**Table 1: Intervention Design (n=61 studies; 59 interventions)**

| **Author(s)** | **Country** | **Age of target audience** | **Characteristics of target audience** | **Program Name** | **Treatment details** | **Non-digital components** |
| --- | --- | --- | --- | --- | --- | --- |
| **Mobile Phone (calls or SMS)** | | | | | | |
| 1. Belzer et al. (2014) | USA | 15-24 years | Youth living with HIV (YLH) | None | Daily phone calls (Monday to Friday) to remind participants to take medication. | Face-to-face interaction with Adherence Facilitator at baseline. |
| 1. Bull et al. (2017) | USA | Unspecified |  | *Youth all engaged (YAE!)* | Between 5-7, automated messages were sent weekly, of which 40% were bidirectional. | None |
| 1. Gold et al. (2011) | Australia | 16-29 years |  | *S5 project* | Text messages about ‘sex’ on a fortnightly basis, with an ‘opt out’ option. | None |
| 1. Hacking et al. (2019) | South Africa | 15-25 years |  | *Virtual Mentors Program* | The virtual mentor interacted with the mentee via a mobile interface (SMS text messaging, call, or WhatsApp messenger). | HIV-positive individuals had the option to join a youth-adherence club. |
| 1. John et al. (2016) | Nigeria | 15-24 years | YLH | None | Weekly voice calls, short text messages/multi-media messages (SMS/MMS), and WhatsApp messages (depending on user preference). | None |
| 1. Juzang et al. (2011) | USA | 16-20 years | African American | None | Three text messages per week for 12 weeks about HIV prevention (i.e., condom use and reduction in the number of sexual partners). One quiz was sent per week. | None |
| 1. Lim et al. (2012) | Australia | 16-29 years | None | None | SMS messages about STIs every 3-4 weeks while e-mails sent less than monthly. E-mails contained messages about safe sex or STI topic and had links to sexual health websites. | None |
| 1. Linnemayr et al. (2017) | Uganda | 15-22 years | YLH | None | Intervention 1:  For the 1-way group, the message was, “We hope you are feeling well today.”  Intervention 2:  For the 2-way group, the message was, ‘We hope you are feeling well today. Reply 1 if well, 2 if unwell.” | Clinical visits once every 1-3 months |
| 1. Liu et al. (2019) | USA | 18-29 years | Young men who have sex with men (YMSM) | *PrEPmate* | Reminders for clinic visits via phone calls, while the SMS-based adherence support component included weekly “check-in” messages asking participants how PrEP was going and daily pill-taking reminder messages. A password-protected website provided information about PrEP, videos and testimonials of peers taking PrEP, and an online support forum. | PrEP education, adherence, and risk-reduction counselling conducted by a health educator. |
| 1. McCarthy et al. (2016) | UK | 16-24 years | None | *Safetxt* | Short text messages designed to reduce STIs in young people by promoting condom use, disclosing infection status to partners, and encouraging STI testing before unprotected sex with a new partner. | None |
| 1. McCarthy et al. (2018) | Tajikistan | 16-24 years | None | None | Mobile app and intervention messages. | None |
| 1. Merrill et al. (2018) | South Africa | 11-16 years | Adolescent girls | *SKILLZ Street* | Two-way short-messaging-service (SMS) campaign to link program participants with health services. A supplementary service data (USSD) line, called “Coach Tumi”, was created to reinforce messages delivered in the curriculum and provide information on how to access local health services. | 2-hour sessions scheduled at school grounds after school hours twice-a-week for five weeks. During the session, participants would discuss life skills activities and sexual reproductive health with their coach. |
| 1. Rockicki et al. (2017) | Ghana | 14-24 years | Female students | None | Unidirectional Intervention:  One text message per week about reproductive health.  Interactive Intervention:  One multi-choice quiz question via text message each week, which they could respond to free of charge. | A free public hotline number and lecture (30-45mins) about reproductive health delivered by a nurse at a 3-month follow-up. |
| 1. Stankievich et al. (2018) | Argentina | <25 years | HIV-positive individuals | None | Text messages inquiring about the status of the patient and medication-related issues, twice a month. Participants were also contacted via social networks such as WhatsApp, Facebook, and e-mail. | None |
