

TRIBAL RECOMMENDATIONS FOR DESIGNING CULTURALLY APPROPRIATE TECHNOLOGY-BASED SEXUAL HEALTH INTERVENTIONS TARGETING NATIVE YOUTH IN THE PACIFIC NORTHWEST

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Abstract: Media technologies, including the Internet, cell phones, and video games, offer new avenues to reach Native youth on sensitive health topics. Project Red Talon, a sexually transmitted disease (STD)/HIV prevention project that serves the 43 federally recognized tribes in Oregon, Washington, and Idaho, used community-based participatory research methods in partnership with the Northwest tribes to review existing technology-based interventions and generate recommendations for designing interventions that reflect the culture, needs, and organizational capacities of participating tribes and Native youth. These findings are now being used to guide the development of technology-based health interventions targeting American Indian/Alaska Native teens and young adults.

INTRODUCTION

The sexual and reproductive decisions of American Indian and Alaska Native (AI/AN or Native) teens and young adults are shaped by unique social norms and sexual contexts that include both traditional and contemporary cultural values. Influenced by years of federal policies designed to exterminate their populations, Native communities often view the arrival of new life favorably, regardless of the parent's age. High teen pregnancy and sexually transmitted disease (STD) rates indicate that sexual activity in AI/AN communities starts earlier than among other American teens, and often occurs without the use of protective measures. Environmental factors such as poverty, geography, and inadequate health services further exacerbate the adverse sexual health outcomes that many AI/AN youth experience.

Until quite recently, few sexual health interventions were designed for or evaluated in Indian Country. As a result, most Native youth do not receive sufficient reproductive health education and support. Media technologies like the Internet, cell phones, and video games offer new ways to bridge

this gap in ways that are familiar, accessible, and culturally appropriate for Native youth. Many approaches can be tailored to the maturity and interests of the individual, can be disseminated broadly regardless of geographic location, and can be privately accessed when and where the individual is ready (Bennett & Glasgow, 2009; Coyle, Doherty, Matthews, & Sharry, 2007; Lustria, Cortese, Noar, & Glueckauf, 2009; Portnoy, Scott-Sheldon, Johnson, & Carey, 2008). Media technologies thus hold great promise for public health practitioners seeking to reach Native youth, as vehicles for education and intervention related to sexual and reproductive health (Bull, Phibbs, Watson, & McFarlane, 2007).

Project Red Talon has provided capacity-building assistance on STD/HIV prevention and surveillance to the 43 federally recognized tribes in Oregon, Washington, and Idaho for over two decades. In response to tribal interest, Project Red Talon surveyed over 400 Native youth on their media technology use and online health information seeking in 2009 (the *Native Youth Media Survey*), conducted a systematic literature review to identify available technology-based interventions, and facilitated a variety of community-based participatory research (CBPR) activities to generate recommendations for designing technology-based interventions that would best align with the culture, needs, and organizational capacities of tribes in the Pacific Northwest. Findings from the *Native Youth Media Survey* have been reported elsewhere in the literature (Craig Rushing, 2010; Craig Rushing & Stephens, 2011). This paper will share findings from the study's literature review and CBPR activities.

Community-based Participatory Research in Indian Country

Respecting Indigenous research methods requires that communities have direct input in “developing and defining research practices and projects that relate to them” (p. 503), defining for themselves what is and what is not acceptable research (Battiste, 2008). Such a relationship can be achieved by using community-based participatory research (CBPR) methods that involve communities in selecting the scope and design of the study, the collection of data, the interpretation of research findings, and the dissemination of results (Minkler & Wallerstein, 2003). Additionally, there are several distinct benefits to using CBPR in Indian Country, including that it reflects and acknowledges tribal sovereignty, self-determination, and self-governance; allows research to occur in circumstances where it otherwise wouldn't; and better aligns with traditional research approaches. In their curriculum on *Research that Benefits Native People*, the National Congress of American Indians (2009) describes traditional research practices as:

- based on the collective wisdom of community members, built through careful observation and experiences of natural patterns of life
- learned, transmitted, and retained in the telling of stories

- complex, interrelated, and based on diverse conditions
- closely linked with cultural views of the world (p. 13)

CBPR mirrors the values and strengths of many AI/AN nations, including respect for community processes and consensus, sincere equal partnership, and the ecological view of the individual as intricately linked with family and tribe. In CBPR, equal weight is given to both scientific and Indigenous expressions of knowledge (Cochran et al., 2008; Forster et al., 2007), employing both Western and cultural lenses in the interpretation of data (Warner & Grint, 2006). CBPR acknowledges that “research is not culturally neutral” (p. 12), and that Indigenous knowledge is a necessary component of the research process (National Congress of American Indians, 2009). Consequently, CBPR has become an informal code of conduct for most research and surveillance now done in Indian Country.

