

# A Pilot, Web-Based HIV/STI Prevention Intervention Targeting At-Risk Mexican American Adolescents: Feasibility, Acceptability, and Lessons Learned

Angela Chia-Chen Chen,  
Associate Professor of  
Arizona State University,  
USA  
College of Nursing & Health  
Innovation

Marguerita Lightfoot,  
Professor,  
The University of  
California,  
San Francisco, USA  
School of Medicine

Laura A. Szalacha  
Clinical Professor &  
Director, Research Methods  
and Statistics,  
University of Arizona  
College of Nursing, USA

Cathy Strachan Lindenberg  
President of TeenSmart  
International

**Abstract**— Information technology provides new avenues to increase opportunities to deliver HIV/STI prevention interventions in a confidential, sensitive, and engaging manner for youth. While technology-based HIV/STI interventions show promise in preventing HIV/STI among different populations, few have targeted young Latinas. This pilot study examined the feasibility and acceptability of a bilingual, web-based HIV/STI prevention intervention among Latino females aged 15-19. We used a mix-method approach, including a prospective 2-group design with 3 repeated measures, and a post-intervention focus group discussion. We recruited 14 participants from an alternative high school and randomized into each study condition. Participants took 5 structurally equivalent modules focusing on either HIV/STI prevention (intervention) or nutrition/exercise (comparison) and completed assessments before the intervention, immediately post-intervention, and 2 months post-intervention. The findings suggested that the intervention had high levels of feasibility and acceptability. We discuss the keys to success, challenges encountered, and future directions.

**Keywords**- HIV/STI prevention, web-based, Latina adolescents, feasibility, acceptability

## I. INTRODUCTION

Risky sexual behavior in adolescents is associated with undesired health consequences, such as sexually transmitted infections (STI) including HIV/AIDS and unwanted pregnancies. In the United States, the rates of STI among Latino female (Latina) adolescents aged 15-19 years are about 1.5-2.5 times higher than among their white counterparts [1]. Latinas aged 13 years and older continue to be disproportionately affected by HIV [2]. Despite national declines, Latina adolescents continue to have the highest rate of teen pregnancies [3]. These alarming statistics highlight the importance of preventing risky sexual behavior in Latina adolescents.

For Latinas in the United States, risky sexual behavior is often associated with a lack of sex-related knowledge and inadequate communication skills to discuss sexual issues with their partners, and it is compounded by poverty, pressures to acculturate, discrimination, and limited access to health care [4, 5]. Latinas also often play a more subordinate role in sexual decision-making than Latino men, making them more vulnerable to STIs [6]. HIV/STI prevention interventions tailored to the special cultural, linguistic, and socioeconomic needs of young Latinas are warranted, particularly given research suggesting that targeted interventions may be more efficacious than traditional, universal ones [7]. Despite the

disproportionate rate of HIV/STI infection in Latinas and the high numbers of Latinas who are infected in adolescence or young adulthood through heterosexual behaviors, prevention efforts that address the unique needs of Latina adolescents are insufficient [8].

Unprecedented advances in information technology provide new avenues to create health interventions in a confidential, sensitive, accessible, and engaging manner. Given the rapid growth and near ubiquitous use of technology among adolescents, including young Latinas, HIV/STI prevention interventions delivered via technology have a high potential to reach vulnerable adolescents who are at risk of acquiring HIV/STI [9, 10, 11]. Computer-based HIV/STI prevention programs, which have software installed on individual computer or tablets, show promising results among adolescents [12, 13, 14], suggesting their potential utility with young Latinas. The advantages of computer-based programs include standardization and ease of replicating them with fidelity [15]. Web-based interventions share many of the same advantages as other computer-based programs, with the additional benefit of being able to reach a large sample in diverse settings. However, published web-based HIV/STI prevention interventions targeting Latina adolescents are rare.

Latinos of Mexican origin rank as the largest subgroup of Latinos in the United States (63%), followed by Central and South Americans (13.5%), Puerto Ricans (9.2%), and Cubans (3.5%). Latinos of Mexican origin also have the largest proportion of youth under age 18 (37%) [16]. The diversity within the Latino population in relation to HIV/STI associated behaviors is well documented, and ethnicity, nativity, language use, geography, and level of acculturation have been found to be associated with health status and health behaviors in Latinos [17]. Given these statistics, we therefore designed our intervention for Mexican American females aged 15-19 from economically disadvantaged communities.

