management was to regulate the underlying emotion so that the adolescent could use protective behavioral strategies (e.g., assertive communication, condoms). Dysfunctional thinking was labeled as "unsafe thoughts" that influence sex and substance use behavior, and adolescents were taught to recognize and challenge such thoughts. After the introductory sessions on affect management and cognitive monitoring, relevant aspects of behavioral skills were incorporated into subsequent sessions. The intervention also addressed other topics of special relevance to youth in mental health treatment such as the impact of mental health symptoms on risk (e.g. sadness and low self esteem as a risk factor) and the value of adherence to psychiatric treatment. STAR was written to be particularly **sensitive to ethnic, racial, sexual minority status** and this was imperative to the success of STAR. STAR provided prompts for discussion about stigma related to HIV, LGBTQQ sexual behavior and minority racial/ethnic status. Intervention activities used gender neutral names for the role plays and allowed participants to choose the gender of their pretended sexual partner. Some role plays included same sex partners, and in others, adolescents played the part of the characters from the opposite gender. Mixed gender groups were very useful in promoting discussion of gender stereotypes, differences and similarities. STAR also recognized **substance use** as a prevalent and significant co-factor in HIV risk for those in mental health settings. Substance use was discussed as a factor that increased risk for HIV, and decreased effectiveness of psychiatric medication and treatment. Feedback on one's current substance use compared to other youth was given to enhance motivation to reduce use. Role plays and videos emphasized substance related risks that are especially relevant for youth in mental health treatment.

STAR's 14 group sessions (45 minutes each) were conducted weekly, followed by a final, review session one month later. Groups of four to eight students were led by two trained research staff facilitators, including a clinician with at least a master's degree in psychology and a Bachelor-level research assistant. The highly scripted sessions used an interactive psycho-educational format of didactic instruction, games, role plays, videos and group discussion. Sessions focused on basic skills relevant to communication, abstinence, and condom use, as well as basic information about HIV, sexuality and health relationships. To address affect management skills, adolescents practiced recognizing and labeling feelings, developed skills to quantify those feelings, discussed negative outcomes of affect dysregulation, and practiced distress tolerance skills in role plays of sexually relevant situations. To enhance cognitive monitoring skills, adolescents practiced recognizing cognitive errors pertaining to HIV risk and learned strategies to counter dysfunctional cognitions such as replacement with healthy thoughts. Youth practiced affect management and cognitive monitoring skills while learning sexuality specific skills (e.g., condom use) and while role playing relevant communication scenarios (e.g., negotiation of condoms, sex refusal). Please see the **Appendix** for the full content and activities.

Setting. The study occurred in fourteen therapeutic schools in southern New England. These schools are a unique setting comprising high-risk youth with mental health issues who have not been able to succeed in traditional school environments. Therapeutic and alternative schools have students with high rates of comorbid psychiatric disorders, substance abuse, learning disorders, and a history of sexual abuse. Many of the youth are in other mental health treatments and the sample shares many of the risk characteristics of youth in various mental health treatment settings.

Participants. Schools identified 289 youth ages 13 to 18 for potential participation (about 85% of those in available classes) and 185 were eligible, consented and allocated to an intervention. The sample had a mean age of 15.3 years and was 61% female, ethnically 27% Hispanic, racially 57% white and 19% African American. 55% reported a history of vaginal or anal sex, of those that were sexually active only 54% used a condom at last sex. 23% reported a history of sexual abuse. There were no differences between conditions on any of these baseline characteristics except that the STAR youth reported greater emotional abuse on the Childhood Trauma Questionnaire (11.32 vs. 9.58, t (167) = 2.09, $p < .05$) and were more likely to be female (70% vs. 50%, p=.005). Accordingly, outcome analyses adjusted for differences between conditions.

Intervention dose and fidelity. To ensure adherence to the scripted intervention and to reduce "drift," investigators observed at least 20% of intervention sessions, with excellent ratings of adherence and performance (see Paper in **Appendix**).

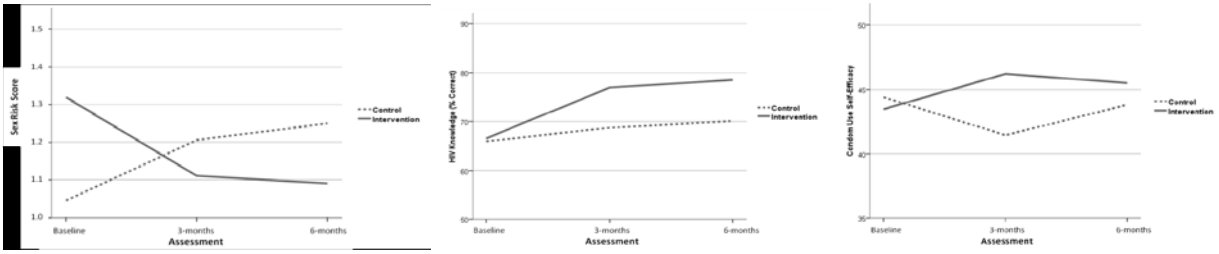
Retention. Adolescents were assessed at 3, 6 and 9 months after the final intervention session and rates were not influenced by baseline characteristic nor were there significant differences in conditions. Overall, 91% of youth were assessed at least once during the follow-up period (82% at 6 months for example

Data Analysis. Three-level mixed models were used to account for the nested nature of these data. Assessments were nested within participants who were nested within 29 groups ranging in size from four to nine. Mixed models not only address nesting but also address missing data through the application of full information maximum likelihood estimation. Piecewise models were used to test the treatment effect from baseline through 6 months post intervention, and the maintenance effect from six months to nine months post intervention since previous HIV prevention programs have found decay in impact after six months.

Sexual Risk Index. To include the level of sexual risk of subjects who were not sexually active or who had sex infrequently, an alternative to the count of unprotected sex acts (which tends to be highly skewed at both ends of the distribution[35]) was used. A composite index of sexual risk was created (Sexual Risk Index), with participants reporting: no lifetime history of sex assigned a risk score of 0, prior experience with sex but no sex during the past 90 days assigned a score of 1, 100% condom use during sex over the last 90 days assigned 2, inconsistent condom use during sex over the last 90 days assigned 3, and no condom use during sexual encounters in last 90 days assigned 4.

Intervention Outcomes. Unadjusted means for Sex Risk Index, HIV Knowledge and Condom Use Self-Efficacy are shown below. Relative to control participants, participants in the STAR intervention showed a significant decrease in the Sex Risk Index across the three and six month follow-up assessments (t (27) = -2.60, p =.*02*). They also showed greater increases in HIV-related Knowledge scores (t (27) = 2.81, p = .01), and greater increases in Condom Use Self-efficacy scores (t (27) = 2.28, p = .03). There were no significant differences between treatment conditions for scores on Negative Condom Use Expectations or Advantages of Condom Use.

Fig. 1. Project Star Graphs



The second segments of the piecewise models were the maintenance of effects from six to nine months post intervention (see Paper in Appendix). Although the direction of most effects was consistent with waning influence of intervention at nine months post intervention, none of these trends reached statistical significance.

Summary. This project found that an intervention for youth in therapeutic and alternative schools based on empirically supported HIV prevention techniques and sexuality-specific affect management and cognitive monitoring components, was associated with less sexual risk over a six month follow-up period and improvements in HIV knowledge and self efficacy for condom use compared to a brief, knowledge-based comparison condition. This study had numerous methodological strengths which enhance its validity such as a highly scripted intervention, intensive monitoring of the intervention's delivery, confidential adolescent self-report via laptop computers, and good retention of a population that is often transient. STAR is ready for dissemination in digital format, which has the advantages of reliability, reach, and adolescent appeal.(1)

History of successful collaboration between VBI and RIH- Eliciting Affect in Teens in a Virtual World (1R41MH087322-01A1). Our team of VBI and RIH has successfully collaborated on this previously funded Phase I STTR, in which a virtual reality (VR) party environment for adolescents that incorporated cues for substance use and sexual risk behavior was developed. After focus groups to obtain feedback about the party environment, script, music, and avatars, the developed VR was tested with 46 adolescents. Seventy percent approved of the party layout and scene. As hypothesized, there was evidence of physiological arousal due to the party scene since there a significant increase in heart rate during the VR party compared to the VR baseline environment (neutral aquarium stimulus). Also, post-hoc examination of specific stimuli within the VR

party indicated that the sexual and drug stimuli increased HR. Thus, VR has the potential to immerse adolescents in a more realistic experience than typical role-playing in order to practice newly acquired assertive communication. A Phase 2 application has been submitted to build on this VR approach to immersive simulation of risk situations with peers but there will not be any scientific or budgetary overlap with this project.

