#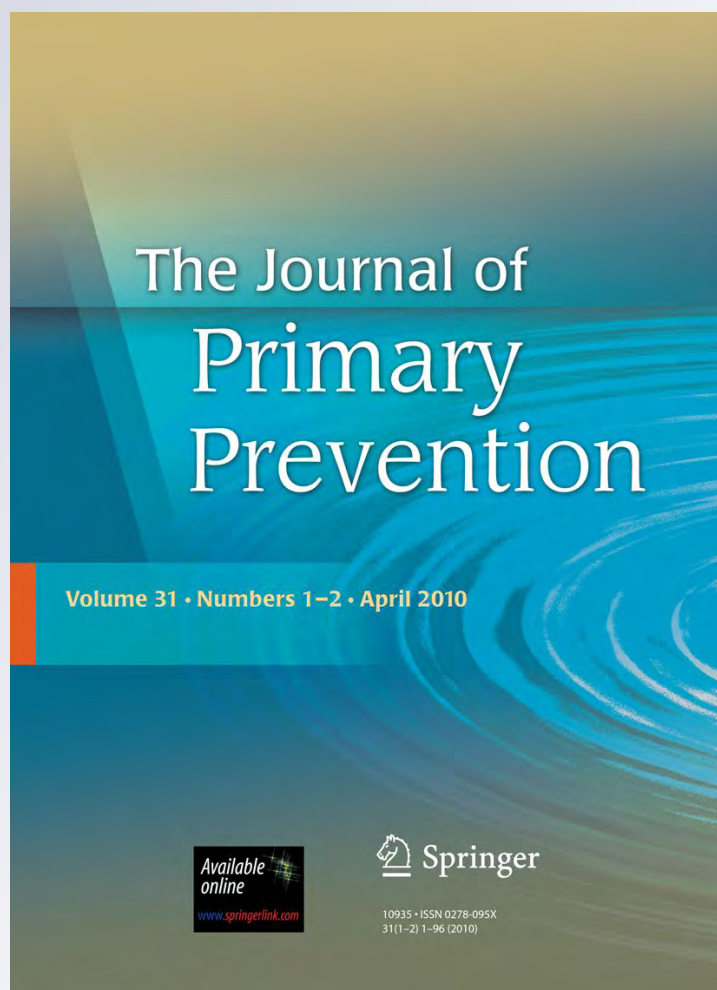 Use of Media Technologies by Native American Teens and Young Adults in the Pacific Northwest: Exploring Their Utility for Designing Culturally Appropriate Technology-Based Health Interventions

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# Use of Media Technologies by Native American Teens and Young Adults in the Pacific Northwest: Exploring Their Utility for Designing Culturally Appropriate Technology-Based Health Interventions

**Stephanie Craig Rushing · David Stephens**

**Abstract** American Indian and Alaska Native (AI/AN) youth are disproportionally burdened by many common adolescent health issues, including drug and alcohol use, injury and violence, sexually transmitted infections, and teen pregnancy. Media technologies, including the Internet, cell phones, and video games, offer new avenues for reaching adolescents on a wide 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, this study quantified media technology use among 405 AI/AN youth (13–21 years old) living in tribes and urban communities in the Pacific Northwest, and identified patterns in their health information-seeking practices and preferences. Overall, technology use was exceptionally common among survey respondents, mirroring or exceeding national rates. High rates of online health information seeking were also reported: Over 75% of AI/AN youth reported searching online for health information. These data are now being used by the Northwest Portland Area Indian Health Board and NW tribes to design culturally-appropriate, technology-based health interventions targeting AI/AN youth.

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**Keywords** American Indian · Media technology · Internet · Intervention · Adolescent health

## Introduction

American Indian and Alaska Native (AI/AN or Native) youth disproportionally experience many common adolescent health issues. To address them, media technologies like the Internet, cell phones, and video games offer new avenues to communicate 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 the user's geographic location, and can be privately accessed when and where the individual is ready (Bennett and Glasgow 2009; Coyle et al. 2007; Lustria et al. 2009; Portnoy et al. 2008). For these reasons, the 43 tribes in Oregon, Washington, and Idaho have expressed interest in using media technologies to promote adolescent health and wellbeing (Project Red Talon 2009).