*GirlSmart*, a bilingual (English/Spanish), web-based, HIV/STI prevention intervention was developed based on behavioral theories, empirical evidence, and an existing comprehensive health promotion education “TeenSmart” developed by Lindenberg and colleagues [18]. The aims of this pilot study were to examine the feasibility and acceptability of the intervention and conduct post-intervention focus groups to gain additional insight into curriculum refinement and other potential platforms for intervention delivery (e.g., smart phones, social networking sites) and elicit suggestions for improving recruitment and retention.

A. Theoretical framework

The study was guided by the information-motivation-behavioral skills (IMB) model [19] (Fig. 1). The IMB model has demonstrated efficacy in HIV/STI prevention interventions targeting racial/ethnic minority adolescents [20, 21]. In this model, knowledge (information) alone is usually not sufficient for behavioral change. Motivation to engage in preventive behaviors at the personal level (having favorable attitudes toward the behavior) and the social level (perceiving social support for performing the behavior) will determine whether or not an individual acts on the knowledge. Building behavioral skills is critical for individuals to undertake desired behaviors. Thus, individuals who are knowledgeable, highly motivated, and equipped with appropriate behavioral skills are more likely to initiate and maintain protected sexual behaviors.

II. METHODS

A. Design

We used a mixed-method approach, including a prospective 2-group design, and a post-intervention focus group discussion. Participants were randomly assigned to one of 2 conditions: (1) the *GirlSmart* intervention designed to prevent HIV/STI risk and an unplanned pregnancy or (2) a health promotion intervention with content related to exercise and nutrition. All intervention modules were delivered online for both conditions. One designated bilingual facilitator established relationships with the adolescent participants and provided them with any necessary technological support (e.g., navigating the website) rather than delivering the content during the 5-week intervention period. We learned in our prior work [18] that being connected with a nonjudgmental and trusted adult who understands the culture appeared to facilitate participation and retention. The one post-intervention focus group we conducted was with participants in the *GirlSmart* intervention condition.

B. Participants and recruitment

Individuals were eligible to participate in this study if they (1) self-identified as Latina of Mexican origin, (2) were 15-19 years old, (3) were not married, (4) had no children, (5) were not currently pregnant and not actively trying to become pregnant within the past 6 weeks, as these situations may influence sexual behaviors, and (5) were sexually active with a male partner in the past 3 months. English fluency was not required, given the bilingual (English/Spanish) features of the intervention and the multicultural and multilingual resources of the research team.

C. The *GirlSmart* intervention

When developing *GirlSmart*, we leveraged the strength of cultural values to address issues of gender and power and to provide the information, motivation, and behavioral skills necessary to reduce the risk behaviors of sexually active Latina adolescents. Cultural values, including familism, personalismo (personal relationships), and respeto (respect), have proven effective in facilitating behavior change that prevents HIV/STI infection among Latina adolescents [22], Latina women [23], and Latino youth [17]. With regard to

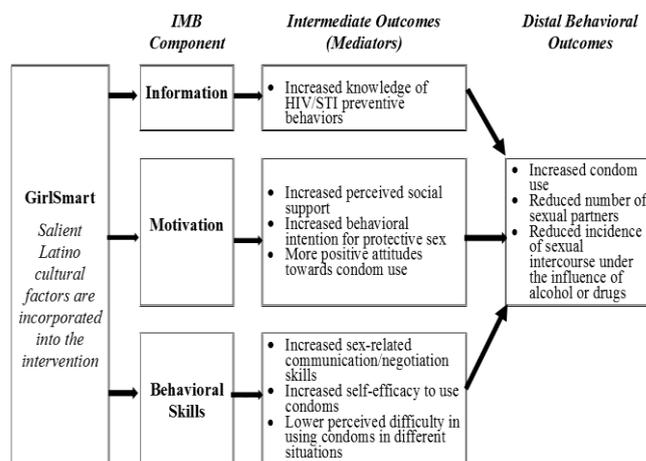


Figure 1. Theoretical Model

familism, participants were engaged in considering how HIV/STI would negatively impact not only their own lives but also the lives of their family members. Adolescents who used condoms consistently or practiced secondary abstinence were taking responsibility for their families. Latino cultural norms such as personalismo and respeto were also incorporated into the intervention to inform effective communication about safe sex practice with partners.

