

Use of Media Technologies by Native American Teens and Young Adults:
Evaluating their Utility for Designing Culturally-Appropriate Sexual Health
Interventions Targeting Native Youth in the Pacific Northwest

by

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Abstract

American Indian and Alaska Native (AI/AN) youth are disproportionately burdened by high rates of sexually transmitted infections and teen pregnancy, heightening their need for sexual health interventions that are aligned to their unique culture and social context. Media technologies, including the Internet, cell phones, and video games, offer new avenues for reaching adolescents on a range of sensitive health topics. While several studies have informed the development of technology-based interventions targeting mainstream youth, no such data have been reported for AI/AN youth. To fill this gap, I: a) quantified media technology use in a select group of AI/AN teens and young adults living in Pacific Northwest tribes and urban communities; b) identified patterns in their health information-seeking and media preferences; and c) worked with local tribes and regional partners to develop recommendations for designing culturally-appropriate technology-based interventions targeting Native adolescents.

This research included: a) an anonymous, paper-based survey of over 400 AI/AN youths age 13-21 years; b) a systematic review of technology-based sexual health interventions; and c) a variety of community-based participatory research activities to analyze findings, prioritize options, and generate recommendations for designing interventions that align with the culture, needs, and organizational capacities of the tribes in the Pacific Northwest.

Technology use was exceptionally common and diverse among survey respondents, mirroring patterns reported by teens in the general population. Seventy-

five percent of AI/AN youth reported using the Internet, 78% reported using cell phones, and 36% reported playing video games on a daily or weekly basis. Thirty-five percent reported that they would feel most comfortable getting sexual health information from the Internet, and 44% reported having done so in the past. Youth expressed interest in a wide array of interactive media features, and culturally-specific content that holistically encompassed their wide-ranging health interests and concerns. Tribal health educators expressed particular interest in adapting Internet-based skill-building modules and informational websites, and teens expressed interest in websites and videos. These findings are now being used by the Northwest Portland Area Indian Health Board to inform the development and adaptation of culturally-appropriate interventions targeting AI/AN youth in the Pacific Northwest.

Dedication

This work is dedicated to my loving family, near and far,
and to the many young people who inspired this undertaking.

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Glossary of Terms and Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
AI/AN	American Indian/Alaska Native, used interchangeably with the inclusive terms 'Native' or 'Native American'
avatars	a computer user's representation of himself/herself or an alter ego, used in virtual world game play
BIE	Bureau of Indian Education
blogs	Online journals that almost anyone with an Internet connection can use. Most blogs share a similar format in that the entries are posted in a reverse chronological order and may allow readers to comment on posts.
CDC	Centers for Disease Control and Prevention
CIHR	Canadian Institutes of Health Research
début	Age of sexual initiation
DHHS	U.S. Department of Health and Human Services
digital divide	Refers to gaps that exist between those who have access to digital technology and those who do not
eGames	electronic or online computer games
e-learning	A term that encompasses all forms of technology enhanced learning (TEL), also referred to as E-learning, electronic learning , and eLearning
e-patient	Are health consumers who use the Internet to gather information about a medical condition, also referred to as Internet Patients
edutainment	A form of entertainment designed to educate and amuse
Facebook	A is a social networking site where users can add friends, send messages, write blogs, post pictures and videos, and update their personal profiles. Users can join networks organized by city, workplace, and school.
Gen M	Generation M, those born between 1980 and 2000
HIV	Human Immunodeficiency Virus
IHS	Indian Health Service

IM	Instant Messaging, an Internet-based service used to transmit short text messages
Indian Country	A term generally used to describe (collectively or individually) the many self-governing AI/AN communities located throughout the United States. It is a conceptual term, a geographical space, and a legal designation.
Indigenous Knowledge	A complex, interrelated, and diverse body of knowledge based on the collective wisdom of ancestors; built through observation and experience; and learned, transmitted, and retained in the telling of stories to succeeding generations (National Congress of American Indians, 2009).
I/T/U	An abbreviation used to describe the Indian healthcare system, including IHS, Tribal, and Urban healthcare facilities.
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Questioning
MMORPG	massively multiplayer online role-playing games
MMS	Multimedia Message Service, a cell phone-based service used to transmit graphics, video clips or sound files
MySpace	A social networking site similar to Facebook where users are able to manage their personal profile, add friends, write blogs, post comments and pictures, and participate in multimedia activities.
Native	Native American, a broad term that encompasses both American Indians and Alaska Natives, used interchangeably with AI/AN
NPAIHB	Northwest Portland Area Indian Health Board, comprised of the 43 tribes in Oregon, Washington, and Idaho
NSFG	National Survey of Family Growth
NW	Northwest, used interchangeably with Pacific Northwest, a region comprised of Oregon, Washington, and Idaho.
PDA	Personal Digital Assistant
PYD	Positive Youth Development. A body of research that investigates the constructs, opportunities, and environments that contribute to healthy development for children and adolescents.
RSS	Really Simple Syndication, a program used to publish frequently updated digital news feeds in a standardized format

SMS	Short Message Service, a cell phone-based service used to transmit short text messages, used interchangeably with ‘text messaging’
SNS	Social Networking Sites, online communities where people can interact with friends, family, and acquaintances. Most social networking sites provide ways for their users to interact, such as messaging, photo/video sharing, blogging, and discussion groups. Popular SNS include: Facebook, MySpace. Health-related SNS include: DailyStrength and CaringBridge
STD	Sexually Transmitted Disease, used interchangeably with STI
STI	Sexually Transmitted Infection, used interchangeably with STD
TEL	Technology enhanced learning refers to any learning activity that is supported or facilitated by technology
teen	Youths age 13-19 years
Twitter	A micro-blogging and social networking site that is used to share information, commentary, and highlight audio or video content. Twitter users can send "tweets" that are no more than 140 characters in length.
young adult	Youths age 20-24 years
YRBS	Youth Risk Behavior Survey

Preface

In any family or community, talking about sex and sexuality can be difficult. In addressing this subject over the last five years, members of Project Red Talon and the Red Talon STD/HIV Coalition have tried to remind one another, and the communities that we serve, that sexual expression is a normal part of human development – that it is a gift from the creator that brings both pleasure and responsibility. While this topic might be uncomfortable to discuss, it is essential that adults step up to the challenge, and support teens in making healthy sexual decisions (OR DHS, 2009).

Forming and testing romantic relationships is a developmentally appropriate part of adolescence, and a necessary precursor to adult health and wellbeing (Dailard, 2006). It is during this critical time that teens and young adults define their sexual beliefs, attitudes, and behaviors that last well into adulthood (OR DHS, 2009). Our silence and inaction around this important topic allows negative health outcomes to perpetuate, including unintended teen pregnancy, sexually transmitted infections, and sexual violence. We cannot let our discomfort, social stigmas, or fear stop us from taking the needed steps to protect future generations.

In undertaking this research, I have sought to remain respectful of both indigenous research practices and the sensitive nature of this subject. Respecting indigenous research methods requires that communities have direct input in “developing and defining research practices and projects that relate to them,” defining for themselves what is and what is not acceptable research (Denzin, Lincoln, & Smith, 2008, p. 503). This can be achieved by using inclusive, participatory research

methods, and by balancing three interconnected goals: research, action, and education (Minkler & Wallerstein 2003). Without meaningful action or community benefits, research fueled solely by interest or academic pursuit would be “hollow” (Denzin et al., 2008, p. 162). Shaped by this understanding, I remain committed to protecting the interests of tribal participants and communities, to working with tribes in the Pacific Northwest to develop and implement health interventions that meet their needs and priorities, and to sharing resultant data and resources with tribal partners who could benefit from this work.

Chapter 1: Introduction

Media technologies like the Internet, cell phones, and video games offer new avenues for communicating with teens and young adults about sensitive health topics, in a manner that is convenient and familiar to them. 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. For these reasons and others, media technologies hold great promise for public health practitioners as vehicles for education, data collection, and intervention related to sexual and reproductive health (Bull, Phibbs, Watson, & McFarlane, 2007).

While a great deal of data have been collected from the general population on teen technology use and health information-seeking, much less is known about the use of interactive media technologies by American Indian and Alaska Native (AI/AN)¹ teens and young adults. To fill this gap in research and scholarship, this dissertation will document a mixed methods study that was designed and carried out in partnership with the 43 federally-recognized tribes in Idaho, Oregon, and Washington, which generated guidelines and priorities for designing technology-based sexual health interventions targeting AI/AN youth in the Pacific Northwest (NW). This research was guided by the understanding that, to be effective, resultant interventions must account for and align with the target population's individual knowledge and readiness, the community's social norms and cultural values, and the environmental, organizational, and political settings surrounding their implementation.

¹ Used interchangeably with the terms 'Native' and 'Native American.'

To gain a better understanding of the epidemiological context for this research endeavor, this chapter summarizes key physiological and behavioral health data for adolescents as a whole and for AI/AN youth in particular. The remainder of the chapter discusses social and environmental determinants that affect sexual health outcomes for tribal communities, AI/AN health epistemologies, and the study's primary aims and research hypotheses.

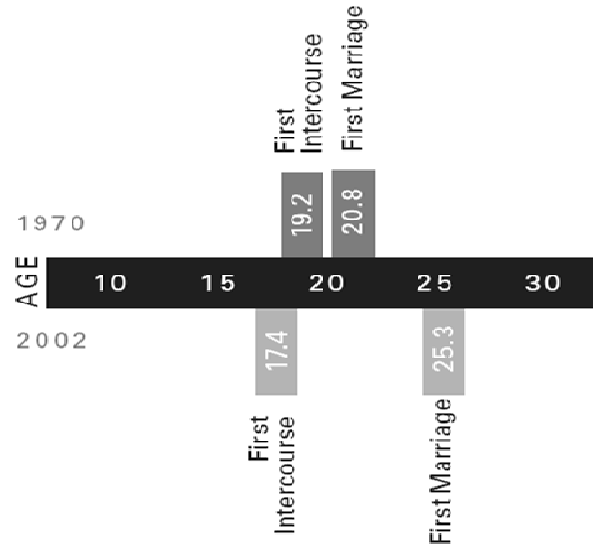
Adolescent Sexual Health and Behavior

The time span between puberty, initiation of sexual activity, and the age of first marriage has gradually lengthened in the U.S. over the last several decades. The average age of puberty has declined (by two months to a year, depending on the study), due to a combination of genetic, nutritional, and social factors (Kirby, 2007). Today, the median age of menarche is 12.6 years for females in the U.S., and for males the median age of spermarche is 14.0 years (Kirby, 2007).

Age is the single characteristic most closely associated with sexual experience among teens and young adults (Dailard, 2006). The average age of sexual initiation – or sexual début – has decreased since 1970 (from 19.2 years in 1970 to 17.4 years in 2002), but has remained relatively steady in the U.S. since 1997 (see Figure 1, page 3) (Santelli et al., 2006). National Youth Risk Behavior Surveillance System (YRBSS) data indicate that approximately 7% of American youth report sexual début prior to 13, and 32% report having had intercourse by 16 years (Cavazos-Rehg et al., 2009). This figure nears 50% for all high school students, with 70% of youth experiencing sexual début by 18 years (Cavazos-Rehg et al., 2009).

Patterns of marriage and cohabitation have also shifted considerably over the last several decades (Galston, 2007). The median age of first marriage rose more than four years between 1970 and 2002 in the U.S., from an average age of 20.8 years in 1970 to 25.3 in 2002 (Santelli et al., 2006). Experts believe that the 12 year divide that now exists between entering puberty, first intercourse, and marriage increases youths' risk for unwanted pregnancy and sexually transmitted infections (STIs) (Kirby, 2007).

Figure 1: Average Age of First Intercourse and First Marriage in the U.S. – 1970 & 2002 (Santelli et al., 2006)



As one would expect, age at first intercourse has been shown to directly impact the number of sexual partners an individual has over time. Consequently, early sexual debut is a “significant predictor of both initial and subsequent sexual risk behaviors and related health outcomes, including lack of condom use, multiple and high-risk sexual partners later in life, recurrent STDs, and cervical cancer (Butler, Miller, Holtgrave, Forehand, & Long, 2006, p. 378).” Data from the National Survey of

Family Growth (NSFG), collected in 2002, also indicate that teens who began sexual activity between the ages of 15-19 years experienced higher rates of problematic behaviors than young adults 20-24 years old (L. Gavin et al., 2009). It is for this reason that both abstinence only and comprehensive sex education programs recommend that youth delay sexual activity.

Sexually active teens who do not use contraception have a 90% chance of becoming pregnant within a year. Encouragingly, most teens now use contraception the first time they have sex (74% of U.S. females and 82% of U.S. males), a rate that has risen markedly among teens since 1995 (Guttmacher Institute, 2006). This may be due, in part, to improvements in the availability of confidential reproductive health services. Twenty-one states and the District of Columbia explicitly allow minors to consent to STD/HIV testing and contraceptive services without parental consent, including Idaho, Oregon, and Washington, the region covered by the Northwest Portland Area Indian Health Board (NPAIHB) where this study took place (Guttmacher Institute, 2009).

Adolescent Pregnancy and Birth Rates.

On the whole, pregnancy rates for U.S. teens and young adults have declined dramatically over the last decade, dropping 46% among 15-17 year-olds, and over 30% among 18-19 year-olds from 1990-2004 (L. Gavin et al., 2009). Research suggests that most (86%) of the decline can be attributed to more consistent contraception use among teens, while 14% of the decline can be attributed to higher proportions of teens choosing to delay sexual activity (Guttmacher Institute, 2006).

Despite this drop, nearly 2.4 million pregnancies occurred among teens and young adults under the age of 25 in 2004 (L. Gavin et al., 2009). Among those who were 15-19 years old in 2004, 57% of the pregnancies ended in live birth, 27% ended in induced abortion, and 16% ended in miscarriage (L. Gavin et al., 2009).

Due to a number of factors, pregnancy and birth rates vary considerably by race and ethnicity, and are disproportionately high among African American, Hispanic, and American Indian teens and young adults. Contributing factors include differing social values and norms surrounding the acceptability of teen pregnancy and condom use, and poorer access to adolescent health services. These factors and others are explored in greater depth for AI/AN youth on pages 12-20.

Adolescent STD/HIV Rates.

Sexually transmitted infections (STI)² pose a significant public health challenge in the U.S. The Centers for Disease Control and Prevention estimate that approximately 19 million new infections occur every year (CDC, 2009c). While young people represent only 25% of the sexually active population, 15-24 year-olds acquire nearly half of the reported STDs (Weinstock, Berman, & Cates, 2004). Chlamydia is the most common notifiable disease in the U.S., and rose over 7% in 2007 (CDC, 2008b). HIV infections are also on the rise among young people. Half of all new HIV infections occur among people under the age of 25, and one-quarter occur among youth 21 years and under (CDC, 2004).

The long-term health consequences of undiagnosed STDs are serious, particularly for women. Untreated infections can cause chronic pelvic pain, pelvic

² Used interchangeably with 'sexually transmitted disease' (STD).

inflammatory disease (PID), ectopic pregnancy, and infertility (CDC, 2007).

Individuals infected with an STD are also 2-5 times more likely to be infected with HIV, if exposed. Compared to adults, teens are at heightened risk for STDs for a variety of reasons (CDC, 2008b). Age-related disparities reflect barriers to STD prevention and treatment, including insufficient access to teen-friendly health services, and concerns about confidentiality and parental notification. Youth disproportionately engage in high risk behaviors. Girls are also biologically more susceptible to many STDs than males and older women, and are less likely to experience signs or symptoms when infected, impeding appropriate detection and treatment. In 2008, CDC estimated that one in four (26%) female adolescents in the U.S. were infected with one or more STIs (CDC, 2008c). This estimate was generated from STD test results for 838 female adolescents (14-19 years) who participated in the 2003-2004 National Health and Nutrition Examination Survey (NHANES). Among girls who were sexually active in the study, the STD prevalence was nearly 40% (CDC, 2008c).

Adolescent Sexual Risk and Protective Factors.

Researchers have identified more than 500 risk and protective factors that influence teens' sexual behavior, representing a range of biologic, environmental, and social influences, (shown in Table 1 on page 7) (Kirby, 2007). In evaluating their relative importance, data suggest that teens' own sexual beliefs, values, attitudes, and intentions are the strongest predictors of sexual behavior, indicating that these factors should be given priority when designing or selecting interventions for teen pregnancy and STD/HIV prevention (Kirby, 2007).

Table 1: Risk (-) and Protective (+) Factors for Teen Pregnancy and Sexually Transmitted Infections (Kirby, 2007)

Biological Factors	Sexual Beliefs, Attitudes, and Skills
+/- Being male	- More permissive attitudes toward premarital sex
+/- Being older	+ Taking a virginity pledge
+/- Being physically more mature	+ Greater perceived male responsibility for pregnancy prevention
Race and Ethnicity	+ Stronger beliefs that condoms do not reduce sexual pleasure
- Being African-American (vs. white)	+ Greater value of partner appreciation of condom use
- Being Hispanic (vs. non-Hispanic white)	+ More positive attitudes toward condoms & other forms of birth control
- Being AI/AN (vs. white)	+ More perceived benefits and/or fewer costs and barriers to using condoms
Attachment to and Success in School	+ Greater confidence in ability to demand condom use
+ Greater connectedness to school	+ Greater confidence in using condoms or other forms of contraception
+ Higher academic performance	+ Greater motivation to use condoms or other forms of contraception
- Being behind in school or having problems in school	+ Greater intention to use condoms
+ High educational aspirations and plans for the future	+ Greater perceived negative consequences of pregnancy
Attachment to Community	+ Greater motivation to avoid pregnancy and STD
+ Being involved in the community	Relationships with Romantic Partners and Previous Sexual Behavior
+ Having a religious affiliation	- Dating more frequently
Problem or Risk-Taking Behavior	- Going steady, having a close relationship
- Alcohol use	- Ever kissed or necked
- Drug use	+ Older age at first voluntary sex
- Being part of a gang	- Greater frequency of sex *
- Physical fighting and carrying weapons	- Having a new sexual relationship
- Other problem behavior or delinquency	- Greater number of sexual partners
Other Behavior	+ Discussing sexual risks with partner
- Working for pay more than 20 hours per week	+ Discussing pregnancy and STD prevention with partner
+ Involvement in sports (girls only)	+ Previous effective use of condoms/B.C.
Cognitive and Personality Traits	- Previous pregnancy or impregnation
+ Higher level of cognitive development	- History of prior sexual coercion or abuse
+ Greater internal locus of control	- Same-sex attraction or sexual behavior
Emotional Wellbeing and Distress	- Being married
- Depression and thoughts of suicide	
<i>Note.</i> (-) = Risk factor; (+) = Protective factor.	

Epidemiology of STD, HIV, and Pregnancy for AI/AN Adolescents

Racial and ethnic minorities represent one of the fastest growing segments of the U.S. population. In 2006, 4.5 million AI/ANs lived in the United States, representing 1.5% of the total population (DeVoe & Darling-Churchill, 2008). The federal government currently recognizes 562 distinct bands or tribes, and in 2000, nearly 47% of AI/ANs lived in tribal areas, reservations, or on trust lands (DeVoe & Darling-Churchill, 2008; Federal Register, 2008). Family and cultural ties often differ for AI/ANs living in urban and rural communities, and collectively, tribal communities represent a vast spectrum of cultures, values, histories, and traditions.

AI/AN Adolescent Sexual Behavior.

The sexual and reproductive decisions of AI/AN 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 population, the arrival of new life is often viewed favorably by Native communities, regardless of the parent's age. Environmental factors such as poverty, geography, and inadequate health services further exacerbate the adverse sexual health outcomes that many AI/AN youth experience.

Due to their relatively small numbers and disbursed geographic location, few national studies report sexual behavior or contraceptive use for AI/AN youth. High teen pregnancy and STD rates, however, indicate that sexual activity in AI/AN communities starts earlier than among other American teens, and often occurs without the use of protective measures (see Table 2, page 9). Similar to other populations,

differences by age and gender have been observed, with higher rates of sexual activity reported by males than by females, increasing by age and grade-level.

Table 2: Selected Measures of Reproductive Health among U.S. Females (age 15-19 years*), from 2004-2006 (L. Gavin et al., 2009)					
	White	Black	AI/AN	Asian/ Pacific Islander	Hispanic
Birth rate per 1,000 population, 2004	26.6	63.7	55.0	17.0	83.0
Proportion of births to unmarried women (%)	79.4	96.9	89.8	77.3	80.8
Proportion receiving third trimester or no prenatal care*** (%)	4.8	7.2	10.2	8.6	7.1
Proportion of mother's smoking during pregnancy ††† (%)	25.4	5.5	16.3	7.3	2.9
¶¶¶ AIDS prevalence rate per 100,000 population (50 states)	2.5	49.6	2.6	1.3	12.2
†††† Chlamydia rate per 100,000 population§§§§	1,374.9	8,858.1	4,672.9	729.3	2,845.8
†††† Gonorrhea rate per 100,000 population	208.3	2,829.6	548.9	98.7	319.2
Table 2 (continued)					
<p><i>Note.</i> SOURCE: National Vital Statistics System, CDC's Abortion Surveillance System, the Guttmacher Institute's Abortion Provider Survey, and the National Survey of Family Growth.</p> <p>* Unless otherwise noted, denominator includes all females, regardless of race/ethnicity, marital status, and sexual activity.</p> <p>*** Data on prenatal care are for 34 reporting areas. As of January 2006, a total of 33 reporting areas had not implemented the 2003 Revision of the U.S. Standard Certificate of Live Birth.</p> <p>††† Data on smoking are for the 33 reporting areas that had not implemented the 2003 Revision of the U.S. Standard Certificate of Live Birth as of January 2006.</p> <p>¶¶¶ SOURCE: HIV/AIDS Reporting System, 2006.</p> <p>†††† SOURCE: STD data, Nationally Notifiable Disease Surveillance System, 2006.</p> <p>§§§§ Colorado and Hawaii were excluded from 2006 chlamydia cases and rates because race/ethnicity data were reported for fewer than half of the cases.</p>					

According to the 2005 Youth Risk Behavior Survey (YRBS) involving a representative sample of Bureau of Indian Education (BIE) high school students, youth attending BIE high schools were more likely to have had sex than the national average (at 54%, compared with 47% of high school students nationally), and were also more likely to have had sex in the last three months (38%, compared with 34% nationally) (CDC, 2005; de Ravello, 2010). AI/AN students reported similar levels of condom use at last sex (62% and 63% respectively), but were more likely to have had four or more sex partners in their lifetime (21% compared with 14% nationally) (CDC, 2005; de Ravello, 2010). In the last two decades, several studies have reported younger than average sexual debut and lower rates of consistent condom use among groups of AI/AN youth (Adolescent Health Program, 1992; W. Hellerstedt, 2004; Kaufman, Beals, Mitchell, LeMaster, & Fickenscher, 2004).

AI/AN Adolescent Pregnancy and Birth Rates.

While pregnancy and abortion rates are not available from national datasets for AI/AN teens, birth rates are included in National Vital Statistics Reports (Suellentrop & Hunter, 2009). Compared with other ethnic populations, AI/AN 15-19 year-olds had the third highest teen birth rate in the U.S. in 2007, at 59 per 1,000 population (compared with 43 per 1,000 population for the nation as a whole) (Hamilton, Martin, & Ventura, 2009). After experiencing more than a decade of decline, teen birth rate increased 12% in Indian Country between 2005 and 2007—more than any other racial or ethnic population. One fifth of Native teen girls now give birth before turning 20

years old (Hamilton et al., 2009).

AI/AN Adolescent STD/HIV Rates.

Compared to other American teens, AI/AN youth experience significant and persistent STD/HIV disparities. In 2007, AI/ANs were 4.5 times more likely than Whites to be diagnosed with chlamydia, over three times more likely to be diagnosed with gonorrhea, and twice as likely to be diagnosed with primary or secondary syphilis (CDC, 2008b). Between 2000-2004, young people (15-24 years old) accounted for 68% of the AI/AN chlamydia cases and 60% of the AI/AN gonorrhea cases (Kaufman, Shelby et al., 2007). High chlamydia positivity rates have repeatedly been documented for AI/AN women (Dicker, Mosure, Kay, Shelby, & Cheek, 2007). In a recent study of AI/AN women attending family planning clinics in Oregon, Washington, Idaho, and Alaska, AI/AN women age 15-24 years had chlamydia positivity levels ranging from 8% to 12% from 1997-2004 (1.5 to 2.2 times higher than the non-AI/AN population in those states) (Gorgos, Fine, & Marrazzo, 2008). Compared with the non-AI/AN population of women tested at these clinics, AI/AN women were younger and reported more behavioral risk factors.

Altogether, more than 3,200 AI/ANs have been diagnosed with AIDS since the beginning of the epidemic (CDC, 2008a). In 2007, young people under 25 years made up 19% of all AI/AN HIV/AIDS diagnoses (CDC, 2009a). Due to late testing and suboptimal treatment, Native Americans have one of the lowest survival rates of any racial/ethnic group, with just one in four living more than three years after their diagnosis (CDC, 2008a). Washington is among the five states with the highest

numbers of reported AI/AN AIDS cases, which together account for more than half (53%) of the AIDS diagnoses in Indian Country (Bertolli et al., 2004).

AI/AN Adolescent Sexual Risk and Protective Factors.

A number of risk and protective factors have been explored for their impact on the sexual experiences of AI/AN teens. In general, risk and protective factors appear to be similar to those reported for other populations (Chewning et al., 2001; Edwards, 1992; W. L. Hellerstedt, Peterson-Hickey, Rhodes, & Garwick, 2006; Kaufman et al., 2004; Kaufman, Desserich et al., 2007; Mitchell, Kaufman, & Beals, 2005; Mitchell, Rumbaugh Whitesell, Spicer, Beals, & Kaufman, 2007). Supporting this, research by Chewning, et. al. (2001) found that while cultural dynamics do affect the sexual practices of Native youth, they have a less robust influence on teen's sexual behaviors than other social and environmental triggers, including self-efficacy, parental relationships, peer groups, and academics (Chewning et al., 2001).

In a survey of 13,500 AI/AN youths attending reservation schools, reasons given for not having sex closely mirrored those given by non-Native youth, including wanting to wait until they were older (45%), not wanting to risk pregnancy (46% of females, 20% of males), wanting to wait until marriage (41% of females, 29% of males), not being emotionally ready (37% of females, 16% of males), and fearing risk of disease (28% of females, 22% of males) (Edwards, 1992). Twenty-four percent of females and 8% of males in the study reported they were not having sex because of their parent's values. Likewise, in a survey of 484 AI/AN students in grades 6-12 in five Midwestern, rural schools, protective factors for not having had sex included

perceived parent- and school-connectedness, and students' self-efficacy (i.e., confidence that they could refuse sexual advances) (Chewning et al., 2001). The variables most associated with contraception use were having the perception that friends were not having sex, perceived mother support (i.e., perception that their mother strongly supported the use of contraception), and condom self-efficacy (i.e., confidence that they could use a condom correctly) (Chewning et al., 2001).

Some research has also been done to identify culturally-specific traits and conditions that impact sexual decision-making for Native youth (Kaufman et al., 2004; Kaufman, Desserich et al., 2007; Mitchell et al., 2005). Kaufman et. al. (2007) developed a grounded theory modeling the sexual health framework of youth living in one Northern Plains tribal community, comprised of personal stressors and conflicts, cultural buffers, and the external social context surrounding the youth (Kaufman, Desserich et al., 2007). Their qualitative study found that cultural identification was not always associated with risk avoidance (e.g., girls traditionally gave birth in their teens; and male "hunting" was referenced in relation to multiple sex partners). Most participants, however, believed that their risky sexual behaviors conflicted with their traditional values. Focus groups and interviews with young adults (18-25 years) found that many participants faced challenges "synthesizing contemporary sexual attitudes and expectations with cultural values (Mitchell et al., 2005, p. 161)."

The social milieu that reinforced pervasive teen sexual activity on the reservation was described by investigators as reflecting a "loss of connection - to their families, culture, and community" (Kaufman, Desserich et al., 2007, p. 2157). Teens

and young adults described risky sexual situations at parties, where they drank alcohol, used drugs, and tried to “hook up.” Teen participants felt there was an inevitable link between getting drunk and having sex, and saw sexual activity in these situations as a “given.” Participants felt that condom use was most dependent on convenient availability, followed by female initiation of their use. According to those interviewed, little conversation occurred at parties about personal health or ways to reduce risk (Kaufman, Desserich et al., 2007). While such studies have not been replicated in the Pacific NW, anecdotal reports from tribal health educators suggest that very similar perceptions and sexual contexts are likewise prevalent in this region.

Social and Structural Factors Affecting AI/AN Sexual Health

Sexual behaviors and subsequent health outcomes are heavily influenced by an array of social and structural factors, including poverty and discrimination, gender roles and power imbalance, healthcare quality and accessibility, stigma, and historical trauma (OR DHS, 2009). Described by Kaufman et al. (2004), “part of the explanation for apparently higher levels of risky sexual behavior for American Indians may draw from the context of daily life. In many American Indian communities, poverty is widespread, unemployment is high, and health problems are common (p. 303).” The following section briefly describes several of these exacerbating conditions.

Indian Healthcare System.

Historical treaty obligations and the unique government-to-government relationship that exists between the United States government and federally recognized tribes entitles AI/AN tribal members to receive federally funded health

services (Bertolli, Lee, & Sullivan, 2007). The Indian healthcare system is a comprehensive service delivery system that serves 1.9 million of the nation's AI/AN. The acronym "I/T/U" is commonly used in reference to the system: "I" stands for the Indian Health Service, "T" for tribally-operated health programs, and "U" stands for urban Indian Health Centers. According to the Government Accountability Office (GAO), the Indian healthcare system is significantly underfunded and overburdened with need, making contraception, prenatal care, and STD/HIV treatment difficult to access for many AI/AN youth (GAO, 2005). Adding to the challenge, confidential reproductive services may be nearly impossible to access for teens living in small, isolated communities, where clinic personnel and community members inevitably know one another.

Clinicians in the Northwest report that, for the most part, they do not consider STD/HIV issues to be a clinical priority, though nearly all provide cursory testing and treatment services (Project Red Talon, 2005). Due to limited funds, many tribal clinics do not follow the Centers for Disease Control and Prevention's (CDC) STD Treatment Guidelines to screen asymptomatic, sexually active females 25 years and younger on an annual basis. Even fewer clinics have implemented the CDC's universal HIV testing guidelines for those 13-64 years old. Insufficient services are further hampered by the fact that few tribes have designated staff or funding in their health departments to work specifically on STD, HIV, or teen pregnancy prevention.

Poverty, Employment, & Education.

Poverty and lower socioeconomic status are both associated with teen pregnancy and STD/HIV. The poverty rate for AI/ANs is higher than that for the total U.S. population. In 2006, 27% of AI/ANs lived in poverty compared with 13% of the U.S. population, and the median annual earnings for 25-34 year-olds was almost 40% lower than the general population (DeVoe & Darling-Churchill, 2008). Contributing to this disparity, a smaller percentage of AI/AN students (75%) reported receiving a high school diploma in 2006 than White (91%) and Asian/Pacific Island students (93%), and a higher percentage of AI/ANs age 16-years and over were unemployed in 2007 (12%), compared with Whites (4%), Hispanics (6%), and Asian/Pacific Islanders (3%) (DeVoe & Darling-Churchill, 2008). The present recession has impacted AI/AN communities to varying degrees, but not systematically more so than other Americans (Palermo, 2009). As described by the President of the Navajo Nation, Joe Shirley Jr., in many cases, it has just made the poor even poorer (Palermo, 2009).

Geography.

Rural youths of all race/ethnicities are at heightened risk for STDs, HIV, and teen pregnancy (Roberto et al., 2008). Rural youths frequently live far from friends and constructive entertainment, placing them at risk for drug and alcohol use and risky sexual activity (D'Allesandri et al., 2003). Many of the factors that increase youths' risk for early sexual initiation, multiple partners, STDs/HIV, and unprotected sex are common in rural communities. Such factors include low levels of education among parents, high poverty rates, close-knit sexual networks, STD/HIV stigma, conservative

school-based sex education programs, and social norms that condone or support teen pregnancy (Roberto et al., 2008; Rural Center for AIDS/STD Prevention, 2009).

In general, AI/ANs are geographically concentrated in the west (49%) and in rural areas (40-50%) (DeVoe & Darling-Churchill, 2008). Tribes in the Pacific NW vary considerably in population size (ranging from 147 to 8,880 members), culture (coastal, plains, plateau), and geographic location (rural and urban). In the NW, Indian reservations are dispersed across great distances, and many are located in isolated areas with sparse populations.

Historical Trauma.

A significant body of research has explored the impact of historical trauma on the health of AI/ANs (Dixon & Iron, 2006; Walters & Simoni, 2002). Within the last two centuries, the federal government enacted a series of policies that actively sought to assimilate, isolate, or exterminate AI/ANs (Aufrecht, 1999). Among these were policies that forcibly removed Native children from their homes to attend boarding schools. As a result, the “transmission of traditional values around parenting and safety was almost completely destroyed... in separating children from tribes, the federal government disrupted bonding and modeling necessary to pass on healthy parenting to future generations (Vernon, 2001, p. 55).” Adding to the resultant trauma, children raised in these boarding school environments were often exposed to violence and sexual assault by their caregivers. In many cases this led to cyclical patterns of family- and self-violence, or to substance abuse as a way to self-medicate unresolved mental health issues. Researchers have concluded that historical trauma is intricately

connected to the poor mental health outcomes that are now experienced by some AI/ANs, including posttraumatic stress disorder, alienation, depression, alcohol abuse, and sexual risk taking (Duran & Walters, 2004).

Substance Abuse.

A sizable body of research has documented the association between drug and alcohol use and STDs. Illicit substances (including alcohol, inhalants, and methamphetamines) can reduce inhibitions and drastically alter sexual behavior. AI/AN youth (12-17 years) report higher rates of past month cigarette use, binge drinking, and illicit drug use than those from other racial/ethnic groups, and report higher rates of past year substance use disorders (NSDUH, 2004, 2007). Based on combined data from the Substance Abuse and Mental Health Services Administration's (SAMHSA) 1999-2001 National Household Survey on Drug Abuse, AI/ANs were also more likely to initiate substance use at age 14-years or younger (46%), compared with other racial/ethnic groups (32%).

Sexual Violence and Coercion.

Sexual violence against women contributes both directly and indirectly to the reproductive health of AI/AN youth. Directly, women and girls who experience sexual violence are less able to protect themselves from STDs or pregnancy. Indirectly, research demonstrates that women with a history of involuntary sexual intercourse are more likely to have voluntary intercourse at earlier ages than women who were not abused.

This theory is supported by several studies in Indian Country. In a survey of 4,135 Minnesotan Native youths in 6-12th grade, the strongest correlates of sexual experience were individual problem behaviors, including exposure to dating violence or sexual abuse (W. L. Hellerstedt et al., 2006). In a survey of 289 Native 17-25 year-olds on a Northern Plains reservation, having two or more causal sexual partners in the past year was nearly three times more common among women with a history of abuse (Kaufman et al., 2004). Similar findings were obtained in a survey of 13,500 AI/AN youths attending on-reservation schools in the early '90s (Edwards, 1992). Students who had been sexually abused were more likely to be sexually active.

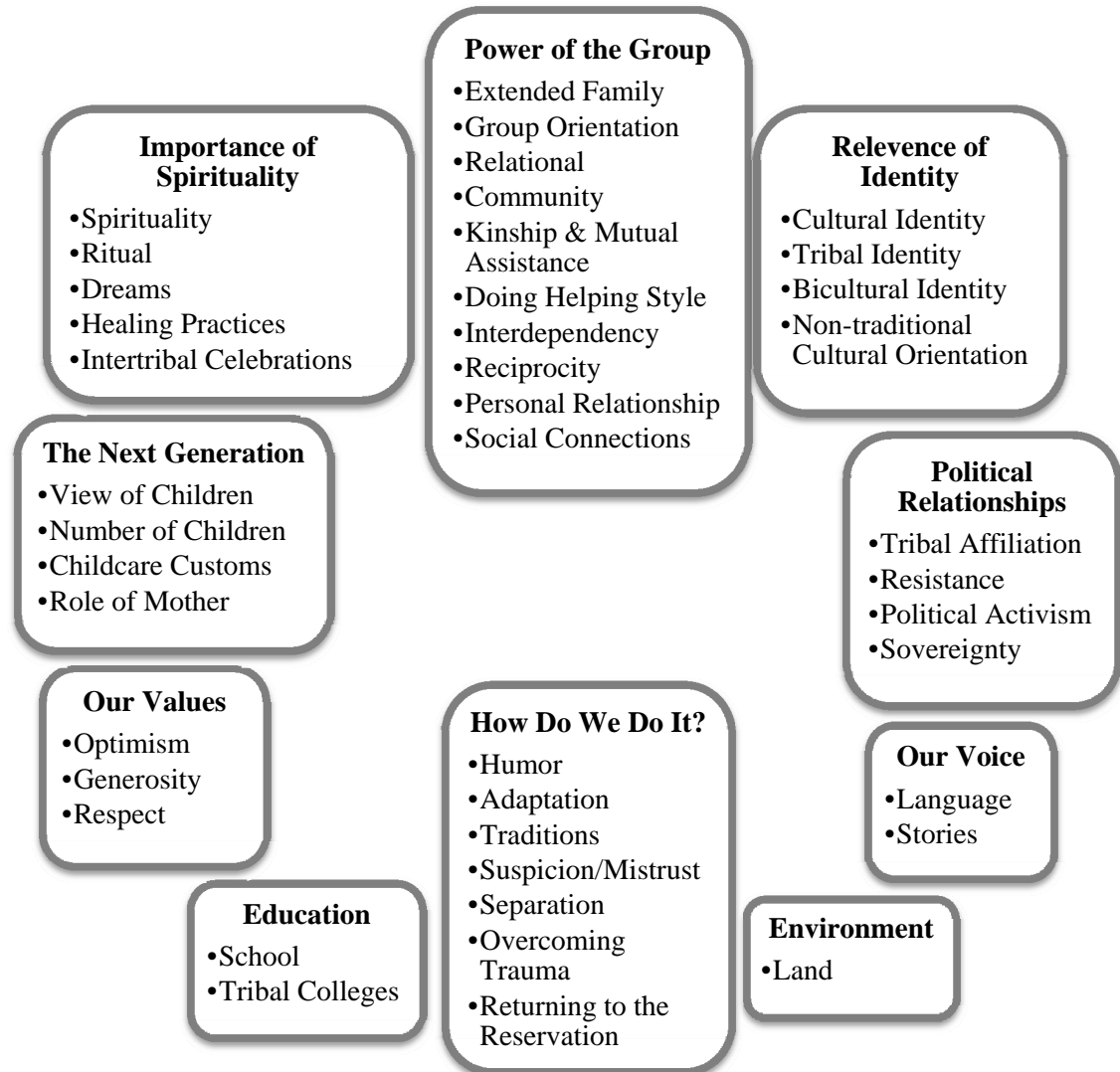
Over the last decade, studies by the federal government have repeatedly found that AI/AN women experience much higher rates of sexual violence than other populations (Amnesty International, 2007). The U.S. Department of Justice found that Native women are over 2.5 times more likely to be raped or sexually assaulted than other women in the U.S. (Amnesty International, 2007). More than one in three AI/AN women will be raped during their lifetime.

Community Strengths.

Rather than focus solely on risk factors and community deficits, however, a growing body of research has focused on the assets and strengths of indigenous communities that can be used to promote health and wellbeing. In her exploratory research on Native American children and youth, Goodluck (2002) identified 42 community strengths, the top being: extended family, spirituality, and social connections (see Figure 2) (Goodluck, 2002). All of these community assets can be

cultivated and drawn upon to improve the sexual and reproductive health of AI/AN teens and young adults.

Figure 2: Social and Cultural Strengths Present in American Indian Communities (Goodluck, 2002)



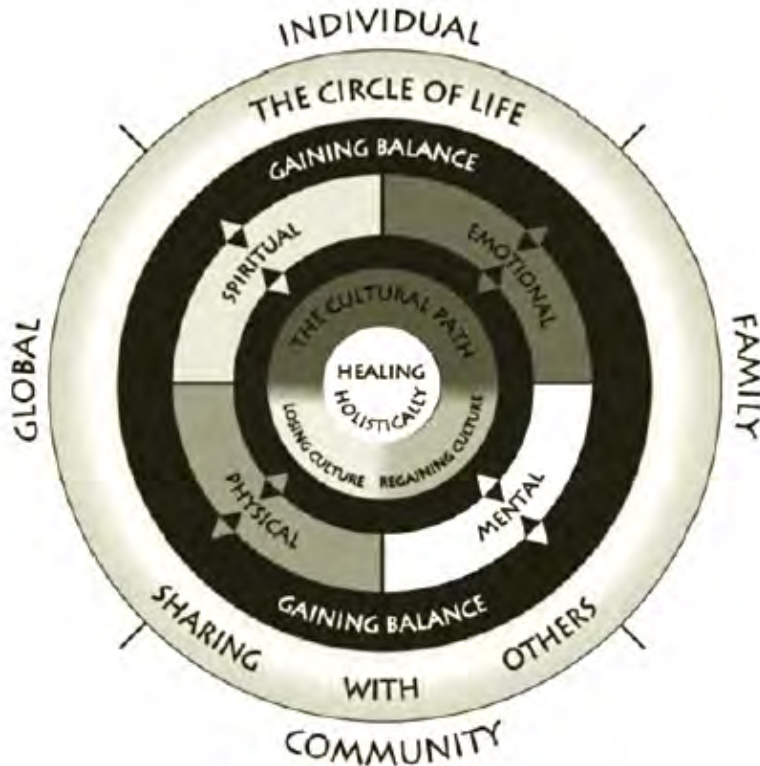
AI/AN Health Epistemologies

Though considerable diversity exists throughout Indian Country, the AI/AN worldview is often fundamentally different than Western and Eastern worldviews, contributing to unique concepts about health and healing (Schelbert, 2003). Traditionally for many AI/AN people, all aspects of life were viewed as intimately intertwined, including economic, political, and social endeavors (Schelbert, 2003). This concept was first described as the “Relational Worldview Model” by the National Indian Child Welfare Association in the 1980's (Cross, 1997). According to the Model, mind, body, spirit, and context are intimately connected to one another, requiring harmony and balance to promote health and wellbeing. Within this worldview, the passage of time is viewed as circular, rather than linear (Schelbert, 2003). Decisions are made with consideration for past, present, and future generations, and focus is placed on community needs over those of the individual. The circle of life recognizes the importance of all generations, giving special consideration to elders, who are relied upon to protect cultural understandings and share life lessons, and to children and youth, who are seen as safeguards of the future (Hunter, Logan, Goulet, & Barton, 2007).

Grounded in this reality, many Indian people view health and healing holistically (see Figure 3, page 22) (Swinomish Tribal Mental Health Project, 2002). The Native wellness model inseparably integrates physical, emotional, social, and spiritual elements. Imbalance in any one area can manifest as sickness or disease in another. The social dimensions of health extend beyond the individual, encompassing

the community, tribe, nation, and world. Consequently, "...Indian people tend not to focus on merely 'physical' or 'medical' causes of illness, but also examine the broader relation of the person to his or her total environment (Swinomish Tribal Mental Health Project, 2002, p. 138)." In this context, sexual health can be viewed as having physical, emotional, social, and spiritual dimensions that must be considered and addressed to ensure holistic health and wellbeing.

Figure 3: American Indian Model for Holistic Healing
(Hunter, Logan, Goulet, & Barton, 2006)



Healing requires listening and learning, finding balance in mind, body, and spirit (Canales, 2004). No two beings are the same, making the healing journey different for each person.

Integrating traditional medicines or natural practices can correct imbalance and promote harmony and personal healing. For many traditional healers, the healing process is more important than the final outcome, and the intensity of the process is more important than the duration. Traditional healing practices include consultation with elders, bringing family groups together, giving social support, prayer and song, removing dangerous spiritual influences, dietary remedies, herbal remedies, participating in ceremony, and seeking assistance from those recognized in the community as helpers (Swinomish Tribal Mental Health Project, 2002).

Problem Statement

Despite the compelling need, Native youth do not receive sufficient reproductive health education and support. Few sexual health interventions have been designed or evaluated in Indian Country. Fortunately, new media technologies offer great promise for bridging this gap in ways that are familiar, accessible, and culturally-appropriate for AI/AN youth. To guide their development, research is needed to identify the most appropriate technologies and intervention strategies, the health-seeking patterns and preferences of Native teens and young adults, and important organizational factors that might affect their implementation and sustainable use in tribal settings.

