CrossMark

NATIVE-It's Your Game: Adapting a Technology-Based Sexual Health Curriculum for American Indian and Alaska Native youth

Ross Shegog[1] · Stephanie Craig Rushing[2] ·
Gwenda Gorman[3] · Cornelia Jessen[4] ·
Jennifer Torres[1] · Travis L. Lane[3] · Amanda Gaston[2] ·
Taija Koogei Revels[4] · Jennifer Williamson[4] ·
Melissa F. Peskin[1] · Jina D'Cruz[5] · Susan Tortolero[1] ·
Christine M. Markham[1]

Abstract Sexually transmitted infection (STI) and birth rates among American Indian/Alaska Native (AI/AN) youth indicate a need for effective middle school HIV/STI and pregnancy prevention curricula to delay, or mitigate, the consequences of early sexual activity. While effective curricula exist, there is a dearth of curricula with content salient to AI/AN youth. Further, there is a lack of sexual health curricula that take advantage of the motivational appeal, reach, and fidelity of communication technology for this population, who are sophisticated technology users. We describe the adaptation process used to develop Native It's Your Game, a stand-alone 13-lesson Internet-based sexual health life-skills curriculum adapted from an existing promising sexual health curriculum, It's Your Game-Tech (IYG-Tech). The

✉ Ross Shegog
Ross.Shegog@uth.tmc.edu

Jina D'Cruz
ygp4@cdc.gov

[1] Center for Health Promotion and Prevention Research, The University of Texas School of Public Health, The University of Texas Health Science Center Houston, 7000 Fannin Street, Suite 2668, Houston, TX 77030, USA

[2] Northwest Portland Area Indian Health Board, 2121 SW Broadway, Suite 300, Portland, OR 97201, USA

[3] Inter Tribal Council of Arizona, Inc., 2214 North Central Avenue, Suite 100, Phoenix, AZ 85004, USA

[4] Division of Community Health Services, Alaska Native Tribal Health Consortium, 3900 Ambassador Drive, Anchorage, AK 99508, USA

[5] Center for Disease Control (CDC), Office of Public Health Scientific Services (OPHSS), Center for Surveillance, Epidemiology and Laboratory Services (CSELS), Dekalb County, Atlanta, GA, USA

adaptation included three phases: (1) pre-adaptation needs assessment and IYG-Tech usability testing; (2) adaptation, including design document development, prototype programming, and alpha testing; and (3) post-adaption usability testing. Laboratory- and school-based tests with AI/AN middle school youth demonstrated high ratings on usability parameters. Youth rated the Native IYG lessons favorably in meeting the needs of AI/AN youth (54–86 % agreement across lessons) and in comparison to other learning channels (57–100 %) and rated the lessons as helpful in making better health choices (73–100 %). Tribal stakeholders rated Native IYG favorably, and suggested it was culturally appropriate for AI/AN youth and suitable for implementation in tribal settings. Further efficacy testing is indicated for Native IYG, as a potential strategy to deliver HIV/STI and pregnancy prevention to traditionally underserved AI/AN middle school youth.

Background

American Indian/Alaska Native (AI/AN) youth experience significant sexual and reproductive health disparities. For AI/AN ages 15–19 years, the 2012 birth rate was 35 per 1000, which exceeded the national rate of 29 per 1000 (National Campaign, 2007). In 2009, non-Hispanic AI/AN youth had the second highest rates of STIs nationally, with at least double the rates of chlamydia, gonorrhea, and syphilis prevalent among non-Hispanic Whites (CDC, 2010). Early age of sexual initiation is associated with increased risk of pregnancy and STI (Kaestle, Halpern, Miller, & Ford, 2005; O'Donnell, O'Donnell, & Stueve, 2001). Nationally, relative to White students AI/AN youth are more likely to report sexual début before age 13 (CDC, 2013), earlier sexual initiation (Chewning, Douglas, Kokotailo, LaCourt, Clair, & Wilson, 2001; Hellerstedt, Peterson-Hickey, Rhodes, & Garwick, 2006; Kaufman, Desserich, Big Crow, Holy, Keane, & Mitchell, 2007; Palacios & Kennedy, 2010), and lower rates of consistent condom use (Edwards, 1992; Hellerstedt, 2004; Kaufman, Beals, Mitchell, Lemaster, & Fickenscher, 2004; Minnesota University, 1992).

Risk and protective factors for this population are often similar to those reported for non-Native youth (Edwards, 1992; Kaufman et al., 2004; Mitchell, Kaufman, Beals, Choice, & Team HWP, 2005; Mitchell, Rumbaugh, Whitesell, Spicer, Beals, & Kaufman, 2007). Age is closely associated with sexual début (Dailard, 2006), and being female, higher academic performance, valuing school achievement, sexual health knowledge, and refusal self-efficacy may protect against early début (Chewning et al., 2001; Kaufman et al., 2007; Mitchell et al., 2005, 2007). Normative perceptions for contraception use and condom self-efficacy are associated with contraception use (Chewning et al., 2001). Risk factors include substance use (Beauvais, 1998; Hellerstedt et al., 2006; Nixon, Phillips, & Tivis,

2000; Rolo, 1999), and sexual violence (Amnesty International, 2007; Aufrecht, 1999; Hellerstedt et al., 2006; Vernon & Bubar, 2001). Compared to Whites, AI/AN students report greater marijuana use before age 13 (21.8 vs. 6.6 %) and the experience of forced sex (18.2 vs. 6.1 %; CDC, 2013).

Parental monitoring and parent–child communication can be protective of early sexual initiation (Chewning et al., 2001), while household structure, financial hardship, and lower parental education levels may be risk factors (Hellerstedt et al., 2006; Mitchell et al., 2007). Cultural values (e.g., positive Native identity) may be protective, with youth believing that risky sexual behaviors conflict with traditional values (Kaufman et al., 2007). Conversely, a traditional environment that includes a deep appreciation for new life and strong extended family networks may minimize the consequences of teen parenthood (Dalla & Gamble, 1997; Kaufman et al., 2007). Poverty, geography and scarce health resources significantly contribute to the high prevalence of teen pregnancy and STIs among AI/AN youth (Kaufman et al., 2004).

The need for effective pregnancy and HIV/STI prevention in early adolescence is evident. Schools and after-school programs can provide an important channel to maximize reach and formalize sexual health education and life skills training for AI/AN youth, just as they have for the general population. Further, Native youth identify the Internet and school as preferred delivery channels (Leston, Jessen, & Simons, 2012). To date, of the programs delivered in school settings, relatively few have been middle school programs that have demonstrated sustained behavioral impact (Coyle, Kirby, Main, Gomez, & Gregorich, 2004; Dilorio et al., 2006; Jemmott, Jemmott, & Fong, 1998; Manlove, Franzetta, McKinney, Papillo, & Terry-Humen, 2004; Markham et al., 2012; O'Donnell et al., 1999; Tortolero et al., 2010).

Internet-based sexual health resources hold promise for sexual health education due to their fidelity, accessibility, and appeal, and may be particularly acceptable to AI/AN youth (Fox & Jones, 2009). In a survey of AI/AN youth in the Pacific Northwest, most (>76 %) were experienced and comfortable searching online for health information (Craig Rushing & Stephens, 2011), exceeding rates reported by US 7th–12th graders (55 %; Fox & Jones 2009; Rideout, Foehr, & Roberts, 2010). They were interested in websites with culturally-relevant content, including images of people who looked like themselves and were experiencing similar life issues (Craig Rushing & Stephens, 2012). There may be combined advantages of an Internet-based curriculum within the school context if it is acceptable to Native communities.