Connerll's [24] theory of gender and power addresses gender-specific norms and gender relations in social and cultural contexts and power dynamic within social relationships. In the context of risky sexual behavior, it suggests that gender roles and cultural values about Latinas can contribute to their engagement in unprotected sex. For example, dominant male gender roles can make it difficult for a young woman to request that the male use a condom. Thus, our intervention included case studies and exercises to help Latina adolescents understand and learn how to communicate effectively with their male partners about safe sexual practice.

The 5 modules of the *GirlSmart* intervention respectively addressed (1) peer pressure and how to respond to it to prevent risky sexual behaviors and substance use, (2) abstinence and protected sexual behaviors, (3) preventing HIV/STI, (4) family planning and preventing unplanned pregnancy, and (5) the relationship between substance use and risky sexual behavior, and strategies to prevent them from happening. Each module comprised education and activities that address the IMB model. Besides information about HIV/STI, unplanned pregnancy, and substance use, culturally relevant case studies were included to promote Latina adolescents' positive attitudes towards condom use, critical thinking, and decision-making. Latina adolescents learned to realistically assess their own strengths and vulnerability in cultural and societal contexts, clarified their own values and norms related to sexual behaviors, and engaged in problem-solving exercises such as practicing effective communication strategies to negotiate condom use with their sexual partners. Through

Funding source: U.S. National Institute of Health/National Institute on Drug Abuse (NIH/NIDA #R25DA028567).

these activities, Latina adolescents shared what they learned with someone important, practiced ideas and discuss to see how they work, and found ways to make them work more effectively. Fig 2 shows the English and Spanish version modules of the *GirlSmart* and health promotion programs.

### E. Procedures

After we received approval from the institutional review board of the Arizona State University and the alternative high school where the study was implemented, we held brief instructional sessions with the assistance of the health education teacher. All eligible students received a package that included a parental consent form; an adolescent assent form; and a letter describing the study purpose, procedures, benefits and risks, and confidentiality issues. All materials were prepared in English and Spanish to accommodate the needs of our target population. We received written parental consents and adolescent assents prior to implementing the study. All participants who returned the consent/assent forms completed a baseline assessment on a laptop or school computer. We then randomized them into the *GirlSmart* intervention condition or the health promotion comparison condition based on a blind-coded randomization chart. Participants were then scheduled for an orientation session. At the initial session, each participant was assigned a unique identifier to use along with her own confidential password to access the protected study website. Both the intervention and comparison conditions had the same number and length of modules to help evaluate the possibility that any observed effects were due to the attention the intervention group participants received.

Participants in both study conditions completed one module per week at their own pace, with reentry privileges. The facilitator sent a reminder to all participants on Sundays until the participants completed all 5 modules. Participants in both study conditions received an automatic recognition message after completing each module and a summary matrix regarding what module had been completed.

We collected data at 3 time points from online surveys: prior to the intervention (T0 baseline), immediately post-intervention (T1), and 2-month post-intervention (T2). At T0 baseline, all participants were asked about sociodemographic characteristics and modifiable, theoretical variables (information, motivation, behavioral skills, and sex-related outcomes). At immediately post-intervention, all participants were asked about key theoretical variables and an acceptability scale [18]. At 2-month post-intervention (T2), all participants were asked the same questions as at T1, except the acceptability scale. To acknowledge the participants' time and effort, each received \$35 gift cards from the study and 12 hours of community service credits offered by the school.

Two months following the intervention, we also conducted a focus group (1.5 hours) with the participants assigned to the *GirlSmart* intervention condition and audiotaped the discussions with their permission. We also took notes during the focus group to augment the audiotapes and provide descriptions of nonverbal interactions. Participants were told that there was no right or wrong answer and that data were