| 1. Yao et al. (2018) | USA | 15-24 years | American Indian and Alaska Native youth | *Texting 4 Sexual Health* | Text messages about condom use and STI/HIV testing twice a week for 12 weeks. The study involved 97 SMS delivered over 9 months, including 32 intervention messages and 12 survey questions sent out three times (36 messages in total). | None |
| 1. Ybarra et al. (2018) | USA | 14-18 years | Sexual minority adolescent males | *Guy2Guy* | Multiple daily messages for 5 weeks with a 1-week booster delivered six weeks after the 5-week period ended. Additional interactive components included ‘Text Buddy” and “G2Genie” (an on-demand tool containing pre-programmed advice on various topics). | None |
| **Mobile Applications** | | | | | | |
| 1. Brayboy et al. (2017) | USA | 12-17 years | Teenage girls | *Girl Talk* | A smartphone application (iPhone compatible) containing comprehensive sexual health information. Notifications were sent every 72 hours to encourage the use of the application. | None |
| 1. Dehghani et al. (2016) | Iran | 18-25 years | Female students | None | A mobile application containing information about high-risk sexual behaviours and STDs, safe sex methods, condom use training, and the skills of ‘saying no’. | None |
| 1. Jeong et al. (2017) | South Korea | 18+ years | None | None | A smartphone application containing information about STI risks, STI knowledge, STI prevention skills, STI coping skills, and links to STI-related websites. Cartoon clips were used to discuss STI information. Weekly reminders via text messages were sent to participants. | A traditional face-to-face lecture that lasted 50 minutes and a 30-minutes self-study examined the contents of the educational booklet or mobile application. |
| 1. Manlove et al. (2020) | USA | 18-20 years | Black and Latinx women | *Pulse* | Regular text messages with program content and reminders to view the app. *Pulse* contained 6 interactive sections centred on sexual and reproductive health and 16 core activities featuring informational videos, appointment reminders, and a clinic locator feature. | None |
| 1. Mesheriakova et al. (2017) | USA | 12-18 years | Adolescent females | *Health-E-You* | An iPad-based application that presented audio and visual components in an interactive format. Video vignettes were incorporated into the app featuring young women discussing their experiences with contraception. A truth-vs-myth game was used to assess participants’ knowledge about sexual health. | Clinic visit |
| 1. Nielsen et al. (2019) | Sweden | 18-23 years | None | MOSEXY trial | A smartphone app called ‘Skyddslaget’ contained youth-friendly ‘safe-sex and STI’ information. The app included weekly games and quizzes about safe sex, condom usage, and STIs. There were also personal stories related to sexual risk-taking narrated by peers. | The routine standard of care at the YHCs includes testing and treatment services and access to contraceptives and counselling services. |
| 1. Jones et al. (2013) | USA | 18-29 years | African American women | *Love, Sex, and Choices (LSC)* | Weekly e-mails with a link to soap opera videos about reducing HIV risk behaviour. Participants had to answer three content-related questions before proceeding to the next video episode. | None |
| **Web- and online-based** | | | | | | |
| 1. Bailey et al. (2013) | UK | 18-20 years | None | *Sexunzipped Trial* | An interactive intervention website featuring information about safe sex, relationships, and sexual pleasure. An automated e-mail was sent at 6 and 9 weeks to encourage user engagement. The website contained quizzes and activities that provided tailored feedback. | Urine sample kit by post at 3 months for genital chlamydia testing. The kit contained instructions, a urine sample container, and a prepaid envelope addressed to the laboratory. |
| 1. Ballester-Arnal et al. (2015) | Spain | 18-25 years | None | *Unisexsida* | Intervention 1:  An educator discussed HIV/AIDS without illustrative tools. In the website group, participants had access to HIV/AIDS information on the customised website.  Intervention 2:  Three different motivational techniques were adopted: 1) in the attitudinal discussion group, the educator facilitated a debate about HIV/AIDS; 2) the second technique involved an HIV seropositive individual who explained his experiences with HIV infection and the best methods to prevent HIV infection; 3) the third technique used fear-inducing images and video messages about the impact of HIV.  Intervention 3:  This intervention included a role-play on how to deal with risky sexual situations and communicative skills for negotiating condom use. | * Face-to-face interactions with an educator and a HIV-seropositive individual. * In-person role-plays on dealing with risky sexual situations. |