Background on Technology-based Interventions

Media technologies, including the Internet, cell phones, and video games, are increasingly being used to disseminate health information and teach users new skills. To support healthy behavior change, research in the field suggests that technology-based interventions incorporate several important components, including: (a) messages that are tailored to the needs of the user; (b) features that enhance social support and communication; (c) content that is interactive and multimedia; (d) features that promote repeated use of the intervention; and, like other behavioral interventions, (e) content that addresses the core risk and protective factors associated with health outcomes (Craig Rushing, 2010; Noar, Black, & Pierce, 2009).

Health messages can be tailored to an individual by eliciting information from the user, and then using that information to selectively display content in a manner that is relevant or engaging (Baylari & Montazer, 2009). Technology-based interventions have tailored their content using a variety of criteria, including users’ age, gender, race/ethnicity, sexual orientation, stage of change, perceived needs, and reported risk factors (Lustria et al., 2009). Tailored content can be used to bypass material that does not reflect the user’s individual needs, and can thus reduce intervention time requirements and enhance user retention (Kiene & Barta, 2006). Software and information technologies now make it possible to provide tailored interventions to an entire population, producing “mass customization” (Cobb, Graham, Bock, Papandonatos, & Abrams, 2005). Gaming research similarly suggests that integrated assessment tools and responsive adaptation can improve learning and cognition (Wilson et al., 2009). Assessment tools that provide immediate feedback give learners a clear understanding about how they are doing on the task, help students identify errors, and improve understanding and motivation to stay on task (Wilson et al., 2009).

Tailoring is theoretically supported by the Transtheoretical Model (Prochaska, DiClemente, & Norcross, 1992). According to the model, behavior change involves progression through a series of predictable, though not necessarily sequential, stages. By understanding what processes are present at each stage, interventions can be aligned to the needs of individuals at any point along the continuum. Stage-based interventions have been shown to dramatically increase successful recruitment, retention, and completion, and promote movement through successive stages (Di Noia, Contento, & Prochaska, 2008). Tailoring is also supported by research in the communication and learning fields. Skinner and colleagues found that tailored information is more likely to be read, understood, perceived as personally relevant, and remembered (Skinner, Campbell, Rimer, Curry, & Prochaska, 1999). The literature suggests that learners experience greater success in learning environments that adapt to and support their individual learning orientations, and that patient satisfaction and care can be optimized by integrating the patient's interests, strengths, and ideas into the treatment process (Baylari & Montazer, 2009; Coyle et al., 2007). As a result, computer tailoring has the potential to enhance both the reach and effectiveness of behavioral interventions (Lustria et al., 2009).

Media technologies offer a variety of tools to instill social support and communication between users, including e-mail, instant messaging, text messaging, discussion boards, blogs, chat rooms, and social networking. The literature suggests that virtual peer-to-peer interaction can support healthy behavior change by creating and reinforcing positive social norms (Cobb et al., 2005; Gerber, Solomon, Shaffer, Quinn, & Lipton, 2007; Rhodes, 2004). Technology-based interventions are now being designed to facilitate sensitive conversations between adolescents and their parents, between adolescents and their health care providers, between peers, and between sexual partners. Virtual "discussions" between experts and peers can make learning a dynamic, two-way experience (Barak & Fisher, 2001; Baylari & Montazer, 2009). Providing expert feedback within tailored interventions has been shown to be more effective for helping smokers quit than providing tailored messages alone (Dijkstra, 2005).

Media technologies can also incorporate a wide variety of interactive design elements, including graphics, animation, photos, videos, sounds, click-through modules, games, quizzes, surveys, polls, and links. Hypertext learning environments allow users to access multiple sources of information, enriching the informational experience (Bull et al., 2007). The selection, pace, and depth of information is controlled by the learner, meeting his or her unique educational needs (Coyle et al., 2007). These technologies accommodate diverse preferences and learning styles by presenting information in multiple ways—via text, audio, and visual elements (Ito, Kalyanaraman,

Ford, Brown, & Miller, 2008). Several studies support the use of multimedia platforms to enhance learning, user satisfaction, and behavior change (Daft & Lengel, 1986; Liu, Liao, & Pratt, 2009; Mayer & Moreno, 1998).

Just as seen in face-to-face treatment, the intensity and duration of technology-based interventions appears to be closely associated with subsequent health outcomes (Cobb et al., 2005). In follow-up studies of smoking-cessation Web sites, those who successfully quit smoking logged in more frequently, spent more time online, and viewed more pages than those who continued to smoke (Cobb et al., 2005). It is not yet known what frequency and intensity are needed for technology-based interventions to modify behavior, but repeat use is clearly an important component of such programs.

To achieve this level of use, technology-based interventions must incorporate features that promote repetition. Retention tools (like reminder systems, personal contact with participants giving positive feedback, and incentives for returning—raffles, point systems, or giveaways) and compelling design features (like content that is new and salient, user-generated, and/or entertaining and interactive) have been reported by several investigators (Bull, Lloyd, Rietmeijer, & McFarlane, 2004; Bull, Vallejos, Levine, & Ortiz, 2008). Other studies have incorporated booster sessions to reinforce information and maintain program effects (Bull, Pratte, Whitesell, Rietmeijer, & McFarlane, 2009; Card & Kuhn, 2006; Metcalf et al., 2005; Pedlow & Carey, 2004). Media interactivity has been found to increase user retention (Hurling, Fairley, & Dias, 2006), and gaming researchers have found that learner control (the ability to dictate the pace and sequence of activities), mystery (gaps in knowledge), and challenge can improve learning attitudes, motivation, and cognition (Wilson et al., 2009).