There is an ethical imperative that sexual health programs for AI/AN youth be culturally sensitive and relevant, and that they not inadvertently negatively affect youth's cultural values, competencies, or language. A number of adaptation frameworks and guiding principles have been described to enable this (Bartholomew, Parcel, Kok, & Gottlieb, 2011; Card, Solomon, & Cunningham, 2011; Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2003; Resnicow, Baranowski, Ahluwalia, & Braithwaite, 1999; Santisteban, Muir-Malcom, Mitrani, & Szapocznik, 2001; Turner, 2000). There is currently insufficient evidence to determine if culturally-adapted versions of programs are significantly more effective than generic versions, since there are few efficacy trials which have compared these

versions (Chino & Debruyn, 2006; Gray & Rose, 2012). However, evidence from adaptations of therapeutic programs indicates that customizing, tailoring, or adapting a therapy to client characteristics improves its effectiveness (American Indian Law Center Inc., 1999; Israel, Schulz, Parker, & Becker, 1998; Minkler & Wallerstein, 2003; Viswanathan et al., 2004).

Creating culturally sensitive adaptations of sexual health programs for AI/AN youth requires collaboration with AI/AN communities, inclusion of AI/AN researchers and staff, responsiveness to Native-informed practice models and conceptual frameworks, and adaptation of evidence-based practices that retain core components yet provide sufficient augmentation for AI/AN youth (Yellow Horse & Yellow Horse Brave Heart, M. Native American Children, 2002). Empirical research cautions that adaptations should maintain fidelity and not reduce dosage, cut core interactive elements, or focus on affective impact rather than behavior change (Kumpfer, Alvarado, Smith, & Bellamy, 2002).

The purpose of this article is to describe the pragmatic, empirically-based adaptation, development, and usability testing of an Internet-based HIV/STI and pregnancy prevention curriculum for AI/AN middle school youth. The curriculum, *Native It's Your Game* (*Native IYG*) was adapted from *It's Your Game-Tech* (*IYG-Tech*; Peskin et al. 2015; Shegog et al., 2014), a computer-based pregnancy and HIV/STI prevention program for middle school youth (Markham et al., 2012; Tortolero et al., 2010). The stepped empirical process has broader implications for adapting existing evidence-based programs for culturally diverse populations.

Methods

A systematic instructional design approach, Intervention Mapping (IM), and previously published adaptation protocols informed the adaptation process (Bartholomew et al., 2011; Card et al., 2011). IM is a framework that informs the development and testing of theory- and empirically-based health behavior interventions, using a systematic approach (Bartholomew et al., 2011). Development and testing occurred in three phases: pre-adaptation, adaptation, and post-adaptation, which incorporated steps to (1) develop a community collaborative; (2) analyze content through review of behavioral outcomes, determinants, and learning objectives; (3) select theory-based methods and practical applications; and then (4) develop, and (5) pilot test the adapted program (see Table 1).

Our adaptation process was informed by cultural sensitivity adaptation frameworks and principles (Gray & Rose, 2012; Kreuter et al., 2003; Kumpfer et al., 2002; Resnicow et al., 1999; Santisteban et al., 2001; Turner, 2000; Yellow Horse & Yellow Horse Brave Heart, M. Native American Children, 2002), and included changes to *surface* and *deep* structures (Chino & Debruyn, 2006). *Surface structure* adaptations involved matching program materials and messages to observable characteristics of AI/AN youth (e.g., people, places, music, locations, and clothing), whereas *deep structure* involved incorporating cultural, social, environmental, and psychological influences on sexual health behaviors (Resnicow et al., 1999).

Table 1 Adaptation phases, tasks, and products

Steps	Adaptation tasks	Adaptation products
Phase 1: Pre-adaptation		
1	Develop a community collaborative	
	Meet with tribal leaders, councils, and community stakeholders	Written collaborative agreements
		IRB approvals
2	Analyze content through review of behavioral outcomes, determinants, and learning objectives	
	Review existing sexual health resources for AI/AN youth	Literature review—evidence table
		Revised conceptual model
	Review *IYG-Tech* targeted behaviors and learning objectives	Reviewed learning objective matrices for *IYG-Tech*
	Identify culturally-appropriate content and learning strategies	
	Usability test the *IYG-Tech* curriculum with youth ($n = 80$), adult stakeholders ($n = 38$), and team consultants	Usability results table with youth ratings on ease of use, acceptability, credibility, motivational appeal
	Obtain recommendations for improvement	Qualitative data regarding overall feedback and recommendations from youth, adult stakeholders, experts (on team), and consultants
	Review community educational technology infrastructure	Community computer infrastructure inventory
Phase 2: Adaptation		
3	Select theory-based methods and practical applications	
	Design screen maps and scripts for adapted activities	Design document for adaptation
		Production table for learning activities
4	Develop the adapted program	
	Produce the *Native IYG* curriculum	*Native IYG* program consisting of 13 computer-based lessons featuring new and revised activities and videos
	Video production with AI/AN youth and elders	
	Alpha testing	New logo
		New videos featuring elders, AI sexual health expert, and AI/AN youth
		Modified ($n = 8$) and new ($n = 2$) fact sheets
Phase 3: Post-adaptation		
5	Pilot usability testing of *Native IYG*	
	Youth ($n = 45$) and adult stakeholders ($n = 27$)	Usability results table with youth ratings on ease of use, acceptability, credibility, motivational appeal, and applicability
	Obtain feedback on cultural appropriateness	
		Qualitative data from youth and adult stakeholders on acceptability for use in AI/AN communities

Developing a Community-Based Research Collaborative

Our core research team included representatives from the Indian Health Services' (IHS) national STI Program, the Northwest Portland Area Indian Health Board (NPAIHB), the Alaska Native Tribal Health Consortium (ANTHC), and the Inter Tribal Council of Arizona, Inc. (ITCA). The team also included experienced consultants in AI/AN adolescent sexual health. These partners were uniquely equipped to collaborate with tribal communities and navigate research protocols, having close working relationships with key decision-makers. This included gaining permission to conduct research through regional and individual tribal Institutional Review Boards (IRBs), tribal councils and schools boards, tribal health boards/committees, and tribal health directors (as appropriate for each region and tribe). The team also had experience in technology-based, sexual health research.

We adopted a community-based participatory research (CBPR) approach to equitably involve local communities in the research process (American Indian Law Center Inc. 1999; Israel et al., 1998; Minkler & Wallerstein, 2003; Trimble, Scharron-del-rio, & Hill, 2012; Viswanathan et al., 2004). Protocols were designed to maximize community 'ownership' of the adaptation process to develop a program responsive to the voice of regional tribes, parents, and youth (Craig Rushing & Stephens, 2011).

Liaison with local AI/AN communities was conducted by the respective regional organization (NPAIHB, ANTHC, and ITCA), collectively serving 295 tribes. We used convenience sampling to recruit AI/AN communities based on interest. Meetings were arranged with tribal leaders, councils, and community stakeholders to explain the study's objectives. Written agreements signed by tribal regional organization representatives outlined tribe, school site, and regional organization responsibilities, and the use and disclosure of information. Adaptation protocols were approved by IRBs in Alaska (ANTHC), Portland (NPAIHB), the University of Texas, and by participating tribal organizations. Below, we describe the results for each of the three chronological adaptation phases: (1) Pre-adaptation needs assessment; (2) adaptation including design document development, prototype programming, and alpha testing; and (3) post-adaption usability testing.

