

**International Students’
Online Health Information Seeking Behavior**
**A Cross-Sectional Study of Sexually Transmitted Diseases (STIs) Prevention
and Health Literacy among Chinese International Students**

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Abstract

Sexual health is crucial to the overall health and wellbeing of international students; however, few studies about them have evaluated their health literacy and knowledge about sexually transmitted infections (STIs) prevention. This study investigated Chinese International Students’ (CIS) health literacy about STIs, focusing on their use of information online. A culturally-tailored 12-item STIs prevention survey was developed for this study, and an internet search was conducted by eight CIS. Overall, participants found correct information for the STI items in 51% of the cases (n=96). A Wilcoxon test suggested that CISs who were sexually active had lower health literacy skills than those who were not ($p=0.02$), and there were no significant associations between health literacy levels, acculturation, and length of stay in the United States. While limited in scope, the result from this study suggests the need for further research as well as need for education in health literacy in order to counter threats to wellbeing among sexually-active CISs.

Keywords: International Students; Health Literacy; Sexually Transmitted Infections; Internet.

Globalization has rapidly changed the landscape of higher education (Johnstone, 2010). One noticeable trend in U.S. higher education system is the presence of more Asian international students than ever before (Perry, Weatherford, & Lausch, 2016). Specifically, Chinese international students (CISs) are the largest group, as there are more than a quarter million CISs enrolled in the US (IIE, 2016).

Chinese college students have inadequate safe-sex education and low sexual health awareness which often results in risky sexual activities (Ma & et al., 2006). According to the National Association of Foreign Student Advisers' report (NAFSA) *Optimizing Health Care in International Educational Exchange* (O'Hara, Larsen, & Rogers, 2002), one major health-related challenge in the U.S. higher education is inadequate health services to the international student communities. Specifically, the NAFSA report suggested that there is an urgent need for providing sexual-transmitted infections (STI) related-education to international students (O'Hara, Larsen, & Rogers, 2002, p.49). Meston and Ahrold (2018) suggested that while Asian international students were less sexually active than their non-Asian counterparts before migrating to their host country, as their length of stay increased, they were more likely to adopt a more "liberal sexual attitudes." Specifically, a Canadian university study showed that among East Asian male students, there was a positive relationship between Westernization-acculturation and liberality of sexual attitudes (Brotto, Woo, & Ryder, 2007). In addition, CISs also experience dramatic changes in cultural norms regarding sexuality and sexual behaviors. While it has been reported that only about one-fifth of Chinese youth are sexually active, less than 20% of these youths have ever used any STIs preventative measures on a consistent basis (Wang et al., 2007).

Multiple studies have shown that in order to prevent STIs and to promote sexual health on campuses, educators, health professionals, and university administrators should focus on increasing sexual health literacy and promoting health-seeking abilities (Simpson & et al., 2015; Runk & et al., 2016; Thongnopakun, Pumpaibool, & Somrongthong, 2018). Our study used an extensive observation based cross-sectional design including both qualitative and quantitative methods in order to investigate the problem of health literacy of STIs and internet usage among CISs. A study by Gao (2015) has evaluated sexual-health literacy among international students. Given the high number of CISs on U.S. campus, the dire situation of inadequate STIs prevention and sexual health, and the serious consequences of contracting STIs, findings from this study could provide much-needed knowledge for researchers, educators, and public health professionals to identify barriers to sexual health and STIs prevention interventions. Adding to the knowledge on the subject, this study examined the following aspects regarding CISs' STIs information seeking behaviors:

1. The accuracy of CISs' online health information searching results.
2. The relationship between health literacy and health information seeking behavior.

3. Factors that impact CISs' online health seeking behavior regarding STIs prevention.

Literature Review

A recent World Health Organization report (2016) suggested that sexually transmitted infections (STIs) have become a major global health problem, as more than one million individuals are infected with an STI daily. This challenge is significant among both adolescents and adults. One study showed that low health-literacy levels and insufficient STI education place individuals at higher risk of contracting an STI (Agosti & Goldie, 2007). Additionally, low health literacy has been associated with lower cervical cancer screenings among young females (Gu et al., 2010). One systematic review showed low health literacy levels could be a risk factor for contracting HIV and other STIs (Zhao, Luo, Tucker & Wong, 2015).