METHODS

Founded in 1972, the Northwest Portland Area Indian Health Board (NPAIHB) is a tribally operated non-profit organization that provides health research, technical assistance, and policy advocacy on behalf of its member tribes. Housed within the NPAIHB's Tribal Epidemiology Center, Project Red Talon works to reduce STD/HIV infections through research, surveillance, and health promotion practices.

In 2005, Project Red Talon formed the *Red Talon STD/HIV Coalition* at the request of tribal health advocates to work collaboratively across Northwest tribes to reduce STDs and improve sexual health outcomes. Recognizing the need to provide better reproductive health education to Northwest teens and young adults, the group frequently reviewed mainstream STD/HIV prevention resources and interventions, but repeatedly found that their content did not reflect the life experiences of rural,

Native youth. Interested in harnessing the privacy, reach, and customizability of technology-based interventions, the *Red Talon STD/HIV Coalition* included this research activity as an action item in 2009: “Identify innovative STD/HIV prevention strategies using computer-based programs and social networking sites; explore their possible relevance and utility in Indian Country” (Project Red Talon, 2009).

To inform the selection and development of culturally appropriate technology-based health sexual health interventions for youth, coalition members felt they needed to know more about youths’ current use of media technologies (types of technologies used, frequency and duration of use, preferred media features and activities) and to what extent they search online for health information (Craig Rushing & Stephens, 2011). Members were also interested in learning about the types of technology-based health interventions that were currently available in the published literature, their effectiveness, and organizational resources that would be needed to implement them. Members agreed that a *Native Youth Media Survey* and literature review would be useful activities to generate this information.

To ensure human protections throughout the research process, the protocol was submitted to the Portland Area Indian Health Service’s Institutional Review Board (PA IHS IRB - #09-P-03) and Portland State University’s (PSU) Human Subjects Research Review Committee (HSRRC - #09880). Approval was obtained from both committees prior to data collection. Project Red Talon staff then worked with coalition members and tribal health educators to carry out the *Native Youth Media Survey*. Survey methods and results are reported elsewhere (Craig Rushing, 2010; Craig Rushing & Stephens, 2011). The literature review was simultaneously completed by Project Red Talon staff.

Community-based participatory research (CBPR) activities took place throughout the year-long project (see Table 1). Because the study was conducted regionally, rather than with a single Northwest tribe, Project Red Talon staff sought input from project stakeholders multiple times in multiple settings. tribal coalition members, Native youth, and topical experts were all involved in shaping the study’s scope and design, contributed to data collection efforts, reviewed qualitative and quantitative data, offered recommendations for selecting and adapting technology-based interventions, reviewed draft reports and manuscripts, and helped disseminate study findings. This iterative process helped ensure resultant recommendations were relevant to the diverse needs and capacities of our Northwest tribes, while maintaining adherence to CBPR principles.

Table 1
Research Methods

Location, Date	Informant Type, Demographics	Research Activities
Red Talon Coalition Meeting, Portland, OR January 7, 2009	Tribal health advocates: 15 people (40% M, 60% F) representing 1 NW tribe, 5 tribal organizations, and 3 partnering agencies.	Finalized STD/HIV Action Plan, which included this research activity as an action item, after two prior meetings.
January-July 2009		Literature review
February-March 2009	8 community partners and topical experts	Compiled survey tool, sent draft to community partners and topical experts for input and feedback
NW tribe March 31, 2009	12 youth, 3 parents	Piloted survey tool with teens and their parents
NW Indian Youth Conference, Spokane, WA April 3-5, 2009	196 Youth: 37% Male, 63% Female	Collected survey data
Red Talon Coalition Meeting, Seaside, OR April 8, 2009	Tribal health advocates: 8 people (100% F) representing 2 NW tribes, 2 NW tribal organizations, and 2 partnering agencies.	Participants were given copies of the survey and discussed potential data collection strategies and sites.
NPAIHB Quarterly Board Meeting, Grand Ronde, OR April 20-23, 2009	Delegates to the Northwest Portland Area Indian Health Board, representing 43 member tribes.	Shared progress to date, discussed data collection strategies and sites.
Tribal School A	81 Youth, 48% male, 52% female	Collected survey data
Tribal School B	28 Youth, 68% male, 32% female	Collected survey data
Tribal School C	16 Youth, 44% male, 56% female	Collected survey data
Tribal School D	43 Youth, 42% male, 58% female	Collected survey data
NPAIHB Quarterly Board Meeting, Tulalip, WA July 22, 2009	Delegates to the Northwest Portland Area Indian Health Board, representing 43 member tribes.	Shared progress to date, discussed preliminary data.
Native STAND Youth Summit, Chehalis, WA July 27-31, 2009	30 youth, 2 adult mentors	Existing media interventions were described and demoed. Group discussions were used to gauge interest in available methods/ modalities.