D. APPROACH

Overview. This Phase I/II Fast-Track application will digitize STAR, the sole HIV prevention program developed to address the needs of youth in mental health treatment. STAR has been shown to be efficacious in reducing sexual risk for six months following the intervention in a randomized trial.(1) The resulting automated, interactive, multi-media driven D*STAR will provide for reliable and easy delivery to care agencies that serve adolescents in mental health treatment in the U.S., increasing its acceptance, and ultimate dissemination. Our collaborative, multidisciplinary team is well positioned to conduct both Phases of the project and is comprised of experts in HIV prevention and child and adolescent psychiatry; experts in modeling and computer simulation; as well as seasoned product development and business professionals. We have specifically chosen **the Fast Track SBIR mechanism** as our proposal addresses a pressing public health problem and a Fast Track reduces the latency inherent in such a project making it to market. Moreover, Phase I focuses on creating a prototype of D* STAR with capabilities and technologies that Virtually Better has successfully refined over the last 15 years of effective SBIR projects. Therefore, we are confident in our successful Phase I completion and transition to Phase II. Finally, we are focused on capitalizing on the market size allocated for HIV-related prevention opportunities in this digital era.

Phase 1: Specific Aims

1. To develop and refine digital versions of core sessions of STAR that introduce affect regulation and cognitive monitoring in sexual situations, and provide basic sexual health skills and education.
2. To conduct qualitative evaluations of the feasibility, utility, and acceptability of the sessions. There will be focus groups with approximately 10 community stakeholders comprised of parents of youth in mental health treatment *and mental health treatment center staff. There will also be focus groups with approximately 15 adolescents and two individual interview sessions with approximately 15 adolescents in mental health treatment (13-20 years old)*
*3. To conduct an open trial of the D*STAR sessions with approximately 30 adolescents to determine its preliminary impact.*

Overview. The Phase 1 aims will be accomplished by an iterative process of digital development between Virtually Better and the developers of STAR, with feedback from adolescents in mental health treatment and our community stakeholders. Phase 1 will focus on transferring the content of four sessions of STAR, which teach sexuality specific cognitive monitoring, affect regulation skills and sexual health knowledge, into digital format. The sessions contain modalities such as role playing, knowledge games, personal evaluation and group discussion similar to those used the remaining 10 sessions. Thus, Phase 1 will create some of the core affect management, cognitive monitoring elements, and safe sex strategies of STAR, as well as create an effective template and the necessary architecture for the modalities that are used in the remaining sessions. The 24 months of Phase 1 will allow for an iterative development and will conclude with an open pilot trial with approximately 30 youth to demonstrate its preliminary impact, engagement and acceptability.

Eligibility Criteria. Adolescent males and females ages 13 to 20 years who are in mental health treatment will be eligible for enrollment in each phase of study according to the following criteria: 1) English speaking, 2) adolescent assent given to participate in the study, 3) consent of a parent/legal guardian and HIPAA research authorization permission and 4) attending an alternative / therapeutic school, mental health day treatment program, partial hospital program, or therapeutic group homes. Exclusion criteria include: 1) self-report of HIV infection (STAR is not designed to address disclosure, stigma, and medical adherence issues), 2) recent or current pregnancy, 3) cognitive limitation that impairs consent capacity by judgment of clinical staff and 4) current participation in another psychosocial intervention that is addressing STI/HIV prevention.

Community stakeholders will be eligible for enrollment in the focus group phase of the study according to the following criteria: 1) staff members from a mental health setting, parents of an adolescent in mental health treatment, and staff members from relevant community organizations, such as those serving lesbian, gay, bisexual, transgender, and questioning youth (see letters of support from Bradley Hospital, Gateway Health,

AIDS Care Ocean State and Youth Pride Rhode Island), 2) English speaking and 3) consent and HIPAA research authorization permission. Exclusion criteria include: 1) not English speaking and 2) inability to provide consent.

Sample and Recruitment. We will recruit adolescents in Phase 1 from mental health related day programs in southern New England, similar to recruitment for Project STAR. Dr. Brown has been highly successful in recruiting adolescents from these programs for STAR (185 youth enrolled) and for another group HIV prevention intervention (RO1 MH066641), which enrolled 225 youth in mental health treatment. Programs will identify youth in the eligible age range and obtain consent to contact permission from parents / guardians. Research staff will contact the parents / guardians to determine initial eligibility and then screen the adolescent for eligibility. Consent from caregivers and assent of adolescent will be obtained as described in the Human Subjects section. Similar to STAR, we anticipate that 70% of eligible youth who are contacted will be enrolled.

Development Process. Virtually Better, Inc develops software using Scrum, an agile development framework. This process includes daily team meetings and incremental product deliveries. Working versions of the product are delivered throughout the development process, allowing product stakeholders to review and revise the product's direction for the next incremental delivery. As suggested by other researchers who have transformed face-to-face intervention into a multimedia format, we will use a systematic, iterative process between VBI, who has successfully completed over 15 Phase I/II SBIR/STTR's, and the developers of the original intervention, as well as community stakeholders, and adolescents from our target population.(61,62,69) Our process will have **four stages,** (timeline in **Budget Justification**); 1) develop storyboards, 2) develop multimedia activities and receive community stakeholder and YAB feedback, 3) develop the multimedia sessions, and 4) evaluate the sessions with an open pilot trial.

Phase I, Stage A: Develop preliminary storyboards for the 4 sessions (Months 1-4). The iterative process will ensure that the STAR intervention content is transformed to D*STAR in a way that retains the core elements of the efficacious intervention. Essential content elements of STAR include 1) focus on affect management and cognitive monitoring skills specific to sexuality, 2) tailored relevance for youth in mental health treatment, 3) developmental appropriateness, 4) focus on skills relevant to communication, abstinence, and condom use, and 5) information about HIV, sexuality and healthy relationships. Essential processes of the intervention elements include its structured group session format and the use of multiple interactive features (such as didactic instruction, games, role plays, videos and group discussion).(1) VBI and HIV prevention intervention scientists at Rhode Island Hospital (RIH) will collaboratively develop draft scripts and storyboards for each activity of the four identified interventions. VBI will create color schemes and design templates and the user interface (UI) design of the software. RIH will review the material to ensure that it is appropriate for adolescents, consistent with STAR topics, and that the essential core elements are retained.

Phase I, Stage B: Feedback on the multimedia storyboards (Months 4-9). Feedback will be obtained from focus groups with approximately 10 **community stakeholders** and from focus groups with approximately 15 youth in mental health treatment. Community stakeholders will include a variety of staff from mental health treatment settings such as administrators, supervisors, therapists, health teachers at therapeutic schools, clinicians at day hospitals and day treatment programs, parents of youth in mental health treatment and from relevant community organizations, such as those serving lesbian, gay, bisexual, transgender, and questioning youth (see letters of support from Bradley Hospital, Gateway Health, AIDS Care Ocean State and Youth Pride Rhode Island). Detailed notes will be taken at stakeholder feedback sessions and themes will be compiled by RIH. The community stakeholders will provide valuable input at each step in this project concerning the translation of STAR, the use of multimedia to deliver the program, parental reaction to the program, and DSTAR's relevance and appropriateness for diverse youth. The community stakeholders will also review material for sensitivity to culture (e.g., ethnic and racial, sexual orientation) and gender and the appropriate inclusion of substance use as a risk behavior. Similar stakeholders were important in the development of STAR. **Adolescent Focus Groups will also be utilized to gain essential feedback from** participants with representing of the important demographic characteristics (age, gender, race, ethnicity, sexual orientation) of the target population. The "Rapid Approach" of Kruger and Casey (2000) wlll be used and focus groups will be conducted by 2 members of the research team, with a note-taker present.(81) Dr. Brown has utilized focus groups with the development of all his previous NIH-funded adolescent HIV prevention programs, including STAR, so has considerable experience in the procedures needed to obtain material of particular relevance to intervention development and adaptation. Focus groups will all occur in our research lab and questions will address reactions to the initial translation of the STAR sessions into multimedia storyboards. Participants will review the original STAR sessions and determine if the multimedia storyboards are consistent.

We will obtain their views on areas of intervention design such as (a) program structure (e.g., frequency, length, time); b) media formats (video, cartoon, game, novella, self-rating) c) session structure (e.g., group discussion, media interaction, question & answer sessions); d) session content (e.g. relevance to topic); and e) overall impressions of the proposed sessions (e.g., engagement, acceptability). We will continue to hold groups until no new information is obtained, which is likely to be after 3-4 groups of 5 adolescents. The storyboards will be revised based on the feedback.