A study of Asian immigrants' health behavior suggests that language barriers prevent them from conducting proper health information seeking behavior (Wang & Yu, 2014). Epidemiological studies also show that non-culturally-based STI prevention and intervention programs were not effective among East Asian immigrants (Homma, Saewyc, Wong & Zumbo, 2013). Twenty-nine percent of the world's annual cases of cervical cancer occur in China (Hu et al., 2011). Studies have suggested that both STIs and cervical cancer are related to early-age sexual intercourse and unsafe sexual behaviors (Hu et al., 2011; see Zhao et al., 2015). When untreated, STIs can lead to serious health problems, such as infertility, cancer, chronic pelvic pain, neurological problems, and pelvic inflammatory disease (Stamm, 1999; Zetola et al., 2007; Genc & Ledger, 2000).

Low health-literacy levels and insufficient STI education also places individuals at higher risk of contracting an STI (Agosti & Goldie, 2007; Gu, Chan, & Twinn, 2010). In China, STI awareness is considerably lower compared to the US. For example, in a study using 8,000 Chinese adults less than 17% had ever heard of the Human Papillomavirus (HPV) (Li et al., 2009). In the same study, 9% of participants knew the relationship between HPV and cervical cancer, and 3% understood that HPV could result in genital warts (Li et al., 2009). Besides having low levels of health education, cultural stigmas towards STIs and infidelity were cited as factors that prevent individuals from getting proper screening tests and treatments (Haire, 2015).

Several studies have pointed out that young immigrant populations face a higher risk of contracting STIs than their nonimmigrant counterparts (Shedlin & Shulman, 2006; Champion, 2017; Marques et al., 2014). Many researches have suggested that a higher risk of STIs among immigrants is often associated with poor acculturation practices, such as delays in seeking health care (Levy et al., 2006), a lack of knowledge about health services (Fernbrant et al., 2016), and perceived discrimination (Cashman et al., 2011). Two studies using Asian immigrants' found that having language barriers is another major factor that prevents them from conducting proper health information seeking behaviors (Wang & Yu, 2014; Kamrudin, 2007).

While there is increasing interest in STIs prevention research among immigrant communities, little research has been published pertaining to STI preventative health behaviors and international student populations (Thomas et al., 2014; Agu et al., 2016). Currently, there are more than a quarter million CISs enrolled in the US (IIE, 2016). CISs have several cultural and demographic characteristics, such as holding strong cultural stigmas towards STIs/STDs (Zhang et al., 2004); being sexually active (Ho, 2004); and limited sexual-health/safe sex education (Wang et al., 2005; Zhang, Li, & Shah, 2007). While there are disabling factors for the STI prevention for this population, there are specific resources and policies that many universities promote that can be utilized to improve their sexual health and overall quality of life. First, many universities require all students to have health insurance, which can provide students with free or low-cost health services; second, many universities give students free access to both computers and high-speed internet, which can be used to locate health information; and third, many universities provided free safe-sex/sexual health education program through student service initiatives. Previous studies suggest that using online resources for health-related questions is one of the most popular uses of the Internet among adults in the United States (Rice, 2006; Morahan-Martin, 2004; Gray et al., 2005). Recent studies have also started to document how college students use the Internet to search for sexual health-related information online (Stellefson et al., 2011; for Chinese students see Hong et al., 2007).

With the growing prevalence of STIs among young adults and an increasing CIS population in the United States, it is crucial to study their knowledge and behaviors centered on preventative health behaviors. It is also important to know whether this population has the ability to use online resources to find correct STIs and health-related information. Acculturation may also be associated with CISs health behaviors and the ability to use online resources, and therefore should also be considered.

To reduce the STI risk for CISs, provide a safe education environment, and reduce the potential of health disparities, it is crucial to investigate the health literacy level and online health information seeking ability of this population. Results from this study will provide useful information for health professionals who are working with immigrant groups or groups with low health literacy levels. This study aims to provide answers to the following research questions:

1. Can CISs find accurate sexual health and STI prevention information online?
2. Is CISs' health literacy associated with online sexual health-seeking behaviors?
3. Are other factors related to CISs' online health seeking behavior regarding STI prevention?

Methods

Participants

This study was a cross-sectional study and approved by the authors' Institutional Review Board. Recruitment materials were sent through the

university group email system to CISs and recruitment flyers were posted at different on-campus locations. Eligibility criteria included being between the ages of 18 to 30, being born in Mainland China, and being enrolled as an undergraduate student at the university as an international student under the F1 visa program.

