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### Publication Date

2010

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New Media Interventions in Youth Sexual Health Promotion and  
HIV/STI Prevention

By

William Brown III

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Public Health

In the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Meredith Minkler, Chair  
Professor Julianna Deardorff  
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Fall 2010



## Abstract

### New Media Interventions in Youth Sexual Health Promotion and HIV/STI Prevention

by

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Doctor of Public Health

University of California, Berkeley

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New Media include a wide range of programs, Internet access tools, and wireless computer-mediated communication devices, which facilitate reciprocal interaction with the media consumer. Integrating traditional media with dynamic communication tools and interactive user feedback, New Media allows for user participation and community formation. Public health leaders, as they actively seek innovative and cost effective health solutions to positively impact individual and community level health, are starting to look towards New Media as a viable option for communication and interaction with the populations they wish to serve.

Using data from the field of youth sexual health promotion and HIV/STI prevention, my dissertation aimed to unearth the potential application of New Media in public health by: conducting an overview of relevant literature, constructing a new social ecological model that incorporates New Media, and developing an evaluation plan for a New Media-based sexual health intervention.

The first project, the literature review, explored studies and statistics on New Media, and paid particular attention to the potential use of Social Media in youth retention, data collection, information dissemination, and participant privacy and confidentiality. The literature review illuminated what is known about the application of New Media in public health practice and identified that which has yet to be explored. The second project, developing a new social ecological model, examined the various models currently in use and their value in providing a framework to contextualize the individual and his or her environment. An archival case study and interview data were used as exemplars to construct a new social ecological model. This model takes the dynamic nature and utility of New Media into full consideration and unearths the emergence of a second social ecology, the “Virtual.”

Research and evaluation of public health programs and interventions is key to verifying efficacy and defining applicability. Evaluating health interventions is intrinsically tied to program success and successful outcomes. The third project therefore outlined an evaluation plan for a New Media-based sexual health intervention, InSPOT (an Internet-based sexual partner notification tool for those recently diagnosed with an STD). The evaluation plan was not only developed to evaluate the intervention tool’s

potential for promoting youth sexual health, but to also act as an example of the level of evaluation necessary to address questions of efficacy. Implications of these projects suggest that: 1) New Media can provide viable and potentially cost effective means of health intervention; 2) there is a New Media-based social ecology which the current public health social ecological model needs to fully take into consideration; and 3) further research and evaluation of New Media-based programs and interventions is imperative if we are to verify its potential applicability in public health practice.

## Dedication

To those of my feet, the ancestors,  
whose struggles provide the mounds on which I  
stand tall enough to reach the stars.

To those of my mind, my mentors,  
whose guidance provides the map so that I  
may find the paths to stars of my own.

To those of my left hand, my friends,  
who help me to brace myself and steady me as I  
reach as far as I can.

To those of my right hand, my family,  
who are my strength,  
and without whom grasping stars would be impossible.

To those of my eyes, the youth,  
who allow me to look forward and understand the  
purpose of the star's light,  
that I may see a better tomorrow.

To all those who provide me with a  
galaxy of possibilities,  
I thank you.

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## Acknowledgments

I would like to acknowledge those individuals without whom this dissertation would not have been possible. First, I felt privileged to have been given the task of creating an evaluation proposal for ISIS inc., and to have been allowed to continue its development after my residency as a part of my dissertation. I would like to acknowledge Deb Levine, Executive Director of ISIS Inc., and her team for their assistance, guidance, critical review of the proposal, and support to both this dissertation and my doctoral development.

To Diana, Andrea, and Joan for keeping me tough and for being so wise. To my “Mean Girls”, A.K.A “Team Brown”, Susana, Katherine, McKenzie, and our “athlete” Sid, life coaching is a reciprocal process, thank you for your support. Thank you to SMAAC youth center for adding to my family and becoming a home that embraces every aspect of me. Special thanks to “Will’s Angels”, A.K.A. my big sisters -and soon to join me as doctors, Tamar, LeConté, and Analilia. I would have been so lost without you all. You guided me, reminded me what time I should be where and what I was supposed to have read, and encouraged me to shine. I owe you all so much and am so proud of my DrPH sisters.

I would like to say thank you to my guiding compass, Dr. Linda Neuhauser, for encouraging me to pursue the DrPH and fully supporting me academically and professionally. To Dr. Len Syme, the star to which I aspire, it is because of you that I believe in myself You are a creator of greatness and expect nothing less, and I refuse to disappoint. To Dr. Juliana Deardorff, Dr. David Huebner, and (soon to be Dr.) Jordan Rullo, for your endless support, cultivation, and advice. To Dr. Meredith Minkler, my chair, and advisor; I do not just feel lucky to have had you as my academic advisor, I feel divinely favored.

To Lee, my best friend, travel companion through life, and future retirement home roommate, thank you for proving to me that some things, like our friendship, are just meant to be. You helped keep this dream alive in my head. And to his/my family, the Staubs, thank you for being my surrogate family while I am away from mine. Chris, my best and longest friend, thank you for setting the bar high from the beginning and always being there for me. And to David, my #1 wing man in fun and in life, thank you for taking away my stress, and reminding me to have fun!

To my parents, William and Debra Brown, for nurturing me. To my sister Traci and brother Brian, for giving me a reason to strive. To my grandmother and great-aunt, Joyce and Sylvia, for believing in me. To my grandmother, Gertie, for loving me unconditionally. To my uncle Mandla and auntie Charita for inspiring me; and to the rest of my family, friends, and mentors that all made this dissertation and doctoral degree possible – Thank you!

## Introduction

My dissertation aims to describe applications of New Media in public health. New Media is an increasingly popular designation for a wide range of programs, technology, computer-mediated communications (CMC), computer-enabled devices, and Internet-based<sup>1</sup> tools for communicating, and information gathering and sharing. New Media technologies include desktop and portable computers, as well as handheld devices and many wireless technologies. Through reciprocal interaction with the media consumer, New Media transforms traditional media (film, TV, images, news paper, text, radio, music, etc.) by integrating it with interactive user feedback, user participation and community formation (Gitelman, 2008; Lister, Dovey, Giddings, Grant, & Kelly, 2003; Parker & Thorson, 2008). This dissertation includes: an overview of relevant literature and thinking in the field regarding New Media, particularly as it relates to youth sexual health; development of a new social ecological model of health promotion through an exploration of archival data from an exemplar case study and interviews from professionals of New Media, public health, and youth sexual health interventions; and the development of an evaluation process for a specific New Media-based sexual health intervention.

*Reviewing the Literature (Project 1)* -Although there has been a widespread increase in the use of Social Media in the general public, the use of Social Media in programs and research for health promotion is still in its infancy (Chou, Hunt, Beckjord, Moser, & Hesse, 2009a; Biocca, 2000; Jastrow & Hollinderbaumer, 2004). The literature review in this dissertation explores applications of Social Media in youth retention, data collection, information dissemination, and participant privacy/confidentiality. I provide a scholarly, conceptual, and contextual introduction to applications of Social Media in youth health promotion. I also touch on Social Media tools, youth and New Media technology, program design and Social Media in research. My aim was to contextualize the potential utility and pitfalls of applying social networking tools to retention, data collection, information dissemination, and privacy/confidentiality. For this project my research questions were: How is Social Media used to retain youth in health programs and research? How is this approach used to collect data on youth participation and behavior in youth health programs and research? And how is Social Media employed to disseminate information to youth in health programs and research? As such, I reviewed the relevant literature, including well-supported, scholarly, peer-reviewed, and “gray literature” on Social Media based or Social Media incorporated programs. I further utilized the following databases: CINAHL Plus (Cumulative Index to Nursing and Allied Health Literature), EMBASE: Excerpta Medica (Ovid), ERIC (CSA), Global Health (Ovid), PsycINFO (CSA), PubMed (Medline), Web of Science (ISI), History of Science, Technology, and Medicine (OCLC), Proquest, PubMed/Medline, ISI Web of Science, and Google “Smart” to find conference proceedings and abstracts that may have otherwise been missed by more formal research databases. Using these search tools, and

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<sup>1</sup> A method of data transfer that conforms to a particular set of communication protocols or rules for exchanging information over a vast global network.

strategic keyword/phrase combinations (to be discussed further), a total of 488 sources were found.

My literature review identified weaknesses, and unearthed potential benefits of applying Social Media in youth health promotion. It further underscored that designing an intervention program or conducting research that aims to improve the health of youth and young adults presents a variety of challenges. Four specific areas of difficulty examined uncovered were participant retention, data collection, dissemination, and privacy/confidentiality. First, it can be difficult to create an environment where youth can find engaging and rewarding opportunities that effectively encourage retention. In addition, youth tend to be selectively public beings. They are often willing to share many parts of their life with others, but tend to restrict certain personal information to a privileged few. In efforts to gather information from youth, engaging actively in building trust and using effective communication strategies is fundamental to the data collection and retention process. Lastly, when important information needs to be disseminated, maintaining lines of communication with youth during and after the program or research has been conducted introduces a host of issues, including accessibility, literacy, and engagement.

Traditionally, the most effective way to enhance all three of these aspects of the programmatic process (retention, data collection and dissemination) has been to engage youth in their environments, and to use tools with which they are already familiar (Boyd, 2009; Cassell, Huffaker, Tversky, & Ferriman, 2006; Ginsburg et al., 2002; Kennedy, Charlesworth, & J. L. Chen, 2003). Health organizations that wish to specifically impact on youth are beginning to recognize New Media, Internet-based computer-mediated communication, and Social Media<sup>2</sup> in particular, as a useful tool of engagement (Bolam, McLean, Pennington, & Gillies, 2006a; Della, Eroglu, Bernhardt, Edgerton, & Nall, 2008a). Since the inception of Social Media tools, scholars from various disciplines have studied social network sites in order to understand user behavior, cultural implications, social performance, and symbolic interaction as users engage one another through multiple Internet-based computer-mediated (IBCM) platforms. This literature review helped bring together what is known – and what is yet to be systematically explored—in these critical areas, and makes a case for further research on the application of New Media in programs, research, and interventions.

*Developing A New Social Ecological Model (Project 2)* – Social ecology speaks to the interaction of an organism, or in the case of public health, people and the environment in which they live. The social ecological model provides a framework by which various contexts of the individual and his or her environment can be analyzed and acted upon (Oetzel, Ting-Toomey, & Rinderle, 2006). People are responsible for enacting and maintaining healthy lifestyle changes critical to reducing risk and improving health quality, but the social ecological model notes that their behavior is also largely determined by their social environment, (e.g. community norms and values, regulations, and policies) an environment that now includes New Media and the Internet. Thus, for this project I asked the following questions: How can the social ecological model be

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<sup>2</sup> A type of Internet-based New Media that allows a user to share information and create an online social system, network, and identity.

reconstructed in a way that fully accounts for the unique and dynamic social ecology of cyberspace, New Media and Internet-based computer-mediation? How can current Internet and New Media work focused on sexual health with youth help to inform our understanding of what a new “Duo” model would look like? And what are some promising New Media and Internet-based computer-mediated research methodologies and interventions to promote youth sexual health?

Internet-based social mediums continue to proliferate and become intrinsically tied to individuals’ day-to-day functioning. With the growth of online social networks sites (i.e. Facebook, Myspace, LinkedIn, Friendster, e-Harmony, Yahoo personals, Gay.com, etc.), and increasing online communication technologies (i.e. Skype, AIM, Yahoo IM, YouTube, Twitter, etc.), cyber socialization and the development of a virtual existence continue to increase for all age groups, ethnicities, sexes, and socioeconomic groups (SES) (Lenhart, Purcell, Smith, & Zickuhr, 2010; Miltrano, 2006; Biocca, 2000; Manuel. Castells, 2001; Manuel Castells, 2004a). Thus, New Media technology and Internet-based socialization in the 21<sup>st</sup> century mark the development and growth of a second social ecology; an existence where almost all elements of our social selves and environments in our real world, the “Actual”, are available in our digital/cyber world, the “Virtual”, and may be equally as viable a point of intervention to increase positive health outcomes (Miltrano, 2006; Kreutzer, 2009; Boyd & Heer, 2006; Lenhart, 2010; Chou et al., 2009a; Lampe, Ellison, & Steinfield, 2007; Lenhart, Madden, & Hitlin, 2005). Many public health organizations are beginning to use New Media and the Internet to provide health services, and many of the services currently provided through the Internet can be further adapted to health interventions. Therefore, a new ecological model that fully takes into consideration the integration and widespread use of New Media technology is necessary. Towards this aim I reviewed earlier social ecological models (e.g. Bronfenbrenner, Comer, Stokol, Dahlgren and Whitehead, etc.) and then built on these to indicate how at each level they examine (e.g. Interpersonal, Institutional, community, etc.) a corresponding level exists in a virtual context; a level that merits attention. I further emphasize the importance of what I have termed the Nano, or Intra-individual level, which some early models (e.g. Bronfenbrenner) miss. I model the social ecological structure of New Media and relate it to exemplar interventions of public health practice and youth sexual health promotion.

*Fundamentality of Evaluation* - Recognizing New Media’s potential, and already taking advantage of the Social Media phenomenon, researchers and interventionists interested in public health are finding ways to use New Media and the Internet for surveys, interviews, demographic data analysis, health information sharing, and even focus groups (from an individual or community level to a global scale). Applications in research and health intervention also include: Public Service Announcements (PSAs), free online HIV/STI testing, health information, online physician help, low-cost medication, faster test results, and Internet-based nutrition programs (Bolam et al., 2006a; Chou et al., 2009a). New Media and the Internet appear to be increasing health professionals’ and the health care system’s ability to reach more people faster and potentially more efficiently (Chou et al., 2009a; Hawn, 2009). Much further, more rigorous evaluative research is needed in this area to provide a stronger evidence-base for this claim.

In the United States, youth are the fastest growing users of New Media and in particular the Internet (Biocca, 2000; Miltrano, 2006). Many young people at risk for HIV/STI transmission use the Internet to seek health information (Skinner, Biscope, Poland, & Goldberg, 2003; Chisolm, 2010), and are increasingly using mobile technologies to access the Internet from anywhere at anytime (Lenhart, Ling, Campbell, & Purcell, n.d.; Lenhart, 2010). Youth are also meeting people online with whom they might have a future physical relationship (Alapack, Blichfeldt, & Elden, 2005; Malu, Challenor, Theobald, & Barton, 2004; Davis, Hart, Bolding, Sherr, & Elford, 2006). Since the lack of resources has continued to be a challenge for health departments that wish to conduct STI/HIV prevention (Hogben & Kachur, 2008), there has been a substantial amount of support for the application of New Media technology in public health practice as a potentially cost-effective and efficacious approach (Greiginger, 2009). Still, little has been done to evaluate the Internet's capacity as an HIV/STI prevention tool. Therefore, I have developed an evaluation plan for an Internet-based computer-mediated intervention (InSPOT) designed to assist those who have tested positive for an STI to notify their sexual partners of a potential exposure. Briefly, my evaluation plan includes a history of partner notification and relevant literature. The evaluation plan will also provide an overview of the intervention (InSPOT), and discuss the need it fulfills. It further provides a logic model of the intervention, and a full research proposal to evaluate the intervention, including a diagram of the process. Lastly, it will provide a detailed timeline for execution and will address limitations and threats to validity. It is my hope that this evaluation will not only be funded, but will also serve as an example of how to address a growing need, the evaluation of New Media technology.

New Media and its applications in public health intervention still constitute a relatively new field. Therefore, selecting appropriate methodologies for the literature review, the development of a new social ecological public health model, and the evaluation plan were fundamental to the success of this dissertation. I not only took into consideration the current politics surrounding health care, foundational? and other relevant public health theories, and sexual health education debates, but also the current global financial crisis. These debates and contextual settings are fundamental to fully answering my research questions and reaching my aims. Moreover, to maintain the integrity of my work, I paid close attention to ethical considerations, rules and regulations of institutional review boards, and to addressing validity concerns.

# **PROJECT 1 - New Media's Potential for Youth Sexual Health Promotion: A review of the literature**

## **About this Literature Review**

This literature review will introduce the reader to both published and unpublished works (“Gray literature”) in the areas of New Media and youth health, with particular attention to applications of Social Media, within the last decade. As this paper will later discuss, most literature and research findings in the applications of Social Media in health are unsubstantiated by rigorous research methods or are tangential to the purpose of the study. Due to the limitations of the subject matter, this literature review will not be considered rigorous and will only provide a summation of the findings in the literature that discuss Social Media in their conclusions. Though rare, concrete data and statistics, founded in sound research methodology, on the efficacy of New Media and Social Media will be used when available. Excellent – great way to handle this

This literature review will not include a meta-analysis of the data found in the literature, but will employ a systematized search method, specify a search inclusion criteria, make use of advanced search technology, as well as identify and discuss a broad range of relevant literature. The goal of this literature review is to bring the reader, up to date on current literature on New Media, research employing Social Media, and their application in youth health promotion, as well as to demonstrate the need for future research in this area.

## ***Need for IBCM Intervention Reviews***

New Media technology such as Social Media, an Internet-based computer-mediated tool, offers great potential for youth sexual health promotion and HIV/STI prevention. There are no known comprehensive and systematic reviews of Internet-based computer-mediated delivery for youth sexual health interventions. Though thorough reviews of youth sexual health interventions are available, these reviews focus on interventions that make use of in-person interaction and education by teachers, peer educators or healthcare providers (Paul-Ebhohimhen, Poobalan, & van Teijlingen, 2008; Turnbull, van Wersch, & van Schaik, 2008; Underhill, Montgomery, & Operario, 2008).

It is still uncertain whether an Internet-based computer-mediated intervention is simply another delivery system relying on standard information sharing techniques found in traditional youth sexual health education, or whether the Internet can provide unique mechanistic features (i.e. social networking, geographically specific resource information and/or mobile accessibility) that affect the end user in a different way than do in-person youth sexual health education. The perceived anonymity of the Internet, for example, may enable participants to reciprocally engage with an intervention. Conversely, there may be something intrinsically positive about in-person interactions that lend themselves to a more adjustable intervention process. There is also the potential that Internet-based computer-mediated interventions may cause harm, e.g., if a youth who learns on line that he or she has contracted HIV is despondent and lacks the immediate social support that an in-person encounter can provide. Thus, a systematic review of Internet-based

computer-mediated interventions that make use of Social Media is timely in order to assess their efficacy and/or effectiveness.