Results

Phase 1: Pre-Adaptation

Pre-adaptation comprised a review of existing sexual health resources for AI/AN youth and testing of the original *IYG-Tech* program to inform needed adaptations.

Review of Existing Sexual Health Resources for AI/AN Youth

A literature review of health promotion programs available to AI/AN youth and a content review of existing theory-based sexual health curricula targeting these youth (Kaufman et al., 2010; Smith, Craig Rushing, & The Native STAND Curriculum
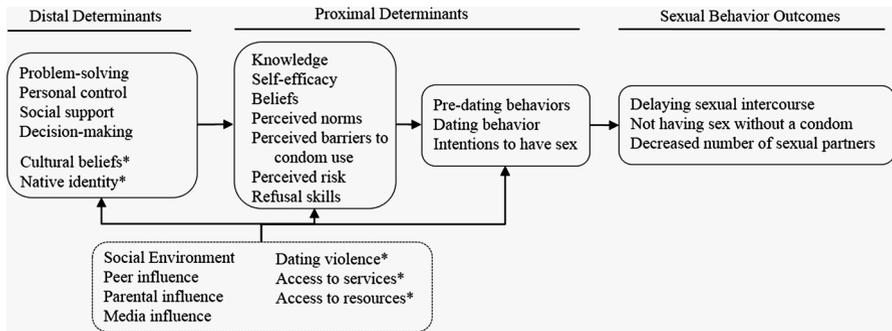
Fig. 1 Conceptual framework of behavioral determinants and outcomes. A conceptual framework, informed by a review of the literature and our prior research, illustrates psychosocial and environmental factors associated with sexual behavior and outcomes of sexual behavior for American Indian/Alaska Native youth. Factors indicated by an asterisk (*) were incorporated into the model as important considerations for the AI/AN adaptation

Development Group, 2011; Kaufman et al., 2014) informed the development of an evidence table comprising 41 research studies that is available upon request from the corresponding author. Studies supported the importance of: (1) addressing health behavior mediators of knowledge, attitudes, self-efficacy, perceived norms, and social support; (2) expanding existing *IYG-Tech* content on healthy relationships, dating violence, and substance abuse; and (3) incorporating concepts related to cultural values, identity, and holistic health that were not originally represented in the program (see Fig. 1).

Review of IYG-Tech Targeted Behaviors and Learning Objectives

IYG-Tech is a computer-based middle school curriculum comprising thirteen 35-min stand-alone lessons founded on Social Cognitive Theory (Bandura, 1986) and social influence models (Komro, Perry, Williams, Stigler, Farbakhsh, & Veblen-Mortenson, 2001; Perry, 1999; Story, Lytle, Birnbaum, & Perry, 2002), which is designed to impact: (1) abstinence from sex, (2) healthy relationships, (3) condom use, (4) birth control, and (5) testing for HIV/STIs and pregnancy (Shegog et al., 2014). Evaluation of *IYG-Tech* had been conducted with 907 predominantly low-income Hispanic (44 %) and African American (42.3 %) youth in 10 urban middle schools. Post-hoc analysis demonstrated that students receiving the full 13-lesson curriculum significantly delayed sexual initiation compared to those receiving 4 or fewer lessons (Peskin et al., 2015). Content review by the research collaborative determined that the sexual behaviors, behavioral determinants, and learning objectives ($n = 193$) targeted by *IYG-Tech* were consistent with the literature and relevant and valid for a Native-oriented program. Further, the core *IYG-Tech* life skills decision-making paradigm (*Select, Detect, Protect*) that teaches students to *select* personal limits regarding risk behaviors, to *detect* signs or situations that might challenge these limits, and to use refusal skills to *protect* these limits was considered relevant for AI/AN middle school students. The research

collaborative also considered appropriate the tailoring of selected lesson activities on gender, self-reported sexual experience and intentions to engage in sex (Shegog et al., 2014) and considered the curriculum's scope and duration feasible for use in middle schools in tribal communities.

Pre-Adaptation Usability Testing of IYG-Tech

Youth Usability Testing   We conducted usability testing with 80 AI/AN youth to gain their perspectives on needed adaptations (Nielsen, 1993; Shegog et al., 2014). Youth were aged 9–16 years (13.0 ± 0.94), from varied locations within each study region (33 % AK, 31 % AZ, 35 % PNW), mostly female (60 %), self-identified as AI/AN (96 %), primarily 7th and 8th grade (72 %) and had regular computer access (81 %). Some youth self-identified as multi-racial (6 % White, 5 % Black) and Multi-Ethnic (10 % Hispanic). Regional staff recruited participants through flyers posted in schools, tribal community centers, after-school and summer camp programs, and advertising on organizational websites, social media sites, and/or newsletters. Each youth accessed seven lessons of *IYG-Tech* (the first lesson and six lessons from either the first or second half of the curriculum) in a single day in a simulated classroom or computer lab setting using laptop or desktop computers with headphones. Youth completed a demographic survey, reviewed each lesson, completed usability questionnaires regarding that lesson, and provided open-ended responses regarding ideas for improvement. Participation was voluntary; written parental consent and child assent were obtained. Incentives up to $50 were provided.

Measures and analysis: We assessed usability parameters using previously reported Likert scale ratings and open-ended response formats that were adapted to reflect the content of Native IYG and its appropriateness for AI/AN youth (Shegog et al., 2014). We assessed *likability* as how much the youth liked different lesson activities and program elements (e.g., pictures/colors, sounds, and videos) using 5-point Likert scale ratings that ranged from "dislike a lot" to "like a lot." We assessed *ease of use* as the perceived difficulty of the lesson and of directions within the lesson (very easy, kind of easy, kind of hard, very hard) and if youth needed adult help to use *IYG-Tech* (yes, no). We assessed *understandability* as whether youth understood the words used (yes, no) and assessed *credibility* as perceived content correctness using a 3-point Likert scale rating ("right," "wrong," "don't know") and content credibility ("yes," "no," "don't know"). *Acceptability* was assessed by the pace of *IYG-Tech* activities ("too fast," "just right," "too slow"). *Motivational appeal* (if youth would use *IYG-Tech* again and recommend it to others), and *perceived impact* (if youth thought these lessons would help them make healthy decisions) were rated using a 3-point Likert scale ("yes," "no," "don't know"). We assessed the *appropriateness for AI/AN youth* by whether the program met the needs of AI/AN youth and whether any changes were recommended, with ratings of 'yes' or 'no' responses, and group discussion. We administered usability measures via paper–pencil surveys and analyzed the data using descriptive and inferential statistics (paired t tests and sign tests), according to distribution assumptions, using SAS software (version 9.2).