Eight participants were recruited for this study. While this sample was small, it is similar to other studies that have evaluated how individuals search for health information on the Internet (Hansen, Derry, Resnick & Richardson, 2003; Kim, Park & Bozeman, 2011). CISs ($N = 8$; 2 freshmen, 2 sophomores, 2 juniors, and 2 seniors) included both female ($n=5$) and male ($n=3$), and participants' ages ranged from 20 to 26 years. Their length of stay (LOS) in the United States ranged from 18 to 55 months ($M=32.3$ months ± 12.8).

Development of Instrument

Based on our research questions the instrument used in this study was first conceptualized by listing possible interview questions, which led to a total of 12-items for the final survey (Sexually transmitted infection prevention questionnaire (STIPQ)). The questionnaire was then sent to five experts for face and content validity (two in the field of sexual reproductive health communication; two in the field of health promotion and education; and one for the target population).

Afterward, the questionnaire was piloted with two CIS, who were asked to provide feedback regarding their overall perception of the questionnaire, and the difficulties they encountered during their online search session. After the research team received feedback, the STIPQ was modified and finalized. In the final version of the STIPQ, the accuracy of the search results (AOSRs) was individually measured for each participant by counting how many correct answers that the participant achieved, with a possible score ranging from 0 (none correct) to 12 (all correct).

Beside the STIPQ, the research team used the "Vancouver Index of Acculturation" (Ryder, Alden & Paulhus, 2000), to measure the acculturation level of participants. The "Vancouver Index of Acculturation (VIA)" has frequently been used in the field of immigrant health, due to its high validity and reliability (Ahrold & Meston, 2008; Celenk & Vijver, 2011). The VIA evaluates several acculturation factors such as whether participants had developed social networks with American people, whether participants preferred American media to the media from their own culture, and whether participants behaved more like their American counterparts or like people from their cultural community. Each item was measured on a 9-point scale and odd-numbered items measured how participants identified themselves with their cultural heritage, while even-numbered questions measured how participants identified themselves with American culture. By comparing the answers from the even and odd-numbered questions, the VIA helped the researchers to identify acculturation levels of the participants.

Besides the STIPQ and the VIA, the research team also used a questionnaire to obtain background information about the participants. This survey

collected participants' demographic information, such as age, gender, and length of stay in the United States. It also collected participants' sexual health-related information, such as whether they had sexual health-related education, whether they had engaged in vaginal intercourse, and whether they had ever been diagnosed with an STI. Also, daily Internet usage and participants' online health-information-searching history was evaluated.

Procedure

Before participants received the STIPQ, they were asked to finish the VIA and background information questionnaire. Afterward, each participant was provided with a Macintosh notebook, and Internet access and a researcher explained the task. Next, the researcher left the room, and the participant completed the online information-searching task alone in an office. During the task, Camtasia™ was used to record participants' online activities and verbal responses. There were several reasons for recording verbal response in this study. First, as Leyva and colleagues suggest, for immigrants such as international students, linguistic proficiency is associated with acculturation, and it often indicates health literacy levels (Leyva, Sharif & Ozuah, 2005). Second, verbal responses help researchers understand participants' thinking processes and mental states when they are performing assigned tasks (Hansen, Derry, Resnick & Richardson, 2003). The analysis of verbal response is significant to this study because it helps the research team to identify potential correlations between health information seeking behavior and acculturation-related issues.

Analyses

Descriptive statistics were used to summarize demographic characteristics, acculturation levels, the sexual health-related background of the participants, and Camtasia™ recorded search performances of the participants. Inferential statistical analyses were used to test several hypotheses. Data were analyzed using JMP 11.0.

Results

All participants used the Internet on a daily basis, and on average, spent 5.9 hours on the Internet per day. However, only three participants had ever searched for health-related information online. Just one participant had used the Internet to search health-related information more than once a month.

None of the participants had STIs prevention-related education in China; two participants reported that they had STIs prevention-related education in the United States. Three participants reported that they had vaginal intercourse, and none were ever diagnosed with an STI.

All eight participants finished the 12-item STIPQ. Based on the screen recordings from Camtasia™ files, all 96 typed results (12 responses from 8 participants) from the online health information searches were organized and sorted into different categories. First, the research team measured the accuracy of

the search results (AOSRs) by categorizing all typed answers (N=96) into correct or incorrect responses. The results suggested that participants were accurate 51% of the time (n=49, with one participant scoring as high as 10 of 12, and another scoring as low as 4 of 12. The mean score was 6.1 answers correct (+/-2.3). The most missed item was “the correct way one should put on a male condom,” and only one participant correctly answered this question. The least missed item was “which body fluids could transmit HIV from one person to another,” and only one participant did not find the correct answer to this question.