### ***Project Aims, Research Questions & Objectives***

This literature review aimed to review and draw on relevant literature and other sources to explore New Media technology, specifically Social Media, in youth program retention, data collection, information dissemination, and privacy/confidentiality. In doing so, I have attempted to answer several integrally related questions. I begin by providing statistics that illustrate youths' growing use of the Internet and New Media technology. I then define Social Media and describe the youths' relationships to Social Media as a part of their daily lives. These sections provide the foundation and background to help address the questions: how is Social Media used to retain youth in health programs and research? How is this approach used to collect data on youth participation and behavior in youth health programs and research? And how is Social Media employed to disseminate information to youth in health programs and research? I then describe how Social Media has been used to improve youth health specifically. Furthermore, in order to clarify the implications of Social Media in public health practice, I identify evidence in the literature that supports the application of Social Media to youth health promotion. Based on this evidence, I explain what I believe is necessary for Social Media to successfully assist in retention, data collection, and information dissemination. Lastly, I discuss the ethical implications and challenges –especially surrounding privacy and confidentiality- involved in using Social Media in youth retention, data collection, and dissemination.

### **Methods**

Literature reviews can be approached in multiple ways, and technology offers several new techniques that greatly increase the success and breadth of the empirical review process. Because of its relative infancy, Social Media, as a literature review topic, presents interesting challenges. The depth and breath of literature on Social Media interventions are gaining great momentum in academia, but due to the high level of specialized knowledge necessary to research, review, and evaluate New Media technologies, compiling and reviewing the literature in this area can be challenging. Even more problematic is the specificity of my topic: youth-oriented health programs that utilize Social Media for retention, data collection, and dissemination activities. However, through the use of New Media technology itself, particularly the medium of the Internet, I was well-poised to conduct a literature search for well-supported, scholarly, peer-reviewed, and gray literature on Social Media based or Social Media incorporated programs. The Internet was used both as a clearing-house for seeking out literature on Social Media-based interventions and other New Media, as well as to provide an access point to literature databases.

By using the Internet, one can tailor searches by study design, keywords, topic areas, or search content directly in the literary work itself. Most literary works now are available in some digital form (Gitelman, 2008). Furthermore, because of the demand by students for universities and government organizations to keep up with advances in



technology, the great bulk of literary works from around the world can be referenced in a library via the Internet. The Internet also allowed me to meet the scientific needs of my research question(s) and goals by taking advantage of a possible propensity for New Media scholars to publish in journals that utilize emerging Internet technology, and therefore may not be as readily accessible through traditional academic databases. In addition, Internet-based research methods provide an array of search options and techniques. Advanced search options and mechanisms provide a great advantage to this literature review, but the quantity of possible criteria combinations for searching the literature can quickly become overwhelming. Therefore, it was crucial to systematize the search process and track both search methods and results.

### ***Sampling: Criteria for Considering Studies for this Review***

In order to capture the scope of literature on applying Social Media in youth program retention, data collection, and information dissemination, I initially searched the peer-reviewed literature broadly. As previously mentioned, I utilized the following databases: CINAHL Plus (Cumulative Index to Nursing and Allied Health Literature), EMBASE: Excerpta Medica (Ovid), ERIC (CSA), Global Health (Ovid), PsycINFO (CSA), PubMed (Medline), Web of Science (ISI), History of Science, Technology, and Medicine (OCLC), Proquest, PubMed/Medline, ISI Web of Science. I also conducted searches through Google “Smart” which is a global and modifiable search service designed to understand relationships between words to better grasp what Internet search query users are looking for. Moreover, this system particularly aids in searches, which attempt to identify public health, governmental, and non-governmental organization (NGO)-disseminated information. Google “Smart”<sup>3</sup> searches were also conducted for conference proceedings and abstracts to identify innovative interventions related to Social Media in youth program retention, data collection, and information dissemination.

I included the following keywords (including plurals), phrases and combinations in my searches:

- Roots/Constants: Youth, adolescent, teen, young adult
- Modifiers: Retention, data collection, information dissemination, recruitment, distribution, sharing, data mining, intervention, health program, sexual health.
- Specifiers: New Media, Social Media, technology, computer-mediated communication, Internet, internet-based, social network, networking, cell phone, mobile phone, Facebook, Twitter, CyWorld, Myspace, LinkedIn, blogs, blogging, tweets, tweeting, Youtube. These searches were restricted to English-language peer-reviewed journals and gray literature.

Using these search terms, a total of 488 sources were found. Of these 488, 21 mentioned Social Media and retention of which only 3 were peer-reviewed journal articles. There were 108 sources that mentioned Social Media and data collection. Of these 108, 88 were peer-reviewed journal articles and 3 were published books. Twenty sources mentioned Social Media and dissemination, and of these, 18 were peer-reviewed journal publications. Finally, 104 sources mentioned Social Media and privacy, and of these, 53 were peer-reviewed journal articles and 5 were published books. Most of the

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<sup>3</sup> Advanced Internet and database searching and categorization tools.

literature and research findings were either unsubstantiated, not supported by data, or did not employ rigorous research methods. Though many studies mentioned the desired topics (Root, Modifier, and Specified combination) it was usually tangential to the purpose of the study. Due to the limitations of the subject matter, this literature review will only provide a summation of the findings in the literature that discuss Social Media in their conclusions.

### **Types of studies**

I included both randomized controlled trials (RCTs) and non-randomized control trials. The RCTs included were randomized either by individual randomization or cluster randomization. Evaluations of programmatic Social Media interventions, which were conducted alongside RCTs or independent of RCTs, also were included. Studies, trials, or evaluations that compared Social Media interventions with varying levels of interactive elements were represented. I also included trials that compared two or more types of Social Media interventions, or that aimed to compare the effects produced by different designs of intervention, such as different technological delivery systems (e.g. computer, mobile phone, gaming consoles, etc.). I included randomized and non-randomized control trials that included Social Media as a component of a multi-component intervention even if the main premise of the study was not New Media or technology oriented. Multi-component trials that involved non-technology driven aspects of the intervention were included as long as it was possible to differentiate between the effects of the Social Media vs. the non-technology component.

### **Types of participants**

I included studies with participants, users, and/or consumers in the 12 to 24 year old age range. For this review, youth refers to 12 to 17 years olds and young adult included 18 to 24 years olds. In the case that participants' and/or users' age ranges were below 12 or beyond 24, studies were included only if they clearly differentiated and identified study results for participants in the circumscribed age range (12 to 24) from those of other age ranges. I included studies with participants of any gender, sexuality, ethnicity, nationality, and level of ability/disability.

### **A focus on intervention research**

Although I did not limit this review to intervention literature, I did focus largely in this area primarily because intervention research with youth has strong documentation of Social Media use. My interests for this review were not in the specifics of the actual interventions themselves, but rather were focused on identifying the commonly related components of interventions to inform how Social Media is being used for retention, data collection, and dissemination. Moreover, I strove to glean aspects of "user interactivity" in interventions with Social Media components. Understanding user interactivity (e.g. user input which defines or changes computer output, entering personal data, making choices) is essential to understanding the social networking process and use of social media for retention, data collection, and information dissemination.

The interventions included in this review had to have a goal of health promotion or disease prevention. Moreover, interventions had to be *Internet-based*, including but not limited to computer-mediation, and involve a *processor unit*. As previously mentioned, “Internet-based” is defined as a method of data transfer that conforms to a particular set of communication protocols or rules for exchanging information over a vast global network (Gitelman, 2008; Kraut, Brynin, Kiesler, & ebrary Inc., 2006). The term processor, in the context of computer-mediation and non-computer mediation, means to provide a platform or system of operation to organize and manage user applications or data transmission over a network (i.e. Mobile phone, iPad, iPod, etc.). Mediated, or mediation, is the process that links the two; the computer or other processor device comes between the interaction of the user and the Internet, by putting data into electronic or magnetic code, or optical patterns for storage and transmittal (Merriam-Webster, 2010).

### **Types of social media used**

Scholars have identified six different types of Social Media: collaborative projects, blogs and microblogs, content communities, social networking sites, virtual game worlds, and virtual social worlds (Kaplan & Haenlein, 2010). However, other related and sub-categorized social connective tools exist as well. Social Media tools that were considered in addition to those mentioned above are: blogging platforms, picture or photo-sharing, video blogs (vlogs), web casts or audio blogs, wall posts or updates, email/messages, instant messaging (IMing), music-sharing, content or application sharing (Farmer, Bruckner Holt, Cook, & Hearing, 2009; Kaplan & Haenlein, 2010).

## **Background – Youth Sexual Health & New Media**

### ***Youth Sexual Health***

The CDC and other major health organizations consider youth a high-risk group in terms of sexual behavior and related outcomes and are therefore a priority in sexual health promotion and prevention for public health professionals researching and combating HIV/STI infection, prevention, morbidity, and mortality (Eaton et al., 2010). In this dissertation, and commonly throughout the study of sexuality, youth is defined as including individuals 14 to 24 years of age. Sexually transmitted infection (STI) and Human immunodeficiency virus (HIV) remain a problem among youth in the United States (Eaton et al., 2010). HIV prevalence is especially high in youth of minority groups, and epidemics of sexually transmitted HIV are increasing in these vulnerable populations (Eaton et al., 2010; Hall, Espinoza, Benbow, & Y. W. Hu, 2010). STIs such as chlamydia, gonorrhoea and syphilis are more prevalent in homosexual, African American, and Latino populations especially among youth (Eaton et al., 2010; Hall et al., 2010; “Emerging trends. New HIV infections among gay men cause for concern, CDC says,” 2010).

Youth belonging to particular socio-demographic groups, such as racial, ethnic, or sexual minorities, are at further risk of poor sexual health when disenfranchised,

marginalized, or low income. This is true for lesbian, gay, bisexual and transgender (LGBT), and heterosexual youth (Solorio, Milburn, Weiss, & Batterham, 2006; Tyler, 2008; Van Leeuwen et al., 2006). Due to confidentiality concerns, uncomfortable power dynamics, and real or perceived health service providers' discomfort about discussing such potentially sensitive topics, youth in general –and LGBT youth in particular- may not broach concerns regarding sexual health in healthcare encounters (Gadomski, Bennett, Young, & Wissow, 2003; Merzel, et al., 2004).

### ***Youth and Internet Use***

Internet use is increasingly becoming ubiquitous among youth and young adults. Since the beginning of 2000, youth (here referring to ages 12 to 17) and young adults (here referring to ages 18 to 29) have remained the most likely groups to go online. Ninety-three percent of youth and young adults in the U.S. go online today (Pew Research Center, 2009a). Access to New Media, especially Social Media, is most commonly accomplished by using computer-mediated communication through the Internet (Adamic & Adar, 2004; Bozarth, 2010). Youth, ages 12 to 17, are increasingly using various types of media technology at a faster rate than young adults and adults. Youths' use of the Internet has also intensified, with teens using the Internet more often and in a greater variety of ways compared to other age groups (Pew Research Center, 2009b). About 31% of youth use the Internet to get health information, and 17% of youth who use the Internet report using the Internet to find information on health topics that are difficult to discuss with adults (e.g., drug use, sex, and sexuality) (Pew Research Center, 2009c).

However, it is important to note that demographic usage trends are not equal across all racial and socioeconomic groups (Pew Research Center, 2009b). Both youth and young adults from the lowest-income households are less likely to report use of the Internet. About 73% of youth from U.S. households earning under \$30,000 per year report Internet use, while 90% of youth in families earning more than \$30,000 a year report going online. This increases to 93% for households earning \$75,000 or more. These Internet use trends vary by race as well. Whereas 87% of Caucasian youth and 89% of Hispanic youth (English-speaking) go online, only 77% of African-American youth go online. However, all three groups' youth are more likely to be online than the overall population of American adults, and are also more likely to be online than their parents (Pew Research Center, 2009b). Thus, regardless of household income, or race, youth represent the predominant demographic using the Internet with the highest frequency.

Among young adults, use of the laptop and wireless<sup>4</sup> Internet is higher than it has ever been. Sixty-six percent of 18 to 29-year-olds own a laptop computer or netbook, in contrast to 53% owning a desktop computer (Pew Research Center, 2009b). Young adults, ages 18 to 29, are the only age group that has adopted the use of laptop computers more than desktops. Reports from Pew Internet and American Life Project show that

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<sup>4</sup> Radio transmission through the air. Although all forms of transmission over the air (AM, FM, TV, portable house phones, cellphones, etc.) are naturally wireless, there is a tendency for the term to refer only to Wi-Fi (a wireless Local Area Network [LAN]) or to cellular data services (PC Magazine Encyclopedia, 2010).

those under age 30 prefer laptops to desktops, particularly because of laptops' wireless capabilities. Eighty-one percent of young adults, ages 18 to 29 years old, are wireless Internet users compared 63% of adults, 30 to 49 years old. Fifty-five percent of young adults have wireless Internet access via a laptop or by cell phone, and 28% have accessed the Internet wirelessly through an e-book reader, gaming, or other wireless device (Pew Research Center & Smith, 2010).

The mobile web is not only impacting the computer choices of both youth and young adults, but also significantly impacting mobile phone usage. Seventy-five percent of youth and 93% of young adults ages 18 to 29 currently own a cell phone. Mobile phone ownership has become prevalent among even the youngest teens. Fifty-eight percent of 12-year-olds now own a cell phone, up from just 18% of 12-year-olds as recently as 2004 (Pew Research Center, 2009d; Pew Research Center & Smith, 2010).

African Americans, particularly adults, are the most active mobile web users. Unlike computer-mediated access to the Internet, African Americans' use of mobile web Internet access is growing at a faster rate than mobile Internet use among Caucasian adults (Pew Research Center, 2009d). Ownership of a mobile device is more common among African-Americans and English-speaking Latinos than among Caucasians (87% vs. 80%). Moreover, African-Americans and English-speaking Latinos remain among the most active users of the mobile Internet, and African-Americans and English-speaking Latinos take advantage of a much greater range of their phones' features than do Caucasians. Sixty-four percent of African-Americans access the Internet wirelessly from a laptop or mobile device, which represents a significant increase from 57% in 2009 (Pew Research Center & Smith, 2010).

Fifty-nine percent of youth that use New Media technology to send instant messages (IMs) or text messages (SMS) to friends send messages through some social networking system (Lenhart et al., n.d.) The capabilities of mobile phones, desktop computers and wireless laptops' to access Social Media wirelessly drastically impacts the speed and accessibility of communication for youth and young adults. As youth journey away from only using email from a stationary computer to using social networks for messaging and communication, these online networks become the primary vehicles by which text-based short messages, imagery, and video communications are sent ("Mobile phone text messaging in the management of d... [J Telemed Telecare. 2004] - PubMed result," n.d.). Thus, access to Internet-based New Media, such as Social Media tools, is not limited by geographic location, age, race, or social economic status, making Social Media a viable programmatic tool for health promotion and disease prevention.

## ***Social Media***

As previously mentioned, Social Media represents one type of New Media that is available to youth over the Internet or through wireless devices. For the purposes of this review I define Social Media as any Internet-based service, wireless or otherwise, which allows a user to: create a public or semi-public, or private profile within a enclosed online social system; network profiles together; designate and share a list of users, associates, or "friends" with whom they share a connection; and depending on allowed setting and provided tools, view and review their and others' list of connections within that enclosed social system. Within these parameters I will allow for variations in the application,

characteristics, and taxonomic systems as defined by the social network company. This definition would exclude other New Media-based social connecting tools such as Instant Messaging (IM), text messaging (SMS), picture messaging (MMS), or geographic positioning system (GPS) social locating tools (Friend or Family member locators/position sharing/tracking systems).

Social Media not only allows individuals to stay connected with current real life social network members, but to also meet people to create new social connections. Moreover, Social Media enables its users to identify and show their social networks to others, which facilitates social connections between individuals that would not have otherwise be made. Though networking (creating a new social connection to other users) is one option provided by social networking sites, individuals tend to network primarily within their immediate social networks (Adamic & Adar, 2004). Some social networking sites, such as Facebook, attempt to facilitate the process of creating new social connections by suggesting connections within “one to two degrees of separation” between individuals who have multiple shared characteristics, such as academic affiliations, work affiliations, political interests, hobbies, or number of common friends (Boyd, 2008b). Nonetheless, users primarily interact with other users within their immediate or extended social network (Valerie Barker, 2009).

### ***Youth and Social Media***

Since their launch, social network sites such as MySpace, Facebook, Ning, CyWorld, and LinkedIn have accrued massive numbers of participants. Users of Social Media have rapidly made social networking and cyber-social interaction a part of their everyday routine. Online social connections, like real life social connections, tend to be based on one or multiple user traits, including similar activities, common interests, shared political views, similar identities, friends in common, or social labels (i.e. regarding race, class, language, sexuality, religion, and background) (Kraut et al., 2006). By mirroring the social melee of cliques, peer groupings, and other familiar categorizations in school settings, Social Media sites organize their strategies to encourage active social networking among youth.

There are hundreds of social network sites, with various features and applications, which support a wide range of youth interests and needs. Although many features are similar and even standard across the board (friends list, connections, profile info, picture sharing, etc.), the use and implementation of the technology and services they offer varies. Social network sites also vary in how they incorporate tools for communication and information sharing, such as mobile connectivity, status updates, blogging, and photo/video posting. Some Social Media accommodate or encourage diverse youth audiences, while others attract youth based on commonalities, such as race, sexual orientation, religious beliefs, political views, age range, geographic location or nationality (Biocca, 2000). For example, BlackPlanet.com and AsianSocialNetwork.com cater specifically to African American and Asian users respectively, and Gay.com markets to homosexual males.

As noted earlier, there are many types of Social Media: blogs, social networking sites, tweeting sites, community- oriented sites, personals, etc. Social Media trends, usage patterns, and types of social media are often changing or reinventing themselves to attract

youth. Often a site will try to incorporate as many options of functionality as possible, paying close attention to the most desired type of activity (i.e. blogging, tweeting, photo sharing, “Like’ing”, etc.). As mentioned earlier, usage trends vary based on age group, race, or social economic status (Albrechtslund, 2008; Backstrom, Huttenlocher, Kleinberg, & Lan, 2006). Since 2006, youth and young adult blogging dropped from 28% to 14%, and commenting on blogs has also seen a significant decline from 76% to 52%, which includes youth commenting on blogs within social networking sites. Conversely, youth, young adult, and adult use of social networking sites have significantly increased. In the U.S., 73% of wired<sup>5</sup> youth now use social networking websites. Also, whereas 55% of youth used social networking and various forms of Social Media in November 2006, by February 2008 the percent had increased to 65% (Lenhart et al., 2010). As youth’s use of Social Media increases, the popularity of specific features within various social networking sites has shifted. For instance, daily messages to friends within social networks decreased from early-2008 to mid-2009. This included sending bulletins, group messages or private messages (Faw, 2009a).