Table 2 Pre- and post-adaptation usability agreement

Usability parameters	Gradient	Range of agreement across lessons (%)[a]	
		Pre-adaptation[b]	Post-adaptation[c]
Likability	'A lot' or 'a little'	51–98	68–94
Ease of use	'Very easy' or 'kind of easy'	75–97	79–100
	'Did not need adult help'[c]	62–93	44–89
Understandability	'Words are understandable'	64–93	74–100
Acceptability	'Pace of lessons just right'[d]	64–94	58–100
Credibility	'Information was correct'	69–97	77–100
	'Information was trustworthy'	67–94	77–100
Motivational appeal	'Would recommend to classmate'	49–82	37–100
Perceived impact	'Help them make better choices'	72–94	73–100
Enjoyable	'As much or more fun than favorite video game'	40–73	37–86
	'As much or more fun than other lessons at school'	53–88	58–100
	'As much or more fun than other computer based lessons at school'	58–83	57–93
	'As much or more fun than other health lessons at school'	63–91	58–100
AI/AN appropriate	'Would make changes'	12–39	NA
	'Meets needs of AI/AN youth'	NA	54–86

[a] Participant agreement on usability parameters (e.g., likable, easy, understandable etc.) for the lessons. A range is presented. For example, in pre-adaptation, participant agreement that they liked a lesson (a little/a lot) ranged from 51 % for the lowest rating lesson to 98 % for the highest rating lesson. Agreement on likability for the other lessons was within this range

[b] Number of youth who rated each lesson ranged from 33 to 69

[c] Number of youth who rated each lesson ranged from 6 to 27

[d] Pace and understandability for post-adaptation was impacted by unreliable access to internet-based program via internet in one testing location

Usability testing results: Youth rated *IYG-Tech* lessons and agreed that they were enjoyable, easy to use, mostly requiring no assistance, understandable, and acceptably paced (see Table 2, Pre-Adaptation). Most rated the lessons as credible, helpful for making healthy choices, and more fun than other school lessons, computer-based lessons, and health lessons. Many indicated they would recommend *IYG-Tech* to classmates (49–82 %). The lower level of this range was primarily related to the lesson on human anatomy and reproduction. Both lessons contain relatively explicit material (e.g., the definition of sex, the reproductive anatomy of males and females), similar to conventional text-book biology lessons (accompanied by illustrations) with more conventional knowledge-based, rather than skills-based learning objectives. For other lessons the range was 64–82 %. There was modest agreement that the lessons were more fun than their favorite video game. A smaller percentage agreed that changes should be made to the lessons.

Recommended enhancements included a greater focus on drug and alcohol abuse (42 %), Native pride and identity, including stories, traditional healing and ceremonies (32 %), abstaining from sex (32 %), and healthy relationships and dating (30 %). Other recommendations included greater focus on bullying, religion/spiritual beliefs, stress, suicide, and depression. Recommended curriculum features included music or videos (55 %), a place to write personal thoughts (51 %), video/video games (47 %), and photos or videos of peers undergoing similar life experiences (43 %). Youth provided feedback on program titles, with *Native IYG* rating highest.

Adult Stakeholder Review   Adult stakeholders ($n = 38$), who comprised parents, youth group leaders, community health nurses, school nurses, health educators, IHS representatives, and state health program managers, participated in focus groups and community advisory meetings across the three regions to provide input on the adaptation. They reviewed a cross-section of *IYG-Tech* lessons including activities on healthy friendships, human anatomy and reproduction, dating relationships, consequences of sex, and risk reduction practices (condom and contraceptive use). They provided input on the topics, their importance, and anything to be added or removed.

All topics were considered important but the more sensitive topics, e.g., condoms and contraception, were considered challenging for inclusion for middle school youth (given varying State laws on sex education). The most important topics were personal rule setting and identification of personal strengths (rights and responsibilities). Suggestions for additional content included adding an elder or traditional healer, cultural teachings about healthy relationships, AI/AN images and values, more AI/AN youth in videos, reservation and rural settings, internet safety (bullying, risky behaviors online), interpersonal violence, suicide prevention, and the ability to modify lessons to meet state-specific regulations.

Review of Available Community Educational Technology Infrastructure

Participating schools completed a 'Computer-Based Education Inventory Survey' (Shegog et al., 2014) and connectivity and bandwidth testing to inform the design specifications of the adapted program. They comprised primarily Windows (63 %) and Mac (31.5 %) computers, mostly desktop computers (88.2 %), and mostly Internet accessible (89.5 %). Primary web browsers included Chrome (36.8 %), Safari (26.3 %), and Internet Explorer (21 %). Download speed ranged from 0.24 to 93.5 Mbps (mean = 25.6 ± 31.14; median = 6.37 Mbps).

Phase 2: Adaptation

The adaptation phase comprised programming and alpha testing the adapted *Native IYG* curriculum prototype based on phase one data. We collated and tabulated the review comments and ratings for each activity. A two-step prioritization coding scheme was applied to (1) categorize the type of change (cultural, educational,

technical) and then to (2) prioritize the amount of adaptation required (no change, minimal/small change, moderate changes, large change), its importance (essential vs. not essential), and budget/timeline constraints (plausible vs. not plausible).

The Native IYG Curriculum

The *Native IYG* curriculum is housed on a secure server at the University of Texas School of Public Health, web-accessible to schools serving AI/AN students during the regular school-day or during after-school or summer camp programs. *IYG-Tech's* 13-lesson scope and educational strategies (including interactive activities, quizzes, animations, videos, and fact sheets) were retained, as were tailoring algorithms based on gender, self-reported sexual experience and intentions. Content sequencing was also retained—healthy friendships, protecting personal limits, puberty and reproduction, healthy dating relationships, consequences of sex (HIV, STI, and pregnancy), refusal skills-training, testing if sexually active, and condom and contraceptive skills-training. However, surface and deep cultural adaptations were integrated throughout the program. Surface adaptations included changing both the program name to '*Native IYG*' and the program logo to symbolically reflect the collaborative research team from the southwest plains, northern forest, and Arctic lakes and sea. Images and names of characters were changed to reflect Native culture and language from the three different regions (see Table 3).

Deep cultural program adaptations included the addition of Native elders and health educators to reflect tribal 'voices' and perspectives (see Table 4). Videos featuring AI/AN youth, elders, and a health education expert were produced in participating regions and supervised by the regional PIs following a priori production specifications. Elders provided blessings and introduced the curriculum and sensitive lessons (e.g., anatomy and reproduction), referencing the Native Wellness Model, an integration of the physical, emotional, social, mental, and spiritual dimensions of health (Chino & Debruyn, 2006). Video clips featuring local AI/AN youth provide heterogeneous peer perspectives on healthy friendships, and setting and protecting personal rules. Production elements also included video and music produced by Native artists and videos of cultural events (e.g., Pow Wows and Native Youth Olympics) representative of the various groups in the regions.

We modified or created fact sheets to extend coverage of pregnancy testing, menstruation, birth control, STIs, HIV-testing, body art, substance use, LGBT-two spirit youth, interpersonal violence, and suicide. The curriculum retained six parent–child homework activities to facilitate dialogue on friendships, dating, and sexual behavior. In-house alpha tests followed previously developed protocols to ensure *Native IYG* conformed to design intentions (content and function). Health domains of substance abuse and dating violence were strengthened in the adapted curriculum.

Table 3 Surface program adaptation examples

Revisions	Original version (*IYG-tech*)	Adapted version (*Native IYG*)
PERIPHERAL: Clothing, music, colors, images, fonts, pictures of group members, places		
New title and logo was developed to reflect Native identity and the geographic tribal regions (lakes/rivers, forest/grassland, desert)		
New music was incorporated from contemporary AI/AN music from groups with a positive image		
Lead characters' images were changed to reflect AI/AN youth		
Risky situation contexts were changed (e.g., from teen club to house party with alcohol in animated role model story)		
Animated "welcome character" changed from older White male to younger Native security guard		
Animated guides who appear throughout the program were changed to reflect Native youth and provided more modest attire		
LINGUISTIC: Language(s), terms, literacy level		
New Native character names replaced original White, Hispanic, and Black names	Character names: Miguel, Andrea, Jay, Kay, Trevor and Karly	Character names: Seneca, Cheyenne, Datu, Ap'ii, River, Denali, Ceeguumuk
Reading level (literacy demand) was reduced throughout the program		

Based on models from Resnicow et al. (1999) and Kreuter et al. (2003)

Phase 3: Post-Adaptation

Pilot testing of *Native IYG* comprised usability testing with AI/AN youth and adult stakeholders.