Research Aims

The primary aims of this study were to: (a) quantify media technology use among AI/AN teens and young adults (13-21 years) living in NW tribes and urban communities, and differences associated with gender and age; (b) identify patterns and

preferences in their use of the Internet to obtain health information; and (c) work with NW tribes and local partners to collaboratively develop guidelines and priorities for designing culturally-appropriate technology-based interventions targeting AI/AN youth in the Pacific NW.

Hypotheses

Hypothesis One.

Most Native youth (greater than 50%) in the Pacific Northwest will have used the Internet to retrieve health information. A growing body of evidence from the general population supports this hypothesis, showing increasing rates of online health information-seeking among teens and adults over the last decade (Susannah Fox, 2008; S Fox & Jones, 2009; RWJF, 2008). In a 2007 survey conducted by Harris Interactive, respondents reported that they rely on the Internet for health information nearly as often as they do their primary doctor. Seventy percent of adults use the Internet to obtain medical and health information, making it vastly more popular than traditional media outlets such as newspapers or magazines (30%), television (26%), or books (25%) (Ask.com, 2007). By 2008, nearly 80% of Internet users had looked online for health information – a group coined “e-patients” by the Pew Internet & American Life Project (S Fox & Jones, 2009).

These data suggest that online health-seeking vary by age more so than by race/ethnicity, occurring more often among young people than older adults (72% of young adults 18-29 years old have used the Internet to obtain health information, compared with 27% of those 65 years old or older) (S Fox & Jones, 2009). These

numbers are expected to increase in coming years with the expansion of wireless Internet. While no such data exists to document this trend for AI/AN youth, there is no reason to believe that the technology use patterns of AI/AN teens will vary drastically from those reported by other American youth.

Hypothesis Two.

Native youth will report a range of readiness levels for sexual health information that will vary significantly by age, and to a lesser extent by gender. This hypothesis is supported by research from the general population reporting that sexual maturity is strongly associated with age and to a lesser extent with gender (L. Gavin et al., 2009). This variation in sexual maturity is supported by data from the CDC's 2007 Youth Risk Behavior Survey (YRBS), which found that 33% of high school 9th graders, 44% of 10th graders, 56% of 11th graders, and 65% of 12th graders reported having had sexual intercourse (L. Gavin et al., 2009). These findings are also supported by Butler et al. (2006), who reported that sexual readiness was associated with age among African American preteens. My research infers that similar developmental patterns occur among AI/AN youth, though it will not directly measure sexual activity among survey respondents. Instead, sexual maturity will be indirectly gauged by assessing readiness for sexual health information, and then correlated with age and gender.

Hypothesis Three.

Compared to younger teens (13-15 years), a greater proportion of older teens (16-18 years) will report experience and interest accessing health information online,

particularly around sexual health topics (like STD/ HIV, pregnancy, and birth control). Similarly, a greater proportion of teens reporting higher levels of readiness for sexual health information (“high readiness”) will report experience and interest accessing sexual health topics online, compared with youth reporting lower levels of readiness for sexual health information (“low readiness”). This topic has not been well studied, but based on anticipated variations in sexual maturity, it is expected that survey respondents will report varying levels of experience and interest accessing sexual health information online, which will be associated with their age and level of readiness.

Hypothesis Four.

Native youth will prefer to get sexual health information on the Internet when it is located on websites that are culturally-appropriate, discussing a broad spectrum of issues relevant to young people, compared to websites dedicated specifically to STDs, HIV, or sexual health. This topic has not been documented among AI/AN teens and young adults, but a great deal of data support the assumption that group-specific health interventions “are not only more easily accepted but may also produce better, faster, and longer lasting results than... nonspecific interventions (Marin et al., 1995, p. 347).” Such outcomes were reported by Backer, Rogers, & Sopory (1992), who found that tailoring reproductive health messages to specific populations increased their use of health services (S. N. Keller & Brown, 2002). Factors that motivate teens to become sexually active, use condoms, or communicate with their partners about contraception likely differ across racial/ethnic groups, genders, and age groups,

making it necessary to tailor public health messages and approaches to the target population.

While I anticipate that AI/AN youth will prefer media interventions that align with their age, gender, and communication patterns, I do not know to what extent they will prefer media interventions that are Native-specific, containing references to cultural values, teachings, symbols, or graphics. The development of culturally-targeted interventions will thus be based less on racial/ethnic identification, and more on the reported ethnographic culture of AI/AN teens and young adults that will emerge from their survey responses and informal target audience research.

This hypothesis is further supported by unpublished data that were presented at the National Coalition of STD Directors' annual conference, in Phoenix, AZ (October 2008), and again in Washington DC (October 2009). Qualitative data on adolescent preferences regarding sexual health websites were collected by the Massachusetts Department of Public Health to guide the development of a new website targeting teens: www.urhealthstyle.com. Teens indicated that they did not want a website that focused solely on STDs/HIV. Instead, they wanted a website that would meet all their health needs in a private, teen-friendly way. Based on this premise, I anticipate that AI/AN youth in the Pacific NW will similarly prefer websites that discuss a broad spectrum of topics relevant to young people.

Hypothesis Five.

Health communication and behavior change theories will provide a useful framework for evaluating technology-based health interventions, using alignment

strategies to identify those that are most relevant to and appropriate for AI/AN youth in the Pacific Northwest. A number of reviews and meta-analyses have been done in recent years on technology-based interventions, which suggest that communication and behavior change theories offer useful criteria for evaluating interventions (Bennett & Glasgow, 2009; Coyle, Doherty, Matthews, & Sharry, 2007; Lustria, Cortese, Noar, & Glueckauf, 2009; Nguyen, Carrieri-Kohlman, Rankin, Slaughter, & Stulbarg, 2004; Portnoy, Scott-Sheldon, Johnson, & Carey, 2008). Lustria et al. (2009) used components of health communication and behavior change theories to systematically review computer-tailored health interventions, compiling: implementation strategies, intervention modalities, skill-building tools, and criteria used for intervention tailoring. Portnoy et al. (2008) used similar criteria in their review of computer-delivered health interventions, including: intervention delivery methods, tailoring strategies, and dose-response measures. Outcomes of interest were clearly derived from behavior change theory, including changes in knowledge, attitude, intention, social norms, self-efficacy, and behavior.

National guidelines for selecting appropriate interventions recommend that consideration be given to the relevance of the intervention to the underlying factors that drive risk-taking behaviors in the target population, and the community's social and cultural context (Center for Substance Abuse Prevention, 2009). Attention must also be paid to the appropriateness of the intervention given local and organizational resources, to ensure selected interventions can be feasibly implemented (Center for Substance Abuse Prevention, 2009). These criteria and others have been used to

measure the “fit” of interventions to the needs and contexts of subpopulations, and as such, should be useful in this study for generating recommendations for technology-based interventions targeting AI/AN youth in the Pacific NW.

Hypothesis Six.

Community-Based Participatory Research (CBPR) methods will generate better recommendations for designing technology-based health interventions targeting NW Native youth than would be made using solely the study’s survey results or its systematic literature review. CBPR methods will generate important information about the cultural, social, and environmental contexts that surround AI/AN youth, which could affect the potential implementation and effectiveness of resultant interventions. This hypothesis is well supported by literature demonstrating that CBPR is an effective tool for conducting research with communities who share a distinct geographic, social, or cultural identity (Viswanathan et al., 2004). Involving community members in research design, data collection, and interpretation fosters trust between diverse stakeholders and helps legitimize findings, increasing the likelihood that resultant data will be used by the community to promote healthy change (Israel, Schulz, Parker, & Becker, 1998). This process improves the effectiveness and efficiency of interventions, empowers participants, generates knowledge that can be used to influence policy and resource allocation, and builds local capacity to conduct future research (Minkler & Wallerstein, 2003).

Critical to this particular project, CBPR is useful for identifying nuanced risk and protective factors that would otherwise be difficult to identify using other research

methods, like those surrounding sexual norms, contraception, and teen pregnancy (Israel et al., 1998; Viswanathan et al., 2004). Involving the target audience in research activities can also introduce new and innovative ideas not previously considered by external investigators (S. Bull et al., 2007). Involving tribal members who have local expertise can thus improve the quality and validity of findings, and produce a deeper understanding of the tribes' or communities' unique characteristics (Minkler & Wallerstein, 2003; Viswanathan et al., 2004). Supporting its use for this research topic in particular, CBPR has been successfully used by other investigators to develop computer tailored sexual health messages (Baker et al., 2002), and has been repeatedly used by the NW tribes and the NPAIHB to design and implement culturally-appropriate sexual health media campaigns and interventions.

Study Significance

To have a lasting impact, health interventions must be delivered in ways that young people trust and relate to (IHS, 2009). Interactive, technology-based interventions offer new opportunities to meet the sexual health needs of Native youth in the Pacific NW. This research project will increase our understanding of the technology use patterns and preference of AI/AN youth, and will help determine to what extent available technology-based interventions align with the culture and implementation capacity of the NW tribes. These findings will allow tribes and tribal health advocates to prioritize and adapt technology-based interventions to reduce health disparities among AI/AN teens and young adults, including those surrounding STDs, HIV, and teen pregnancy.

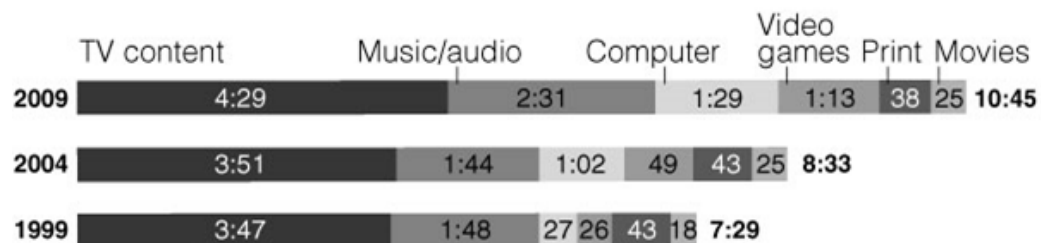
Chapter 2: Literature Review

A wide body of literature influenced this research. This chapter will summarize the range and relative merits of several media technologies frequently used by teens and young adults, including the Internet, cell phones, and video games. The remainder of the chapter will review theories and models that influenced the project's research aims, hypotheses, and methods, including: community-based participatory research (CBPR) strategies, behavior change theories, learning and health communication theories, traits associated with positive youth development, and intervention alignment strategies.

Adolescent Media Technology Use

Media technologies are becoming increasingly imbedded in the daily lives of American teens and young adults, creating a technological landscape that is constantly changing in speed, volume, variety, intensity, and accessibility (Rainie, 2009). According to a 2009 study conducted by Kaiser Family Foundation, youth (8-18 years old) spend more than 7½ hours a day using media technologies, and pack nearly 11 hours of content into that period, when accounting for media multitasking (i.e., surfing the Internet while listening to music; see Figure 4) (Rideout, Foehr, & Roberts, 2010).

Figure 4: Average Time (hours and minutes) Spent with Media Technologies in a Typical Day, among U.S. Youth (age 8-18 years) – 1999, 2004, & 2009 (Lewin, 2010)



In the last five years, the digital divide that once separated the technology “haves” from the technology “have nots” has almost entirely disappeared in the U.S. (Horrigan, 2009). Disparities in technology use now exist primarily between generations³, rather than between racial/ethnic groups, socioeconomic strata, or in relation to urban/rural status (Horrigan, 2009). A recent report issued by Native Public Media helps substantiate this trend in Indian Country⁴ (Morris & Meinrath, 2009). The study found that, despite higher prices for broadband and suboptimal infrastructure, many AI/ANs use media technologies at rates much higher than the national average (Morris & Meinrath, 2009). Two NW tribes (Coeur d’Alene and the Confederated Tribes of the Colville Reservation) were specifically highlighted in the report as examples of “Digital Excellence in Native America.”

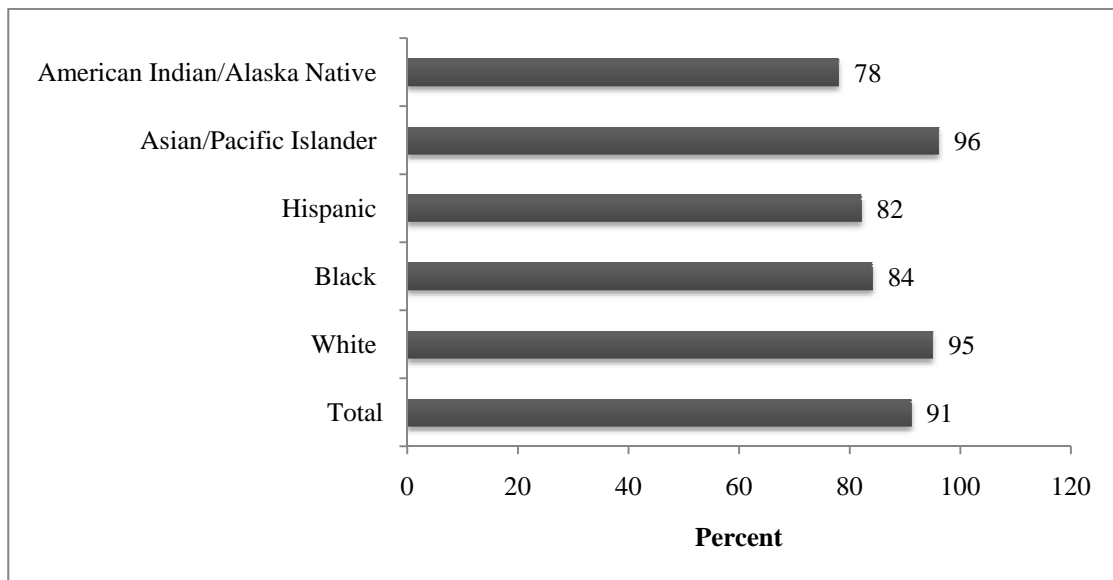
Internet.

The Internet is nearly universally accessed by American teens and young adults. Surveys conducted by the Pew Internet & American Life Project indicate that 93% of U.S. teens use the Internet, and approximately 60% own a laptop or computer (Rainie, 2009). In 2007, 78% of AI/AN 8th graders in public schools reported using a computer at home, a rate slightly lower than 8th graders of other race/ethnicities (see Figure 5, page 33) (DeVoe & Darling-Churchill, 2008). On average, teens in the U.S. spend 11 hours and 32 minutes per month online (Nielsen Wire, 2009a).

³ Only 41% of 65+ reported using the Internet, compared with 87% of young adults age 18-29 years.

⁴ Survey respondents represented over 120 tribes in 28 states.

Figure 5: Percentage of 8th Grade Students in U.S. Public Schools who Use a Computer at Home, by Race/Ethnicity – 2007 (DeVoe & Darling-Churchill, 2008)



Nationally, teens report a wide variety of online activities. Over 70% of online teens use social networking sites (SNS) like MySpace or Facebook, and over one-quarter report having their own webpage (Rainie, 2009). According to Nielsen Online, Americans nearly tripled the amount of time they spent on social networking and blog sites in the last year (Nielsen Wire, 2009b). By August 2009, 17% of all Internet time was spent on SNSs (Nielsen Wire, 2009b). With 75.4 million unique visitors, Facebook is currently the No. 1 SNS in the U.S., and MySpace.com remains the top SNS when ranked by total video streams (at 116.1 million) (Nielsen Wire, 2009c). Twitter, a social networking micro-blogging service, was the fastest-growing web brand in 2009, increasing from 1.2 million to 18.2 million visitors during the year (Nielsen Wire, 2009c). The average time spent on Twitter also increased, from just over 6 minutes to well over 17 minutes per person. Nearly 68% of online teens use

instant messaging (IM), most of whom IM daily (Polly Klaas Foundation, 2005; Rainie, 2009). Over 60% of online teens create and share written content on the Internet, and nearly 40% use the Internet to share artwork, photos, stories, or videos (Rainie, 2009). Online TV and video viewing is also exceptionally common. In May 2009, 12 million U.S. teens—about two-thirds of those online—used the Internet to watch videos (Nielsen Wire, 2009a).

The speed and quality of Internet access is highly variable in tribal communities (Morris & Meinrath, 2009). Respondents to the Native Public Media Survey reported having Internet access through multiple channels, including: dial-up modems (7%), high-speed connections (13%), DSL-enabled phone lines (26%), cable modems (18%), and through wireless connections (19%) (Morris & Meinrath, 2009). Like other communities and interest groups, many Native Americans are using the Internet to carve out social networks and share their culture within and beyond their local community (Morris & Meinrath, 2009). Sites like RezKast (www.rezkast.com), NativeTube (www.nativetube.com), and RezLifeYouth (www.rezlifeyouth.ning.com – “A place 4 tribe[sic] youth 2 talk and make new friends”) are also multiplying. Among those surveyed by Native Public Media, 88% reported that their tribe had its own website (Morris & Meinrath, 2009).

Cell Phones and Text Messages.

Since 2004, cell phone use has increased steadily among 12-17 year-olds, from 63% in 2006 to more than 75% in 2009 (Amanda Lenhart, 2009; Rainie, 2009). Age is a significant factor in cell phone ownership. Older teens are more likely to have cell

phones than younger teens, with rates increasing significantly during the transition from middle school to high school at age 14 (Amanda Lenhart, 2009). Nationally, girls and boys are equally likely to own a cell phone; no differences occur by race/ethnicity. Cell phone coverage in Indian Country is variable but steadily increasing. In Native Public Media's 2009 survey, respondents reported five main cellular providers in their communities: Verizon (55%), AT&T (48%), Sprint (32%), T-Mobile (24%), and US Cellular (16%) (Morris & Meinrath, 2009).

Youth today spend more time listening to music, playing games, or watching media on their cell phones than they do talking on them (Lewin, 2010). In a 2008 survey of 13-19 year-olds, over half (52%) reported using their cell phone to chat, play games, shop online, surf the Internet, and send text, picture, or video messages (Harris Interactive, 2009).⁵ Text messaging has rapidly developed into a new mode of communication for teens and young adults (de Jongh, Gurol-Urganci, Vodopivec-Jamsek, Car, & Atun, 2009). By 2009, mobile teens sent or received an average of 191 calls and 2,899 text messages per month (Nielsen Wire, 2009a). The average number of text messages has grown over 565% in the last two years (Nielsen Wire, 2009a). Other cell phone-based activities are also increasing among teens: more than one-third use their phone to visit the Internet, one-quarter download games and applications, one-third download ringtones, and one quarter send video messages (Nielsen Wire, 2009a).

⁵ Text messaging technology (or SMS) allows up to 160 characters of text to be sent from the Internet or cell phone to one or more cell phones. Multimedia Message Services (MMS) transmit graphics, video clips, or sound files to a cell phone.

Video Games.

Virtually all (97%) American teens play video games (Rainie, 2009). Over half own a portable gaming device and 77% own a console like Xbox® or PlayStation® (Amanda Lenhart, 2009). With the expansion of wireless Internet and handheld devices, eGames (electronic or online games) are also increasing in popularity – one-quarter of Internet users visit online gaming sites (CDC, 2009b). Altogether, teens average 25 minutes of console use per day last year—comparable to time spent online (Nielsen Wire, 2009a). Gaming is typically more common among male teens than among female teens (averaging 41 minutes per day, compared with just 8 minutes per day among females), but these patterns may already be changing (Nielsen Wire, 2009a). A recent study by eMarketer found that women and older adults account for three-quarters of the casual gamers worldwide (CDC, 2009b).⁶

A wide variety of games are available and played by teens, including: racing games (like Nascar or Mario cart - 74%), puzzle games (like solitaire or Tetris - 72%), sports games (like Madden or Tony Hawk - 68%), action games (like Grand Theft Auto - 67%), adventure games (like Legend of Zelda - 66%), music/rhythm games (like Guitar Hero or Dance Dance Revolution - 61%), simulation games (like Sims or Rollercoaster Tycoon - 49%), role-playing games (like Final Fantasy - 36%), massively multiplayer online role-playing games (MMORPG) (like World of Warcraft - 21%), and virtual worlds (like Second Life or Gaia - 10%) (Rainie, 2009).

⁶ Casual eGames are distinguished by their simple rules and lack of long-term time commitment or special skills to play. Examples include: solitaire, tetris, and bejeweled.

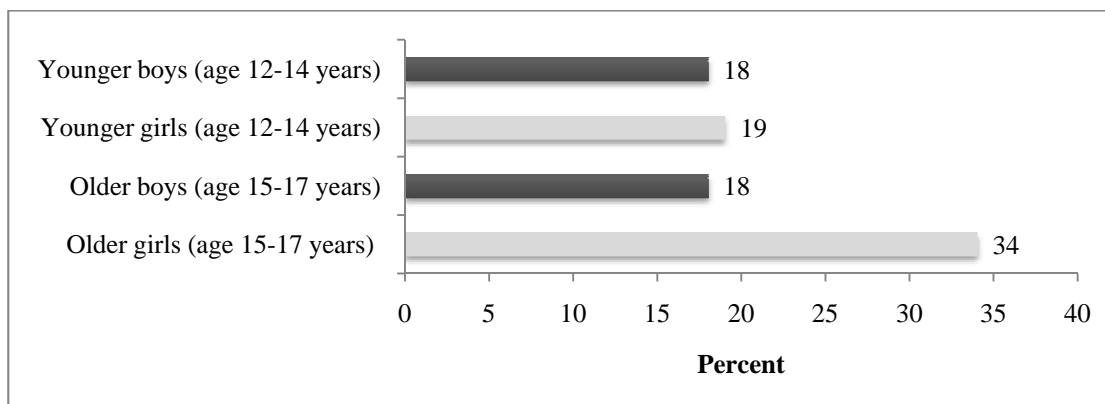
Adolescent Health Information-Seeking using Media Technologies

The privacy and prevalence of media technologies are changing the way teens find health information when they need it (Benight, Ruzek, & Waldrep, 2008). Many teens feel comfortable using media technologies for learning and communication, and their ability to ease interpersonal communication makes them an ideal vehicle for broaching sensitive health topics (Gerber, Solomon, Shaffer, Quinn, & Lipton, 2007; S. Keller, Labelle, Karimi, & Gupta, 2002; S. N. Keller & Brown, 2002). Many youth seek sexual health information online due to the sensitive nature of the subject and the privacy afforded by the Internet (S. Keller et al., 2002). Youth use anonymous message boards more often than they use traditional advise hotlines (O'Malley, 2008). In many ways, this pattern appears to reflect teens' common desire to share personal issues and get advice from their peers, rather than from parents or medical professionals (Deb Levine, executive director of ISIS, Inc.).

The Pew Internet & American Life Project estimates that between 75% and 80% of Internet users have looked online for health information (Susannah Fox, 2008). This figure is slightly lower among teens and young adults, but has risen to over 50% of all youth (O'Malley, 2008). In 2004, when asked specifically about topics that may be difficult to talk about (like drug use, sexual health, or depression), 22% of youth indicated that they had searched online for such topics (A. Lenhart, Madden, & Hitlin, 2005). Girls were more likely to report searching for health issues than boys, and older teens (15-17 years) reported higher rates than younger teens (12-14 years). Consistent with this trend, older girls reported searching for sensitive health

information online at higher rates than any other group (see Figure 6) (A. Lenhart et al., 2005). No such data have been published documenting online health information-seeking among AI/AN youth.

Figure 6: Percentage of U.S. Teens who Report Having Searched for Health Information Online, by Gender and Age – 2004 (A. Lenhart et al., 2005)



Little is known about the proportion of teens and young adults who use mobile phones or text messaging services to access health information, though numerous options now exist. Despite the increasing popularity of social media technologies, like social networking sites and status update services (like Twitter), few teens appear to be using them to gather or share health information (S Fox & Jones, 2009). Only a small portion of the population currently reports tracking their friends' personal health experiences, posting their own health-related comments, getting health information, or joining a health-related "group" using such services (S Fox & Jones, 2009).

Health Interventions Using Media Technologies

Reflecting these trends, interactive media technologies are now being used to address an array of public health issues, including: nutrition, weight loss, physical

activity, eating disorders, smoking cessation, alcoholism, panic disorder, stress management, diabetes self-management, asthma self-management, coping skills, chronic pain, tinnitus, and toilet training (Bennett & Glasgow, 2009; Coyle et al., 2007; Lustria et al., 2009; Nguyen et al., 2004; Portnoy et al., 2008; Ritterband et al., 2003; Ybarra & Bull, 2007; Ybarra & Eaton, 2005), as well as a variety of sexual health behaviors and outcomes (S. N. Keller & Brown, 2002; Noar, Clark, Cole, & Lustria, 2006; Rietmeijer & McFarlane, 2008; Ybarra & Bull, 2007). While early studies focused primarily on their feasibility and acceptability, more recent studies have begun to evaluate their ability to produce meaningful changes in knowledge, attitudes, perceptions, intentions, and behavior, many showing promising results. Several technology-based sexual health interventions targeting adolescents are described in detail in Appendix B (page 232), but a general overview of the collective field follows in this section.

Social media tools (like social networking sites, micro-blogging, and virtual worlds) are also increasingly being used to promote public health. Federal agencies, state health departments, and health advocacy groups now offer blogs, podcasts, RSS (Really Simple Syndication) news feeds, Twitter, and widgets, covering health topics from the seasonal flu to Food and Drug Administration (FDA) recalls (CDC, 2009d). While a growing body of evidence supports their use, more thorough evaluations are needed to discover the breadth and limitations of their effectiveness. Offering people more information is not necessarily better, and information alone is often insufficient to change long-standing, complex health behaviors.

Internet-Based Interventions.

Bennett & Glasgow (2009) recently operationalized the term “Internet interventions” in reference to “systematic treatment/prevention programs, usually addressing one or more determinants of health..., delivered largely via the Internet, and interfacing with an end user.” They take a wide variety of forms, from basic information sharing on sites like WebMD.com, to anonymous health education provided in high risk chat rooms, to highly personalized programs that are tailored to the risk profile of the individual user (Lustria et al., 2009). Internet interventions also vary in the level of human support and interaction provided, from self-administered programs to interventions that are predominantly led by a therapist, augmented occasionally by online components (Benight et al., 2008).

In the realm of sexual health, several state and county health departments now engage in STD/HIV prevention activities online, including online partner notification, virtual chat outreach and education sessions, the dissemination of STD testing slips (delivered via the Internet), and the distribution of condoms and STD screening kits (ordered confidentially online and delivered via the mail) (McFarlane, Kachur, Klausner, Roland, & Cohen, 2005; NCSD, 2008).

Most Internet-based behavioral interventions have focused on populations other than teens or young adults. At least two interventions have focused on those who are HIV positive (HIV+) (Kalichman et al., 2006; Markham, Shegog, Leonard, Bui, & Paul, 2009). Most others have focused on men who have sex with men (A. Bowen, 2005; A. M. Bowen, Williams, Daniel, & Clayton, 2008; Bull, Lloyd, Rietmeijer, &

McFarlane, 2004; Bull, McFarlane, Lloyd, & Rietmeijer, 2004; Carballo-DiÁcquez, Miner, Dolezal, Rosser, & Jacoby, 2006; Lau, Lau, Cheung, & Tsui, 2008; MacMaster, Aquino, & Vail, 2003). It is only in relatively recent years that Internet-based interventions have been designed for and evaluated among youth. Several have reported changes in sexual health knowledge or attitudes, but thus far, only one has reported changes in condom use or sexual behavior (see Appendix C, page 247).

For Native youth in particular, only one computer-based program has been developed and evaluated to improve health – a software program designed nearly two decades ago to improve dietary choices and prevent tobacco use (Schinke, Moncher, & Singer, 1994). More recently, several educational websites have been developed for Native youth (www.StoptheSilence.org, www.Iknowmine.org, <http://kids.indianeducation.org/>), but as of yet, no behavioral Internet-based sexual health interventions have been designed for or evaluated among AI/AN teens and young adults.

Cell Phone-Based Interventions.

The potential of cell phones and personal digital assistants (PDAs) to promote healthy behaviors has not yet been fully explored (Coyle et al., 2007). To fill this gap, the Cochrane Collaboration recently developed cell phone messaging protocols for preventive health care, communicating test results, sending reminders about scheduled appointments, and facilitating management of long-term conditions (Gurol-Urganci, de Jongh, Vodopivec-Jamsek, Car, & R, 2009). Several studies have demonstrated major cost savings, shorter wait times, and increased convenience and satisfaction,

with better or similar efficacy compared with standard communication strategies (Gurol-Urganci et al., 2009). In the developing world, cell phones are also being used to improve the operational efficiency of remote health workers, to improve data collection and analysis for service management purposes, and as portable diagnostic devices (Leach-Lemens, 2009).

The ubiquity, mobility, and speed of text messaging has also given rise to new strategies for connecting people to health information (Atun & Sittampalam, 2006). SMS texting programs have been used to remind patients to take their medication, confirm doctor appointments, monitor chronic conditions, promote healthy behaviors, provide psychological support, and trace communicable diseases, including STIs (de Jongh et al., 2009; Medina, 2009; Newell, 2001). In the U.S., text-based interventions are thought to be most effective when targeting young people, due to their relative comfort with these technologies (de Jongh et al., 2009), but lessons from the developing world suggest that generational divisions may lessen as technology use patterns evolve in the future.

Several cell phone-based interventions have been implemented in the U.S. to address STDs/HIV among teens and young adults, including services that connect users to local HIV testing and treatment providers (by sending a zip code to “KNOWIT”), services that send sexual health information to enrolled participants via text message, and services that allow teens to pose personal health questions to experts and receive timely text message responses (Hoffman, 2009; KFF, 2007; D. Levine, McCright, Dobkin, Woodruff, & Klausner, 2008). Due to insufficient evaluation to

date, none of the existing phone-based interventions have been able to quantify changes in knowledge or sexual behavior, and only one has explicitly reported changes in STD/HIV testing behavior (see Appendix C, page 247). Rigorous evaluation is still critically needed to determine the reach, effectiveness, and impact of cell phone-based sexual health interventions. As of yet, no cell phone-based behavioral interventions have been designed for or evaluated among AI/AN youth.

Video Game-Based Interventions.

The power of video games to distract, immerse, and engage users is being increasingly used to promote health and wellbeing (Coyle et al., 2007; Dobson & Ha, 2008; Egenfeldt-Nielsen, 2008; Amanda Lenhart et al., 2008; Lieberman & Kidz Health Software, 1998; Papastergiou, 2009; David M. Paperny & Starn, 1989; Streisand, 2006; Thomas, Cahill, & Santilli, 1997; Timpka, Graspemo, Hassling, Nordfeldt, & Eriksson, 2004; Wideman et al., 2007). The range of their uses and forms has expanded dramatically in recent years, to include those played on computers, video game consoles, handheld devices, and virtual reality headsets. Studies indicate that video games can improve client engagement and goal setting, affecting their knowledge, attitudes, perceptions, and behaviors (Howell, 2005). They can be as fun and challenging as popular video games, while educating and motivating users around a variety of health topics (Wideman et al., 2007).

MMORPGs are a unique genre of games, in which large numbers of players interact virtually, taking on the role of fictional characters. MMORPGs typically have tools to facilitate communication between players and require some level of

cooperation and teamwork. This has led researchers to investigate virtual interactions, cultures, the spread of virtual plagues, and the ability MMORPGs to affect public health (Wikipedia, 2010). Internationally, MMORPGs are immensely popular. This has prompted the CDC to develop a presence in Second Life (www.secondlife.com) and Whyville (www.whyville.net) (Amanda Lenhart et al., 2008). Second Life has over 15 million registered users (mostly adult), with over 1,435,000 residents logging in over a two-month period (Beard, Wilson, Morra, & Keelan, 2009). Whyville is the leading virtual world for children and young teens. Since its launch in 1999, more than three million teens have joined and built avatars (a computer user's representation of himself/herself or an alter ego), with monthly visits averaging three to five hours per person (L. Wilson, 2008). The site hosted more than 8.5 million educational games in 2007, focusing on science, technology, engineering, and math.

Numerous educational applications have been proposed for virtual worlds, including distance education, training and skills development, self-paced tutorials, interactive role plays, and simulations (Gorini, Gaggioli, Vigna, & Riva, 2009; Kamel Boulos, 2007). Many feel that virtual worlds hold enormous potential for offering creative and dynamic educational experiences, and meaningful opportunities for communication and social support (Coyle et al., 2007; Kamel Boulos, 2007).

The 2004 Games for Health Conference offered guidelines to improve health motivation, learning, and behavior change using video game technologies (Howell, 2005). To expand this body of research, Robert Wood Johnson Foundation awarded more than \$2 million in grants in 2008, exploring the development and use of digital

interactive games to improve players' health. So far, only two published gaming studies have focused on sexual health issues (David M. Paperny & Starn, 1989; Thomas et al., 1997). Due to insufficient data collection and follow-up, neither study reported changes in sexual behavior following use (see Appendix C, page 247). Only one health-related computer game targeting AI/AN populations has been published – a culturally-relevant computer game that promoted breast cancer screening for AI/AN patients and their healthcare providers (Roubidoux, Hilmes, Abate, Burhansstipanov, & Trapp, 2005). As of yet, no video game-based sexual health interventions have been designed for or evaluated among Native youth.

Benefits and Drawbacks of Technology-Based Interventions

Using media technologies for public health intervention incurs unique benefits and drawbacks for users and investigators. These traits have been discussed at great length by Barak (2001), Keller (2002), Bull (2004), Bowen (2005), Cobb (2005), Frederickson (2005), Hurling (2006), Coyle (2007), Benight (2008) Bennett (2009), and Lustria (2009). Their list of benefits includes:

- **Acceptable** – Most people view computers and the Internet as standard tools for education and entertainment. This acceptability is growing for newer technologies like text messaging and video games, but is particularly evident among teens and young adults. In some cases, students find media-based instruction and communication to be more satisfying and engaging than traditional modalities.
- **Adaptable** – With proper formative research, interventions can be replicated and adapted for different target audiences.
- **Affordable** – Once developed, interventions implemented via media technologies can be widely disseminated at a relatively low cost per user.

- **Anonymous** – Many media-based interventions allow people to access sensitive information and learn with complete anonymity.
- **Available** – Most media interventions can be accessed anytime, anywhere, at the convenience of the user. This feature overcomes many traditional challenges associated with geography, transportation, and access.
- **Consistent** – Once developed, interventions implemented via media technologies can be uniformly implemented, ensuring consistency, fidelity, and unfailing quality.
- **Current** – The educational content and methods of media interventions can be centrally revised, updated, and upgraded over time to remain current, effective, and medically accurate.
- **Entertaining and Educational** – Edutainment refers to the integration of educational material into entertaining activities. Media interventions can take advantage of a multitude of design features to enhance their edutainment capabilities.
- **Effective** – While media-based interventions are not uniformly effective, effective strategies have been developed for a wide range of media technologies.
- **Efficient** – Information retrieval via media technologies is more efficient, immediate, and reinforcing than other communication or information management systems.
- **Evaluative** – Many media interventions allow investigators to seamlessly collect user data that can be used to support process and impact evaluation and continuous quality improvement. According to Bowen (2005), Internet data collection is relatively fast and inexpensive, and large numbers can be recruited from diverse locations.
- **Multimodal** – Some media-based interventions incorporate graphics, text, and sound, facilitating multimodal learning.
- **Personal** – Some media interventions can be tailored to the needs and interests of the user, based on age, gender, risk, culture, or other important criteria,

allowing greater audience segmentation to take place than is possible or economically feasible using other approaches.

- **Preventive** – Media interventions can prevent expensive medical outcomes and reduce health costs.
- **Repetitive** – Many media interventions allow users to return for more information or to reinforce content already obtained.
- **Self-Modulated** – Many media interventions provide individual control over the occurrence, extent, and intensity of accessing health information, and the occurrence and pace of interpersonal interactions, adapting to the personal preferences of the user.
- **Supportive** – Media interventions can encourage peer support, healthy social norms, and the exchange of information using message boards, chat rooms, text messaging and email. The privacy afforded by the Internet make it an ideal venue for honest and open communication around sensitive health topics.

Many of these qualities are especially important for delivering reproductive health information to young people who may not access health services on a regular basis, who may lack transportation, or who may feel uncomfortable broaching these subjects in traditional settings – with parents, clinicians, in classrooms, or using information hotlines.

Despite their many benefits, several important limitations have also been identified, which must be weighed and assessed when designing technology-based interventions targeting young people:

- **Accessibility** – Many early studies questioned the accessibility of the Internet and other media technologies to poor, disenfranchised populations (Barak & Fisher, 2001). The use of technologies has increased considerably in recent years among diverse populations, making this concern much less critical but not obsolete (Cobb, Graham, Bock, Papandonatos, & Abrams, 2005). Many interventions require the presence of reliable, high-quality Internet and cell phone coverage, which are not universally available in Indian Country. Other

concerns have been raised about the accessibility of sexual health websites in schools and public venues that have explicit policies and software controls prohibiting access to content that is sexual in nature (Barak & Fisher, 2001). This concern may also be less relevant today, given rising access to the Internet at home or via cell phones. It is still relevant, though, for those who only access the Internet at school.

- **Cost** – The development and start-up costs for many technology-based interventions are substantial. Technology-based interventions also require ongoing financial investments to maintain and improve services in a rapidly changing media environment, and to market their ongoing availability.
- **Effectiveness** – The ease and feasibility of technology-based interventions have been well documented, but with insufficient research to date, fewer interventions have proven effective at changing risky behavior long-term. Most interventions have only been evaluated for their short term impact on secondary outcomes (i.e., knowledge, self-efficacy), not primary outcomes (i.e., behavior), and, according to Bennet & Glasgow's (2009) review, only about half have reported statistically significant results (Bennett & Glasgow, 2009). Bennet & Glasgow (2009) note that these findings should be interpreted with caution, however. Many of the randomized controlled trials conducted thus far have been relatively small and underpowered, with fairly high levels of attrition. Additional research is needed to determine core intervention traits and characteristics that are needed to ensure long-term behavior change.
- **Ethics** – Some technology-based interventions encounter unique legal and ethical considerations that must be addressed prior to use, often surrounding privacy, confidentiality, and user safety. New standards of care for technology-based interventions are still being discussed and developed (Multnomah County Health Department, 2008; NCSD, 2008).
- **Fidelity** – With self-administered programs, it is difficult to ensure that users will complete the intervention as originally designed. Several studies have encountered low rates of uptake and high dropout rates, especially with those that did not involve some form of human interaction (Marks, Cavanagh, & Gega, 2007). Self-directed technology-based interventions must compete for the time and attention of youth, requiring creative approaches to ensure intended use (Bull, Pratte, Whitesell, Rietmeijer, & McFarlane, 2009).

Effective Technology-Based Interventions: Common Features and Strategies

Research informing the development of technology-based health interventions has emerged from a wide spectrum of fields, including: education, e-learning, computer science and engineering, psychology, sociology, and public health. To optimize their effectiveness, research in this domain supports the inclusion of several important design elements, including: (a) tailored, personalized, and individualized content; (b) features that enhance social support and communication; (c) integration of interactive multimedia; and (d) features that promote repeated use of the intervention. The importance of each of these design features are further explained by the behavior change and learning theories discussed later in the chapter.

Tailored, Personalized, and Individualized Content.

Information retrieved and dispersed using media technologies can be tailored to a population or an individual by eliciting information from the user, and then using that information to selectively display content in a manner that is relevant and/or engaging to them (Baylari & Montazer, 2009). These programs use a range of criteria to tailor their content, including users' age, gender, race/ethnicity, sexual orientation, stage of change, perceived needs, or reported risk factors (Lustria et al., 2009).

Personalized interventions integrate personal information into the educational content (e.g., name, school, behaviors) to increase the perceived meaningfulness of the message, thereby creating the impression that the message was designed specifically for them (Lustria et al., 2009). *Individualized* health programs take this process one step further, using either interactions with a healthcare provider or user generated goal

setting activities and self-monitoring tools to create a highly personalized experience (Lustria et al., 2009). Tailored, personalized, and individualized content can be used to bypass material that does not reflect the user's individual needs, and may reduce intervention time requirements and enhance user retention (Kiene & Barta, 2006). As a behavior change tool, Bandura (1998) recommends that tailoring criteria and content be selected after first identifying those factors that are most significantly associated with the targeted behavior (Bandura, 1998). Providing tailored material addressing the behavior's key determinants will be most likely to improve intervention effectiveness.

Software and information technologies now make it possible to provide tailored and personalized interventions to an entire population, producing mass customization (Cobb et al., 2005). This process requires the use of reliable, standardized questionnaires, risk assessments, and staging tools. Computerized versions of many of these tools have been reliably validated for sexual activity (Ito, Kalyanaraman, Ford, Brown, & Miller, 2008). Studies suggest that many users find it easier and less embarrassing to disclose sensitive health information to a computer (Coyle et al., 2007). Compared to traditional paper and pencil assessment methods, computer-assisted self-interviewing (CASI) systems also offer the added benefit of lowering costs and improving data quality and turnaround time.

Adding additional support for their use, gaming research suggests that integrated assessment and adaptation tools can improve learning and cognition (K. A. Wilson et al., 2009). Wilson and colleagues (2009) report that the 'specificity' and 'immediacy' of games' assessment and tailoring tools are closely associated with

learner motivation and attitude. Assessment tools that provide immediate feedback give learners a clear understanding about how they are doing on the task, helps students identify errors, and improves their understanding and motivation to stay on task (K. A. Wilson et al., 2009). Research also suggests that learners who receive immediate feedback are more likely to learn and retain information than those receiving delayed feedback (Kiene & Barta, 2006). In their analysis of effective web-based educational systems, Baylari & Montazer (2009) found that learning was optimized when users were given instant feedback from the software or their instructor.

Tailoring is theoretically supported by the transtheoretical model, which asserts that behavioral interventions must align with the user's readiness level in order to be effective (Coyle et al., 2007; Gold, Chiappetta, Young, Zuckoff, & DiClemente, 2008). Tailoring is further supported by the communication and learning theories discussed later in this chapter. Studies by Skinner et. al. (1999) have shown that tailored information is more likely to be read, understood, perceived as personally relevant, and remembered (Ito et al., 2008). Tailoring is also supported by research exploring personalized learning environments and patient-centered care. 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).

Computer-tailoring has been applied to more than 20 different health behaviors, many of which are still in the early phases of development and evaluation (Lustria et al., 2009). Reviews and meta-analyses of technology-based interventions have thus far reported incremental benefits for tailored interventions over untailored interventions (Lustria et al., 2009). Noar, et. al. (2006) recommend increased tailoring in interactive safer sex websites to match messages with particular audiences (Noar et al., 2006). Roberto, et. al. (2008) likewise recommend greater emphasis on individual tailoring in future interventions, varying messages based on student's earlier responses (Roberto et al., 2008). These findings are supported by a recent study by Gold, et. al. (2008), in which urban, minority girls used computer-assisted educational modules to explore several reproductive health topics. Participants valued being able to choose what they learned and expressed greater satisfaction when the information provided to them by the program related to their own sexual behaviors (Gold et al., 2008). Citing examples from several computer-tailored health interventions, Lustria, et. al. (2009) concluded that combining computer tailoring with Internet delivery holds great promise for boosting the effectiveness of tailored behavioral interventions.

Features that Enhance Social Support and Communication.

Media technologies offer a wide range of design elements that can be used to support communication and dialogue, including email, instant messaging, text messaging, discussion boards, chat rooms, social networking sites, and "ask an expert" features. Virtual "discussions" can take place between experts and peers, making learning a dynamic, two-way experience (Barak & Fisher, 2001; Baylari & Montazer,

2009). Providing expert feedback within tailored interventions has been shown by Dijkstra (2005) to be significantly more effective for helping smokers quit, compared with tailored messages alone (Lustria et al., 2009).

The literature also suggests that virtual peer-to-peer interaction may be useful for supporting healthy behavior change by creating and reinforcing positive social norms. In evaluations of QuitNet.com, an online tobacco cessation intervention, use of the site's social support features were associated with three times greater cessation and four times greater abstinence for more than 2 months (Cobb et al., 2005). This finding was supported by preliminary evaluations of a diabetes management website for teens and young adults (Gerber et al., 2007). Of all of its features, the site's discussion board received the most use by participants, and more personal contact with other participants was requested by participants during the site's final evaluation (Gerber et al., 2007). Online forums and chat rooms have repeatedly been cited as providing risk-reducing social support for men who have sex with men (Rhodes, 2004), people who are HIV+, and for otherwise isolated or stigmatized populations, though few have produced robust evidence supporting their effectiveness in relation to primary or secondary health outcomes (Eysenbach, Powell, Englesakis, Rizo, & Stern, 2004).