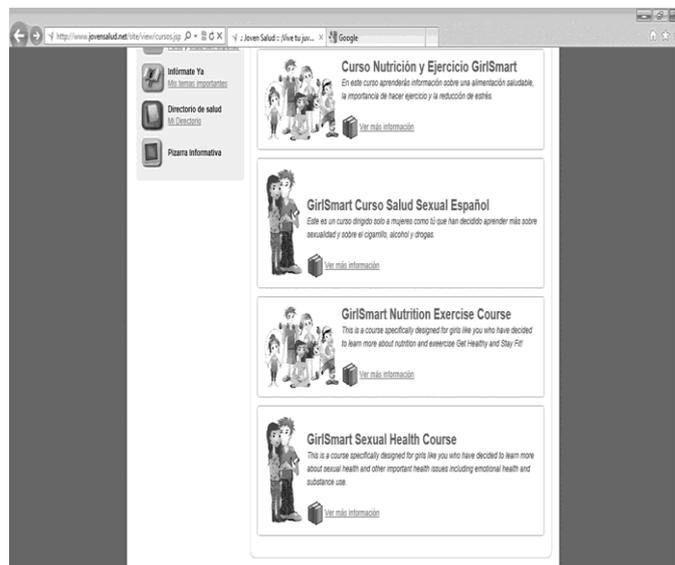


Figure 2. Modules Screen of *GirlSmart* and Health Promotion Programs

kept confidential. A list of questions was prepared, moving from the general (e.g., How did you like or dislike the program?) to the specific (e.g., What specific activities helped you learn the most or the least?). Each focus group participant received a \$10 gift card.

Data collected at T0, T1, and T2 were via an anonymous survey with a pre-assigned code. We secured the survey data in a HIPAA-compliant and encrypted server with multilevel password protection, enterprise-level firewalls, and antivirus barriers to ensure confidentiality of the data.

### F. Measures

We used reliable and valid scales validated in our prior work with Latino youth, including Mexican American female adolescents, to collect data at different time points. Given that this article focuses on examining the feasibility and acceptability of the *GirlSmart* intervention, we only briefly describe the theoretical mediators and outcome variables in the following paragraphs.

*Feasibility* was defined as the proportion of participants who completed all intervention modules.

*Acceptability*. We collected both quantitative and qualitative data to examine the acceptability. We collected quantitative data using a 22-item Likert scale validated in our prior work [18]. It included questions regarding the ease of use, credibility, understandability, and adequacy of the intervention. The score of the acceptability scale ranged from 0 to 36, with a higher score indicating a higher level of acceptability. We collected the qualitative information using the focus groups method.

*Sociodemographics*. We gathered data on participants' age, birth country, age when they first came to the United States (if not born in the United States), religion, any receipt of free or reduced lunch, any repetition of a grade, parental education, level of acculturation [25], and gender role orientation [26].

*Intermediate outcomes (Mediators)*. We measured theoretical mediators, including information (knowledge of

HIV/STI preventive behaviors), motivation (social support, behavioral intentions, attitudes towards using condoms), and behavioral skills (sex-related communication and negotiation skills, self-efficacy in condom use, difficulty in using condoms).

*Distal behavioral outcomes.* We used frequency of condom use for vaginal intercourse in the last 30 days, number of sexual partners, and sexual intercourse encounters under the influence of alcohol or drugs to examine the intervention effect.

### G. Data analysis

We used descriptive statistics to describe the feasibility, acceptability, and participants' sociodemographic characteristics. For the focus group data, we transcribed the audiotapes with all identifiers removed. No translation was required, as all participants opted to participate in English. Prior to coding, a research assistant compared audiotapes with transcripts to ensure accuracy. Two team members independently conducted a qualitative analysis of the transcripts. Data analysis began during the debriefing sessions and continued during the process of coding and identifying themes. Coding differences between the 2 team members were examined and discussed until a consensus was reached.

## III. RESULTS

### A. Sample characteristics

The sample for analysis included 14 Latina adolescents (7 in each study condition) with a mean age 16.45 years (SD = 1.29) who were recruited from an alternative high school that primarily served students from low-income families. Most participants (70%) were born in the United States, and 30% were born in Mexico. Ninety percent of them received free or reduced lunch at school; all participants had failed at least one grade. Half spoke only English or more English than Spanish with their parents. All chose the English-version intervention and expressed difficulty in reading and writing Spanish.

### B. Feasibility and acceptability

All 7 participants (100%) in the *GirlSmart* intervention condition completed all 5 modules while 3 out of 7 participants in the comparison condition completed all modules. Overall, the acceptability was high across modules. Among the 5 modules, Module 1 had the lowest acceptability score (M = 25.4; SD = 5.32), while Module 5 had the highest score (M = 30.4; SD = 5.02). Participants in the *GirlSmart* intervention condition reported a higher acceptability score than participants in the comparison group across all modules (see Fig 3).