While media technologies may prove useful for reaching Native youth, little is known about the extent to which they are used by teens in Indian Country. No research has been reported on the use of interactive media technologies by AI/AN youth or their online health information-seeking practices and preferences. Research in this domain will allow tribal health advocates to prioritize and adapt technology-based

health interventions that better meet the needs of AI/AN teens and young adults.

AI/AN Health Disparities and Wellness Model

Compared to other American teens, Native youth experience significant and persistent health disparities. In 2007, AI/AN 15–19-years-olds had the third highest teen birth rate in the US (Hamilton et al. 2009). That year, AI/ANs were 4.5 times more likely than Whites to be diagnosed with Chlamydia (Centers for Disease Control and Prevention 2008). AI/AN 12–17-years-olds also reported higher rates of past month cigarette use, binge drinking, and illicit drug use than those from other racial/ethnic groups in 2007 (National Survey on Drug Use and Health 2007). These disparities are influenced by unique social and environmental factors, including poverty, stigma, and historical trauma.

The health decisions of Native youth are also shaped by unique cultural values and perspectives that heighten their need for culturally tailored messages and interventions. Influenced by years of federal policies designed to exterminate their population, for example, the arrival of new life is often viewed favorably by Native communities regardless of the parent's age, making mainstream teen pregnancy messages irrelevant or insensitive. Though considerable diversity exists throughout Indian Country, the AI/AN worldview is often fundamentally different than Western and Eastern worldviews (Schelbert 2003). AI/AN people traditionally viewed all aspects of life as intimately intertwined. In this context, adolescent health is viewed as having physical, emotional, social, and spiritual dimensions that must be holistically addressed to ensure balance and wellbeing.

Adolescent Media Technology Use

Media technologies are becoming increasingly imbedded in the daily lives of American teens (Rainie 2009). In 2009, youth (8–18 years) spent more than 7½ h a day using media technologies, and packed nearly 11 h of content into that period when accounting for media multitasking (i.e., surfing the Internet while listening to music; Rideout et al. 2010). The Internet is nearly universally accessed by American teens. Surveys conducted by the Pew Internet and American Life Project indicate that 93% of US teens use the Internet, and approximately 60% own a laptop or computer (Rainie 2009). On average, teens in the US spend 11 h and 32 min per month online participating in a wide variety of activities, including visiting social networking sites, playing games, and watching TV (Nielsen Wire 2009).

Cell phone use has also increased among 12–17-years-olds, from 63% in 2006 to more than 75% in 2009 (Lenhart 2009; Rainie 2009). 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 (Lenhart 2009). Girls and boys are equally likely to own a cell phone; no differences in ownership occur by race/ethnicity. Today, youth spend more time listening to music, playing games, or watching videos on their cell phones than they do talking on them (Lewin 2010). By 2009, teens with phones sent or received an average of 191 calls and 2,899 text messages per month (Nielsen Wire 2009).

Similarly, 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® (Lenhart 2009). With the expansion of wireless Internet and handheld devices, online games are also increasing in popularity; one quarter of Internet user's visit online gaming sites (CDC 2009). Altogether, teens averaged 25 min of console use per day last year—comparable to time spent online (Nielsen Wire 2009). Gaming is typically more common among males than among females, averaging 41 and 8 min per day, respectively (Nielsen Wire 2009).

Altogether, the digital divide that once separated the technology "haves" from the technology "have nots" has almost entirely disappeared in the US (Horrigan 2009). A recent report issued by *Native Public Media* helps substantiate their presence in Indian Country. The report surveyed AI/AN adults in 28 states, representing over 120 tribes, and found that AI/AN adults use media technologies at rates higher than the national average (Morris and Meinrath 2009). Comparable data for AI/AN youth have not been reported.

Health Interventions Using Media Technologies

In response to these trends, media technologies are increasingly being used to address an array of public

health issues (Bennett and Glasgow 2009; Coyle et al. 2007; Lustria et al. 2009; Nguyen et al. 2004; Portnoy et al. 2008; Ritterband et al. 2003; Ybarra and Bull 2007; Ybarra and Eaton 2005). Whereas 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, intentions, and behavior. Bennett and Glasgow (2009) 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 highly personalized programs tailored to the risk profile of the user (Lustria et al. 2009). A meta-analysis of computer-based HIV prevention interventions found that many were as effective as traditional interventions delivered in-person (Noar et al. 2009). Other reviews have found that they are most effective when tailored to the user, based on a behavior change theory, when they are interactive and facilitate communication and social support, and when they include multiple intervention sessions (Craig Rushing 2010; Noar et al. 2009).