| 1. Brown et al. (2016) | UK | 13-19 years | None | *Respect yourself (RY)* | A website and web app (both optimised for viewing on a smartphone or tablet computer). | None |
| 1. Danielson et al. (2014) | USA | 14-18 years | African American female adolescents | *Sistas Informing Healing Living Empowering (SiHLEWeb) program* | An interactive website incorporated videos, quizzes, and demonstrations designed to enhance ethnic and gender pride, HIV prevention, and assertive communication skills. The study coordinator sent weekly reminders via e-mail, phone call, or text message. | None |
| 1. Doubova et al. (2017) | Mexico | 14-15 years | None | None | Four educational sessions on the website for four weeks. Educational content included dating, courtship, sexual relationships, gender roles, partner abuse, STIs, early pregnancy, self-esteem, safe sex, use of male and female condoms, and examples for condom negotiation. Two comic avatars (a teenage boy and a girl) were used to present the information through an informal dialogue about their experiences and those of their friends. | Six 30-mins class discussions were conducted after the intervention for three months to encourage participants to examine educational sessions and answer their questions. |
| 1. Gottvall et al. (2010) | Sweden | 15-25 years | None | None | A classroom lesson, an intervention website, and an informational folder. The project’s website included quizzes about HPV. | * A 1-hour lesson about HPV and preventive methods delivered by a registered nurse * Folder containing condoms and information about HPV and its prevention |
| 1. Horvath et al. (2017) | USA | 15-24 years | Gay, Bisexual, and men-who-have-sex with men (MSM) | *Get Connected!* | The intervention website employed tailored algorithms based on participants’ key characteristics (e.g., age, race/ethnicity, relationship status, sexual identity) to tailor imagery and intervention content. Educational content focused on HIV/STI transmission and care and HIV/STI test locator. | None |
| 1. Lustria et al. (2016) | USA | Mean age: 20 years | None | *RU@Risk* | A tailored Web-based intervention designed to promote STD testing among young adults. Participants received unique combinations of messages, testimonials, feedback, and images based on their pre-test responses and individual health information needs. | STD testing in a clinic setting or at-home testing (collecting specimens and mailing them to the lab for analysis) |
| 1. Massey et al. (2013) | Senegal | 15-21 years | None | None | The intervention was implemented at 3 schools which involved peer-led, school-based clubs that engaged students in raising HIV awareness and testing. Clubs at 3 schools were formed to create a youth-focused space whereby students created original videos, audio (songs), and print messages (journalistic articles) about HIV/AIDS. A contest was held to identify the best content created by club members. | None |
| 1. Mevissen et al. (2011) | Netherlands | 18-25 years | None | *Justify your love* | Intervention:  A web-based, tailored, relationship-oriented intervention that provided advice about safe sex. The website acted as a virtual STI public clinic involving a virtual consultant that asked questions and provided information in text blocks or balloons.  Non-tailored Intervention:  A simplified version of the tailored intervention was embedded in a similar virtual STI-public clinic but lacked the virtual consultant, question-answer structure, and tailored feedback. | None |
| 1. Mortimer et al. (2015) | Australia | 18-29 years | None | *Healthy.me* | Online access to a personally controlled health management system (PCHMS) which provided evidence-based information about sexual health and STI testing indications and procedures, and an online appointment booking service and forum. | Interactions with a healthcare professional |
| 1. Naar-King et al. (2013) | USA | 16-24 years | HIV+ youth | *Motivational Enhancement System for Adherence (MESA)* | Computer-delivered motivational intervention for youth starting ART. The software used realistic interactions with a two-dimensional animated character to mimic person-delivered brief interventions’ conversational nature. The program also delivered personalised health feedback, ART information and activities and provided affirmations based on user responses. | Clinic visits |