The Social Media use trends and behaviors of young adults are very similar to that of youth. Seventy-two percent of online young adults, ages 18 to 29 use social networking sites, which is similar to the 73% of youth mentioned earlier, and significantly higher than the 40% of wired adults age 30 and above. Young adults also differ from older adult in social networking site choice and how they maintain their profiles. For instance, young social networking users are more likely to have and maintain a profile on MySpace (66% of young adults vs. 36% of adults 30 and older), but both youth and young adults are less likely to use more professionally-oriented social networking sites such as LinkedIn (7% of young adults vs. 19% of adults). Contradictory to this trend is use of Facebook; youth and young adults under 30 and adults 30 and older are equally as likely to use Facebook (71% of youth and young adults as compared with 75% of adults) (Lenhart et al., 2010).

Another emergent Social Media tool is micro-blogging or status updating also know as tweeting. However, tweeting appears less popular among youth. Whereas youth are the leading users of almost all other New Media and Social Media Internet-based applications, youth are not using Twitter in large numbers. Only 8% of wired youth ages 12 to 17 use Twitter or “tweet.” Twitter use also varies depending on age; 10% of wired youth ages 14 to 17 use “tweet,” compared with only 5% of youth ages 12 to 13 years. There are also significant gender differences. Girls aged 14 to 17 are more likely to use Twitter than their male counter parts; Thirteen percent of wired girls ages 14 to 17 use Twitter, compared with 7% of boys of the same age. In contrast to youth, young adults are much higher Twitter users, or when it comes to updating their status. Over 33% of wired young adults 18 to 29 year-olds post new status updates or read the status updates of others (Lenhart et al., 2010).

Overall, regardless of some subgroup variations, it is clear that both youth and young adults are active leaders in the use of Social Media and are continuing to grow as users. Moreover, due to expanding access to the Internet and New Media technology access to Social Media is becoming less restricted by the age, racial, geographic and economic digital divides. These statistics provide a strong argument for the integration of

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<sup>5</sup> Making use of computers and information technology, including wireless devices, to transfer or receive information, especially by means of the Internet (Oxford Dictionaries Online, 2010)

New Media, or more specifically Social Media, into youth focused public health communication and intervention programs.

### ***Scholarship on Social Media***

Social Media represents an important new area of research for scholars investigating processes of youth socialization and behavior. Scholarly research and literature on Social Media is growing in tandem with the expansion of Social Media itself. Not surprisingly, scientific literature on Social Media is emerging from multiple and varied disciplines (e.g., public health, law, marketing, psychology). Adding to the large and growing body of literature on computer-mediated communication, scholars are addressing topics ranging from structural networks, real and virtual socialization, privacy, impression management, and social performance, to name a few (Alapack et al., 2005; V. Barker, 2009; Bijker, Hughes, Pinch, & American Council of Learned Societies., 1987). In addition, research has identified extended social networks as identity signals, which serve to validate identity information presented in profiles, or as sources of data on naturalistic behavior (Boyd, 2004, 2009).

As Social Media grows in popularity and use, it has quickly become a rich research data source, allowing scientists the ability to traverse large-scale patterns of connections, usage, behavior, interests, and psychological processes. Scholars have discovered ways to collect and organize social network data through automated collection techniques or through datasets provided directly from Social Media companies (Chou et al., 2009a). For example, social scientists studying Social Media have analyzed friendship maintenance and social development using such sites as Friendster, Myspace, Cyworld, and Facebook. Historically established areas of study have begun to include research on Social Media, such as studies of race, ethnicity and culture (Lariscy, Reber, & Paek, 2010), gender and religion (Thelwall, 2008), national identity (Backstrom et al., 2006), and sexuality (Rietmeijer & McFarlane, 2009). Through these studies of social, psychological, and technological sciences, scholars are rapidly documenting some of the emerging scientific implications of Social Media. However, comprehensive reviews on Social Media are lacking due to the fact that much research on Social Media is still in progress and ever changing.

Social Media developers create tools for users based on content trends and users create content based on the tools provided. Due to the organic nature, iterative developmental process, and indefinable future of Social Media, now is an optimal opportunity for a review that will indicate what's been done, find where the gaps are, illuminate the overarching themes, and suggest what we can learn from them. The bulk of studies with youth that focus on Social Media have looked specifically at youth program participation and data collection. Relatively fewer studies have examined dissemination, and there is a scarcity of studies examining social media and retention. This review represents the first attempt to examine the use of social media in all four areas and the potential implications of this usage among youth.



## Review and Summation of the Literature

### *Intervention Strategies*

One-on-one and group, health care provider and school-based, interventions are the most common sexual health educational intervention strategies used to promote youth sexual health<sup>6</sup> (Paul-Ebhohimhen et al., 2008). These interventions have limited geographic reach, relegated to parental consent if based in schools, and may ignore issues of disenfranchised LGBT youth. Moreover, sexual health interventions can often be complex in both scope and execution, or overly simplified by a single clinic visit. There frequently are a number of components to sexual health promotion programs (e.g. educating parents, condoms at school, training for teachers, etc.), which work in tandem with one another to elicit a different response or address a specific concern, at varying levels, toward a central goal (Agha & Van Rossem, 2004; Paul-Ebhohimhen et al., 2008). Research on health interventions to promote youth sexual health and increase sexual health knowledge have consistently shown that providing information to youth does not significantly produce positive behavior change (Catalano, L. E. Gavin, & Markham, 2010; L. E. Gavin, Catalano, David-Ferdon, Gloppen, & Markham, 2010a).

Theory-supported interventions are often reported to have higher rates of efficacy (Fishbein & Ajzen, 2005; Hagman, Clifford, & Noel, 2007), as are interventions that are customized to address the specific concerns and needs of the target population (J. D. Fisher, D. H. Cornman, Norton, & W. A. Fisher, 2006). Relevant theories, particularly those in the social and psychological sciences, and those specific to sexuality and social behavior, have strengthened? the final outcome of a well-developed intervention. Kirby's classic application of social cognitive theory and social influence theory in the *Safer Choices* intervention, which addresses the sexual behaviors of different subgroups of high school students, is exemplary in this regard.

Kirby found that "*Safer Choices*, a theory-driven multi-component, curriculum-based intervention, can have a long-term impact up to 31 months; can have positive effects on males and females, all major ethnic groups, sexually inexperienced and experienced youth, and lower-risk and higher-risk youth; and may be especially effective with Hispanic and higher-risk youth." Students in the intervention schools were 1.68 times more likely to have used condoms ( $P=0.04$ ), and 1.76 times more likely to use an effective pregnancy prevention method (birth control pills, birth control pills plus condoms, or condoms alone) ( $P=<.05$ ) at last intercourse than were students in the comparison schools. Also, students in the intervention expressed significantly more positive attitudes about condoms ( $P=<.01$ ) and reported greater condom-use self-efficacy ( $P=.00$ ) and fewer condom-use barriers ( $P=<.01$ ) (Kirby, Laris, & Rolleri, 2007).

As shown in the *Safer Choices* study above, self-efficacy is important to youth sexual health promotion (Kirby et al., 2004). In a meta-analysis of thirty youth sexual health programs regarding self-efficacy, researchers found that positive youth development programs, which improve self-efficacy, can promote adolescent sexual and reproductive health. Fifteen of the thirty programs showed evidence of improving at least one adolescent sexual and reproductive health outcome (i.e. increased condom use,

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<sup>6</sup> Sexual health is not only the absence of disease, dysfunction or infirmity but also a state of physical, emotional, mental and social well-being in relation to sexuality.

increased birth control use). Some characteristics of the programs included: parental involvement, group discussions, and one-on-one and group education. Of these fifteen programs, effects were moderate and well sustained. Moreover, they concluded that tested and effective positive youth development programs should be a part of a comprehensive approach to promoting adolescent health (L. E. Gavin, Catalano, David-Ferdon, Gloppen, & Markham, 2010b). Despite successful intervention methods such as Kirby's, retention, data collection, information dissemination, and privacy/confidentiality still present challenges to youth health intervention. Thus, more research is needed to learn how traditional methods and challenges, such as those mentioned above can be improved by the application of New Media and/or Internet-based computer-mediate tools (i.e. Social Media).

## **Retention**

Retention presents significant challenges in programs and research with youth and young adults. In a New Zealand study, data from structured interviews were collected (n = 79), as well as a clinical file search of 184 randomly selected young attendees of alcohol and other drug (AOD) treatment services. The study found that "fixed" characteristics of youth (i.e. age, sex, and ethnicity) were not strongly associated with retention, but independent characteristics (i.e. attendance motivation, positive experiences with staff, and program involvement/investment) predicted retention (Schroder, Sellman, Frampton, & Deering, 2009). Though retention rates are difficult to significantly improve (Seed, Juarez, & Alnatour, 2009), these data suggest that by creating more youth appropriate services and identifying ways to influence independent characteristics, organizations can improve youth retention (Schroder et al., 2009). Social Media has the potential to markedly affect independent characteristics, and in turn improve retention.

There are numerous examples of well-designed programs that utilize tools from the Internet and have produced significant results (Roberto, Zimmerman, Carlyle, & Abner, 2007; Womble et al., 2004; Wang & Etter, 2004; Lou, Q. Zhao, Gao, & Shah, 2006; McFarlane, Kachur, J. D. Klausner, Roland, & Cohen, 2005). As such, the research in this area suggests that online tools that incorporate higher levels of participant investment and interactivity, as available through Social Media, may increase participant retention (Bull, Lloyd, Rietmeijer, & McFarlane, 2004; Schroder et al., 2009).

Internet-based tools, such as Social Media, are increasingly being explored as a possible solution to program retention. Retention is highest when youth are motivated in a way that promotes some form of economic gain, positive experience, or contains some interactive element related to program goals (Stiefvater, 2009; Rajasekaran, 2010). Youthography, an advanced research and marketing communications agency specializing in "tweens", youth and/or young adults, developed and implemented a countrywide series of engagement events to gauge possible applications of Social Media in youth retention. These events convened over 300 Canadian youth and identifiable leaders. Youthography findings support that economic gain, positive experience, and interactivity can be provided through Social Media in varying forms (Rajasekaran, 2010).

Interactive Social Media-based programs can increase participation among youth in order to forge bonds and help them make decisions (Stiefvater, 2009; Kreutzer, 2009). In a study on Facebook, researchers used a dataset of 30,773 Facebook profiles to predict

friendship links and discuss associations. They conducted a survey of 286 undergraduate students, which suggested strong associations between use of the social networking platform Facebook, and three types of social capital. The strongest type of social capital that was facilitated by Facebook was “bridging social capital”. Facebook users in this study filled 59% of the personal information fields provided. Undergraduates had more friends than any other group, and of those, females had slightly more than males, 52% and 48% respectively. Also, older accounts had more friends of all types with a Pearson correlation coefficient of  $r=0.37$  between the age of the account and friends at the same institution, and a Pearson correlation coefficient of  $r=0.24$  between the age of the account and friends at other institutions. (Lampe et al., 2007). Facebook allowed students to build new connections with individuals that they could later utilize for personal gain or call upon as resources. Moreover, providing insider-only access and privileges helped to formulate group bonds that promoted study retention (Lampe et al., 2007, 2008). Social Media also provides benefits for users experiencing low self-esteem and low life satisfaction (Lampe et al., 2008), a common challenge to adolescent success and program retention.

In another study that demonstrates retention in Social Media, a course was created at Rochester Institute of Technology to examine the design and use of Social Media while evaluating the use of computer-mediated and Social Media tools as part of the course itself (Jacobs, Egert, & Barnes, 2009). The course enrolled 35 and was subdivided into 28 students registered through Communications and 7 registered through Information Technology. The gender subdivision consisted of 21 males and 14 females. Students were provided a survey at the beginning of the course. The survey showed that 50% had used Social Media for a period of one year or greater, 94.4% utilized social media in a social “friends and family” way, and 55.6% used social media for profession collaboration or communication. “As for use of Social Media in a learning environment, 61.1% of students agreed that Social Media should be used in an educational context”.(Jacobs et al., 2009). Because youth and young adults in this generation tend to have wholly integrated Social Media into their everyday way of life (Roberts, 2000; Miltrano, 2006; Jue, Marr, & Kassotakis, n.d.; Watkins, 2009), The researchers of the study were able to conclude that Social Media can potentially impact program retention and participation without additional life interruption (Jacobs et al., 2009)

Although there is limited research on applying Social Media to the challenges of youth retention, the available research suggests that most Social Media tools help to foster social relations conducive to program retention. To create participant investment in a program and influence dependent personal characteristics, one must create a participatory community (Albrechtslund, n.d.; Hallett, Brown, Maycock, & Langdon, 2007; Carlson et al., 2006).

In a study investigating the integration of web-based Social Media technologies coupled with a constructivist-based course design has a positive influence on student retention, motivation, and perceived cognitive learning, graduate students were grouped and observed while “constructed knowledge using both online dialogue (synchronous and asynchronous) and Social Media technologies as tools to support their learning”. The Study found a greater than 90% retention rate as well as evidence that supported the integration of web-based learning communities and collaborative group assignments into the design of the course (Mercedes Fisher & Baird, 2005a). A well thought-out Social

Media strategy can improve retention by fostering dynamic online communities and supportive networks and facilitating information exchange and engagement. Further research is needed to determine what role cultural mores, attitudes, and gender may play in the application of Social Media and retention, but there is strong evidence that stresses the “importance of cultivating relationships, and then carefully balancing the symbiotic relationship between social technologies, community, and constructivist learning as a means to provide avenues of opportunity for students to achieve their full potential” (Mercedes Fisher & Baird, 2005a, 2005b)(“Online learning design that fosters student support, self-regulation, and retention,” n.d.). Ultimately, comprehensive analysis of the use of Social Media in program retention is still needed.

### **Data Collection**

Internet-based data collection offers the opportunity to make improvements to the quality of epidemiologic measurement by providing privacy and convenience to participants while reducing costs associated with questionnaire administration and allowing for real-time data processing (Baer, Saroiu, & Koutsky, 2002). However, when considering the use of Social Media in data collection, one must recognize that “participant surveillance” is involved in this process. Essentially, the participant and his/her interactivity are being observed, in some way, through use of the technological tools. While the use of surveillance through the Internet has long been a heated topic of discussion, the conversation has broadened and the debates are further exacerbated by an influx of personal data available through Social Media. I argue that participant surveillance is not necessarily intrinsically hierarchical (i.e. watcher controls or has power over the watched) (Albrechtslund, 2008). In terms of data collection and technology-based mediation, surveillance can be enacted in negative ways (i.e. wherein the subject actively resists the surveillance) (Ball & D. C. Wilson, 2000; Mcgrath, 2003) or can be positive (i.e. the subject gains empowerment through exercising exhibitionism) (Koskela, 2004). When enacted positively, the Internet (generally) and Social Media (specifically) can become powerful tools for data collection by using methods that are collaborative and rewarding for participants and researchers.

What’s more, Social Media profiles have become a mechanism for presenting data related to one’s identity, and have been extended to include explicit social data such as relationship types, affiliations, views, personality traits, intimate thoughts, and personal opinions. For example, a web survey of 1,715 college students was conducted to examine Facebook Groups users' gratifications and the relationship between users' gratifications and their political and civic participation offline. A factor analysis revealed socializing, entertainment, self-status seeking, and information gathering as four primary needs. Furthermore, these needs varied depending on the demographics of the user (i.e. gender, geographic location, age, and affiliations). Facebook Groups users’ political engagement was positively associated with and significantly predicted by Facebook Groups use for information gathering about campus events ( $\beta 0.13$ ,  $p < 0.001$ ), socializing ( $\beta 0.12$ ,  $p < 0.01$ ), and self-status seeking ( $\beta 0.12$ ,  $p < 0.01$ ) (N. Park, Kee, & Valenzuela, 2009). This study demonstrated that the plethora of information freely gathered and provided by Social Media users are not only based in real time, but are also related to their offline lives. There is also an element of dynamism in data from Social Media.

Users actively depict themselves, and through contributing on the web pages and personal profiles of others, shape how others are depicted on the social network (Boyd & Heer, 2006), providing not only primary and secondary, but also tertiary data.

Moreover, Social Media can be a cost effective means of data collection. Cross-sectional data collected via the Internet has indicated that the Internet may serve as an expedient, cost effective, and reliable methodology to increase understanding of human behavior and data collection. In this study of MSM sexual behavior there were no significant differences in online data and field data collected on oral and vaginal intercourse. Condom use during oral, anal, or vaginal intercourse was not significantly different between the study methodologies. However, the Internet sample reported utilizing more diverse sources of information ( $p < .01$ ), and was significantly more likely to report obtaining sexual health information from news magazines ( $p < .005$ ), men's magazines ( $p < .04$ ), health departments ( $p < .009$ ), health care providers ( $p < .005$ ), and television ( $p < .01$ ) (Rhodes, DiClemente, Cecil, Hergenrather, & Yee, 2002). Most studies on data collection within Social Media are tangential to larger study goals and are rarely empirically substantiated. As such, rigorous empirically supported research is lacking in the area and much needed.

### ***Dissemination***

Internet-based forums and social platforms can provide easy access to health information and social support. The Internet in general, and Social Media specifically, "provide a venue for the dissemination of health information and also serve as a virtual voice for lifestyle coaching, political action, community building, and advocacy" (Donelle & Hoffman-Goetz, 2008). In an analysis of 1,000 Twitter status updates, it was found that Social Media sites offer means of information sharing, particularly for public health. Of the 1000 status updates, 971 were categorized into eleven groups ranging from advice/information ( $n = 157$ ), to side effects/negative reactions ( $n = 113$ ), to diagnosis ( $n = 102$ ), Misunderstanding or confusion as well as abuse were also identified. For instance, "flu + antibiotic(s)" ( $n = 345$ ), or "cold + antibiotic(s)" ( $n = 302$ ). This study demonstrates how Social Media sites offer means of health information sharing. The researchers call for further study to see how networks can provide a locus to identify information-facilitated behavior change, the dissemination of accurate information, and the gathering of real-time health data. (D. Scansfeld, V. Scansfeld, & Larson, 2010).

Similarly, an Internet content analysis of Social Media marketing found that youth and young adults are turning to Social Media platforms, such as YouTube, Facebook, MySpace, Twitter, and Second Life, as major and even primary sources of health information (Vance, Howe, & Dellavalle, 2009).

. The study found that youth and young adults appear to be turning to Social Media because of several advantages: low cost, rapid transmission of information, and ease of interaction with a wide community. Disadvantages included issues of information reliability and trust, for instance: blind authorship, lack of citation, and opinion presented as fact (Vance et al., 2009).

As the number of individuals looking for health information online increases, with estimates ranging from 37% to 52% (Kapp, LeMaster, Lyon, Zhang, & Hosokawa, 2009; Fox & Pew Internet & American Life Project., 2005), public health professionals must

learn how to add content to the Internet and arbitrate the existing content so that youth are provided with accurate, understandable, and developmentally-appropriate information. Moreover, public health instructors should also begin to educate other health professionals on the use of Social Media and its role in the dispersion of public health information (Kapp et al., 2009).