Social and interpersonal interactions are also thought to contribute to positive learning outcomes for video game players, where real time relationships can foster mutual respect and a sense of belonging (K. A. Wilson et al., 2009). Virtual world technologies have been used to establish a sense of "social presence" for remote patients, a condition that improved therapeutic effectiveness (Gorini et al., 2009).

More research is needed to determine what conditions and factors influence the effectiveness of peer-to-peer support systems, including the impact of professional moderation, and to what extent virtual communities can substitute or complement face-to-face support groups (Eysenbach et al., 2004).

Media technologies also provide opportunities to integrate other social interactions that align with formative research and community values. Barack & Fisher (2001) recommend scripting in parental participation and involvement in sexual health interventions targeting teens, helping parents and children to interact with one another. Many teenagers are self-conscious, and may not feel comfortable engaging in face-to-face dialogue with their parents about sensitive health topics (Coyle et al., 2007). Technology-based interventions could incorporate activities to ease this conversation in a manner that is comfortable and familiar to both. Shared quizzes, videos, and discussion boards could provide a vehicle for indirect communication between parents and children about important sexual health topics, family values, and future goals and aspirations. Similar tools could be developed to support communication between adolescents and healthcare providers, between peers, and between sexual partners.

Interactive Multimedia.

Media technologies can incorporate a wide variety of interactive design elements, including graphics, animation, photos, videos, sounds, click-through modules, blogs, games, quizzes, surveys, polls, and links, among others. Hypertext and hyper-connectivity enable 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 their 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 et al., 2008).

The use of multi-modal media is theoretically supported by Daft and Lengel's (1986) Media Richness Theory, which posits that “rich” media environments increase viewers personal connection to the information by providing learners with instant, personalized feedback (Daft & Lengel, 1986). Mayer's (1997) Theory of Multimedia Learning likewise proposes that multimedia environments enhance learning by building connections between the visual and verbal information processing systems of users (Mayer & Moreno, 1998). Subsequent research on the theory found that it is better to present information using two “modes of representation” than one (i.e., narration and pictures), but that redundant content (i.e., narration, animation, and on-screen text) is counterproductive (Mayer & Moreno, 1998).

Several studies support the use of multimedia platforms to enhance learning, user satisfaction, and behavior change. A study by Liu et. al. (2009) reported that richer media content was positively associated with higher concentration levels among students (Liu, Liao, & Pratt, 2009). Applied to public health, Hurling et al. (2006) found that a more interactive intervention website created higher expectations for exercise, greater satisfaction and motivation, and increased self-perception of fitness (Hurling, Fairley, & Dias, 2006). Applied to sexual health, a review by Delgado &

Austin (2007) found that technology-based interventions seemed to be most effective when they were implemented using multiple channels simultaneously (mass media, computers, and the Internet) with sustained efforts over time (Delgado & Austin, 2007). Tortolero and colleagues (2008) similarly concluded that the effectiveness of their sexual health intervention was partly attributed to its multimodal application of computer-based gaming technology, interactive online activities, and small group interactions (Tortolero et al., 2008).

Other research has found that entertaining, aesthetically pleasing, multimedia websites are necessary to engage adolescents and create a user-friendly experience (Bull et al., 2007). In focus groups conducted by Bull et al. (2007), urban youth expressed interest in sexual health chat rooms, videos, quizzes, and engaging graphics, and requested instant communication with experts (Bull et al., 2007). When asked about ways to “operationalize theoretical constructs associated with risk reduction,” participants voiced preference for realistic role models, credible statistics, positive expectations toward condom use and healthy sexual norms, and brief, step-by-step guidance on how to fulfill desired health behaviors (Bull, Phibbs, Watson & McFarlane, 2007).

Features that Promote Repeated Use.

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 websites, 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). Similar findings have been reported by diet and nutrition websites, where behavior change was positively associated with the amount of time sites were viewed (Buller et al., 2008). Early Internet-based STD/HIV research reported significant user attrition over time (Bull, Lloyd et al., 2004). Others have tested brief interventions that did not achieve the desired changes in knowledge or behavior (Bull et al., 2009). 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.

Several features have been shown to improve user retention and repetition during the evaluation of technology-based interventions. 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 new and salient content, user generated content, and entertaining and interactive content) have been reported by several investigators (Bull, Lloyd et al., 2004; Bull, Vallejos, Levine, & Ortiz, 2008). Houston & Ford (2008) found that adding a brief motivational introduction to their smoking cessation website that discussed the importance of using all components of the site to ensure desired outcomes helped increase the amount of time users spent on the site (Houston & Ford, 2008). Other studies have incorporated booster sessions to reinforce informational content and maintain program effects (Bull et al., 2009; Card & Kuhn, 2006; Metcalf et al., 2005; Pedlow & Carey, 2004). Pequegnat et al. (2007) suggest that user retention might also be increased by taking steps “to reduce participant burden and

fatigue... [by] asking participants to complete multiple, brief, online assessments (e.g., six 7-min assessments over a 12-month period) instead of one longer 40-min assessment (Pequegnat et al., 2007),” or by breaking up educational content with fun, entertaining breaks. Media interactivity has also been found to increase user retention (Hurling et al., 2006).

Gaming researchers have found that learner control (the ability to dictate the pace and sequence of activities), mystery (gaps in knowledge), and challenge are often valued by users, and can improve learning attitudes, motivation, and cognition (K. A. Wilson et al., 2009). Fantasy (placing users in unusual roles, locations, and social situations, analogous to real-world processes), conflict (the presence of solvable problems), and safety (providing a safe way to experience reality) are also critical attributes that can promote interest and learning (K. A. Wilson et al., 2009).

Optimizing the amount of learner control, mystery, and challenge may also help make technology-based interventions more interactive and engaging. Balance must be struck, however, between the requisite educational content and the need for user engagement (Bennett & Glasgow, 2009; Coyle et al., 2007). Additional research is needed to establish the “optimum mix of Human–Computer Interaction design (to make the system more engaging) and Behavior Change principles (to make it more effective) (Hurling et al., 2006, p. 768),” features that clearly vary by target population and intervention format. Given the importance of intervention duration and intensity, effective technology-based interventions will need to identify and incorporate strategies that promote repeated use.

Characteristics of Effective Prevention Interventions

Not surprisingly, offering medically-accurate information alone does not ensure youth will adopt healthy behaviors (Coury-Doniger, Levenkron, Knox, Cowell, & Urban, 1999). To create both engaging and effective sexual health interventions using media technologies, we must turn to traditional interventions for guidance. This body of research is immense, but a brief review of the most common components of effective behavioral interventions follows.

In 2007, Kirby reviewed over 100 rigorously evaluated pregnancy and STD prevention interventions, identifying seventeen characteristics associated with those that were most effective. According to his analysis, the development process for effective interventions involved (Kirby, 2007):

- Multiple people with expertise in theory, research, and adolescent sex, STD/HIV, and/or pregnancy prevention;
- Steps to clearly identify the sexual health needs and assets of the target population;
- Comprehensive logic models;
- Intervention activities that were consistent with community values and available resources (including staff time, skills, facility space and supplies); and
- Thorough pilot tests of the program prior to full implementation.

The importance of Kirby's fourth trait was echoed by Holtgrave and colleagues (1995) in their review of effective behavior-based HIV prevention programs. They found that effective programs addressed "the real and expressed HIV prevention needs of the community being served," which protected them from being "rejected by the community as inappropriate, superfluous, and a waste of scarce resources (Holtgrave

et al., 1995, p. 135).” This trait is also embraced by the Community Readiness Model, an intervention planning and alignment tool that originated in Indian Country and has been extensively used to address STDs and HIV (McCoy, Malow, Edwards, Thurland, & Rosenberg, 2007; B. Plested, Jumper-Thurman, & Edwards, 2006; B. A. Plested, Edwards, & Thurman, 2007; Project Red Talon, 2006; Thurman, Vernon, & Plested, 2007). To be effective, attention must be paid both to the capacity of the community to implement the program and to the readiness of the community to react positively to it (Wandersman & Florin, 2003).

According to Kirby’s (2007) review, the goals and objectives of effective sexual health interventions universally:

- Focused on clear prevention goals;
- Concentrated on narrowly defined behaviors; and
- Addressed psychosocial risk and protective factors associated with sexual behavior (including knowledge, perceived risks, values, attitudes, perceived norms, and self-efficacy).

These traits are also consistent with Holtgrave’s review, which found that effective programs targeted well defined audiences and objectives, and were strongly rooted in behavioral and social science theory (Holtgrave et al., 1995). Recognizing the importance of this, a review of health communication and behavior change theory is included in the following section.

Kirby (2007) also found consistencies in the activities and teaching methods employed by effective sexual health interventions. All of them:

- Created a safe learning environment for participants;
- Included multiple activities to change targeted risk factors;

- Actively involved youth in learning lessons and activities;
- Covered topics in a logical sequence; and
- Used instructional methods and messages that were appropriate to the teens' culture, age, and sexual experience.

Once again, similar conclusions were drawn by Holtgrave (1995), who reported that interventions must be “sensitive to the particular culture of the audience” and tailored to their developmental status (p. 135). This finding reinforces the need for research surrounding the cultural values, identities, and norms of AI/AN youth to ensure technology-driven interventions are congruent with their personal experiences and worldview. Empirical studies also reveal that lasting behavior change is achieved only when sexual health interventions are delivered with sufficient duration and intensity (Manlove, Papillio, & Ikramullah, 2004).

Finally, Kirby (2007) reported that the implementation process for effective behavioral interventions:

- Had the support of local stakeholders;
- Utilized trained educators with desired characteristics;
- Took intentional steps to recruit and retain teens; and
- Implemented activities with reasonable fidelity.

Adding to the list of important criteria, Holtgrave (1995) found that effective programs included careful process evaluation and midcourse corrections to ensure services were delivered as intended. Lessons from effective behavioral interventions should likewise be used to guide the development of technology-based interventions.

Influential Theories, Models, and Research Approaches

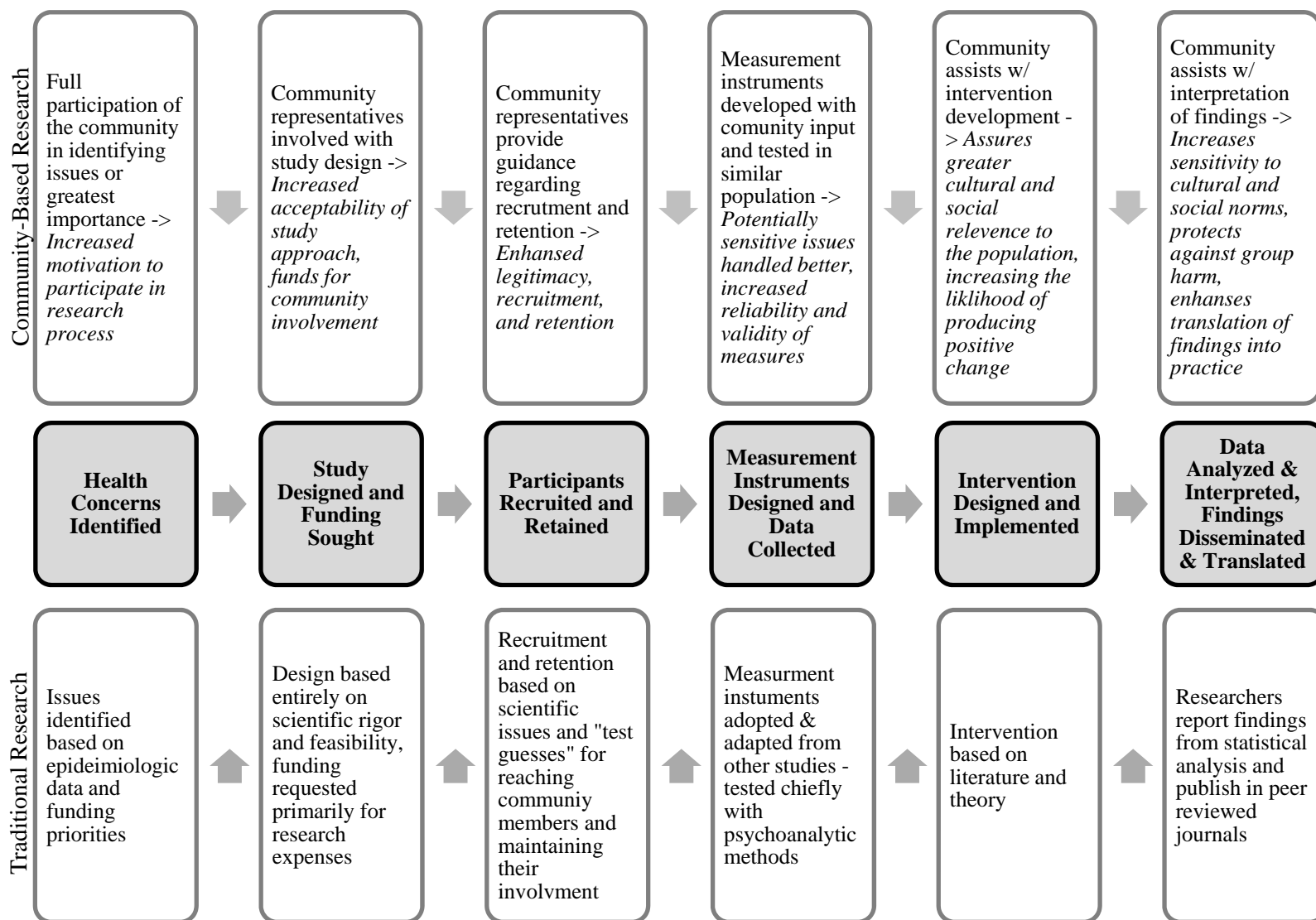
My research and dissertation were influenced by several theories, models, and research approaches.⁷ Particular attention will be given in this section to community-based participatory research (CBPR) principles; behavior change, learning and health communication theories; the fields of positive youth development and wellbeing; and intervention alignment strategies.

Community-Based Participatory Research.

CBPR is a collaborative research approach that equitably involves all partners in the research process (Israel et al. 1998; Minkler & Wallerstein 2003). While methods vary from site to site, the theory embraces four core concepts: (a) local participation in the research process; (b) immediate use of the information generated by the research to address local needs; (c) steps to minimize power discrepancies between researchers and participants; and (d) praxis resulting in local empowerment and action (Minkler & Wallerstein, 2003). It is deeply committed to ensuring meaningful participation by those impacted by the research during all phases of the study's design, implementation, interpretation, and dissemination (see Figure 7 by Viswanathan et al. (2004), page 63) (Minkler & Wallerstein, 2003).

⁷ By definition, theories are an analytic structure used to explain the underlying relationship between empirical observations. Models offer a simplified view of a complex reality, representing empirical processes in a logical way.

Figure 7: Components of Traditional and Community-based Research (Viswanathan et al., 2004)



There are several distinct benefits to using CBPR in Indian Country, including that it: (a) reflects and acknowledges tribal sovereignty, self determination, and self governance; (b) allows research to occur in circumstances where it otherwise wouldn't; and (c) better aligns with traditional research approaches. Outside investigators have repeatedly misrepresented or published sensitive cultural information, sensationalized tribal problems, released publications without concern for their impact, and profited from their research without compensating tribal participants (AILC, 1999). As a result, many AI/AN communities share a historic mistrust of research (Viswanathan et al., 2004). CBPR rebuilds community trust and “allows research to happen where it might otherwise be impossible (Schnarch, 2004, p. 93).”

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. CBPR acknowledges that “research is not culturally neutral,” and that indigenous knowledge is a necessary component of the research endeavor (National Congress of American Indians, 2009, p. 12). 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).

Consequently, CBPR has become an informal “code of conduct” for research in Indian Country. Despite the diversity that exists in Indian Country, AI/AN research systems “reveal striking similarities in the process of negotiation, approval, and subsequent support (Manson, Garrouette, Goins, & Henderson, 2004, p. 60S).” Many

tribes and Alaska Villages are members of regional Indian Health Boards, which provide health surveillance, research, and advocacy on their behalf. The Northwest Portland Area Indian Health Board and its Tribal Epidemiology Center (Tribal EpiCenter) are one such entity, conducting research on behalf and in close partnership with the NW tribes. Tribal EpiCenters are uniquely trusted by tribes because they are directly accountable to tribes and often have a long history of positive, participatory collaboration.

Behavior Change Theories

As an evidence-based public health endeavor, the design and selection of technology-based sexual health interventions must be guided by behavior change theory. Over the years, a vast number of behavior change theories have been applied to sexual health topics. This dissertation was particularly influenced by: the Transtheoretical Model; Information, Motivation, and Behavior Change (IMB) theories; and the Social Ecological Model.

The Transtheoretical (Stages of Change) Model.

The Transtheoretical Model (TTM) integrates the principles of behavior change from over 300 theories of psychotherapy, and has been successfully used in health interventions ranging from smoking cessation to sexual behavior (J. O. Prochaska, DiClemente, & Norcross, 1992; J. O. Prochaska, Velicer, & Rossi, 1994). Empirical testing of the model indicates that an individual's level of readiness is essential to their initiation and completion of behavior change. According to the

model, behavior change involves progression through a series of predictable, though not necessarily sequential, stages:

- Precontemplation - minimal awareness, no intent to change
- Contemplation - awareness, but no commitment to change
- Preparation - ready to change
- Action - overt change
- Maintenance - sustained change
- Termination - no risk of relapse

The TTM is made up of four constructs: (a) stages of change, the temporal readiness to modify health behavior; (b) decisional balance, the relative importance of perceived pros and cons of change; (c) situational self-efficacy, confidence in one's ability to modify behavior in difficult situations; and (d) processes of change, the experimental and behavioral strategies that individuals use to progress through TTM stages (Di Noia, Contento, & Prochaska, 2008). 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 intervention recruitment, retention, and completion, and promote movement through successive stages (Di Noia et al., 2008). In the sexual health field, the model has been applied to condom use and STD/HIV risk behaviors (Coury-Doniger et al., 1999; LaBrie, Quinlan, Schiffman, & Earleywine, 2004), sexual initiation (Butler et al., 2006), adolescent sex education (Wallace et al., 2007), and condom carrying behaviors (Arden & Armitage, 2008).

Butler et al. (2006) identified distinguishable patterns of sexual readiness among youth (also associated with age), reinforcing the development and use of age- and readiness-appropriate interventions (Butler et al., 2006). Developmental research has found that interventions must be implemented early (between the ages of 9 and 11 years) to effectively impact youth's progression from sexual intention to sexual behavior (Butler et al., 2006). Recognizing the wide variation in sexual experience reported by youth, Wallace et. al. (2007) recommend that it may be more appropriate and effective to tailor behavior change programs to the youth's personal history and readiness, a strategy that can be employed using media technologies (Wallace et al., 2007). While an abundance of research upholds the importance of matching advice to individual readiness, Gilbert et al. (2008) advise that using the TTM model alone to drive an intervention's tailoring capabilities does not take into consideration the full spectrum of factors influencing complex social behaviors. Sexual readiness is just one factor among many that influence sexual activity among teens and young adults. Gilbert et al. contend that better personalization can be achieved by using multiple theories and criteria to inform the tailoring process (Gilbert, Nazareth, Sutton, Morris, & Godfrey, 2008).

Information, Motivation, and Behavior Change.

Several other behavior change theories and models have likewise been shown to influence sexual behavior and risk taking among youth, and have thus been used to design technology-based interventions promoting adolescent sexual health. Rosenstock's (1966, 1997) Health Belief Model postulates that behavior is affected by

an individuals' *beliefs* about the behavior and its consequences (Basen-Engquist et al., 1999; Basen-Engquist & Parcel, 1992). Four health beliefs are considered to be relevant to behavior change: (a) perceived susceptibility to the health problem; (b) perceived seriousness of the health problem; (c) perceived barriers to changing the behavior; and (d) perceived benefits of behavior change.

Fishbein and Ajzen's (1975) Theory of Reasoned Action hypothesized that *intention* is an immediate determinate of behavior, and that one's *attitudes* and *norms* surrounding the behavior can be used to predict behavioral intention (Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Basen-Engquist et al., 1999; Basen-Engquist & Parcel, 1992; Roberto, Zimmerman, Carlyle, Abner et al., 2007). Attitudes are made up of the perceived consequences associated with the behavior and the value an individual places on those consequences (positive or negative). Norms reflect the attitudes of influential people toward the behavior (e.g., peers, parents, siblings and teachers), which in turn are affected by the individual's motivation to comply with each person (Basen-Engquist et al., 1999).

The Theory of Planned Behavior is an extension of the theory of reasoned action, and has also been used to design technology-based interventions (Arden & Armitage, 2008). The theory adds the concept of *perceived behavioral control* to the model, originating from Self Efficacy Theory. Ajzen's (1985) theory of planned behavior postulates that perceived control over the behavior is needed to overcome obstacles and actualize behavior (Albarracin et al., 2001). Bandura's (1977, 1986, 1980) self-efficacy theory posits that behavior change is more likely when an

individual has confidence in his/her ability to perform the behavior and when one believes that the behavior will lead to a desirable outcome (Lustria et al., 2009).

Meta-analyses conducted by Albarracin, Johnson, Fishbein, and Muellerleile (2001) indicate that the theories of reasoned action and planned behavior change are highly successful predictors of condom use (Albarracin et al., 2001). The study's empirical conclusions suggest that intention to use condoms appears to be derived from "attitudes, subjective norms, and perceived behavioral control... these attitudes and norms, in turn, appear to [be derived] from outcome and normative beliefs (p. 155)." Past actions also appear to influence future behavior (Albarracin et al., 2001). A more recent study by Arden & Armitage (2008), found that attitudes, perceived control, and intention were predictive of TTM stage transitions, but that the theory of planned behavior alone was not sufficient for predicting safe sex (Arden & Armitage, 2008).

Consequently, several investigators have called for the use of integrative models to better explain relationships among age, gender, readiness, and behavior (Arden & Armitage, 2008; Gilbert et al., 2008; Ito et al., 2008). To enhance their effectiveness, interventions must address multiple factors affecting health behavior, including the cognitive determinants of sexual risk (beliefs and expectations), the psychosocial determinants of sexual behavior (values, attitudes, perceived self-efficacy, norms and intentions), and the development of necessary behavioral skills. Technology-based interventions have been successfully designed to address each of these domains, including to: influence users' beliefs, demonstrate desired behaviors,

generate personal goals, reinforce healthy norms, motivate action, and allow users to develop and practice important social and behavioral skills (Basen-Engquist & Parcel, 1992; Lustria et al., 2009).

Learning and Health Communication Theories

Information Processing Theories.

A number of learning and information processing theories have been used to justify the application of media technologies to promote sexual health, particularly among Gen M youth (Bowman Cvetkovic & Lackie, 2009; S. N. Keller, Labelle, Karimi, & Gupta, 2004). This body of literature finds that learning is most effective when it accounts for individual differences in learn styles and preferences, when it can be self-paced, and when the information is perceived as personally relevant.

Social Learning Theory supports the integration of personal narrative and role model stories into multimedia technologies. Narrative is a common teaching tool and a fundamental way of acquiring knowledge that is particularly valued by many indigenous groups, including the NW tribes (Hinyard & Kreuter, 2007). Journaling, testimonials, and storytelling are increasingly being used to support risk-reduction and normalize healthy behavior. According to Hinyard & Kreuter, (2007) the personal narrative can help:

- Overcome resistance, by improving listeners' awareness of a situation and their readiness to act (i.e., telling the story of a person who was able to successfully use condoms, or a story that conveys the benefits of STD screening).
- Facilitate attention, comprehension, and information processing. Substantial evidence suggests that humans are better able to process, store, and recall social information that is presented in narrative scripts.

- Address emotional and existential issues. Authentic, well honed narratives may be able to convey the emotional and existential complexities of adolescent sexuality, enhancing meaning making and/or coping with an STD/HIV infection or an unintended pregnancy.

Early studies by Sharry et al. (2004) describe the potential of collaborative multimedia storytelling to engage clients (particularly children and adolescents) in narrative treatments (Coyle et al., 2007). Goldsworthy (2002) has offered evidence for using video-based, multimedia scenarios to engage adolescents in social learning (Coyle et al., 2007). Peer role models have been shown to improve information processing by teens and young adults in classroom settings, where youth may feel more comfortable talking to their peers about reproductive health issues than they are with adults, and thus may be more likely to absorb and act upon peer-delivered sexual health messages (Burlew & Philliber). While role models have been shown to promote behavior change in-person, this type of STD/HIV intervention has only recently been evaluated online using role model stories (Bull et al, 2007). More research is needed to explore the full range of possibilities that exist for using cell phones, digital cameras, camcorders, and webcams to allow youth to document, explore, and give voice to their own lives and perspectives, and the impact that these technologies might have on learning and health (Coyle et al., 2007).

Research on information processing patterns also indicates that processing can be influenced by the degree to which messages are perceived by the recipient to be personally relevant. Messages that resonate with the recipient's personal experiences "tend to be retained for a longer period of time and are more likely to lead to enduring attitude and behavior change (Kreuter & Wray, 2003, p. S229)." It is based on this

premise that research has focused on identifying young people's primary concerns about sexual health (Kang & Quine, 2007), the situational environments that surround their sexual decision-making (Downs et al., 2004), while also taking onto consideration their racial/ethnic culture.

Cultural Sensitivity and Cultural Tailoring.

The role that culture plays in health behavior and behavior change is a relatively new and emerging field. It is only in the last decade that public health practitioners have come to recognize that:

It is through the lens of culture that people define health and illness and perceive and respond to health messages. Culture... affect[s] from whom health care is sought, how symptoms are described, how treatment options are considered, and whether medical treatment will be chosen and adhered to (Andrulis & Brach, 2007, p. S123).

These considerations pose a distinct challenge for public health practitioners working in Indian Country, where mainstream public health messages are frequently inappropriate or ineffective, especially as they relate to sexual health (Chino & Debruyn, 2006; Gilley, 2006).

Described by Krueter et al. (2003), "culture is learned, shared, and transmitted from one generation to the next, and... can be seen in a group's values, norms, practices, systems of meaning, ways of life, and other social regularities (p. 133)."

Culture is defined by the multitude of social cues and constructs that surround and influence one's outlook and behavior, which are imbedded and reinforced by families, friends, organizations, and communities. Culture encompasses spiritual values and philosophies, language and communication styles, individual ontology, social

hierarchies, personal attire, and a great deal more. Failure to incorporate important aspects of culture into direct patient care and prevention have been shown to result in less effective programs and poor patient satisfaction (Jack, 2007). Various aspects of this concept have been described in the literature as “cultural competence,” “cultural sensitivity,” “cultural proficiency,” and “cultural tailoring.”

Resnicow et. al. (1999) first described cultural sensitivity as being comprised of two dimensions: surface and deep structures.

Surface structure involves matching intervention materials and messages to observable, ‘superficial’ characteristic of a target population. This may include using people, places, language, music, food, locations, and clothing familiar to, and preferred by, the target audience (Resnicow, Baranowski, Ahluwalia, & Braithwaite, 1999, p. 11).

Deep structures, on the other hand, “involve incorporating the cultural, social, historical, environmental and psychological forces that influence the target health behavior in the proposed target population (Resnicow et al., 1999, p. 12).” This level of sensitivity ensures that the program is grounded in the population’s core health epistemology, values, and beliefs. To achieve this, community participation is critical throughout the program’s development and implementation.

Subsequent research by Kreuter & Wray (2003) has found that messages tailored to the culture of recipients are “more likely to be read and remembered, rated as attention catching, saved and discussed with others, and perceived as personally relevant (p. S229).” According to Marin et. al. (2005), to be culturally-appropriate, health interventions must: (a) be based on the cultural values of the target population; (b) use strategies that reflect the subjective cultural characteristics of members of the

group (i.e., their attitudes, expectancies, norms regarding a particular behavior); and (c) incorporate activities that reflect the behavioral preferences and expectations of the group (Marin et al., 1995).

Integrating culture into health interventions has been shown to enhance their appeal and effectiveness in diverse populations (Gilley, 2006; Kreuter, Oswald, Bull, & Clark, 2000; Kreuter et al., 2004; Kreuter et al., 2005). In a meta-analysis of 20 extracurricular interventions that reduced sexual risk taking among sexually experienced youth, Mullen and colleagues reported that protective outcomes were associated with social-behavioral interventions that took place in groups with 100% ethnic similarity, possibly indicating the importance of cultural-fit to this sensitive health topic (Mullen, Ramirez, Strouse, Hedges, & Sogolow, 2002). Romeo & Kelley (2009) likewise recommend that sex education programs recognize the role that socio-cultural influences have on sexual identity, expression, and behavior for them to be maximally relevant, inclusive, and engaging to youth.

Social-Ecological Model

In approaching this process, I recognized that interventions cannot have a lasting impact on the long-term health status of a population by focusing on individual behavior alone, without also influencing the social, structural, and environmental stressors that contribute to behavior (Butterfoss, Goodman, & Wandersman, 1996; Griffin et al., 2005). Addressing this limitation, “CBPR in public health focuses on social, structural, and physical environmental inequalities (Israel et al., 1998, p. 173).” Socio-ecologic approaches account for the “interwoven relationship that exists

between the individual and their environment,” requiring health interventions to address multiple levels of behavioral influence, including (Moore, 2008):

- Physical Environment & Public Policy
- Structural & Organizational Systems
- Community Norms & Interactions
- Family Norms & Interactions
- Individual Knowledge, Attitudes, and Behaviors

Multilevel, socio-ecologic approaches have been successfully used to address complex public health problems, including adolescent pregnancy, substance abuse, and HIV/AIDS (Butterfoss et al., 1996; Duran & Walters, 2004). Likewise, sexual health interventions will be most effective when they are complemented and reinforced by other activities at the individual, community, and policy levels, and when provided in conjunction with appropriate health services (S. N. Keller & Brown, 2002), activities already underway by Project Red Talon.

Positive Youth Development and Wellbeing

Over the last 25 years, another relevant body of research has emerged surrounding the multilevel constructs, opportunities, and environments that contribute to healthy adolescent development, a domain termed “positive youth development” (PYD) (Catalano, Gavin, & Markham, 2010). Pittman et. al. (1993) describe youth development as “the ongoing growth process in which all youth are engaged in attempting to meet their basic personal and social needs to be safe, feel cared for, be valued, be useful, and be spiritually grounded, and to build skills and competencies that allow them to function and contribute in their daily lives (L. E. Gavin, Catalano,

& Markham, 2010).’’ Evidence-based PYD constructs include family connectedness, parent-adolescent communication, parental monitoring, school connectedness, cognitive and social competence, prosocial norms, spirituality, belief in the future, self-determination, and self-efficacy (Catalano et al., 2010). Similar bodies of research have explored wellbeing and thriving in adolescence, identifying similar critical assets and traits, including support, empowerment, self-knowledge, and resilience (Benson & Scales, 2009; Lou, Anthony, Stone, Vu, & Austin, 2008). Others have explored life skills needed by American Indian youth, stressing the importance of positive cultural influences to achieve positive identity development (Long, Downs, Gillette, Kills in Sight, & Konen, 2006).

Programs and interventions that contribute to PYD “help youth strengthen relationships and skills, embed them in positive networks of supportive adults, and help them develop a more positive view of their future... (L. E. Gavin, Catalano, David-Ferdon, Gloppen, & Markham, 2010, p. S76).’’ Such programs have been shown to significantly improve adolescent sexual and reproductive health behaviors and outcomes, including preventing teen pregnancy and STIs, and can help guide the development of technology-based sexual health interventions targeting teens and young adults (L. E. Gavin, Catalano, David-Ferdon et al., 2010). Media technologies have been successfully used to promote civic engagement among youth (Amanda Lenhart et al., 2008) and empower them to take meaningful action in their communities (www.dosomething.org), embodying critical components of both the social-ecological and assets-based health promotion models.

Edutainment

Loosely connected to this sphere, “edutainment” is a term used to describe the use of popular media (i.e., television, radio, computer games) to promote social change (Egenfeldt-Nielsen, 2008). Originating in Latin America, the published literature in this domain blends communication theories and entertainment pedagogy to guide the development of educational media (Egenfeldt-Nielsen, 2008). According to Montgomery, by repeating health messages in the foreground and background of popular media, media can depict certain behaviors as normative, model desired actions or behaviors, and encourage compassion and understanding for different conditions and people (Atkin & Wallack, 1990). Several studies have described edutainment interventions that effectively generated changes in individual and community health, including around sexual behavior (Bloom, 2009; Cassidy, 2008; Dobson & Ha, 2008; Kara & Yeslyurt, 2008).

Intervention Alignment Strategies

Finally, many public health practitioners now recognize the importance of aligning interventions to the needs, culture, and readiness of the target population, and to the community’s ability to implement and sustain interventions over time. This concept has been used by theorists and practitioners in a variety of fields, and has been reinforced by a wealth of empirical data (Alfonso et al., 2008). The principle of “fit” considers the degree of alignment that exists between an approach and the context surrounding its use; alignment refers to the “appropriateness” of the various elements to one another (Chorn, 1991). Goodness-of-fit models have been used by academic

and organizational researchers to demonstrate that individual and contextual variables impact learning, performance, and motivation, with congruence improving outcomes (Churchill, 2003; Lerner, Lerner, & Zabski, 1985; Simeonsson, Bailey Jr, Huntington, & Comfort, 1986).

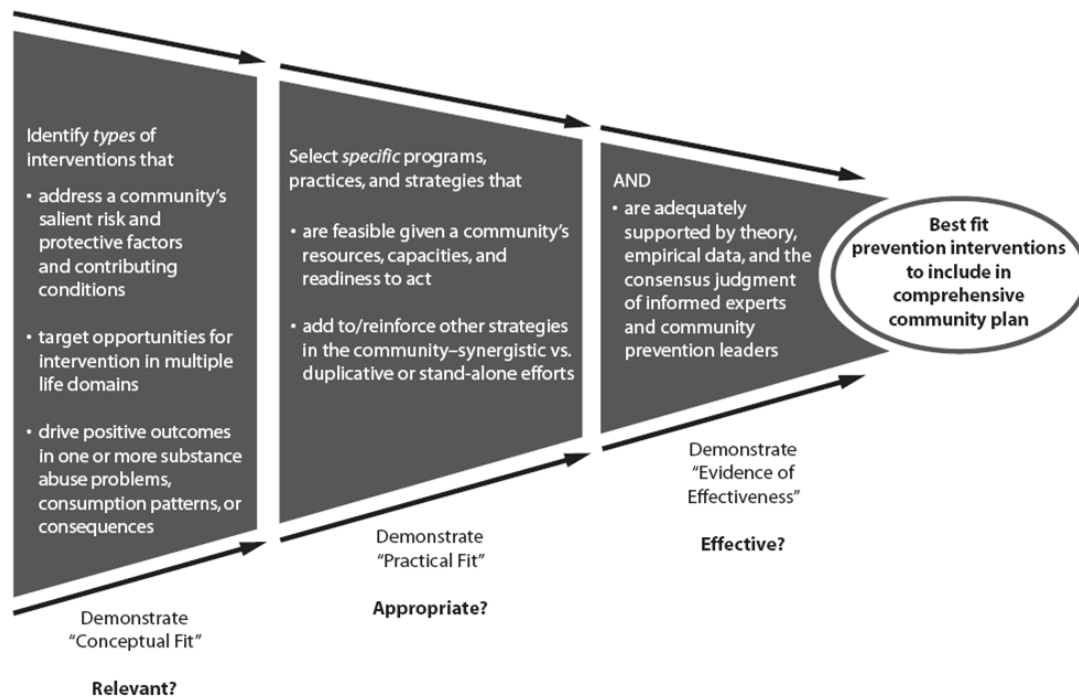
In selecting appropriate public health interventions, experts in prevention planning encourage organizations to consider (Chinman et al., 2005; Chinman, Imm, & Wandersman, 2004; Wandersman, Imm, Chinman, & Kaftarian, 2000):

- The traits and characteristics of the target population and individual participants, including their age, gender, ethnicity, health literacy, perception of risks and benefits, and stage-of-change (TTM).
- The values and culture of the community, including health epistemologies and levels of spirituality, collectivism, and racial pride, amongst others.
- The community's level of readiness for the intervention – affected, in part, by the community's knowledge about and attitudes toward the condition (stigmas and social norms), and their readiness to take action to address the problem.
- Existing services available to the target population.
- Environmental contexts, including urban/rural geography, transportation, and intervention accessibility.
- The priorities of key stakeholders, including funders, policymakers, service providers, community leaders, and program participants.

Likewise, organizational capacities should also be taken into consideration when selecting interventions, including: the mission of the host agency, the availability of staff with appropriate skills and training, the commitment of staff to the intervention, the extent to which leaders understand and support the program, and the availability of current and reoccurring funds to implement the program as planned

(Kelly, Baker, Williams, Nanney, & Haire-Joshu, 2004). Gaps or misalignment in any of these domains can create irrelevant or duplicative programs, unsustainable services, or negate the effectiveness of the intervention. To assess conceptual and practical fit, the Center for Substance Abuse Prevention (2009) likewise recommends the use of logic models and community assessment activities, as described in Figure 8.

Figure 8: Process for Selecting Best Fit Prevention Interventions
(Center for Substance Abuse Prevention, 2009)



While I will not detail all of the steps that were taken to ensure the structural-ideological fit of selected interventions, it is important to note that this paper is the product of a larger research agenda carried out by Project Red Talon over the past five years, which lends insight to tribal STD/HIV readiness levels, organizational

capacities, and prevention priorities. Several of these activities are described on pages 81-86, documenting the CBPR methods that were employed during this dissertation research. This particular research endeavor thus adds to the rich body of evidence that has already been compiled in the Pacific NW, using long-standing tribal relationships, strategic planning, and ongoing program evaluation to maximize intervention relevance, appropriateness, effectiveness, and fit.

Chapter 3: Research Methods

Based on my primary research questions, my guiding theoretical frameworks, and the complex nature of this research agenda, this study employed a mixed-methods research design comprised of: (a) an anonymous, paper-based survey of over 400 AI/AN youths 13-21 years old; (b) a systematic review of technology-based sexual health interventions; and (c) a variety of community-based participatory research strategies to analyze findings, prioritize options, and generate recommendations for designing technology-based interventions that align with the culture, needs, and organizational capacities of the tribes in the Pacific Northwest.

Community-Based Participatory Research

To maximize the structural-ideological fit of resultant interventions, the Red Talon STD/HIV Coalition (which later merged with the NW Native Adolescent Health Alliance), and other research partners served as community advisors during all phases of the project. A mutually beneficial learning environment was thus established between the NW tribes, parents, youth, and employees of the Northwest Portland Area Indian Health Board (NPAIHB), in which all contributed to the study's scope and design, the collection of data, the interpretation of quantitative and qualitative results, and the dissemination of research findings. By working with a wide variety of community partners and topical experts, this research process helped ensure that resulting recommendations were theory- and evidence-based, culturally-appropriate, and relevant to the needs and capacities of participating communities. This collaborative, co-learning process also helped increase interest and enthusiasm for

resultant interventions, and helped generate community ownership over selected activities.

Tribal Health Coalitions.

Community coalitions have been shown to improve health outcomes by motivating and empowering local community members in public health planning (Butterfoss et al., 1996). In the Pacific NW, tribal coalitions serve the dual purpose of engaging tribes in joint prevention planning and outreach, while providing direction to NPAIHB staff members on desired goals and activities for the region as a whole.

During the course of this research, tribal coalition meetings were held on a quarterly basis and were attended by tribal health advocates (health educators, community health representatives, RNs, and youth prevention staff) and representatives from the NPAIHB, regional and national Indian Health Service programs, state and county Health and Education Departments, and a variety of health promotion partners and programs. Members are well aware of community norms, appropriate messages, traditional teachings, and effective strategies for reaching high risk populations. Coalition members are regularly called upon to guide the development of social marketing campaigns and educational materials produced by the NPAIHB, and are familiar with health research and planning processes.

The Red Talon STD/HIV Coalition was formed in 2005 at the request of tribal health advocates, to: (a) reduce the prevalence of STDs among American Indians and Alaska Natives by sharing wisdom, data, and resources; (b) identify and address common priorities; and (c) develop strategies to eliminate STD-related disparities. In

December 2009, the Red Talon STD/HIV Coalition merged with three other tribal health planning groups to form a larger, more holistic coalition focusing on a range of adolescent health topics, creating the NW Native Adolescent Health Alliance.

Four tribal coalition meetings were held during the duration of this research. At the first meeting in January 2009, an intertribal STD/HIV Action Plan was finalized, which included this research activity as an action item for 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).” Prior to the meeting, a preliminary review of online prevention resources (websites, downloadable videos, etc) was compiled by a student intern working with Project Red Talon. These resources were shared and their relevance and utility were discussed by the group. By the second meeting in April 2009, the Native Youth Media Survey tool was complete and ready for use. Coalition members were given copies of the instrument and discussed potential data collection strategies and sites.⁸

At the third meeting in December 2009, participants reviewed and discussed data reports from the Native Youth Media Survey and informal qualitative data obtained from youth attending educational events in the region. The group then reviewed technology-based interventions identified in our systematic literature search, discussed the merits and drawbacks of various intervention strategies, prioritized options in light of resultant data and their own community experiences, and generated recommendations for culturally-appropriate interventions. To support this discussion,

⁸ What would have been an additional Coalition meeting in July 2009 was postponed by Coalition members so that a regional youth gathering could be held during that time period (the Native STAND Youth Summit). This was another activity included in the group’s intertribal STD/HIV Action Plan.

visual examples of available interventions were included in a PowerPoint presentation, which demonstrated possible approaches and available features. This particular meeting had thirty-five attendees, representing seven NW tribes, three Native-specific youth treatment centers, Native American Rehabilitation Association (NARA), NPAIHB, two universities (Oregon Health Sciences University and Portland State University), and three divisions of the Oregon State Department of Human Services (HIV/STD/TB, Indian Education, Alcohol and Mental Health).

At the fourth meeting in February 2010, attendees refined recommended intervention strategies and features by once again reviewing regional data, discussing the merits and drawbacks of possible approaches, prioritizing options, and reviewing regional recommendations. To support the prioritization process, visual examples of available interventions were once again shown, and an automated response system was used to poll attendees on possible features and strategies throughout the discussion. This meeting was attended by forty-seven people representing eighteen NW tribes, one Native-specific youth treatment center (Wembly House), two tribal organizations (NPAIHB and the South Puget Intertribal Planning Agency), one university (University of Washington), and two divisions of the Washington State Department of Human Services (HIV/STD/TB and tobacco prevention).

Youth Participation and Perspectives.

Of equal importance, informal participatory research activities were carried out with Native teens and young adults at several points throughout the study. As described later in this chapter, teens, young adults, and parents from a NW tribe were

consulted during the development of the Native Youth Media Survey instrument. 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.

Audience research is often used by investigators to help understand target audience preferences and identify messages, images, and contexts that resonate with the consumer (Bull et al., 2007). Preliminary audience research was carried out with youth attending the Native STAND Youth Summit, hosted by Project Red Talon from July 27th-31st in Chehalis, WA. A variety of existing media interventions were described and shown to the 29 participating high school students. Students were then asked about the options and features they were most interested in. This process was repeated in November 2009 with roughly 60 high school students attending Chemawa Indian Boarding School, a Bureau of Indian Education residential school located in Salem, OR, and with over 600 AI/AN junior and senior high school students attending the 35th annual NW Indian Youth Conference in April 2010 (<http://nwiyc2010.com>).

As this project moves toward the design and development of technology-based interventions, Project Red Talon will continue to seek youth input and guidance during trainings and community gatherings, and using more formal research processes, including focus groups, pilot tests, and randomized controlled trials.

Community Partners and Topical Experts.

Several partners that work with Native youth were consulted during the research process to ensure that resultant data would be useful and relevant to their

work, including the Executive Director of Native Wellness Institute (NWI), Jillene Joseph; the former Suicide Prevention Coordinator for the Native American Rehabilitation Association, Jason Yarmer (now the Tribal Liaison for the Addictions & Mental Health Division of the Oregon Department of Health); the STD Program Director for the Alaska Tribal Health Consortium, Jessica Leston; and staff from the Indian Health Service's National STD Program, Scott Tulloch and Lori de Ravello.