Phase I, Stage C: Develop and validate all digital components for four sessions (Months 6-16). Each storyboard activity will be created in a digital format and will be informed by the iterative focus group feedback described above. VBI will ensure that the prototypes are technically feasible and make maximal use of multimedia capabilities. RIH will ensure that the prototypes are consistent with the content and process elements of STAR and that they are appropriate for adolescents. Feedback on the Stage C digital material will be obtained from approximately 15 youth in mental health treatment. Two, 90-minute qualitative interview sessions with adolescents will occur in our research lab and will be used at this stage to gather detailed critiques. The sample of adolescents in mental health treatment will adequately represent the demographic characteristics (age, gender, race, ethnicity, gender orientation) of the target population. Each activity will be reviewed and critiqued as to its acceptability by adolescents and its likelihood of conveying the intended material. Interviews will probe for ambiguous material and comprehension of content. In addition, each participant will rate each D*STAR activity as to its clarity, relevance and appeal (see draft rating forms in Appendix). Interviews will continue until no new information is obtained (estimated to be 10-15 youth). Digital material will again be refined by VBI and RIH based on feedback from the adolescent interviews and from the community stakeholders and compiled into compete sessions. Participants will also complete the Session Evaluation Form (SEF) and the Client Satisfaction Questionnaire (CSQ) (see Measures) to assess the clarity, relevance and appeal of the activities and their over-all reactions to the sessions.(82,83) **Validation check:** Mean scores of 24 on the CSQ and 30 on the SEF, comparable to "good," will be deemed as **acceptable** for each complete session. The process of refinement will continue with more youth, if needed, until all four sessions meet these criteria

Phase I, Stage D: Open Pilot Trial (Months 17-24). The validated D*STAR sessions will be tested with a new cohort of approximately 30 youth in mental health treatment. Subjects will participate in four weekly, one-hour sessions, and after each session will complete a brief (five-minute) questionnaire about the acceptability and relevance of the session. Assessments and the sessions may occur in the participants' school, place of mental health treatment or in our office. To determine the preliminary impact of the sessions, youth will complete several measures of HIV cognitions and attitudes (see Measures). Participants will be asked to complete one 60-minute computerized questionnaire before the program starts, and one computerized questionnaire one month after the program. The sample will have power 0.8 to discern a moderate effect size on attitudes in a pre-posttest design (see Data Analysis). The process of refinement will continue with more cohorts, if needed, until change in attitudes is observed.

Settings and Recruitment: Adolescents will be recruited from mental health related day programs (alternative / therapeutic school, mental health day treatment programs, partial hospital programs, or therapeutic group homes). Dr. Brown has been highly successful in recruiting adolescents from these programs for STAR (185 youth enrolled) and for another group HIV prevention intervention (R01 MH066641), which enrolled 225 youth. Programs will identify youth in the eligible age range and will obtain permission to contact parents / guardians. Research staff will contact the parents / guardians to determine initial eligibility and then screen the adolescent for eligibility. Consent from caregivers and assent of adolescent will be obtained as described in the Human Subjects section. Similar to STAR, we anticipate that 70% of eligible youth who are contacted will be enrolled. **Retention:** Procedures will be similar to those used in STAR, which retained more than 85% of the sample at 3 months after the completion of the intervention and similar rates are anticipated with this project. Thorough locator and tracking information will be collected at enrollment and will be updated frequently. Many youth will be in the mental health settings for 6 months, which facilitates follow-up. **Open Trial Intervention Procedures:** After completion of the baseline assessment adolescents will participate in four weekly, one hour sessions of D*STAR. The intervention will be conducted in mixed gender groups of 4-8 adolescents (similar to STAR) and take place weekly. Sessions will last approximately one hour each and will be led by a single facilitator from Rhode Island Hospital. **Facilitator training and fidelity monitoring:** Because the intervention is digitally delivered, training is minimal. Facilitators will be oriented to the sessions, common questions from participants and operational issues. Participants will not need to disclose sensitive personal information in the groups but will discuss how adolescents similar to them might

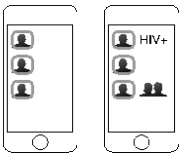


Fig. 4. The Bump Reveal

feel and self-reflect on their own behavior and attitudes Because of this structure, fidelity monitoring is not needed but facilitators will complete a check list at the end of each session to document activities and any aberrations.

Intervention Architecture and Automation

Architecture**.** D*STAR will be a synchronous, multi-user, multi-device simulation. Two versions of the software will be produced, a client and a server version. Both versions of the software will be created using the Unity game engine and will have a shared codebase. Unity will provide all multimedia capabilities such as animated 3D characters, video-based presentation content, and rich interactive scenarios. Unity is implemented on top of Mono, an open source implementation of Microsoft's .NET framework, which will provide lower level services such as networking, memory management, and object serialization. Virtually Better currently uses Unity as its preferred game engine because of its ability to target so many varied platforms including all major desktop operating systems as well as popular mobile platform such as iOS and Android. A single instance of the server version of the software will be run on a laptop computer which will take on the role of the virtual facilitator and will be used to track the overall state of the simulation. The simulation state will include items such as the current simulation step, the avatar images of the participants, and any other interactive choices the participants make. The virtual facilitator will be visually represented on a shared screen **(Fig. 2)** connected to the desktop or laptop running the server version of the software.

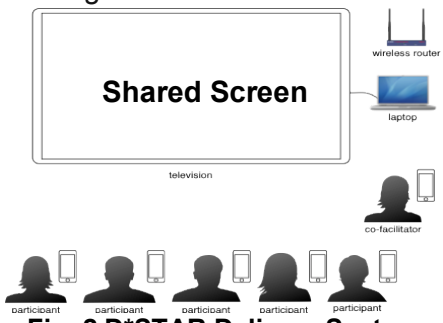


Fig. 2 D*STAR Delivery System

0 Each participant will have their own instance of the client software running on a mobile device **(see Appendix B).** The client version of the software will connect to the server over a standard Wi-Fi network giving the participants a virtual presence in the simulation. All communication between the client and server instances of the software will be done using standard web- based protocols which will provide a high level of compatibility with wireless networks and devices. The server will contain an embedded HTML5 WebSocket server to provide full-duplex communication between the server and client. All simulation state changes will be serialized and exchanged between the client and server using a JSON (JavaScript Object Notation) based format. As long as the WebSocket connection is maintained, it is only necessary for the client and server to exchange differences to the simulation state. When network errors occur, the client will automatically reconnect to the server and the server will provide the entire current state of the simulation.

Automation. The automation of the facilitator provides systematic delivery of content and de-obligates the need for a trained clinician to deliver the intervention. VBI and RIH will develop decision trees to drive the virtual facilitator's narration, prompting, and feedback. At times, it will be necessary for the trained RIH research assistant to coordinate certain group interactions, but these will all be managed through an administrative control panel on a mobile device, which gives the research assistant a layer of control over the timing and content of necessary statements by the virtual facilitator. At various times, participants will be prompted to interact and discuss topics with each other by the virtual facilitator, but the trained research assistant will have the ability to click button on their "admin only" mobile device to indicate when the discussion is complete, or when the virtual facilitator needs to prompt more questions or provide summary statements. We also recognize the possibility that that the group could "get stuck" or struggle to begin or complete a group interaction, even after pre-programmed prompts by the virtual facilitator. For this reason, the research assistant will have additional system control to initiate appropriate comments. When these buttons are activated, the virtual facilitator will provide validating statements, similar to a human facilitator, and then provide advice on how to begin the interaction.

Session Examples: Translating STAR to D*STAR

From STAR Session 4: Personal Vulnerability. D* STAR will teach about the vulnerability to contract HIV through ***The Envelope Game* (see Appendix C),** which begins by *virtually* passing out envelopes, shown as a fanned-out stack on the group *shared* screen. The envelopes will appear to move from the shared screen to each participants' screen (Fig.3). Individual envelopes appear on each of the participant's mobile device. Next, as in the original version, each

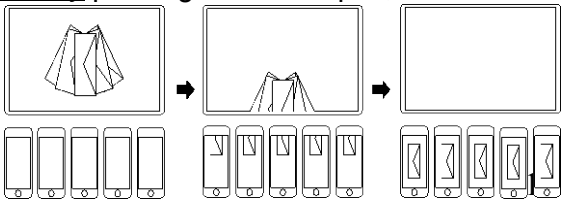


Fig. 3. The Envelope Game

of the participants are told by the virtual facilitator that they will meet others in the group. In the D*STAR version, they will be instructed to gently bump fists with other participants while holding their device. This gesture was an innovation inspired by the iPhone app Bump by Bump Technologies, Inc. When two participants bump their devices simultaneously, each participant will end up with additional avatar images on their device. The participants are then told they didn't just meet these people, they had "virtual" sex with them. The participants can then open their envelopes by touching them on their mobile device and the envelopes reveal that some used a condom, some used a condom incorrectly, and some did not have sex (Fig 4). The impact on the transmission of HIV/ST among the group is explained by the virtual facilitator.