As an exemplar, thirteen focus groups were held with 287 students to examine issues around health information dissemination to youth. Participants all had access to school Internet resources and of those 224 (78.0%) also had access available at another location. One hundred and seventy-eight (62.0%) accessed the Internet (e-mail, games, chat, and homework) at least once per week. Also, 202 (70.4%) reported that they would be interested in a “question line” where they could e-mail questions to a health care professional. The focus groups supported the Internet, and Social Media, as practical and increasingly accessible ways of disseminating health information to young people, particularly if it is integrated into activities that are enjoyable (Goold, Ward, & Carlin, 2003). Studies such as this indicate that further research on internet-based and Social Media applications of information dissemination is critical. Researchers should explore further how such networks may provide a venue to disseminate valid information and explore how such tools can be used to gather real-time health data (D. Scanfeld et al., 2010)

### ***Privacy/Confidentiality***

Social Media use raises privacy concerns specifically surrounding youth. In a national random cross-sectional study of 2065 youth age 8 to 18, researchers found that most youth have personal media and average six hours of media consumption daily. When various forms of media are used simultaneously, exposure increases to eight hours per day. Exposure varied by age, gender, race/ethnicity, and socioeconomic status. One-half (50%) of the youth in the study use a computer daily, with significant use occurring in the absence of parents. A subsample of 8 to 18 year olds (N = 487) kept media diaries. This subsample reported using two or more media 15% of their total media time. Younger children (8 to 13) report more than half an hour more daily exposure than youth 14 to 18. Within the larger sample there were also differences by race/ethnicity. African-American youth approximately ten hours of daily media exposure, and Hispanic youth report nine hours, and Caucasians only seven. Socioeconomic level was also a predictor. Youth of household incomes of \$40,000 reported almost 1 hour less exposure than youth of households below \$25,000. (Roberts, 2000). With such widespread and unmonitored use, privacy becomes an important issue.

Facebook, for instance, has experienced numerous challenges regarding keeping public and private data separate. Facebook’s popularity has made it a target for considering user protection, privacy, e-professionalism, and identity to the professional world (Mattingly, Cain, & Fink, 2010). In a study of 4,000 Carnegie Mellon University (CMU) students’ Facebook profiles, researchers found several areas of privacy concern, especially the ability to reconstruct social security numbers using date of birth and geographic location data. CMU Facebook user study participants provided a large amount of personal information in their profile: 90.8% posted images of which 80% contained at least some information useful for identification. Over four-fifths (87.8%) revealed their

date of birth, 39.9% provided their phone number (28.8% of which were mobile numbers), and 50.8% list their residential address. Most users indicated dating preferences (male or female) and relationship status (single, married, or in a relationship). Of those indicating relationship statuses other than single 62.9% identified their partner and provided a link to their partners profile. The majority of users also provided information indicating political views and/or affiliations (from “very liberal” to “very conservative”), and interests (including music, books, and movies). The researchers also found that only 1.2% of users (45 male, 18 female) utilized privacy setting. (Gross & Acquisti, 2005).

In contrast, researchers have also found that students’ desires to protect their privacy did not always coincide with their behaviors. This has been deemed the “privacy paradox,” a counter-intuitive unawareness experienced by many youth of the public nature of the Internet (Barnes, 2006; Stutzman, 2006; Antón, Earp, & Young, 2010). Another study by Pew suggests that youth are aware of privacy issues and that many young people attempt to minimize privacy risks. Pew found that 66% of youth report blocking their profiles from general viewing (Lenhart & Madden, 2007), but the privacy options offered by current social networking sites do not adequately account for differences in privacy perception among peers. Though some youth have high privacy settings, the privacy of what they share amongst each other is subject to the peer with the least privacy restrictions (Preibusch, Hoser, Gürses, & Berendt, 2007).

Another issue is Social Media and the law. Social Media issues of public or private spaces have proven challenging for lawmakers. It is still unclear where jurisdictions, particularly those of policy officers and prosecutors, fall or extend in the cyber-social world (Miltrano, 2006; Lessig, 2004).

## **Discussion**

### ***Applications of Social Networking Tools to Research***

Research continues to investigate how online interactions relate and interface with offline interactions. Given that Social Media sites enable individuals to connect with one another, Social Media tools have become deeply embedded in user’s lives (Faw, 2009b; Biocca, 2000) and therefore have potential for building community around a project’s participants. Once participants have been successfully recruited to the project, online community building through Social Media can help keep them involved, interested, and connected (Mercedes Fisher & Baird, 2005a). For example, the creation of a Facebook group page, when developed strategically, can be designed so that members or program participants are selected, recruited, or retained according to the control characteristics defined in the study or research guidelines/proposal (Karki, 2006). Features such as calendars for events can be helpful tools to remind participants of crucial dates, activities, or commitments. While this review did not focus on recruitment, using “suggest to friends” Facebook and similar Social Marketing tools can also provide an opportunity for participants to quickly snowball into a large number of friends that also may be likely participants for the program or study. Other tools, such as personalized message through Facebook, can be used as introductions or confirmations (Adamic & Adar, 2004; Sexton, 2010). Because the message is associated with the researchers’ profiles, and would be

accompanied by a picture or other personalized information, a message sent through a social networking site could be more impactful in forming connections to the research and the people involved than via email (Bolam et al., 2006a).

Again, Facebook, MySpace, CyWorld, and similar social networking sites are already heavily integrated into youth and young adults' day-to-day life (Roberts, 2000; Miltrano, 2006; Biocca, 2000; Jue et al., n.d.; Watkins, 2009). The inherent association of their social networking interactions as being related to their real life connections may give an equivalent sense of real life connectedness to the research, particularly if youth and young adult participants are recruited through Social Media or other cyber social mediums.

Social Media tools also have the ability to integrate with each other. This makes it easy for researchers or program administrators to make use of features unavailable through their primary Social Media platform (Vance et al., 2009). However, it is important to identify strengths and weaknesses of each Social Media tool before use or integration with one another. For instance, if communication requires short bits of information from multiple users and constant updates, then creating a Twitter project account for participants to "follow" would be a better social networking approach. Twitter's strength and weakness lie in its "simple syndication" design. It only has the ability to network and share short messages at massive numbers (Hawn, 2009). If resource materials need to periodically accompany certain nodes of information, then the Social Media design would need to link to other mediums: for example, linking Facebook and Twitter together so that the information could be cross syndicated between the two mediums. Then, the researcher could make use of Twitter's simple syndication and Facebook's detailed profile development and sharing tools. This linking could also be setup to automatically occur for participants, and participants could designate which Social Media site is the central place by which they receive information (Terry, 2009).

Social Media offers a plethora of tools. Another useful feature unique to Twitter are "hashtags," which when used in conjunction with key words could automatically link participants with other pertinent or project-related conversations happening in the "Twitterverse" (B. Williams, 2010a; Hawn, 2009). This Twitter feature combined with YouTube's video social syndication could allow visuals to be supported by forum conversations or vice versa. Using Social Media's video sharing capability can offer visuals to the project, be stimulating, and provide another avenue by which participants can stay involved. Again, sharing video can be done through the project's Facebook page and updates can be further disseminated via the program's Twitter page (B. Williams, 2010b; Pujazon-Zazik & M. J. Park, 2010). Lastly, because Social Media is becoming increasingly accessible on handheld mobile devices, researchers and program coordinators have greater ability to share last minute project updates, like changes in meeting location or driving directions (Pew Research Center & Smith, 2010).

Blogs can also help to build community around an organization's project. Blogs are a useful platform for participant storytelling or sharing personal histories. They are useful as a place for the researcher to share the program background, founding story of the agency, or information about a partnering community. The goal should be to share stories of impact, especially about the impact of the project itself. Participants should be encouraged to contribute to blogs or communicate through social media. Reflection on participation is key to encouraging program interest that facilitates retention and data



collection (Stiefvater, 2009). Some possible strategies (if confidentiality allows) are to engage participants by disseminating project photos to the project's Facebook page and to encourage participants to share their own related project photos. Micro-contests also provide great incentives and opportunities, and thereby facilitate engagement (Stiefvater, 2009; Sexton, 2010). In addition, participants can take part in the selection process by voting when there are micro-contests.

Crowdsource assistance from participants can help improve the project structure and goals (Catone, 2008). For example, participants could be asked to share their input and ideas by posting questions on the project's Facebook page. They might be asked, for instance: What worked this week in the project? What could have been improved? What could have been done differently? What are some ideas for general feedback? It may be important to test different kinds of content and discover what engages participants most, for example positive or negative content, celebratory, informational, or content that address causes or concerns of their community.

There are also opportunities to use Social Media for participant recognition, by identifying respected funding agencies of the project and indicating the importance of the program, the participants, and the reasons the work was funded. To this end, Social Media can be used to disseminate statistics about the impact of the participants' involvement on the project. Finally, it may be helpful to invite funding agencies and participating organizations to help support a program's Social Media efforts (McNab, 2009).

### ***Social Networking Analysis***

Social network analysis is a large and growing area of research. The measurement and analysis of relational structure aims to address issues pertaining to singular networks, data collection, and network comparison (Butts & Carter, 2008). It is important to be able to develop a visual representation of social networks in order to understand data nodes and convey analysis findings. Program heads and researchers can make use of social network analysis software to identify, represent, analyze, visualize, or simulate data (e.g. race, age, location, participation, knowledge, progress). Network analysis software can also show mathematical models and statistical routines that demonstrate relationships between various combinations of input data (relational and non-relational) (Scott et al., 2005). Network analysis tools provide researchers with useful ways to investigate networks of varying sizes, from a small participant cohort to whole geographic locations. Social network analysis tools include UCINet, Pajek, ORA, the statnet suite of packages in R, and GUESS are popular (Casos, 2010; Wikipedia, 2010; Batagelj & Mrvar, 2002; Hancock, Hunter, Butts, Goodreau, & Morris, 2008).

### ***Limitations***

The dearth of literature on applications of Social Media in programmatic retention of youth and young adults was a significant limitation of this review. Though there is literature to formulate a case for the plausibility of using Social Media in youth retention, there was not sufficient literature to significantly support its efficacy or potential effectiveness. The retention literature also relied heavily on expert opinion. Many experts

cited in the research were in accordance with one another, articulating similar ideas and conclusions about the effects, applications, uses, and implications of Social Media. However, the reliance on expert opinion, though potentially valid and consistent, does not correspond to the scientific testing of hypotheses (Dorussen, Lenz, & Blavoukos, 2005). Thus, though we can rely to some extent on the experience and breath of knowledge provided by designated experts in the field, we still must take into consideration the significant lack of systematically tested results.

Similarly, the inclusion of non-peer-reviewed articles e.g., gray literature, though broadening the breath and depth of information on this topic, hampered our ability to rise to academic standards of scientific rigor. This was a known limitation in undertaking this project and was inherent given the relative infancy of this area of study. It should be noted, however, that sole inclusion of peer-reviewed articles would not have provided sufficient data to substantiate a case for or against the use of Social Media in the youth and young adults programs and research.

Due to language barriers, all non-English literature on the application of Social Media was excluded, which may limit the breath and depth of the research presented in this emerging, innovative field. Lastly, the paucity of scientifically evaluated interventions that utilized Social Media was a significant limitation.

### ***Implications***

Increasingly, programs and research are looking toward Social Media to establish an interactive web presence. Social networking sites give programs a considerable amount of control over how to shape their image in an ever-growing Internet driven public forum. In this capacity, Social Media can serve as a simple, low-cost, user-friendly way to obtain a web presence and provide a host of tools for programs, even for those with limited funding or resources (E. A. Miller & West, 2009). Acting as an additional public face for the program, Social Media serves as a communication vehicle, which can amplify and broaden the dissemination of outreach messages and informational resources.

Social Media also promotes a “Cloud” type availability of knowledge and information, whereby program leaders or researchers do not have to rely solely on their program resources to disseminate information among the group or to collect new information. Individuals in the network have the ability to contribute preexisting knowledge they have, knowledge about the program that others have missed, or information that is new to the field from other sources (Catone, 2008). Program leaders and researcher still have control over this interaction. There is the built-in capacity to verify information, corroborate sources, mediate conversations and mitigate damage from conflicting information. This may greatly increase the program’s ability to provide accurate and substantial amounts of information to participants quickly.

As participants share, they are also providing data. What people say or do within Social Media based spaces can be useful for the program. Discussions on issues regarding the program itself, or with elements of the program that relate to real life, can be collected as free form knowledge that can then be used to improve the program or study (Baer et al., 2002). The more involved participants get in the program and in the Social Media space, the more they will want to share (Jacobs et al., 2009). This means that buy-in

should be a fundamental goal. When there is a large influx of data that is freely given, there is a better chance for analysis of the data to make concrete inferences be they causal or indirect.

Social Media's ability to facilitate interactivity – to allow constant contact with others and to share – keeps people invested in using the tool in their day-to-day lives. The growth of Social Media as a mainstay of modern life contributes to its potential to involve participants in a program or research. Recruitment methods such as snowball sampling or flyering in specific geographic have been shown to be effective traditional recruitment methods (Kendall et al., n.d.). Social Media brings snowball sampling to the digital age, whereby social sites, in and of themselves, can be considered geographic locations where similar people congregate. Social Media also provides tools for recruitment via Social Marketing tools. Now that most Social Marketing systems are set to collect general data about users, targeted marketing greatly increases the success rate of reaching interested and qualified people, thus generating a greater recruitment return (Sexton, 2010).

Though the literature was sparse on retention, findings from this review suggest that there is a great potential for youth retention when facilitated by Social Media. Supportive research suggests that participant investment is key to retention efforts. Social Media has already gained a large number of people investing time and energy to the medium (Faw, 2009b; Lenhart et al., 2010). Also, Social Media has done well to retain individuals who start using some form of Social Media. Although individuals might not all use the same type of Social Media, or may stop using a specific social networking website, the literature suggests that programs and researchers can rely on people to continue to use Social Media in some form (Lenhart et al., 2010; Lenhart & Madden, 2007).

The literature commonly discussed the concern for privacy (Lenhart & Madden, 2007; Antón et al., 2010). Because privacy with Social Media has been noted as a concern in news media, Social Media sites have responded to the public's concerns by increasing viewing and security options (Boyd, 2008a). The issue of privacy remains an important topic to consumers, and strategies to protect privacy will likely shift, change, or grow according to societal needs (Lenhart & Madden, 2007).

In terms of applicability, the literature suggests that programs can use Social Media to stay in touch with participants, provide them with information, and collect data on participants (Mercedes Fisher & Baird, 2005b; Bolam et al., 2006a). Participants can begin to rely on Social Media to help them interact with the program and other participants in a dynamic and innovative way, and stay in touch with one another after they move on. The literature suggests that Social Media shows great promise in youth retention, data collection, and information dissemination, and all studies encouraged further application, evaluation, and analysis.

Different New Media continue to be developed, and Social Media is beginning to move beyond being a pop culture phenomenon to being a cultural staple (Jacobs et al., 2009). To continue to positively and effectively impact individual, community, and national level health, it is critical for public health practice to stay current with social trends, cultural phenomena, and individual behaviors. As previously mentioned, intervention and research can potentially be improved by a well thought-out Social Media strategy (Ellison, Steinfield, & Lampe, 2007; Mercedes Fisher & Baird, 2005a).

Community development and supportive group networks facilitate exchange and engagement. Social Media is a viable, and already widely used, method of community and network development (Steinfeld, Ellison, & Lampe, 2008). Thus, further research is fundamental to unearth how such networks may provide a venue to retain study populations, efficiently collect accurate participant data, and disseminate valid information.

Again, in most of the studies found utilizing Social Media, Social Media was tangential to larger study goals and were rarely empirically substantiated. In order for Social Media, or various New Media, to be viable options for health research and intervention, further study on the maintenance of privacy, and the protection of participant confidentiality, is necessary. This literature review, in identifying the scarcity of scientific and peer-reviewed studies, and in providing compelling arguments and evidence from available literature, gives a strong justification for further research on the application of IBCM communication and New Media -specifically Social Media- in programs, research, and interventions.

## **PROJECT 2 - The Actual and the Virtual: Constructing and Applying the Duo-Social Ecological Model**

### **About This Project**

In 1967 sociologists Barney Glaser and Anselm Strauss developed the research method Grounded Theory, and were among the first to push for the use of case studies to develop new theory in social sciences (Glaser & A. L. Strauss, 1967). The use of case studies in exploring hypotheses and developing theory has increased over the last 30 years or so, particularly in education and educational evaluation (Stake, 1995). Through a grounded theoretical data analysis process, I conceptualized and developed a new social ecological model that takes into consideration the exponential growth of New Media technology, Social Media as a cultural phenomenon, and the application of Internet-based computer-mediated public health interventions. Using a qualitative research model, I conducted one study through a series of semi-structured interviews and a case study (conducted during my doctoral residency), and analyzed data using grounded theory (Glaser & A. L. Strauss, 1967; A. C. Strauss & Corbin, 1990). Then I developed theory from the data as a way of contextualizing unexpected phenomena. I also used selective coding by choosing specific themes to be core narratives: Virtual existences, New Media and public health practice, Social Media phenomenology, and Internet-based computer-mediation and related all other themes to these narratives. My goal was to develop a single storyline around which everything else could be draped.

For that project I undertook a six-month research residency at Internet Sexuality Information Services (ISIS, Inc.), a nonprofit 501(c)(3) organization that develops technology to promote sexual health and healthy relationships, and to prevent disease transmission. There, through participant observation, I studied leadership, research, innovation, and the development of educational resources in sexual health promotion through New Media and Internet-based computer-mediated platforms. The main goal for the residency was to better understand the capacity of the Internet and developing technologies in HIV/STI prevention and sexual health promotion.

In order to achieve this goal, I was charged with creating a database to help facilitate a review of the literature and statistical data on the effectiveness of HIV partner notification (PN); collecting supporting data on the efficacy of online interventions; reviewing literature on youth HIV/STIs statistics, prevention methods, and Internet research; observing the agency's interactions, projects, and procedures; reviewing current ISIS grants and contracts; and reviewing media (newspapers/journals/blogs) about technology interventions for HIV/STI prevention. Through this process I was able to unearth practical, technology-based processes, applications of health technology, Internet-based development of computer-mediated intervention, cultural trends in technology, as well as pitfalls and successes in New Media innovations in public health. The knowledge, experience, and data I collected during my residency greatly informed this paper.