Additional information was gathered from 65 teachers, parents, and health educators who attended a three-day training on Working with Native Youth, hosted by NWI from August 11-13, 2009 in Portland, Oregon. During my workshop I presented preliminary results from the first 201 survey respondents, and sought their feedback on the accuracy and interpretation of this data. A variety of existing media interventions were then shared with participants, and their relative strengths and weaknesses were discussed. Finally, informal small and large group discussions were used to elicit their opinions and ideas about the sexual health of Native adolescents, technology-based interventions, and cultural considerations for future programming messages.

Several other regional meetings and conferences were also used to inform community stakeholders about the research process, the project's progress to date, and to inclusively seek participants' input and ideas. Tribal delegates to the NPAIHB and members of the Board's Behavioral Health Committee were consulted throughout the project during quarterly board meetings to identify testing sites, share progress to date, and generate interest in resultant interventions.

Native Youth Media Survey

The purpose of the Native Youth Media Survey was to identify: (a) to what extent AI/AN teens and young adults use interactive media technologies (media types, frequency of use, and duration); (b) how AI/AN teens and young adults typically use these technologies (preferred features and activities); and (c) to explore to what extent media technologies might be effectively used to communicate health messages to young people to prevent STDs, HIV, and teen pregnancy.

Survey Design and Validation.

The Native Youth Media Survey was designed by Stephanie Craig Rushing and David Stephens at the NW Tribal Epidemiology Center (EpiCenter), drawing questions from several existing questionnaires that have been implemented and validated in other settings. To help ensure the survey reflected the interests and research priorities of the NW tribes, drafts of the survey were shared with tribal coalition members and other collaborating partners. To improve the reliability of the survey, some questions were purposefully altered to contain consistent answer scales. Similar questions were asked multiple times to assess the accuracy and consistency of provided responses. Where appropriate, questions were added to assess specific tribal contexts and content specific to this study. Appendix A contains a copy of the survey tool (page 216).

Demographic questions for the Native Youth Media Survey were derived from a 2008 survey contracted by the National Campaign to Prevent Teen Pregnancy (2008). Questions and answer choices are noted in Table 3.

Table 3: Native Youth Media Survey, Demographic Questions
Are you male or female?
Multiple choice: 1. Male 2. Female
Age
Open ended, fill-in the blank.
What state do you live in most of the time?
Multiple choice: 1. Oregon 2. Washington 3. Idaho 4. Other: Fill in the blank
Most of the time, do you live in...
Multiple choice: 1. A large urban area – like Portland or Salem – like Seattle, Tacoma, Bremerton, or Spokane – like Boise 2. A more rural area – like eastern Oregon, central Washington, or the Olympic peninsula 3. Other: Open-ended fill-in the blank.
What is your race or ethnicity?
Circle all that apply: American Indian or Alaska Native, Black or African American, White or Caucasian, Asian or Pacific Islander, Hispanic/Latino, Other: Fill-in the blank.

To improve student responses, impertinent states were excluded from the list, “most of the time” was added to questions about where participants lived (to better accommodate youth attending Indian boarding schools), and examples of urban and rural cities in OR, WA, and ID were added to clarify intended responses.

To quantify media technology use patterns and preferences among NW Native youth, several other questions were drawn from the National Campaign's 2008 survey, as shown in Table 4.

Table 4: Native Youth Media Survey, Questions to Quantify Media Technology Use
<p>How often do you use the following technologies? Cell Phone; Computer; The Internet; iPod or other MP3 player; Game consoles like X-box, Playstation, or Wii; Digital Camera; Digital Camcorder; Webcam.</p>
<p>Likert-type matrix anchored at: Every day or Almost Every Day, A few times a Week, A few times a Month, Less Often, Never. To better understand technology use patterns, a frequency scale was added to this question, rather than asking as originally designed: Do you use the following technologies: Yes/No.</p>
<p>Do you:</p> <ul style="list-style-type: none"> Have a profile on a social-networking site (like MySpace or Facebook) View other people's profiles/pictures posted on a social-networking site (like MySpace or Facebook) Write or update a personal blog Regularly read other people's personal blogs Send or receive pictures or videos on a cell phone Send or receive pictures or videos on a computer Post photos online where others can see them Post videos online (like on YouTube) where others can see them Watch TV shows online or on your MP3 Player/iPod Watch videos posted online (like on YouTube)
<p>Multiple choice matrix: Yes, No, Don't know</p>

Several additional questions were derived from the Pew Internet and American Life Project, shown in Table 5 (Amanda Lenhart et al., 2008).

Table 5: Native Youth Media Survey, Pew Questions to Quantify Media Technology Use
<p>Thinking about all the different ways that you socialize or communicate with your friends, about how often do you...</p> <p>Send text messages to each other (via cell phone)</p> <p>Send instant messages to each other (IM - via computer)</p> <p>Send email to each other</p> <p>Send messages through a social networking site like MySpace or Facebook</p> <p>Talk to each other on a cell phone.</p>
<p>Likert-type matrix anchored at: Every day or Almost Every Day, A few times a Week, A few times a Month, Less Often, Never. This scale was amended for consistency with preceding frequency questions.</p>
<p>Do you:</p> <p>Use the Internet to get news or information about movies, TV shows, music groups, or sports stars you are interested in.</p> <p>Use the Internet to get news or information about current events or politics.</p> <p>Use the Internet to get news or information about American Indian events, politics, culture, or your tribe.</p>
<p>Multiple choice matrix: Yes, No, Don't know</p>
<p>Do you play any Massively Multiplayer Online Role Playing Games (MMORPGs) like World of Warcraft, EverQuest, Second Life, Sims, Webkinz, or similar types of games?</p>
<p>Multiple choice: Yes, No, Don't know. To improve student responses, additional MMORPG examples were added to the question.</p>
<p>If you use the Internet, where do you go to access it?</p> <p>Home</p> <p>Someone else's house</p> <p>School</p> <p>Tribal Center/Building</p> <p>A Library</p> <p>A cell phone</p>
<p>Multiple choice matrix: Once a week or more, Less than once a week, Never. Additional sites were added to the list, and answer choices were condensed to reduce respondent fatigue.</p>

Several new questions assessing technology use patterns and preferences were developed specifically for this project, and are included in Table 6.

Table 6: Native Youth Media Survey, New Questions to Quantify Media Technology Use
Thinking about text messages, about how many do you send and receive per day?
Multiple choice: No cell phone; I have a cell phone, but I don't send text messages; 1-10 messages; 11-20 messages; 21-40 messages; 41-60 messages; More than 60 messages per day.
If you use the Internet, how much privacy do you usually have?
Multiple choice: It is usually private, It is sometimes private, It is usually not private.
If you use the Internet, on average, about how much time do you spend online per day?
Multiple choice: Never use the Internet; Less than ½ hour; ½ hour – 1 hour; 1 hour – 2 hours; 2 hours – 4 hours; More than 4 hours.
If you play video games, on average, about how much time do you spend playing per day?
Multiple choice: Never play; Less than ½ hour; ½ hour – 1 hour; 1 hour – 2 hours; 2 hours – 4 hours; More than 4 hours.

These questions were added to collect more specific information about the duration/intensity of youth's technology use practices, and to better understand to what extent respondent's online activities were perceived as private. This question was added to determine whether online health information-seeking was influenced by youth's perceived level of privacy.

To quantify health information-seeking, two questions were drawn from national surveys carried out by the Pew Internet and American Life Project, as shown in Table 7 (S Fox & Jones, 2009).

Table 7: Native Youth Media Survey, Questions to Quantify Online Health Information-seeking
<p>We would also like to know if you've ever searched the Internet or visited websites to get more information about health and wellness. Specifically how many times have you looked for information online about...</p> <ul style="list-style-type: none"> A specific illness or medical problem Diet, nutrition, exercise, or fitness Tobacco products Drugs or alcohol Depression, anxiety, stress, or suicide Sexual health, sexually transmitted infections (STDs), or HIV Dating Contraception or birth control Pregnancy Violence, sexual assault, or bullying Our bodies, body parts, or anatomy.
<p>Multiple choice matrix: Five or more times, Less than five times, Never, Don't know.</p> <p>To better reflect typical adolescent health topics, the list of health topics was amended and new topics were added. To better quantify health information-seeking, a frequency scale was added to this question. Original: Now, we'd like to ask if you've looked for information ONLINE about certain health or medical issues. Specifically, have you ever looked online for...?: Yes/No.</p>
<p>Which of the following resources would you feel most comfortable using to get more information about a sexual health topic like birth control, STDs, or pregnancy?</p> <p>Talking to a parent; Talking to another trusted adult (aunt, uncle, teacher); Talking to a doctor, nurse, or health educator; Talking to a friend or sibling; Reading print materials (books, magazines, brochures, posters); Searching the Internet or visiting a website; Text messaging an expert (via cell phone); Instant messaging an expert (via computer); Watching TV or a DVD; Watching a video from a site like YouTube; Downloading information to an iPod or MP3 player; Playing a multiplayer role-playing game (a fictional character or avatar).</p>
<p>Circle top four selections. The list of resources was expanded to include additional technology-based resources, and the question itself was rewritten to focus specifically on sexual health topics.</p>

Several other new questions were added to the survey to explore other aspects of youth's online health-seeking preferences and priorities, as described in Table 8.

Table 8: Native Youth Media Survey, New Questions to Quantify Online Health Information-seeking Patterns and Preferences
If you were going to use the Internet to get more information about a sexual health topic (like birth control, STDs, or pregnancy), which of the following sites would you feel most comfortable visiting...
<p>Multiple choice.</p> <p>A website designed for:</p> <ol style="list-style-type: none"> 1. American Indian teens and young adults that only covered sexual health topics 2. All teens and young adults that that only covered sexual health topics 3. American Indian teens and young adults that covered a lot of different health topics 4. All teens and young adults that covered a lot of different health topics
<p>If you were going to visit a webpage about health and wellness, what types of features would you like it to have?</p> <p>Instant messaging; Blogs, message boards, or places to post and read personal stories; An “ask the experts” section to get questions answered; Numbers or statistics; Video games; Multiplayer role-playing games (with a fictional character or an avatar); Animations or Flash Player Technology; Music or audio; Videos; Pictures; Photos or videos of people who are the same age as you, going through the same types of life issues; Native American graphics, symbols, and design; Large fonts and bold colors; Links to other websites.</p>
Circle all that apply. The list of features was derived from the general literature on media technologies and from Bull (2007).
<p>If you were going to visit a webpage about health and wellness for teens and young adults, what information would you like it to cover?</p> <p>Current Events; School and Academics; Physical Fitness and exercise; Weight and body image; Nutrition; Diabetes; Native American Culture, Stories, Values, or History; Religion/Spiritual Beliefs; Traditional Methods of Healing for American Indians and Alaska Natives; Depression; Stress; Suicide; Confidence and Self esteem; Violence or Bullying; Tobacco Use; Drug and Alcohol Use; Puberty (physical changes, periods, etc); Dating and relationships; Virginity; Male and Female body parts; Sexual expression & sexual identity; Pregnancy; Birth control and condoms; Sexually Transmitted Diseases (STD) and HIV/AIDS; Sexual assault</p>
Circle all that apply. The list of health topics was derived from adolescent health literature.

Finally, based on the stages-of change TTM model, one question was added to the survey to assess youth's readiness for accessing sexual health information, as shown in Table 9. The development of this question was informed by Prochaska, Arden, and Butler's research on this subject (Arden & Armitage, 2008; Butler et al., 2006; J. O. Prochaska et al., 1994).

Table 9: Native Youth Media Survey, New Question to Assess Youth's Readiness for Accessing Sexual Health Information
Which of the following best describes how you feel right now about sexual health:
<p>Multiple choice:</p> <ol style="list-style-type: none"> 1. I currently do not think about any sexual health topics like birth control, STDs, or pregnancy – These topics are not important to me. (Coded: Precontemplation) 2. I sometimes think about sexual health topics like birth control, STDs, or pregnancy – Someday I think I would like to learn more. (Coded: Contemplation) 3. I think about sexual health topics like birth control, STDs, or pregnancy – I would like to start getting more information right now. (Coded: Preparation) 4. I recently started looking for more information about sexual health topics like birth control, STDs, or pregnancy – These topics are important to me and I'd like to learn more. (Coded: Action) 5. I feel pretty confident that I know a lot about sexual health topics like birth control, STDs, or pregnancy – I don't really need to know much more right now. (Coded: Maintenance)

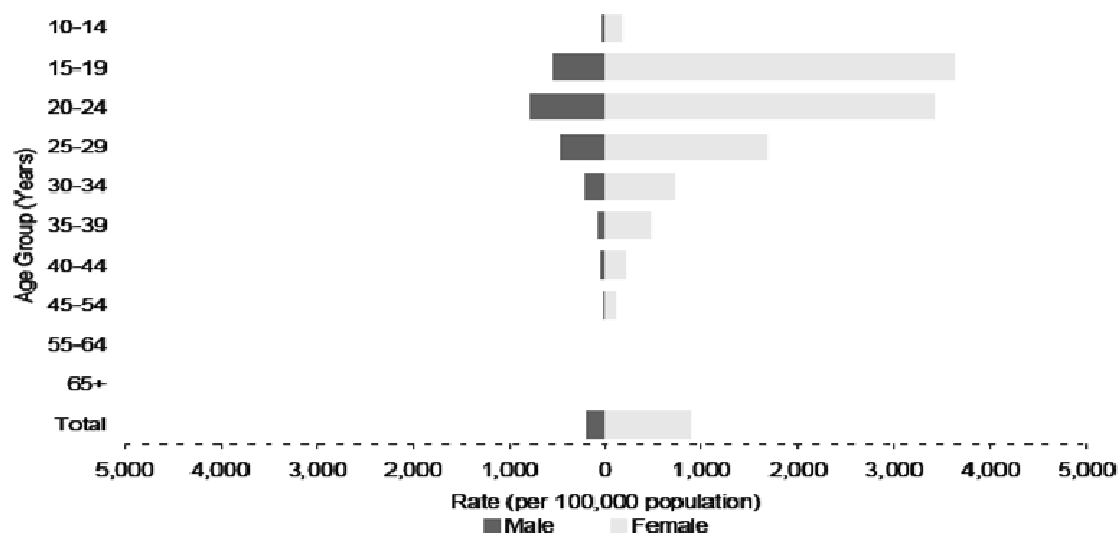
To verify that the questionnaire was readily understood and inclusive of all desired variables and content, the tool was pilot tested with a representative group of teens, young adults, and parents from a NW tribe, following an adolescent reproductive health training. The questionnaire was then modified based on participant feedback, and reviewed by partners with subject matter, technical, and community-level expertise, including the NW Tribal EpiCenter Data Workgroup, the executive director of the Native Wellness Institute, the planning committee for the Northwest Indian Youth Conference, and the Indian Health Service's STD Division. This

iterative process helped improve the reliability and validity of the survey instrument, and helped reduce measurement errors that could have occurred if participants had not understood or misinterpreted questions in the survey.

Population.

To design useful and effective STD/HIV prevention interventions, we were most interested in the responses of youth at risk for acquiring an STD and those slightly younger, prior to sexual début. In the region served by the NPAIHB (ID, OR, WA), chlamydia rates are highest among 15-19 year-olds (see Figure 9). Tribal coalition members thus elected to target junior and senior high school students (roughly 13-21 years) for this survey – prior to and shortly after sexual début.

Figure 9: Chlamydia Rates among AI/AN in the Portland IHS Area (ID, OR, WA), by Gender and Age - 2007 (CDC and Indian Health Service, September 2009)



Data collection for the Native Youth Media Survey involved AI/AN youth living in urban and rural communities in Oregon, Washington, and Idaho. Census

estimates from 2005-2007 for Oregon (114,532), Washington (169,135), and Idaho (33,597) indicate that there are approximately 317,264 individuals living in this region who self-report AI/AN race alone or in combination with one or more other ethnicities. With an estimated 9% falling within the 13-21 age group, the target population for this study consisted of approximately 28,554 AI/AN teens and young adults, approximately half of which were male, and half of which were female.

Sampling.

A variety of convenience⁹ and targeted¹⁰ sampling methods were employed for both pragmatic and purposeful reasons. There are 43 federally-recognized tribes in Oregon, Washington, and Idaho, which would have made it inordinately time and resource intensive to individually select and recruit tribes to participate. Additionally, approaching individual tribes at the study's onset would have limited the number of tribes and grade levels represented in the sample, and would have failed to include AI/AN youth living in urban, non-tribal communities.

Consequently, the paper-based survey was administered at several different locations targeting NW Native youth between April and November 2009:

- The 2009 Northwest Indian Youth Conference, hosted by the Coeur d'Alene Tribe, which took place April 2-7th, 2009 in Spokane, WA. Over 350 youth, parents, and mentors registered for the conference, representing thirteen tribes and one tribal Boarding School: Muckleshoot, Klamath, Coeur d'Alene, Shoshone-Bannock, Spokane, Squaxin Island, Quinault Nation, Nisqually, Yakama, Nez Perce, Lummi, Colville, Sauk-Suiattle, and Chemawa.

⁹ Convenience sampling involves a sample that is drawn from an available/easy-to-reach source.

¹⁰ Targeted sampling, also referred to as "judgment sampling," involves selecting sites based on a specific feature, treatment, or condition.

- The Native STAND¹¹ Youth Summit, hosted by Project Red Talon, which took place July 27th-31st, 2009 in Chehalis, WA. The week-long STD/HIV training was attended by youth representing 4 NW tribes and one urban area, including: Shoalwater Bay Indian Tribe; the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw; the Colville Confederated Tribes; the Quileute Tribe; and Portland, OR.
- The Yakama Nation Tribal High School in Yakama, WA.
- The Shoshone-Bannock High School in Ft. Hall, ID, in the school's junior and senior high health class.
- Chemawa Indian Boarding School in Salem, OR, in 4 periods of the school's health class and at the Native STAND kick-off retreat.
- Nixyáawii High School at the Confederated Tribes of the Umatilla Reservation, in Pendleton, OR.
- The Klamath Nation Back-to-School Pow wow and at the Wembly House Treatment Program in Klamath Falls, OR.

The 2009 Northwest Indian Youth Conference was specifically selected as a venue due to the number, diversity, and age range of youth who participate. The annual event is attended by junior and senior high school students, recent high school graduates no longer in school, youth from urban and rural communities, and a number of parenting teens. The conference is held during spring break to encourage participation from as many AI/AN youth as possible from throughout the region. The registration fee is kept deliberately low, scholarships are available, and tribal prevention staff chaperone groups of youth to attend. The conference is youth planned and directed, attracting a national group of presenters with expertise in adolescent

¹¹ Native STAND is a healthy decision-making peer education curricula for high school students.

health and development. The Native STAND Youth Summit was selected for similar reasons, drawing urban and rural AI/AN youth from throughout the Pacific Northwest.

After reviewing preliminary demographics (age, gender, state, urban/rural status), targeted sampling was then used to increase participation among demographic groups underrepresented in the sample, particularly youth living in Oregon. The survey was also administered at one tribal school per state, to ensure broad geographic representation, and at the only Bureau of Indian Education residential school in the region, Chemawa Indian School.

Sampling Bias.

When used together, convenience and targeted sampling methods can help alleviate potential sampling errors and improve the external validity of a study – in this case, ensuring that youth from a variety of backgrounds and settings were included in the sample, and that specific states and regions were not overrepresented or underrepresented in the sample population. Sample population demographics are shown and discussed in Table 10 on page 106.

Because the surveys were collected at multiple venues, a sampling bias could have occurred if participants completed the survey on more than one occasion. To prevent this situation, youth at venues following the Northwest Indian Youth Conference and the Native STAND Youth Summit were explicitly asked during the consent process if they had heard about, seen, or taken the survey before, or if they had attended either event (no students at the Native STAND Summit had attended the NW Indian Youth Conference). The only overlap in attendance took place at

Chemawa, where three students in the health class were also Native STAND peer educators. These students were already known by the Principal Investigator, who participated in their training as peer educators. One of the students chose not to retake the survey, and the two remaining duplicative surveys were marked and excluded from analysis.

Participant Recruitment and Consent.

At all venues, the survey was reviewed and approved by appropriate conference, event, or school administrators prior to delivery. In several cases this was facilitated by local health educators involved in the Red Talon STD/HIV Coalition or members of the NPAIHB Behavioral Health Committee. At each site, Project Red Talon or a trained collaborating partner gave participants a verbal description of the survey's purpose, general content, and an assurance of confidentiality. The survey itself took 20-30 minutes to complete. Depending on the site, respondents were given either a raffle ticket for the chance to win one of several larger prizes (like an iPod shuffle or \$25 gift certificate) or individual gifts (water bottle, snack) in appreciation for their time. Gifts/prizes were selected by local youth or tribal health educators. At all venues, participating youth had parents, teachers, or chaperones present who could answer personal questions about the health topics included in the survey, if needed. Project Red Talon also offered age-appropriate fact sheets and brochures.

Because the survey was completely anonymous¹² and posed no more than minimal risk to participants, a waiver for written or parental consent was requested and received from Portland State University's (PSU) Human Subjects Research

¹² Participant names, birthdates, and tribal affiliation(s) were not collected.

Review Committee (HSRRC) and from the Portland Area Indian Health Service's Institutional Review Board (PA IHS IRB). Informed consent was achieved by having the Principal Investigator or a community partner introduce the survey's purpose and content to participants, describe how the data would be used, assure anonymity and confidentiality, describe how the data would be used in aggregate form, and answer any questions participants might have. The survey included a brief, but detailed cover letter discussing all topics needed for informed consent (see Appendix A). Informed assent was thus assumed for those who completed and submitted the survey.

Human Subjects Protection.

To ensure human protections throughout the research process, the research protocol was submitted to PSU's HSRRC (#09880) and the PA IHS IRB (#09-P-03). Approval was obtained from both committees prior to data collection.

Statistical Power.

PASS software (2008, Kaysville, UT) was used to determine an adequate sample size of 371 respondents for this study, which would allow results to be reported with an error of $\pm 5\%$ at the 95% confidence level.

Inclusion and Exclusion Criteria.

When the survey was administered at a conference or training, all participants were invited to complete the survey (regardless of age, ethnicity, or tribal affiliation) to make sure all attendees felt included in the process. Participants were told, however, that only respondents who met the study's selection criteria would be included in the final report. All respondents who were not American Indian or Alaska Native (alone

or in combination with other race/ethnicities), between the ages of 13 and 21 years old, and living in Oregon, Washington, or Idaho were excluded from analysis. Three youth at tribal schools who did not report their age were also excluded from analysis. Participants who did not report rural or urban residence were not excluded. In total, sixty-six respondents were excluded from analysis, most of whom were parents and mentors attending the NW Indian Youth Conference.

Data Management and Analysis.

All data collected during the conduct of these surveys were held in the strictest confidence by NW Tribal EpiCenter staff. Electronic datasets were entered and managed by the Principal Investigator and a trained project assistant using EpiData (version 3.1, Odense Denmark). Double entry procedures were used to verify the completeness and accuracy of all entered data to minimize potential processing errors. All data were entered as reported by participants, with two exceptions: (a) all students attending Chemawa Indian School were entered as Oregon residents living in an urban area; and (b) for those students who wrote in “reservation,” “country,” or “small town” as their location of residence, their responses were re-coded as “a rural area” during final analyses. Both modifications were made to improve reporting consistency.

Data were analyzed using SPSS (version 17.0, Chicago, IL) by generating descriptive statistics for variables of interest (e.g., means, frequencies, percentages, counts). To explore differences associated with recruitment site, data were also analyzed separately by site. For the purposes of this study, I was particularly interested

in differences in technology use and health information-seeking behavior across demographic factors (age, gender, urban/rural residence) and across reported readiness levels. For those questions that have appeared in national surveys, results were included side-by-side, allowing rough comparisons to be made by race/ethnicity (comparing AI/AN youth to youth from the U.S. general population). Where this was done, every effort was made to compare like age groups, resulting in different groupings for different questions.

To explore other outcomes of interest, several dichotomous variables were created for comparison using chi-square analyses: urban/rural, frequent/infrequent media users, ever/never Internet health information-seeking. Correlations were also used to explore relationships between age, gender, level of readiness, and key technology use activities. Cells with five or fewer respondents were suppressed to protect anonymity. Only seven participants were between the ages of 19-21 years. Their data were excluded from age group comparisons stratified by gender.

Generalizability.

Based on the sampling methods employed, the resultant data can be generalized to AI/AN youth living in urban and rural communities in Idaho, Oregon, and Washington, who are in junior or senior high school or who are actively involved in prevention activities carried out by their tribe or by urban Indian organizations. As intended, this is the group that will be most likely to participate in technology-based interventions ultimately developed by the NPAIHB. Data from this project cannot be

generalized to other regions of the country, and does not accurately represent individual tribes within the Northwest.

Intervention Literature Search for Systematic Review

The second component of this study involved a systematic review of technology-based sexual health interventions. To locate appropriate articles, key terms were used in academic search engines, including *technology*, *Internet*, *online*, *computer-based*, *cell phone*, *text message*, and *video game* 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*. The search was expanded by reviewing the citations of articles that closely aligned to the search criteria. This search yielded thousands of citations; 202 were deemed potentially relevant by the Principal Investigator and were archived in an Endnote (ver. 10) database. Studies were then screened in several stages using explicit inclusion criteria, referencing the full-text article when necessary.

Intervention Selection Criteria.

Studies included published articles or reports documenting the development or evaluation of sexual health interventions implemented using a media technology (e.g., computer, Internet, cell phone, video game, interactive video/DVD). This 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. Studies 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). Twenty-nine interventions identified through this process 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).

Data Extraction for Systematic Review.

Two researchers coded the interventions independently on variables of interest to the study in a Microsoft Excel spreadsheet. Variables included:

- **General Information:** title, authors, source, date published, author contact information.
- **Study Methods:** aim of study, study design, participant recruitment.
- **Interventions:** brief description, development process, theoretical framework, purpose/health focus of intervention, implementation setting, duration of intervention, message content, message tailoring criteria, features and modalities, user control, privacy.
- **Target Population:** geographic location, age, gender, ethnicity, socioeconomic status.
- **Outcomes:** changes in behavior, knowledge, attitudes, perceptions, or 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 in the data collection matrix to ensure that classification was consistently and accurately applied throughout the process (see Appendix D, page 251). 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 email or phone. Thirteen out of sixteen investigators responded to such inquiries, answering questions directly or sending other pertinent documents for review.

Chapter 4: Results

Native Youth Media Survey

A total of 405 surveys were included in the following analyses. Table 10 shows the demographic characteristics of the population included. All together, slightly more females (57%) participated in the Native Youth Media Survey than males (43%), and the mean age of participants was just over 15 years. More respondents participated from Washington and Oregon than from Idaho, which is consistent with the AI/AN population distribution for the three-state region.

Table 10: Respondent Demographics by Gender, Age, State, Urban/Rural Status, and Race/Ethnicity – 2009			
	Male (n)	Female (n)	Total %
Age (mean)	15.9	15.6	15.7
13-15 years	62	103	41%
16-18 years	108	125	58%
19-21 years	3	4	2%
State			
Oregon	72	72	36%
Washington	65	94	39%
Idaho	36	66	25%
Geography			
Urban	68	89	39%
Rural	101	134	58%
Other/Missing	4	9	3%
Race/Ethnicity			
AI/AN Alone	138	174	77%
Multi-racial AI/AN	35	58	23%
Total	173	232	100%
<i>Note.</i> Due to rounding, percentages may not add up to 100%.			

Three percent of survey respondents did not report rural or urban residence. The majority of respondents (58%) were from rural communities, consistent with the geographic locations of NW reservations. As intended, the sample was more reflective of tribal youth than of urban AI/AN youth, reflecting the primary target audience of the NPAIHB. Altogether, about one-quarter (23%) of the survey's respondents reported multiracial heritage in addition to AI/AN ethnicity.

Table 11 stratifies respondent characteristics by collection site. The location of participating schools was purposely excluded to protect tribal identity. Aside from location of residence, which understandably varied by site, there were no critical differences between sites with regard to the age or gender of participants, or their reported technology use behaviors and preferences. Each school received a report containing its own respondents' data, but to protect tribal identity, these data are not included in the dissertation. On average, students at the four participating tribal schools were slightly older than students at the Northwest Indian Youth Conference, but by less than one year.

Table 11: Respondent Demographics by Sample Site, Age, and Gender – 2009					
	Northwest Indian Youth Conference n = 196	Tribal School A n = 81	Tribal School B n = 28	Tribal School C n = 16	Tribal School D n = 43
Age (mean)	15.5	16.3	16.3	16.4	16.1
13-15 yrs	47%	30%	29%	6%	33%
16-18 yrs	52%	67%	71%	94%	65%
19-21 yrs	1%	4%	0%	0%	2%
Gender					
Male	37%	48%	68%	44%	42%
Female	63%	52%	32%	56%	58%
Total	100%	100%	100%	100%	100%
<i>Note.</i> School names and locations are not included to protect tribal identity. Due to rounding, percentages may not add up to 100%.					

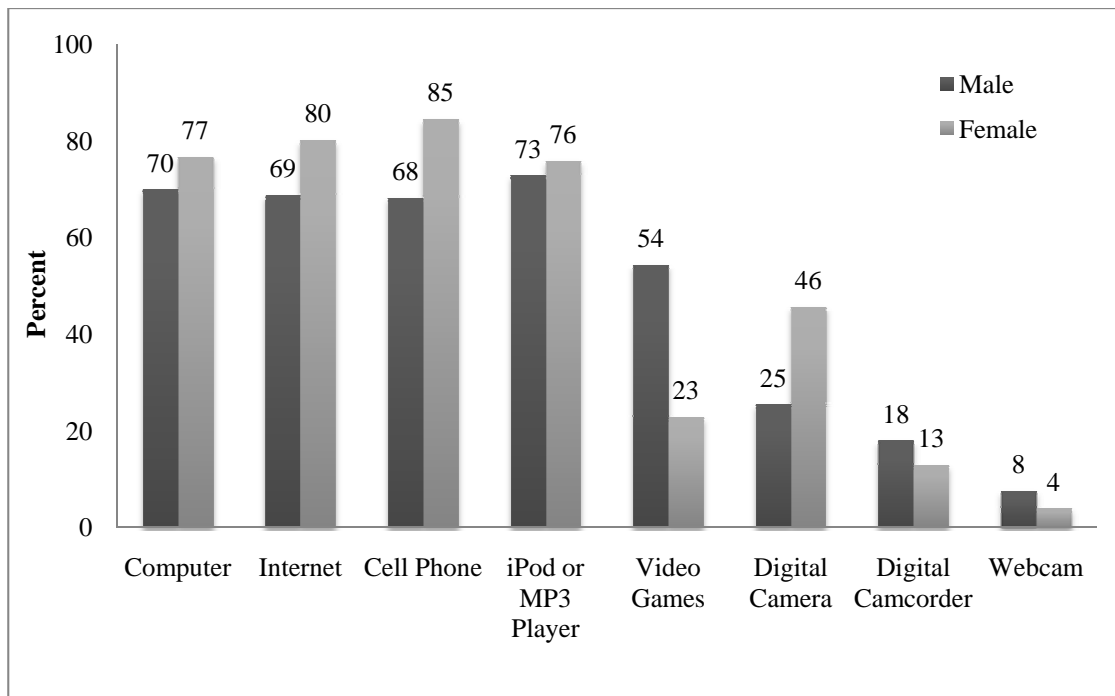
Media Technology Access and Use.

As shown in Table 12, NW AI/AN teens and young adults (13-21 years of age) reported using a wide variety of media technologies in their daily lives, including: cell phones (78%), the Internet (75%), iPods and MP3 players (75%), computers (74%), digital cameras (37%), and video games (36%). Less than 3% of respondents reported never using computers or the Internet and only 6% reported never using cell phones.

Table 12: Daily or Weekly Media Technology Use among NW AI/AN Youth (age 13-21 years), by Age and Urban/Rural Status – 2009					
	Age 13-15 yrs n = 165	Age 16-18 yrs n = 233	Rural n = 235	Urban n = 157	Total N = 405
Computer	72%	75%	76%	71%	74%
Internet	73%	76%	76%	75%	75%
Cell Phone	78%	77%	81%	72%	78%
Video Games	36%	36%	38%	33%	36%
iPod/MP3 Player	74%	75%	75%	74%	75%
Digital Camera	42%	33%	39%	34%	37%
Camcorder	18%	12%	13%	17%	15%
Webcam	4%	6%	5%	6%	5%

Similar to other national surveys conducted among teens (A. Lenhart et al., 2005), NW Native females reported more technology use than Native males (see Figure 10). The only exceptions to this trend were for video games, camcorders, and webcams, where AI/AN males reported more frequent use than AI/AN females.

Figure 10: Daily or Weekly Technology Use Among
NW AI/AN Youth (age 13-21 years), by Gender – 2009



Among NW Native females, cell phones were the most frequently used technology, with 85% of respondents using a cell phone on a daily or weekly basis. This was followed closely by computer/Internet use (77% and 80%) and iPod use (76%). A considerable proportion of AI/AN young women also reported frequent digital camera use (46%). About one-quarter (23%) reported playing video games on a daily or weekly basis, 13% reported using a digital camcorder, and 4% reported using a webcam with that frequency.

Among NW AI/AN males, digital music players were the most frequently used media technology, with nearly three-quarters (73%) of respondents using an iPod or MP3 player on a daily or weekly basis. This was followed closely by computers/Internet (69% and 70%) and cell phone (68%) use. Over half (54%) of AI/AN young men reported playing video games on a daily or weekly basis, and one-quarter (25%) reported frequent use of a digital camera. As was found among female youth, very few males reported frequent use of digital camcorders (18%) or webcams (8%).

Chi-square analyses indicated that there were no significant differences between frequent and infrequent computer users in relation to age, gender, or urban/rural status. Nor were significant differences found between iPod, camcorder, or webcam users on these demographic factors. The only significant difference was for digital camera use, where girls were more likely to report frequent use than males (47% and 26% respectively; $p < .01$) (see Table 13). Differences in Internet, cell phone, and video game use will be described in greater detail in the following sections.

Table 13: Differences in Frequent Media Technology Use Among NW AI/AN Youth (age 13-21 years), by Gender – 2009						
	Total n = 397	Male n = 168	Female n = 229	X ²	df	p
Computer	75%	72%	78%	1.697	1	.19
iPod/MP3 Player	76%	75%	77%	.183	1	.67
Digital Camera	38%	26%	47%	17.876	1	<.01**
Camcorder	16%	19%	13%	1.922	1	.17
Webcam	6%	8%	4%	2.600	1	.11
<i>Note.</i> Frequent = Daily or weekly use; Infrequent = Monthly or less frequent use.						
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.						

Internet Access and Use.

Like other U.S. teens and young adults, NW Native youth reported high levels of Internet use and a wide variety of online behaviors. Chi-square analyses revealed significant differences in Internet use by gender, with females reporting more frequent Internet use than males (82% and 71% respectively; $p=.01$). Differences between age groups and urban/rural status were not significant (see Table 14).

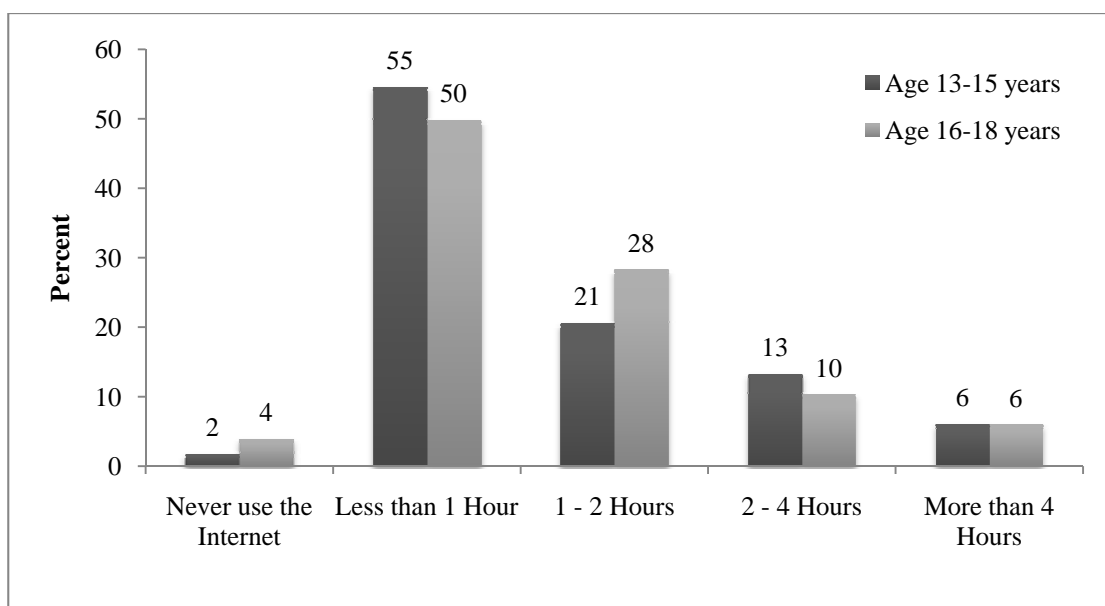
Table 14: Differences in Internet Use among NW AI/AN Youth, by Gender, Age, and Urban/Rural Status – 2009					
	Frequent Internet Use n = 305	Infrequent Internet Use n = 89	X ²	df	p
Gender			6.277	1	.01*
Male	71%	29%			
Female	82%	18%			
Age			3.446	2	.18
13-15 years	74%	26%			
16-18 years	79%	21%			
Geography			4.360	3	.23
Urban	77%	23%			
Rural	78%	22%			
<i>Note.</i> Frequent = Daily or weekly use; Infrequent = Monthly or less frequent use.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Most NW AI/AN teens and young adults who participated in the Native Youth Media Survey reported using the Internet 30 minutes to one hour per day (30%), or one to two hours per day (25%), with similar patterns reported by males and females (see Table 15). Altogether, 73% reported using the Internet 30 minutes or more per day. Slight differences in the duration of Internet use occurred by geographic location and age. AI/AN youth living in urban locations were more likely to report using the Internet less than 30 minutes per day (27%, compared with 18% of rural youth), and AI/AN teens living in rural locations were more likely to report using the Internet more than four hours per day (9%, compared with 3% of urban youth).

Table 15: Duration of Internet Use Per Day among NW AI/AN Youth (age 13-21 years), by Gender and Urban/Rural Status – 2009					
	Male n = 173	Female n = 232	Rural n = 235	Urban n = 157	Total N = 405
Never use the Internet	5%	1%	3%	3%	3%
Less than 1 Hour	52%	52%	48%	60%	52%
1 - 2 Hours	25%	25%	26%	22%	25%
2 - 4 Hours	11%	12%	12%	10%	12%
More than 4 Hours	5%	7%	9%	3%	6%
<i>Note.</i> Due to rounding, percentages may not add up to 100%.					

As shown in Figure 11, younger teens (age 13-15 years) were more likely than older teens to report using the Internet less than one hour per day (55%, compared with 50%), and older teens (age 16-18 years) were more likely than younger teens to report using the Internet one to two hours per day (28%, compared with 21%).

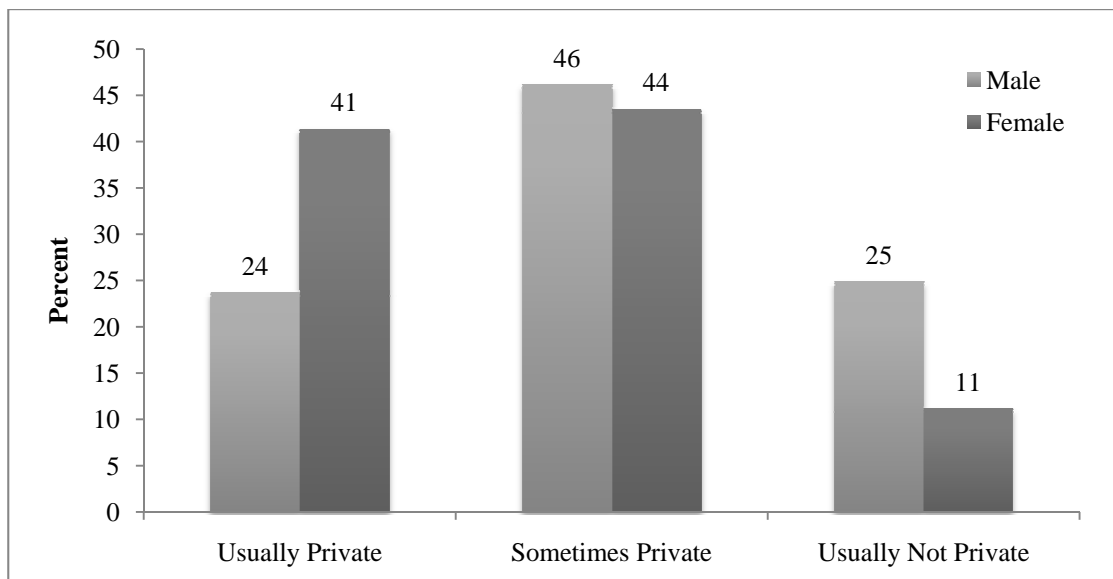
Figure 11: Duration of Internet Use Per Day among NW AI/AN Youth, by Age – 2009



Most NW Native teens and young adults reported accessing the Internet at home (50%) and at school (47%). A sizable proportion also reported accessing the Internet from a cell phone (36%), a condition that did not differ significantly by age or rural/urban status. Similar patterns of Internet access were reported by both genders, except for at home, where 55% of young women and 43% of young men reported having access. Similar patterns of access were also reported by age and geographic location (urban/rural).

AI/AN youth reported varying levels of privacy during their Internet use, a condition that remained fairly consistent between age groups and by urban/rural status. In general, NW Native females reported more privacy during their Internet use than NW Native males (see Figure 12). Altogether, nearly 85% of Native females reported that their Internet use was usually or sometimes private, compared with less than 70% of Native males.

Figure 12: Privacy of Internet Use among NW AI/AN Youth (age 13-21 years), by Gender – 2009



While on the Internet, NW AI/AN youth reported both a wide spectrum and a considerable amount of online activity (Tables 14 and 16). The vast majority of youth reported having a profile on a social networking site (SNS) like MySpace or Facebook (87%), viewing other people's profiles (80%), watching videos on sites like YouTube (77%), and posting photos online (71%). A significant proportion of youth also reported using the Internet to get news or information about movies, TV shows, music

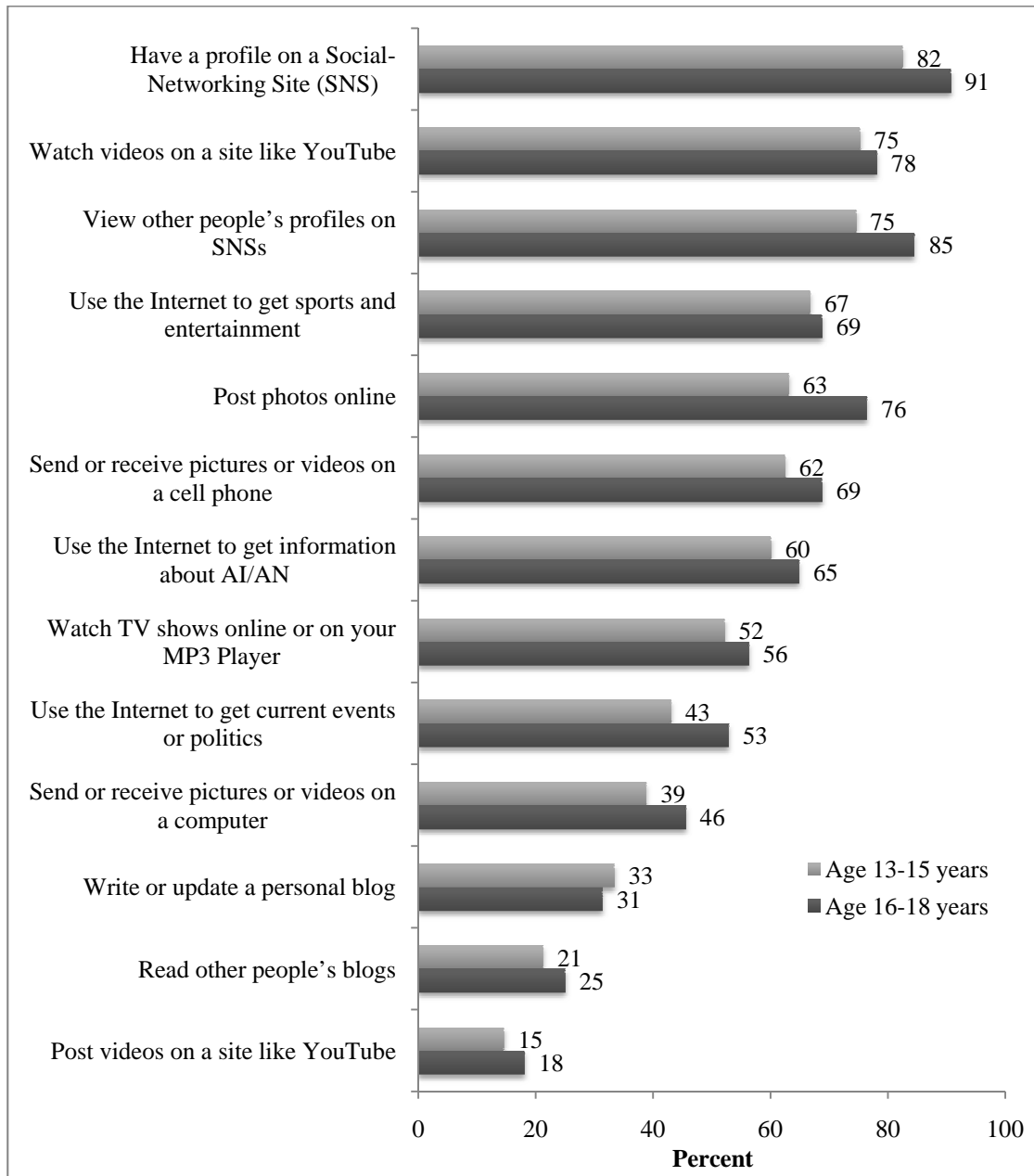
groups, or sports (68%), and to get news or information about AI/AN events, politics, culture, or their tribe (63%) (see Table 16, page 118). In total, over half (53%) of AI/AN youth indicated that they participate in seven or more online activities, and 12% reported participating in 10 or more queried activities.