Researchers also evaluated which websites were visited. Based on the domains of the sites, all websites were categorized as: government websites, websites from educational institutions, websites from commercial businesses, and websites associated with non-profit organizations. Slightly over half (51%) of the typed answers came from government websites (.gov). The second primary information source (17%) was from business websites (.com), followed by educational sites (.edu) (11% of answers). The website for the Centers for Disease Control and Prevention (CDC.gov) had the highest usage of all sites (visited 40 times). Also, most of the answers came from the first three links generated by the search engine (63%). Google recommended answers (also known as the Google Featured Snippets) provided 23% of the typed results. Seven answers came from a “Google’s sponsored ad.”

To measure how much effort was spent on each question, researchers counted the number of clicks participants conducted to find each answer. “Clicks” were defined as how many times new websites/links were visited before they found a final answer. Results suggested that most of the participants only made a limited number of clicks ($M=1.65$ clicks +/-1.91). On average, participants spent about 4 minutes finding the answer to each question ($M=243$ seconds +/-162). Participants spent the most amount of time on the question regarding the different ways one can prevent contracting an STI ($M=393$ seconds +/-146), and they spent the least amount of time on the question about whether kissing can lead to contracting the HIV infection ($M=143$ seconds +/-68). Google was the only search engine used by the participants for information searching, and Baidu (a Chinese search engine) was solely used as an online translator.

Contingency Table Analysis were used to answer the research question regarding whether different types of websites affect the accuracy of the search results (AOSRs). Because the sample size in this study was small, the Likelihood Ratio Chi-Square test was used. The null hypothesis for this research question was that the AOSRs were independent of the type of information sources. The result from the Contingency Table Analysis suggested that the AOSRs were independent of the type of information sources ($p>0.05$) (**Table 1**).

Table I Contingency Analysis of the Relationship between Type of Websites and Answer

N	DF	-LogLike	RSquare (U)
96	5	1.8092077	0.0272

Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	3.618	0.6056
Pearson	2.837	0.7252

The P-value for Likelihood Ratio Chi-Square test is 0.6056. Since its value is greater than 0.05, the research team concluded that they could not reject the null hypothesis.

Due to the size of the sample, this study used nonparametric tests, Spearman's ρ test, and Kendall's τ test, to analyze two correlations:

1. Whether there was a significant correlation between the AOSRs (measured by the total number of the correct response) and the length of stay in the United States.
2. Whether there was a significant correlation between the AOSRs and the acculturation level of the participants.

Results suggested that there was no significant correlation between the AOSRs and the length of stay in the United States (Prob> $|\rho|$ =0.6072 for the Spearman's ρ test; Prob> $|\tau|$ =0.6981 for Kendall's τ test). The results also suggested there was no significant correlation between the AOSRs and acculturation scores of the participants (Prob> $|\rho|$ =0.2166 for the Spearman's ρ test; Prob> $|\tau|$ =0.1992 for Kendall's τ test).

To investigate whether there were between-group differences for the AOSRs, three separate Wilcoxon Kruskal-Wallis tests were conducted. Due to the small sample size, the research team chose to use the chi-square approximation to the one-way. The first Wilcoxon test examined whether the median of the AOSRs was different between the group who had partners and the group who did not have partners. The result showed no significant difference ($p=0.09$). The second Wilcoxon test focused on the median of the accuracy of the search results (AOSRs), and potential differences between the group who had sexual health education and the group who did not have sexual health education. Again, the results suggested no difference between groups ($p=0.49$). The final Wilcoxon evaluated the median of the AOSRs between the group that had vaginal intercourse and the group that did not have vaginal intercourse. The result showed that there was a significant difference between groups ($p=0.02$). A closer examination suggested that the group who did not have vaginal intercourse had higher scores compared to the group that had vaginal intercourse for the AOSRs.

Both quantitative and qualitative methods are valuable in data collecting and analyzing the contexts of specific health behaviors. In this study, the research team used Camtasia™ to collect verbal responses from the participants during the STIPQ session. Although the researchers had encouraged the participants to read both the questions and answers, the recordings from Camtasia™ showed that participants either said very little or their voices were very low. From the limited cognizable recordings, the research team noticed that the participants had problems in pronouncing words, such as vaginal, condom, and vaccines.