I also conducted in-depth interviews with key informants (professionals/experts in the fields of technology, public health, and youth sexual health) about their experiences, opinions, or practices with regard to applications of New Media technology and Internet-based, computer-mediated health promoting tools. From these interviews I was able to examine organizational techniques, research methodology, innovation, and the developmental process in creating technology-based resources and tools in public health promotion. I believe the knowledge gained from the case study and interviews can help to determine how New Media and Internet-based computer-mediated interventions can affect the field of public health in general, and youth sexual health and HIV/STI prevention in particular.

### ***Project Aims, Research Questions, and Objectives***

This project aims to determine the role of New Media technology and Internet-based computer-mediated communication, both in public health in general, and in youth sexual health promotion and HIV/STI prevention specifically. Ultimately, I will demonstrate and explain the need for a new social ecological model for public health practice, and develop that model. Using archival data I previously collected for a related research project, I will define the types of New Media technology and social level of impact (defined later) appropriate for health promotion, providing examples of current applications of New Media and Internet-based computer-mediated technology in youth sexual health research and intervention. In addition, I will identify potentially effective Internet-based interventions from my case study on ISIS, which will help to illuminate the future of New Media and Internet-based technology in youth sexual health promotion.

I begin by discussing major theoretical foundations in technology, ecological systems, and New Media: Social Construction of Technology (SCOT), Ecological Systems Theory, New Media, and Social Systems theory integrating it with New Media theory. In the discussion on New Media, I will explicate Systems Theory as applied to New Media. These sections provide the theoretical foundation, and the archival data provide the background and information necessary, to help address the following questions:

- How can the social ecological model be reconstructed in a way that fully accounts for the unique and dynamic social ecology of cyberspace, New Media and Internet-based computer-mediation?
- How can current Internet and New Media work focused on sexual health with youth help to inform our understanding of what a new “Duo” model would look like?
- What are some promising New Media and Internet-based computer-mediated research methodologies to promote youth sexual health?

Answering these questions will help us better understand how public health leaders can use the Internet to intervene to affect public health in general and the sexual risk behavior of youth specifically. Moreover, the research will better illuminate how New Media and Internet-based computer-mediated research methodologies translate to real life practice, and will begin to ask the question, “Do they work better than ‘traditional’ interventions?” Ultimately, this project aims to show and model the variations in applicability of New

Media and Internet-based computer-mediated tools for different levels of social ecological systems, with a particular accent on sexual health promotion and disease prevention.

## **Methods**

### ***Research***

I conducted a case study analysis of the nonprofit organization Internet Sexuality Information Services (ISIS) for a different project. ISIS develops technology for the promotion of sexual health and healthy relationships and the prevention of disease transmission. By studying ISIS's New Media methods and health promotion leadership, innovation, educational resource development and research in online sexual health promotion, I hoped to illuminate the potential of New Media and various computer-mediated technologies in youth sexual health promotion and public health. Because these data were collected for a different project, it will be considered archival. Using this archival case study data, I also focused particular attention on the organization's online intervention, InSPOT (Internet [STI] Notification Service for Partners or Tricks), which I will discuss in more detail below and use as an exemplar to develop a New Media-oriented evaluation plan. InSPOT is a peer-to-peer, online partner notification system, which assists those diagnosed with an STI (sexually transmitted infection) in notifying their sexual partners, confidentially or anonymously, about a potential exposure.

I collected organizational information data from ISIS, including observational notes. Using data from this case study, I explored organizational techniques, research methodology, innovation, and the development process in creating InSPOT and other educational resources in youth sexual health promotion that use New Media technology. I examined this data to determine how the social ecological model — a standard in public health practice — can be reconstructed in a way that fully accounts for the unique and dynamic social ecology cyberspace, New Media and Internet-based computer-mediation. Also, based on the previously mentioned statistics on youth and New Media use, such a model would be particularly relevant to the promotion of youth sexual health and HIV/STI prevention.

I further reviewed existing anonymous data from the Pew Internet & American Life Project (<http://www.pewinternet.org/>). None of the archival data I use includes identifying information of any person. Lastly, as noted above, I conducted in-depth interviews with key informants (professionals/experts in the technology, public health, and youth sexual health fields), and draw on this archival data to support the conceptualization of a new social ecological model. Key informants included both ISIS employees and experts in the fields of public health, youth sexual health, and computer and Internet technology.

### ***Procedures***

No non-UCB institutions or individuals were engaged in this research. I obtained archival data provided by ISIS. These data included anonymous usage feedback reported by ISIS from InSPOT users, data on organizational affiliates of ISIS, published data, and organizational-level data. I also utilized published and publicly available reports from the

Pew Internet & American Life Project (<http://www.pewinternet.org/>). These data were analyzed to provide background, process, and intervention development information for my case study of ISIS and any of their interventions (i.e., InSPOT). I organized a database of national professionals in the field of public health and technology by relevance to New Media, youth sexual health, and level of experience in technology and public health. ISIS gave me further use of the database after completion of my residency.

## **Theoretical Foundations**

Over the years, several theories have emerged in an effort to address the functional and social development of technology. These theories are often linked to disciplines such as communications or science and technology studies, and try to address the relationship between technology and society, which further unearths questions of control, autonomy, networks, and agency.

Theories of technology are often separated into two categories, social or group theories. We can further divide these categories into descriptive or critical theories. Of particular interest to this dissertation and the field of public health are social descriptive theories. Under the social theory umbrella, descriptive theories attend to the substance and defining points of technology. Descriptive theories explain what's behind the development and variation of technology. Moreover, these theories attempt to address the autonomous nature of technology and its influence on social structure or human practice. The techno-theorists introduced below greatly inform the theoretical foundations of socialization, ecology, and New Media. By laying a foundation in these theories we can begin to construct a new social ecological model that sufficiently incorporates New Media.

### ***Social Construction of Technology (SCOT)***

The Social Construction of Technology (also referred to as SCOT), and also known as technological constructivism, is a theory within the sociological realm of social constructionist thought, and a leading theory developed from the field of Science and Technology Studies. This theory supposes that human action shapes technology, which in turn is rooted within a social context. In the context of SCOT, New Media are technology, and the reason for our social acceptance or refutation of New Media is a direct result of factors in the social world. New Media theorists seek to understand the reasons for actors' acceptance or rejection of a technology. Commonly, theorists find it insufficient to describe the proliferation of computer-mediated interaction as a success in the development of technology, or its marketability, without fully considering and expounding on the social forces that dictated that development, and ultimately that success. Scholars are also concerned with how the criteria of successful New Media are defined, and what stakeholders and/or actors define that criteria

Moreover, leading proponents of SCOT, Trevor Pinch and Wiebe Bijker (1986) argue that sociology acts as the driver of technology rather than that technology drives the actions of people. Applying their theoretical construct on technology to New Media, we could then argue that New Media does not determine human action, but that human action shapes the development of New Media. This means there is plasticity to the interpretation of New Media; that New Media is constructed within a cultural context, often toward some aim or need, and that that applicability or use is then reinterpreted by



society. Individuals' interpretations of New Media can be flexible, or interpreted differently, and this flexibility also has an effect on the design of New Media. Moreover, people from the same social group, age, race, SES, etc., often share a particular set of meanings about media. The New Media context of New Media use and development stabilizes when the social groups appear to reach implicit consensus on the social/cultural norms that influence the meaning of that media.

Like American historian of technology Thomas P. Hughes (1987), I seek to describe the actors who define New Media and its developmental criteria by which success or marketability is measured. By understanding why New Media criteria are defined in a specific way, we can also (find out/determine/learn) who is included or excluded in the creation, use, and relation of New Media to agency and power. SCOT is helpful in that it is not only a theory, but also acts as a method, and provides guidelines for analyzing technological failure or success. The theoretical tools SCOT provides are central to the analysis of projects 2 and 3 (development of a New Media-integrated social-ecological model, and of evaluation plan to study a Internet-based computer-mediated intervention).

### ***New Media***

New Media is an umbrella term that first took hold in the 1990s (Gitelman, 2008; Lister et al., 2003). The term references a dynamic change in the way media are produced and consumed. It describes the confluence of traditional media, such as the written and spoken word, images, music, radio, television, video, and film, with the interactive power of computer-mediated communications technology, computer-enabled consumer devices, and the fundamental influence of the Internet. Individuals have interactive access to content any time, anywhere, on virtually any digital device. New Media speaks to the ability of individuals to provide interactive feedback, create online communities, develop or maintain real life social capital in a digital world, and contribute to a seemingly endless body of knowledge through networks, systems, and a reciprocal process of information gathering and sharing.

Within the umbrella of New Media are Social Media, one of the newest and fastest growing phenomena of the 21<sup>st</sup> century. Social Media use Internet-based technologies to facilitate interactive communication through writing and image and video creation and sharing. Simply defined, Social Media can be seen as digital networks and Internet-based tools or programs that build on the ideology and technology that enable the creation and exchange of user-generated content, also known as "Web 2.0" (Kaplan & Haenlein, 2010).

### ***Ecological Systems Theory***

Though many researchers have developed theories regarding the ecological systems of nature, ecological systems theory for health and human development was originally put forth by Urie Bronfenbrenner (1977, 1979). Bronfenbrenner is also noted for his contributions to the interrelated dynamics of research and policy, and the impact of this interplay on adolescent development. Bronfenbrenner suggests that research on adolescent development is strengthened by the support of institutional policies that allow for studies to be conducted in and focus on the subject's environment (Day, 2009; Johnson, 1994; Stokols, 1996). Bronfenbrenner's ecological systems theory delineates

four types of “nested systems”: the *micro-system* (family/classroom); the *meso-system* (organizations/social institutions); the *exo-system* (relationships among organizations/communities); and the *macro-system* (sociocultural context/governmental policy) (Day, 2009). Later, Bronfenbrenner contributes one more system to his model, the *chrono-system* (the evolution of the external systems over time) (Day, 2009). All four main systems contain social norms, role types, and behavioral tenets that significantly shape development (see Figure 2).

Since Bronfenbrenner, other social ecological theories have also emerged. James Comer (1968), a renowned education theorist, put forth a similar system called the social networks approach, which is now incorporated into many school development programs, and is widely used as a model for school reform efforts (Comer, Joyner, & Ben-Avie, 2004a). Later, in the field of public health practice, Göran Dahlgren and Margaret Whitehead (1991), as well as Daniel Stokols (1996), took Bronfenbrenner’s model a step further and mapped out the utility of the social ecological model and the imperative of public health practice guided by a social ecological perspective (Dahlgren & Whitehead, 1991; Stokols, 1996).

Like Bronfenbrenner, Comer describes several levels of environments affecting the child: The outermost institutional policies, then secondary social networks (schools, workplaces, health and social services organizations), and then primary networks (parents, guardians). The critical difference between Bronfenbrenner’s model and both Comer’s and Stokols’ theories is that in Comer’s social networks approach and Stokols’ public health social ecological approach the individual is at the center (Stokols, 1996; Comer, Joyner, & Ben-Avie, 2004c). Moreover, Dahlgren and Whitehead describe a social ecological model of health that identifies layers of influence on individual health, as well as individual-level social elements that interact with larger social agents (Dahlgren & Whitehead, 1991) (see Figure 3).

Comer’s social networks approach for child development puts forth a system that represents the innermost environment of the child, the “inner life,” which has a fundamental role in the child’s development. Comer describes this system as paramount to all of the systems external to the child: “our behavior is not simply a response to the actions of others, but that it is also a manifestation of our inner psychological states”; “We think, we act, but we also feel. Unless we are forced to, however, most of us give little acknowledgment to our own feelings or to the feelings of others. We forget our own inner life; we can’t see it or don’t want to recognize it, much less recognize the inner life of someone else” (Comer, Joyner, & Ben-Avie, 2004b). This “inner life” level, or inner environment of the child — or any person — is missing from Bronfenbrenner’s Ecological Systems Theory and illuminates a missing element of his work, which does not include the individual as an active agent unto itself, but rather focuses on aspects related to and nested in the broader macro-system.

Moreover, Dahlgren and Whitehead (1991) put forth a social ecological theory for understanding influences on health that attempts to map the relationship between the individual, his or her environment, and disease (Dahlgren & Whitehead, 1991). The authors note that individuals are at the center, with fixed genetics, but are surrounded by modifiable influences on health. Their “layers” are: the personal behavior and ways of living (health promoting or damaging), which includes friendship patterns and community norms; the social and community influences (i.e., support systems); and

finally structural factors (i.e., housing, working conditions, access to services) and provision of essential facilities (Dahlgren & Whitehead, 1991). Stokols' guide to applying social ecological theory to community health promotion includes the importance of combining person-focused and environmentally based components within a comprehensive public health approach. He notes that public health organizations and interventions can be most successful by identifying high-impact leverage, intermediary points of impact (Stokols, 1996).

Since Dahlgren, Whitehead, and Stokols laid out their social ecological models as an approach to public health, many public health organizations have made this approach a standard and have adapted it according to their target community's needs or institutional practices. For instance, the Board on Health Promotion and Disease Prevention (HPDP) of the Institute of Medicine (IOM), in its landmark book "The Future of the Public's Health in the 21st Century" (Committee on Assuring the Health of the Public in the 21st Century, 2002) adapted and modified the social ecological model from Dahlgren and Whitehead (see Figure 4). In the interest of this paper, their major contribution to the social ecological model was an examination of the potential role of mass media as an actor in the public health system — that is, how it can be used to mobilize societal action and to create conditions for health:

Mass media plays a central role in people's lives. Its importance is evident in the amount of time people spend watching television, surfing the World Wide Web, listening to music, and reading newspapers and magazines. The delivery of information through mass media is instant and available around the clock. The proliferation of communication technologies — miniature TVs, handheld radios, and personal computer companions such as Blackberry and Palm Pilot — contribute to the omnipresence of the media in daily life. More and more, a growing proportion of "life experience" is mediated through communication technologies instead of being directly experienced or witnessed. The public health community and policy makers often do not appreciate the importance and power of the media in shaping the health of the public. More importantly, media outlets or organizations do not see themselves as a part of, or contributing to the public health system. As this chapter discusses, however, the media plays a number of roles in educating the public about health issues and has a responsibility to report accurate health and science information to the public (Committee on Assuring the Health of the Public in the 21st Century, 2002).

The board on HPDP of the IOM argue that, ultimately, measuring the scope, sustainability, and ecological depth of public health intervention is imperative for positive health outcomes over prolonged periods (Committee on Assuring the Health of the Public in the 21st Century, 2003). At a practical level, social ecological theories offer critical implementation guidelines for maximizing the health, economic, and societal benefits of health promotion interventions (Stokols, 1996).

### ***Social Systems Theory and New Media Theory***

Systems theory, originating in the biological sciences in the early 1920s, addresses the nature of complex systems in multiple environments and/or fields (Skyttner, 2001). Developed to explain the interrelatedness of organisms in ecosystems, systems theory can address the complexities of nature, social spheres, and science technology. Systems theory is fundamentally the science and research of systems, and resulting from Bertalanffy's General System Theory (GST), systems theory emphasizes

the connections between the development of New Media and the social, economic, political and cultural factors that influence it. Moreover, Thomas P. Hughes (1992) discusses how systems theory also allows for the investigation of actors, which could be a single individual, entity, societal organization, or technological/mechanical artifact that works in tandem to produce some outcome. In terms of New Media, systems theory addresses the foundational development of technology through history, and emphasizes heterogeneity. From these assertions derives the possibility of a coalescence of theory, whereas the popularization of New Media technologies is marshaling a feasible and exciting, alternative to traditional mass media in the form of predominantly computer-mediated networked and digital systems.

Niklas Luhmann (2000) further explains how systems theory is one of the foremost theoretical influences on New Media theory, which has quickly gained ground as a key theoretical field today. New Media theory has quickly gained the support and captured the interest of scholars, many of whom have been fundamental in describing the greater impact of social systems mediated by New Media. New Media theorists are working in tandem with current theorists from other fields, and are also working with historical theorists whose work greatly informs New Media theory (Gitelman, 2008; Lister et al., 2003; Looy & Baetens, 2003; Thorburn, H. Jenkins, & Seawell, 2003). The most influential changes in media since the advent of New Media involve the mass distribution of computer technology, the proliferation of computer-mediated communication, the popularization of online social networking, and the Internet connectivity advances in cell phone technology. These changes fuel the continuously transforming nature of New Media and make it particularly difficult for scholars of New Media theory to accurately describe the evolving landscape of the field.

Theorists describe how New Media is fundamentally reshaping the constitution of systems theory and is facilitating a change in the way we think of traditional systems theory. Douglas Kellner's new media global public sphere discusses system theory-based modes of media communication, the implications of which promote democratic debate on technological diversity that ultimately will permit a full range of voices and ideas (Durham & Kellner, 2006). Within these new developing cyber-systems, democratization of the media world — through education and New Media literacy — is possible, eminent, and essential (Kellner, 2004; Marcuse & Kellner, 1998).

Scholars committed to developing and recounting the field of New Media contribute to the fundamental conjecture of New Media theory. Such scholars have noted stark differences between what mass media was in the past and what New Media is today. Leading techno-theorist Henry Jenkins expounds upon both the inequalities and democratic opportunities intrinsic to New Media. Jenkins describes eight widely accepted capacities of New Media, which not only set it apart from traditional or conventional mass media, but also spurred computer-mediated communication (H. Jenkins, 2006). First, Jenkins talks about “innovation” fueled by protracted technological development; second, the “convergence” of past methods of mass media with new media; third, the “integration” of New Media into the various aspects of our everyday routine; fourth, the ease with which individuals can model and reconstitute media into the mainstream leading to mass “appropriation”; fifth, the devolution of community “networks,” simplifying the transference of information by interconnection; sixth, “globalization” of communication, which transcends international boundaries and physical barriers; seventh,

a “generational” divide in applications of youth and adult technology use, which keeps both groups in different virtual and technological environments; and eighth, disparities in access to the technology, leading to technologic inequality and lost opportunities for power, wealth, and knowledge to newer users (Manuel Castells, 2004b, 2004c).

Jenkins furthers the ideas Kellner and Castells put forth by proposing that New Media tools greatly facilitate subject participation, thereby adding user discourse and culture to technology systems. Jenkins and like theorists suggest that New Media are a fundamental aid in the emergence of participatory media systems, and that New Media literacy should be a priority for practitioners and those who seek to intervene in communities. As suggested by Jenkins’ work, New Media has the greatest potential to enact change. New Media literacy is gaining momentum as New Media situates itself in the everyday lives of people in the U.S. As occurred with radio and television before, the reach of media, and by extension, public health information, becomes boundless with innovation, market competition, affordability, and user application. Despite this global reach, we mustn’t forget that fundamental to the utilization of New Media technology is “trust.” For a sexual health intervention to be effective, the user must trust the source of information and intervention. In Internet-based computer-mediated communication trust networks are fundamental to the effectiveness of interventions.