251671552251669504251670528**STAR Session 6: Dysfunctional Thinking (Appendix D).** In D*STAR, participants will have several interactive ways to learn the cognitive aspects of safe sexual decision making emphasized in STAR. For example, the virtual facilitator will list various thoughts about sex (e.g., "condoms are disgusting", "not all teens have sex, maybe I'll wait") and through individualized voting, participants will be able to use the *Thoughts Wizard* icons to vote as to whether the thoughts are Health or Unhealthy (Fig 5). Each participant will make a choice, and when the group has submitted all answers, the virtual facilitator will display the vote breakdown, discuss the voting pattern, and then pose a question for the group to discuss. The virtual facilitator will provide correct answers at each juncture if the group is unable to provide a correct response.

Fig. 5. Thought Wizards

D*STAR will use role-plays to emphasize and practice new skills, similar to STAR. For example, in one role-play two participants will take the part of two characters ("Sam" and "Alex,") in a sexual situation and two other participants will give voice to their thoughts, The group will hear what Sam and Alex are thinking, as well as what they are saying (role play content is provided digitally on the volunteer's mobile device). The characters stand up in front of the rest of the group. The "thought" characters stand on the outside next to their respective "real" character, to emphasize that they belong together. At the completion of the role-play, the virtual facilitator will praise the teens and pose a group question (e.g., "*Good job! We not only heard what Max and Jocelyn were saying, we also heard what they were thinking. What were some of their unsafe thoughts?")* Once the group identifies unsafe thoughts, the virtual facilitator will have the group answer individually on their devices and Safe and Unsafe thoughts Q and A.) as to the type of unsafe thoughts identified. Once complete, the teens will be able to follow up with picking Safe thoughts suitable for the situation that they would recommend to Alex. These responses will then be shown on the group shared screen, and the virtual facilitator will ask leading questions for the group to discuss about the identified Safe thoughts.

From STAR Session 7: Affect Management (Appendix E). To teach affect management skills in the context of role plays, the virtual facilitator, who appears on a shared screen in front of the room, will seek two volunteers for scripts of emotion-laden situations. Once actors are assigned, the virtual facilitator will read the scenario, review what is read, and then the two gender-neutral scripts will appear on the two actors' mobile devices, with the whole script appearing on all other devices. At the conclusion of the role play, the virtual facilitator will appear on the group shared screen to thank them and will prompt all participants to look at their mobile devices and answer questions about the emotional reactions that the actors were role-playing, using emotional face examples another rating scales (Fig. 6). When all users have answered all questions and clicked the "complete" button, the virtual facilitator will initiate a group discussion about participant responses.

Fig. 6. Facial Emotions

251675648In several exercises in which increasing awareness of one's own emotions is emphasized, participants will be provided a Feelings Rater and the corresponding faces (Figs. 7) to provide a context for rating one's own emotional reactions to pictures, sounds, and role plays provided throughout the intervention. This will serve as a constant calibration and emphasis on paying attention to one's emotional state, and will reinforce the link between emotions, thoughts and actions. Once this concept is taught and practiced, the virtual facilitator will bring it back up on each user's device at various times to teach the participants, in real time, and with little

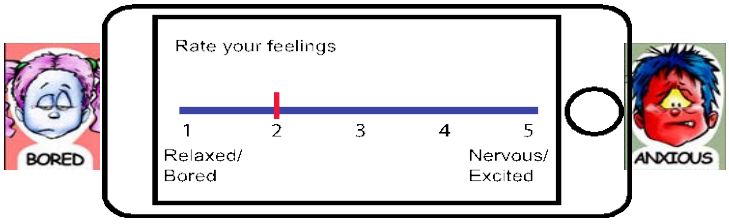


Fig. 7 Feelings Rater

warning, how to constantly remain aware of one's emotional state.

From STAR Session 11: Condom Use (Appendix F). In the ***Checkerboard Order Game,*** the virtual facilitator will pre-assign participants into groups of 2-3, with each group seeing the same set of condom visuals, intentionally in a scrambled order. The virtual facilitator will explain the game, which tasks each group to rearrange the pictures in the proper order of condom use. When all groups have completed the task, by submitting their final arrangement, the virtual facilitator will review their ordering with them, pointing out both correct and incorrect sequencing, all the while reinforcing them for their attempts. This task will then be followed by several prompting questions from the virtual facilitator to discuss differences in their sequencing. Depending on the nature of any sequence errors made, the virtual facilitator will help them locate and understand their errors and possible alternatives.

Phase 2: Specific Aims

*1. To develop and refine digital versions the remaining sessions of STAR and a digital general health promotion (HP) intervention, building upon the essential content areas and refinements developed in Phase I. 2. To conduct qualitative evaluations of the feasibility, utility, and acceptability of D*STAR and the digital HP intervention with adolescents in mental health treatment,* and communitystakeholders, which may include parents of youth in mental health treatment, staff from mental health faciltities, and staff from relevant community organizations serving youth. *3. To conduct a randomized control trial of D*STAR compared to the time matched digital HP intervention among 120 adolescents ages 13 to 20 in mental health treatment.*
The Phase 2 aims will be accomplished by a development stage, a pilot stage, and a RCT stage (see Timeline in Budget Justification).

Overview. The Phase 2 aims will be accomplished by an iterative process of digital development between Virtually Better and the developers of STAR, with feedback from adolescents in mental health treatment and our community stakeholders. Phase 2 will focus on transferring the content of the remaining sessions of STAR, which teach sexuality specific cognitive monitoring, affect regulation skills and sexual health knowledge, into digital format. The sessions contain modalities such as role playing, knowledge games, personal evaluation and group discussion. The development process, including 4 months (months 25-28) of storyboarding, 5 months of concept development and feedback (months 26-30) and 13 months of **digital development** (months 28-40) will be in the same order (though longer time allotment given increased content in Phase II) as was planned for to develop in Phase I. Storyboards, digital activities and D*STAR sessions will be critiqued by adolescents in mental health treatment and then refined until they are scored by youth as acceptable, relevant and useful. Community stakeholders will also rate D* STAR as to its ease of use and acceptability (with corresponding refinement) during the development. Development of a digital general health promotion (HP) condition will occur using the same procedures during the same time period. Approximately 20 youth will participate in this stage and the validation check criteria for sessions will be the same as in Phase 1.

During the **6-month pilot stage** (months 40-45), agency staff will randomly implement D*STAR or HP for approximately 20 youth in order to test our agency procedures and sessions logistics, which will be refined based on qualitative and quantitative feedback. Phase 2 will conclude with a 18 month RCT to determine the efficacy of D*STAR among 120 adolescents ages 13 to 20 in mental health treatment.

Eligibility.. Adolescent males and females ages 13 to 20 years who are in mental health treatment will be eligible for enrollment in each phase of study according to the following criteria: 1) English speaking, 2) adolescent assent given to participate in the study, 3) consent of a parent/legal guardian and HIPAA research authorization permission and 4) attending an alternative / therapeutic school, mental health day treatment program, partial hospital program, or therapeutic group homes. Exclusion criteria include: 1) self-report of HIV infection (STAR is not designed to address disclosure, stigma, and medical adherence issues), 2) recent or current pregnancy, 3) cognitive limitation that impairs consent capacity by judgment of clinical staff and 4) current participation in another psychosocial intervention that is addressing STI/HIV prevention.

Community Stakeholders will be eligible for enrollment in the focus group phase of the study according to the following criteria: 1) staff members from a mental health setting, parents of an adolescent in mental health treatment, and staff members from relevant community organizations, such as those serving lesbian, gay, bisexual, transgender, and questioning youth (see letters of support from Bradley Hospital, Gateway Health, AIDS Care Ocean State and Youth Pride Rhode Island), 2) English speaking and 3) consent and HIPAA research authorization permission. Exclusion criteria include: 1) not English speaking and 2) inability to provide consent.