| 1. Rosser et al. (2010) | USA | >18 years | MSM | *SexPulse* | The *SexPulse* website incorporated video segments, interactive text, and animations focused on safe sex, risk reduction, and long-term sexual health. Interactive modules included a ‘hot sex’ calculator, virtual gym, online chat simulation, and reflective journal. Participants could also consult the frequently-asked-questions (FAQ) section. | None |
| 1. Spielberg et al. (2014) | USA | 18-30 years | Women | None | The website contained information about STIs, prevention, testing, and treatment. An eSTI system provided access to both patients and clinical staff. Participants were mailed a vaginal specimen collection kit in a pre-addressed postage-paid return envelope. Notification about results was sent via text message, e-mail, or both to notify them to log onto the website to view their results. | * Home STI test-kit * STI treatment at a pharmacy or a clinic |
| 1. Starling et al. (2014) | USA | 14-16 years | None | *Bready4it* | Participants spent 3 hours over 2 days completing an online program (a multi-media interactive website that consisted of 5 units involving simulations and activities). | None |
| 1. Villegas et al. (2015) | Chile | 18-24 years | Women | *I-STIPI* | A password-protected I-STIPI website that consisted of 4 online modules. Participants who completed three or more modules received an electronic certificate of completion. | None |
| **Online Education Program** | | | | | | |
| 1. Carvalho et al. (2016) | Portugal | 18-25 years | Men | None | Intervention 1:  The motivational intervention consisted of screen content that promoted positive outcomes of condom use.  Intervention 2:  A volitional intervention that used an onscreen page to encourage participants to formulate action plans. | None |
| 1. Castillo-Arcos et al. (2016) | Mexico | 14-17 years | None | *Connect: A Program on Responsible Sexuality* | Internet-based sessions designed to reduce sexual risk behaviours and increase resilience to sexual risk. The intervention comprised eight 1-hour sessions (6 online sessions; 2 face-to-face sessions). | Two face-to-face sessions lasting 1-hour, facilitated by health experts. |
| 1. Chong et al. (2020) | Colombia | 14-15 years | None | None | Intervention Classroom:  Mandatory internet-based sexual education course. An online tutor monitored students’ performance and answered their questions.  Spill over classroom  Did not receive the treatment but is in the same school as the one that does. | Condom vouchers |
| 1. Kaufman et al. (2018) | USA | 10-12 years | American Indians and Alaska Natives | *Circle of Life (mCOL)* | An online multi-media format was used. Each online chapter comprised stories, games, and videos and required 20-25 minutes to complete. | Class-based discussions, instructions, demonstrations, games, and craft activities require approximately 1 hour. |
| 1. Klein et al. (2017) | USA | 19-34 years | Latina and African American women | *C-SAFE (Sexual Awareness for Everyone)* | A clinic-based intervention comprising three sessions, each lasting 3-4 hours, delivered via a computer and mobile device (or tablet) to promote abstinence, mutual monogamy, correct and consistent condom use, STI treatment protocols, and reduction in the number of sex partners. | Presentation, discussions, role-plays, games, and videos were incorporated into the program. |
| 1. Marsch et al. (2015) | USA | 12-18 years | None | *Therapeutic Education System (TES)* | The Therapeutic Education System (TES) is an interactive, customisable, web-based program containing 26 modules centred on preventing HIV, STIs, hepatitis, and substance-abuse treatment. | None |
| 1. Scull et al. (2018) | USA | 18-19 years | None | *Media Aware* | The intervention was a 5-lesson, web-based sexual health program accessible on mobile devices that included various interactive features such as quizzes, peer-based videos, popular media examples, and skill practice with real-time feedback. | None |
| 1. Shafii et al. (2019) | USA | 14-24 years | None | *e-KISS (electronic KIOSK)* | The interactive computer-based intervention included personalised sexual health feedback from a physical avatar and instructive video modules advocating sexual health. | None |
| 1. Widman et al. (2018) | USA | 15 years | Girls | *Health Education and Relationship Training [HEART]* | The program included five modules that could be accessed via a computer, tablet, or smartphone. Each module contained audio and video clips, tips from other adolescents, interactive games and quizzes, infographics, and skill-building exercises with self-feedback given in real-time. | None |