Post-Adaptation Usability Testing of NATIVE-IYG

Youth Testing   *Native IYG* usability testing was conducted with 45 youth, ages 11–15 years (12.8 ± 1.8) from each study region [29 % AK, 51 % AZ, 20 % PNW], comprising females (55 %), self-identifying as AI/AN (93 %), primarily 7th and 8th grade (80 %), and mostly with regular computer access (73 %). Some youth self-identified as Multi-Racial (4 % White, 9 % Black), and Multi-Ethnic (9 % Hispanic). Usability testing protocols, measures, and analysis were as previously

Table 4 Deep program adaptation examples

Revisions	Original version *IYG-Tech*	Adapted version *Native IYG*
Constituent-involving: Indigenous staff, lay health workers, involving community in planning & decision-making		

Native community members and AI/AN research team members informed the adaptation throughout

Native youth production of adapted video role model stories.

An *American Indian educator* replaced the original expert to present facts on sex, the consequences of sex, and risk reduction practices

Interviews with AI/AN youth were added in eight lessons to discuss goals, culture, friendships, healthy and unhealthy relationships, and personal rules

Sociocultural: Cultural values & beliefs; social, historical, environmental and psychological forces that influence target health behavior

Native blessing was added to begin the program. *Elder voice* was added in 5 lessons to frame sensitive topics: pregnancy, healthy relationships, and personal rules about sex, condoms, and contraceptives

Core cultural values were included within activities regarding providing for family, seeking counsel from elders, and autonomous responsible life choices

Holistic health (comprising mental, social, physical, and spiritual health) was included for consistency with native perspectives

Substance (drugs and alcohol) abuse was given greater emphasis in added activities and skills practice in refusal and avoidance

Cultural beliefs regarding healthy relationships (through Native teen and elder voices) were included

Dating violence and escaping unhealthy relationships were included

Table 4 continued

Revisions	Original version *IYG-Tech*	Adapted version *Native IYG*
Traditional Native youth activities (sports, dances, and songs) were included	*Fact sheets* on sexual abuse and suicide prevention were included	

Based on models from Resnicow et al. (1999) and Kreuter et al. (2003)

described. Satisfaction ratings were obtained specifically for 11 culturally adapted activities and five recurring adaptations (elders, teen peer videos, fact sheets, AI/AN health expert, and private graffiti wall).

Usability testing results: *Native IYG* lessons were rated as enjoyable, easy to use with most students requiring no assistance, understandable, and acceptably paced (Table 2, Post-Adaptation). Pace and understandability ratings were adversely affected by unreliable Internet access in one testing site. Most students rated the lessons as credible, helpful in making healthy choices, and more fun than other school lessons, computer-based lessons, and health lessons. Most indicated they would recommend *Native IYG* to friends (54–100 %), with the exception of the lesson on anatomy and reproduction (37 %). There was modest agreement that the lessons were more fun than their favorite video game (50–86 %), excluding the lesson on anatomy and reproduction which continued to rate lower (37 %). A majority agreed that *Native IYG* met the needs of AI/AN youth.

Satisfaction ratings were positive for the 11 culturally adapted activities (71–100 %) and the recurring adaptation of elders (79–100 %), teen peer videos (81–100 %), and a private graffiti wall (83–100 %). Fact sheet ratings were positive but comparatively lower (58–93 %). The AI/AN health expert was rated highly (73–82 %) in most lessons but comparatively lower for the lesson on anatomy and reproduction (42 %). When queried about "anything else they would want to see in the program" most (65 %) indicated no desired changes. Recommended changes focused on general program elements such as "more video" or "less cartoons," not content. Youth predominantly agreed that the program was suitable for AI/AN youth (77 %), more so for younger teens (not high school) given the predominance of cartoons, and recommended that other youth should use it (80 %).

Adult Stakeholder Review   AI/AN adult stakeholders ($n = 27$), comprising parents, health educators, health care providers, and other community members participated in focus groups or community advisory meetings across the three regions, to review a cross-section of adapted lessons. Participants were ages 31–40+, predominantly female (85 %), from 13 different tribal communities, with all but one self-identifying

Table 5 Post-adaptation likability agreement ratings for adult stakeholders

IYG-Tech adapted activities	%
Single adaptation (significant change to original script)	
Introduction video montage featuring Native youth, cultural events, and music	100
Coping with life stressors (Lawrence)	85
Healthy relationship role model stories (Cassie and Jason)	84
Leaving an unhealthy relationship (Kim)	86
Elder wisdom story—advising on life decisions (Datu)	91
Recurring adaptations (significant change to original or newly created)[a]	
Elder voice video introductions (Rene and Kirby)	79–100
Teens talk role model videos—personal rules about sex (Montage of Native youth)	81–100
Fact sheets	58–93
Expert videos—HIV; condom and dental dam demo (Native health educator)	42–82
Private wall (Cyber Café journal activities)	83–100
Single adaptation (Superficial/minimal change to original script)	
Ineffective refusal (Mark and the Movie)	79
Clear no role modeling (Mark and the Movie)	89
Alternative action role modeling (Mark and the Movie)	84
Avoidance and escape of unhealthy relationships (River and Denali)	84
Respecting other people's rules (Apollo and Jane)	71
Role model story (Seneca and Cheyenne)	83

Satisfaction (on a 4-point Likert scale from 'liked a lot' to 'disliked a lot')

$N = 27$; any one activity was reviewed by 6–27 raters

[a] Range of percent agreement across multiple activities

as AI/AN. Groups were shown a diversity of content across the lessons (i.e., healthy friendships, anatomy and reproduction, dating relationships, consequences of sex, and risk reduction practices), varying levels of adaptation (i.e., superficial vs. significant changes to the original script) and a variety of media types (i.e., animations, peer and expert video, and interactive activities).

Participants felt that all program topics were important. Adapted activities received likability ratings from 42 to 100 % (see Table 5). Lower ratings were provided for the expert videos demonstrating condom and dental dam use and fact sheets. Stakeholders provided positive feedback on the program because it was more "interactive" and "exciting." They perceived it as helping to meet youth's sexual health needs and filling a current void in educational options, providing a "holistic approach incorporating indigenous perspectives, values, and issues." Some recommended the inclusion of information on sexual abuse, to enable youth to understand it is not normal and to offer specific support strategies.

Stakeholders described the language as "empowering," culturally appropriate, and representative of the "student perspective." They considered the representation of traditional values to be appropriate overall and reported that it had achieved the aim of cultural appropriateness. Supporting statements included: "it encompasses many tribal nations," "uses teen verbiage," focuses on "responsibility," "the fact

that it pertains to us personally will reach a lot further with kids and parents," and "you have succeeded in making it more culturally appropriate because it made me feel good."

While inclusiveness of Native communities was cited as a strength, it was also identified as a potential weakness. Stakeholders suggested that greater use of cultural values, stories, or images might enhance the program but also acknowledged that this might also "regionalize it," undermining generalizability. Specific concerns focused on one role model story of teens challenged by pregnancy. Suggestions to improve cultural appropriateness included reducing the sense of shame by showing supportive parents (rather than just negative parental reactions) and a supportive community to provide the message that teens were not alone. Other general concerns related to some youth role model videos appearing too old for the targeted age group, and that the elder is more likely to initiate conversations around sexual health, contrary to a conversation initiated by a youth in one role model story.