## **Revising the Social Ecological Model and Developing an Alternative**

The social ecological model has been useful in public health to underscore the multiple effects and interwoven relationship of social environmental elements in which such work takes place. As discussed below, the fact that this model was developed in advance of the transformative changes brought about by widespread use of the Internet and New Media in health, sexual health, and a nearly all aspects of life in the 21<sup>st</sup> century, severely limited its utility. Building in part on insights gained from the present study, I therefore have developed an alternative “Duo-Social Ecological model” (Figure 1), which takes into consideration a virtual existence and Internet-based social ecology.

### ***Conceptualizing the Model***

In conceptualizing a new model I have chosen to use as a starting point the foundational model developed by Bronfenbrenner (1979). The subsequent models by Comer, Dahlgren & Whitehead, and Stokols will be used as contributing guides. Though Bronfenbrenner later put forth the *Chronosystem* to represent the evolution of the external systems over time, it is an insufficient social ecological diagram for the 21<sup>st</sup> century. On the other hand, the board of HPDP and the IOM acknowledge and discuss the importance and application of mass media, including Internet and mobile technologies, in public health practice. Unfortunately, their use of a model based on Dahlgren and Whitehead’s (1991) does not depict the presence of mass media with the same importance with which they discuss it in their narrative. Moreover, neither the IOM’s adapted model nor their discussion takes into consideration the existence of individuals’ virtual identities or the impact of Social Media and the development of a new New Media driven and Internet-based social ecology (Miltrano, 2006; Talamo & Ligorio, 2001).

The case study on ISIS, an organization that utilizes New Media technology to affect youth sexual health from the developmental level into adulthood, and the key informant interviews I conducted for this research project unearthed the fundamental importance of New Media technologies on all levels within new social ecological model. In addition, archival research data mentioned previously suggested that with the advent of technology, New Media have become fully integrated into the daily lives of western civilization and inextricably linked to an individual's health and well-being. Furthermore, the archival data illuminated the need for New Media as its own social domain.

In light of the themes that emerged from the interviews and data collected from the case study, I think current social ecological models do not fully account for the fundamental role of New Media nor the full extent of its influence. Also, though the board on HPDP of the IOM note the relationship of the individual and the health impact of the Internet in its more basic form, they in no way account for the advent of Web 2.0 — which represents a shift from the Internet being written for consumers to consumers now contributing to the Internet. This shift presages a fundamental period in which consumers are affecting the media they consume in a fundamental and transformative way, deciding how they consume the media. Web 2.0 also changes earlier notions of online identity and begins to expand the possibilities and definition of both social identity and community.

To help address these gaps, I posit a model that situates the internal environment of the individual, and denote it — in Bronfenbrenner's naming style — as the “Nano.” Furthermore, I argue that both models are missing a sixth level or system, which I call “Techno,” in which mass media, both traditional and New Media, are nested under the societal level. Lastly, and more importantly, I demonstrate how the domain of the “Virtual” or a digitized reality, is also missing from current social ecological models, and must be addressed as fundamental in the same way as the domain of the “Actual” or true reality.

In the following sections I discuss, in more detail, all four of Bronfenbrenner's levels or systems of influence and situate each in the domain or realm of the “Actual” (e.g., Micro-Actual, Meso-Actual, Exo-Actual, Macro-Actual). I also include the new Nano and Techno levels I put forth (e.g., Nano-Actual, Techno-Actual). In discussing all six levels, I further situate each in the domain of the “Virtual” (e.g., Nano-Virtual, Micro-Virtual, Meso-Virtual, Exo-Virtual, Techno-Virtual, and Macro-Virtual) and explain how each not only exists by itself within a digitized context, but also is directly related to the domain of the “Actual.” Lastly, I note the means or technologies by which the two domains are connected.

## **Levels of Influence in the “Actual” and the “Virtual”**

### ***Nanosystem (Individual)***

Building on Comer's idea of “inner life” in his social networks approach, I add the nanosystem, or individual level, to Bronfenbrenner's social ecological model. In the domain of the “Actual,” the “Nano-Actual” represents the internal, emotional, and individual processes that influence the health choices and actions each individual makes. It also represents our motivations — the internal thought processes that drive us to take action or non-action. Like Comer's “inner life,” the Nano-Actual also recognizes that our

desire for that which makes us feel good, despite logical and pragmatic cognitive processes, is also triggered by an inner system of biochemical reactions that may fuel unhealthy choices (Comer et al., 2004c). The Nano-Actual represents our individual passion and desires, noting that even when people know that something is unfavorable logically they are still driven to that action. Thus, in health, the Nano-Actual would include our mental mechanical processes of reasoning and our healthful or un-healthful choices (what we eat or how we chose to protect ourselves and our health).

In the domain of the Virtual, the “Nano-Virtual” is represented by online identity and technologies that aim to affect individual-level physical, behavioral, and cognitive processes. This includes virtual identity creation and representation (avatars, screen names, personal profiles), stimulating media and user-specific targeted messages (images, music, videos), video games that promote activity (wii, PlayStation move, Dance, Dance Revolution, xbox kinect) (Conjecture Corporation, 2010; PCGameSystems.info, 2010), individual biomonitoring technologies, which includes behavior auto-recording devices (pedometers, bio-meters), behavior tracking devices and programs (nutrition recorders, calorie counters), individualized data collection (through electronic questionnaire forms), auto-individualized data collection (through automated profile information sharing and analysis), online personal resources and health information (Miltrano, 2006; Conjecture Corporation, 2010). The Nano-Virtual is our individual relationship with technology, our individual dependence on technology for day-to-day function, and our cyber-selves (Avatar, character, screen name, or online representations and behaviors).

### ***Microsystem (Interpersonal)***

The Nanosystem is nested in the Microsystem, which represents interpersonal relationships and group dynamics that help formulate the beginning and closest foundations of the individual’s social identity. This includes various aspects of groups and roles within groups (Gregson et al., 2001). Interpersonal attributes of the Microsystem are often strong nodes of identity or self-perception. Roles within the social dynamic of the Microsystem include mother, father, child, brother, sister, aunt, cousin, etc., or other such characteristics they may have in common, (e.g., religious affiliation or ethnic background).

In the domain of the “Actual,” or Micro-Actual, individuals learn the different characteristics and relationship types in accordance with their membership in a group in the physical world. Through touch, sight, and sound, roles are understood and made salient. Arguably, there are ingrained characteristics — such as race, ethnicity, and/or gender — that are inherently subsumed by the individual as a natural component of identity. Others argue that these relationship types (race, ethnicity, gender, etc.) are also learned (Whitty & J. Gavin, 2001). The Microsystem also takes into consideration, and is largely responsible for, the individual’s cognitive and psychological components (Gregson et al., 2001). Interpersonal relationships and interactions greatly influence and contribute to belief systems, ideals, goals, and other aspects of one’s personality (family religion and tradition, who your friends are, and how they treat you or others). In the Micro-Actual, the personality shaping of the individual on the interpersonal level is best described in child development theory, which holds that a child is a product of both familial connections, societal environment (i.e., school, culture), and other interpersonal

influences (i.e., extended family, teachers, and friends) (Belsky, Steinberg, & Draper, 1991; Fincham, 2001).

Often, most of the interpersonal relationships of an individual's "Actual" domain are recreated and expanded upon in the "Virtual." In the domain of the "Virtual" or Micro-Virtual, interpersonal relationships are developed and maintained primarily through Social Networking tools. Other New Media tools contribute to the individual's ability to be interconnected and share and link his or her virtual identity to those within their interpersonal group (i.e., Instant messaging, texting, massive multiplayer online role playing games [MMORPG], blogging, etc.) (Conjecture Corporation, 2010).

Family and friends keep in contact with one another; share both public and private information, photos, memories, thoughts, and relationships in a constant stream of information accessible through designated rights and privileges set by the user. Family members can designate their relationship roles to other individuals, indicating if they have children, siblings, aunts, uncles, grandparents, and cousins. The network also helps those who might not have known their exact familial relation to someone in the "Actual" understand what that relationship is (i.e., cousin, aunt, second cousin, in-law, or other distant relative) (Belsky et al., 1991). The social network allows for support to be provided to the individual in a manner that is similar to that which they would find in real life. Thus, online social networks have been found to provide positive psychological benefits for the individual (Nanosystem) (Hawn, 2009). We can begin to see how the Actual and the Virtual are connected and how they not only bridge each other but also bridge the nested levels/systems to other levels/systems.

Friendships are also maintained through different Social Media platforms. Individuals can create new and various forms of social capital by making connections with other people who can provide resources or information to meet a specific goal. Friendship networks and similar interpersonal connections supply many of the same positive benefits that familial relationships provide through Social Media (i.e., communication, photo sharing, etc.). Conversely, interpersonal relationships mediated through Social Media platforms can have similar negative drawbacks. Just as support can be expressed through online social networks, so can individual and interpersonal problems, negative information, hurtful dialogue, negative or socially damaging images, and online social rejection.

### ***Mesosystem (Organizational/Institutional)***

The next system is the Mesosystem, which denotes the role of institutions and organizations as influential elements in the social ecology of both the individual and the interpersonal level (Gregson et al., 2001). The Mesosystem, or institutional level, is nested within a community (to be discussed in the next system), and shapes or structures the rules, policies, and acceptable business behaviors. Some organizations are more formal than others, and/or have different goals, rules, and social philosophies. In the domain of the "Actual" these institutions include schools, sports teams, companies, grocery stores/markets, hospitals, and churches, to name a few. Organizational and institutional influences in the domain of the Meso-Actual are often based on employer to employee, service provider to client, or seller to consumer relationships.



In the domain of the “Virtual” there are two main ways the Mesosystem is fashioned. The first is by the institution’s online face. This is usually in the form of a website, but can also include both Internet and intranet means of linking employees and clients to company resources, services, and to each other. Clients or patrons can access information about the company, and in many cases resources from the company, from their webpage. More and more, companies and institutions are providing services online that previously were available only by physically visiting the company. Moreover, the employee work environment most often includes email, which wouldn’t normally be considered a part of a social system, but the mechanisms of the work-flow (i.e., cc and group email conversations) give a larger networked and social context to this digital form of communication.

In the Meso-Virtual, organizations and institutions often make use of internal networks to share documents or collaborate on various projects and documents. Individuals in the same organization can work from their desks, a different floor, or even in a different building while working with other co-workers from a distance. This provides increased flexibility and autonomy for the individuals, allowing some to be able to work from home or multitask. This kind of interaction also improves the lines of communication by providing more options for communicating. Choice in communication and access to digital resources allows individuals to be selective about how they communicate, when they can communicate, and from where they can communicate.

Many organizations are now providing information, staying in contact with clientele, and keeping employees connected and supported by creating a Facebook or MySpace page. For instance, increasing numbers of health institutions are providing their patients with options and resources through the remote access of a website, mobile webpage, or mobile application (i.e., Kaiser Online, Google Health, etc.). Individuals are gaining the ability to take control and manage greater aspects of the health services they receive and, ideally, their own health outcomes. The importance of communication is one of the reasons why many organizations make use of New Media when creating a virtual presence to interact with workers, participants, and clients.

### ***Exosystem (Community)***

As mentioned earlier, the Exosystem is the level just above the Mesosystem. The Exosystem represents the community-level factors that influence the individual relationships of the Nanosystem and/or the interpersonal relationships in the Microsystem. This level includes social norms, geographic area, standards of living, and the greater social networks that can greatly shape an individual’s behavior (Gregson et al., 2001). Often the community level of an individual’s social economy is comprised of both interpersonal relationships and institutions/organizations. The Exosystem, though larger than the Mesosystem, is still a primary point of cultural influence. However, it is only a component of the respective national culture, which is represented by the Macrosystem (to be discussed later).

In the domain of the “Actual” the community level can be thought of in terms of geography, and can be represented by a few blocks, a district, or a city. Yet there need not be any physical or spatial characteristics that make up the community. For instance, an affiliation with or membership in a group can also be considered a community (i.e., race, nationality, political affiliation, ability, sexual orientation). Exosystems are, in

essence, group-based elements that affect the individual. Individuals can be active in their community, be affected passively, or can be aware or unaware of their affiliation (Day, 2009).

In the Exo-Virtual, Social Media and reciprocal interactivity provided by the Internet are the primary means by which digital communities are built and maintained. Social Media websites such as Wikis,<sup>7</sup> YouTube, Ning, YouTube, and Facebook provide the cyberspace and communication tools necessary for members of a group to develop and facilitate an online community. The biggest difference between the Exosystem in the domain of the “Virtual” vs. the domain of the “Actual” is the element of geography or physical place. Geography can still be a category by which individuals or groups choose to develop an online community, but in the domain of the “Actual” geography can also be a limitation. Individuals may be limited to what community they can be a part of or may not have a choice to be part of because of distance. In the domain of the “Virtual” this is not an issue. As long as the online community members don’t add geography as a requirement or restriction, someone can be a part of a community that is far away or that would not normally have been accessible because of distance.

### ***Technosystem (Media)***

Also missing from both Bronfenbrenner’s and Comer’s models is media, and an analysis of the rapid growth and proliferation of New Media technologies. The Techno-Actual includes what are commonly known as mass media, but includes two different forms of mass media. The first, representing the techno-actual, are traditional media (television, broadcast radio, newspaper, and magazine). Traditional media are one form of communication and information transmittal. They are supported by technology (i.e., television, radio) or through industry (newspaper, magazine) (Durham & Kellner, 2006). For decades public health efforts utilized traditional media to communicate crucial health information to a large population for both prevention and action. Governments have relied on traditional media to get their messages out, and inform and guide communities, organizations and institutions, families, and individuals when necessary (Lessig, 2004).

The second form of mass media is now commonly known as New Media, which, as noted above, includes the digitized form of various traditional media, various forms of computer-mediated communications, mobile communications technologies, Social Media, and Web 2.0. The techno-virtual is a phenomenon of both the technological and digital revolutions; the technological revolution in the mass and rapid advancement of electronics, and the digital revolution in the exponentially growing expanse of online space and existences (Lister et al., 2003; E. A. Miller & West, 2009).

What fundamentally sets traditional media and New Media apart, or the Techno-Actual from the Techno-Virtual, are the Internet-based tools that facilitate interactive information sharing, interoperability, user-centered design, and collaboration on the Internet (Lister et al., 2003). New Media has transformed traditional media not just by providing them in a digitized format through the Internet, but by allowing consumers of digital TV, news, radio, and magazine to comment, contribute, modify, and share what

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<sup>7</sup> A web application that allows anyone visiting a website to edit content on it (Dictionary.com, 2010).

they consume with others (V. Miller, 2008; H. Jenkins, Thorburn, & Seawell, 2003). This adds to the dialogue of digital information and transforms the information in a way that provides a social voice and gives it a dynamic nature.

As an example, in their “Fresh Focus Video Contest,” ISIS utilized online video-sharing to allow youth to provide ideas about how they thought sexual health should be discussed. Using digital video technology, ISIS asked youth to tell what their sex education was like, thus, engaging the youth in a reciprocal learning process. Here, ISIS learns what to do and what not to do when it teaches youth about sexual health, youth learn about sexual health from the subsequent resources ISIS will create, and youth also learn about the experiences of other youth.

Bronfenbrenner and others note the fundamental role that media, particularly mass media, play in communicating information to and between the levels. However, Bronfenbrenner does not consider the overarching entities that control the policies and development of the infrastructures that dictate the use of mass media. The Macrosystem, or societal level, which includes government policies, funding, and national-level influences, is the only level where mass media can be controlled. Bronfenbrenner also misses the direct influence mass media have on the cultural (religious media, music, racialized imagery), institutional (advertisements, negative press), interpersonal (social media, news letters), and individual (general media consumption/access) levels. Thus, the Duo-Social Ecological model posited here nests these four subsystems within the Technosystem (Mass Media), and nests the Technosystem within the Macrosystem.

### ***Macrosystem (Societal)***

The last and largest system in the model is the Macrosystem, which represents the societal level of the social ecological model. The societal level is the amalgamation of all five levels and influences combined (Day, 2009). The societal level also includes sub-domains, such as policy, government, and other goals or belief systems that occur on a national scale. The Macrosystem is the marker of larger cultural contexts (Day, 2009). The influence of cultural development at the Micro (interpersonal) and Exo (community) levels have similarities. However, a wider ideological influence than that of the Micro or Exosystems exists; the influence of the Macrosystem is not more significant, but often includes individuals outside of one’s interpersonal or cultural groups.

In the domain of the “Actual,” the Macrosystem represents the national cultural context, which provides the categories for political affiliations and societal choices. It includes the policies, governmental institutions, economic decisions, and societal belief systems (i.e., national security, freedom) that most peoples within a nation believe and maintain together. Through war, entrepreneurship, and expansionism it also influences the geographic landscape and economic stability of all sublevels. The decisions made at this level filter down through the subsequent levels in order to influence every individual in society.

In the domain of the “Virtual,” the Macrosystem continues to play a significant role on all levels. The role of New Media at the societal level largely takes on the form of national applicability (i.e., tools that government or other national institutions push forward to affect the greatest number of individuals). This push could take the form of providing new funding sources for innovation, or putting out manuals about the

application of New Media technologies on national issues, particularly those concerning health. Notably, the Centers for Disease Control and Prevention (CDC) and the US Department of Health and Human Services are pushing for the use of New Media in public health. For instance, Erin Edgerton, senior Social Media strategist at the CDC has expressed how “mobile provides a fantastic channel for communication [as] it’s always on, always with you and provides personal access to information” (Greiginger, 2009).

Moreover, New Media is being seen as the best way to engage with individuals, particularly youth and young adults, on a national scale. In the last presidential election, the Obama campaign revolutionized the standards and mechanisms of political campaigning and funding acquisition (D. M. Clayton, 2010). The campaign's strategy was to appeal to a younger population and to do so by using technologies (Social Media, email, text messaging, and various computer-mediated means) that resonated with their social communication trends. By reaching a voting-age population rarely tapped by traditional campaigns, through media these potential voters were most familiar with, the Obama campaign was helped to gain victory (D. M. Clayton, 2010). Public health leaders are beginning to look into comparable innovative approaches for public health education and promotion on a similar societal scale (Wyatt & F. Sullivan, 2005; Lessig, 2004; Greiginger, 2009). In sum, while the ecological model has held public health in good stead for many years, the advent and rapid rise of New Media and the Internet have transformed the landscape in ways that require a substantial broadening and deepening of such models. I turn now to a discussion of the archival data from the case study and interviews as they relate to the Duo-Social Ecological model.