Sample and Recruitment. We will recruit adolescents in Phase 2 from mental health related day programs in southern New England, similar to recruitment for Project STAR. Dr. Brown has been highly

successful in recruiting adolescents from these programs for STAR (185 youth enrolled) and for another group HIV prevention intervention (RO1 MH066641), which enrolled 225 youth in mental health treatment. Programs will identify youth in the eligible age range and obtain consent to contact permission from parents / guardians. Research staff will contact the parents / guardians to determine initial eligibility and then screen the adolescent for eligibility. Consent from caregivers and assent of adolescent will be obtained as described in the Human Subjects section. Similar to STAR, we anticipate that 70% of eligible youth who are contacted will be enrolled.

Development Process. Virtually Better, Inc develops software using Scrum, an agile development framework. This process includes daily team meetings and incremental product deliveries. Working versions of the product are delivered throughout the development process, allowing product stakeholders to review and revise the product's direction for the next incremental delivery. As suggested by other researchers who have transformed face-to-face intervention into a multimedia format, we will use a systematic, iterative process between VBI, who has successfully completed over 15 Phase I/II SBIR/STTR's, and the developers of the original intervention, as well as community stakeholders , and adolescents from our target population.(61,62,69) Our process will have **four stages,** (timeline in **Budget Justification**); 1) develop storyboards, 2) develop multimedia activities and receive stakeholder and YAB feedback, 3) develop the remaining multimedia sessions, and 4) evaluate the sessions with a randomized control trial.

Phase 2, Stage A: Develop storyboards for the remaining STAR sessions and the digital Health Promotion comparison condition (Months 25-28). The iterative process will ensure that the STAR intervention content is transformed to D*STAR in a way that retains the core elements of the efficacious intervention. Essential content elements of STAR include 1) focus on affect management and cognitive monitoring skills specific to sexuality, 2) tailored relevance for youth in mental health treatment, 3) developmental appropriateness, 4) focus on skills relevant to communication, abstinence, and condom use, and 5) information about HIV, sexuality and healthy relationships. Essential processes of the intervention elements include its structured group session format and the use of multiple interactive features (such as didactic instruction, games, role plays, videos and group discussion).(1) VBI and HIV prevention intervention scientists at Rhode Island Hospital (RIH) will collaboratively develop draft scripts and storyboards for each activity of the four identified interventions. VBI will create color schemes and design templates and the user interface (UI) design of the software. RIH will review the material to ensure that it is appropriate for adolescents, consistent with STAR topics, and that the essential core elements are retained.

Phase 2, Stage B: Feedback on the multimedia storyboards (Months 26-30). Feedback will be obtained from focus groups with approximately 10 **Community Stakeholders** and from focus groups with approximately 20 youth in mental health treatment. Community stakeholders may include parents of youth in mental health treatment, staff from mental health facilities, and staff from relevant community orginizations serving youth (see letters of support from Bradley Hospital, Gateway Health, AIDS Care Ocean State and Youth Pride Rhode Island). These individuals will be recruited from the organizations and schools that we are working with. Detailed notes will be taken at feedback sessions and themes will be compiled by RIH. The stakeholders will provide valuable input at each step in this project concerning the translation of STAR, the use of multimedia to deliver the program, parental reaction to the program, and DSTAR's relevance and appropriateness for diverse youth. The stakeholders will also review material for sensitivity to culture (e.g., ethnic and racial, sexual orientation) and gender and the appropriate inclusion of substance use as a risk behavior. **Adolescent Focus Groups will also be utilized to gain essential feedback from** participants with representing of the important demographic characteristics (age, gender, race, ethnicity, sexual orientation) of the target population. The "Rapid Approach" of Kruger and Casey (2000) wlll be used and focus groups will be conducted by 2 members of the research team, with a note-taker present.(81) Dr. Brown has utilized focus groups with the development of all his previous NIH-funded adolescent HIV prevention programs, including STAR, so has considerable experience in the procedures needed to obtain material of particular relevance to intervention development and adaptation. Focus groups will all occur in our research lab and questions will address reactions to the initial translation of the STAR sessions into multimedia storyboards. Participants will review the original STAR sessions and determine if the multimedia storyboards are consistent. We will obtain their views on areas of intervention design such as (a) program structure (e.g., frequency, length, time); b) media formats (video, cartoon, game, novella, self-rating) c) session structure (e.g., group discussion, media interaction, question & answer sessions); d) session content (e.g. relevance to topic); and e) overall impressions of the proposed sessions (e.g., engagement, acceptability). We will continue to hold groups until no new information is obtained, which is likely to be after 3-4 groups of 5 adolescents. The storyboards will be revised based on the feedback.

Phase 2, Stage C: Develop and validate all digital components for remaining STAR sessions and Health Promotion condition (Months 28-40). Each storyboard activity will be created in a digital format and will be informed by the iterative focus group feedback described above. VBI will ensure that the prototypes are technically feasible and make maximal use of multimedia capabilities. RIH will ensure that the prototypes are consistent with the content and process elements of STAR and that they are appropriate for adolescents. Feedback on the Stage C digital material will be obtained from approximately 20 youth in mental health treatment. Two, 90-minute qualitative interview sessions with adolescents will occur in our research lab and will be used at this stage to gather detailed critiques. The sample of adolescents in mental health treatment will adequately represent the demographic characteristics (age, gender, race, ethnicity, gender orientation) of the target population. Each activity will be reviewed and critiqued as to its acceptability by adolescents and its likelihood of conveying the intended material. Interviews will probe for ambiguous material and comprehension of content. In addition, each participant will rate each D*STAR activity as to its clarity, relevance and appeal (see draft rating forms in Appendix). Interviews will continue until no new information is obtained (estimated to be 10-15 youth). Digital material will again be refined by VBI and RIH based on feedback from the adolescent interviews and from the community stakeholders and compiled into compete sessions. Participants will also complete the Session Evaluation Form (SEF) and the Client Satisfaction Questionnaire (CSQ) (see Measures) to assess the clarity, relevance and appeal of the activities and their over-all reactions to the sessions.(82,83) **Validation check:** Mean scores of 24 on the CSQ and 30 on the SEF, comparable to "good," will be deemed as **acceptable** for each complete session. The process of refinement will continue with more youth, if needed, until all four sessions meet these criteria

Phase 2, Stage D: Open Pilot Trial (Months 40-45). During the **6-month pilot stage** (months 40-45), agency staff will randomly implement D*STAR or HP for approximately 20 youth in order to test our agency procedures and sessions logistics, which will be refined based on qualitative and quantitative feedback. The validation check criteria for sessions will be the same as in Phase 1.

Settings and Recruitment: Adolescents will be recruited from mental health related day programs (alternative / therapeutic school, mental health day treatment programs, partial hospital programs, or therapeutic group homes). Dr. Brown has been highly successful in recruiting adolescents from these programs for STAR (185 youth enrolled) and for another group HIV prevention intervention (R01 MH066641), which enrolled 225 youth. Programs will identify youth in the eligible age range and will obtain permission to contact parents / guardians. Research staff will contact the parents / guardians to determine initial eligibility and then screen the adolescent for eligibility. Consent from caregivers and assent of adolescent will be obtained as described in the Human Subjects section. Similar to STAR, we anticipate that 70% of eligible youth who are contacted will be enrolled. **Retention:** Procedures will be similar to those used in STAR, which retained more than 85% of the sample at 3 months after the completion of the intervention and similar rates are anticipated with this project. Thorough locator and tracking information will be collected at enrollment and will be updated frequently. Many youth will be in the mental health settings for 6 months, which facilitates follow-up.

Facilitator training and fidelity monitoring: Because the intervention is digitally delivered, training is minimal. Facilitators will be oriented to the sessions, common questions from participants and operational issues. Participants will not need to disclose sensitive personal information in the groups but will discuss how adolescents similar to them might feel and self-reflect on their own behavior and attitudes. Because of this structure, fidelity monitoring is not needed but facilitators will complete a check list at the end of each session to document activities and any aberrations.