Stakeholders were positive about disseminating the program; most (87 %) indicated that their community would support implementation, through community organizations including health clinics, tribal councils and governments, hospitals, schools, and tribal chiefs' conferences. Others indicated a wait-and-see approach ("we shall see") or predicted challenges ("there might be resistance"). They acknowledged that the material "may be a little graphic" but deemed it "necessary." Stakeholders recommended one-on-one meetings, program demonstrations, and educational efforts as ways to engage those who might oppose the program.

Discussion

We described the pragmatic, empirically-based adaptation of *Native IYG*, a pregnancy and HIV/STI prevention program for AI/AN youth. *Native IYG* represents an innovative contribution to sexual health education for this population. While data indicate that AI/AN communities face disparities regarding youth sexual health, data also support that AI/AN communities are well disposed for using technology as a sexual health education platform (Craig Rushing & Stephens, 2011; Fox & Jones, 2009; Morris & Meinrath, 2009; Rideout et al., 2010).

The *Native IYG* adaptation process was consistent with numerous cultural adaptation frameworks (Gray & Rose, 2012; Kreuter et al., 2003; Kumpfer et al., 2002; Resnicow et al., 1999; Santisteban et al., 2001; Turner, 2000; Yellow Horse & Yellow Horse Brave Heart, M. Native American Children, 2002) including the ecological validity framework (Bernal, Bonilla, & Bellido, 1995; Bernal & Saez-Santiago, 2006), the cultural accommodations model (Leong & Lee, 2006), the cultural sensitivity framework (Resnicow et al., 1999), cultural adaptation process model (Domenech-Rodriguez & Wieling, 2004), and cultural tailoring approaches (Kumpfer et al., 2002). Stakeholders' input and existing research findings (Bernal & Saez-Santiago, 2006) informed the development. We made modifications to support increased youth engagement, acceptability, and relevance and aligned the

intervention to tribal priorities and organizational capacities to support uptake. We employed multiple data collection methods to assess cultural adaptation, and to ensure fidelity and fit (Bernal & Domenech Rodriguez, 2012).

A compelling rationale to adapt *IYG-Tech* for AI/AN youth included the demonstrated need for pregnancy and HIV/STI prevention for AI/AN middle-school students, the applicability of technology for AI/AN youth, *IYG-Tech's* established effectiveness and its appeal among AI/AN youth, and AI/AN community support for such programs. Additional factors included participation of the *IYG-Tech* creators in the adaptation process, the existence and availability of original computer-based lessons and associated assets, and the upsurge of Internet connectivity in US schools to capitalize on eHealth curricula. Despite this, adaptation challenges included ensuring that learning objectives targeted content most salient to AI/AN youth while retaining the original effective core content, that the program was acceptable to AI/AN youth and stakeholders at surface and deep cultural levels, and that *Native IYG's* content and mode of delivery was seen as feasible to implement in AI/AN communities.

Limitations

Although results are encouraging, several limitations should be noted. The samples used were small though not atypical for usability testing, making it difficult to generalize to broader AI/AN communities. However, there is some confidence that no major 'red flags' were raised by youth or adults. Further, while most schools have internet connectivity, they vary in the number of available computers, Internet reliability, and bandwidth, particularly in rural AI/AN communities. Stakeholders' support for *Native IYG* was encouraging; however, potential implementation barriers included school officials' concern about negative community reactions (Landry, Singh, & Darroch, 2000), perceived lack of parental support (Buston, Wight, Hart, & Scott, 2002; Paulussen, Kok, & Schaalma, 1994; Rolleri, Wilson, Paluzzi, & Sedivy, 2008), pressure to devote class time to academic versus health topics, and whether *Native IYG* conformed to their state's policy for sexual health and HIV education. Further, while post-adaptation testing suggested field-readiness for *Native IYG*, it was logistically prohibitive to address all comments received.

It would be inaccurate to suggest that *Native IYG* meets the ideal of a culturally-based, culturally congruent, and culturally grounded practice emerging from multiple AI/AN worldviews (Gray & Rose, 2012). The *Native IYG* research collaborative comprised AI/AN researchers and substantial community input from three distinct tribal geographic regions. We balanced adaptation efforts against the considerable heterogeneity within the cultures in these regions. While *Native IYG* objectives include sensitivity to AI/AN culture, the program does not represent one specific AI/AN culture or provide tailoring to a particular region, tribe, reservation, or individual. Rather, it combines several cultures. The danger is that in an effort to be relevant to all, it is relevant to none. Some stakeholder feedback indicated a desire for a deeper relation to traditional local stories but, in the same breath, acknowledgment that this would limit generalizability. This raises the question of

how effective *Native IYG* can be when it provides a 'pan-tribal' approach to behavioral change without tailoring to values and teachings specific to each tribe.

The decision to adapt a program and the degree of adaptation brings with it a tension between honoring the fidelity of the original evidence-based program and the 'fit' of the program with community preferences, culture, and context. Strengths of the adaptation framework for developers include its systematic approach, the use of an amalgamated cultural adaptation framework to conceptualize surface and deep cultural components, the use of mixed methods to inform adaptation, and the utility of applying published usability and acceptability assessments. This approach should be interpreted in light of its limitations, as it represents an adaptation of an existing computer-based program rather than the development of a new program using ethnographic and grounded theory approaches. Further, the degree of adaptation was secondary to the aim of achieving 'pan-tribal' acceptability, decreasing the imperative to plumb cultural nuances idiosyncratic to particular tribes. Nor could the approach adequately attend to the particular needs of subpopulations (e.g., sexual minorities, visually or hearing impaired) without a greater specific focus on those populations. Despite this, this pragmatic empirically-based adaptation approach offers a broad application to practitioners in triaging their evidence-based programs for cultural sensitivity and 'field-readiness.' The ultimate test of the success of *Native IYG* will be its impact on long-term behaviors in a randomized controlled efficacy field trial.

Despite compelling need, AI/AN youth do not receive sufficient sexual health education. While they "may grow up in families that inculcate strong traditional values, which may protect against sexual risk-taking," they are exposed to powerful pressures to engage in early sexual activity (Mitchell et al., 2005, page 161). AI/AN communities recognize this problem and are supportive of collaborative interventions such as *Native IYG*.

Conclusion

The development and testing of *Native IYG* demonstrates the curriculum's usability and appeal among AI/AN youth and stakeholders, suggesting a feasible delivery channel for sexual health education in AI/AN communities. The development process included adherence to a rigorous, phased adaptation protocol with adaptation steps informed by iterative prototype testing. This work provides a guide for future research on adapting evidence-based programs for diverse populations and technology platforms.

Compliance With Ethical Standards

Conflict of Interest The authors have no conflicts of interest to disclose.

References

American Indian Law Center, Inc. (1999). *Model tribal research code, with materials for tribal research and checklist for Indian health boards*. Albuquerque, NM.

Amnesty International. (2007). *Maze of injustice: The failure to protect Indigenous women from sexual violence in the USA*. London: Amnesty International Publications.

Aufrecht, S. E. (1999). Missing: Native American governance in American public administration literature. *The American Review of Public Administration, 29*(4), 370–390.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs: Prentice-Hall.

Bartholomew, L. K., Parcel, G. S., Kok, G., & Gottlieb, N. (2011). *Planning health promotion programs: An intervention mapping approach* (3rd ed.). San Francisco: Jossey-Bass.