| 1. Markham et al. (2020) | USA | Mean age: 13 years | None | *It’s Your Game (IYG)* | **IYG** is a 2-year program encompassing 24 lessons that integrate group-based classroom activities with personalised journaling and computer-based activities. It comprises 24, and 50-minute lessons-addressing life skills, sexual behaviour, and related psychosocial factors. The program is highly interactive, combining classroom-based activities with individual journaling and tailored computer-based activities. | Group-based lessons. Trained teachers conduct classroom lessons. |
| 1. Peskin et al. (2019) | USA | 12-13 years | None | *It’s Your Game…Keep It Real!* | Twenty-four (24) lessons delivered to 7th and 8th-grade students by teachers during regular classroom time. | Parent-child homework activities facilitate dialogue on friendship qualities, dating, and sexual behaviour. |
| 1. Rohrbach et al. (2019) | USA | 14-15 years | None | *It’s Your Game (IYG)…Keep It Real* | IYG comprises 24 lessons centred on HIV/STI/teen pregnancy prevention that contains tailored computer-based and classroom-based activities. | Classroom-based activities facilitated by teachers include movie acting, role plays, individual journaling, and group discussion. |
| **Social Media** | | | | | | |
| 1. Bull et al. (2012) | USA | 18-24 years | African American and Latino | *Just/US* | STI prevention messages delivered via a Facebook page. Youth facilitators updated the page daily with new video links, quizzes, games, and threaded discussions relevant to weekly topics. | None |
| 1. Dulli et al. (2020) | Nigeria | 15-24 years | Youth living with HIV (YLHIV) | *SMART Connections* | Facebook-based support group involving daily activities and expert-facilitated discussions. | * Support-group facilitators provided in-person support for HIV+ youth. * Routine clinical care for HIV treatment |
| **Games** | | | | | | |
| 1. Chu et al. (2015) | Hong Kong | 12-16 years | None | *Making Smart Choices* | A game application (designed for tablets, Facebook, and the Web) was used for sex education and attitudinal change. The app contains 5 mini games based on different scenarios. | None |
| 1. Christensen et al. (2013) | USA | 18-24 years | MSM | *Socially Optimised Learning in Virtual Environments (SOLVE)* | A simulation video game designed to reduce shame and unprotected anal intercourse. | None |
| 1. Haruna et al. (2018) | Tanzania | 11-15 years | None | None | Intervention 1:  Sexual health education delivered using game-based learning in a computer lab. Participants were asked to view the game story and attempt questions related to each topic.  Intervention 2:  Sexual health education delivered using gamification in a computer lab. Lessons were delivered in a quiz format. | None |
| 1. Whitely et al. (2018) | USA | 14-26 years | Youth living with HIV (YLWH) | *BattleViro* | An iPhone game/app with game-related text messages (sent bi-weekly) and quizzes. | * Medication monitoring device. * Clinical care visits. |
| 1. Fiellin et al. (2017) | USA | 11-14 years | None | *PlayForward* | An experimental role-playing adventure video game focused on sexual health and risky behaviours. Participants were asked to engage in two gaming sessions per week, approximately one hour per session, to improve sexual health outcomes. | None |
| **Multi-media** | | | | | | |
| 1. Ezegbe et al. (2018) | Nigeria | 14-15 years | None | *REDStory* | HIV/AIDS videos played during group meetings or at home twice a week. Each participant reflected on lessons learned from the video during group meetings. Homework assignments were incorporated into the course. | Group meetings led by a therapist. |
| 1. Solorio et al. (2016) | USA | 18-30 years | Latino MSM | *Tu Amigo Pepe* | * Spanish-language radio public service announcements (PSAs) * Website * Social media outreach (Facebook, Twitter) * Reminder system using mobile * Toll-free hotline * Zip code locator to identify nearby HIV testing sites * Two free HIV testing sites | * Print materials, including 100 posters posted in small grocery stores frequented by Latinos. * Free home-based HIV testing kits |
| 1. Sznitman et al. (2010) | USA | 14-17 years | African American | *iMPPACS* | Television and radio advertisements were delivered, averaging at 3 per month, in two cities randomly selected within each of two regionally matched city pairs with the other cities serving as controls. | * ART treatment * Face-to-face small group counselling |