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**Table 1, Continued
Research Methods**

Location, Date	Informant Type, Demographics	Research Activities
Working with Native Youth training, Portland, OR August 11-13, 2009	65 teachers, parents, and health educators	Existing media interventions were described, demonstrated, and discussed. Small and large group discussions were used to elicit opinions and ideas about tech interventions and cultural considerations.
November-December 2009		Individual data reports were returned to participating tribes.
Chemawa Indian Boarding School, Salem, OR November 23, 2009	60 high school students	Existing media interventions were described and demoed. Group activities were used to gauge interest in available methods/modalities.
Adolescent Health Alliance, Salem, OR December 9, 2009	Tribal health advocates: 35 attendees, representing seven NW tribes, three Native youth treatment centers, one Urban Indian health clinic, NPAIHB, two universities, and three divisions of the Oregon State Department of Human Services.	Participants reviewed and discussed survey data, technology-based interventions (abstracts, photos/demos, and comparison charts), and the merits and drawbacks of various strategies. Attendees then prioritized options and offered recommendations for designing culturally appropriate interventions.
Tribal school board January 20-22, 2010	10 tribal school administrators	Discussed school's data and strategies to disseminate findings.
Adolescent Health Alliance, Shelton, WA February 24, 2010	Tribal health advocates: 47 people representing 18 NW tribes, one Native-specific youth treatment center, two tribal organizations, one university, and two divisions of the Washington State Department of Human Services.	Participants reviewed and discussed survey data, technology-based interventions (abstracts, photos/demos, and comparison charts), and the merits and drawbacks of various strategies. Attendees then reviewed and refined recommendations for designing culturally appropriate interventions.
35th annual NW Indian Youth Conference April 2010	600 AI/AN junior and senior high school students	Existing media interventions were described/demoed. Group discussions and activities were used to gauge interest in available methods/modalities.
NPAIHB Quarterly Board Meeting, Cow Creek, OR April 20, 2010	Delegates to the Northwest Portland Area Indian Health Board, representing 43 member tribes.	Shared progress to date; discussed priorities and recommendations for designing culturally appropriate interventions.

CBPR with Tribal Coalitions

In the Pacific Northwest, tribal coalitions serve the dual purpose of engaging tribes in planning and outreach, while providing direction to NPAIHB staff on desired goals and activities for the region as a whole. These coalitions meet at rotating locations throughout the Northwest, and attendance typically varies from 15-45 members. To maximize participation, meetings are scheduled in conjunction with other relevant tribal gatherings or trainings, and travel expenses for attendees are reimbursed by the NPAIHB. In 2009, the *Red Talon STD/HIV Coalition* merged with three other planning groups to create a more holistic body, forming the *Northwest Native Adolescent Health Alliance*.

Coalition members are well aware of community norms, appropriate messages, traditional teachings, and effective strategies for reaching high-risk populations. As a result, they are regularly called upon to guide the development of educational materials produced by the NPAIHB. Meetings typically include a variety of partners, including tribal health advocates (health directors and educators, community health representatives, RNs, and youth prevention staff) and representatives from regional and national Indian Health Service programs, state and county Health Departments, Universities, and other tribal programs and partners.

During the course of this year-long project, tribal coalition meetings were held quarterly. At the first two meetings, participants selected the research topic, reviewed survey instruments, and brainstormed data collection strategies and sites. Coalition members then administered the survey in their local communities, or facilitated its administration by Project Red Talon staff.

When these activities were complete, two additional coalition meetings were convened to review survey data and discuss identified interventions. The first meeting had 35 attendees, representing seven Northwest tribes, three Native youth treatment centers, one Urban Indian Health clinic (NARA), two universities (Oregon Health Sciences University, Portland State University), and three divisions of the Oregon State Department of Human Services (HIV/STD/Tuberculosis, Indian Education, Alcohol and Mental Health). The second meeting was attended by 47 people representing 18 Northwest tribes, one Native youth treatment center, two tribal organizations (the NPAIHB, South Puget Intertribal Planning Agency), one university (University of Washington), and two divisions of the Washington State Department of Human Services (HIV/STD/Tuberculosis, Tobacco Prevention).

Participants at the final two meetings discussed the merits and drawbacks of available intervention strategies, prioritized options in light of resultant data and community experience, and proposed and refined recommendations for designing culturally appropriate interventions. Comparison charts, demonstrations, and visual examples of available interventions were provided

to support group discussion. Detailed meeting minutes were taken by Project Red Talon staff to capture participants' input, and an automated response system was used at the final meeting to poll attendees on possible intervention designs.

CBPR with Native Youth

Project Red Talon staff also sought input from Native teens and young adults at several points throughout the study to inform the selection of technology-based interventions. Project staff piloted the survey tool with 10 teens and parents from a Northwest tribe, and integrated their suggestions before administering it regionally. Teens and young adults at all surveying sites were invited to participate in the distribution and collection of surveys, pens, and raffle tickets, and seemed to take interest in both the survey process and the findings that would emerge.