RCT Stage (months 45-56). D*STAR will be evaluated in comparison to the D*HP control condition through a randomized trial with 120 adolescents in mental health treatment. **Subjects** will be eligible as described in Phase 1, and with no overlap with previously recruited youth. **Settings and Recruitment:** Adolescents will be recruited from mental health related day programs (alternative / therapeutic school, mental health day treatment programs, partial hospital programs, or therapeutic group homes). Dr. Brown has been highly successful in recruiting adolescents from these programs for STAR (185 youth enrolled) and for another group HIV prevention intervention (R01 MH066641), which enrolled 225 youth. Programs will identify youth in the eligible age range and will obtain permission to contact parents / guardians. Research staff will contact the parents / guardians to determine initial eligibility and then screen the adolescent for eligibility. Consent from caregivers and assent of adolescent will be obtained as described in the Human Subjects section. Similar to STAR, we anticipate that 70% of eligible youth who are contacted will be enrolled. **Retention:** Procedures will

be similar to those used in STAR, which retained more than 85% of the sample at 3 months after the completion of the intervention and similar rates are anticipated with this project. Thorough locator and tracking information will be collected at enrollment and will be updated frequently. Many youth will be in the mental health settings for 6 months, which facilitates follow-up. **RCT Intervention Procedures:** After completion of the baseline assessment and once randomized (using urn randomization, with stratification to achieve balance based on gender and racial/ethnic minority status between conditions), adolescents will either participate in D*STAR or D*HP. Sites will have at least 15 eligible youth, so randomization can occur by individuals. Both interventions will be conducted in mixed gender groups of 4-8 adolescents (similar to STAR) and take place weekly. Sessions will last approximately one hour each and will be led by a single facilitator from the agency. **Facilitator training and fidelity monitoring:** Because the intervention is digitally delivered, training is minimal. Facilitators will be oriented to the sessions, common questions from participants and operational issues. Participants will not need to disclose sensitive personal information in the groups but will discuss how adolescents similar to them might feel and self-reflect on their own behavior and attitudes Because of this structure, fidelity monitoring is not needed but facilitators will complete a check list at the end of each session to document activities and any aberrations.

MEASURES

All eligible and consented/assented adolescents will complete a demographics form (age, gender, race, ethnicity, parent education, and household income). During Phase 1 all measures will be delivered via paper and pencil. In the Phase 1 Open Trial acceptability and relevance of the sessions will be answered in paper and pencil format, but all other measures will be administered via audio computer assisted self-interview (ACASI) to increase adolescent comfort reporting on sexual and substance use attitudes and behaviors. The ACASI will be administered prior to the start of the intervention, immediately after the intervention, and then 1 month later. In the Pilot and RCT stages of Phase 2, all measures will be administered via computer assisted self-interview (CASI) to increase adolescent comfort reporting on sexual and substance use attitudes and behaviors. The CASI will be administered prior to randomization, immediately after completing the final intervention session, and then 1 month later for the Pilot stage or 3 months later at the RCT stage.

Phase 1: Focus group assessment and Individual Interviews (see guides in the Appendix)

Session Evaluation Form (SEF). The SEF is a brief 13-item questionnaire that will be given to intervention participants at the end of each session. This questionnaire consists of 10 items on a 4-point response scale aimed at eliciting information about the participant's experience with the session (i.e., was the session interesting, was it relevant to their life, did they learn from the session). Three open-ended items query participants about what was most and least useful about the session.(82)

Client Satisfaction Questionnaire–8 (CSQ-8). The CSQ-8 will be used at the completion of the intervention to assess the participant's satisfaction with the intervention, including the procedures, quality and quantity of service, outcome, and general satisfaction. These domains are assessed on a 4-point response scale with individually specified anchors. In addition, three open-ended questions are included that solicit comments about what respondents liked most and least about the intervention. The CSQ-8 has demonstrated high internal consistency across a large number of studies with alpha coefficients ranging from .83 to .93.(83)

Phase 1 Open Trial Measures

HIV related Risk Behaviors. The Adolescent Risk Behavior Assessment (ARBA) is a computer-assisted structured interview designed specifically for use with adolescents to assess their self-reported sexual and drug behaviors associated with HIV infection. **HIV-Related Behavior**. Sexual-risk questions ask about type of sexual behavior lifetime and in past three months (i.e., anal, oral, vaginal), frequency of sexual intercourse, age of sexual debut, number of sexual partners and frequency of condom use, and condom use intentions in the next 3 months. These items are used to compute a **Sex Risk Score** (0 to 4), which reflects sexual behavior for all youth, as done in Project STAR. **Substance Use.** Questions ask about alcohol and marijuana use including frequency and quantity.

HIV/Sexual Risk Cognitions and Attitudes. Our brief scales (developed and refined over the past 20 years) to measure HIV-related knowledge and attitudes in adolescent have demonstrated adequate test-retest reliability (r=0.67 to 0.83) in a delayed education control group over three weeks and adequate internal consistency (alpha = 0.62 to 0.79).(85,86) The knowledge and attitudes scales have proven to be sensitive to educational impact. **HIV Knowledge.** A twenty-item (true, false, uncertain) scale surveys routes of

transmission, casual contact misconceptions, general information and course of illness. It increased significantly with STAR compared to the control condition that provided similar HIV knowledge, presumably due to the decrease in cognitive errors from the STAR training. **Self-Efficacy for Condom Use Scale.** The scale contains 13 items that reflect the context of condom use, such as "could use a condom when I'm very upset" and was found to have a good factor structure and a strong alpha of 0.9.(87) Self-efficacy in emotionally stressful situations improved in STAR, presumably due to the improvement in affect management. **Affect Dysregulation Scale.** A six item scale assessing adolescents' perceived abilities to manage emotional upset (e.g., "In the past three months, I have had trouble controlling my feelings." The scale has a Cronbach's alpha = .72. The scale correlates strongly with behavioral risk in a sample of youth in mental health treatment.(48) **Advantages of Condom Use Scale.** (88) This scale has 13 items (alpha=.78) to assess cognitions of condom use (e.g. "it would be safer"), which are relevant to the interventions focus on cognitive monitoring.
Because of the prevalence of psychological symptoms and trauma history, this will be assessed to describe the sample. **Childhood Trauma Questionnaire (CTQ).** This is a 28-item youth self-report measure that assesses history of physical, sexual and emotional maltreatment. It yields a subscale score for each domain of maltreatment as well as a total score. The CTQ has demonstrated excellent psychometric properties in clinical and non-clinical samples (α=. 92).(89) **The Brief Symptom Inventory (BSI)**. This measure yields symptom scales and global indices and has norms for adolescents. The reliability, validity, and utility of the BSI instrument have been tested in more than 400 research studies.(90)

Participants will also complete the SEF and CSQ-8 in paper and pencil format (see above) following the end of each session to assess the acceptability and relevance of the session.

Phase 2 Pilot and RCT Measures

HIV related Risk Behaviors. The Adolescent Risk Behavior Assessment (ARBA) is a computer-assisted structured interview designed specifically for use with adolescents to assess their self-reported sexual and drug behaviors associated with HIV infection. **HIV-Related Behavior**. Sexual-risk questions ask about type of sexual behavior lifetime and in past three months (i.e., anal, oral, vaginal), frequency of sexual intercourse, age of sexual debut, number of sexual partners and frequency of condom use, and condom use intentions in the next 3 months. These items are used to compute a **Sex Risk Score** (0 to 4), which reflects sexual behavior for all youth, as done in Project STAR. **Substance Use.** Questions ask about alcohol and marijuana use including frequency and quantity. **Cross-talk.** Two items concern discussion with peers about HIV attitudes and skills to assess for potential cross-talk between those in different interventions.(40)

HIV/Sexual Risk Cognitions and Attitudes. Our brief scales (developed and refined over the past 20 years) to measure HIV-related knowledge and attitudes in adolescent have demonstrated adequate test-retest reliability (r=0.67 to 0.83) in a delayed education control group over three weeks and adequate internal consistency (alpha = 0.62 to 0.79).(85,86) The knowledge and attitudes scales have proven to be sensitive to educational impact. **HIV Knowledge.** A twenty-item (true, false, uncertain) scale surveys routes of transmission, casual contact misconceptions, general information and course of illness. It increased significantly with STAR compared to the control condition that provided similar HIV knowledge, presumably due to the decrease in cognitive errors from the STAR training. **Self-Efficacy for Condom Use Scale.** The scale contains 13 items that reflect the context of condom use, such as "could use a condom when I'm very upset" and was found to have a good factor structure and a strong alpha of 0.9.(87) Self-efficacy in emotionally stressful situations improved in STAR, presumably due to the improvement in affect management. **Affect Dysregulation Scale.** A six item scale assessing adolescents' perceived abilities to manage emotional upset (e.g., "In the past three months, I have had trouble controlling my feelings." The scale has a Cronbach's alpha = .72. The scale correlates strongly with behavioral risk in a sample of youth in mental health treatment.(48) **Advantages of Condom Use Scale.** (88) This scale has 13 items (alpha=.78) to assess cognitions of condom use (e.g. "it would be safer"), which are relevant to the interventions focus on cognitive monitoring.

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Youth Risk Behavior Surveillance System (YRBSS). We will use items from the YRBSS (CDC, 2001) to assess adolescents' tobacco use, dietary behaviors, and physical activity, and behaviors that contribute to

unintentional injuries. As with all other measures, the YRBSS will be administered to adolescents in all three conditions.