Just as NW Native girls reported more frequent Internet use than their male counterparts, females also reported significantly more online activities. Compared with males, more Native females reported having an online profile (92%, compared with 80% of males, $p=.01$), writing or reading a personal blog ($p<.01$ and $p=.02$ respectively), or posting photos online (80%, compared with 59% of males, $p<.01$). Female respondents were also more likely than males to report using the Internet to get news or information about current events (52% and 49% respectively), entertainment (72% and 62% respectively), or AI/AN events, politics, culture, or their tribe (66% and 59% respectively), though these differences were not statistically significant. The only activities that AI/AN males did more often than females was post and watch videos on a website like YouTube. Native males posted videos significantly more often than females (24%, compared with 11% of females; $p<.01$).

Table 16: Differences in Selected Online Activities among NW AI/AN Youth (age 13-21 years), by Gender – 2009						
	Total n = 405	Male n = 173	Female n = 232	X ²	df	p
Have a profile on a Social Networking Site (SNS)	87%	80%	92%	13.048	3	.01*
View other people's profiles on a SNS	80%	70%	88%	21.193	3	<.01**
Write or update a personal blog	32%	22%	40%	20.001	3	<.01**
Read other people's personal blogs	24%	18%	28%	9.964	3	.02*
Send or receive pictures or videos on a computer	43%	42%	43%	4.617	3	.20
Post photos online where others can see them	71%	59%	80%	24.261	3	<.01**
Post videos online (like on YouTube)	17%	24%	11%	19.731	3	<.01**
Watch videos posted online from a site like YouTube	77%	78%	76%	4.382	3	.22
Use Internet to get news about sports and entertainment	68%	63%	72%	6.068	3	.11
Use Internet to get news about current events or politics	49%	49%	52%	5.768	3	.12
Use Internet to get news about AI/AN events, politics, culture, or tribe	63%	59%	66%	5.893	3	.12
Pearson chi-square analysis. * p < .05, two-tailed. ** p < .01, two-tailed.						

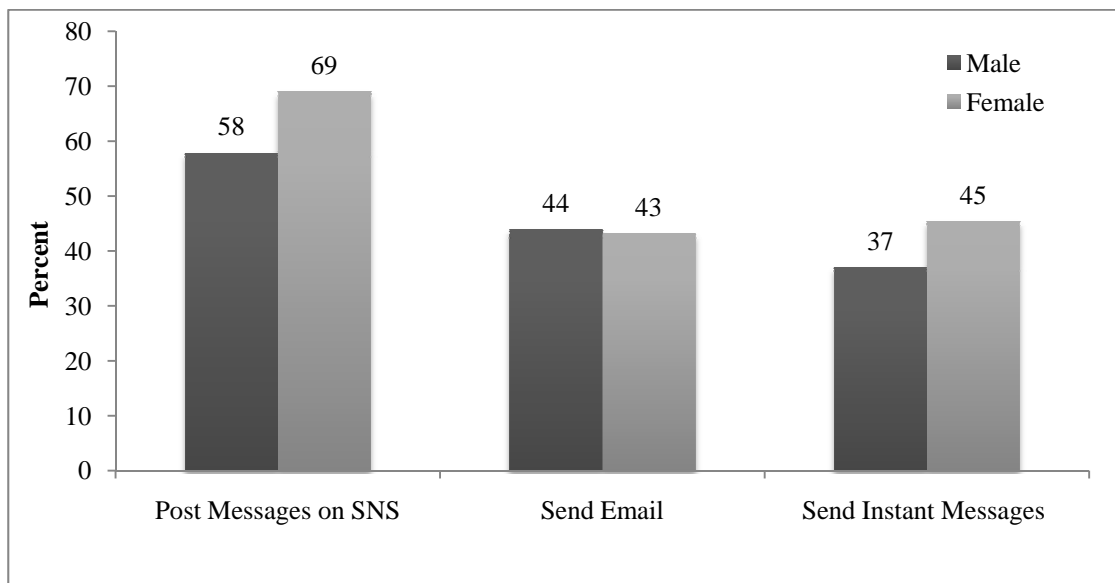
Similarly, older teens (age 16-18 years) reported higher levels of online activity than younger teens (age 13-15 years), though these differences were not statistically significant (see Figure 13).

Figure 13: Selected Online Activities among NW AI/AN Youth, by Age – 2009



NW Native youth also reported using the Internet to communicate with their friends via instant messages (IM), emails, and posts on social networking sites (SNS). Over two-thirds (64%) of all NW AI/AN respondents reporting posting messages to their friends through a SNS on a daily or weekly basis (58% of males and 69% of females) (see Figure 14). Nearly 44% of all AI/AN youth reported sending their friends emails (44% of males and 43% of females), and 42% reported sending IM as often (37% of males and 45% of females).

Figure 14: Daily or Weekly Online Peer Communication among NW AI/AN Youth (age 13-21 years), by Gender – 2009



Cell Phone Access and Use.

Of all the technologies included in the Native Youth Media Survey, cell phones were the technology most frequently used – to talk, text, access the Internet, and send or receive images. Only 17% of NW AI/AN youth reported not having a cell phone. In chi-square analyses, significant differences in frequent cell phone use were found by gender, with higher rates reported among females (86% compared with 70% of males; $p < .01$) (see Table 17). Rural youth reported more frequent cell phone use than urban youth (83% and 73% respectively), a difference that did not achieve statistical significance.

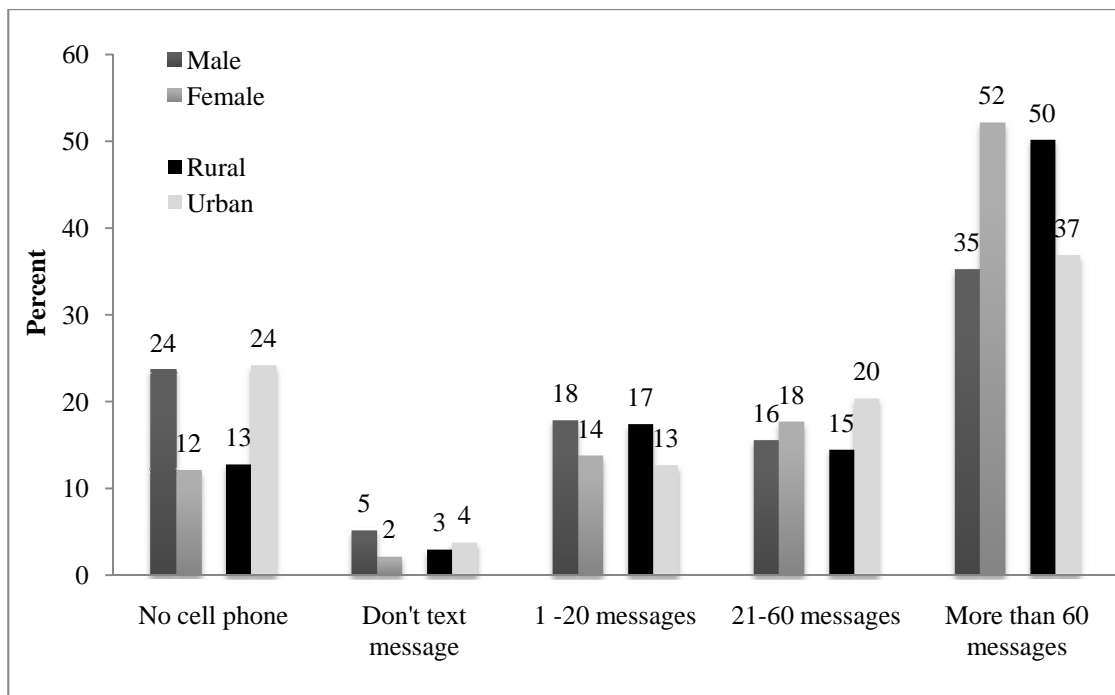
Table 17: Differences in Cell Phone Use among NW AI/AN Youth, by Gender, Age, and Urban/Rural Status – 2009					
	Frequent Cell Phone Use	Infrequent Cell Phone Use	X^2	df	p
Gender			16.104	1	<.01**
Male	70%	30%			
Female	86%	14%			
Age			.214	2	.90
13-15 years	80%	20%			
16-18 years	79%	21%			
Geography			6.266	3	.10
Urban	73%	27%			
Rural	83%	17%			
<i>Note.</i> Frequent = Daily or weekly use; Infrequent = Monthly or less frequent use.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Gendered differences in cell phone use also occurred for other cell phone activities. Nearly 72% of NW Native females and 63% of males reported using cell phones to talk to their friends on a daily or weekly basis ($X^2=3.738$, $df=1$, $p=.05$; data not shown). Nearly 86% of females and 67% of males reported text messaging their friends as often ($p<.01$, see Table 18), and approximately 72% of females and 58% of males reported using their cell phone to send or receive pictures or videos ($X^2=10.814$, $df=3$, $p=.01$; data not shown). Fairly similar proportions of male and female youths reported accessing the Internet from their cell phone (32% of males, 39% of females).

Table 18: Differences in Text Messaging Friends among NW AI/AN Youth, by Gender, Age, and Urban/Rural Status – 2009					
	Frequent Texting	Infrequent Texting	X^2	df	p
Gender			18.471	1	<.01**
Male	67%	33%			
Female	86%	15%			
Age			.264	2	.88
13-15 years	78%	23%			
16-18 years	78%	22%			
Geography			6.056	3	.11
Urban	73%	27%			
Rural	81%	19%			
<i>Note.</i> Frequent = Daily or weekly use; Infrequent = Monthly or less frequent use.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Altogether, NW Native youth reported sending and receiving a substantial number of text messages per day (see Figure 15). Of those who had cell phones, nearly all used its text messaging feature – at least occasionally. Female respondents sent and received the greatest number of text messages, with 52% of females exchanging more than 60 messages per day. Text messaging patterns were fairly similar by age group; the most marked differences occurred by gender and urban/rural status (Figure 15).

Figure 15: Number of Text Messages Exchanged Per Day by NW AI/AN Youth (age 13-21 years), by Gender and Urban/Rural Status – 2009



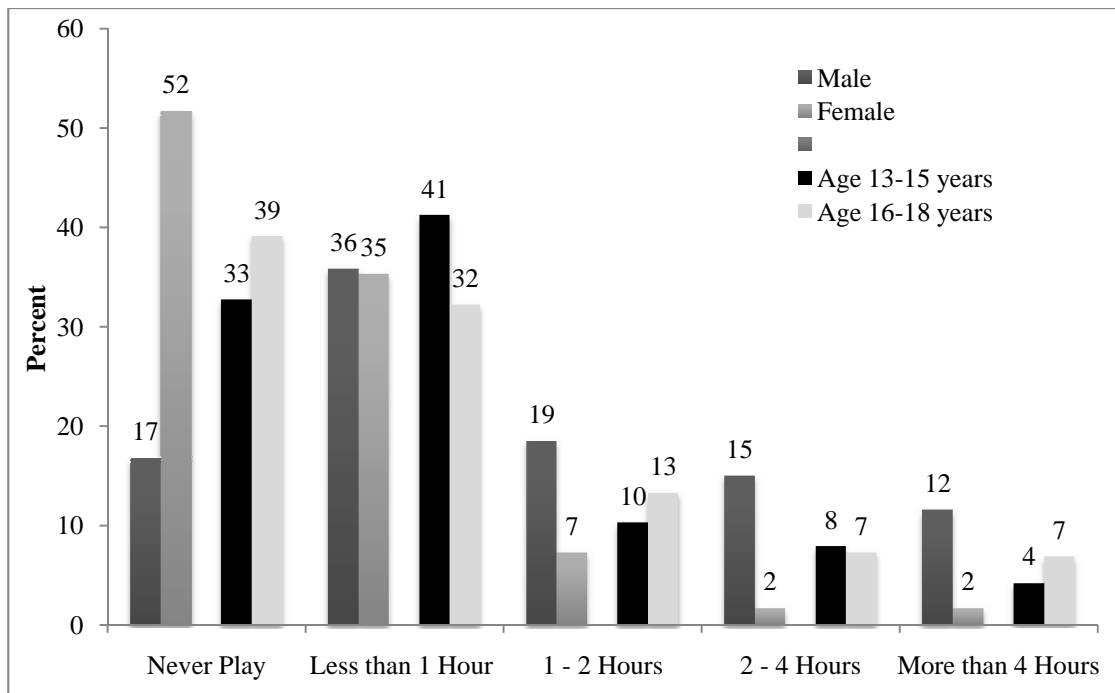
Video Game Access and Use.

Among NW Native youth, playing video games was most frequently reported by young men. Altogether, one-quarter (25%) of Native males (13-21 years) reported playing video games every day or almost every day, and an additional 63% reported playing on an occasional basis. Significant differences in video game use were observed between males and females ($p < .01$), but not between age groups or by geographic location (Table 19).

Table 19: Differences in Video Game Use among NW AI/AN Youth, by Gender, Age, and Urban/Rural Status – 2009					
	Frequent Video Game Use	Infrequent Video Game Use	X ²	df	p
Gender			45.041	1	<.01**
Male	56%	44%			
Female	23%	77%			
Age			1.216	2	.54
13-15 years	37%	63%			
16-18 years	37%	63%			
Geography			2.104	3	.55
Urban	34%	66%			
Rural	39%	61%			
<i>Note.</i> Frequent = Daily or weekly use; Infrequent = Monthly or less frequent use.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

When playing video games, 12% of all youth reported playing one to two hours per day, 7% reported playing two to four hours, and 6% reported playing more than four hours per day. As shown in Figure 16, these rates varied most markedly by gender and age.

Figure 16: Duration of Video Game Use Per Day among NW AI/AN Youth, by Gender and Age – 2009



Altogether, only 12% of respondents reported playing massively multiplayer online role-playing games (MMORPG), a response that varied by gender (male – 16%, female – 9%). Few respondents wrote in the names of the MMORPGs that they played, but those who did most frequently mentioned: SIMS (n=10), World of Warcraft (n=7), Halo (n=5), Gears of War (n=2), Call of Duty (n=2), Mobsters (n=2), and Modern Warfare (n=2).

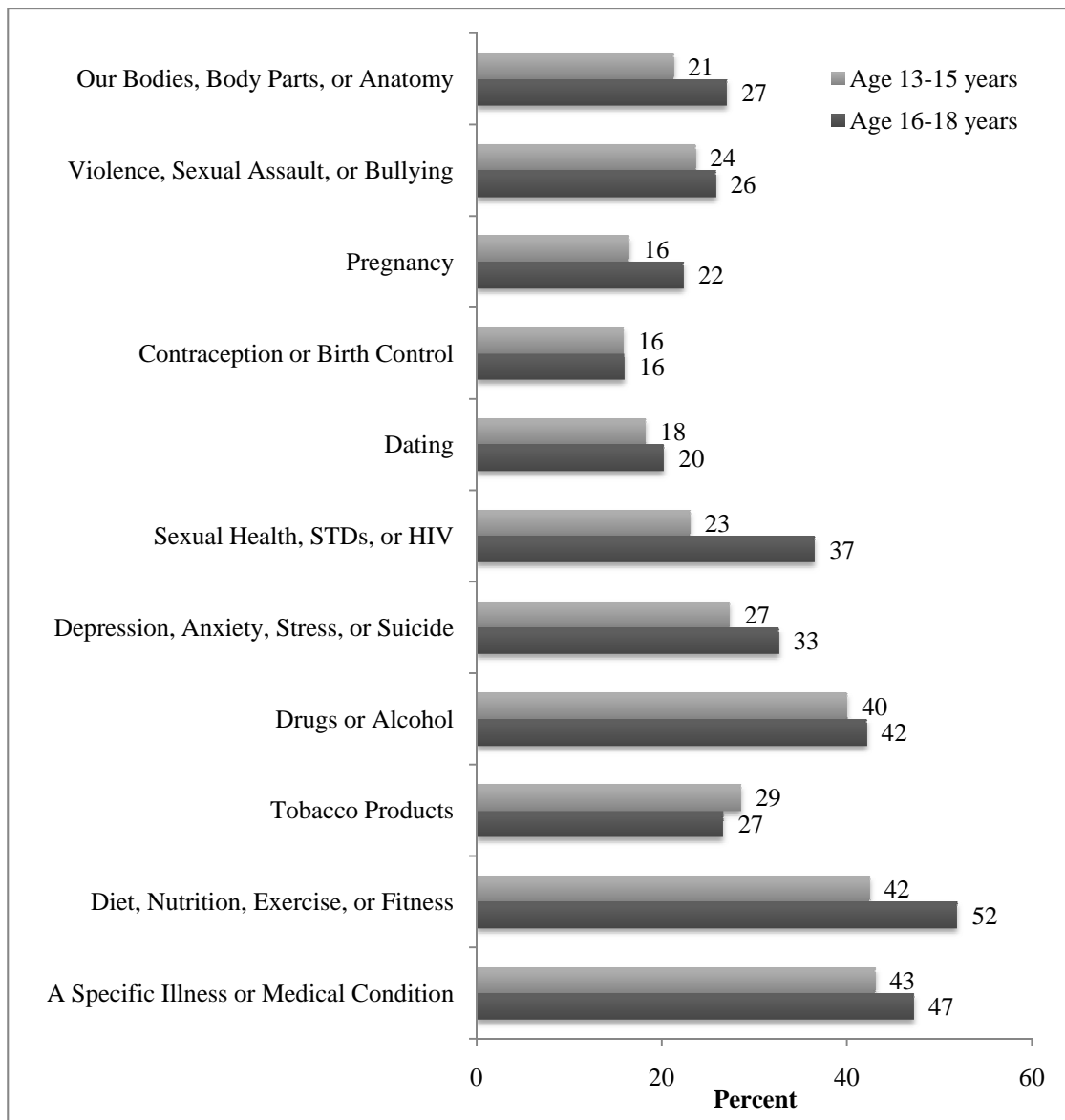
Online Health Information-Seeking.

NW Native youth reported using the Internet to get health information on a wide variety of topics, including: diet, nutrition, exercise, or fitness (50%); specific illnesses or medical conditions (47%); drugs or alcohol (42%); sexual health, STDs, or HIV (32%); and depression, anxiety, stress, or suicide (32%) (see Table 20). All together, 76% of respondents reported using the Internet to get information on at least one health topic listed in the survey, and 40% reported searching for three or more health topics. In all categories, a greater proportion of AI/AN females reported searching online for health information than AI/AN males.

Table 20: Ever Having Searched the Internet for Select Health Information among NW AI/AN Youth (age 13-21 years), by Gender – 2009			
	Male n = 173	Female n = 232	Total N = 405
Diet, Nutrition, Exercise, or Fitness	43%	52%	50%
A Specific Illness or Medical Condition	40%	50%	47%
Drugs or Alcohol	36%	44%	42%
Depression, Anxiety, Stress, or Suicide	24%	35%	32%
Sexual Health, STDs, or HIV	26%	35%	32%
Tobacco Products	23%	31%	28%
Violence, Sexual Assault, or Bullying	20%	28%	25%
Our Bodies, Body Parts, or Anatomy	20%	28%	25%
Dating	19%	20%	20%
Pregnancy	6%	30%	21%
Contraception or Birth Control	6%	24%	17%

As shown in Figure 17, older NW Native teens (age 16-18 years) were also more likely to conduct health related searches than younger teens (age 13-15 years) for nearly all of the topics queried. Differences in sexual health information-seeking are explored in greater depth in the following section.

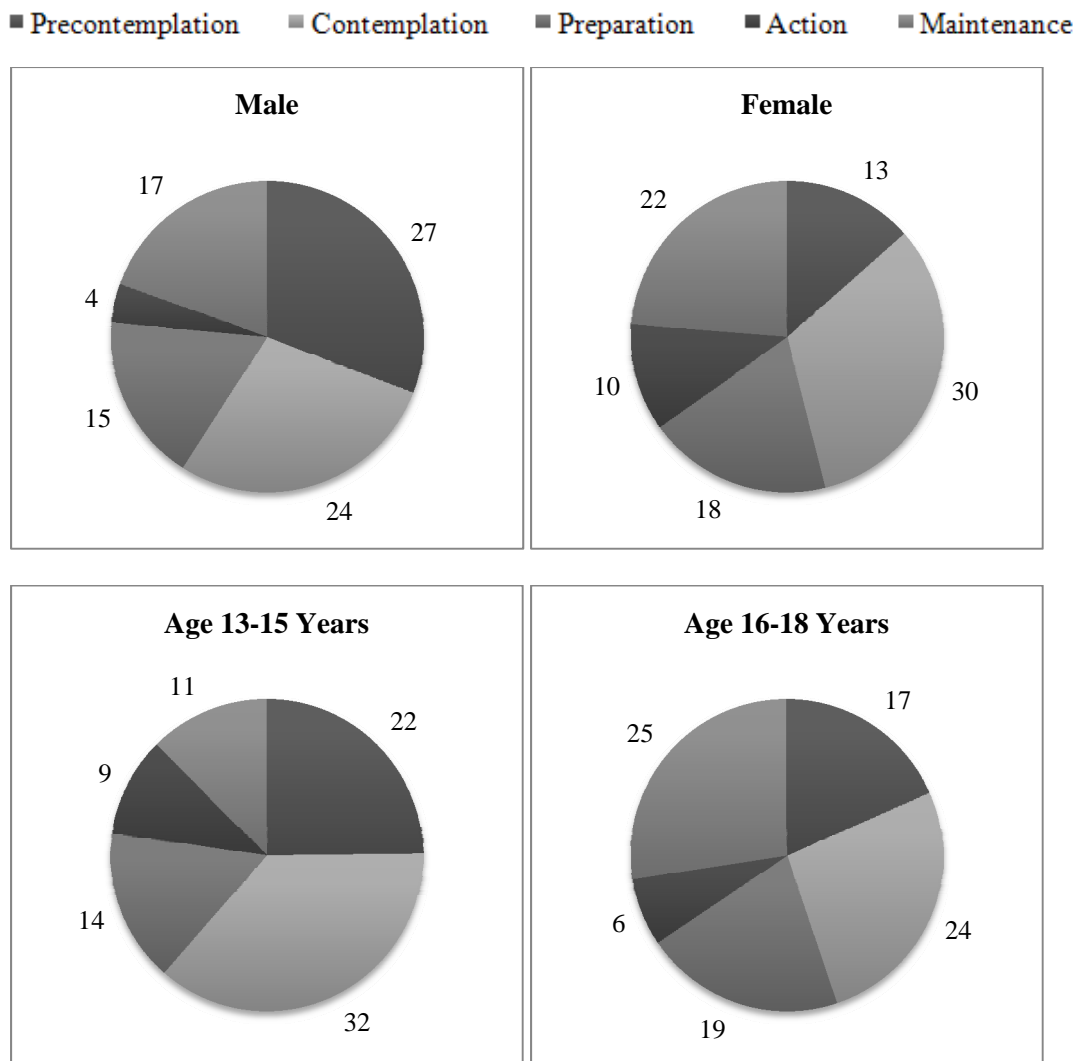
Figure 17: Ever Having Searched the Internet for Select Health Information among NW AI/AN Youth, by Age— 2009



Sexual Health Readiness and Information-Seeking.

Using the TTM stages-of-change model to classify youths' readiness for sexual health information, males and younger teens (age 13-15 years) were more often staged as precontemplative or contemplative (coded as "low readiness"), while females and older teens (age 16-18 years) were more evenly split between the five possible stages (see Figure 18).

Figure 18: Stages of Sexual Health Readiness among NW AI/AN Youth, by Gender and Age – 2009



Readiness for sexual health information was associated with both gender and age for NW Native youth (see Table 21). Forty-three percent of NW AI/AN females were staged at high readiness (action or maintenance), compared with 29% of males ($p=.01$). Similarly, 44% of 16-18 year-olds were staged at high readiness, compared with 27% of those who were 13-15 years-old ($p=.01$).

Table 21: Differences in Sexual Health Readiness among NW AI/AN Youth, by Gender and Age - 2009					
	Low Readiness	High Readiness	X ²	df	p
Gender			6.630	1	.01*
Male	72%	29%			
Female	57%	43%			
Age			9.397	2	.01*
13-15 years	73%	27%			
16-18 years	57%	44%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Altogether, 44% of the survey's respondents indicated that they had searched online for a sexual health topic, and one-quarter (25%) indicated that they'd searched for two or more sexual health topics online.¹³ For many of the topics, differences in online information-seeking occurred by gender, age, and sexual readiness. Having ever searched for "sexual health, STDs, or HIV" was more common among 16-18 year-olds (38%) than among 13-15 year-olds (24%), a difference that was statistically significant ($p=.02$) (see Table 22). This occurrence was also more common among youth reporting higher levels of sexual readiness (42%) than among youth reporting lower levels of sexual readiness (27%; $p=.01$). The difference in sexual health information-seeking between males (27%) and females (35%) did not reach statistical significance ($p=.10$).

¹³ Coded as ever having searched for: sexual health, STDs, or HIV; contraception or birth control; pregnancy; and/or body parts or physical anatomy.

Table 22: Differences in Sexual Health Information-seeking among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Ever Searched for Sexual Health, STDs, or HIV	Never Searched for Sexual Health, STDs, or HIV	X ²	df	p
Gender			2.794	1	.10
Male	27%	73%			
Female	35%	65%			
Age			8.292	2	.02*
13-15 years	24%	76%			
16-18 years	38%	62%			
Readiness			6.670	1	.01*
Low Readiness	27%	73%			
High Readiness	42%	58%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * p < .05, two-tailed. ** p < .01, two-tailed.					

Having ever searched for “contraception or birth control” was markedly more common among females (24%) than among males (6%), a difference that was statistically significant ($p < .01$) (see Table 23). This occurrence was also more common among youth reporting higher levels of sexual readiness (28%), compared with youth reporting lower levels of sexual readiness (9%; $p < .01$). For “birth control” searches, no differences were observed between age groups.

Table 23: Differences in Birth Control Health Information-seeking among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Ever Searched for Birth Control	Never Searched for Birth Control	X ²	df	p
Gender			22.762	1	<.01**
Male	6%	94%			
Female	24%	76%			
Age			.729	2	.69
13-15 years	16%	84%			
16-18 years	17%	84%			
Readiness			16.816	1	<.01**
Low Readiness	9%	91%			
High Readiness	28%	73%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Likewise, having ever searched for “pregnancy” was significantly more common among females (31%) than among males (7%; $p < .01$), and among youth reporting higher levels of sexual readiness (38%) than among youth reporting lower levels of sexual readiness (11%; $p < .01$) (Table 24). No differences were observed between age groups.

Table 24: Differences in Pregnancy Health Information-seeking among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Ever Searched for Pregnancy	Never Searched for Pregnancy	X ²	df	p
Gender			33.544	1	<.01**
Male	7%	93%			
Female	31%	69%			
Age			2.371	2	.31
13-15 years	17%	83%			
16-18 years	23%	77%			
Readiness			28.429	1	<.01**
Low Readiness	11%	89%			
High Readiness	38%	62%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Consistent with reported chi-square analyses, gender was strongly correlated with Internet use, text messaging, video game use, and online health seeking; and age was strongly correlated with online health information-seeking (see Table 25).

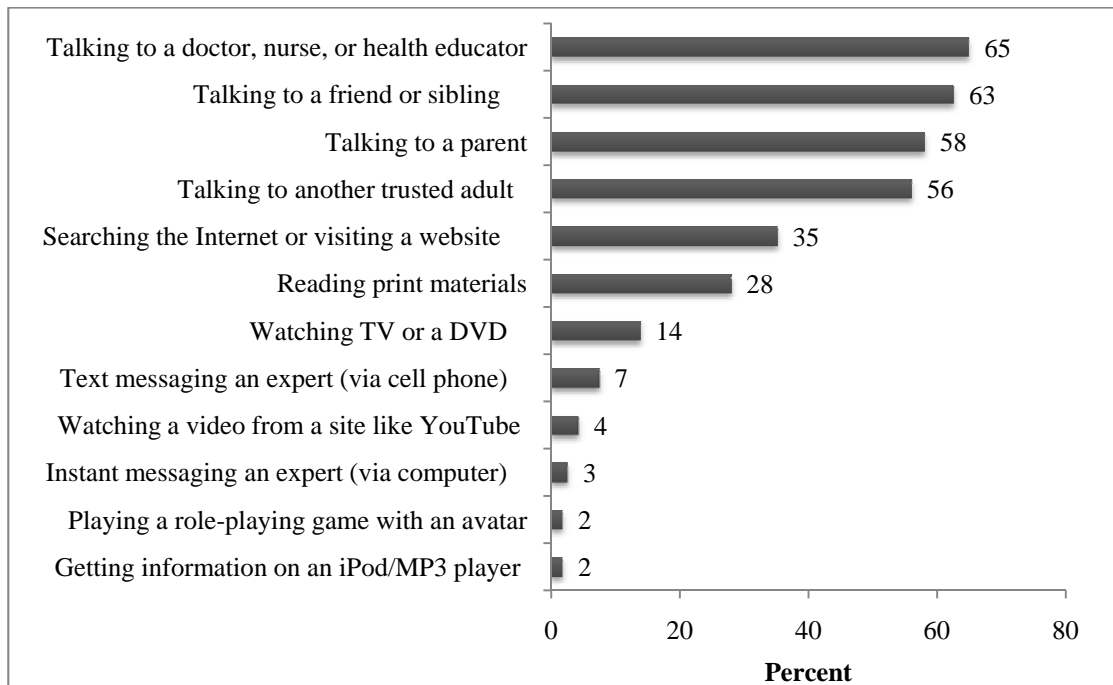
Readiness for sexual health information was not associated with any of these behaviors.

Table 25: Correlations Between Gender, Age, Readiness for Sexual Health Information, Frequency of Technology use, and Online Health-seeking								
	Gender	Age	Readiness	Frequency: Internet use	Frequency: text messaging	Frequency: video games	Health seeking: all topics	Health seeking: sexual health topics
Gender	1.00							
Age	-.132**	1.00						
Readiness	0.00	0.08	1.00					
Frequency: Internet use	-.099*	-0.04	0.05	1.00				
Frequency: text messaging	-.196**	-0.03	0.06	.410**	1.00			
Frequency: video games	.263**	0.01	0.06	.292**	.263**	1.00		
Health seeking: all topics	.185**	.136**	-0.02	-0.09	-.174**	0.00	1.00	
Health seeking: sexual health topics	.226**	.150**	0.03	-0.04	-.117*	0.02	.860**	1.00
<i>Note.</i> Levels of Readiness: Precontemplation, Contemplation, Preparation, Action, Maintenance. Frequency: Every day or Almost Every Day, A few times a Week, A few times a Month, Less Often, Never. Sexual health topics: puberty, dating and relationships, virginity, anatomy, sexual identity, pregnancy, birth control, STD/HIV, and/or sexual assault.								
Pearson Product Moment Correlation Matrix. *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).								

Accessing Sexual Health Information.

When asked about sources they would feel most comfortable using to get information about a sexual health topic, the vast majority of NW Native youth selected a person – a parent, healthcare provider, friend, sibling, or another trusted adult (ranging from 56-65%)¹⁴ (see Figure 19). Beyond human interactions, over one third (35%) indicated that they would feel most comfortable searching the Internet or visiting a website, roughly one-quarter (28%) preferred reading print materials (like brochures, fact sheets, or posters), and 14% preferred watching TV or a DVD. These findings did not vary considerably by gender, age, or rural/urban status (data not shown).

Figure 19: Preferred Sources for Sexual Health Information, among NW AI/AN Youth (age 13-21 years) – 2009



¹⁴ Percentages do not total 100%; respondents were asked to circle up to four preferences.

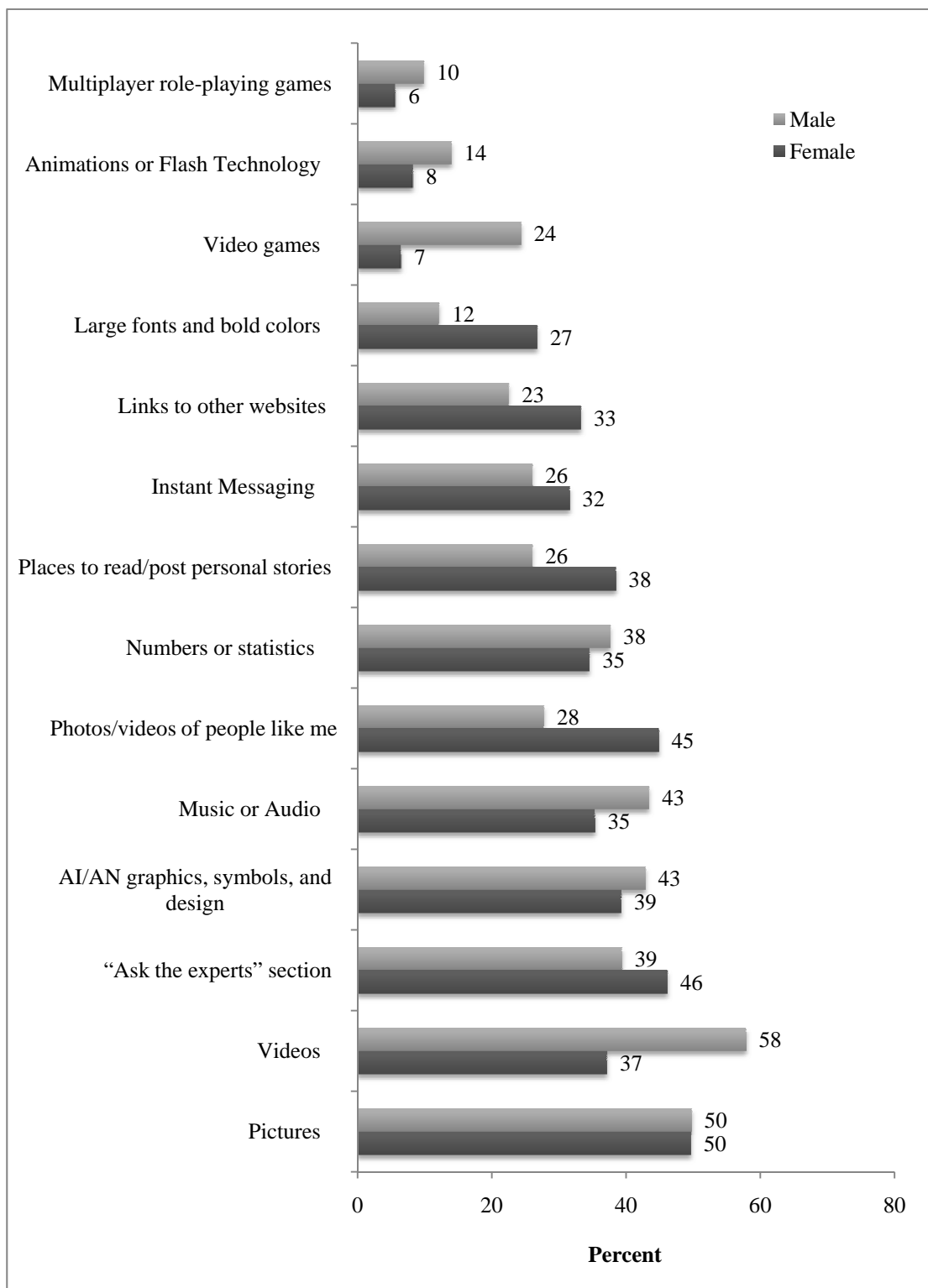
Preferred Website Design.

When asked about specific design elements for an adolescent health website, NW AI/AN teens and young adults were most interested in sites with pictures (50%), videos (46%), an “ask the experts” section (43%), music or audio (39%), and numbers or statistics (36%).¹⁵ Respondents were particularly interested in seeing images of people who looked like themselves and who were going through the same types of life issues (38%). Respondents were also interested in having places to post and read personal stories, like blogs or message boards (33%), having Instant Messaging (IM) (29%), and having links to other websites (29%).

Most preferences did not vary by age, but several varied by gender (see Figure 20). Males were more interested than females in sites having videos (58% and 37% respectively) ($X^2=18.710$, $df=2$, $p<.01$) and video games (24% and 7% respectively) ($X^2=26.552$, $df=2$, $p<.01$; data not shown). Females were more interested than males in sites having blogs (38% and 26% respectively) ($X^2=6.923$, $df=2$, $p=.03$), images like themselves (45% and 28% respectively) ($X^2=12.638$, $df=2$, $p<.01$), and large fonts and bold colors (27% and 12% respectively) ($X^2=13.031$, $df=2$, $p<.01$; data not shown). The only difference between age groups was for sites containing statistics; youth 13-15 year were less interested in statistics than youth 16-18 years (25% and 42% respectively) ($X^2=20.198$, $df=4$, $p<.01$; data not shown)

¹⁵ Percentages do not total 100%; respondents were asked to circle all that apply.

Figure 20: Preferred Features for an Adolescent Health Website,
as Reported by NW AI/AN Youth (age 13-21 years), by Gender – 2009



Preferred Website Content.

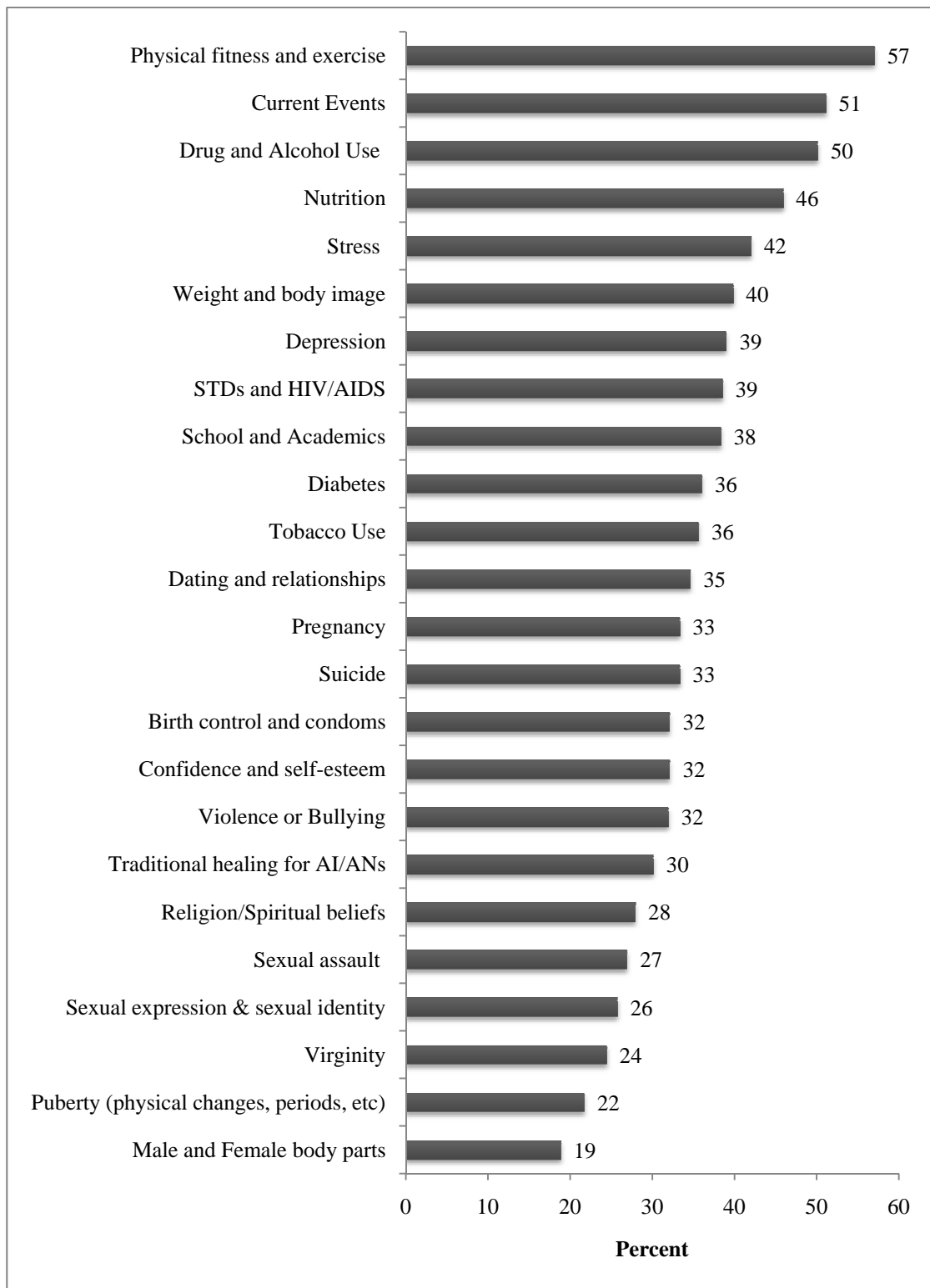
When asked about the kind of information that they would like to have included on a “webpage about health and wellness for teens and young adults,” respondents included a broad spectrum of content, including: physical fitness and exercise (57%), current events (51%), drug and alcohol use (50%), nutrition (46%), and stress (42%) (see Figure 21).¹⁶

No sexual health topics were ranked among the top five selections. Of the sexual health topics included on the list, NW Native teens and young adults were most interested in STDs and HIV/AIDS (39%), dating and relationships (35%), pregnancy (33%), birth control and condoms (32%), and sexual assault (27%). Nearly one-quarter of respondents also expressed interest in information on puberty, virginity, and on sexual expression and identity.

With the exception of “current events,” a greater proportion of AI/AN females expressed interest in the queried topics than AI/AN males. Older teens (age 16-18 years) also expressed greater interest than younger teens (age 13-15 years) in most of the topics offered, except for “weight and body image” and “virginity,” for which interest was greater among younger teens. For all but one topic, “physical fitness and exercise,” a greater proportion of rural youth than urban youth expressed interest in accessing health topics online (data not shown).

¹⁶ Percentages do not total 100%; respondents were asked to circle all that apply.

Figure 21: Preferred Topics for an Adolescent Health Website, as Reported by NW AI/AN Youth (age 13-21 years) – 2009



Altogether, 60% percent of the survey's respondents indicated that they'd like the website to include one or more sexual health topics, and nearly one-third (30%) indicated that they'd like three or more sexual health topics.¹⁷ Differences in respondent preferences for sexual health topics occurred by gender, age, and sexual readiness. Wanting "puberty" on the site, for example, was significantly more common among females (26%) than among males (16%; $p=.02$) (Table 26).

Table 26: Differences in Reported Preferences for "Puberty" Information on an Adolescent Health Website, among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Preference For Puberty Information	No Preference For Puberty Information	X ²	df	p
Gender			8.179	2	.02*
Male	16%	75%			
Female	26%	68%			
Age			2.149	4	.71
13-15 years	19%	74%			
16-18 years	24%	69%			
Readiness			.772	2	.68
Low Readiness	22%	76%			
High Readiness	26%	72%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

¹⁷ Coded as expressed interest in: puberty, dating and relationships, virginity, anatomy, sexual identity, pregnancy, birth control, STD/HIV, and/or sexual assault.