Informal formative research was carried out with 25 high school students attending the 2009 Native STAND Youth Summit, with 60 students attending Chemawa Indian School, a Bureau of Indian Education residential school, and with over 600 AI/AN junior and senior high school students attending the 35th annual Northwest Indian Youth Conference. At each of these gatherings, a variety of existing media interventions were shown or described to attendees, and interactive discussions and activities were used to gauge student interest.

CBPR with Community Partners and Topical Experts

Additionally, Project Red Talon staff consulted with community partners and topical experts to ensure resultant data would be useful and relevant to their work, including staff from the Indian Health Service's National STD Program, Native Wellness Institute, and State Health Departments in Oregon and Washington. Several regional meetings were also used to inform community stakeholders about the project's progress, and to seek participants' input and ideas. Feedback was gathered from 65 teachers, parents, and health educators who attended a three-day training on *Working with Native Youth* (August 11-13, 2009). Tribal delegates to the NPAIHB and members of the NPAIHB's Behavioral Health Committee were consulted quarterly throughout the year-long project.

Literature Review on Technology-based Sexual Health Interventions

The literature review was carried out by study co-authors Stephanie Craig Rushing, Director of Project Red Talon at the NPAIHB, and David Stephens, a part-time student intern. To locate appropriate articles, key terms were used in academic search engines (i.e. Academic Search Complete, Cochrane Library, PubMed, etc.), including *technology*, *Internet*, *online*, *computer-based*, *cell phone*, *text message*, and *video game*. These words were cross-referenced with terms like *health promotion*,

health intervention, risk-reduction, and terms like *sexual health, STD, pregnancy, contraception, condom, adolescent, teen, or young adult*. Resultant studies were screened in several stages using explicit inclusion criteria, referencing the full-text article when necessary.

Twenty-nine interventions were selected for systematic review based on their delivery method (computer, Internet, cell phone, video game, interactive video/DVD), health focus (STD, HIV, or pregnancy prevention; abstinence, condom or contraception use; STD/HIV testing), and intended outcome (changes in behavior, knowledge, attitudes, perceptions, or skills). Both researchers coded the interventions independently on variables of interest to the study in a Microsoft Excel spreadsheet (see Table 2 and Craig Rushing [2010] for intervention matrices and operational definitions). Variables included:

- Study Methods: aims, study design, participant recruitment.
- Intervention Design: description, theoretical framework, purpose/health focus, implementation setting, duration, message content, message tailoring criteria, features and modalities, user control, privacy.
- Target Population: age, gender, ethnicity, socioeconomic status.
- Outcomes: changes in behavior, knowledge, attitudes, perceptions, skills.
- Results: process or utilization data, retention, user satisfaction.
- Organizational Requirements for Implementation: funding, space, incentives.
- Technical Requirements for Implementation: software, equipment.
- Personnel Requirements for Implementation: number, skills/training, gender.

Operational definitions for each variable were summarized to ensure they were consistently applied throughout the process. On those occasions when the published literature was not sufficient to complete the matrix for a particular intervention, the Principal Investigator contacted the intervention's corresponding author with follow-up questions via e-mail or phone. Thirteen out of 16 investigators responded to such inquiries, answering questions directly or sending other pertinent documents for review.

Table 2
Technology-based Interventions Included in the Systematic Review

Delivery Method	Intervention	Author	Youth	Adults	HIV +	MSM*
Computer-based Modules	1. It's Your Game (IYG)	(Shegog et al., 2007; Tortolero et al., 2008)	X			
	2. Let's Talk About Sex	(Ito et al., 2008)	X			
	3. Project L.I.G.H.T.	(Lightfoot, Comulada, & Stover, 2007)	X			
	4. Sexual Risk Reduction	(Kiene & Barta, 2006)	X			
Computerized Risk Assessment/Diagnostic Tools	5. Computer-assisted Motivational Intervention (CAMI)	(Gold, Chiappetta, Young, Zuckoff, & DiClemente, 2008)	X			
	6. Youth Health Provider	(Paperny, 1997)	X			
	7. Aid for Contraceptive Decision-making (ACD)	(Chewning et al., 1999)	X			
Internet Class	8. Health Info. Consumer Skills	(Kalichman et al., 2006)		X	X	
Informational Web Site	9. www.sexualityandu.ca	(Barak & Fisher, 2001, 2003)	X	X	X	X
Internet-based Modules	10. Keep it Real	(Bull et al., 2007; 2008; 2009)	X			
	11. Trust Yourself, Reduce Your Risk	(Roberto et al., 2008; Roberto, Zimmerman, Carlyle, & Abner, 2007; Roberto, Zimmerman, Carlyle, Abner, et al., 2007)	X			
	12. +CLICK (adapted from IYG)	(Markham, Shegog, Leonard, Bui, & Paul, 2009)	X		X	
	13. Queermasters	(Kok, Harterink, Vriens, de Zwart, & Hospers, 2006; Mikolajczak, Kok, & Hospers, 2008)				X
	14. Smart Sex Quest	(Bull et al., 2004)				X
	15. WRAPP Internet Intervention	(Bowen, 2005; Bowen, Williams, Daniel, & Clayton, 2008)				X