### C. Focus group findings

The 5 focus group participants from the *GirlSmart* intervention condition thought the intervention content was easy to understand, developmentally appropriate, and relevant to their daily lives. They found that the culturally relevant case studies helped them clarify their own values, analyze pros and cons of different situations in a relationship, and brainstorm potential solutions. Learning from the case studies, the

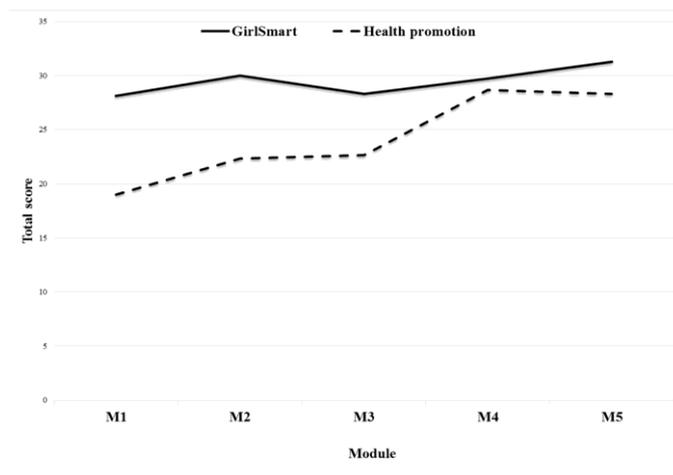


Figure 3. Acceptability of Each Module

participants also felt that their sexual knowledge increased, and they felt more comfortable voicing their concerns to their partners about an unplanned pregnancy and unprotected sexual behavior. Their favorable attitude towards condom use and self-efficacy in using condoms increased after the intervention. Two participants expressed their appreciation of learning the association between substance use (particularly alcohol) and risky sexual behavior and ways of avoiding substance use.

Regarding the preferred access points for intervention delivery, participants were in favor of accessing the program in the school's computer room, which afforded them privacy and gave them access to the school's high-speed internet. One participant reported accessing the intervention via her mobile phone and school computers, and she found both platforms easy to use. Participants commented on the flexibility of learning important sexual health information and skills online, as opposed to learning them during in-class lectures, because the online learning allowed them to learn it at a time and place they preferred and at a pace that felt comfortable. Participants recommended the inclusion of more interactive features (e.g., short videos, music) in the intervention.

Participants liked the gift cards and community participation credits they received to acknowledge their time and effort. They suggested that appropriate incentives always be included to increase recruitment and retention. Participants also thought the bilingual content was helpful to attract Latina adolescents who spoke English or Spanish.

## IV. DISCUSSION AND LESSONS LEARNED

The findings of this study showed that the web-based *GirlSmart* intervention was feasible and acceptable among Latina adolescents recruited from an alternative high school. Participants in the *GirlSmart* intervention condition completed all of the modules and rated each module highly in terms of its ease of use, credibility, and understandability. We were encouraged that 2 participants in the *GirlSmart* intervention condition contacted a Title X family planning clinic for STI testing and treatment as a result of their participation. Our findings support the potential for a web-based intervention to

engage sexually active Latina adolescents in activities to reduce their risk for contracting HIV/STI and having an unplanned pregnancy. We identified several keys for success and noted some issues that need to be addressed when developing technology-based interventions: (1) administrative commitment and support, (2) adequate technological capacity (i.e., computers with high-speed internet access), (3) an intervention development team with experts who specialize in prevention science, adolescent sexual health, and technology, (4) a bicultural/bilingual research staff, and (5) acknowledgment of the participants' time and effort.

We worked very closely with the school administrative team, including a health education teacher, to understand our target population and plan the consenting, implementation, and evaluation procedures with the goal to minimize any possible disruptions in the participants' class schedules. The health education teacher was a champion for the study and instrumental in helping us identify and recruit participants.

Prior to the study, we tested the computers in the lab to ensure that they had sufficient RAM and memory and that the internet connection was smooth and able to support the features of the study website. No adjustments were needed. We also negotiated the availability of the computer room to make sure that participants had sufficient time to complete the study activities. The health education teacher also designated specific after-school time blocks when only participants could access the computers and so have their privacy protected.

We told the participants that besides using the school computer lab, they could access the intervention via computers, tablets, and smartphones at other places as long as an internet connection was available. The majority of the participants in both study conditions favored accessing the modules and assessments in the school computer lab. This may be due to the quiet environment, comfort, and fast internet connection in the school computer lab, as commented by the focus group participants.