Wanting information on “dating and relationships” was significantly more common among females (42%) than among men (24%; $p < .01$), among older teens (16-18 year-olds, 41%) than among younger teen (13-15 year-olds, 26%; $p = .04$), and among youth reporting higher levels of sexual readiness (49%, compared with 31% of youth with lower levels of readiness; $p = .01$) (Table 27).

Table 27: Differences in Reported Preferences for “Dating and Relationship” Information on an Adolescent Health Website, among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Preference For Dating and Relationship Information	No Preference For Dating and Relationship Information	X^2	df	p
Gender			14.862	2	<.01**
Male	24%	66%			
Female	42%	52%			
Age			10.193	4	.04*
13-15 years	26%	67%			
16-18 years	41%	52%			
Readiness			9.658	2	.01*
Low Readiness	31%	67%			
High Readiness	49%	49%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Wanting “virginity” on the site was significantly more common among females (30%) than among males (17%; $p < .01$) (Table 28).

Table 28: Differences in Reported Preferences for “Virginity” Information on an Adolescent Health Website, among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Preference For Virginity Information	No Preference For Virginity Information	X^2	df	p
Gender			10.903	2	<.01**
Male	17%	73%			
Female	30%	64%			
Age			.666	4	.96
13-15 years	25%	68%			
16-18 years	24%	69%			
Readiness			.039	2	.98
Low Readiness	26%	72%			
High Readiness	26%	73%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Wanting “pregnancy” on the site was significantly more common among females than among males (at 44% and 19% respectively; $p < .01$). Nearly significant differences also occurred between youth reporting high levels of readiness for sexual health information (46%) and youth reporting low levels of readiness (32%; $p = .06$) (Table 29).

Table 29: Differences in Reported Preferences for “Pregnancy” Information on an Adolescent Health Website, among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Preference For Pregnancy Information	No Preference For Pregnancy Information	X ²	df	p
Gender			27.948	2	<.01**
Male	19%	71%			
Female	44%	50%			
Age			3.703	4	.45
13-15 years	30%	62%			
16-18 years	35%	58%			
Readiness			5.769	2	.06
Low Readiness	32%	66%			
High Readiness	46%	53%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Wanting information about “contraception and birth control” was significantly more common among females (43%) than among males (17%; $p < .01$), and among youth reporting higher levels of sexual readiness (42%) than among youth reporting lower levels of readiness (28%; $p = .05$) (see Table 30).

Table 30: Differences in Reported Preferences for “Birth Control” Information on an Adolescent Health Website, among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Preference For Birth Control Information	No Preference For Birth Control Information	X ²	df	p
Gender			30.477	2	<.01**
Male	17%	73%			
Female	43%	51%			
Age			6.402	4	.17
13-15 years	27%	66%			
16-18 years	35%	58%			
Readiness			6.153	2	.05
Low Readiness	28%	70%			
High Readiness	42%	56%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

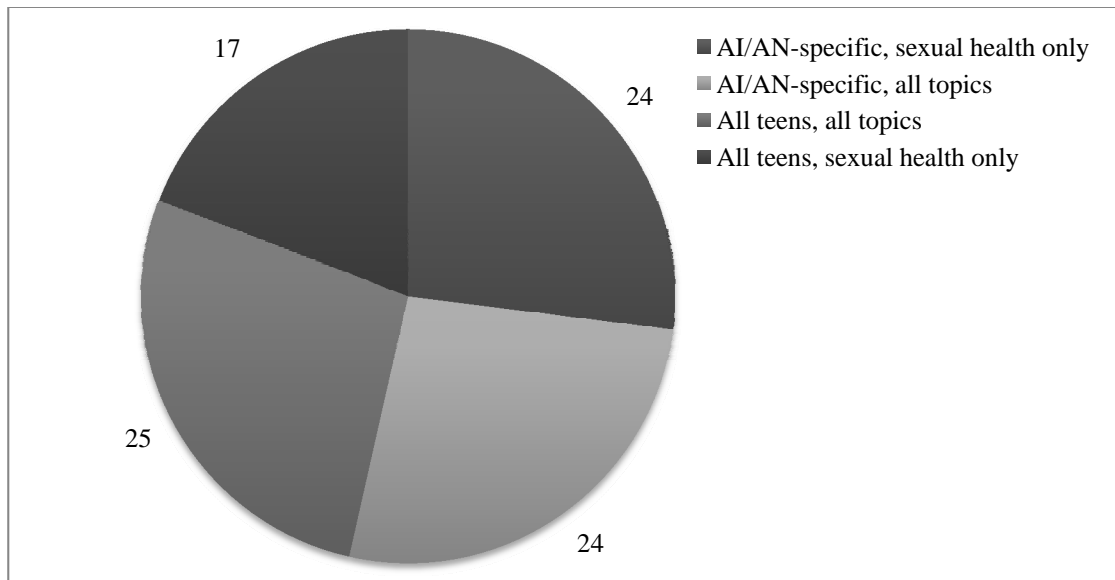
Preferring the inclusion of “STD/HIV” was also significantly more common among AI/AN females (47%) than among AI/AN males (27%; $p<.01$), among 16-18 year-olds (45%) than among 13-15 year-olds (30%; $p=.04$), and among youth reporting higher levels of sexual readiness (52%) than youth with lower levels of readiness (34%; $p=.01$) (see Table 31).

Table 31: Differences in Reported Preferences for “STD/HIV” Information on an Adolescent Health Website, among NW AI/AN Youth, by Gender, Age, and Readiness – 2009					
	Preference For STD/HIV Information	No Preference For STD/HIV Information	X ²	df	p
Gender			18.594	2	<.01**
Male	27%	64%			
Female	47%	47%			
Age			10.250	4	.04*
13-15 years	30%	63%			
16-18 years	45%	48%			
Readiness			8.907	2	.01*
Low Readiness	34%	64%			
High Readiness	52%	46%			
<i>Note.</i> Levels of Readiness: Low Readiness = Precontemplation & Contemplation; High Readiness = Action & Maintenance.					
Pearson chi-square analysis. * $p < .05$, two-tailed. ** $p < .01$, two-tailed.					

Cultural Tailoring.

When asked to choose between four possible designs for a website containing sexual health information, NW Native youth indicated that they'd feel most comfortable accessing a site that specifically targeted AI/AN youth (48%, compared with 42% for a website targeting all U.S. teens) and broadly included an array of adolescent health topics (49%, compared with a website covering only sexual health topics, at 41%) (see Figure 22).¹⁸ While the majority preferred a holistic health website specifically targeting Native youth, responses to this particular question were fairly evenly divided between the four options.

Figure 22: Preferred Scope and Design for a Website Covering Adolescent Health Topics, as Reported by NW AI/AN Youth (age 13-21 years) – 2009



Other questions in the survey were thus helpful to determine the importance of tailoring interventions for cultural appropriateness. In several places throughout the

¹⁸ Nine percent of the survey's respondents did not answer this question.

survey, AI/AN youth expressed experience and interest in accessing cultural information specific to AI/ANs. Most Native youth in the Pacific Northwest reported having using the Internet to get news or information about AI/AN events, politics, culture, or their tribe, including 66% of the females and 59% of the males.

Most (62%) of the survey's respondents indicated that adolescent health websites should include information on one or more topics specific to Native Americans. Nearly one-third (30%) were interested in traditional methods of healing for AI/ANs, 28% expressed interest in religion and/or spiritual beliefs, and over half (56%) expressed interest in AI/AN culture, stories, or history. When asked about specific design features, 43% of males and 39% of females included "AI/AN graphics, symbols, and design," ranking this element in the top third of available features (at 4th out of 14 queried features; see Figure 20, page 137).

National Comparisons by Race/Ethnicity

For those questions that have appeared in national surveys, rough side-by-side comparisons can be made by race/ethnicity. In this section, new analyses were carried out to compare NW Native respondents to national datasets, using the same or similar age groups where possible. Different age groupings were thus used for different questions, resulting in slightly different figures than reported in the previous section.

As shown in Table 32, compared to a national sample of U.S. teens (age 13-19 years), a substantially greater proportion of NW Native teens reported ever using computers (95%, compared with 79% nationally), cell phones (91%, compared with 87% nationally), iPods or MP3 players (95%, compared with 55% nationally), and

digital camcorders (64%, compared with 29% nationally) (The National Campaign to Prevent Teen and Unplanned Pregnancy, 2008). Fewer AI/AN teens reported using webcams, however, than the national sample (24%, compared with 33% nationally).

Table 32: Selected Technology Use, by Race/Ethnicity – 2008, 2009			
	2009 NW AI/AN Youth (age 13-19 yrs) N = 404 Use...	2008 National Youth* (age 13-19 yrs) N = 653 Have and use...	2009 AI/AN Adults† (median age = 46) N = 196 Have...
Computer	95%	79%	90%
Cell Phone	91%	87%	93%
iPod or MP3 Player	95%	55%	85%
Digital Camera	84%	80%	85%
Camcorder	64%	29%	52%
Webcam	24%	33%	44%
<p><i>Note.</i> Limitations for cross-study comparisons are discussed on page 185.</p> <p>SOURCE: * Sex and Technology (The National Campaign to Prevent Teen and Unplanned Pregnancy, 2008)</p> <p>† Native Public Media (Morris & Meinrath, 2009)</p>			

In many cases, the technology use patterns of NW AI/AN teens closely resembled those reported in a national sample of Native adults (20-75 years-old), who were surveyed between October 2008 and September 2009 by Native Public Media, using similar questions from the Pew Internet & American Life Project (Morris & Meinrath, 2009). Among those surveyed, 90% of AI/AN adults reported having a

computer, 93% reported having a cell phone, 85% reported having an iPod, 85% reported having a digital camera, 52% reported having a video camera, and 44% reported having a webcam (Morris & Meinrath, 2009).

Internet Access and Use.

Compared to a national sample of U.S. teens (age 12-17 years), NW AI/AN teens (age 13-17 years) reported less access to the Internet at home than teens of other race/ethnicities (50%, compared with 89%), as well as less access to the Internet at school (47%, compared with 74% for teens of other ethnicities) (Amanda Lenhart et al., 2008). Among adult AI/ANs who participated in the Native Public Media Survey, most respondents reported accessing computers at work (96%) and at home (91%), while schools and tribal/community centers were utilized by roughly one-third of respondents (Morris & Meinrath, 2009).

Many of the Internet behaviors reported by NW Native youth mirrored those reported by youth of other race/ethnicities in nationally representative surveys (see Table 33). A similar percentage of NW AI/AN teens (age 13-19 years) from our survey reported having a profile on a social networking site (87% compared with 89%), writing or updating a personal blog (32% compared with 25%), reading other people's blogs (24% compared with 33%), and posting photos online (71% compared with 78%). AI/AN teens were less likely than other teens, however, to report posting videos online (17% compared with 38%); compared to youth of other race/ethnicities, AI/AN teens (age 13-17 years) in our sample reported less use of the Internet to get

news or information about topics related to sports, entertainment, current events, or politics.

Table 33: Selected Online Activities, by Race/Ethnicity – 2008, 2009			
	NW AI/AN Youth	National Youth	AI/AN Adults [¶]
Have a profile on a Social Networking Site (SNS)	87%	89%*	44%
View other people's profiles/pictures posted on SNSs	80%	85%*	N/A
Write or update a personal blog	32%	25%*	33%
Regularly read other people's personal blogs	24%	33%*	59%
Send or receive pictures or videos on a computer	43%	80%*	N/A
Post photos online where others can see them	71%	78%*	63%
Post videos online (like on YouTube)	17%	38%*	28%
Watch TV shows online or on your MP3 Player	54%	63%*	N/A
Watch videos posted online from a site like YouTube	77%	N/A	67%
Use Internet to get news about sports and entertainment	67%	81%†	N/A
Use Internet to get news about current events or politics	48%	63%†	70%
<p><i>Note.</i> Limitations for cross-study comparisons are discussed on page 185.</p> <p>SOURCE: * Sex and Technology (The National Campaign to Prevent Teen and Unplanned Pregnancy, 2008), comparing youth age 13-19 years</p> <p>† Teens, Video Games & Civics (Amanda Lenhart et al., 2008), comparing youth age 13-17 years</p> <p>¶ Native Public Media (Morris & Meinrath, 2009), whose participants were 20-75 years, with a median age of 46 years.</p>			

Compared to a national sample of U.S. youth (age 12-17 years), NW AI/AN teens (age 13-17 years) also reported less frequent daily or weekly online communication with their friends via instant message (43%, compared with 53% nationally) or through posts on social networking sites (66%, compared with 86% nationally) (Amanda Lenhart et al., 2008).

Cell Phone Access and Use.

Compared to a national sample of youth (age 12-17 years) taken in 2007, Native teens (age 12-17 years) in the Pacific Northwest reported more frequent daily use of cell phones to talk to their friends (at 69%, compared with 51% nationally), but fairly similar levels of ever having talked to their friends on a cell phone (at 91%, compared with 93% nationally) (Amanda Lenhart et al., 2008). Comparing responses from these two surveys, AI/AN teens were also considerably more likely than teens of other race/ethnicities to report sending text messages to their friends on a daily (66% and 38% respectively) or weekly basis (77% and 50% respectively). This finding is consistent with AI/AN adults who participated in the Native Public Media Survey, where 74% reported sending and receiving text messages (Morris & Meinrath, 2009). In another national sample of U.S. teens (age 13-19 years) taken in 2008, a similar percentage of AI/AN teens reported sending or receiving pictures or videos on a cell phone (65%, compared with 61% of all U.S. teens) (The National Campaign to Prevent Teen and Unplanned Pregnancy, 2008).

Online Health Information-Seeking.

For several of the topics included in the survey, the proportion of respondents who had conducted health related searches exceeded those reported in a national sample of adults age 18-years and over, conducted by the Pew Internet & American Life Project in 2006 (see Figure 34) (Susannah Fox, 2006). Over one-quarter (28%) of AI/AN teens and young adults reported searching online for information on “Tobacco Products”, compared with 9% of the U.S. adult population. AI/AN teens were over five times more likely to report having searched online for information on “Drugs or Alcohol” (42%, compared with 8% of the U.S. adult population). One-third (32%) of AI/AN teens and young adults reported searching for information on “Depression, Anxiety, Stress, or Suicide,” compared with 22% of the U.S. adult population; and AI/AN teens were nearly three times more likely to report having ever searched for information on “Sexual Health, STDs, or HIV” (32%, compared with 11% nationally).

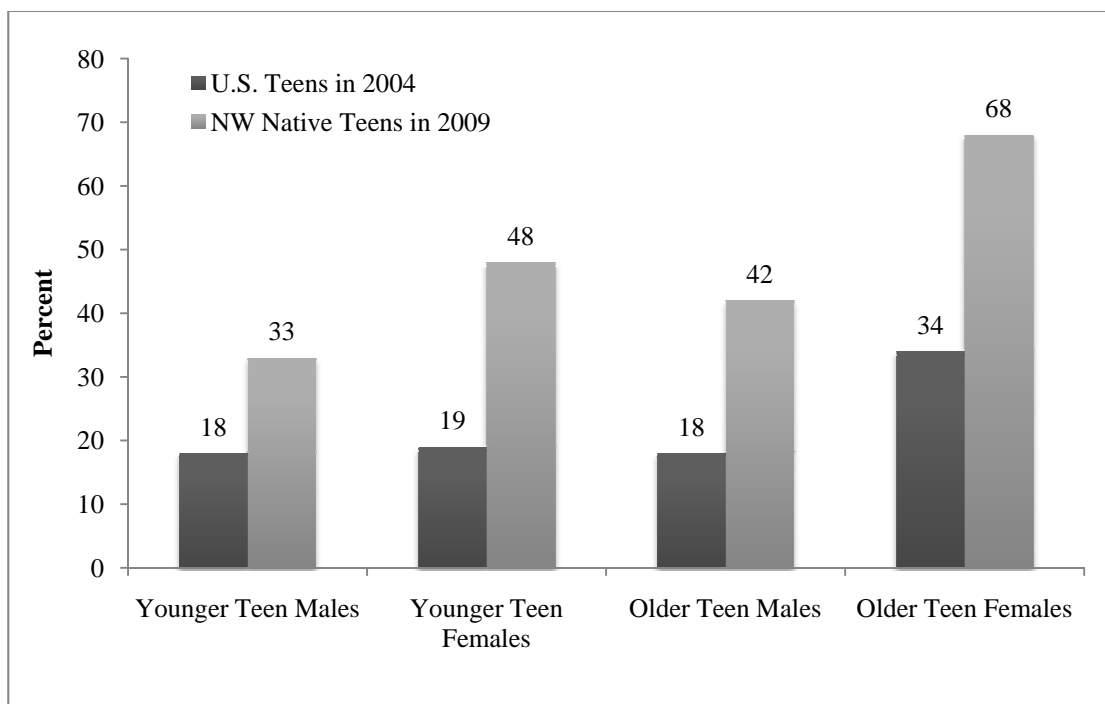
Table 34: Ever Having Searched the Internet for Specified Health Topics, by Race/Ethnicity – 2006, 2009		
	NW Sample of AI/AN Youth	National Sample of Adults*
A Specific Illness or Medical Condition	47%	64%
Diet, Nutrition, Exercise, or Fitness	50%	49%
Tobacco Products	28%	9%
Drugs or Alcohol	42%	8%
Depression, Anxiety, Stress, or Suicide	32%	22%
Sexual Health, STDs, or HIV	32%	11%
<p>Note. Limitations for cross-study comparisons are discussed on page 185.</p> <p>SOURCE: * Pew. Online Health Search. (Susannah Fox, 2006). Figures include adults 18-years and older.</p>		

The proportion of NW AI/AN youth who reported having searched online for health information exceeded those reported by national samples of youth. All together, 76% of NW AI/AN youth (age 13-18 years) reported having searched online for health information, compared with 55% of U.S. 7th–12th graders, queried by the Kaiser Family Foundation from October 2008 through May 2009 (Rideout et al., 2010). The proportion of NW AI/AN youth who reported having searched online for a sensitive health topic also exceeded those reported by U.S. teens in 2004 (see Figure 23, page 154) (A. Lenhart et al., 2005).¹⁹ One-third of younger NW Native males (13-14 years-old) reported having searched online for a sensitive health topic, compared with 18%

¹⁹ Sensitive health topics included: drugs, sexual health, and/or depression.

of other young U.S. males (12-14 years-old). Forty-two percent of older NW Native males (15-17 years old) reported conducting such searches, compared with 18% of similarly aged U.S. males. Nearly half (48%) of younger NW Native females (13-14 years old) reported having searched online for a sensitive health topic, compared with 19% of other young U.S. females (12-14 years old), and 68% of older NW Native females (15-17 years old) reported conducting such searches, compared with 34% of similarly aged U.S. females. Consistent with national trends, older Native teen females reported searching online for sensitive health information at higher rates than any other group (Rideout et al., 2010).

Figure 23: Ever Having Searched Online for Sensitive Health Information, by Gender, Age, and Race/Ethnicity – 2004 and 2009



Systematic Review of Technology-Based Sexual Health Interventions

As shown in Table 35, 29 interventions fulfilled the project's inclusion criteria for systematic review (see Appendix C for the complete matrix). Twenty-one interventions targeted young adults, 13 contained gender specific content, seven targeted men who have sex with men (MSM), 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 American Indian or Alaska Native 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. Approximately one-third of the interventions required trained, on-site staff to implement the intervention (n=9), and a similar proportion required a private, quiet computer space (n=9). Over half of the interventions could be privately or anonymously used by participants without having to give personally identifying contact information (n=17). A number of the interventions included in the review were evaluated in school settings (n=6), clinic settings (n=8), or at community centers (n=3), but most were not tied to a specific setting or could be implemented in other settings if needed (n=25).

Tailoring.

Interventions reviewed in this study incorporated a wide range of tailoring criteria and techniques (see Appendix C, Table C2, page 248). Most 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 behavioral risk factors (n=14). To create tailored content, 18 of the interventions imbedded risk, needs, or readiness assessments directly into the program. Slightly fewer (n=13) incorporated "virtual" interactions with a healthcare provider or user-generated goal setting activities or self-monitoring tools to create a more personalized experience. A smaller number (n=7) imbedded personal information (e.g., name, school) into the content, a feature that is thought in some cases to increase the perceived meaningfulness of the message.

Table 35: Technology-based Interventions Included in the Systematic Review

Delivery Method	Intervention	Author	Youth	Adults	Gender Specific	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		F		
	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 et al., 2008)	x		F		
	6. Youth Health Provider	(D. M. Paperny, 1997)	x				
	7. Aid for Contraceptive Decision-making (ACD)	(Chewning et al., 1999)	x		F		
Internet Class	8. Health Info. Consumer Skills	(Kalichman et al., 2006)		x		x	
Informational Website	9. www.sexualityandu.ca	(Barak & Fisher, 2001, 2003)	x	x	B	x	x
Internet-based Modules	10. Keep it Real	(Bull et al., 2007; Bull et al., 2009; Bull et al., 2008)	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 et al., 2009)	x			x	

Communication Strategies and Skill-building Tools.

Drawing from a wide range of behavior change theories, the interventions reviewed in this study employed a variety of communication strategies and skill-building tools to promote healthy change (see Appendix C, Table C3, page 249). Twenty-two of the interventions 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 of the interventions 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 were interactive, requiring active participation by the user (n=21) (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 into the intervention design.

Effectiveness of Selected Technology-based Interventions.

The interventions reported varying levels of effectiveness, and tracked a variety of cognitive and behavioral outcomes (see Appendix C, Table C4, page 250). 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).

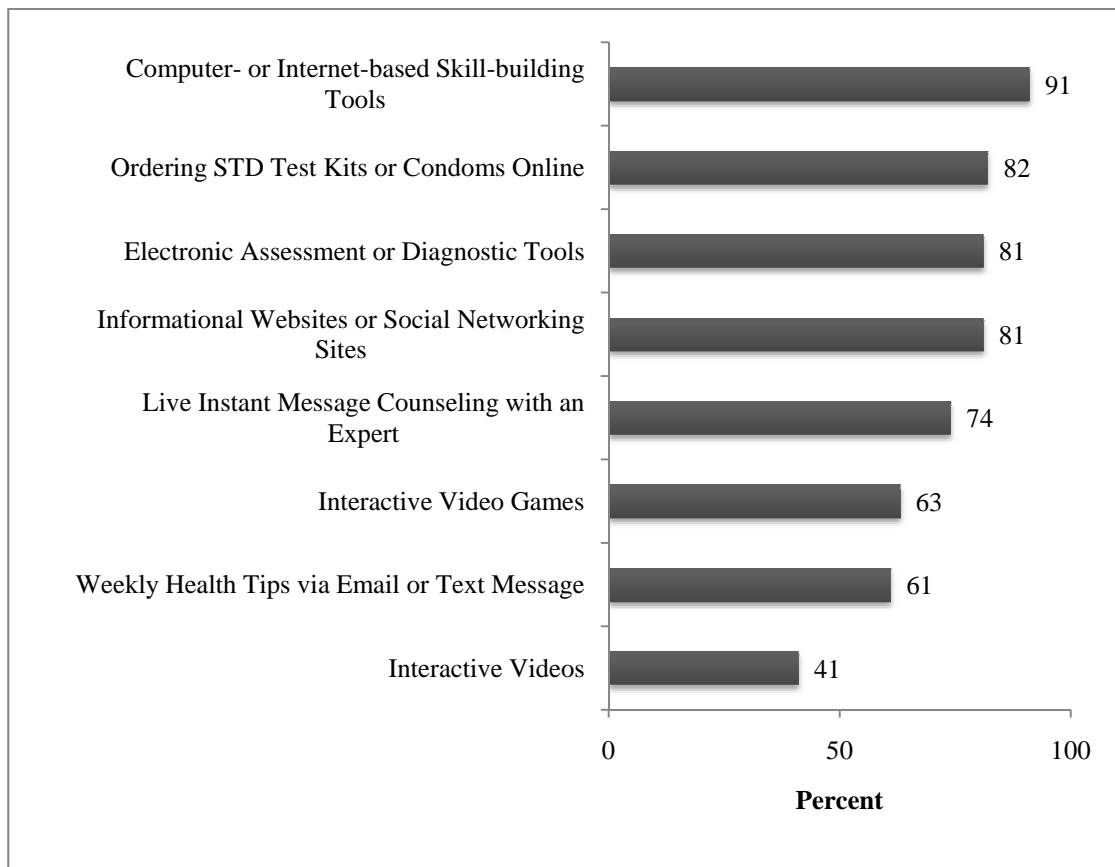
Despite this seemingly low level of efficacy, fewer than half of the interventions were truly designed to assess behavioral outcomes. Instead, many were intended to evaluate the intervention's acceptability and feasibility, and thus involved small sample sizes, did not track behavioral outcomes, or did not require participant follow-up to 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%) interventions were evaluated using a randomized controlled trial, and three (10%) were evaluated using a non-randomized controlled trial. 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

When asked about the potential utility of various intervention strategies, particularly in relation to their own community's programs, resources, and needs, tribal partners indicated that computer- or Internet-based skill-building tools would be most useful (91%) for their community, followed by informational websites or social networking sites (SNS) (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/text counseling with an expert (74%) (see Figure 24, page 161). During the discussion, the Director of the Washington State STD Program indicated that the state health department would

be starting an online STD test kit service in the next six months, making this particular activity less pressing for the NW tribes.

Figure 24: Reported Utility of Potential Intervention Strategies by NW Tribes and Tribal Partners –2009



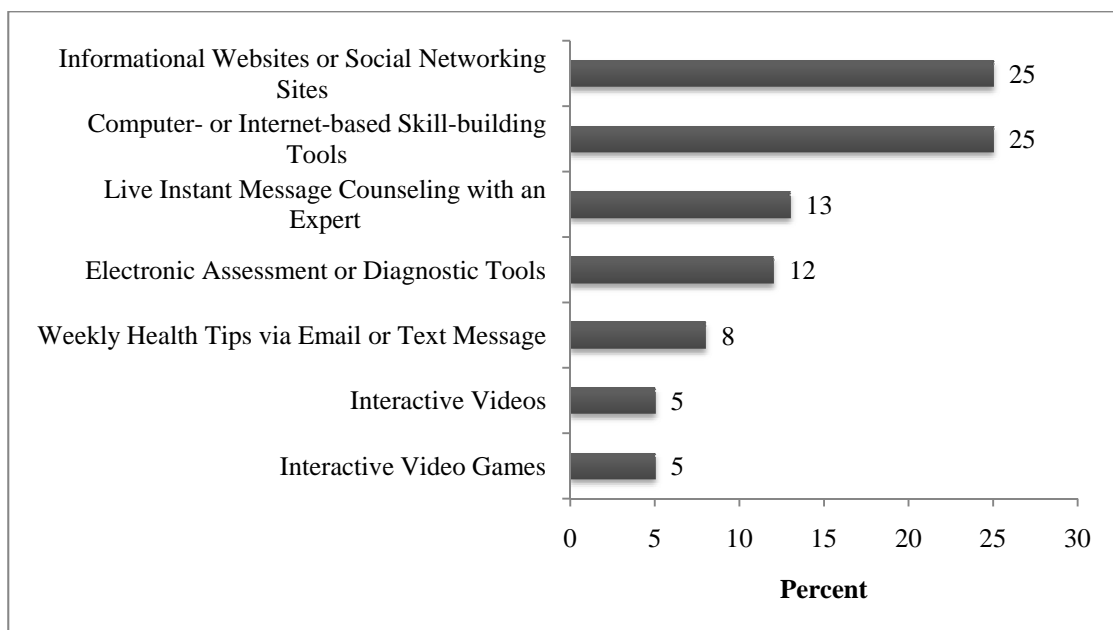
During the discussion, participants indicated that they would prefer interventions that could be administered by someone at the regional level (like NPAIHB), by a local health educator, or, if appropriate, by the youth themselves. Few felt that it would be highly problematic for them or their tribe to 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 a cell phone (36%).

Tribal Priorities.

After discussing each intervention's utility, efficacy, and possible benefits and challenges associated with their development and implementation, tribal attendees prioritized several different intervention strategies (see Figure 25). This ranking process prioritized different interventions at different meetings, but overall, produced results similar to those in the preceding section.

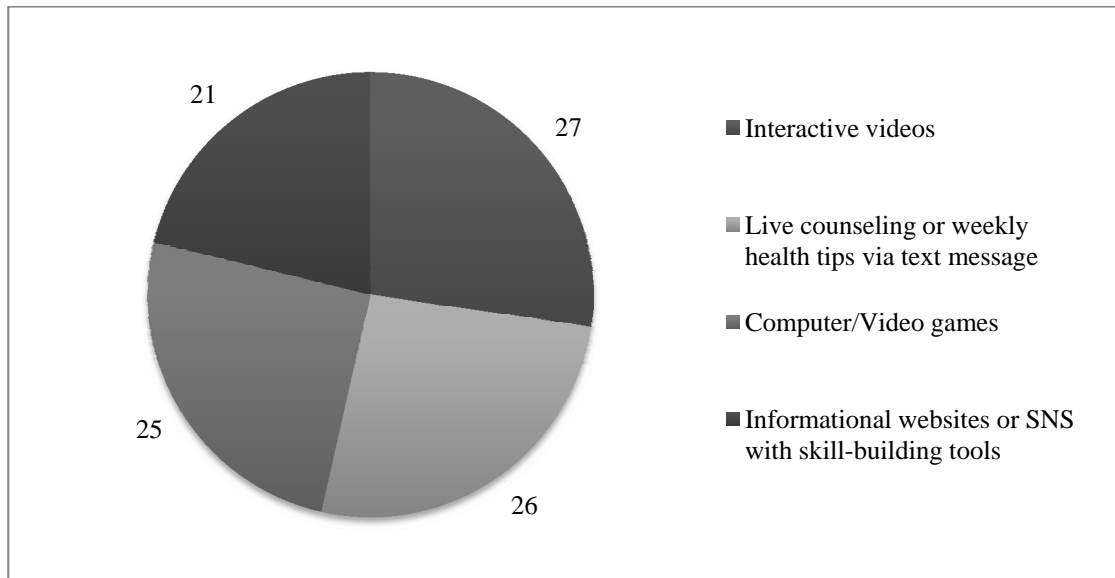
Figure 25: Ranking of Potential Intervention Strategies by
NW Tribes and Tribal Partners –2009



To simplify the discussion, NW Native teens and young adults ranked and discussed only four possible intervention modalities, including: online or interactive videos, informational websites or social networking sites, computer or video games,

and either instant message counseling with an expert or weekly text messaging tips. While more youth preferred online videos (27%) than any other approach, responses were fairly evenly divided between the four options (Table 26).

Figure 26: Ranking of Potential Intervention Strategies by
NW AI/AN Youth (age 13-21 years) – 2009



Tribal Recommendations.

Discussions with NW Native youth and tribal health educators elicited broad recommendations for the design, selection, and adaptation of culturally-appropriate, technology-based interventions for NW Native youth. During these meetings, participants identified several traits that they felt ought to be considered when designing or adapting interventions. Specifically, they should:

- **Contain Accurate Age- and Gender-Appropriate Content.** Using the tailoring capabilities of computer-based programs, interventions should contain gender specific “information for males and females” and “age-appropriate

content for younger and older youth.” Health information should be monitored and “medically accurate.”

- **Start Early.** Prevention messages should especially target pre- and young teens. As noted by community partners, “starting during the teenage years is too late. We need to start when children are younger.”
- **Include Abstinence.** Participants noted that abstinence was underemphasized or not included in many of the websites reviewed and discussed. Interventions targeting NW AI/AN youth should have “a bigger focus on abstinence.”
- **Be Holistic.** Participants noted that the technology-based interventions reviewed and discussed by the group focused mainly on STD/HIV prevention, and were not inclusive of other important adolescent health issues. Interventions targeting NW AI/AN youth should also address other priorities, “like suicide.” Substance abuse, early sexual involvement, and suicide are the symptoms of deeper social and emotional deficiencies and traumas that must also be addressed to promote positive youth development.
- **Be Based in Culture.** Interventions targeting NW 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.
- **Promote Healthy Behaviors.** Instead of stigmatizing sexuality, interventions addressing sexual health topics should promote healthy attitudes and beliefs surrounding sexual behavior, and focus on “positive messages and protective factors.” They should also promote healthy relationships, and include focus on both the physical and “emotional aspects of relationships.”
- **Develop Skills.** 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), in addition to offering general education.
- **Encourage Dialogue.** Interventions should include content that supports and encourages “dialogue with trusted adults (not necessarily parents),” like tips for talking to adults and doctors, tools that connect youth to adult mentors and peer role models, activities that require one-on-one conversations with adults, and interactive videos that could be watched together to spark conversation.

- **Incorporate Local Follow-up.** Participants noted that some technology-based interventions didn't offer "ways for local adults to provide follow-up if a teen needed additional resources." When appropriate, adapted interventions should include avenues for local health educators to locate and provide personal follow-up with teens in need.
- **Protect Privacy.** Participants felt that it's important to offer youth at least some resources and information that can be accessed privately. "If teachers or students are embarrassed to teach or learn about sensitive health topics" or to "go into a public place to get condoms," then technology-based interventions can provide a comfortable way to learn about and access these things. Interventions should include steps "to protect youth if parents look at computer search histories or text phone numbers" and provide youth with "confidential access" to information and services.
- **Be Interactive.** Interventions should incorporate a wide range of interactive features, like quizzes, experts, IM, games, and "audio that cheers you on for healthy behaviors and answers to increase motivation." Participants particularly liked the interventions that had a human voice guiding teens, "making the social interactions more realistic." Interventions should "allow users to choose who is leading them through the program, with a range of options to choose from (i.e. different genders, ages, animals, animations)."
- **Empower Youth.** Interventions targeting NW AI/AN youth should empower them and "get them involved in their own health and wellbeing." Participants also liked programs that permitted users to self-navigate through the content, allowing them to engage with the materials that most interested them.
- **Be Real.** Native youth are impacted by a range of social and emotional challenges, including poverty, discrimination, violence, gangs, sexual abuse, and substance abuse. Interventions targeting NW Native youth must be real, reflecting their life experience and social pressures.
- **Incorporate Evaluation Plans.** New interventions should incorporate evaluation strategies to "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 Personnel.** Participants expressed concern about interventions that were labor intensive, and interventions that required technical expertise or multiple people to implement. If interventions are designed to be implemented by local health educators, they must be easy to pick up and ready to use.
- **Intervention Setting.** Participants noted that local school districts are not always open to having tribal people come in to the school for lessons or workshops, and do not allow tribal youth to be pulled from their classrooms. Different school districts also have different policies pertaining to sexual health instruction. To be most widely implemented, interventions should be flexibly designed for use in home, community, or clinic settings.
- **Multimodal Formats.** When possible, technology-based interventions should include a variety of teaching/modeling tools, be made available in alternate formats, and provide 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 retention and “attention span issues.” On the whole, intervention activities should be shorter, and not require multiple clinic visits.
- **Literacy Levels.** Interventions should take into consideration the “different reading/literacy capabilities of youth, even within grade levels.”
- **Cost.** The only cost concerns voiced by participants were in relation to text messaging interventions, which might be problematic for some youth (depending on particular calling plans).
- **Maintaining Youth’s Interest and Attention.** Participants noted that “there are a lot of interesting sites on the Internet that teens frequent already – we will have to compete with them to get their attention.” Interventions will have to be “as good as the technologies that teens are already using, or teen won’t use them.”

Chapter 5: Discussion

The first goal of this study was to quantify media technology use among Native American teens and young adults (age 13-21 years) living in NW tribes and urban communities. Overall, technology use was exceptionally common and diverse among survey respondents, mirroring or exceeding patterns reported by teens from the general U.S. population. Three-quarters of NW AI/AN youth reported using computers, cell phones, and iPods on a daily or weekly basis, and over one-third reported playing video games or using digital cameras as often. Utilization rates for many of these technologies substantially exceeded those reported by other U.S. teens in 2008, including for computers (95%, compared with 79% nationally), cell phones (91%, compared with 87% nationally), iPods or MP3 players (95%, compared with 55% nationally), and digital camcorders (64%, compared with 29% nationally) (The National Campaign to Prevent Teen and Unplanned Pregnancy, 2008).

As noted by a 2010 Kaiser Family Foundation study, the explosion in cell phone ownership and use among U.S. teens in recent years has caused “striking changes in the media landscape” (Rideout et al., 2010, p. 18). Teens now use cell phones to text, listen to music, play games, or watch videos more often than they do to talk (Rideout et al., 2010). Similar trends are also occurring among NW Native youth, where cell phones were the most frequently used media technology. Over 80% of NW Native youth reported having a cell phone. Like youth of other race/ethnicities, respondents reported using their cell phones to text (76%) more frequently than they did to talk (67%). Sixty-six percent of NW Native youth sent or received pictures and

videos with their cell phone, while 45% exchanged more than 60 text messages per day – only 4% of those owning a cell phone didn't engage in any text messaging at all.

Three-quarters of NW Native youth reported accessing the Internet on a daily or weekly basis – most often from home (50%) or school (47%), but also quite regularly from their cell phone (36%). Forty-three percent reported spending more than an hour online when accessing the Internet. This high level of Internet use generated a wide spectrum of online activity, quite similar to behaviors reported by other U.S. teens (Amanda Lenhart et al., 2008; Rideout et al., 2010; The National Campaign to Prevent Teen and Unplanned Pregnancy, 2008). Over 85% of NW Native youth reported maintaining a MySpace or Facebook page, three-quarters (77%) watched videos on sites like YouTube, and a significant proportion used the Internet to get news or information about sports or entertainment (68%), current events or politics (49%), and AI/AN events, politics, culture, or their tribe (63%). Over half of NW Native youth indicated that they engage in seven or more queried activities online. NW Native youth also reported using the Internet to communicate with their friends, by posting messages on social networking sites (64%), sending email (44%), and instant messaging (42%).

While computer games and video games were fairly popular among NW Native youth – over one-third (36%) reporting daily or weekly utilization – the frequency and duration of play was relatively low compared to other media technologies. Thirty-seven percent of NW Native youth reported never playing video games, and of those who did play, 58% reported playing less than an hour at a time.

Despite the potential educational utility and therapeutic impact of virtual worlds, only 12% of respondents reported ever playing massively multiplayer online role-playing games (MMORPG).

Chi-square and correlation analyses indicated that gendered differences in media technology use occurred for the Internet ($p < .01$), cell phones ($p < .01$), and digital cameras ($p < .01$), where NW Native females reported more frequent technology use than NW Native males. As one would expect, these patterns of use translated into subsequent differences in online activity and differences in talking and texting via cell phone. The only online activity that Native males did in significantly more often than females was posting videos on websites like YouTube (24%, compared with 11% of females; $p < .01$). Gendered differences in technology use were also observed for video games, where NW Native males reported playing more frequently than NW Native females (56% and 23% respectively; $p < .01$). Comparing younger (age 13-15 years) and older (age 16-18 years) respondents, chi-square analyses revealed no significant differences in frequent media technology use by age group for the Internet, cell phones, or video games.

These data suggest that technology-based interventions might be most effectively delivered to NW Native youth using cell phones, the Internet, or iPods. Programs delivered via cell phones or the Internet could capitalize upon their text messaging, social networking, and video-sharing (YouTube) capabilities – all features frequently used by NW Native youth. Both methods would reach a higher proportion of females than males, but would still reach roughly 70% of NW Native males. All

three technologies were equally used by younger and older teens, and in rural and urban communities.

Hypotheses

The second major goal of this study was to identify patterns and preferences among NW AI/AN teens and young adults in their use of the Internet to obtain health information. As hypothesized, Native youth in this study expressed both experience and comfort searching online for health information. Over three-quarters (76%) of NW Native youth reported having used the Internet to get health information – substantially exceeding rates reported by 7th–12th graders from the general population (55%) and by U.S. adults (61%) (S Fox & Jones, 2009; Rideout et al., 2010). The topics most commonly searched for by NW Native youth included: diet, nutrition, exercise, or fitness (50%), drugs or alcohol (42%), depression, anxiety, stress, or suicide (32%), and sexual health, STDs, or HIV (32%). Mirroring gender- and age-related differences in Internet use,²⁰ a greater proportion of Native females reported searching online for health information than males (78% and 73% respectively), and a slightly greater proportion of older teens reported searching online than younger teens (78% and 75% respectively), though neither of these differences were statistically significant.²¹

When asked specifically about sexual health information, 35% of NW AI/AN youth reported that they would feel most comfortable getting this type of information from the Internet, and 44% reported having done so in the past. Significant differences

²⁰ Gender-related differences were statistically significant; age-related differences were not.

²¹ Older teens: 16-18 year-olds, Younger teens: 13-15 year-olds.

in online health information-seeking occurred for topics related to sexual health, particularly in relation to gender, age, and sexual readiness. As hypothesized, having ever searched for “sexual health, STD, or HIV” was significantly more common among older teens and youth reporting higher levels of sexual readiness ($p=.02$ and $p=.01$ respectively). Having ever searched for “birth control” or “pregnancy” was significantly more prevalent among females and teens reporting higher levels of sexual readiness (all at $p<.01$). Altogether, nearly two-thirds of NW Native youth indicated that they’d like future adolescent health websites to include sexual health topics, and one-third requested the inclusion of three or more such topics.

As hypothesized, Native youth reported a range of readiness levels for sexual health information, which was associated with both age ($p=.01$) and gender ($p=.01$). A greater proportion of 16-18 year-olds were staged at high readiness than 13-15 year-olds (at 44% and 27% respectively), and a greater proportion of NW Native females were staged at high readiness than NW Native males (at 43% and 29% respectively). Both findings reflect known developmental patterns for youth, and are consistent with research indicating that sexual maturity is strongly associated with age, and to a lesser extent gender (L. Gavin et al., 2009).

Accordingly, females and older NW Native youth reported higher levels of interest in and readiness for accessing sexual health topics online. A significantly higher proportion of older teens expressed interest in adolescent health websites containing information about dating and relationships ($p=.04$) and STD/HIV ($p=.04$). Significantly more females than males reported a preference for websites containing

information on puberty ($p=.02$), dating and relationships ($p=.01$), virginity ($p<.01$), pregnancy ($p<.01$), birth control ($p<.01$), and STD/HIV ($p<.01$); and youth reporting higher levels of sexual readiness were significantly more likely to express interest in adolescent health websites containing information on dating and relationships ($p=.01$), birth control ($p=.05$), and STD/HIV ($p=.01$).

While sexual activity is quite common among older teens and young adults, young people's sexual experiences do vary widely, necessitating sexual health programs and interventions that speak to a wide spectrum of behaviors, interests, and maturity levels (Kang & Quine, 2007). Male and female survey respondents also preferred distinctly different media design features and informational content. To capture the interest and attention of all youth, technology-based interventions should integrate a range of gender- and readiness-appropriate content and features, or include tailoring software that aligns health messages to the age, gender, and/or readiness of the user. Additional analyses will be carried out to prioritize tailoring criteria for NW AI/AN youth.

Despite their experience searching online for sexual health information, NW Native youth expressed greater interest in accessing other adolescent health topics online, including: physical fitness and exercise (57%), drug and alcohol use (50%), nutrition (46%), and stress (42%). No sexual health topics ranked among the top five. Perhaps as a result, NW Native youth expressed a greater preference for accessing sexual health information on websites containing a broad spectrum of topics relevant to youth – including health and wellness, social-relational issues, and academic topics

– than on stand-alone sexual health websites. While websites focusing specifically on STDs or HIV offer greater topical depth, a broader adolescent health framework may be needed to gain the trust and attention of NW Native teens and young adults.

To successfully compete for their time and attention, sexual health interventions should be integrated into venues already visited by tech-savvy teens, incorporating their primary online interests and activities. Additionally, such steps could help protect youth's privacy from parental monitoring, by masking the nature of their health information-seeking. Websites that solely cover sexual health topics do, of course, still have strong merit. A substantial portion (41%) of NW Native youth expressed interest in stand-alone sexual health websites. Such sites can be offered as links from more holistic adolescent health media, offering users more in-depth information if needed.