For descriptive purposes, data on feasibility and adherence will be collected. **Agency feasibility** is the ability to access and use the program successfully, assessed by the number of completed modules and the contacts with VBI and RIH regarding technical issues, clinical questions or clarification. **Participant treatment adherence** is the percentage of completed activities and sessions.

Data Analysis

Qualitative Data (Focus Group and Qualitative Interview). Focus group notes will be analyzed using the "Rapid Approach" of Kruger and Casey (2000) as described earlier to tabulate the common themes to each probe in order to refine the translation tables.(81) Matrix displays will be used to organize and analyze qualitative data gathered during the developmental individual interviews based on procedures described by Miles and Huberman (1994).(91) This approach allows for examining each individual's responses in relation to each other (i.e., within case analyses) as well as comparing responses across interviews (i.e., between case analyses). A matrix format for entering and displaying data, which may include words, phrases, or direct quotes, with each of the primary topics having a separate matrix to identify common themes and concepts of importance. These analyses will guide revisions of the digital material. For example, commonly mentioned dysfunctional cognitions, if not already listed in STAR, will be added to increase the relevance of D*STAR. Qualitative data will help identify specific points of modification that will make activities more acceptable and impactful.

Phase 1 Quantitative Data (Open Trial). Validation Check: Mean scores of 24 on the CSQ and 30 on the SEF, comparable to "good," will be deemed as acceptable for each complete session. Modifications to each of the activities and session will be based on these scores and the qualitative feedback. To judge the preliminary impact of the developed sessions HIV cognition and attitude scales will be examined from pre to post test using a one-tailed paired *t*-test with alpha = .05. **Power** is 0.8, with *n*= 26, to distinguish an effect size of 0.5, similar to the STAR study.

Protection of Human Subjects and Safety Monitoring Plan

Human Subjects Involvement, Characteristics and Design

The proposed research study is comprised of two phases. In the 24 months of **Phase 1,** we will develop and refine digital versions of 4 sessions of STAR: two sessions dealing with instruction in affect regulation in sexual situations and role-playing practice of those affect regulation skills, and two sessions of STAR dealing with instruction in cognitive monitoring in sexual situations and role-playing practice of those cognitive skills. This will be accomplished by an iterative process of digital development between the developers of STAR and our technology partner, Virtually Better, and with feedback from 60 adolescents in mental health treatment and community stakeholders. In the 36 months of **Phase 2**, we develop and refine digital versions the remaining sessions of STAR and a digital general health promotion (HP) intervention in an iterative process with Virtually Better, building upon the essential content areas and refinements developed in Phase I. Also, we will conduct a randomized control trial of D*STAR compared to the time matched digital HP intervention among 120 adolescents ages 13 to 20 in mental health treatment.

Inclusion Criteria. Adolescent males and females, ages 13 to 20 years, who are in mental health treatment will be eligible for enrollment in each phase of study according to the following criteria: 1) English speaking, 2) adolescent assent given to participate in the study, 3) consent of a parent/legal guardian and HIPAA research authorization permission and 4) attending an alternative / therapeutic school, mental health day treatment program, partial hospital program, or therapeutic group homes. There will not be overlap between subjects in the Development Phases, the Pilot Trial and the Randomized Controlled Trial.

Community stakeholders will be eligible for enrollment in the focus group phase of the study according to the following criteria: 1) staff members from a mental health setting, parents of an adolescent in mental health treatment, and staff members from relevant community organizations, such as those serving lesbian, gay, bisexual, transgender, and questioning youth (see letters of support from Bradley Hospital, Gateway Health, AIDS Care Ocean State and Youth Pride Rhode Island), 2) English speaking and 3) consent and HIPAA

research authorization permission. Exclusion criteria include: 1) not English speaking and 2) inability to provide consent.

Sources of Materials

Research Material Obtained from Living Human Subjects. Research material obtained from participants includes questionnaire data, and audio-tapes from qualitative interviews and focus groups. For development of the intervention, subjects will complete qualitative interviews and focus groups in-person regarding their reactions to the digital multimedia activities. The focus groups and qualitative interviews will be recorded and they will take place at the Bradley Hasbro Research Center. The audio-taped interview and written surveys of their reactions to the Intervention will be the sources of material for this phase. For both the Pilot and Randomized Controlled Trials, participants will complete computerized questionnaires about their demographic information, sexual behavior, substance use, affect regulation, and HIV related knowledge/attitudes. Questionnaires will be given at a Lifespan facility or cooperative agencies, and they will be completed at entry to the study, after the last intervention session and 3 months later. Any data collected outside of Lifespan will be transported on a laptop back to Bradley Hasbro Research Center where it will be backed-up and deleted immediately.

Linkages to Subjects and Access to Subject Identities. For each stage of the research, participant names and contact information will be maintained in a recruitment/enrollment database during the course of the study. Once individuals enroll in the study, names will be linked to participant ID number in this database, which will be kept in a restricted access folder on a secure server. All name/ID number files will be assigned a code name unrelated to the name of the study. Signed consent and assent forms will also be kept in a locked file cabinet, separate from any other project data. Once data collection is completed, the corresponding recruitment/enrollment database will be deleted as it is unnecessary to maintain the link between participant identity and study data. Destruction of the Master Clinic Patient Lists must be witnessed and documented on the Master List Verification of Destruction document, which will be maintained in the site's regulatory files. Furthermore, any information collected as part of this study will be accessible only to research staff that has completed mandatory training in the protection of human subjects.

Potential Risks

Every effort will be made to ensure that study participants are protected from risks. The risks are as follows: 1) potential coercion, 2) loss of confidentiality, 3) emotional discomfort during the assessment and/or program sessions. The protection against each risk is described in detail below under Adequacy of Protection Against Risk.

Adequacy of Protection Against Risk

Recruitment and Informed Consent. The risk of potential coercion will be minimized by following standard procedures for obtaining the informed consent from participants, parents, and assent from teens. Recruitment for all phases of the project will involve the same screening procedures. Adolescents will be recruited from mental health related day programs (alternative / therapeutic school, mental health day treatment program, partial hospital program, outpatient clinic, or therapeutic group home) in southern New England. Programs will identify youth in the eligible age range and obtain consent to contact permission from parents / guardians (see consent to contact form). The consent to contact form describes D*STAR, including who will participate in the study and what is expected of research participants, and it explains that participation is voluntary and that all of the information participants provide will be kept confidential. The form also asks parents / guardians (including biological parents, stepparents, legal guardians, or, in the case of wards of the state, the regional supervisor of the Department of Children, Youth and Families (DCYF)) to sign their agreement or disagreement with being contacted. If interested, research staff will contact the parents / guardians to determine initial eligibility and then screen the adolescent for eligibility over the phone. Study personnel will fully explain the study procedures, risks, benefits, and alternatives to participants. Participants and their parents will also be reminded that study participation is voluntary and that refusing to participate or withdrawing from the study at any time will not result in any negative consequences. Research staff will make

every attempt to obtain parental consent in person, however if this cannot be achieved phone calls will be made to the parents / guardians to ensure they understand what the study entails (see below). In all cases above, participants will be assured that they are free to withdraw from the study at any time and that if they do withdraw any data collected up to that point will be destroyed/stripped from any data files (see Protection Against Risk for data handling procedures). As noted above, participation in all stages of the intervention is entirely voluntary and subjects are free to withdraw from the project at any time. Discontinuation or decision not to participate will not jeopardize routine care in their mental health program in any way.

Consent of community stakeholders: At a routine meeting of community stakeholders, an announcement will be made stating that an opportunity exists for members to participate in a research study in which they will be reviewing and providing feedback on a multimedia-based HIV prevention and safe sex education that has been developed for adolescents. Those interested in participating will be contacted at a later date and will meet individually with a researcher to discuss consenting. Participants will be informed that their participation in the study is voluntary and will not effect their current position and/or child's treatment.

Obtaining Informed Consent in Special Cases. Consent/assent of an adolescent (<18) from a mental health treatment program without a parent or guardian present: Families will be sent a consent to contact form (see above). If parents / guardians are interested and have signed the consent to contact form research staff will call them over the phone to screen the adolescent for eligibility. Families will be fully informed in the consent form and, either in person or by phone, about the purposes and procedures of the study. Participants and their parents will also be reminded that study participation is voluntary and that refusing to participate or withdrawing from the study at any time will not result in any negative consequences. If the parent / guardian cannot be consented in-person we will send them a consent form to sign, and we will verify their written consent, discuss the details of the study, and their child's participation over the phone. The consent form will be signed by the guardian before the adolescent will be allowed to participate in the study. Adolescents whose parents / guardians have signed the consent will be told of the consent and study procedures, and expectations will be explained in a private setting. Adolescents will be reminded that participation is voluntary and will not effect their mental health treatment. Only those adolescents who provide assent will be enrolled. All adolescents who have signed consent forms indicating parental permission to participate in the study, and have signed assent, will be eligible for the study.