The potential of cell phones and personal digital assistants (PDAs) to promote health and wellbeing has not yet been fully explored, but many exciting applications are starting to emerge (Coyle et al. 2007). The Cochrane Collaboration recently produced cell phone messaging protocols for preventive healthcare, communicating test results, and to support the management of long-term conditions (Gurol-Urganci et al. 2009). Several studies have demonstrated major cost savings, shorter wait times, and increased convenience and satisfaction, with better or similar efficacy compared to standard communication strategies (Gurol-Urganci et al. 2009). The ubiquity, mobility, and speed of text messaging services have also given rise to new strategies for connecting people to health information (Atun and Sittampalam 2006). Texting programs have been used to remind patients to take their medication, monitor chronic conditions, promote healthy behaviors, provide psychological support, and trace communicable diseases (de Jongh et al. 2008; Newell 2001). Rigorous evaluation is still critically needed to determine the reach, effectiveness, and impact of cell-phone-based

interventions, but early studies have shown promising results (Obermayer et al. 2004).

Video games are also increasingly being used to promote health and wellbeing (Bloom 2009; Egenfeldt-Nielsen 2008; Papastergiou 2009; Timpka et al. 2004). 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).

Despite their potential, few technology-based adolescent health programs have been published on or evaluated in Indian Country. A computer program based on a legend of the Seneca Nation was developed and evaluated two decades ago to improve dietary choices and prevent tobacco use among AI/AN youth (Schinke et al. 1994). Since then, few other examples have been published. A computer-based drug prevention intervention is currently being developed for AI/AN teens (http://www.hawksquared.com), and three evidence-based multimedia sexual health programs are now being adapted and evaluated for Native youth (Circle of Life, It's Your Game, VOICES). Several educational websites have also been developed but remain largely unevaluated for their impact on knowledge or behavior.

As of yet, no multimedia health interventions have been rigorously tested or evaluated among AI/AN teens and young adults. 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.

## Methods

### Native Youth Media Survey

The goal of the Native Youth Media Survey was to identify (a) to what extent AI/AN teens and young adults use media technologies (media types, frequency,

and duration); (b) how they use the technologies (online behaviors and activities); and (c) to what extent they might be used to promote adolescent health (online health-seeking practices and preferences). The survey was designed by staff at the Northwest Portland Area Indian Health Board, drawing questions from several existing questionnaires that have been validated in other settings (Fox 2008; Fox and Rainie 2000; Lenhart and Madden 2005; Lenhart et al. 2005, 2008; The National Campaign to Prevent Teen and Unplanned Pregnancy 2008). Where appropriate, questions were added to assess content specific to this study. Drafts of the survey were reviewed by local tribal members and collaborating partners to ensure the research priorities of the NW tribes were reflected in the tool. The survey was also pilot tested with youth from the target population to ensure clarity and comprehension.

### Population and Sampling

The target population consisted of AI/AN youth between the ages of 13 and 21 years living in Oregon, Washington, or Idaho. A variety of convenience and targeted sampling methods were employed for both pragmatic and purposeful reasons. There are 43 federally recognized tribes in the region, which would have made it inordinately time and resource intensive to individually select and recruit tribes to participate. Approaching individual tribes would also 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 regional events targeting NW Native youth from April to November 2009.

A Native youth wellness 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 from urban and rural communities. The conference is held during spring break to encourage participation from throughout the region. A similar youth summit was likewise selected, drawing urban and rural AI/AN youth from throughout the Pacific Northwest (NW). After reviewing preliminary demographics (i.e., age, gender, state, urban/rural status),

targeted sampling was then used to increase participation among demographic groups underrepresented in the original sample, particularly youth living in Oregon. The survey was administered at one tribal school per state to ensure broad geographic representation and at a Bureau of Indian Education boarding school in the region. Youth received a small incentive to participate; steps were taken to ensure respondents did not return multiple surveys.

### Human Subjects Protection and Consent

Because the survey was completely anonymous and posed no more than minimal risk to participants, a waiver for parental consent was requested and received from Portland State University's Human Subjects Research Review Committee and from the Portland Area Indian Health Service's Institutional Review Board. No individual or tribal identifiers were collected. Informed consent was achieved by having the Principal Investigator or a local community partner introduce the survey's purpose, describe how the data would be used, assure confidentiality, and describe how the data would be reported in aggregate form. Assent was assumed for those who filled out and returned the survey.