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Table 2, Continued
Technology-based Interventions Included in the Systematic Review

Delivery Method	Intervention	Author	Youth	Adults	HIV +	MSM*
Chat Room	16. PowerON	(Moskowitz, Melton, & Owczarzak, 2009a;b)				X
Virtual World	17. Sexual Health Sims - Second Life	(Beard, Wilson, Morra, & Keelan, 2009)		X		
E-mail-based	18. Online Prevention Program	(Lau, Lau, Cheung, & Tsui, 2008)				X
Online STD Testing	19. STDTest.org & syfilistest.nl	(Koekenbier, Davidovich, van Leent, Thiesbrummel, & Fennema, 2008; Levine, Scott, & Klausner, 2005)				X
	20. IWantttheKit.org	(Owens et al., 2009)	X	X		
Cell Phone	21. Cell Phone Reminders	(Puccio et al., 2006)	X		X	
Text Messaging Service	22. Hookup & TeenSource	(Woodruff, 2009)	X			
	23. SexInfo	(Levine, McCright, Dobkin, Woodruff, & Klausner, 2008)	X			
	24. The Birds & Bees Text Line	(Hoffman, 2009)	X			
	25. Text to Change	(Text to Change, 2009)	X	X		
Video	26. What Could You Do?	(Downs et al., 2004)	X			
	27. Video to Promote Dual Methods	(Roye, Perlmutter Silverman, & Krauss, 2007)	X			
Video Game	28. Baby Game and Romance	(Paperny & Starn, 1989)	X			
	29. Life Challenge	(Thomas, Cahill, & Santilli, 1997)	X			

*MSM = Men who have sex with men

RESULTS

Literature Review

As shown in Table 2, 29 interventions fulfilled the project's inclusion criteria for systematic review (see Appendices of Craig Rushing [2010] for intervention abstracts and additional matrices). Reviewed articles included preliminary feasibility and usability studies, randomized controlled trials, quasi-experimental studies, and non-experimental utilization reports. Study participants varied in age, gender, ethnicity, and sexual orientation. Twenty-one interventions targeted young adults, seven targeted men who have sex with men, and four targeted people who were HIV-positive. Most of the interventions included in the review specifically addressed sexual risk factors, but two addressed a wide range of health topics pertinent to youth (like sexual activity, alcohol use, marijuana use, substance abuse, sexual abuse, contraception, and suicide attempts). None of the interventions were designed for AI/AN populations, and none of the evaluation studies included a significant number of AI/AN participants.

Altogether, 22 of the interventions were delivered using a computer or CD-ROM, 12 required Internet access, four were delivered via a cell phone using text messages, two were primarily video-based, and three solely involved a computer-based video game. The interventions were implemented in a variety of settings (e.g., clinics, schools, community centers, at home), and were administered by a range of trained and untrained personnel (e.g., clinicians, health educators, teachers, or self-administered). Many included messages or visual content that was aligned to the users' age ($n = 29$), gender ($n = 13$), race/ethnicity ($n = 5$), sexual orientation ($n = 7$), stage-of-change ($n = 4$), self-identified informational needs ($n = 9$), or reported risk factors ($n = 14$). To create tailored content, 18 imbedded risk, needs, or readiness assessments directly into the program. Slightly fewer ($n = 13$) incorporated "virtual" interactions with a health care provider or user-generated goal-setting activities or self-monitoring tools. Twenty-two included skill-building exercises or personal development tools, like goal-setting activities, boundary-setting activities, condom demonstrations, or activities that helped users practice healthy communication skills. Fourteen required users to participate in multiple sessions, 15 involved interactions with peers or peer role models, and 15 involved virtual or in-person communication with health experts. Most of the interventions ($n = 21$) were interactive, requiring active participation by the user (i.e., as opposed to passively reading text or watching a video). Fewer ($n = 12$) were intensely multimedia, integrating text, audio, video, games, quizzes, and links to other sources within the intervention.

The interventions reported varying levels of effectiveness, and tracked a variety of cognitive and behavioral outcomes. Only one (3%) reported changes in perceived sexual risk or consequences, three (10%) reported changes in intention or motivation, and three (10%) reported changes in

perceived peer norms or behaviors. Ten (34%) interventions reported changes in participant knowledge about STDs, HIV, or condoms, seven (24%) reported changes in sexual values or attitudes, and nine (31%) reported changes in participant skill or self-efficacy. Altogether, 12 (41%) reported changes in condom or contraception use, STD/HIV screening rates, or sexual activity (11 of which were statistically significant at the $p < .05$ level).