Protections Against Risk

Breach of Confidentiality. Potential risk will be minimized by strictly adhering to the guidelines for research outlined by the Lifespan IRB, Rhode Island state law, the Federal Health Insurance Portability and Accountability Act of 1996 and its regulations ("HIPAA"), and the DHHS Federal Policy for the Protection of Human Subjects (45 CFR Part 46 Subpart D). This will include identifying participant research data by numeric ID only and maintaining any records containing potentially-identifying information separate from any research data. All research data (written records and audiotapes of program sessions) will be kept in a locked file and electronic data will be password-protected. All of these study-related materials will only be accessible to research staff. No names, only identification codes, will be used in presenting data in lectures, seminars, and papers. Information will be released only with written consent of the parent/guardian.

By enrolling in the study, other individuals may know that a participant is in mental health treatment. This may result in a breach of confidentiality. This can be addressed by research staff. During the consenting process it will be explained to participants that all of those in the research study are in mental health treatment and will be known to them. To further protect against the breach of confidentiality by other research participants, research staff will explain and stress the importance of confidentiality prior to each session, just as it was explained during the consenting process. Prior to each session of group activities research staff will review the group expectations as they pertain to respect for individuals and their privacy. These expectations and guidelines will establish that although research staff will make every effort to minimize risk for breach of confidentiality, research staff cannot control the actions of other group members outside of the research activity setting. Facilitators will be trained in group management. Additionally, a school staff member will be present at all group sessions to monitor behavior and to ensure compliance with school rules.

Participant confidentiality will be breached only to protect the safety and welfare of research participants and only in accordance with state and federal law. If child abuse or neglect is reported, a report

will immediately be filed with the Rhode Island Department of Children, Youth and Families. See "Emotional Distress" below for more details on the available clinical services.

All data collection will take place in secure and supervised clinical settings at the Bradley/Hasbro Research Center. All study personnel names on this application have completed training and received certification in Human Subjects Research Protection (CITI Program) and HIPAA regulations. They will continue to renew this training in compliance with hospital policies.

Parents of participating teens will be asked to provide informed written consent to audiotaping at the time of study entry if they are participating in the qualitative interviews. To assure confidentiality and protection of the participants during audiotaping, all tapes will be stored in locked file cabinets in a secured office. Only Drs. Brown, Whiteley and the project's research assistants will have access to the audiotapes to collect data to inform the development of the intervention.

Emotional Distress. We will minimize distress by presenting questions/program techniques in a supportive manner, assuring participants that they may refuse to answer any questions that make them uncomfortable, and may terminate participation in the intervention at any time. All subjects may receive medical or mental health treatment at any time during the study. Clinical need will determine whether it is appropriate for the participant to stop continuation in the study.

If a participant reports feeling distressed, or has any acute concerns, as a result of their involvement in any phase of the research project (i.e. consenting, baseline assessment, interview session, intervention session, follow-up) clinical resources will be offered on-site. The clinical locations used in this study are ideal as they each provide easy access to medical and mental health clinicians. If a subject contacts study staff because of distress or concern due to participation in the study or directed activities that occur away from the clinical space the subject will be assessed first over the phone, and then, if needed, as described below.

During any phase of the study, if research staff determines that a participant is an acute medical or psychiatric risk, the PI or licensed designee will meet with the participant individually for further assessment and notify the participants' parents of any clinical needs. Staff at the mental health program will also be notified, if indicated. Acute risks would include severe medical illness, or the development of any other severe psychiatric symptoms or disclosure of sexual or physical abuse. Any subjects who exhibit acute risks will be evaluated immediately by emergency room clinical staff at Rhode Island Hospital, or if less acute, by an independent clinician that day. Less severe medical needs or distress can be managed by staff or PI over the phone or with an individual interview. The PI and/or staff will meet with participants and/or families to review concerns and to make referrals for continuing care as needed. Of note, members of the proposed research team have substantial prior clinical (medical and psychiatric) and research experience in care of youth in mental health treatment as evidenced through their biographical sketches.

Potential Benefits of the Proposed Research to the Subjects and Others

Importance of Knowledge to be Gained. We hope that our intervention will be successful in addressing the unique HIV prevention needs of youth in mental health treatment and think that the clear examination of these questions outweighs the previously mentioned risks. The effectiveness of a novel, scalable, technology driven, HIV prevention intervention is understudied with this population. Given that adolescents in mental health treatment are at greater risk for HIV and other STIs than their peers, and the paucity of easily available intervention programs for this population, the knowledge to be gained from this research is significant. The risks to participants are minimal in relation to the importance of the knowledge to be gained.

Reimbursement for Time and Effort. In Phase I participants will be reimbursed $50 for their participation in the focus group. Qualitative interview participants will be reimbursed 50 for each individual interview, so will receive $100 if they complete the two sessions. Participants will be reimbursed $50 for baseline and postintervention assessments during the Phase 1 Open Trial, so will receive $100 if they complete both assessments. Subjects in all stages will be compensated $15 for local travel to assessments.

In Phase II participants will be reimbursed $50 for their participation in the focus group. Qualitative interview participants will be reimbursed $50 for each individual interview, so will receive a maximum of $100 if they complete both interviews. Participants will be reimbursed $50 for baseline and postintervention (immediately after last intervention session and one month postintervention) assessments during the Phase 2

pilot, so will receive $150 if they complete all three assessments. Participants in the randomized control trial will be reimbursed $50 for baseline and postintervention assessments (immediately following last intervention session and three month postintervention), so will receive $150 if they complete all three assessments. Subjects in all stages will be compensated $10 for local travel to assessments.

Data and Safety Monitoring Plan

To address the NIH policy for Data and Safety Monitoring, the PI has developed a system for oversight of the proposed study and its participants. The Data and Safety Monitoring Plan for this application will begin by implementing standard procedures for day-to-day monitoring of the study. Weekly meetings with the research team will be conducted to evaluate the progress of the trial and to review data quality, recruitment, study retention, and examine other factors that may affect outcome. Participant experiences with the study procedures and the rates of adverse events will also be reviewed by our Community Advisory Board (see Research Plan), our research team and Virtually Better to determine any changes in participant risk. The PI will immediately report any adverse events that are observed to the Lifespan Internal Review Board (IRB) and NIMH. Serious adverse events (SAEs) will be reported to the Lifespan IRB immediately by telephone and by written report within 24 hours of our receipt of information regarding the event; SAEs will also be reported in writing to NIMH. Actions taken by the IRB in response to SAEs will also be reported to NIMH, as will reports of changes or amendments to the protocol as a result of an SAE. Reports of changes or amendments to the protocol in general must be requested first in writing to the Lifespan IRB, which then will grant or deny permission to make the requested change or amendment in protocol. Modifications to study aims or design will also be submitted to NIMH for approval prior to instituting them. Finally, if significant medical or mental health risks occur during the study period evaluation by the Rhode Island Hospital emergency department will be immediately initiated to determine whether hospitalization or urgent care is needed. In the event that a research participant either withdraws from the study or the investigator decides to discontinue a research participant due to SAE, the research participant will be monitored by the investigator via ongoing status assessment until either a resolution is reached (i.e. the problem requiring hospitalization has resolved or stabilized with no further changes expected), the SAE is determined to be clearly unrelated to the study intervention, or the SAE results in death. Outcome of all SAEs will be periodically reported to NIMH. A summary of the SAEs that occurred during the previous year will be included in the annual progress report to NIMH.

Educational Training

Since October 1, 2001, Lifespan has required that researchers and IRB members read Protecting Study Volunteers in Research (Dunn & Chadwick) and complete the related exam. This process has served as an initial certification. In June, 2005, the Office of Research Administration contracted with CITI, a Collaborative Institutional (modular) Training Initiative program, for our Human Subjects Protection and HIPAA training for all research personnel. Currently this program offers researchers a basic human subject's protection course as well as a refresher course that is required every three years. Documentation of successful completion is automatically generated and can be printed directly by the researcher

Additional and continuing education opportunities for clinical researchers include the Office of Research Administration newsletter that is circulated to > 900 recipients every 6 weeks. Relevant information concerning research review is available on the ORA web page at www.lifespan.org/research/. In addition to standard institutional research information, the web page contains links to other sites such as CenterWatch, NIH, PRIM&R/ARENA.