One issue noted in this pilot study was the website layout. Although all participants identified themselves as bilingual and bicultural, many of them did not read Spanish well. Our study was built within the existing Spanish TeenSmart website. Several participants commented that it was somewhat challenging for them to find out the information for setting up the individual user name and password on the front page, even if the instructions were written in English. We developed a step-by-step guide to help participants navigate the study website, which they found helpful. In our prior work, we had already developed a method to help adolescents remember their user name and password. We asked them to send the information to their own email accounts or send a text to themselves right after they created the account. They could also send a request to our web manager to retrieve the information or reset their account information if necessary.

Our multicultural team included scientists and practitioners/clinicians from nursing, public health, psychology, and computer science with expertise and experience in the design, implementation, and evaluation of theory-driven internet and small-group HIV/STI prevention

interventions in school, clinic, and community settings and the recruitment and retention of vulnerable Latina adolescents. The invaluable and timely feedback of the TeenSmart staff created a strong foundation for the *GirlSmart* intervention. The health promotion education focusing on nutrition and exercise offered for our comparison condition was developed by TeenSmart.

All participants appreciated the bicultural/bilingual research staff who helped them navigate the study website and provided timely feedback to their questions. Our participants were very pleased with our strategies, including a certificate attesting their success in completing the intervention, gift cards, and community credits for acknowledging their time and effort.

## V. LIMITATION

Although the small sample size ( $n = 14$ ) served the purpose of this pilot study, the insufficient power did not allow us to examine the intervention effect. The study variables were measured using the participants' self-report, which may have had bias due to recall and social desirability.

## VI. CONCLUSION

To our knowledge, this innovative study is one of the few web-based, HIV/STI prevention interventions targeting at-risk Mexican American female adolescents in the United States. Findings from this pilot study show the potential of this culturally sensitive, web-based intervention in this vulnerable population. In addition to the high levels of feasibility and acceptability, we found desired changes in many of the key variables (e.g., sexual knowledge, condom use self-efficacy, intention to perform safe sex, perceived difficulty of using condoms, less engagement in vaginal sex, and increased condom use during vaginal sex). The successful referral of some intervention participants to a local clinic for STI testing and treatment is also a promising result of the intervention. The findings of this pilot study, the first step in a program of research aimed at promoting sexual health among low-income Mexican American adolescent girls, provide essential information to inform the development of future, larger-scale interventions.

## ACKNOWLEDGMENT

We wish to acknowledge study participants and the principal and the health education teacher at an alternative high school for their invaluable contributions. We appreciate constructive feedback from researchers at the Center for AIDS Prevention Studies (CAPS) at University of California San Francisco and TeenSmart International. We would also like to thank the U.S. National Institute of Health/National Institute on Drug Abuse (NIH/NIDA #R25DA028567) for funding this research.

## REFERENCES

- [1] Centers for Disease Control and Prevention. (2016). Genital HPV Infection-Fact Sheet. Available: <http://www.cdc.gov/std/HPV/STDFact-HPV.htm#a5>