### Analysis

PASS software (2008, Kaysville, UT) was used to determine an adequate sample size of 371 respondents for the study, which would allow results to be reported with an error of $\pm 5\%$ at the 95% confidence level. 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. Data were analyzed using SPSS (version 17.0, Chicago, IL) by generating descriptive statistics for variables of interest. Several dichotomous variables were also created for comparison using Pearson chi-square analyses and Pearson product-moment correlations: urban/rural, frequent/infrequent media users, and ever/never Internet health information-seeking. Cells with five or fewer respondents were suppressed to protect anonymity.

## Results

### Native Youth Media Survey

A total of 405 surveys were included in our analyses (Craig Rushing 2010). Table 1 shows the demographic characteristics of the population. All together, slightly more females (57%) participated than males (43%). The mean age was just under 16 years. More respondents participated from Washington and Oregon than from Idaho, which is consistent with the AI/AN population distribution in the three-state region. The majority of respondents (58%) were from rural communities, matching the geographic locations of the NW tribes.

### Media Technology Use

As shown in Table 2, NW AI/AN youth reported routinely using a wide variety of media technologies, 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

**Table 1** Respondent demographics by gender, age, state, urban/rural status, and race/ethnicity—2009

| Characteristic | Male (n) | Female (n) | Total (n) | Total (%) |
|---|---|---|---|---|
| Age (mean) | 15.9 | 15.6 | | 15.7 |
| 13–15 years | 62 | 103 | 165 | 41% |
| 16–18 years | 108 | 125 | 233 | 58% |
| 19–21 years | 3 | 4 | 7 | 2% |
| State | | | | |
| Oregon | 72 | 72 | 144 | 36% |
| Washington | 65 | 94 | 159 | 39% |
| Idaho | 36 | 66 | 102 | 25% |
| Geography | | | | |
| Urban | 68 | 89 | 157 | 39% |
| Rural | 101 | 134 | 235 | 58% |
| Other/missing | 4 | 9 | 13 | 3% |
| Race/ethnicity | | | | |
| AI/AN alone | 138 | 174 | 312 | 77% |
| Multiracial AI/AN | 35 | 58 | 93 | 23% |
| Total | 173 | 232 | 405 | 100% |

Due to rounding, percentages may not add up to 100%

using cell phones. NW Native females reported more technology use than Native males. 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.

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.[1] Significant differences did occur by gender for Internet use, with females reporting more frequent Internet use than males (82 and 71%, respectively; $p = .01$). More frequent digital camera use was also reported by females (47 and 26%, respectively; $p < .01$), and more frequent video game use was reported by males (54 and 23%, respectively; $p < .01$). Differences between age groups and urban/ rural status were not significant.

### Internet

Altogether, 73% of NW AI/AN youth reported using the Internet 30 or more minutes per day, of which 25% reported 1–2 h of use per day (data not shown). Differences in the duration of Internet use by age were not statistically significant. 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%). 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 ($p < .01$). Similar patterns of access were also reported by age group and by geographic location.

This high level of Internet use generated a wide spectrum of online activity. The vast majority of AI/ AN youth reported having a profile on a social networking site like MySpace or Facebook (87%), watching videos on sites like YouTube (77%), and posting photos online (71%; see Table 3). Over half (53%) indicated that they participate in seven or more online activities, and 12% reported participating in 10 or more queried activities.

Chi-square analyses revealed several differences in online activity by gender and age group. AI/AN females more frequently reported having a social

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[1] Frequent users reported daily or weekly use; infrequent users reported monthly or less frequent use.