Interestingly, NW Native youth expressed a strong desire to learn about sexual health from a person – a parent, healthcare provider, friend, sibling, or another trusted adult. Unfortunately, for many people today, talking about sex and sexual health can be difficult, and is not done sufficiently to meet the developmental needs of Native adolescents. Coming-of-age ceremonies are no longer commonly practiced by NW tribes, a loss that has affected traditional teaching and learning around puberty, intimate relationships, individual and community roles and responsibilities, and young people's gifts and personal callings. Technology-based interventions should support youth's desire to communicate with friends and trusted adults about these important health topics by including activities and content that supports dialogue between peers,

partners, and adults. To imbue this content in traditional and contemporary knowledge and values, such discussions could explore lessons rooted in traditional stories, teachings, and coming-of-age ceremonies, in addition to present day values, expectations, and perspectives.

Like other U.S. teens, AI/AN respondents were particularly interested in websites containing pictures (50%) and videos (46%) of people who looked like themselves and who were going through the same types of life issues (38%). Such findings are reinforced by Social Learning Theory and empirical evidence, which supports the integration of personal narrative and role model stories into multimedia technologies and STD/HIV interventions (Hinyard & Kreuter, 2007; Kiene & Barta, 2003). It is also supported by meta-analyses conducted by Mullen and colleagues, which documented the importance of cultural-alignment for interventions addressing adolescent sexual risk (Mullen et al., 2002). Follow-up discussions with NW Native youth and tribal health educators repeatedly generated recommendations for interventions incorporating tribal people, stories, or history. Unfortunately, none of the existing technology-based interventions reviewed by participants contained role models, information, or design elements reflecting AI/ANs, a situation that is repeatedly encountered by tribal youth in public health messaging and mass media in general. As voiced by Native Lens, a Seattle-based film production company that works on several adolescent health projects in collaboration with NPAIHB:

For far too long Native people have been given no choice in the media [they view] except to repeatedly enact stereotyped roles, or to remain silent and unseen altogether. We believe this perpetuates violence, hopelessness, and low self-esteem among Native youth.

Culturally-specific health resources and interventions are critically needed to address this situation, to increase the degree to which media messages are perceived as personally relevant to Native youth, and to fully include and embody American Indian health epistemologies in their messaging and design.

The final goal of this study was to work with tribes and local partners to collaboratively develop guidelines and priorities for designing culturally-appropriate technology-based interventions targeting AI/AN youth, using health communication, cultural competence, and alignment theories to frame the discussion. While data from the Native Youth Media Survey offered insight into which technologies might be most effectively employed to reach NW Native youth, it was only with additional community-based participatory research that we were able to ensure that selected approaches aligned to the priorities, capacities, and readiness levels of the NW tribes.

Health communication, behavior change, and alignment strategies offered useful criteria for assessing the potential utility of technology-based health interventions for NW AI/AN communities. Recommendations generated using iterative CBPR processes took into consideration multiple factors that have been shown to affect intervention effectiveness and sustainability, including the inclusion of tailoring and skill building tools, 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, the availability of current

and reoccurring funds to design and implement selected interventions, and more nuanced indigenous knowledge²² about NW AI/AN communities.

As hypothesized, CBPR strategies thus improved the intervention alignment process by giving insight to tribal values and priorities, the ethnographic culture of AI/AN youth, the social and environmental context in which they live, and the capacity of those who would ultimately implement resultant interventions, very little of which could have been determined using other research methods (see Tribal Recommendations, page 160). It was only with CBPR that the project was successfully designed and implemented, employing both western and cultural lenses in the interpretation and dissemination of data.

For example, while cell phones were the most frequently used media technology by NW Native youth, youth, parents, and health educators who participated in follow-up discussions expressed much less interest in phone-based interventions than they did in Internet- or video-based approaches. This apparent divide between youth's current communication and technology use practices and their 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 Native American communities, and are highly dependent upon

²² Indigenous knowledge is defined by the National Congress of American Indians (2009) as “a complex, interrelated, and diverse body of knowledge based on the collective wisdom of ancestors; built through observation and experience; and learned, transmitted, and retained in the telling of stories to succeeding generations (p. 4).”

human interaction (Cajete, 2008; Goodluck, 2002). Rote text messaging services may have felt too impersonal to CBPR partners, compared to videos and CD-ROMS depicting interactions between peers, parents, and partners, reinforced by audio and visual components. CBPR participants were particularly concerned that some technology-based interventions might unintentionally reduce communication (e.g., self-administered, computer-based risk assessments in doctors' offices) or fail to support needed one-on-one 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 (S Fox & Jones, 2009).

Other critical insights gained through CBPR included the importance of empowering Native youth to get involved in their own health and wellbeing, while also addressing the deeper social and emotional deficiencies and traumas that contribute to their disproportionate risk-taking. CBPR partners specifically mentioned the need for interventions that recognize and address the unique life challenges faced by Native American teens and young adults, including the intersecting root causes of substance abuse, early sexual debut, and suicide. One approach may be to translate the core components of positive youth development (PYD) programs into technology-based interventions, to more comprehensively support the developmental needs of Native teens and young adults. This could include activities that improve family connectedness, parent-adolescent communication, school connectedness, social skills, social norms, spirituality, self-determination, and self-efficacy (Catalano et al., 2010).

The concept of “sexual health empowerment” has also been promoted by advocates in the field, which includes: (a) promoting positive self-concepts and identity among youth; (b) engaging youth in collective discussions about why disparate health behaviors and outcomes exist, and what can be done to address them; (c) helping young people develop skills to take personal responsibility and collective action; and (d) providing youth with opportunities to collaborate with their peers to influence their collective culture (Romeo & Kelley, 2009). Several Internet-based programs embodying these principles have already been developed for mainstream youth (see www.amplifyyourvoice.org/, www.dosomething.org/, and <http://us.reachout.com>), and could be incorporated in interventions targeting AI/AN youth.

Data from this mixed methods project thus strongly support the hypothesis that technology-based interventions be tailored to the unique socio-cultural context experienced by AI/AN youth. Overall, NW Native youth expressed a greater preference for accessing sexual health information on websites containing native-specific content than on sites targeting all U.S. youth. When asked about specific features and content, 62% of the survey’s respondents indicated that adolescent health websites targeting them should include information about one or more topics specific to Native Americans, and over 40% expressed interest in sites containing Native American graphics, symbols, and design elements. Nearly one-third (30%) were interested in learning online about traditional methods of healing for AI/ANs, 28% expressed interest in religion or spiritual beliefs, and over half (56%) expressed interest in sites incorporating AI/AN culture, stories, or history.

These findings and others indicate that the ethnographic culture of Native youth is not solely determined by their racial/ethnic identification, but also reflects a range of contemporary social constructs (House, Stiffman, & Brown, 2006). Like any teen or young adult, Native youth identify with and reflect multiple identities (i.e., athletes, skaters, nerds, hip hop, gangster, familial identities - brother/sister/child, political identities – democrat/republican, sexual identities – straight/LGBTQ²³, religious identities, etc.). This is reinforced by research by Leston & Jessen at the Alaska Native Tribal Health Consortium, who conducted a series of focus groups with Alaska Native youth in 2008 to guide the development of www.iknowmine.org, a sexual health website targeting Alaska Native youth (unpublished work, personal communication). Leston & Jessen report that Alaska Native youth likewise identified first and foremost as youth, and secondarily as Alaska Native youth. In order to reflect their full lived experience, technology-based interventions targeting AI/AN youth must embrace both their adolescent and cultural identities.

If designed properly, youth-driven, multimedia technologies could provide Native youth with new avenues to cultivate and strengthen cultural pride, express their opinions and worldviews, build relationships and skills, engage in health-related conversation and action, and spread healthy messages and norms that reflect their unique informational needs and life experiences. Such content and strategies are consistent with behavior change theory, asset-based approaches, and the social-ecological model addressing the social, structural, and environmental stressors that influence adolescent sexual health outcomes (Butterfoss et al., 1996; Griffin et al.,

²³ LGBTQ: lesbian, gay, bisexual, transgender, and questioning.

2005). This approach would recognize sexual health as one of many important aspects of adolescent health and wellbeing, and would incorporate the social, emotional, physical, and spiritual dimensions that are foundational to the Native health and wellness model.

Priority Intervention Strategies

Based on the data, recommendations, and priorities acquired through this research, the NPAIHB will proceed with adapting and piloting interventions that integrate Internet-based information and skill-building tools with electronic assessment and tailoring tools, reinforced by social networking and text messaging capabilities. These programs will incorporate a broad spectrum of content personally relevant to Native youth, including: academics, current events, peer and family relationships, cultural pride and identity, physical fitness, body image, drug and alcohol use, stress and depression, and sexual health. It will contain accurate, age- and gender-appropriate content, and will focus on those factors that have been identified as being the most critical determinants of adolescent health by behavior change and positive youth development research. While technology-based interventions may not be able to address all of the assets and traits needed for behavior change and positive youth development, the literature does suggest that they can be translated to increase healthy values and attitudes, strengthen healthy social norms, enhance self-efficacy and motivation, connect youth to trusted adults, foster communication, and empower youth to take civic action.

These programs will promote active learning using discussion boards, text messaging services, and “ask an expert” features to disseminate medically accurate information. Content will also be developed to reinforce positive social norms between youth, trusted adults, friends, and partners about important health topics and life skills. Resulting interventions will incorporate multimodal educational strategies informed by communication and information processing theories that reflect traditional AI/AN teaching and learning practices, including storytelling (i.e., role model stories, digital storytelling, videos, animation), personal reflection (i.e., journaling, blogging, virtual discussions), and experiential learning (i.e., practice, social service). Given the importance of intervention duration and intensity, the program will intentionally incorporate strategies that promote repeated use, including incentives and contests, text message and email reminder systems, and fresh, entertaining, and challenging content.

Responding to the preferences expressed by NW Native youth and CBPR partners, the program will incorporate traditional and contemporary design elements, healing practices, and wellness models, with specific attention given to important coming-of-age ceremonies and teachings. Multimedia design features will include pictures, videos, and music/audio depicting Native teens and adults experiencing relevant life issues, places to post and read personal stories, quizzes and polls, and youth-friendly statistics and links. Contests and other activities will be purposefully designed to empower Native youth to challenge the status quo and get involved in their communities, health, and wellbeing.

Based on the organizational capacities described by tribal CBPR partners, the intervention will be developed and maintained regionally by the NPAIHB, but will be designed such that it can be promoted and/or flexibly used in home, community, or clinic settings. Some activities will require small groups, which can be promoted or coordinated by teachers, health educators, or other adults working with Native youth. These activities will be offered in user-friendly formats, requiring little additional preparation or resources to implement. Other components will be self-selected and navigated, with activities that can be completed independently by teens and young adults. Finally, the program will link teens to local clinics and health personnel for personalized follow-up if needed, with imbedded tools to facilitate youths' access and use of local health services.

Study Limitations and Strengths

Like all research endeavors, this study had several strengths and limitations worth noting. On the whole, participants did an excellent job filling out their surveys thoughtfully and completely. Missing values ranged from 0% to 10% of the sample, most often occurring around 2%-5%, increasing towards the end of the survey. In all cases, reported results were conservative estimates, excluding missing values from reported proportions. Several questions in the survey were used to assess the reliability of reported data by asking about technology use patterns and behaviors in slightly different ways. In each case, the tool was found to produce reasonable and consistent results (i.e., respondents reported slightly higher rates of “using cell phones” than “owning a cell phone”). To ensure the project's reported findings reflected the lived

experience of AI/AN community members, survey results and interpretations were also vetted and discussed with NW tribal youth and collaborating partners at several regional coalition meetings and events. No concerns were voiced at any of these gatherings when participants were asked whether the data resonated with their own personal experiences or expectations.

Based on my defined hypotheses, most hypothesis testing was done in relation to age and gender – variables that are thought to be reliably reported and entered. Hypothesis testing in relation to age and gender would thus be less prone to type I and type II statistical errors.²⁴ More systematic instrumentation errors may have occurred, however, in the analysis of participants' technology use patterns and preferences in relation to their urban/rural status or their sexual readiness (defined on pages 88 and 94; the complete survey is included in Appendix A).

While efforts were made to help students determine their urban/rural status,²⁵ one-third (33%) of the respondents wrote in their specific reservation, town, or a similar descriptor (i.e., rez, small town, country), making the reliability of this particular question somewhat suspect. As noted in the research methods chapter, steps were taken to improve the analysis of this data, but ultimately, its validity could not be fully verified. It seems unlikely that reporting errors occurred systematically in one direction over the other for urban/rural status. Accurate or not, few significant differences were observed by rural/urban status.

²⁴ Type I: the error of rejecting a hypothesis that should have been accepted (false positive), indicating a test of poor specificity. Type II: the error of accepting a hypothesis that should have been rejected (false negative), indicating a test of poor sensitivity.

²⁵ By offering specific examples from the Pacific Northwest within the answer choices.

Likewise, the reliability and validity of the question used to determine sexual readiness is also unknown. The question has not been used in other regional or national surveys and could contribute to systematic errors if reported answers did not truly reflect participant's actual readiness levels, or if *readiness* itself proves not to be a meaningful measure of the intended research construct (TTM stage). The sexual readiness question did have the highest percentage of missing values for the survey (10.1%), suggesting that participants had at least some level of uncertainty about the question. It does seem plausible that those who chose to respond to the question felt more confident about their reported answer than those who chose to skip the question altogether. Students' answers did reflect all five answer choices, and aligned well with developmental projections, strengthening its case for criterion-related validity. Concerns about the accuracy of sexual readiness staging tools have been noted elsewhere in the literature, and should be explored further if used in isolation to tailor interventions (Ferrer et al., 2009). In this particular study, however, differences in sexual readiness were also observed in relation to gender and age, both thought to be reliably reported and entered, and both factors associated with sexual readiness. In short, reported hypothesis tests in relation to age and gender may be more reliable than tests performed in relation to urban/rural status or sexual readiness, but they do offer a reasonable level of insight and should not be entirely dismissed.

Additional analyses are still needed to determine the relative influence of reported research variables (age, gender, geography, readiness) on outcomes of interest (adolescent technology use and online health information-seeking patterns and

preferences). Beyond the scope of this paper, multivariate analyses will be used to control the effects of known variables on outcomes of interest, and to determine the relative importance of age, gender, and sexual readiness on sexual health information-seeking. These analyses will be useful for selecting tailoring criteria for technology-based interventions targeting NW Native youth.

Comparisons made by race/ethnicity using national surveys (starting on page 147) have numerous statistical and methodological limitations, and are only included to provide readers with a rough idea of technology use patterns for reported populations. Some national surveys included different age groups, covered different time periods, phrased questions or answer choices in different ways, or were collected using different research methods (i.e., phone-based, in-person etc). These differences are noted in the results chapter when known, but many others likely exist as well.

Finally, these research findings represent data from the Pacific Northwest, and cannot be generalized to AI/AN youth living in other regions of the country. The research process was also affected by the practical realities of doing CBPR in Indian Country, which created less than optimal “scientific” conditions. While I am satisfied that the design, conduct, and analysis of the project’s qualitative and quantitative was sufficient to inform the development of well aligned technology-based health interventions, survey respondents and community informants were recruited using convenience and targeted sampling methods and do not represent a random sample of AI/ANs living in the Pacific Northwest. Some of the youth who participated in the

survey were involved in tribe- or school-sponsored health and wellness activities, and may report higher levels of health interest and behavior than typical Native youth.

Fortunately, the project was successful in surveying youth in a variety of settings, and obtained a favorable mix of male and female participants, urban and rural participants, and participants from all three states in the Pacific NW. The study was also informed by the experience of other researchers in the field. Many of the questions included in the survey instrument had been used by the Pew Internet and American Life Project, the National Campaign to Prevent Teen and Unplanned Pregnancy, and by Native Public Media, improving their validity and comparability. Also of value, several investigators whose studies were included in the intervention matrix responded favorably to inquiries for more information and guidance, and expressed interest in collaborating to adapt their interventions for Native youth.

The research process was likewise strengthened by having the support of the NW tribes, who repeatedly expressed interest in the research subject and findings, and unanimously approved the Red Talon STD/HIV Action Plan, which included this research agenda as a task for 2009. Research in Indian Country requires a fundamentally different approach than relied upon in other settings – a process that recognizes and reflects the complex and culturally defined dynamics that are present in tribal communities (Warner & Grint, 2006). 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 (Warner & Grint, 2006).

The project was further strengthened by the fact that it was carried out by a tribal organization that has over 35 years of experience conducting public health research in tribal communities. The Northwest Tribal EpiCenter is uniquely trusted by the NW tribes, and has substantial experience bridging collaborative efforts between academics, tribes, states, federal agencies, and health service organizations. This helped generate community buy-in and trust among participants, improving research outcomes.

Implications for Policy

Data for American Indians and Alaska Natives are often missing from national data reports, “making it difficult for tribes, states, and the federal government to provide policy solutions and social programs that effectively target and benefit Native American communities (National Congress of American Indians, 2009, p. 1).” Local and national AI/AN data are needed on a wide variety of health topics to make informed decisions, design appropriate interventions, and secure federal funding. CBPR methods have been successfully used to generate this data, and its continued use holds great promise for alleviating health disparities among AI/ANs.

For CBPR to remain true to its intent, however, funding agencies must be willing to make long-term commitments to the research process and be willing to fund atypical research priorities, including the asset-based health and wellness epistemologies of AI/ANs (Manson et al., 2004). Many funding agencies limit their

funding to two or three components of the research process: (a) convening stakeholders; (b) conducting formative research; (c) selecting/prioritizing problems, (d) designing appropriate research; (e) implementing research; (f) interpreting data; (g) disseminating results; (h) designing interventions; (i) implementing interventions; (j) evaluating interventions; and (k) supporting and sustaining the interventions' implementation over time. Funding is critically needed that covers the full continuum of public health research. Short-term funding streams fail to reflect what is already known about the duration and intensity of interventions needed to make lasting change in complex behaviors and community norms. Funding continuity is also critical to preserving fragile tribal-researcher relationships. Even short breaks in funding can cause a loss of trust and credibility among tribes, and threatens their involvement in future research activities (Israel, Schulz, Parker, & Becker, 2001). Institutional conflicts also persist over who owns tribal data collected using federal funds.

To address these shortcomings, "Aboriginal and Indigenous communities in Canada are at the forefront of a growing international movement to proactively assume ownership and control over research conducted in their communities (Shore, Wong, Seifer, Grignon, & Gamble, 2008, p. 2)." Canada established the Institute of Aboriginal People's Health (IAPH) to advance ethical indigenous health research within the Canadian Institutes of Health Research (CIHR) in 2000 (Cook). CIHR Guidelines for Health Research Involving Aboriginal People were completed in May 2007, providing clear guidance to researchers and funding agencies conducting research with Aboriginal peoples, on requisite CBPR practices that respect Aboriginal

culture and values (Cook). The development of a similar agency and research guidelines by the U.S. Department of Health and Human Services (DHHS), in partnership with AI/AN communities and researchers, could help codify ethical standards for research in Indian Country.

Findings from this study also substantiate the need for cross-agency funding opportunities that holistically support the health and development of Native adolescents. Misalignment often occurs between the priorities of funding agencies and the priorities of AI/AN communities. Tribes, like other communities, need “funding for comprehensive approaches that extend beyond categorical perspectives and traditional research designs (Israel et al., 2001, p. 185).” Many tribes are too small (both in population size and organizational capacity) to compete for issue-specific funding. Crosscutting, holistic funding opportunities would better reflect tribal priorities and epistemologies, and would better address the intersecting social and environmental determinants and risk-factors that are associated with poor health outcomes for Native adolescents.

This study indicates that Native-specific health messages and interventions are well supported theoretically, and that Native youth in the Pacific Northwest are empirically interested in culturally-tailored materials and interventions. Few “evidence-based” interventions promoted by state and federal agencies have emerged from, been tested with, or adapted to the unique social, economic, demographic, and cultural contexts that surround rural and urban AI/ANs (Spence, 2007). As expressed by Wilson (2004), “the strategies that we develop as Indigenous people... must be

distinct to us and developed from the guiding principles that allowed us to live a sustainable existence for thousands of years (Mihesuah & Wilson, 2004, p. 71).”

Policymakers must recognize that, to be truly effective, health interventions must build upon existing community strengths and resources; fit sustainably into local healthcare systems; and, most importantly, be congruent with the cultural values of the target population (Mohatt et al., 2007; K. L. Walters & J. M. Simoni, 2002). More interventions fulfilling these requirements are critically needed in Indian Country, and require either a greater recognition of tribally-defined evidence-based practices, or substantial leeway for adapting and evaluating existing interventions for AI/AN populations.

Finally, this project echoes the growing call by investigators to accelerate the availability and evaluation of technology-based interventions, particularly for smaller populations who experience higher marginal costs when developing technology-based interventions (Bennett & Glasgow, 2009). To support this endeavor, Coyle et al. (2007) recommend the development and dissemination of general packages that could be modified for unique populations. To maximize their utility and reach for public health practice, such packages should be adaptable to: (a) a broad range of theoretical models; (b) a broad range of risk and protective factors; (c) the differing needs of demographic groups; and (d) the specific needs of individual users (Coyle et al., 2007). Bennett and Glasgow (2009) similarly recommend the creation of “a federally supported, market-competitive, Internet intervention infrastructure that could be leveraged by investigators to disseminate interventions to interested parties (p. 280).”

Until this occurs, smaller populations (like NW Native youth) will likely have few opportunities to develop and implement the most sophisticated technology-based programs. Given their high cost of development, it seems more likely that Native-specific interventions will either remain smaller in scope or will be more broadly designed and disseminated throughout Indian Country, masking differences that are known to exist between regions and tribes.

Implications for Research

At the local level, this project has given rise to new research agendas at the NPAIHB and has allowed Tribal EpiCenter staff to carry out several components of the Intervention Mapping process, a planning process commonly used by researchers and practitioners to develop evidence-based interventions (G. Kok, Schaalma, Ruiter, & van Empelen, 2004). IM consists of six sequential steps that can be used to systematically develop health promotion programs using theory, evidence from the literature, and evidence from formative research (Gerjo Kok, Harterink, Vriens, de Zwart, & Hospers, 2006). Together, the model encourages systematic planning that takes into account the priorities, interests, and social context of the target population.

Local AI/AN health surveillance data, results from the Native Youth Media Survey, and CBPR strategies were used to carry out *Step 1* of the Intervention Mapping process – *Conduct Needs Assessment*. Future NPAIHB trainings and coalition meetings will be used to finish *Step 2 - Specify Program Objectives*, which has already been discussed by regional partners but not fully completed. The priorities and recommendations outlined in this paper have begun to inform *Step 3 - Select*

Theory-based Methods & Practical Strategies. Once funding has been obtained, future coalition meetings will be used to carry out *Steps 4-6: Develop Program Products, Plan for Program Adoption & Implementation, and Plan for Program Evaluation.*

If technology-based interventions are to be designed to more broadly target AI/AN youth in Indian Country, additional research will be needed to better understand the technology use patterns and health information preferences of youth in other regions of the U.S. The technology infrastructure in the Pacific Northwest may be substantively different than in Alaska, the Southwest, the Plains, and in other tribal regions, driving local and regional variations in access and use. Interim research steps will also be needed to screen existing intervention features and content with Native teens and young adults to assess their interest and identify content needing surface and structural tailoring. To maximize behavior change, additional formative research will be done to better understand the attitudes, values, perceptions, knowledge, and decision-making processes and contexts that impact the sexual health of Native youth. Finally, after prototypes are developed, pilot studies will be needed to refine and optimize their appeal and utility, and upon completion, a more rigorous research process will be needed to evaluate their impact and use.

Taken together, this research applies the vast body of evidence surrounding behavior change, health communication, cultural-competency, media advocacy, and multilevel health promotion to the design and delivery of technology-based interventions. According to Flay and Burton (1990), public health's ability to influence individual behavior using mass communication strategies (like the Internet

and cell phones) is dependent upon: (a) the use of high quality messages and sources; (b) characteristics of the target audience (readiness, values, priorities); (c) the extent to which messages gain and retain individuals' attention; (d) the degree to which messages stimulate interpersonal dialogue and communication; (e) the message's ability to change knowledge, attitudes, beliefs, intentions, and skills associated with the behavior; and (f) the message's ability to cause societal changes that reinforce the desired behavior (Atkin & Wallack, 1990).

The multimedia interventions reviewed in this paper not only embody these principles, but vastly expand their possible reach and effects. With continued research and development, the tailoring capabilities of technology-based interventions can reflect the full range of human needs and behaviors recognized by McGuire (1991), to ensure the delivery of appropriate and effective health messages on a massive scale, when and where individuals are ready for change (SAMHSA). Beyond the individual, technology-based interventions can engage social networks in multilevel dialogue and action. Much like media advocacy, these technologies can "...empower individuals by providing knowledge and skills to better enable them to participate in efforts to change the social and political factors that contribute to the health status of all (Atkin & Wallack, 1990, p. 163)." Future research must explore the bounds and limitations of these intersections, and determine what, if any, impact technology-based interventions have on health communication and behavior change theories.

Implications for Practice

Educational materials and interventions that result from this work will provide tribes and tribal health advocates with access to culturally-appropriate, evidence-based strategies to reduce poor health outcomes experienced by AI/AN youth. Several steps have already been taken to share and disseminate these data:

- My dissertation will be made available to those interested in the data collection process and research findings.
- A regional summary report of aggregate data from the survey was sent to all 43 tribes in Oregon, Washington, and Idaho, and is now available as a downloadable resource on Project Red Talon's webpage.²⁶
- Local summary reports were sent to the five tribal schools that participated in the survey. These reports were shared in person with the Chemawa student body during their annual student health fair (February 26th), and with the Shoshone-Bannock Tribal School Board (January 21st). The report was also published in the Shoshone-Bannock tribal paper, Sho-Ban News.
- An article describing the project and its findings was included in NPAIHB's quarterly publication (Health News and Notes – January 2010), and has been accepted by the Indian Health Service's monthly publication (IHS Provider – April 2010).
- Upon completion, a shorter, abridged version of the dissertation will be made for Northwest tribal decision-makers and partnering agencies interested in the outcomes of the project or in duplicating components of the project. This report will be sent to partnering agencies (National Indian Health Board, Indian Health Service, National Coalition of STD Directors etc), and will be included as a downloadable resource on Project Red Talon's webpage.
- Three abstracts have been submitted and approved for inclusion at regional and national conferences:

²⁶ Available at: www.npaihb.org/epicenter/project/media_technologies_supporting_health_education/

- 2010 SexTech Conference, in San Francisco, CA, on February 26, 2010. Presentation Title: Reaching AI/AN Youth with Technology-based Sexual Health Interventions: Data and Guidelines from the Pacific Northwest.
- 2010 National STD Prevention Conference, in Atlanta, GA, on March 10, 2010. Presentation Title: Developing Avenues for Reaching Native Gen M.
- 2010 Adolescent Sexuality Conference, in Seaside, OR, on April 13-14, 2010. Presentation Title: Reaching AI/AN Youth with Technology-based Interventions: Data and Guidelines from the Pacific Northwest.
- One or more articles will be submitted for publication in a peer-reviewed public health journal.

Finally, these data will also be used in grant proposals to solicit funds to develop adolescent health promotion programs and/or technology-based interventions. Two such proposals have already been written using data from the Native Youth Media Survey.

Conclusion

The guaranteed provision of health services to American Indians and Alaska Natives is the direct result of treaties and executive orders between the United States and Indian Tribes. This trust responsibility has been reaffirmed by judicial decisions, executive orders, and Acts of Congress, and forms the basis of federal health services for AI/AN people. Unfortunately, our current system of care often fails to uphold this trust responsibility. At every stage of their lifespan, AI/AN people experience inferior health outcomes and lower survival rates than the general population; studies continue to document disparities in their access and use of health services. While much remains to be done to meet the complex healthcare needs of AI/ANs, this project offers

guidance for one small aspect of this undertaking – harnessing media technologies to deliver culturally-appropriate health interventions for AI/AN teens and young adults.

As described in detail throughout this paper, AI/AN youth do not receive sufficient reproductive health education and support, and as a result, experience high rates of teen pregnancy and STD/HIV. Exacerbating this problem, few sexual health interventions have been specifically designed for Native youth or evaluated in Indian Country, despite widespread state and federal funding restrictions requiring the use of “evidence-based” interventions. While, new media technologies hold great promise for bridging this critical gap, prior to this study, little was known about the technology use patterns and preferences of AI/AN youth in the Pacific Northwest, particularly in relation to sexual health.

Based on the 2009 Native Youth Media Survey and feedback provided by CBPR partners and NW Native youth, it appears quite evident that technology-based interventions can and should be adapted to meet the sexual health needs of AI/AN teens and young adults in the Pacific Northwest. Survey respondents and CBPR partners expressed interest in a wide variety of health topics, intervention modalities, and media design features. Over 75% of NW Native youth reported searching online for health information, and several technology-based interventions were identified in the literature as being capable of improving sexual health knowledge, skills, and behaviors among youth, with potential for adaptation.

To be effective, technology-based interventions must address the core risk and protective factors associated with teen pregnancy and STDs, cultivate individual and

tribal assets and strengths, and foster frequent and repeated use. To do this, their content must be informative, entertaining, and personally relevant to youth. With continued CBPR partnerships, technology-based interventions can be designed to do each of these things, while reflecting traditional and contemporary AI/AN culture, values, teachings, and experiences.

In the end, no two youth are the same, and no single approach is appropriate for all. 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. Integrated, multimedia approaches offer the best opportunity to reach the greatest number of Native youth in the Pacific Northwest. Despite the narrow focus of this project, findings from this research can inform the development of other technology-based interventions targeting American Indian and Alaska Native youth, and will provide the NW tribes with critically needed strategies and tools to improve adolescent health in their local communities.

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Appendix A: Native Youth Media Survey

Consent

You are being asked to participate in a survey research project that is being conducted by Stephanie Craig Rushing, a staff member at the Northwest Portland Area Indian Health Board and a student at Portland State University. The survey will take about 20 minutes to complete.

The information you provide will help us understand how Native teens and young adults most often use the internet, social networking sites, and cell phones. The information collected may not benefit you directly, but what we learn from this study will be used to improve the quality of health information available to young Natives living in Oregon, Washington, and Idaho.

This survey is anonymous. No one, including me, will be able to connect your responses to you.

Your participation is voluntary. You may choose not to take the survey, you may stop responding at any time, or you may skip any questions that you do not want to answer. Your completion of the survey serves as your voluntary agreement to participate in this research project. Questions about the purpose of the research can be directed to me, at 503-228-4185 or scraig@npaihb.org.

This study has been reviewed by the Portland Area Indian Health Services' Institutional Review Board, a tribal committee that is responsible for protecting the rights and welfare of research participants and NW tribal members. If you have concerns or questions about your rights in this study, you may contact the IRB Coordinator at 503-416-3256 or chudson@npaihb.org.

Instructions

Please circle your responses like this:

1. The sky is...

a. Yellow

b. Blue

Or check your responses like this:

	Often	Sometimes	Never	Don't Know
Happy		X		

1. **Are you male or female?** (Circle one)
 - a. Male
 - b. Female
2. **How old are you?** _____ (years)
3. **What state do you live in most of the time?** (Circle one)
 - a. Oregon
 - b. Washington
 - c. Idaho
 - d. Other: _____
4. **Most of the time, do you live in...** (Circle one)
 - a. A large urban area
 - like Portland or Salem
 - like Seattle, Tacoma, Bremerton, or Spokane
 - like Boise
 - b. A more rural area
 - like eastern Oregon, central Washington, or the Olympic peninsula
 - c. Other: _____
5. **What is your race or ethnicity?** (Circle all that apply)
 - a. American Indian or Alaska Native
 - b. Black or African American
 - c. White or Caucasian
 - d. Asian or Pacific Islander
 - e. Hispanic / Latino
 - f. Other: _____

6. How often do you use the following technologies? (Check the appropriate boxes)

	Every day or Almost Every Day	A few times a Week	A few times a Month	Less Often	Never
a. Cell Phone					
b. Computer					
c. The Internet					
d. iPod or other MP3 player					
e. Game consoles like X-box, Playstation, or Wii					
f. Digital Camera					
g. Digital Camcorder					
h. Webcam					

7. Thinking about all the different ways that you socialize or communicate with your friends, about how often do you... (Check the appropriate boxes)

	Every day or Almost Every Day	A few times a Week	A few times a Month	Less Often	Never
a. Send text messages to each other (via cell phone)					
b. Send instant messages to each other (IM - via computer)					
c. Send email to each other					
d. Send messages through a social networking site like MySpace or Facebook					
e. Talk to each other on a cell phone					

8. Do you: (Check the appropriate boxes)

	Yes	No	Don't Know
a. Have a profile on a social-networking site (like MySpace or Facebook)			
b. View other people's profiles/pictures posted on a social-networking site (like MySpace or Facebook)			
c. Write or update a personal blog			
d. Regularly read other people's personal blogs			
e. Send or receive pictures or videos on a cell phone			
f. Send or receive pictures or videos on a computer			
g. Post photos online where others can see them			
h. Post videos online (like on YouTube) where others can see them			
i. Watch TV shows online or on your MP3 Player/iPod			
j. Watch videos posted online (like on YouTube)			
k. Use the Internet to get news or information about movies, TV shows, music groups, or sports stars you are interested in			
l. Use the Internet to get news or information about current events or politics			
m. Use the Internet to get news or information about American Indian events, politics, culture, or your tribe			

9. Thinking about text messages, about how many do you send and receive per day? (Circle one)

- | | |
|--|----------------------------------|
| a. No cell phone | e. 21-40 messages |
| b. I have a cell phone, but I don't send text messages | f. 41-60 messages |
| c. 1-10 messages | g. More than 60 messages per day |
| d. 11-20 messages | |

10. If you play video games, on average, about how much time do you spend playing per day? (Circle one)

- | | |
|---------------------|----------------------|
| a. Never play | d. 1 hour – 2 hours |
| b. Less than ½ hour | e. 2 hours – 4 hours |
| c. ½ hour – 1 hour | f. More than 4 hours |

11. Do you play any Massively Multiplayer Online Role Playing Games (MMORPGs) like World of Warcraft, EverQuest, Second Life, Sims, Webkinz, or similar types of games? (Circle one)

- a. Yes
- b. No
- c. Don't know

If so, which do you play most often?

12. If you use the Internet, how much privacy do you usually have? (Circle one)

- a. It is usually private
- b. It is sometimes private
- c. It is usually not private

13. If you use the Internet, on average, about how much time do you spend online per day? (Circle one)

- a. Never use the Internet
- b. Less than ½ hour
- c. ½ hour – 1 hour
- d. 1 hour – 2 hours
- e. 2 hours – 4 hours
- f. More than 4 hours

14. If you use the Internet, where do you go to access it? (Check the appropriate boxes)

	Once a week or more	Less than once a week	Never
a. Home			
b. Someone else's house			
c. School			
d. Tribal Center/Building			
e. A Library			
f. A cell phone			
Other locations (please specify):			

15. We would also like to know if you've ever searched the Internet or visited websites to get more information about health and wellness. Specifically, how many times have you looked for information online about...

(Check the appropriate boxes)

	Five or more times	Less than five times	Never	Don't Know
a. A specific illness or medical problem				
b. Diet, nutrition, exercise, or fitness				
c. Tobacco products				
d. Drugs or alcohol				
e. Depression, anxiety, stress, or suicide				
f. Sexual health, sexually transmitted infections (STDs), or HIV				
g. Dating				
h. Contraception or birth control				
i. Pregnancy				
j. Violence, sexual assault, or bullying				
k. Our bodies, body parts, or anatomy				
<p>What websites or search engines do you use most often to find this information:</p>				

16. Which of the following resources would you feel most comfortable using to get more information about a sexual health topic like birth control, STDs, or pregnancy?

(Circle up to 4 preferences)

- a. Talking to a parent
- b. Talking to another trusted adult (aunt, uncle, teacher)
- c. Talking to a doctor, nurse, or health educator
- d. Talking to a friend or sibling
- e. Reading print materials (books, magazines, brochures, posters)
- f. Searching the Internet or visiting a website
- g. Text messaging an expert (via cell phone)
- h. Instant messaging an expert (via computer)
- i. Watching TV or a DVD
- j. Watching a video from a site like YouTube
- k. Downloading information to an iPod or MP3 player
- l. Playing a multiplayer role-playing game (using a fictional character or an avatar)
- m. Other: _____

17. If you were going to use the Internet to get more information about a sexual health topic (like birth control, STDs, or pregnancy), which of the following sites would you feel most comfortable visiting...

A website designed for: (Circle one)

- a. American Indian teens and young adults that only covered sexual health topics
- b. All teens and young adults that that only covered sexual health topics
- c. American Indian teens and young adults that covered a lot of different health topics
- d. All teens and young adults that covered a lot of different health topics

18. If you were going to visit a webpage about health and wellness, what types of features would you like it to have?

(Circle all that apply)

- a. Instant messaging
- b. Blogs, message boards, or places to post and read personal stories
- c. An “ask the experts” section to get questions answered
- d. Numbers or statistics
- e. Video games
- f. Multiplayer role-playing games (with a fictional character or an avatar)
- g. Animations or Flash Player Technology
- h. Music or audio
- i. Videos
- j. Pictures
- k. Photos or videos of people who are the same age as you, going through the same types of life issues
- l. Native American graphics, symbols, and design
- m. Large fonts and bold colors
- n. Links to other websites
- o. Please describe any other features that you would like it to have:

19. If you were going to visit a webpage about health and wellness for teens and young adults, what information would you like it to cover?

(Circle all that apply)

- | | |
|--|--|
| a. Current Events | n. Violence or Bullying |
| b. School and Academics | o. Tobacco Use |
| c. Physical Fitness and exercise | p. Drug and Alcohol Use |
| d. Weight and body image | q. Puberty (physical changes, periods, etc) |
| e. Nutrition | r. Dating and relationships |
| f. Diabetes | s. Virginity |
| g. Native American Culture, Stories, Values, or History | t. Male and Female body parts |
| h. Religion/Spiritual Beliefs | u. Sexual expression & sexual identity |
| i. Traditional Methods of Healing for American Indians and Alaska Natives | v. Pregnancy |
| j. Depression | w. Birth control and condoms |
| k. Stress | x. Sexually Transmitted Diseases (STD) and HIV/AIDS |
| l. Suicide | y. Sexual assault |
| m. Confidence and Self esteem | z. Please list any other topics that you would like to see or are interested in learning about: |

20. Which of the following best describes how you feel right now about sexual health:

(Circle one)

- a. I currently do not think about any sexual health topics (like birth control, STDs, or pregnancy)
– These topics are not important to me.
- b. I sometimes think about sexual health topics like birth control, STDs, or pregnancy
– Someday I think I would like to learn more.
- c. I think about sexual health topics like birth control, STDs, or pregnancy
– I would like to start getting more information right now.
- d. I recently started looking for more information about sexual health topics like birth control, STDs, or pregnancy – These topics are important to me and I'd like to learn more.
- e. I feel pretty confident that I know a lot about sexual health topics like birth control, STDs, or pregnancy – I don't really need to know much more right now.

21. Do you ever converse with people that you've only met online (not in person) using email, IM, or chat rooms? (Circle one)

- a. Yes
- b. No
- c. Don't know

22. If you have an online profile (like on MySpace or Facebook), are you friends with anyone that you have not met in person (ie. people that you've only met online)? (Circle one)

- a. Yes
- b. No
- c. Don't know

23. If you have an online profile, how easy do you think it would be for someone visiting your profile to find out who you are, where you live, or where you go to school? (Circle one)

- a. It would be pretty easy
- b. They would have to work at it, but they could figure it out eventually
- c. It would be very difficult for someone to find out who I am from my profile
- d. Don't Know

24. If you have an online profile, do you restrict access to your full profile so that only friends can view it? (Circle one)

- a. Yes
- b. No
- c. Don't know

25. Other than SPAM emails or advertisements, have you ever been contacted online by someone with no connection to you or any of your friends – a stranger? (Circle one)

- a. Yes
- b. No
- c. Don't know

26. If you have been contacted by a stranger online, has that contact ever made you feel scared or uncomfortable? (Circle one)

- a. Yes
- b. No
- c. Don't know

For the remaining questions, it is important that you understand what we mean so that we can interpret your answers correctly. Please keep the following in mind as you read and answer each question:

Any time that we ask about “sexy images – picture or video” we are talking about sexually suggestive, intimate, or nude personal pictures or videos taken of someone (alone or by a friend). Some people call this “sexting.”

* NOT those found on the internet or received from a stranger (like spam or advertisements).

Any time we say “sexy messages” we are talking about sexually suggestive written personal texts, emails, IMs, etc.

* NOT those you might receive from a stranger (like spam or advertisements).

27. Which of the following, if any, have you personally ever done?

(Circle all that apply)

- a. I have received a sexy message from someone else (on email, IM, or text)
- b. I have sent a sexy message to someone else (using email, IM, or text)
- c. I have received a sexy picture or video from someone else (of himself/herself)
- d. I have sent a sexy picture or video of myself to someone else (via email, cell phone, etc.)
- e. I have received a sexually suggestive message on my online profile (like on MySpace or Facebook)
- f. I have posted a sexually suggestive message to someone else’s online profile (like on MySpace or Facebook)

28. If you have sent a sexy message, photo, or video of yourself to someone else, who did you send it to? (Circle all that apply)

- | | |
|---|--|
| a. Boyfriend/Girlfriend | e. Someone I wanted to date or hook up with |
| b. Someone I had a crush on | f. One or more good friends |
| c. Someone I dated or hooked up with | g. Someone I only knew online |
| d. Someone I just met | h. Other: _____ |

29. How much do you agree or disagree with each of the following statements?

(Check the appropriate boxes)

	Strongly Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Strongly Agree	Don't Know
a. There is pressure among people my age to post sexy pictures, videos, or messages in their online profiles						
b. People who exchange sexy messages or images are <u>more likely</u> to date or hook up in real life						
c. People who exchange sexy messages or images are <u>expected</u> to date or hook up in real life						
d. Sending sexually suggestive messages or images can have serious negative consequences						

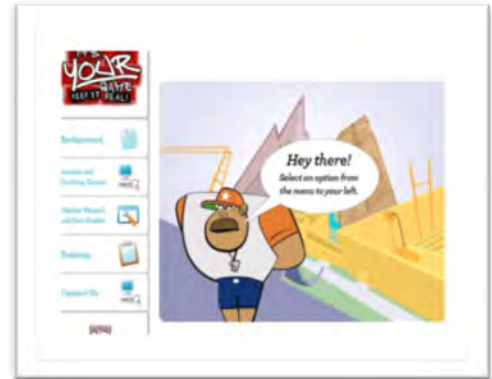
Thank you for taking the time to complete this survey!

Your answers are completely anonymous and will be kept private.

Taken together, results from all of the surveys will be used to improve health services for Native Teens and Young Adults living in Oregon, Washington, and Idaho.

Appendix B: Brief Overview of Reviewed Technology-Based Interventions

1. **It's Your Game...Keep It Real (IYG)** is a classroom- and computer-based STD/HIV and pregnancy prevention program for 7th and 8th grade students. It consists of twelve 50-minute lessons delivered per year. The program integrates group-based classroom activities (e.g., role plays, group discussions) with personalized journaling, and computer-based activities that are tailored to the gender and sexual experience of the individual. A life skills decision-making paradigm (Select, Detect, Protect) 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. The curriculum also includes six parent-child homework activities at each grade level to facilitate dialogue on topics like friendship, dating, and sexual behavior. The computer component includes a 3-dimensional virtual world interface, 2-dimensional educational activities that target determinants of sexual risk-taking (e.g. quizzes, animations, peer video, and fact sheets), and “real world”-style teen serials with on-line student feedback that allow for real time group discussion in the classroom.



Reported Results: Investigators reported significant improvements in several areas, including student's reasons for not having sex, beliefs about abstinence, perceptions about peer sexual norms and peer condom use, confidence to refuse sex and use condoms, and intention to remain abstinent through high school. Post-intervention, participants were 50% less likely to initiate oral sex, 29% less likely to initiate vaginal sex, 66% less likely to initiate anal sex, and 36% less likely to initiate “any” type of sex.

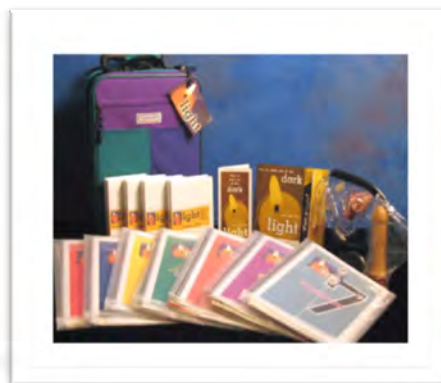
2. **Let's Talk About Sex CD-ROM** is an STD prevention intervention designed for female adolescents. The single-session intervention allows users to choose a culturally appropriate host to guide them through the material. After viewing the menu, users are able to freely navigate through topics of interest. The sections are designed to increase HIV/STI knowledge; raise awareness of the importance of being tested for HIV/STIs; provide HIV/STI risk reduction information; encourage critical appraisal of media images of sexual activity and its



consequences; challenge peer norms regarding abstinence, monogamy, and condom use; and increase skills and self-efficacy supporting abstinence and condom use. The program takes about 20 minutes to complete. The intervention was designed to be fun, educational, and interactive with multiple games, video clips, and cartoons, using simple language and brief bulleted text with matching audio.