- [2] H. W. Chesson, D. U. Ekwueme, M. Saraiya, M. Watson, D. R. Lowy, and L. E. Markowitz, "Estimates of the annual direct medical costs of the prevention and treatment of disease associated with human papillomavirus in the United States," *Vaccine*, vol. 30, pp. 6016-9, Sep 14 2012.
- [3] X. Castellsague, "Natural history and epidemiology of HPV infection and cervical cancer," *Gynecologic Oncology*, vol. 110, pp. S4-7, Sep 2008.
- [4] E. Petrosky, J. A. Bocchini, Jr., S. Hariri, H. Chesson, C. R. Curtis, M. Saraiya, et al., "Use of 9-valent human papillomavirus (HPV) vaccine: updated HPV vaccination recommendations of the advisory committee on immunization practices," *Morbidity and Mortality Weekly Report*, vol. 64, pp. 300-4, Mar 27 2015.
- [5] American Cancer Society. (2015). *Cancer Facts & Figures for Hispanics/Latinos 2015-2017*. Available: <http://www.cancer.org/acs/groups/content/@research/documents/document/acspc-046405.pdf>
- [6] National Conference of State Legislatures. (2016). *HPV vaccine: State Legislation and Statutes*. Available: <http://www.ncsl.org/research/health/hpv-vaccine-state-legislation-and-statutes.aspx#>
- [7] J. D. Allen, M. K. Othus, R. C. Shelton, Y. Li, N. Norman, L. Tom, et al., "Parental decision making about the HPV vaccine," *Cancer Epidemiology, Biomarkers & Prevention*, vol. 19, pp. 2187-98, Sep 2010.
- [8] R. Robitz, S. L. Gottlieb, C. J. De Rosa, S. L. Guerry, N. Liddon, A. Zaidi, et al., "Parent attitudes about school requirements for human papillomavirus vaccine in high-risk communities of Los Angeles, California," *Cancer Epidemiology, Biomarkers & Prevention*, vol. 20, pp. 1421-9, Jul 2011.
- [9] N. Yeganeh, D. Curtis, and A. Kuo, "Factors influencing HPV vaccination status in a Latino population; and parental attitudes towards vaccine mandates," *Vaccine*, vol. 28, pp. 4186-91, Jun 07 2010.
- [10] S. Chando, J. A. Tiro, T. R. Harris, S. Kobrin, and N. Breen, "Effects of socioeconomic status and health care access on low levels of human papillomavirus vaccination among Spanish-speaking Hispanics in California," *American Journal of Public Health*, vol. 103, pp. 270-2, Feb 2013.
- [11] I. C. Scarinci, F. A. Garcia, E. Kobetz, E. E. Partridge, H. M. Brandt, M. C. Bell, et al., "Cervical cancer prevention: new tools and old barriers," *Cancer*, vol. 116, pp. 2531-42, Jun 01 2010.
- [12] T. L. Byrd, S. K. Peterson, R. Chavez, and A. Heckert, "Cervical cancer screening beliefs among young Hispanic women," *Preventive Medicine*, vol. 38, pp. 192-7, Feb 2004.
- [13] K. Espinosa de Los Monteros and L. C. Gallo, "The relevance of fatalism in the study of Latinas' cancer screening behavior: a systematic review of the literature," *International Journal of Behavioral Medicine*, vol. 18, pp. 310-8, Dec 2011.
- [14] M. E. Fernandez, S. A. McCurdy, S. R. Arvey, S. K. Tyson, D. Morales-Campos, B. Flores, et al., "HPV knowledge, attitudes, and cultural beliefs among Hispanic men and women living on the Texas-Mexico border," *Ethnicity & Health*, vol. 14, pp. 607-24, Dec 2009.
- [15] U. Menon, L. A. Szalacha, R. Belue, K. Rugen, K. R. Martin, and A. Y. Kinney, "Interactive, culturally sensitive education on colorectal cancer screening," *Medical Care - Supplement; Monograph from the NCI*, vol. 46, pp. S44-50, Sep 2008.
- [16] K. M. Russell, V. L. Champion, P. O. Monahan, S. Millon-Underwood, Q. Zhao, N. Spacey, et al., "Randomized trial of a lay health advisor and computer intervention to increase mammography screening in African American women," *Cancer Epidemiology, Biomarkers & Prevention*, vol. 19, pp. 201-10, Jan 2010.
- [17] M. W. Kreuter, V. J. Strecher, B. Glassman, "One size does not fit all: the case for tailoring print materials," *Annals of Behavioral Medicine*, vol. 21, pp.276-83, 1999.
- [18] S. M. Noar, N. G. Harrington, S. K. Van Stee, and R. S. Aldrich, "Tailored health communication to change lifestyle behaviors," *American Journal of Lifestyle Medicine*, vol. 5, pp. 112-122, 2011.
- [19] Bureau of the Census. *State & County QuickFacts: Phoenix (city), Arizona* [Online]. Available: <http://quickfacts.census.gov/qfd/states/04/0455000.html>
- [20] L. Green and M. W. Kreuter, *Health Program Planning: An Educational and Ecological Approach*, 4th ed. New York, NY: McGraw-Hill, 2005.