**Table 2** Daily or weekly media technology use among NW AI/AN youth (ages 13–21 years), by gender and age—2009

| Technology | Male $n = 173$ (%) | Female $n = 232$ (%) | Age 13–15 years $n = 165$ (%) | Age 16–18 years $n = 233$ (%) | Total $n = 405$ (%) |
|---|---|---|---|---|---|
| Computer | 70 | 77 | 72 | 75 | 74 |
| Internet | 69* | 80* | 73 | 76 | 75 |
| Cell phone | 68 | 85 | 78 | 77 | 78 |
| iPod/MP3 player | 73 | 76 | 74 | 75 | 75 |
| Video games | 54** | 23** | 36 | 36 | 36 |
| Digital camera | 25** | 46** | 42 | 33 | 37 |
| Camcorder | 18 | 13 | 18 | 12 | 15 |
| Webcam | 8 | 4 | 4 | 6 | 5 |

Pearson chi-square analysis

* $p < .05$, two-tailed. ** $p < .01$, two-tailed

**Table 3** Differences in selected online activities among NW AI/AN youth (ages 13–21 years), by gender—2009

| Online activity | Male $n = 173$ (%) | Female $n = 232$ (%) | $\chi^2$ | df | p | Total $n = 405$ (%) |
|---|---|---|---|---|---|---|
| Have a profile on a social networking site (SNS) | 80 | 92 | 13.048 | 3 | .01* | 87 |
| View other people's profiles on a SNS | 70 | 88 | 21.193 | 3 | <.01** | 80 |
| Write or update a personal blog | 22 | 40 | 20.001 | 3 | <.01** | 32 |
| Read other people's personal blogs | 18 | 28 | 9.964 | 3 | .02* | 24 |
| Send or receive pictures or videos on a computer | 42 | 43 | 4.617 | 3 | .20 | 43 |
| Post photos online where others can see them | 59 | 80 | 24.261 | 3 | <.01** | 71 |
| Post videos online (like on YouTube) | 24 | 11 | 19.731 | 3 | <.01** | 17 |
| Watch videos posted online from a site like YouTube | 78 | 76 | 4.382 | 3 | .22 | 77 |
| Use internet to get news about sports and entertainment | 63 | 72 | 6.068 | 3 | .11 | 68 |
| Use internet to get news about current events or politics | 49 | 52 | 5.768 | 3 | .12 | 49 |
| Use internet to get news about AI/AN events, politics, culture, or tribe | 59 | 66 | 5.893 | 3 | .12 | 63 |

Pearson chi-square analysis

* $p < .05$, two-tailed

** $p < .01$, two-tailed

networking profile than males (92 and 80%, respectively; $p = .01$), and more frequently reported posting photos online than AI/AN males (80 and 59%, respectively; $p < .01$). AI/AN males, on the other hand, reported posting videos online more frequently than females (24 and 11%, respectively; $p < .01$). In general, older teens (16–18 years) reported higher levels of online activity than younger teens (13–15 years), though most differences were not statistically significant (data not shown). The only significant difference occurred for posting photos online, where older teens (16–18 years) reported posting photos more frequently than younger teens (13–15 years; 76 and 63%, respectively; $p < .01$).

**Cell Phones**

Of all the technologies included in the survey, cell phones were the technology most frequently used—to talk, text, access the Internet, and send or receive images. Over 80% of NW Native youth reported having a cell phone, and most respondents reported using them to text (76%) more often than they did to talk (67%). 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 ($p = .05$) while 86% of females and 67% of males reported text messaging their friends as often ($p < .01$). Of those who had cell phones, nearly all used its text messaging feature, at least occasionally. Only 4% of those owning a cell phone did not engage in any text messaging at all. Female respondents sent and received the greatest number of text messages, with 52% of females exchanging more than 60 messages per day.

### Video Games

While computer games and video games were fairly popular among NW Native youth—over one third (36%) reported daily or weekly utilization—the frequency and duration of play was relatively low compared to computer and cell phone use. 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. Altogether, only 12% of respondents reported playing massively multiplayer online role-playing games.

### Online Health Information-Seeking

NW Native youth reported using the Internet to get information on a wide variety of health topics, including diet, nutrition, exercise, or fitness (50%); specific illnesses or medical conditions (47%); drugs or alcohol (42%); sexual health, sexually transmitted diseases (STDs), or HIV (32%); and depression, anxiety, stress, or suicide (32%; see Table 4). 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 topics. Forty-four percent indicated that they had searched online for a sexual health topic in the past.[2]

Gender and age were strongly associated with online health information seeking (data not shown). A greater proportion of AI/AN females reported searching online for health information than AI/AN males (Pearson product-moment correlation = .185; $p < .01$), and older teens (age 16–18 years) more frequently reported searching for health information than younger teens (age 13–15 years; Pearson product-moment correlation = .136; $p < .01$).