Beauvais, F. (1998). American Indians and alcohol. *Alcohol Health & Research World, 22*(4), 253–259.

Bernal, G., Bonilla, J., & Bellido, C. (1995). Ecological validity and cultural sensitivity for outcome research: Issues for the cultural adaptation and development of psychosocial treatments with Hispanics. *Journal of Abnormal Child Psychology, 23*, 67–82. doi:10.1007/BF01447045.

Bernal, G., & Domenech Rodriguez, M. M. (Eds.). (2012). *Cultural adaptations*. Washington, DC: American Psychological Association.

Bernal, G., & Saez-Santiago, E. (2006). Culturally centered psychosocial interventions. *Journal of Community Psychology, 34*, 121–132. doi:10.1002/jcop.20096.

Buston, K., Wight, D., Hart, G., & Scott, S. (2002). Implementation of a teacher-delivered sex education programme: Obstacles and facilitating factors. *Health Education Research, 17*(1), 59–72.

Card, J. J., Solomon, J., & Cunningham, D. (2011). How to adapt effective programs for use in new contexts. *Health Promotion Practice, 12*(1), 25–35.

CDC. (2013). *Youth risk behavior surveillance system (YRBSS 2013)*. Youth online: High school YRBS. Retrieved July 15 2014, from http://nccd.cdc.gov/youthonline/App/Default.aspx?SID=HS

CDC, Division of STD Prevention. (2010). *Sexually transmitted disease surveillance 2009* (Tables 11B, 21B, 34B). Atlanta: U.S. Department of health and Human Services. http://www.cdc.gov/std/stats09/surv2009-complete.pdf

Chewning, B., Douglas, J., Kokotailo, P. K., LaCourt, J., Clair, D. S., & Wilson, D. (2001). Protective factors associated with American Indian adolescents' safer sexual patterns. *Maternal and Child Health Journal, 5*(4), 273–280.

Chino, M., & Debruyn, L. (2006). Building true capacity: Indigenous models for indigenous communities. *American Journal of Public Health, 96*(4), 596–599.

Coyle, K. K., Kirby, D. B., Main, B. V., Gomez, C. A., & Gregorich, S. E. (2004). Draw the line/respect the line: A randomized trial of a middle school intervention to reduce sexual risk behaviors. *American Journal of Public Health, 94*(5), 843–851.

Craig Rushing, S., & Stephens, D. (2011). Use of media technologies by Native American teens and young adults in the Pacific Northwest: Exploring their utility for designing culturally appropriate technology-based health interventions. *Journal of Primary Prevention, 32*(3), 135–145. doi:10.1007/s10935-011-0242-z.

Craig Rushing, S., & Stephens, D. (2012). Tribal recommendations for designing culturally appropriate technology-based sexual health interventions targeting native youth in the pacific northwest. *American Indian and Alaska Native Mental Health Research, 19*(1), 76–101.

Dailard, C. (2006). Legislating against arousal: The growing divide between federal policy and teenage sexual behavior. *Guttmacher Policy Review, 9*(3), 12–16.

Dalla, R. L., & Gamble, W. C. (1997). Exploring factors related to parenting competence among Navajo teenage mothers: Dual techniques of inquiry. *Family Relations, 46*(2), 113–121.

Dilorio, C., Resnicow, K., McCarty, F., De, A. K., Dudley, W. N., Wang, D. T., et al. (2006). Keepin' it REAL! Results of a mother-adolescent HIV prevention program. *Nursing Research, 55*(1), 43–51.

Domenech-Rodriguez, M., & Wieling, E. (2004). Developing culturally appropriate, evidence-based treatments for interventions with ethnic minority populations. In M. Rastogi & E. Wieling (Eds.), *Voices of color: First-person accounts of ethnic minority therapists* (pp. 313–333). Thousand Oaks: Sage.

Edwards, S. (1992). Among Native American teenagers, sex without contraceptives is common. *Family Planning Perspectives, 24*(4), 189–191.

Fox, S., & Jones, S. (2009). *The social life of health information.* Washington, DC: Pew Internet & American Life Project. http://www.pewinternet.org/Reports/2009/8-The-Social-Life-of-Health-Information.aspx?r=1.

Gray, J. S., & Rose, W. J. (2012). Cultural adaptation for therapy with American Indians and Alaska Natives. *Multicultural Counseling and Development, 40*, 82–92.

Hellerstedt, W. L. (2004). *Native teen voices: Feelings about sex, pregnancy, and parenting.* University of Minnesota. http://www.ntv.umn.edu/

Hellerstedt, W. L., Peterson-Hickey, M., Rhodes, K. L., & Garwick, A. (2006). Environmental, social, and personal correlates of having ever had sexual intercourse among American Indian youths. *American Journal of Public Health, 96*(12), 2228–2234.

Israel, B. A., Schulz, A. J., Parker, E. A., & Becker, A. B. (1998). Review of community-based research: Assessing partnership approaches to improve public health. *Annual Review of Public Health, 19*, 173–202.

Jemmott, J. B., I. I. I., Jemmott, L. S., & Fong, G. T. (1998). Abstinence and safer sex HIV risk-reduction interventions for African-American adolescents. *Journal of the American Medical Association, 279*(19), 1529–1536.

Kaestle, C. E., Halpern, C. T., Miller, W. C., & Ford, C. A. (2005). Young age at first sexual intercourse and sexually transmitted infections in adolescents and young adults. *American Journal of Epidemiology, 161*(8), 774–780.

Kaufman, C. E., Beals, J., Mitchell, C. M., Lemaster, P., & Fickenscher, A. (2004). Stress, trauma, and risky sexual behaviour among American Indians in young adulthood. *Culture, Health & Sexuality, 6*(4), 301–318.

Kaufman, C. E., Desserich, J., Big Crow, C. K., Holy, R. B., Keane, E., & Mitchell, C. M. (2007). Culture, context, and sexual risk among Northern Plains American Indian Youth. *Social Science & Medicine, 64*(10), 2152–2164.

Kaufman, C. E., Mitchell, C. M., Beals, J., Desserich, J., Keane, E., Sam, A., et al. (2010). Circle of Life: Rationale, design, and baseline results of a HIV prevention intervention among young American Indian adolescents of the Northern Plains. *Prevention Science, 11*(1), 101–112.

Kaufman, C. E., Rumbaugh Whitesell, N., Keane, E., Desserich, J., Giago, C., Sam, A., et al. (2014). Effectiveness of circle of life, an HIV-preventive intervention for American Indian middle school youths: A group randomized trial in a Northern Plains tribe. *American Journal of Public Health, 104*(6), e106–e112.

Komro, K. A., Perry, C. L., Williams, C. L., Stigler, M. H., Farbakhsh, K., & Veblen-Mortenson, S. (2001). How did project Northland reduce alcohol use among young adolescents? Analysis of mediating variables. *Health Education Research, 16*(1), 59–70. http://www.ncbi.nlm.nih.gov/htbin-post/Entrez/query?db=m&form=6&dopt=r&uid=11252284

Kreuter, M., Lukwago, S. N., Bucholtz, D. C., Clark, E. M., & Sanders-Thompson, V. S. (2003). Achieving cultural appropriateness in health promotion programs: Targeted and tailored approaches. *Health Education and Behavior, 30*, 133–146.

Kumpfer, K. L., Alvarado, R., Smith, P., & Bellamy, N. (2002). Cultural sensitivity and adaptation in family-based prevention interventions. *Prevention Science, 3*(3), 241–246.