## **Relating the New Model to Sexual Health Promotion and Disease Prevention: ISIS As an Example**

### ***Where the “Actual” and “Virtual” Domains Meet***

The Actual and the Virtual domains meet through computer-mediation, mobile phones, and individualized or personal technologies meant to have a direct connection with the specific user. This is well illustrated in ISIS's approach of simultaneously influencing the Actual and the Virtual in the Nano, Micro, Meso and Exosystems (individual, interpersonal, institutional, and community levels) of youth. Through triggers of pleasure, idolization, admiration, entertainment, and the desire to “belong,” ISIS uses all media (traditional and New Media, performance, and Internet-based computer-mediated communication) to reach youth through its “Get Live, Stay Live” event/project.

“Get Live, Stay Live” is a series of events designed to encourage youth to be responsible for their sexual health in the domain of the Actual. It is a stimulating and rousing experience with large individual (emotional and psychological), interpersonal (friends), institutional (SFDPH, New Generation Health Center), and community level (Bayview Hunters Point neighborhood of San Francisco) components. In the Actual, messages about sexual health are spread to youth through flyers, band music, and event trinkets and memorabilia. In the domain of the Virtual, ISIS reaches each youth through email, text messaging, and the “Get Live, Stay Live” website. Through the website youth can get health information, find local clinics, and get access to free HIV/STI testing. The

“Get Live, Stay Live” project also utilizes New Media technologies, including Social Media (a MySpace page), and personalizable online questionnaire information, to reach youth in a way that resonates to them.

### ***Duo-Social Ecological Model: Supporting Data Exemplifying Applicability***

The power of New Media in the “Virtual” domain to facilitate social relations in a way that is similar to social relations in the domain of the “Actual” indicates a potential for public health efforts to be as effective as those public health efforts in people’s “Actual” existence. Data from the interviews in this project support this assertion. More than half (64%) of the public health professionals interviewed for this study discussed the potential for Social Media to be a viable point of impact. Most (85%) of the public health professionals said that their organization was looking into using Social Media tools for health promotion. And a little under half said that their organization is already using one or more forms of Social Media to facilitate public health intervention.

As discussed above, ISIS regularly uses Social Media in its interventions, such as developing a MySpace page to help facilitate interaction between youth who attended a music event, as well as share information and other music in support of its public health mission. In fact, ISIS uses many different Social Media platforms to help support its youth sexual health promotion efforts, including Twitter (Sex::Tech Conference), Facebook (La Vida Es Mida), and Blogs. Its ability to apply various forms of New Media, especially Social Media, into its public health efforts has given ISIS an advantage in communicating with and reaching youth about sexual health.

Some systems affect some social groups more significantly or differently than they do others. For instance, communication is also very important for older youth and young adults. When these groups join the workforce, relationships in the Meso-Actual are particularly influential. Idealizing someone in a company as a mentor, or conversely as a social role model, can shape one’s behavior both in and outside of the workplace. Levels of stress or comfort, and senses of security and stability or instability, translate directly to one’s individual health. Interactions at the organizational or institutional level can also influence the individual’s interpersonal relationships. Stress produced in the institution is often expressed as frustration toward family and friends (G. S. Kim, Cho, Lee, Marion, & M. J. Kim, 2005). Institutions also influence the individual’s ethics and social expectations. Good communication in this system makes the system more influential (positively or negatively) on the systems nested in it (Nano- and Micro-system), and New Media has the potential to enhance that communication (Dahlgren & Whitehead, 1991; Day, 2009).

Moreover, institutions are taking their digitized presence to the next level by making use of multiple New Media, particularly Social Media and mobile technologies (Gitelman, 2008). Very few organizations operate without a Web presence, and it is imperative for public health leaders to capitalize on the proliferation of online interactions between individuals and institutions and/or organizations. As an example, in effort to communicate with various underserved communities, ISIS has been working closely with public health entities such as the San Francisco City Clinic and the San Francisco Department of Public Health to increase access to services and information. One such service, originally developed in response to rapidly rising syphilis rates, is

STDtest.org <<http://www.dph.sf.ca.us/sfcityclinic/syphilistesting>>, a website that provides free and low-cost confidential HIV and STI testing through the Internet for San Francisco's low SES or underserved populations.

Almost all of the professionals interviewed mentioned having several forms of communication technologies to communicate with other coworkers or to access resources and documents more conveniently. This was described as an important element of the working environment. "Communication is paramount at our office. We would be lost without email or ways to share documents. It is especially crucial when you have executives and supervisors who travel frequently. Things need to be instantaneous and the Internet makes that happen." Key informants also reported that using various means of communication is especially important in health organizations. Communication is known to be fundamental in public health practice, be it providers communicating with other providers; providers communicating with patients; or patients communicating with one another (Copeland, 2002; Kunkel, Myers, Lartey, & Oyesanmi, 2000). Access to the institution and its resources, internally and externally, via website or some other interface then becomes fundamental to the overall goal of public health practice.

Results from interviews also support the utility of the "Virtual" Exosystem. Key informants from clinical settings discussed the importance of support groups for different chronic illness and conditions. Mobility is often an issue when dealing with chronic illnesses. Social Media and interactive online communication that facilitates a sense of community allow those with limited mobility to share their experiences and support one another (Chou, Hunt, Beckjord, Moser, & Hesse, 2009b). They also provide a place for recruitment and intervention (Karki, 2006). Statements and experience from the interviews suggest that interventions using online social networks and online communities for the chronically ill provide an ideal venue for public health intervention and promotion efforts.

Lastly, revisiting the Techno-Virtual, in ISIS's "Fresh Focus Video Contest" mentioned earlier, the Internet and New Media technology allowed for an interactive and fun way for youth to provide feedback on their educational experience as well as corroborate their experience with others. ISIS also asked the youth to tell how they would redesign sex education for the future. New Media has the capacity to gather information about the user and customize the information provided, making the delivery of messages and information collected much more effective and widely applicable. Ultimately, didactic and reciprocal processes like these may help public health institutions improve and effectively change sexual education, as well as the standards of public health practice.

### ***Limitations***

The Duo-Social Ecological model presented in this paper was developed in part based on a case study, which suffered from several limitations. By definition, case studies are unique to particular populations and contexts, and the findings are not generalizable. Though this project included in-depth descriptive data recorded and analyzed by an outside observer, findings were subject to bias because the observer was part of a residency. Ultimately, concrete conclusions about cause-and-effect relationships

cannot be made without controlled conditions. Outcomes and effects can only be described or implied, but not explained.

There were only a small number of interviews conducted, and data were sometimes retrospective, thus subject to problems in information recall. In addition, key informant interviews are subject to selection bias and interviewer bias. Despite these limitations, however, the ISIS case study illustrates the viability of New Media technology to reach people, particularly youth, and to provide information, tools, and resources that promote health. It also showed how an organization could affect a target population in both Actual and Virtual domains through computer-mediation, mobile phones, and individualized or personal technologies meant to have a direct connection with the specific user.

Although the ISIS case study used to help develop and illustrate the Duo-Social Ecological model was useful in demonstrating its potential relevance in the digital age, much further testing of the new model is needed to more fully explore and verify its utility. It is hoped that other researchers studying New Media and Social Media approaches to public health, and particularly youth sexual health promotion and STI prevention, will consider utilizing the Duo-Social Ecological model as a conceptual framework, thereby adding to our knowledge base in this area and providing potential refinements to the model.

## **Implications**

From the data presented in this study we can begin to see why the current social ecological model in public health has significant limitations. It is important for public health to stay current with societal developments, as well as trends and changes that significantly influence the health of individuals, communities, and even societies. Media continue to play a fundamental role in communicating about health (Chou et al., 2009a; Bolam et al., 2006a). Through media, and now more commonly New Media, public health entities can choose what to highlight or present to the amalgamation of American communities or to specific sub-communities. With New Media, both communities and individual community members can obtain media that can help them formulate decisions. They can also access tools that enable them to take an active and immediate role in making their health choices.

Today New Media and the Internet give individuals access to nearly every form of media, bit of information, or tool imaginable (Lister et al., 2003). Regardless of age, household income, or race, Internet use — computer-mediated or accessed via a mobile phone — represents a significant percent of all populations across the globe. (For example, Facebook has more than 500 million users worldwide.) (Facebook, 2010). Failure to recognize this powerful medium as a fundamental aspect of public health practice could be detrimental to any public health intervention or organization. The Duo-Social Ecological model may provide a useful conceptual map for the future. It recognizes the staying power and influence of New Media technologies, and the reshaping of the social landscape to include a Virtual world. Social Media is no longer be a phenomenon of this decade, but will be a standard in the next. As the youth who now dominate New Media technology continue to age, today's technology will become more commonplace and new technologies will continue to expand for future generations.

The interviewees in this study and the ISIS case study suggest both the potential growth, pitfalls, and impact of technology and innovation in the 21st century. The federal government is now funding innovative New Media technology and incorporating it into public health practice (Greiginger, 2009). It is hoped that the Duo-Social Ecological model will help to reshape perceived points of influence for promoting individual and community health. Evaluation of New Media and Internet-based health promotion programs and interventions are fundamental to that aim. Evaluation of New Media programs and interventions should be rigorous, systematic, and participatory. It should aim to provide conclusive evidence that a program worked, for whom, and to what degree, and provide useful information for deciding appropriate next steps (R. S. Barbour & M. Barbour, 2003; Loreto et al., 2006).

Unfortunately, the evaluation of interventions and health programs that are using New Media tools is lagging behind that of more traditional intervention approaches (R. S. Barbour & M. Barbour, 2003; Loreto et al., 2006; H. T. Chen et al., 2008). For this trend toward New Media innovation to continue, and for a social-ecological model that takes into account the virtual existences of millions of people to be validated, it is imperative to further evaluate interventions that are based on or incorporate New Media. Public Health and sexual health promotion and disease prevention may provide an important focus for such efforts.



Figure 1 – Duo-Social Ecological Model

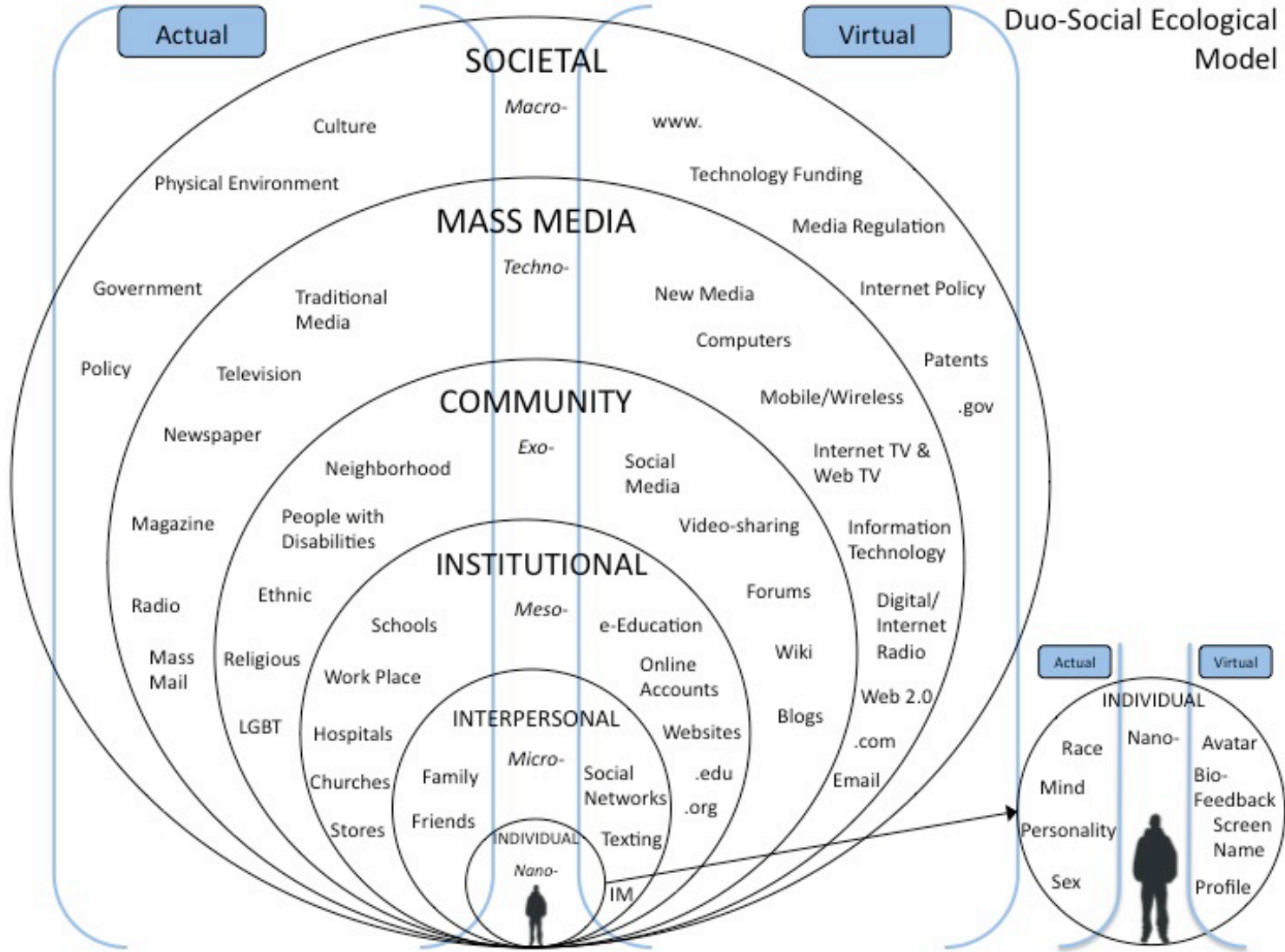
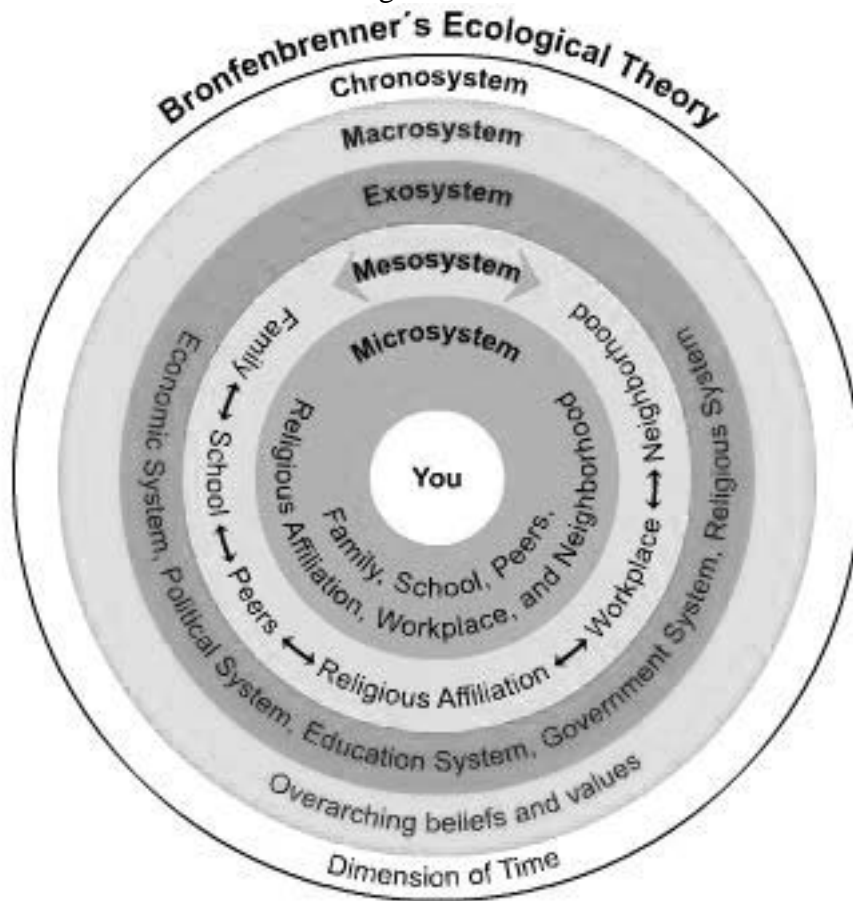
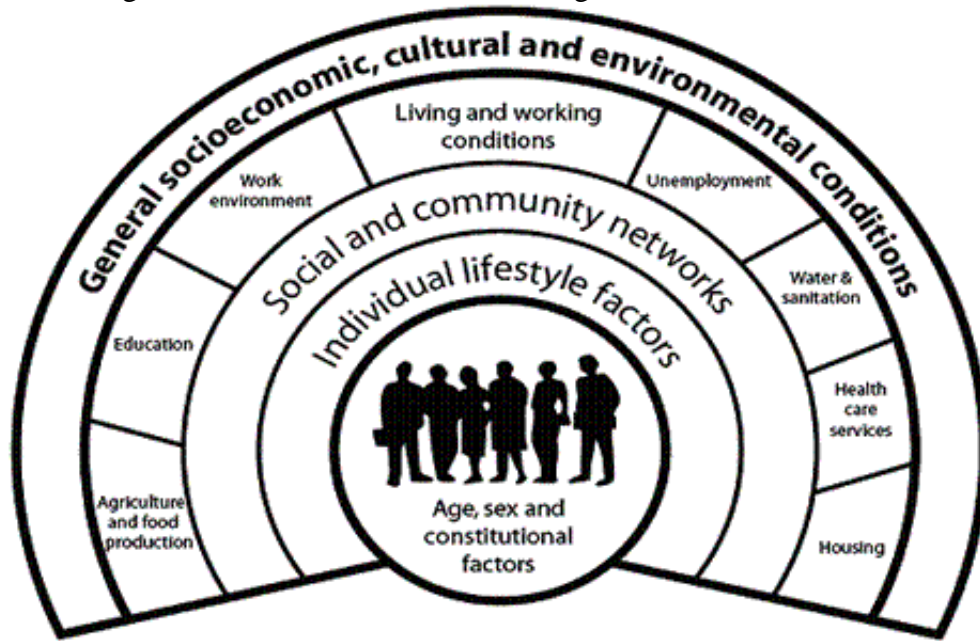