### Online Health Content and Design

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 topics, including physical fitness and exercise (57%), drug and alcohol use (50%), nutrition (46%), and stress (42%; see Table 5). No sensitive health topics (e.g., suicide, sexual health, depression) ranked among the top five. NW Native youth expressed a greater preference for accessing sexual health information on websites containing a broad spectrum of topics relevant to youth (i.e., current events, health and wellness, social-relational issues, and academic topics) than on websites covering only sexual health (49 and 41%, respectively; data not shown). AI/AN youth also expressed interest in a wide variety of multimedia design features, including pictures (50%), videos (46%), interactive "ask the experts" components (43%), and music or audio (39%).

### Culturally-Specific Content and Design

Throughout the survey, Native youth expressed both experience and interest accessing cultural information specific to AI/ANs. Most youth (63%) reported having used the Internet to get news or information about AI/AN events, politics, culture, or their tribe, and similar numbers (62%) felt that adolescent health websites should include information 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 desired website design features, 43% of males and 39% of females included "AI/AN graphics, symbols, and design" elements, ranking it in the top third of available features. When asked to choose between possible designs for a website, NW Native youth indicated that they'd feel most comfortable accessing a site that was specifically designed for AI/AN (48%, compared with 42% for a website targeting all US teens; data not shown).

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

**Table 4** Ever having searched the internet for select health information among NW AI/AN youth (ages 13–21 years), by gender—2009

| Health topic | 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 |
| Sexual health, STDs, or HIV | 26 | 35 | 32 |
| Depression, anxiety, stress, or suicide | 24 | 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 |

**Table 5** Preferred topics and features for an adolescent health website as reported by NW AI/AN youth (ages 13–21 years), by gender and age—2009

| Website content | Male n = 173 (%) | Female n = 232 (%) | Age 13–15 years n = 165 (%) | Age 16–18 years n = 233 (%) | Total n = 405 (%) |
|---|---|---|---|---|---|
| Physical fitness and exercise | 51 | 62 | 52 | 61 | 57 |
| AI/AN culture, stories, values, or history | 49 | 61 | 55 | 56 | 56 |
| Current events | 53 | 50 | 43 | 56 | 51 |
| Pictures | 50 | 50 | 48 | 50 | 50 |
| Drug and alcohol use | 43 | 55 | 44 | 54 | 50 |
| Videos | 58 | 37 | 45 | 46 | 46 |
| Nutrition | 35 | 54 | 37 | 52 | 46 |
| "Ask the experts" | 39 | 46 | 41 | 44 | 43 |
| Stress | 31 | 50 | 40 | 43 | 42 |
| AI/AN graphics, symbols and design | 43 | 39 | 38 | 43 | 41 |
| Weight and body image | 32 | 46 | 41 | 39 | 40 |
| Music/audio | 43 | 35 | 43 | 35 | 39 |
| Depression | 26 | 49 | 36 | 41 | 39 |
| STDs and HIV/AIDS | 27 | 47 | 30 | 45 | 39 |
| "Photos/videos of people like me" | 28 | 45 | 35 | 39 | 38 |
| School and academics | 35 | 41 | 36 | 39 | 38 |
| Numbers/statistics | 38 | 35 | 25 | 42 | 36 |
| Diabetes | 21 | 47 | 32 | 39 | 36 |
| Tobacco use | 31 | 39 | 33 | 37 | 36 |
| Dating and relationships | 24 | 42 | 26 | 41 | 35 |
| Places to read/post personal stories | 26 | 38 | 30 | 35 | 33 |
| Suicide | 24 | 40 | 29 | 37 | 33 |
| Pregnancy | 19 | 44 | 30 | 35 | 33 |
| Confidence and self-esteem | 23 | 39 | 24 | 37 | 32 |
| Birth control and condoms | 17 | 43 | 27 | 35 | 32 |
| Violence or bullying | 26 | 36 | 27 | 35 | 32 |
| Traditional AI/AN healing | 24 | 35 | 26 | 33 | 30 |

## Discussion

Overall, technology use was exceptionally common and diverse among survey respondents, mirroring or exceeding patterns reported by teens from the general US population. While direct comparisons cannot be made, a greater proportion of NW Native teens reported ever using computers (95%, compared with 79% nationally), cell phones (91%, compared with 87% nationally), and iPods or MP3 players (95%, compared with 55% nationally) than teens from a 2008 US sample (The National Campaign to Prevent Teen and Unplanned Pregnancy 2008).[3] Three quarters of NW AI/AN youth reported using these technologies on a daily or weekly basis, and over one third reported playing video games or using digital cameras as often. NW Native youth also reported both experience and interest accessing health information online, with over 75% having done so in the past.