Landry, D. J., Singh, S., & Darroch, J. E. (2000). Sexuality education in fifth and sixth grades in U.S. public schools, 1999. *Family Planning Perspectives, 32*(5), 212–219.

Leong, F. T. L., & Lee, S. H. (2006). A cultural accommodation model of psychotherapy: Illustrated with the case of Asian Americans. *Psychotherapy: Theory, Research, Practice, Training, 43*, 410–423. doi:10.1037/0033-3204.43.4.410.

Leston, J. D., Jessen, C. M., & Simons, B. C. (2012). Alaska Native and rural youth views of sexual health: A focus group project on Sexually Transmitted Diseases, HIV/AIDS, and unplanned pregnancy. *American Indian/Alaska Native Mental Health Research, 19*(1), 1–14.

Manlove, J., Franzetta, K., McKinney, K., Papillo, A. R., & Terry-Humen, E. (2004). *No time to waste: Programs to reduce teen pregnancy among middle school-aged youth.* Washington, DC: National Campaign to Prevent Teen Pregnancy.

Markham, C. M., Tortolero, S. R., Peskin, M. F., Shegog, R., Thiel, M., Baumler, E. R., et al. (2012). Sexual risk avoidance and sexual risk reduction interventions for middle school youth: A randomized controlled trial. *Journal of Adolescent Health, 50*, 279–288.

Minkler, M., & Wallerstein, N. (2003). *Community-based participatory research for health*. San Francisco: Jossey-Bass.

Minnesota University, Minneaplois Division of General Pediatrics and Adolescent Health. (1992). *The state of native American youth health*. Atlanta: University of Minnesota Adolescent Health Program.

Mitchell, C. M., Kaufman, C. E., Beals, J., Choice, P., & Team, H. W. P. (2005). Resistive efficacy and multiple sexual partners among American Indian young adults: A parallel-process latent growth curve model. *Applied Developmental Science, 9*(3), 160–171.

Mitchell, C. M., Rumbaugh Whitesell, N., Spicer, P., Beals, J., & Kaufman, C. E. (2007). Cumulative risk for early sexual initiation among American Indian youth: A discrete-time survival analysis. *Journal of Research on Adolescence, 17*(2), 387–412.

Morris, T. L., & Meinrath, S. D. (2009). *New media, technology and internet use in Indian Country: Quantitative and qualitative analyses*. Flagstaff: Native Public Media.

National Campaign to Prevent Teen and Unplanned Pregnancy. (2007). *Fact sheet: Teen sexual activity, pregnancy, and childbearing among Native Americans*. Washington, DC.

Nielsen, J. (1993). *Usability engineering*. San Diego: Morgan Kaufmann.

Nixon, S. J., Phillips, M., & Tivis, R. (2000). Characteristics of American-Indian clients seeking inpatient treatment for substance abuse. *Journal of Studies on Alcohol, 61*(4), 541–547.

O'Donnell, L., O'Donnell, C. R., & Stueve, A. (2001). Early sexual initiation and subsequent sex-related risks among urban minority youth: The Reach for Health study. *Family Planning Perspectives, 33*(6), 268–275.

O'Donnell, L., Stueve, A., San, D. A., Duran, R., Haber, D., Atnafou, R., et al. (1999). The effectiveness of the Reach for Health Community Youth Service learning program in reducing early and unprotected sex among urban middle school students. *American Journal of Public Health, 89*(2), 176–181.

Palacios, J., & Kennedy, H. P. (2010). Reflections of Native American teen mothers. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 39*(4), 425–434.

Paulussen, T., Kok, G., & Schaalma, H. (1994). Antecedents to adoption of classroom-based AIDS education in secondary schools. *Health Education Research, 9*, 485–496.

Perry, C. L. (1999). *Creating health behavior change: How to develop community-wide programs for youth*. Thousand Oaks: Sage Publications.

Peskin, M. F., Shegog, R., Markham, C. M., Thiel, M., Baumler, E. R., Addy, R. C., et al. (2015). Efficacy of *It's Your Game-Tech*: A computer-based sexual health education program for middle school youth. *Journal of Adolescent Health,*. doi:10.1016/j.jadohealth.2015.01.001.

Resnicow, K., Baranowski, T., Ahluwalia, J. S., & Braithwaite, R. L. (1999). Cultural sensitivity in public health: Defined and demystified. *Ethnicity and Disease, 9*(1), 10–21.

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Generation M2: Media in the lives of 8- to 18-year-olds*. Menlo Park: Henry J. Kaiser Family Foundation.

Rolleri, L. A., Wilson, M. M., Paluzzi, P. A., & Sedivy, V. J. (2008). Building capacity of state adolescent pregnancy prevention coalitions to implement science-based approaches. *American Journal of Community Psychology, 41*, 225–234.

Rolo, M. A. (1999). Indian country's hidden healthcare crisis. *Civil Rights Journal, 4*(1), 44–48.

Santisteban, D. A., Muir-Malcom, J. A., Mitrani, J. B., & Szapocznik, J. (2001). Integrating the study of ethnic culture and family psychology intervention science. In H. A. Liddle, D. A. Santisteban, R. F. Levant, & J. H. Bray (Eds.), *Family psychology: Science-based interventions* (pp. 331–351). Washington, DC: American Psychological Association.

Shegog, R., Peskin, M. F., Markham, C., Thiel, M., Gabay, E. K., Addy, R. C., et al. (2014). 'It's Your Game-Tech': Toward sexual health in the digital age. *Creative Education, 5*(15), 1428–1447. doi:10.4236/ce.2014.515161.

Smith, M. U., Rushing, S. C., & The Native STAND Curriculum Development Group. (2011). Native STAND (students together against negative decisions): Evaluating a school-based sexual risk reduction intervention in Indian boarding schools. *The Health Education Monograph Series, 28*(2), 67–74.

Story, M., Lytle, L. A., Birnbaum, A. S., & Perry, C. L. (2002). Peer-led, school-based nutrition education for young adolescents: Feasibility and process evaluation of the TEENS study. *Journal of School Health, 72*(3), 121–127.

Tortolero, S. R., Markham, C. M., Peskin, M. F., Shegog, R., Addy, R. C., Escobar-Chaves, S. L., et al. (2010). It's your game: Keep it real: Delaying sexual behavior with an effective middle school program. *Journal of Adolescent Health, 46*(2), 169–179.

Trimble, J. E., Scharron-del-Rio, M. R., & Hill, J. S. (2012). Ethical considerations in the application of cultural adaptation models with ethnocultural populations. In G. Bernal & M. M. Domenech Rodriguez (Eds.), *Cultural adaptations*. Washington, DC: American Psychological Association.

Turner, W. (2000). Cultural consideration is family-based primary prevention programs in drug abuse. *Journal of Primary Prevention, 21*(2), 285–303.

Vernon, I. S., & Bubar, R. (2001). Child sexual abuse and HIV/AIDS in Indian country. *Wicazo Sa Review, 16*(1), 47–63.

Viswanathan, M., Ammerman, A., Eng, E., Gartlehner, G., Lohr, K. N., Griffith, D., et al. (2004). *Community-based participatory research: Assessing the evidence. Evidence report/technology assessment no. 99.* Rockville, MD: Agency for Healthcare Research and Quality. AHRQ Publication No. 04-E022-2.

Yellow Horse, S., & Yellow Horse Brave Heart, M. Native American Children. (2002). *DSHS, Washington State Department of Social and Health Services*. PDF available from http://www.nrc4tribes.org/files/Native%20Best%20Practice.pdf