Discussion

Through analysis of the results of the demographic survey, VIA, and STIPQ, this research has provided several findings that could be used as guidance

for future sexual health programs for similar international student populations. The first emergent theme is the issue of having a language barrier in health information seeking. The Flesch Reading Ease readability score of the STIPQ was 59.4. Although all of the participants had been attending an American university for at least 18 months, the analysis of the audio recording still suggested they had difficulties in recognizing commonly used sexual health-related words. One example was that these participants frequently had problems in pronouncing words such as vaginal, condom, and vaccines. Another example is that the screening recordings from Camtasia™ suggested that approximately 25% of the time, participants had to use an online translator to understand the questions or search results (English to Chinese translator by Baidu.com).

The finding from this study coincided with the results from other studies about sexual health. In a recent systematic review, Genoff et al. (2016) suggested that people with limited English proficiency (LEP) often have reduced access to preventive health services and screening. To reduce health disparities and provide quality health services for the diverse population, health professionals have to recognize that in an English-language dominant health system, language barriers are one of the most severe obstacles that many people with LEP are facing. There are several methods for health professionals to reduce the problem caused by LEP. For example, Decamp et al. (2013) suggested that even without bilingual professionals, health professionals can still improve the quality of care by asking people with LEP about what kind of interaction style they prefer. Ngo-Metzger et al. (2003) suggested that when working with Chinese and Vietnamese immigrants with LEP, health providers should be aware of the differences between patients' expressions and needs. They recommend that health providers could use probes to obtain information from the healthcare receivers.

The second theme of this study is related to health literacy. In the Department of Health and Human Services report *National Action Plan to Improve Health Literacy* (2017), it is noted that a comprehensive definition of health literacy should include both skills and knowledge of obtaining health information and services. This report also indicated that due to the complicated and technical nature of health, sometimes people with higher levels of education can still have low health literacy level. The results of this study suggested that CISs had minimal health literacy regarding STDs/STIs prevention, care, and treatment. One potential explanation for why these participants have low sexual health literacy is that none of the participants had any formal sexual health education before they came to the United States. Even though these participants had access to the Internet in the STIPQ session, some of the participants had an incorrect or incomplete understanding of STI/STD transmission pathways and effective prevention options. Adams (2010) suggests that to improve the ability to seek and understand health information, health professionals can use health literacy programs to make their participants or patients become engaged.

The final theme that emerged from this study is how technology changes the process of health information seeking and filtering. All of the participants used

Google to search for information; this result coincided with results in another study by Buhi et al. (2009). Another observation from this study is that participants heavily relied on Google's result page rank to help them decide which information they should use. More than ninety percent of typed answers came from the first three links on the search result page. Klerings, Weinhandl, and Thaler (2015) suggest that while the increasing number of online health information websites had increased the accessibility of information, selecting the correct information could become a daunting challenge, even for health professionals. Thus, it could be the case that when the participants were facing information overload, they tend to use the most convenient information available, which may contain false or misleading information.

Conclusion

There were several limitations to this study. First, although this study provided an in-depth investigation into how CISs conduct online sexual health information searching for STIs/STDs prevention, this study was limited by only using a cross-sectional design. Another limitation is that this study only recruited a small group of participants. As previously noted, it is typical for this type of research to rely on small samples. However, future studies would benefit from having a larger enrollment. Also, this study only included one type of sexual behavior (vaginal intercourse). In future studies, researchers could include other types of sexual behavior in their analyses.

However, the results of this study offer a significant amount of applied knowledge about how CISs use the Internet to find information about STIs/STDs prevention and sexual health. As was shown in the result section, CISs have low sexual health literacy and low health seeking abilities. This study also suggested that for international students, the increase of health information accessibility does not always lead to an increase in their health literacy levels, nor did it increased their health information seeking abilities. This paper is unique in its approach to demonstrating that without proper health education and health promotion programs, international students are struggling with low health literacy and facing a higher risk of contracting STIs. In addition, compared to other migrant groups, international students are significantly younger, and they often lack adequate access to social support (Schwartz, Montgomery, & Briones, 2006; Simpson & Ferguson, 2014). The unique characteristics of international students could make them be more susceptible to unsafe sexual health behavior.

The development of international higher education is indispensable from providing a safe education environment for international students. To reduce international students' STI risks and to ensure the health and wellbeing of them, health professionals should realize the unique characteristics of different international student groups. In addition, health professionals should work with international student offices to provide translated pamphlets to the international students during the international student orientation sessions. In addition, health professionals should work with different international student organizations to

develop a culturally-tailored program to help them to improve their sexual health knowledge. Nonetheless, the developments of high-speed internet, portable electronic devices, and health information applications have improved the accessibility of health information. Health professionals could also work with university administrators and utilize new technologies to deliver health-related information for international students.

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