- [21] I. M. Rosenstock, V. J. Strecher, and M. H. Becker, "Social learning theory and the Health Belief Model," *Health Education Quarterly*, vol. 15, pp. 175-83, Summer 1988.
- [22] I. Ajzen and B. L. Driver, "Prediction of leisure participation from behavioral, normative, and control beliefs: an application of the theory of planned behavior," *Leisure Science*, vol. 13, pp. 185-204, 1991.
- [23] H. L. Bowyer, A. S. Forster, L. A. Marlow, and J. Waller, "Predicting human papillomavirus vaccination behaviour among adolescent girls in England: results from a prospective survey," *Journal of Family Planning and Reproductive Health Care*, vol. 40, pp. 14-22, Jan 2014.
- [24] Authors, "Developing a bilingual, computer-tailored, HPV vaccination promotion intervention for Latino parents," *ACM Digital Health 2015 Proceedings*, 2015.
- [25] D. J. Wilkie, H. Y. Huang, D. L. Berry, A. Schwartz, Y. C. Lin, N. Y. Ko, et al., "Cancer symptom control: feasibility of a tailored, interactive computerized program for patients," *Family & Community Health*, vol. 24, pp. 48-62, Oct 2001.
- [26] L. Rambout, M. Tashkandi, L. Hopkins, and A. C. Tricco, "Self-reported barriers and facilitators to preventive human papillomavirus vaccination among adolescent girls and young women: a systematic review," *Preventive Medicine*, vol. 58, pp. 22-32, Jan 2014.
- [27] J. Lechuga, G. R. Swain, and L. S. Weinhardt, "Impact of framing on intentions to vaccinate daughters against HPV: a cross-cultural perspective," *Annals of Behavioral Medicine*, vol. 42, pp. 221-6, Oct 2011.
- [28] R. Podolsky, M. Cremer, J. Atrio, T. Hochman, and A. A. Arslan, "HPV vaccine acceptability by Latino parents: a comparison of U.S. and Salvadoran populations," *Journal of Pediatric and Adolescent Gynecology*, vol. 22, pp. 205-15, Aug 2009.
- [29] H. Betancourt, P. M. Flynn, M. Riggs, and C. Garberoglio, "A cultural research approach to instrument development: the case of breast and cervical cancer screening among Latino and Anglo women," *Health Education and Research*, vol. 25, pp. 991-1007, Dec 2010.
- [30] G. Marin, F. Sabogal, B. V. Marin, R. Oterosabogal, and E. J. Perezstable, "Development of a short acculturation scale for Hispanics," *Hispanic Journal of Behavioral Sciences*, vol. 9, pp. 183-205, 1987.
- [31] P. A. Harris, R. Taylor, R. Thielke, J. Payne, N. Gonzalez, and J. G. Conde, "Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support," *Journal of Biomedical Informatics*, vol. 42, pp. 377-81, Apr 2009.
- [32] IBM Corp, "IBM SPSS Statistics for Windows," 22.0 ed. Armonk, NY: IBM Corp, 2013.
- [33] J. A. Bartlett and J. A. Peterson, "The uptake of Human Papillomavirus (HPV) vaccine among adolescent females in the United States: a review of the literature," *The Journal of School Nursing*, vol. 27, pp. 434-46, Dec 2011.
- [34] S. Reagan-Steiner, D. Yankey, J. Jeyarajah, L. D. Elam-Evans, J. A. Singleton, C. R. Curtis, et al., "National, Regional, State, and Selected Local Area Vaccination Coverage Among Adolescents Aged 13-17 Years--United States, 2014," *Morbidity and Mortality Weekly Report*, vol. 64, pp. 784-92, Jul 31 2015.
- [35] R. A. Audisio, G. Icardi, A. M. Isidori, C. A. Liverani, A. Lombardi, L. Mariani, et al., "Public health value of universal HPV vaccination," *Critical Reviews in Oncology/Hematology*, vol. 97, pp. 157-67, Jan 2016.

#### AUTHORS' PROFILE

1. **Angela Chia-Chen Chen**, Ph.D., RN, PMHNP is an Associate Professor of Arizona State University College of Nursing & Health Innovation and a Visiting professor at UCSF Center for AIDS Prevention Studies (CAPS). Her program of research addresses health disparities among vulnerable and underserved populations, including ethnic minority population, immigrant and refugees to promote their behavioral and mental wellbeing.
2. **Marguerita Lightfoot**, Ph.D., is Professor at the UCSF School of Medicine, Chief for the Division of Prevention Science, and Director of Center for AIDS Prevention Studies.
3. **Laura Szalacha**, EdD is a Clinical Professor & Director, Research Methods and Statistics at University of Arizona College of Nursing.
4. **Cathy Strachan Lindenberg**, DrPH, RN, is the President of TeenSmart International, a non-profit organization that focuses on preventing risky behaviors in adolescents.