Despite this seemingly low level of effectiveness, fewer than half of the interventions were truly designed to assess behavioral outcomes. Instead, many were intended to evaluate the intervention's acceptability and feasibility, and thus involved small sample sizes, did not track behavioral outcomes, or did not assess changes in behavior over time. Thirteen (45%) were evaluated using a cohort or non-experimental design to test preliminary effectiveness, acceptability, or utilization rates. Thirteen (45%) were evaluated using randomized controlled trials, and three (10%) were evaluated using non-randomized controlled trials. Studies that did include follow-up with a sufficient number of participants showed promising changes in knowledge, attitude, and behavior.

CBPR Recommendations for Intervention Selection and Adaptation

After reviewing data from the *Native Youth Media Survey*, abstracts describing available technology-based sexual interventions, charts comparing their features and effectiveness, and photos or demonstrations of available programs, tribal coalition members discussed the merits and drawbacks of available strategies, prioritized options in light of resultant data and community experience, and proposed recommendations for designing culturally appropriate interventions. During these meetings, participants identified several traits that they felt ought to be considered when designing or adapting interventions. Specifically, interventions should:

- **Contain Accurate Age- and Gender-Appropriate Content.** Interventions should contain gender-specific information and age-appropriate content for younger and older youth, using the tailoring capabilities of computer-based technologies. Health information should be monitored and “medically accurate.”
- **Start Early and Encourage Abstinence.** Prevention messages should target pre- and young teens. We need to start “when children are younger,” before they are sexually active, and be sure to include “a bigger focus on abstinence.”
- **Be Holistic and Real.** Participants noted that many existing technology-based interventions did not address other important adolescent health issues. Interventions targeting Northwest AI/AN youth should be more holistic. Early sexual debut, substance abuse, violence, and suicide are symptoms of deeper social and emotional challenges,

including poverty, discrimination, and sexual abuse. Interventions targeting AI/AN youth must be real, reflect the unique life experiences of Native youth, and address the root social determinants of their health.

- **Be Based in Culture.** Interventions targeting Northwest AI/AN youth should incorporate cultural materials, “like tribal stories or history to teach important concepts.” None of the interventions reviewed by participants contained text, photos, or design elements specific to AI/ANs.
- **Focus on Assets and Skills.** Instead of stigmatizing sexuality, interventions should focus on “positive messages and protective factors,” including both the physical and “emotional aspects of relationships.” It is important for interventions to demonstrate and allow youth to practice important skills (like refusal skills, condom negotiation skills, and how to use a condom), “get them involved in their own health and well-being,” and permit users to navigate through the content that most interests them.
- **Encourage Dialogue While Maintaining Privacy.** Interventions should include content that supports dialogue with trusted adults (“not necessarily parents”), and “ways for local adults to provide follow-up if a teen needs additional resources.” Participants also felt that youth should be able to access private, “confidential” information and services.
- **Be Interactive.** Interventions should incorporate a wide range of interactive features, like quizzes and games, as well as the ability to contact or converse with experts. Participants particularly liked the interventions that had a human voice guiding teens, “making the social interactions more realistic.”
- **Incorporate Evaluation Plans.** New programs should also incorporate evaluation strategies to continuously monitor their use and “measure their effectiveness.”

Participants also identified several potential barriers that they felt ought to be considered when designing or adapting technology-based interventions for AI/AN youth. These included:

- **Staffing and Intervention Setting.** Participants expressed concern about interventions that were labor intensive, and interventions that required technical expertise or multiple people to implement. To be most widely implemented, interventions should be flexibly designed for use in home, community, or clinic settings. If interventions are designed to be implemented by local health educators, they must be easy to pick up and ready to use.

- **Multimodal Formats.** When possible, technology-based interventions should include a variety of teaching/modeling tools, take into consideration the “different reading/literacy capabilities of youth, even within grade levels,” and include print versions “for those who do not have computers.”
- **Shorter Length/Duration.** Participants noted that some technology-based interventions took an hour or more to complete or required youth to return to the clinic multiple times, and were concerned about student retention. On the whole, intervention activities should not require multiple clinic visits, and should be conscientious of possible “attention span issues.”
- **Cost.** The only cost concerns voiced by participants were in relation to text messaging interventions, which they thought might be problematic for some youth (depending on individual calling plans).
- **Maintaining Youth’s Interest and Attention.** Participants also noted that “there are a lot of interesting sites on the Internet that teens frequent already.” Online interventions will have to be “as good as the technologies that teens are already using, or teens may not use them.”

(It should be noted that a mix of teachers, parents, and health educators participated in these meetings; their comments were not collected in such a way that they could be stratified by informant type.)

When asked about the potential utility of various intervention strategies, particularly in relation to their own communities’ programs, resources, and needs, tribal partners used an anonymous automated response system to indicate that computer- or Internet-based skill-building tools would be most useful (91%) for their community, followed by informational Web sites or social networking sites (82%), electronic assessment or diagnostic tools (81%), services that would allow teens and young adults to order STD test kits or condoms online (81%), and programs that offered youth live instant message or text counseling with an expert (74%). Participants indicated that they would prefer interventions that could be administered by someone at the regional level, by a local health educator, or, if appropriate, by the youth themselves. Few felt that it would be highly problematic for them or their tribe to deliver a computer-based intervention (13%), an Internet-based intervention (17%), or an intervention requiring a TV/DVD (13%). More people expressed concern, however, about delivering interventions via cell phone (36%).