Reported Results: Investigators reported no significant changes in self-efficacy for condom communication, refusing sex, using condoms, barriers to condom use, norms about sexual intercourse and condoms, or attitudes about condoms and intercourse.

3. **Project LIGHT (Living in Good Health Together)** is a CDC-recognized HIV preventive intervention for high-risk teens and adults. The computerized version (CD-ROM) of the intervention consists of 6 lessons that include multi-media (flash animation, audio, video), interactive exercises designed to reduce sexual risk. Session 1 introduces HIV transmission and personalizes risk. Session 2 identifies personal risk factors and problem-solving triggers. Session 3 discusses and demonstrates the use of male and female condoms. Sessions 4 and 5 focus on assertive communication and negotiation skills. Session 6 reviews prior skills and helps students develop risk-reduction plans. The program was evaluated in a school-setting, where students completed the program independently at school. Each session took 20-30 minute to complete.



Reported Results: Youths who participated in the computerized intervention reduced their sexual risk - they were significantly less likely to engage in sexual activity and reported significantly fewer partners.

4. The **Computer-Delivered Sexual Risk Reduction** project evaluated the effectiveness of a two-session, individually tailored intervention. During Session 1, participants completed a baseline assessment (measuring HIV prevention knowledge, motivation, skills, and behavior - IMB) and received 15–40 minutes of intervention content. The intervention's educational content was tailored to each individual's baseline IMB measures. That is, of the available content modules, participants received only

How effectively or ineffectively do you feel you would be able to ...	Very effectively	Somewhat effectively	Neither effectively nor ineffectively	Somewhat ineffectively	Very ineffectively
...able to talk to your partner about their sexual risk reduction information you have seen?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...able to get your partner to use condoms for your partner?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...able to get your partner to use condoms during vaginal sex?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...able to get your partner to use condoms for anal sex during vaginal sex?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

those that addressed their particular IMB deficits or low scores (e.g., an individual who lacked condom use information received an informational module, whereas a well-informed participant did not). Two weeks later, participants returned for a 10–20 minute goal-setting exercise using Motivational Interviewing techniques (MI), where participants chose a manageable, yet moderately challenging behavior change goal corresponding to his/her condom use readiness level, and then identified barriers and strategies for achieving their goal.

Reported Results: Compared with the control group, participants exhibited a significant increase in risk reduction behavior, including increased condom-related knowledge and keeping condoms available at four-week follow-up. Among sexually active participants there was a significant increase in self-reported condom use.

5. The **Computer-Assisted Motivational Intervention (CAMI)** is a computerized risk assessment tool and educational intervention designed to reduce sexual risk-taking among female adolescents. The program was designed for use in the clinic setting to support prevention counseling and patient goal-setting. Participants in the study completed a 60-90 minute computerized assessment and then received 30 minutes of face-to-face counseling (which discussed setting and maintaining a sexual “S.A.F.E.” plan) at enrollment, and at 3 month and 6 month follow-up visits. The intervention contained three modules: (a) Abstinence;



Contraception. At each visit, participants could select which of the three reproductive health modules they preferred to receive that day. Modules could not be repeated, so by then end, all three topics were covered. All three modules included a demonstration of how to correctly put on and remove a condom. At the end of each counseling session, counselors gave the participants three pamphlets to take home corresponding to the content of that day's module, and were offered two dozen latex condoms.

Reported Results: CAMI was superior to the control intervention in decreasing sexual and contraceptive risk behaviors among sexually active female adolescents. When asked about condom and birth control use during sexual activity, CAMI participants outperformed control participants on all behaviors (except for dual method protection). The CAMI was also more effective than the control

intervention at increasing sexual abstinence, but the difference was not statistically significant.

6. **Youth Health Provider** is a computer-based program that takes a comprehensive social and behavioral health history, covering preventive issues outlined by the AMA Guidelines for Adolescent Preventive Services (including sexual activity, alcohol/marijuana use, other substance abuse, sexual abuse, contraception use, and suicide attempts). The program starts by obtaining a thorough health and behavior history (lasting approximately 15 minutes). Based on this data, the program prioritizes health problems and needs, and generates: (a) advice and local referrals; (b) age-specific guidance; (c) assessment response data for clinicians to review or add to EHRs; (d) pertinent, succinct education videos, and (e) printed take home materials. The program can be used in a variety of settings, including clinics, schools, shelters, and detention facilities.

Reported Results: A pilot study of 5,000 users found that the program was efficient, reliable, and improved adolescent access to health screening and educational services.

7. The computerized **Aid For Contraceptive Decision-making (ACD)** program was designed to support the selection and use of contraception among young, sexually active women in a clinic setting. During the clinic visit, patients used the ACD program to select a method from the menu (taking 10-15 minutes). The ACD program: (a) demonstrated how the method works and is used; (b) graphically presented the method's effectiveness; (c) helped patients assess their personal characteristics and situation to determine if the method was a feasible choice; (d) presented method benefits and costs in relation to other methods; (e) offered nonjudgmental feedback and advice based on the individual's disclosed barriers to use; and (f) generated a patient printout. The printout was then reviewed and discussed with a healthcare provider.

Reported Results: Compared with the experimental ACD group (3.4%), more control group participants (8.8%) did not follow through with their intention to use oral contraceptives ($p < .05$). The positive reaction of young women suggests that computers can be used to augment interactions with clinicians. A similar tool is available online at: <http://www.sexualityandu.ca/trialdp>

8. **Health Information Consumer Skills** - This intervention was designed to improve health information consumer skills and improve web-based information-seeking, social support, and emotional wellbeing among people living with HIV/AIDS. The intervention consisted of eight, 2-hour group sessions that took place in a computer-lab. The group of 6-8 participants met twice weekly for 4 consecutive weeks. To promote learning, all sessions used facilitator modeling, practice in small groups, and Internet access outside the computer-lab. The first

two sessions were designed to reduce anxieties about using computers, gain familiarity with the Internet, and motivate interest. In Session 3, participants were taught how to evaluate the quality of information found online, and practiced evaluating websites in small groups. Sessions 4–7 focused on the Internet as a tool for health and support. Participants were taught to search for health information, care and support resources, and clinical trials. The intervention concluded with a personalized review of Internet uses, quality evaluation, social uses, and critical thinking skills. Compared with the control group, participants were significantly more likely to search for health information and social support functions online.

9. **Sexualityandu.ca** is an Internet-based educational website that promotes sexual and reproductive health. The site is developed and maintained by the Society of Obstetricians and Gynecologists of Canada (SOGC). In addition to sexual health information, the site has a wide selection of multimedia content, including: peer stories, expert Q&A, TV and radio ads, interactive games and quizzes, a personalized birth control selection tool, and virtual scenarios.



Reported Results: Investigators reported that the most accessed pages addressed sexual relations (average time of 34 seconds), and male and female anatomy (45–1.5 minutes, on the average). Quiz responses provide the authors with a diagnostic tool to provide appropriate, timely, targeted, and behaviorally relevant reproductive health information to its users.

10. **Keep it Real** is a single session, online STD/HIV and pregnancy prevention intervention for teens and young adults. The program asks users to respond to questions related to their HIV risk. Algorithms embedded in the program give personalized feedback based on the user's level of risk. The intervention is divided into five modules, which specifically address theoretical constructs related to condom use: (a) attitudes, (b) norms, (c) awareness of HIV/STD risk, (d) self-efficacy for condom negotiation; and (e) self-efficacy for condom use. In between each module participants are exposed to a role model story. Based on their gender and race/ethnicity, participants are “matched” to a similar role model from the local community. The site includes six role models —male and female Latinos,



male and female African Americans, and male and female Caucasians. Role model stories are delivered using flash technology with accompanying pictures and audio (including voice and music). Stories last between 60 and 90 seconds. The entire intervention takes participants approximately 20 minutes to complete.

Reported Results: Investigators reported changes in perceived risk for STD/HIV and unintended pregnancy, condom use norms, self-efficacy for condom use and condom negotiation, and outcome expectancies related to condom use.

11. Trust Yourself. Reduce Your Risk. is an Internet-based pregnancy, STD, and HIV prevention program for rural high school students. The seven-week intervention includes six computer-based activities that take 10–15 minutes to complete.

- a) Sensation Seeking Scale and Impulsive Decision Making Scale, after which students received tailored feedback about their personality, how it might relate to their risk-taking behavior, and things they could do to reduce their risk.
- b) Truth or Myth - Students were provided with 12 statements and were asked to discern “truth” from “myth.”
- c) Risky Behavior - Students were provided with a list of behaviors and were asked to identify if each was “very risky”, “a little risky”, or “not risky.”
- d) Delaying Tactics - Students reviewed delaying tactics, and then submitted an original entry into a “Best Delaying Tactics Contest.”
- e) Choose Your Own Adventure CD-ROM - Students went on a virtual date and made choices that did or did not lead to sex. The activity ended with positive or negative outcomes based on the decisions made.
- f) Refusal Skills - Students first reviewed the five criteria of successful refusal skills, and then submitted an original entry into a “Best Refusal Skill Contest.”



All but one of the activities was reproduced in hard copy for students without a computer. All activities were designed to be completed outside regularly scheduled class time and were available 24 hours a day, seven days a week. Intervention messages were explicitly designed to increase student perceptions of STD/pregnancy threat and contraception self-efficacy. The authors intend to combine the computer-based activities with a more comprehensive classroom-based intervention.

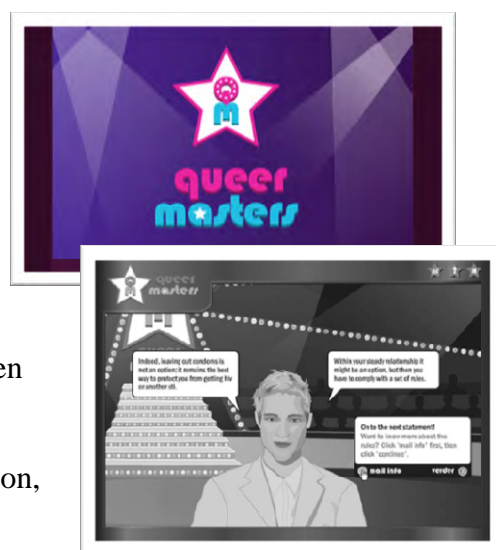
Reported Results: Investigators reported changes in favorable attitude toward waiting to have sex, condom negotiation efficacy, and condom efficacy. Adolescents who were not exposed to the intervention were nearly three times more likely to initiate sexual activity.

12. **+CLICK** is an Internet-based, sexual risk reduction intervention for HIV-positive youth (age 13-24 years). The intervention targets four behaviors: choosing not to have sex, disclosing HIV status to a potential sex partner, using condoms correctly and consistently, and using an effective method of birth control along with condoms. CLICK+ provides interactive activities (including animation, peer and expert video) adapted from an existing computer-based HIV prevention intervention, It's Your Game, Keep it Real (IYG). The application is designed to be accessed via the web during routine clinic visits. To access the program, youth input a unique identifier and provide demographic, behavioral, and attitudinal data to create a personal profile. The profile then guides the program's tailoring functions, based on age, gender, self-reported sexual experience and intentions, and perceived importance and self-efficacy related to abstinence and condom use. Upon leaving the application, youth re-enter slider bar data, assessing immediate program impact. Youth may re-access the game at a later time from another computer and resume activities from the point of exit.



Reported Results: Investigators reported changes in condom use self-efficacy, perceived importance of abstinence, and self-efficacy regarding abstinence or waiting until older to have sex again. Participants liked the autonomy of using the application at their own pace and the confidentiality provided by headphones. Participants reported that the application provided a non-threatening means to receive information on sensitive topics, such as condom and contraceptive use. In addition, participants reported that +CLICK was thought-provoking and helped generate open dialogue with clinic staff regarding reviewed material.

13. **Queermasters** is an Internet-based program that promotes HIV-testing among sexually active men who have sex with men (MSM) in the Netherlands. Participants are recruited using banner ads and buttons on Dutch gay websites. The site is designed as an "online gay health show" (www.queermasters.nl). Participants begin by selecting one of three possible attractive, friendly hosts. The selected host then guides participants through four different educational rounds in the Queermaster game show (focusing on HIV testing: Risk perception, Knowledge, Attitude, Norms, Skills and Self-



efficacy). Computerized tailoring is used to personalize program materials to program participants (i.e., a video role model story is tailored to the age and relationship-status of the participant). Throughout the show, the host poses questions (using real speech in mp3-format), makes jokes, gives tailored feedback to the participant, and sends e-mails to the participant upon request. In addition, he is able to wink, smile, and give thumbs-up or thumbs down, to approximate human face-to-face interaction as closely as possible. A virtual MSM audience is included in the background of the game to act as a reference group, promoting healthy social norms.

14. **Smart Sex Quest** is an Internet-based, tailored STD/HIV website for men who have sex with men (MSM). Men were recruited to the site using passive IM in chat rooms, using links from STD/HIV sites, and banner ads. Eligible participants took a ten-minute baseline risk assessment documenting demographics, sexual risk behaviors and Internet partner seeking behaviors, including partner gender for Internet and non-Internet partners. Those in the intervention received three tailored messages, generated by computer algorithms, based on specific information they provided on the risk assessment. The messages were delivered using a role model story format, and were accompanied by a photo of a man similar to the participant in terms of age and race/ethnicity. The three role model stories were framed within a stage-of-change context, and thus the language in the story encouraged the participant to consider small incremental changes toward three behavioral outcomes: 1) condom use with non-main partners, 2) STD testing and 3) HIV testing. Three months later, participants were sent an e-mail asking them to return to the site to complete a follow-up risk assessment.

Reported Results: Men in the intervention group showed a trend toward testing for HIV more frequently, and were also significantly more likely than men in the control group to indicate they were willing to go to an STD prevention website to obtain information on disease prevention.

15. Two articles evaluated an Internet-based HIV risk reduction program for rural men who have sex with men (18 years of age or older). **WRAPP** participants (N = 475) were recruited online through banner ads, were automatically randomized into the study, and completed pre- and post-test questionnaires online. The intervention consisted of three modules. Each module included two 20-min interactive sessions (usually showing a scripted discussion) using flash player technology. The system was programmed so that participants were required to wait at least 48 hours between sessions (i.e., minimum time to completion was 10 days). To encourage



module completion, email reminders were sent at 5, 12, and 14 days after beginning a module. Printable feedback materials were tailored to the participant's responses during interactive portions of the dialogue. "Tell me more" buttons were included that, if clicked, provided links to access more information on the feedback page. All three modules can be viewed at: www.wrapphome.net.

Reported Results: Initial results support the WRAPP Internet Intervention as an effective platform for providing HIV risk reduction to rural MSM. Participants reduced the percentage of partners with whom they had anal sex, increased the percentage of anal sex partners with whom they used condoms, and increases their willingness to use a condom with every new partner, all the time.

16. In the **PowerON** program, trained health education counselors visit local "men-4-men" chat rooms to provide HIV/STD information and counseling to MSM, and refer users to information on the PowerON website (<http://4healthyliving.org/>). A study was designed to explore the feasibility and effectiveness of using online instant message (IM) sessions to disseminate HIV/STD information and counseling to MSM. Over the course of 3 years, two counselors created profiles on Gay.com and participated in over 279 IM counseling sessions. PowerON counselors entered the chat room between 8 and 10 times a month, usually at peak cruising times (6 p.m.– midnight), under the screen name, "PowerONKansasCity". IM transcripts were then analyzed for emergent themes. Four main topics emerged: (a) testing; (b) risk-taking behaviors; (c) HIV/STD information; and (d) counseling. Testing was the most common theme, appearing in two-fifths (43%) of the sessions. Three subcategories included: testing locations, processes, and referrals. MSM often sought information about degree to which specific behaviors could put them at risk for HIV/STD contraction (38% of the sessions). Questions regarding HIV/STD signs and symptoms occurred in 22% of the sessions. In 18% of sessions, counselors took on the role of a therapist, providing emotional support regarding their HIV/STD status and sexual identity.

Reported Results: Qualitative results showed that HIV/STD prevention information could be disseminated using IM (successfully achieved in almost 90% of the sessions). Data suggests that IM counseling has great potential as a forum for administering facts and answering questions that might lead to decreased risk-taking behavior in MSM.

17. In the **Online Prevention Program**, investigators evaluated the affect of an Internet-based behavioral intervention for men who have sex with men in Hong Kong. Participants were recruited via the Internet or from venues frequented by MSM (bars, saunas, beaches). An Internet website was created for the project, which served as a venue to introduce this study, recruit participants, and administer questionnaires. During the 6-month study period, participants received professionally designed, visually appealing, educational emails and graphical

messages related to STD/HIV prevention on a bi-weekly basis. Topics covered: modes of HIV transmission, correct condom use, HIV testing, relationships & love, and the relationship between drugs and sex. Participants sent back a confirmation email after reading each message. Trained peer counselors attempted to contact participants at least twice a month via email, IM, chat room, etc, and a telephone hotline was made available to participants (only a small fraction of participants used these services).

Reported Results: The intervention did not produce improvements in STD/HIV knowledge, attitudes, or behavior.

18. The **Sexual Health Sim**, run by the University of Plymouth (UK), contains information about sexual health and STDs. The site contains several interactive features, including photographs of sexually transmitted diseases and a 3-D tour of the testes. Users can read about condoms and safe sex practices, and receive a virtual condom for their avatars to use. Avatars can also simulate the experience of having AIDS by donning a “skin” that visually displays the lesions of Kaposi Sarcoma. The Sexual Health Sim offers links to outside support groups for people who have STDs/HIV or questions about sexual health, as well as links to Christian abstinence groups. The site also periodically hosts discussions about sexuality and abstinence.

19. **STDTest.org & syfilistest.nl** – In response to a syphilis epidemic among men who have sex with men, Internet Sexuality Information Services, Inc. (ISIS) and the San Francisco Department of Public Health (SFPDH) collaborated to develop an innovative, confidential, online testing service for syphilis. The service was launched in San Francisco in June 2003 (www.STDTest.org), and was later replicated in Amsterdam in 2004 (www.syfilistest.nl). After going to the website, local residents complete a laboratory requisition form online, print it, and take it to the nearest participating site to have his or her blood drawn. The test is ordered by a licensed physician. After a week, test results are retrieved online using a unique identifier generated by the system. If the results are positive, the person is directed to a website where they can obtain current information about syphilis, guidance for how to tell his or her partner(s) about the disease, and information about public and private treatment options. In addition, they are



notified that a staff person from health department will contact them to assure appropriate care and treatment.

Reported Results: In San Francisco, 218 tests were performed and 13 people tested positive for syphilis during the first year of the program. Both programs found that online testing services offered patients a free and convenient alternative to getting tested at a traditional clinic. Online services detected similar (SF) or a significantly higher percentage (Amsterdam) of men who need treatment for syphilis than did routine STI screening programs at the traditional STI clinic.

20. **IWanttheKit.org** offers home-based STD testing (including chlamydia, gonorrhea and trichomonas) for teens and young adults (14 and older), using self-obtained vaginal samples for females and self-collected penile samples for males. Participants can request the kit via the Internet or a 1-800 telephone number. Self-obtained samples are returned to the lab in a plain pre-paid, pre-addressed envelope. The program is free to residents of Denver, CO, Delaware, the District of Columbia, Maryland, Pennsylvania, Virginia and West Virginia. If users test positive, they can receive free, confidential treatment from a local participating clinic, or the lab can send the results to a healthcare provider of his/her choice. The website also provides tailored information to males and females regarding partner notification services, other STIs, and additional resources.



Reported Results: Over 2,500 test kits have been ordered from the program (as of October 2009). Approximately, 47% were returned. Among female participants, 9.7% were positive for chlamydia, 1.2% were positive for gonorrhea, and 10.4% were positive for Trich. Among males, 12.8% were positive for chlamydia, .8% were positive for gonorrhea, and 9.8 were positive for trich. STD rates varied by age, ethnicity, and risk behavior. Treatment was provided by local clinics partnering with the service. Treatment was confirmed for 96.5% of the CT cases, 100% of the GC, and 100% of the Tric cases. High levels of sexual risk were reported by participants. Participants rated the screening service easy to use - 14.5% of females and 11.8% of men were repeat users. Results suggest that home-based STD testing services may increase adolescent access to screening.

21. **Cell Phone Reminders** - This project involved HIV-infected adolescents and young adults between the ages of 16 and 24 who were beginning a Highly Active Antiretroviral Therapy (HAART) regimen for the first time. Participants received a free cell phone with a local service plan for approximately 6 months and received periodic HAART adherence reminder calls from an experienced HIV treatment nurse. Patients were assessed at 4-week intervals to determine the perceived

intrusiveness or helpfulness of receiving calls, and the frequency of missed medication doses.

Reported Results: Investigators reported the phone calls were generally helpful and many participants began using the calls to ask other health related questions. Significant decrease in viral load tracked positively with adherence to call reminders. Tapering calls rapidly over 3 months provided inadequate support to maintain adherence at 24 weeks.

22. **Hookup & TeenSource** – Hookup is a statewide text messaging service available to teens and young adults in California. To use the service, youth text the word 'hookup' to the appropriate phone number and receive a weekly text-message containing sexual health tips and life advice. The sexual health tips are developed by health educators, focusing on issues that are most on the minds of youth today. Each tip contains a prompt to text the word 'clinic' plus a zip code to receive local clinic referrals. The online home for Hookup is: www.teensource.org, which provides more information about STD and pregnancy prevention, and ways to make responsible sexual health choices.



Reported Results: Investigators reported 873 subscriptions to Hookup from April to June 2009, with 293 clinic requests received via text, equating to 34% of subscribers requesting referrals to clinic services.

23. Launched in 2006, **SexINFO** is a menu-driven sex education and awareness text messaging service. Youth text the word “SEXINFO” to a 5-digit shortcode (61827). They then receive a menu of 5 commonly asked questions about sexual health and are asked to text another keyword to receive the answer. Each answer includes a "nugget" of information, plus two local youth-friendly clinic referrals. The service was launched along with a comprehensive social marketing plan (poster, palm card, video PSA or radio advertisement).



Reported Results: Investigators reported that in the first 25 weeks of service (April–October 2006), more than 4500 inquiries were made to the program. 2,500 of those inquiries led teens to access more information and referrals. The most frequent messages accessed were: #1 (if ur condom broke) (n=532); #2 (to find out about STDs) (n=486); #3 (if u think ur pregnant) (n=372); #4 (to find out about HIV) (n=277); #5 (if ur sexually active) (n=199); #6 (if they're cheating on u)

(n=181); #7 (if ur not sure u want to have sex) (n=158); #8 (if u think u might be gay) (n=110); #9 (Need to speak to someone now) (n=78); #10 (if u need a place to stay) (n=59); #11 (if someone's hurting u) (n=44).

24. The **Birds and Bees Text Line** is a text messaging service for teens and young adults that responds to open-ended sexual health questions. Responses are provided by trained public health experts. The one-on-one exchanges are private, personal, and anonymous, and can be conducted free of parental scrutiny. All questions are answered within 24 hours. Trained health educators follow general guidelines when responding to sexual health questions: No medical advice — urge questioners to speak with a doctor. Do not advocate abortion. When necessary, refer questioners to local clinics, websites, or emergency hot lines. Give reasoned, kind advice. The intervention is not tied to any particular setting. Standard text messaging charges apply.

25. The goal of the **Text To Change** (www.texttochange.com) project was to increase public awareness about HIV/AIDS using cell-phone text messages. The project partnered with a local cell phone network to send an introductory text message to all local cell phone subscribers. The intervention consisted of interactive quizzes sent over a 6-week period, involving one question per week (this data was also used to gauge community knowledge). Correct answers were confirmed and incorrect answers were corrected with a text message response. Incentives were used to promote participation. Future quiz topics will include tuberculosis, malaria, reproductive health and family planning. The intervention was designed to be educational and entertaining - raising and resolving key issues regarding HIV transmission and prevention.



Reported Results: During the pilot test, approximately 2,500 of 15,000 eligible participants responded to the text questions each week (response rate of nearly 17%). The second program in Arua (North West Uganda) targeted an audience of 10,000 mobile phone users, where approximately 3,500 people actively participated in the quiz (response rate of nearly 35%). At the end of six weeks, a final text was sent encouraging participants to go in for HIV testing, which caused a 40% increase in HIV testing over the six-week period.

26. **What Could You Do?** is an interactive DVD designed to educate young women about sexually transmitted diseases (STDs) and increase their ability to choose and implement risk reduction strategies. The program was designed for stand-alone use in healthcare settings, limiting costs and ensuring consistent administration. The interactive video uses peer stories to explore decisions



that young women face in relationships. The DVD offers four topical sections that users can interact with: (a) The sexual situations section covers negotiation strategies with sexual partners to reduce STD risk. (b) The risk-reduction section addresses condom-efficacy and getting and using condoms. (c) The reproductive health section explains pelvic exams, female reproductive anatomy, and physiological responses to infections. (d) The STD section covers general information about eight STDs.



The video vignettes include several choice points, where viewers are presented with options that the characters might choose. The DVD is thus interactive in two ways: users select which sections to watch and how each proceeds. In a randomized clinical trial assessing the intervention's effectiveness, study participants were required to spend 30 minutes alone with only the sexual situations and risk-reduction sections of the DVD. They then returned three more times (at 1, 3, and 6 months), where they spent at least 15 min using all sections of the DVD. Altogether, the DVD contains an hour worth of video content (available at www.WhatCouldYouDo.org). Due to the self-directed nature of the program, viewers did not typically watch the entire intervention.

Reported Results: Participants who viewed the DVD were more likely to become abstinent and, among those who continued to have sex, were less likely to have a condom fail from incorrect usage. Investigators also reported that participants were less likely to report having contracted an STD.

27. **Video to Promote Dual Method Use** – The 21-minute video developed for this project was culturally sensitive, theory-based, and reflected the learning needs of the target population (Black and Latina Female Adolescents age 15-21), as determined by prior qualitative and quantitative research. Three important insights about condom use emerged from those studies, which were incorporated into the video: (a) Many teens do not use condoms when they are protected from pregnancy by a hormonal contraceptive; (b) teens do not use condoms when they feel they can trust their partner; and (c) teens said that if they saw young women like themselves who were infected with HIV, they would take the threat more seriously. Thus, the video intervention featured two young HIV-positive women, one Black and the other Latina, and two young uninfected Black and Latino men. The video was made up of two parts. In the first part, the young women discuss their life and relationships. Then, each talked movingly about finding out she was infected with HIV, even though neither believed she was at risk. The women subsequently talked about how they became infected. In the second part, the young women and men individually responded to issues and barriers to condom use that were noted in the elicitation research. Study participants watched the video alone in a room and then contacted the research assistant when they were finished.

Reported Results: Investigators reported increases in condom use, and ability to get their partner to use a condom.

28. Two computer games (**The Baby Game!** and **Romance!**) were designed for teens and young adults to change attitudes and behaviors associated with pregnancy. The interactive games provide factual information, simulate outcomes (with scenarios and time/cost assessments), and correct misconceptions. Teens have the opportunity to improve decisions as they go, if consequences from original choices prove undesirable. The purpose of "Baby Game!" was to evaluate player's readiness for parenthood while "Romance!" was to improve player's knowledge about sexuality and contraception, increase their communication skills, and simulate responsible sexual decision-making. The computer games were placed at 6 major pediatric clinics.

Reported Results: Both games produced significant changes in knowledge (costs of birth and of costs in money and time of child-rearing) and improved attitudes about sexual behavior (birth control, condom use, pregnancy and parenting). Users found the games to be informative, educational, and fun. The clinics experienced a 15% decrease in the number of positive pregnancy tests for teens in the first year following implementation.

29. **Life Challenge** is an interactive computer game developed by the New York State Department of Health to promote sexual health among high-risk teens and prevent HIV. The program uses a time-travel adventure game format to share information and practice prevention skills in a non-threatening environment. The game includes branching patterns for different partner preferences, and tailored information for those who are HIV positive. Players select a partner (8 available - male and female, ethnically diverse) and then move with their partner through a series of scenes and tasks (which require players to practice sex-negotiation skills). The game uses a voice capture mechanism to play back player responses as they negotiate with their chosen partner. The game was offered at kiosks (slightly smaller than a phone booth with side panels that could be pulled up for added privacy and soundproofing), which were placed in public venues frequented by high-risk youth.

Reported Results: Investigators reported changes in STD/HIV knowledge. For four of the five partner resistance statements, compliance rates clustered around 85% for continuing to negotiate for condom or dental dam use even when their partner resisted using protection. Audio recordings indicate that 81% of youth recorded a response turning down sex.

Appendix C: Intervention Matrix

Table C1: Design Features

Intervention	On-site Staff Required	Private Space Required	Mostly User-Directed or Navigated	Private or Anonymous	Clinic-Based	School-Based	Community Center	Not Site-Specific; may be Adapted for other Settings
1. It's Your Game (IYG)	X					X		
2. Let's Talk About Sex		X	X	X	X			X
3. Project L.I.G.H.T.			X	X		X		X
4. Computer-Delivered Sexual Risk Reduction		X				X		X
5. Computer-Assisted Motivational Intervention	X	X			X			
6. Youth Health Provider					X	X	X	X
7. Aid for Contraceptive Decision-making (ACD)	X	X			X			X
8. Health Information Consumer Skills	X		X	X			X	
9. www.sexualityandu.ca			X	X				X
10. Keep it Real								X
11. Trust Yourself. Reduce Your Risk.						X		X
12. +CLICK (adapted from IYG)		X	X		X			X
13. Queermasters								X
14. Smart Sex Quest			X	X				X
15. WRAPP Internet Intervention								X
16. PowerON	X		X	X				X
17. Sexual Health Sims - Second Life			X	X				X
18. Online Prevention Program				X				X
19. STDTest.org & syfilistest.nl			X					X
20. IWanthetheKit.org			X					X
21. Cell Phone Reminders	X				X			X
22. Hookup & TeenSource				X				X
23. SexInfo			X	X				X
24. The Birds & Bees Text Line	X		X	X				X
25. Text to Change				X				X
26. What Could You Do?		X	X		X			X
27. Video to Promote Dual Method Use	X	X			X			
28. Baby Game and Romance			X	X		X		X
29. Life Challenge		X	X	X			X	X

Table C2: Tailoring Features

Intervention	Integrated Risk, Needs, or Readiness Assessment	Tailored Content or Messages	Personalized Experience	Individualized Messages, Tools, Goal-setting
1. It's Your Game (IYG)	X	X		X
2. Let's Talk About Sex		X		
3. Project L.I.G.H.T.	X	X		
4. Computer-Delivered Sexual Risk Reduction	X	X		X
5. Computer-Assisted Motivational Intervention (CAMI)	X	X		X
6. Youth Health Provider	X	X	X	
7. Aid for Contraceptive Decision-making (ACD)	X	X		X
8. Health Information Consumer Skills				X
9. www.sexualityandu.ca	X	X		
10. Keep it Real	X	X		
11. Trust Yourself. Reduce Your Risk.	X	X	X	
12. +CLICK (adapted from IYG)	X	X		X
13. Queermasters	X	X	X	X
14. Smart Sex Quest	X	X		
15. WRAPP Internet Intervention	X	X	X	X
16. PowerON	X	X		X
17. Sexual Health Sims - Second Life			X	
18. Online Prevention Program		X		
19. STDTest.org & syfilistest.nl				
20. IWanthetheKit.org	X			
21. Cell Phone Reminders			X	X
22. Hookup & TeenSource				
23. SexInfo	X	X		
24. The Birds & Bees Text Line		X		X
25. Text to Change	X			
26. What Could You Do?		X		X
27. Video to Promote Dual Method Use				
28. Baby Game and Romance	X	X		
29. Life Challenge		X	X	X

Table C3: Educational Components

Intervention	Skill-Building or Personal Development Tools	Multiple Sessions or Required Repetition	Virtual or In-Person Interaction with Experts	Peer Interaction and/or Role Models	Highly Interactive Content	Intensely Multi-Media
1. It's Your Game (IYG)	X	X	X	X	X	X
2. Let's Talk About Sex	X		X		X	X
3. Project L.I.G.H.T.	X	X		X	X	X
4. Computer-Delivered Sexual Risk Reduction	X	X		X	X	
5. Computer-Assisted Motivational Intervention (CAMI)	X	X	X			
6. Youth Health Provider				X	X	X
7. Aid for Contraceptive Decision-making (ACD)			X		X	
8. Health Information Consumer Skills	X	X	X	X	X	
9. www.sexualityandu.ca	X		X	X	X	X
10. Keep it Real		X		X		X
11. Trust Yourself. Reduce Your Risk.	X	X			X	
12. +CLICK (adapted from IYG)	X		X	X	X	X
13. Queermasters	X	X			X	X
14. Smart Sex Quest	X			X		
15. WRAPP Internet Intervention	X	X		X	X	X
16. PowerON			X		X	
17. Sexual Health Sims - Second Life			X	X	X	
18. Online Prevention Program		X	X			
19. STDTest.org & syfilistest.nl	X					
20. IWanthetheKit.org	X					
21. Cell Phone Reminders		X	X			
22. Hookup & TeenSource	X	X		X	X	X
23. SexInfo	X				X	
24. The Birds & Bees Text Line	X		X		X	
25. Text to Change	X	X	X		X	
26. What Could You Do?	X	X		X	X	
27. Video to Promote Dual Method Use	X		X			
28. Baby Game and Romance	X			X	X	X
29. Life Challenge	X		X	X	X	X

Table C4: Reported Changes in Knowledge, Attitudes, & Behaviors

Intervention	Perceived Risk or Consequences	Values or Attitudes	Perceived Peer Norms and Behavior	Self-Efficacy	Intention or Motivation	Knowledge re: STDs, HIV or Condoms	Sexual Behavior, Condom Use, or Screening
1. It's Your Game (IYG)		X	X	X	X	X	X
2. Let's Talk About Sex		X*	X*	X*	X*	X	
3. Project L.I.G.H.T.							X
4. Computer-Delivered Sexual Risk Reduction		X*				X	X
5. Computer-Assisted Motivational Intervention							X
6. Youth Health Provider							
7. Aid for Contraceptive Decision-making						X	X
8. Health Information Consumer Skills			X	X	X		
9. www.sexualityandu.ca							
10. Keep it Real							
11. Trust Yourself. Reduce Your Risk.		X		X		X	X
12. +CLICK (adapted from IYG)		X*		X			
13. Queermasters							
14. Smart Sex Quest						X	X*
15. WRAPP Internet Intervention		X		X		X	X
16. PowerON							X
17. Sexual Health Sims - Second Life							
18. Online Prevention Program							
19. STDTest.org & syfilistest.nl							
20. IWanthetheKit.org							
21. Cell Phone Reminders							
22. Hookup & TeenSource							
23. SexInfo							
24. The Birds & Bees Text Line							
25. Text to Change							X
26. What Could You Do?				X		X	X
27. Video to Promote Dual Method Use				X			X
28. Baby Game and Romance	X	X				X	
29. Life Challenge				X		X	

* = Improvement not significant at the $p < .05$ level.

Appendix D: Operational Definitions Used in the Intervention Matrix

Background

Target Population: Teen, Young Adult, HIV +, MSM, Other

Primary Health Focus: STD, HIV, Pregnancy, Other

Breadth of Content: Broad (multiple topics) or Specific (STD/HIV/Pregnancy only)

Theoretical Framework: Stages of Change, Social Cognitive, Self-Efficacy, etc.

Duration: Number of sessions, length of each session, over what period of time, etc.

Intervention "Booster" Sessions: Yes / No, Describe...

Periodic Reminders/Updates: Yes / No, Describe...

Other features that bring users back on multiple occasions: Yes / No, Describe...

Development Process: Describe any formative research done to guide the development process.

Evaluation: Randomized Controlled Trial, Non-Experimental Design, Other

Considerations Affecting Implementation

Geographic Scope: Tribe, County, State, NW, or Indian Country

Intervention Site: School-based, Clinic-based, Other

Privacy: Low (name/password required); Medium (intervention can be used anonymously, but bills/search history could be used by parents to identify use); High (Anonymous, no ability to track use)

Staffing Requirements: Number of staff, Necessary Training/Skills, Amount of time needed or technical support

Start-up and Maintenance Costs: Describe... (including incentives)

User Control: Low (sessions are constrained by the software); Moderate (users guide themselves through intervention sequences that have constrained navigability); High (intervention is user-initiated and navigated)

Other Considerations: Related to Intervention Accessibility, Organizational Capacity, Infrastructure... Describe...

Equipment/Technology Requirements

Computer (Just software or CD-ROM - no Internet)	Yes / No
Internet	Yes / No
Phone or Cell Phone (just talking)	Yes / No
Cell phone - Twitter, Text Messaging	Yes / No
Video Game Console	Yes / No
iPod or MP3 Player	Yes / No
Digital Camera, Camcorder, or Webcam	Yes / No
TV/DVD	Yes / No
Other Equipment or Technology Requirements	Yes / No, Describe...

Multimedia Content/Design/Features

Numbers / Statistics	Yes / No
Printable Newsletter or Fact Sheets	Yes / No
News / Current Events	Yes / No
Responses to Frequently Asked Questions	Yes / No
Games	Yes / No
Avatar / Role playing	Yes / No
Online Quizzes / Self-Assessment tools	Yes / No
Videos	Yes / No
Print/Text	Yes / No
Graphics	Yes / No
Pictures	Yes / No
Animation / Flash	Yes / No
Music / Audio	Yes / No
Spoken Narration	Yes / No
Web Links to Resources	Yes / No
Directs users to STD/HIV Test sites	Yes / No
Place Order For Condoms or Test Kits - Mailed	Yes / No
Culturally Specific Images, Videos, Design elements	Yes / No
Other Features	Yes / No, Describe...

Communication Strategies

Interaction with Peers or Project Staff	What types of personal interactions are supported by the Intervention? Virtual interactions, Face-to-face interactions? With Peers or With Experts?
Social Networking Site	Yes / No
Twitter	Yes / No
Restricted, Guided, or Mediated Discussion Board	Yes / No
Open Chat / IM	Yes / No
Personal E-Journal / Blog	Yes / No
Two-way "virtual" dialogue w/ Expert	Yes / No
Text Messages	Yes / No
Other	Yes / No, Describe...

Intervention Skill-Building, Personal Development Tools

Goal Setting/Boundary Setting	Yes / No, Describe...
Peer Testimonials / Role Model Stories	Yes / No, Describe...
Other Skill-Building Tools	Yes / No, Describe...

Message Tailoring Tools

Immediate/Integrated Standardized Risk, Needs, Readiness Assessment	Yes / No, Describe...
Delayed/External Risk, Needs, Readiness Assessment	Yes / No, Describe...

Message Tailoring Criteria

Self-Identified Information Needs	Yes / No
Health Behaviors	Yes / No
Non-behavioral Risk Factors	Yes / No - Knowledge, Attitudes, Perceptions, etc.
Readiness or Stages of Change	Yes / No
Age or Gender (Adaptive Tailoring)	Yes / No
Ethnicity	Yes / No
Other	Yes / No, Describe...

Personalization	Interventions that integrate personal information (e.g., name, school) to increase the perceived meaningfulness of the message, thereby creating the impression that the message was designed specifically for them. Yes / No, Describe...
Individualized Tailoring	Individualized health programs use either "virtual" interactions with a healthcare provider or user-generated goal setting activities and self-monitoring tools to create a highly personalized experience. Yes / No, Describe...

Intervention Impact: In Relation to Risk and Protective Factors That Affect Sexual Behavior, Condom, or Contraceptive Use (Kirby, 2007)

Knowledge

STD/HIV/Condom Knowledge	Yes / No, Describe impact...
--------------------------	------------------------------

Perceptions

Perception of Risk	Yes / No, Describe impact...
Perception of severity of pregnancy and childbearing	Yes / No, Describe impact...

Perception of severity of STDs	Yes / No, Describe impact...
Perception of severity of HIV	Yes / No, Describe impact...
Perceived effectiveness of condoms	Yes / No, Describe impact...
Perceived effectiveness of condoms to prevent STDs	Yes / No, Describe impact...
Consequences: Other	Yes / No, Describe impact...

Values, Attitudes, Beliefs

Values about sex/abstinence	Yes / No, Describe impact...
Attitude about pressuring someone to have sex	Yes / No, Describe impact...
Attitudes toward condoms	Yes / No, Describe impact...
Belief that condoms are a hassle and reduce pleasure	Yes / No, Describe impact...
Perceived barriers to using condoms	Yes / No, Describe impact...
Attitude toward risky sexual behavior and AIDS prevention	Yes / No, Describe impact...
Attitudes toward HIV-positive people	Yes / No, Describe impact...
Values/Attitudes: Other	

Norms

Perception of peer norms/behavior re sex Yes / No, Describe impact...
 Perception of peer norms/behavior re condoms Yes / No, Describe impact...
 Perception of peer norms/behavior re avoiding risk Yes / No, Describe impact...
 Influence of peers Yes / No, Describe impact...
 Perceived partner norms and reaction to condom use Yes / No, Describe impact...
 Perceived Norms: Other Yes / No, Describe impact...

Self-Efficacy and Skills

Self-efficacy to show love and affection without sex Yes / No, Describe impact...
 Self-efficacy to discuss sex, condoms, or contraception with partner Yes / No, Describe impact...
 Self-efficacy to refuse sex Yes / No, Describe impact...
 Self-efficacy to obtain condoms Yes / No, Describe impact...
 Self-efficacy to use condoms Yes / No, Describe impact...
 Skill at using condoms Yes / No, Describe impact...
 Self-efficacy to avoid risk (e.g., to abstain or use condoms) Yes / No, Describe impact...
 General sexual negotiation skills Yes / No, Describe impact...
 Social competency/locus of control Yes / No, Describe impact...
 Self-efficacy to control desire Yes / No, Describe impact...
 Self-efficacy to provide information to peers Yes / No, Describe impact...
 Self-Efficacy/Skills: Other Yes / No, Describe impact...

Motivation and Intention

Intention to discuss condoms with partner Yes / No, Describe impact...
 Intention to abstain from sex, or restrict sex or partners Yes / No, Describe impact...
 Intention to use a condom Yes / No, Describe impact...
 Intention to avoid unprotected sex Yes / No, Describe impact...
 Motivation/Intentions: Other Yes / No, Describe impact...

Communication

Communication with partner about AIDS, STDs, and past partners Yes / No, Describe impact...
 Communication with boy/girlfriend or partner about abstinence or condom use Yes / No, Describe impact...
 Communication with parents or other adult about sex, condoms, or contraception Yes / No, Describe impact...
 Comfort talking with parents about sex, condoms, or contraception Yes / No, Describe impact...
 Communication: Other Yes / No, Describe impact...

Mediating Factors/Behaviors

Avoiding places and situations that could lead to sex Yes / No, Describe impact...

Avoiding unwanted sexual advances Yes / No, Describe impact...

Being tested for HIV Yes / No, Describe impact...

Being tested for an STD Yes / No, Describe impact...

Condom or Birth Control Use Yes / No, Describe impact...

Engaging in coercive behavior Yes / No, Describe impact...

Future orientation Yes / No, Describe impact...

Having a boyfriend or girlfriend Yes / No, Describe impact...

Obtaining and carrying a condom Yes / No, Describe impact...

Putting a condom on partner (girls only) Yes / No, Describe impact...

Sexual Behavior Yes / No, Describe impact...

Using alcohol or drugs before sex Yes / No, Describe impact...

Using alcohol or drugs Yes / No, Describe impact...

Other Possible Mediating Behaviors Yes / No, Describe impact...

Relationship with Parents

Relevance of parents' concern about sex Yes / No, Describe impact...

Perceived parental concern or values about having sex and using condoms Yes / No, Impact...

Psychological States

Self-esteem Yes / No, Describe impact...

Depression and mental health Yes / No, Describe impact...

Concern about health Yes / No, Describe impact...

Psychological State: Other Yes / No, Describe impact...

Process or Utilization Measures Yes / No, Describe impact...

Other Research Findings Yes / No, Describe impact...