These data suggest that technology-based interventions could be effectively used to reach Native youth with health information, resources, and behavior change tools. Variations in media use by gender and age suggest that some approaches would better reach some segments of the population than others. Internet-based approaches, for example, would reach a higher proportion of females than males. Likewise, interventions delivered via social networking sites or text message would reach a greater proportion of females than males. Conversely, interventions delivered using video games or online videos would reach a greater proportion of males than females. In the end, however, no two youth were the same, and no single approach would be appropriate for all. To meet everyone's needs, age- and gender-appropriate health information should be made available through a variety of channels. Interactive, multimedia approaches combining online content, text messaging, videos and games offer the best opportunity to reach the greatest number of Native youth in the Pacific Northwest.

Survey results also indicate that technology-based interventions targeting NW Native youth should be tailored to reflect their unique worldviews and social

contexts, and should incorporate a range of adolescent health topics. Respondents expressed interest in seeing videos and images of youth like themselves and in health websites incorporating AI/AN culture and imagery. They also expressed interest in a broad spectrum of content, though, not surprisingly, none of the most sensitive health topics ranked among the top five. As a result, interventions that address sensitive health topics may not be accessed or used by Native youth when competing with other media for their time. By covering an array of topics, tribal health advocates may be able to couch sensitive health messages within more accepted topics and activities, leading to better acceptance, reduced stigma, and greater reach. Information on body image and depression, for example, could be imbedded in content on physical fitness, while information on birth control and STDs could be imbedded in content on dating. Fun text messages or videos might be the "hook" that gets youth to visit the site, where tailored information and skill-building tools could be offered to promote learning and behavior change. This approach would also protect youth's privacy from parental monitoring by masking the nature of their health information-seeking. With continued research, technology-based interventions can be designed to support a range of healthy behaviors, while reflecting traditional and contemporary AI/AN culture, values, teachings, and experiences.

Study Limitations and Strengths

These findings represent data from the Pacific Northwest and cannot be generalized to AI/AN youth living in other regions of the country. If interventions are to be designed more broadly, additional research will be needed to better understand the technology use patterns and preferences of AI/AN youth living in other regions. Additionally, about half of the youth who participated in the survey were involved in tribe- or school-sponsored health and wellness activities, and may thus report higher levels of health interest than typical Native youth.

The project was successful, however, in surveying youth from a variety of settings and venues, and obtained good ratios of males and females, urban and rural participants, and participants from all three states. The project was strengthened by the fact that it was carried out by a tribal organization that has over

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[3] These figures compare 2009 data from the Native Youth Media Survey (NW AI/AN youth 13–19 years; $n = 404$) with 2008 data from the Sex and Technology Survey (national sample of youth 13–19 years; $n = 653$).

35 years of experience conducting research in collaboration with tribal communities. The Northwest Portland Area Indian Health Board is uniquely trusted by the NW tribes, and has substantial experience bridging efforts between academics, tribes, states, federal agencies, and health service organizations. This helped generate community buy-in and trust, improving research processes and outcomes.

## Conclusion

Based on these data, it appears quite evident that technology-based interventions can and should be used to meet the diverse health needs of Native adolescents. Findings from this research are now being used to inform the development of health interventions targeting AI/AN youth in the Pacific Northwest (Craig Rushing 2010). If designed well, multimedia technologies could provide Native youth with new avenues to access age- and gender-appropriate health information, engage users in health-related conversation and action, and spread health messages and norms that reflect their unique informational needs and life experiences.

To effectively change adolescent behavior, technology-based health interventions must address the core risk and protective factors that are associated with health outcomes, tailor its messages to the needs of the user, and foster frequent and repeated use (Craig Rushing 2010; Noar et al. 2009). To compete for their time and attention, multimedia health interventions will need to reflect youth's primary media behaviors or be integrated into venues already visited by tech-savvy teens. Since few resources currently target AI/AN youth, it will be necessary to design new media that contain Native-specific design elements and the social, emotional, physical, and spiritual dimensions that are foundational to the AI/AN health and wellness model. Implementing these strategies could provide essential movement towards addressing the ongoing health disparities that now impact NW Native youth.

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