DISCUSSION

While data from the *Native Youth Media Survey* offered insight into which technologies were most often used by AI/AN youth, the literature review and additional CBPR activities provided critical information needed to select strategies that aligned to the priorities and organizational capacities of the Northwest tribes (Craig Rushing, 2010). The literature review provided partners with a better understanding of the types of technology-based interventions that were possible, and the skills and resources that would be needed to implement them. Partners discussed the effectiveness of various approaches, and design features that have been shown to maximize behavioral impacts.

CBPR processes also took into consideration other factors that have been shown to affect intervention effectiveness and sustainability, including the availability of staff with appropriate skills and training, the availability of requisite space and equipment, the perceived merits and drawbacks of available intervention modalities and settings, and the availability of current and recurring funds to implement selected interventions, as well as more nuanced Indigenous knowledge about Northwest AI/AN communities (Center for Substance Abuse Prevention, 2009). CBPR activities substantially improved the intervention alignment process by giving insight to tribal values and priorities, and potential capacities and constraints affecting participating tribes.

CBPR activities also enhanced the interpretation of qualitative and quantitative data collected by the project, employing both Western and cultural lenses. For example, while cell phones were the media technology most frequently used by Northwest Native youth (according to survey results), youth, parents, and health educators expressed much less interest in phone-based interventions than they did in Internet- or video-based approaches. This apparent divide between youth's current technology use and reported intervention priorities may stem from the strong preference (expressed by both survey respondents and CBPR partners), that youth receive sexual health information from a trusted adult. Role modeling, experiential learning, and storytelling are teaching tools traditionally valued by AI/AN communities, and are highly dependent upon human interaction (Cajete, 2008; Goodluck, 2002). Compared to the other strategies offered and discussed, rote text messaging services (that often lack modeling, interaction, and visual cues) may have felt less congruent with traditional teaching modalities.

CBPR participants were particularly concerned that some technology-based interventions might unintentionally reduce communication or fail to support needed follow-up with youth. This concern highlights the importance of using technology-based interventions to enhance, rather than replace, traditional sources of health information, including health professionals and family members (Fox & Jones, 2009). Other critical insights gained through CBPR included the importance of empowering Native youth to get involved in their own health and well-being, while also addressing the deeper social and emotional conditions that contribute to their disproportionate risk-taking.

CBPR strategies increased our understanding of the ethnographic culture of AI/AN youth, and the social and environmental contexts in which they live. Participants pointed out that Native youth “culture” is not solely defined by race/ethnicity. Like other teens and young adults, Native youth identify with and reflect multiple identities (e.g., athletes, skaters, nerds, gangsters, straight/two-spirit/lesbian/gay/bisexual/transgender/questioning, etc.). Northwest Native youth did express a greater preference for accessing sexual health information on Web sites containing Native-specific content than on sites targeting all U.S. youth, but to reflect their full lived experience, interventions targeting AI/AN youth should portray a range of adolescent and cultural identities.

Like all research, this study had several strengths and limitations worth noting. These findings represent data from the Pacific Northwest and cannot be generalized to other regions or individual tribes. Many of the youth who participated in CBPR feedback sessions were involved in tribe- or school-sponsored health and wellness activities, and may have reported higher levels of interest than typical youth. The continuity of our coalition membership was hampered by our inclusion of participants from a geographically disbursed three-state region. This challenge was met by rotating meetings throughout the Northwest, covering travel expenses for tribal participants, and by iteratively reviewing project data and refining recommendations at each subsequent meeting. Fortunately, the project was strengthened by the support of the Northwest tribes, who repeatedly expressed interest in the research subject and its findings. Collecting data and feedback from multiple tribes helped ensure that resulting recommendations and priorities reflected a wide spectrum of perspectives and experiential realities. Guided by CBPR values, this process took active steps to address potential validity threats associated with analyzing data using only a Western interpretive lens.

CONCLUSION

Like all behavioral interventions, to be truly effective, technology-based sexual health interventions must address the core risk and protective factors associated with teen pregnancy and STDs, cultivate individual skills, and foster frequent and repeated use. If designed properly, youth-driven multimedia technologies could achieve these goals, while reflecting traditional and contemporary AI/AN culture, values, teachings, and experiences. To meet everyone’s needs, age- and gender-appropriate sexual health information should be made available in a variety of formats, through a variety of channels. This CBPR study suggests that integrated, multimedia approaches offer the best opportunity to reach the greatest number of Native youth in the Pacific Northwest. The NPAIHB and Northwest tribes are now using this data to inform the development of several technology-based interventions targeting AI/AN teens and young adults.

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FOOTNOTE

- ¹ Hypertext: text displayed on an electronic device with links to other text, tables, or images that can be accessed immediately.

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