Figure 2 – Bronfenbrenner’s Social Ecological Model



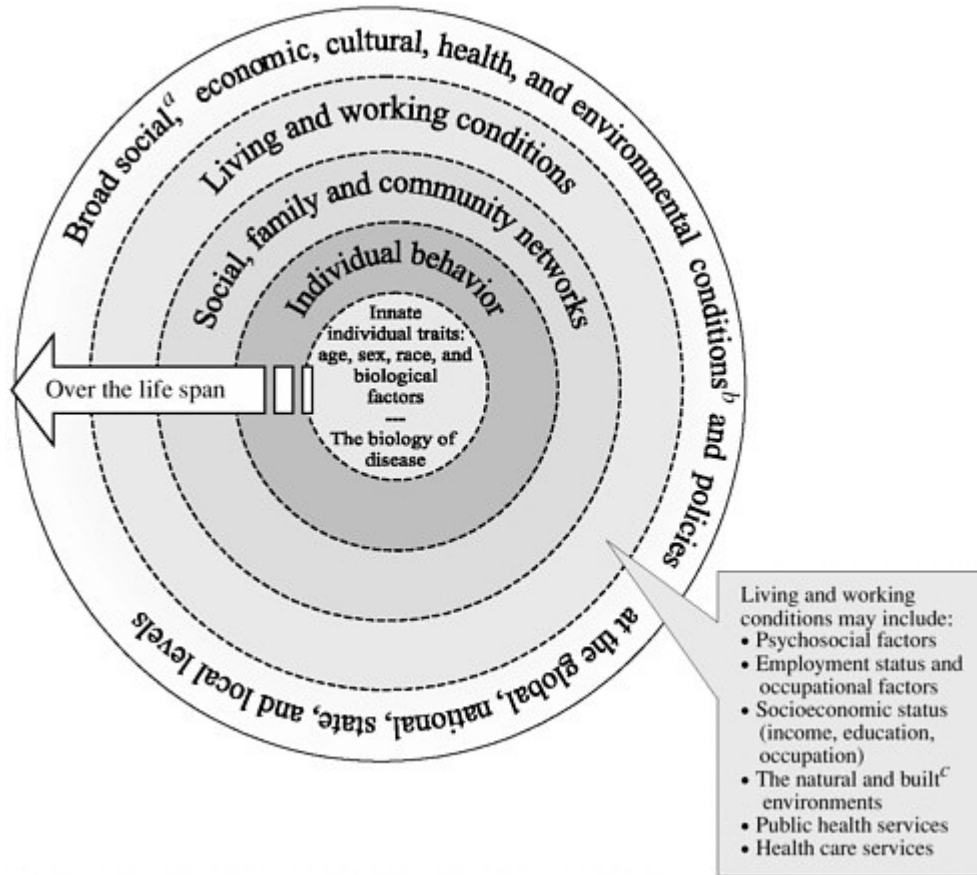
Weber State University, ecological perspectives of development (Day, 2009)

Figure 3 – Dahlgren and Whitehead's Social Ecological Model



Dahlgren and Whitehead determinants chart (Dahlgren & Whitehead, 1991)

Figure 4 – Board on HPDP of the IOM Social Ecological Model



SOURCE: The Future of the Public's Health (Committee on Assuring the Health of the Public in the 21st Century, 2002). FIGURE AND DESCRIPTION: Adapted from Dahlgren and Whitehead, 1991. The dashed lines between levels of the model denote interaction effects between and among the various levels of health determinants (Worthman, 1999). Social conditions include, but are not limited to: economic inequality, urbanization, mobility, cultural values, attitudes and policies related to discrimination and intolerance on the basis of race, gender, and other differences. Other conditions at the national level might include major sociopolitical shifts, such as recession, war, and governmental collapse. The built environment includes transportation, water and sanitation, housing, and other dimensions of urban planning (Committee on Assuring the Health of the Public in the 21st Century, 2002).

# **PROJECT 3 - Evaluation Proposal: Feasibility of Clinical Trials for an Innovative Online HIV/STI Partner Notification Intervention for Young Adults (InSPOT)**

## **About this Project**

As previously mentioned, during my doctoral education, as a part of my residency at Interne Sexuality Information Services (ISIS Inc.), I was tasked with the development of an evaluation proposal for ISIS's sexual partner notification tool, InSPOT. This project began as an effort to support the evaluation of InSPOT, as well as to cultivate my doctoral education. Archival data and internal information provided for background and approved for use by the Executive Director of ISIS, Deb Levine, which was further approved for use by the Committee for the Protection of Human Subjects, were used in the creation of this evaluation proposal.

## **Introduction and Background**

Since the 1930s, the notification of sex partners of their recent exposure to a sexually transmitted infection (STI) has been a mainstay of effective disease prevention and control efforts (Ahrens et al., 2007; Marcus, Bernstein, & J. D. Klausner, 2009). Recent evidence-based reviews concluded that partner notification is a highly effective public health strategy to reduce the transmission of STIs, including HIV (Hogben & Kissinger, 2008; T. E. Wilson et al., 2009; Katz, Hogben, Dooley, & Golden, 2009). Despite the substantial evidence of the efficacy of partner notification, most local health departments do not have the capacity to conduct STI/HIV partner notification (Katz et al., 2009). Most patients newly diagnosed with an STI or HIV infection must notify recent sex partners themselves (MacKellar et al., 2009). Particularly in the case of HIV, reluctance of patients to contact their sexual partners directly has led to problems with individuals not knowing they have been exposed (MacKellar et al., 2009; Klein, Elifson, & Sterk, 2004). This coupled with health care providers' insufficient capacity to provide support, indicates a need for innovative patient-initiated, easy-to-use notification and education mechanisms. The Internet, a fast and inexpensive communication conduit, has the potential to act as such a mechanism.

The Internet provides unparalleled opportunity and capacity to assist communication from users diagnosed with HIV/STI to their partners in part by providing notification of exposure in a manner that may be more acceptable—and therefore more frequently utilized. While many young people at risk for HIV/STI transmission use the Internet to seek health information and meet new sex partners, little has been done to maximize the Internet's potential as an HIV/STI prevention and partner notification tool (Levine, Woodruff, Mocello, Lebrija, & Jeffrey D Klausner, 2008). Recent survey data shows that more people would be willing to notify sex partners of a disease exposure via

e-mail or other new communication technologies and many sex partners would find such notifications highly acceptable, particularly via the Internet (Levine et al., 2008).

Moreover, as previously mentioned the Internet is increasingly becoming ubiquitous among youth (12 to 17) and young adults (18 to 29). Ninety-three percent of youth and young adults in the U.S. go online today (Pew Research Center, 2009b). With over 31% of youth using the Internet to get health information, and 17% searching for information on health topics that are difficult to discuss with adults (e.g., drug use, sex, and sexuality) (Pew Research Center, 2009c), the Internet is already posed as a major tool in sexual health promotion. Additionally, the mobile web and other inexpensive Internet accessing technologies are shrinking the “digital divide”. Thus, regardless of household income, or race, youth represent the predominant demographic using the Internet (Pew Research Center, 2009b).

In 2004, in partnership with the San Francisco Department of Public Health, the non profit organization Internet Sexuality Information Services (ISIS Inc.) launched the Internet [STI] Notification Service for Partners or Tricks) or InSPOT. InSPOT is an innovative, peer-to-peer, online partner notification system to assist those newly diagnosed with an STI, including HIV, in notifying his/her sex partners about a potential exposure.

InSPOT users are given a choice of several electronic postcards (e-cards) to send via email to their sexual partners. All e-cards contain a link to the InSPOT website where visitors can obtain referral information for testing and/or treatment in specified cities, as well as detailed disease-specific information. InSPOT has since been replicated in eleven cities and twelve states throughout the U.S. and is available in three languages. Prior evaluations of InSPOT have been limited to process and some preliminary outcomes evaluation, such as monitoring the number of website visits and the numbers and types of e-cards sent as correlated with national disease trends (Levine et al., 2008). There are no specific data to date regarding InSPOT’s individual or community-level impact on testing, treatment or change in disease transmission.

## **Intervention (InSPOT)**

As noted above, InSPOT users are given a choice of several electronic postcards (e-cards) to send via email to their sexual partners. All e-cards contain a link to the InSPOT.org website where visitors can obtain referral information for testing and/or treatment, as well as detailed disease-specific information. The sender may choose whether to include a personal note in the e-card. In December 2005, ISIS added an HIV component to the site, with one HIV-specific e-card, phone numbers and links to 24-hour HIV/AIDS hotlines, and a direct link from the e-card to HIV testing sites.

InSPOT was developed and usability tested extensively with community advisory boards, community members, and the general population to determine feasibility and design. Certain features were deemed to be important in a website, including ease of use, simplicity of design, and a direct, straightforward approach. In addition, the advisory board recommended a light, humorous tone to help reduce

the stigma of telling someone about a potential STI exposure. Consequently, InSPOT is highly user-friendly. The two sections are “Tell Them” and “Get Checked.” In “Tell Them,” the e-card notification application, users follow this path:

- Choose one of six e-cards,
- Type in recipients' e-mail addresses (up to six),
- Select an STI from a pull-down menu,
- Type in own e-mail address or send anonymously,
- Type in an optional personal message.

When a received e-card is clicked on, recipients are linked to the “Get Checked” section, which provides disease-specific information. The Get Checked section is divided into STI information, a map of local testing sites, and links to online resources. To ensure the privacy of the user, there is no database to store e-mail addresses or information about e-card senders or recipients.

### **InSPOT’s Target Population:**

InSPOT was originally designed for MSM (men who have sex with men) because surveillance data showed that this population used the Internet increasingly to meet sex partners, and such partnering was associated with increases in disease transmission (Kinzie, Cohn, Julian, & Knaus, 2002; D. Lewis, Gundwardena, & El Saadawi, 2005; Pioquinto, 2004; Rosser et al., 2009). In 2005 and 2006, ISIS conducted six focus groups with a range of people to guide the expansion of the service for heterosexual people. Participants indicated that all sexually active people, regardless of sexual orientation, could benefit from InSPOT (Levine et al., 2008). The site was subsequently updated in April 2006 for all audiences with sexually ambiguous photos and inclusive wording.

### **InSPOT Expansion and Maintenance:**

New locations for entire new sites in different cities/states are added to the main InSPOT portal page (the home page that includes links to each participating jurisdiction) in the following manner:

- A local jurisdiction or community organization contracts with ISIS, and provides information about local testing and treatment services.
- ISIS confirms information about local resources, testing sites, etc.
- ISIS creates a local map of the region, finds clinic locations on the map, and parses information into regional subdivisions.
- ISIS builds local InSPOT and provides online access to the sample site for review and approval for placement on the portal at <http://www.InSPOT.org/>.

To keep InSPOT e-cards out of e-mail spam filters ISIS continuously tests and updates the subject line of the e-card messages. ISIS also obtains and maintains current clinic hours, services, and makes regular scheduled phone calls confirming

clinic information in each location, every six to twelve months for each participating jurisdiction.

### ***Program goals, process objectives, and outcome objectives***

#### **Program Goals:**

Internet use among youth is widespread (Lenhart & Madden, 2007; Pew Research Center, 2009b), and Internet use with both African American youth and Latino youth specifically is on the rise (Pew Research Center, 2009b). Since the Internet has been found to facilitate meeting multiple casual sex partners for various high risk groups (both youth and MSM) (Blackwell, 2008; Mitchell, Finkelhor, & Wolak, 2001), InSPOT was created to meet the partner notification needs of Internet users by augmenting existing partner notification services. InSPOT has four major goals:

1. To notify sex partners of potential exposure to an STI, including HIV
2. To provide accurate information about HIV both to index patients and their sex partners
3. To increase the rates of follow-up testing
4. To increase early treatment of sex partners to reduce the spread of STIs and HIV

In sum, and while continually tailored to meet the specific needs of particular target populations and geographic and organizational venues, InSPOT appears to be a highly promising approach for increasing partner notification and early diagnosis and treatment of HIV and other STI's. It further appears to have special salience for youth, and disenfranchised groups (e.g. MSM of color) for whom the Internet is increasingly used to find partners and seek relevant information and services.

#### **Process Objectives:**

1. To assess the use of InSPOT in clinics and by health care providers in participating jurisdictions to determine whether InSPOT serves as a third option of partner notification.
2. To track the dissemination and uptake of InSPOT informational fliers by clinics and health care providers in participating jurisdictions.
3. To assess changes in the amount and form of advertising in participating jurisdictions.
4. To determine whether clinic and disease information is updated as necessary to insure accuracy and support usage.
5. To develop a system to track e-cards sent and link to clinic visits (develop barcodes)
6. To determine and track the extent of national dissemination.

#### ***Outcome Objectives:***



1. Increased notification of one's sex partners of potential exposure to an STI or HIV
2. Increased information about STIs and HIV to both the index patients and their sex partners
3. Increased rates of follow-up testing
4. Earlier treatment of sex partners (pre-symptoms)
5. Reduced spread of STIs and HIV

### ***Intervention example narrative***

First the index patient, either by symptom self-diagnosis or routine check-up, goes to the clinic, or health care provider, for STI testing. The index-patient tests positive for an STI. The patient is told that their sexual partner(s) must be informed and is given the option to self-report to the partner (client-initiated partner notification), relinquish contact information to the clinician (provider-initiated partner notification), or use InSPOT (anonymous/confidential client-initiated partner notification). The index patient opts to use InSPOT for one or more of several reasons: Fear of self-identification, desire for anonymity, email only contact information, or due to the nature of the patient's sexual encounter.

The index patient sends an e-card to his or her partner(s) notifying them of possible infection. Both index patient and sexual partner (e-card recipient) obtain more information about the STI, clinic locations and treatment information from the InSPOT website. The e-card recipient, potentially notified before being symptomatic or despite being asymptomatic, temporarily halts sexual activity, gets tested and is treated early. Early notification decreases the chance of health complications and/or infection to future partners.

Though the individual's early treatment is the primary goal of the intervention, it is also hypothesized that the intervention will affect the community more broadly. Partner notification and early detection have the potential to decrease the rates of co-infections, complications, and transmission. It is ISIS's hope that early partner notification, increased by InSPOT, will not only increase the health of InSPOT users and their sexual partners, but that the increased health and early detection of InSPOT users eventually may translate into improvements in community health more generally.

## **Overall Evaluation Design**

### ***Specific Aims:***

As noted above, the specific aims of this study are to determine the feasibility of an anonymous online evaluation to measure the acceptability, use and impact of InSPOT for partner notification for STIs, including HIV, in two major US cities, San Francisco and Chicago. Individual and group-level data will be collected to estimate

participation rates and effect sizes. These in turn will be used to plan for a future comparative trial of InSPOT to determine the potential impact of this intervention program on partner notification outcomes and HIV/STI transmission among youth in Chicago and San Francisco.

InSPOT is an innovative intervention that is the result of collaboration between community members and health departments. Community members have embraced the site as a partner notification tool because of the anonymity built-in to the service, along with the ease and convenience of use in the often difficult task of notifying partners. Traditional research methods such as double-blind clinical trials have been requested by both the scientific community and the users of the InSPOT service. In this feasibility study, we aim to develop and analyze innovative methods of investigation using encrypted codes to maintain user anonymity in an effort to meet the needs of the users while maintaining scientific integrity.

In this pilot feasibility study, I will to use anonymous methods of data collection to:

1. Determine the proportion of InSPOT senders and recipients (collectively, users) who report complete, incomplete and no demographic and sexual risk behavior data in two representative cities (Chicago and San Francisco).
  - Describe the characteristics of users by age, race/ethnicity, sexual orientation, gender of sex partners and sexual risk behavior, as well as type of disease selected for notification.
  - Describe the frequency of notifications per user by user characteristics.
2. Determine the proportion of InSPOT recipients who report complete, incomplete or no follow-up counseling and medical care data on HIV/STI testing, HIV/STI test results and test-related outcomes in both Chicago and San Francisco.
  - Describe the proportion of those who test positive by type of STI, time to follow-up with counseling and care, and referral to HIV/STI prevention programs.
  - Describe the STI/HIV-related treatment outcomes by the characteristics of InSPOT user and InSPOT recipient.
3. Determine the diseases for which InSPOT is most used, by select target population demographics.
  - Analyze the number of cards sent and received by disease type by demographic and behavioral characteristics of senders and recipients.

### ***Key Research Questions:***

Our analyses will strive to answer several key questions:

1. How acceptable to the index-patient is using an anonymous online surveys to assess the demographic, behavioral, and psychosocial characteristics of InSPOT users?
2. What are the characteristics of InSPOT users (senders and recipients) who report personal demographic and behavioral data into the e-card notification system anonymously?

3. How likely are InSPOT recipients to anonymously report personal characteristics and results of their efforts to get tested, such as test results, counseling, and treatment outcomes?
4. What are the characteristics of InSPOT users?

## **Research Design**

### **Participant Recruitment:**

Three types of participants will be recruited: 1) InSPOT e-card senders who were referred to use the InSpot notification system by a clinician or found out about and elected to use the InSPOT notification system on their own, 2) InSPOT e-card recipients who elect to get tested, and 3) InSPOT e-card recipients who elect not to get tested. InSPOT e-card senders will be enrolled in the study online through a completely automated system within the InSPOT website. InSPOT e-card recipients who elect to get tested will first be recruited online to bring the tracking code associated with the e-card they received to the STI/HIV clinic. Data will be collected again for a second time. Participants will then have to provide demographic data for a second time, their test results, and report STI/HIV testing and sexual risk behavior when they return to the clinic. InSPOT e-card recipients who elect not to get tested will be recruited online also through an automated system within the InSPOT website.

We will recruit 300 e-card senders and 900 e-card recipients into our feasibility study. Based on usage data from InSPOT San Francisco and InSPOT Chicago, there is an average of 135 cards sent per month, to an average of 324 recipients. We are over-recruiting by 50% to ensure participation of more than 200 people in all three groups (600 total).

There are four stages of partner notification: The *discovery stage*, when the index patient finds out his/her new STI/HIV status; the *notification (or partner notification) stage*, when the index patient sends an InSPOT e-card; the *receipt stage*, when sex partners of the index patient receive an InSPOT e-card; and the *follow-through stage*, when sex partners follow through (or not) with testing recommendations of the InSPOT e-card and web site. Data will be collected at three of the four stages (notification, receipt stage, and follow-through stage)

### **Clinic participation:**

The San Francisco and Chicago municipal STI clinics will participate in the evaluation of InSPOT. Trained research assistants at those sites will be responsible for collecting data, assisting with informed consent and survey completion on a study laptop, and provision of incentives. Research assistants will not be staff at the clinics, but will be employees of the study. Additionally, research assistants will ask participants if they are willing to share the type and number of tests they might take, as well as their test results anonymously with the research team. The

percentage and characteristics of those who agree to share test and test results will be a key measure for the future randomized control trial evaluation.

### **Theoretical Framework:**

Internet delivery of sexual health and HIV disease self-management requires an appropriate health behavior theoretical framework as well as appreciation of the unique aspects of the delivery mechanism itself (i.e. need for communication and user-centered design theories for computer interventions) (Kinzie et al., 2002; D. Lewis et al., 2005; Merrill, 2003). I will use an adaptation of the eHealth Behavior Management Model. From the theoretical model the points of data collection correlated with the theories and Transtheoretical Stages of Change, (Pre-contemplation, contemplation, preparation, action, and maintenance) (Bensley, 2004). Moreover, I will utilize persuasive communication methods for web-delivered disease prevention interventions (visual stimuli, succinct user-directed wording, and interactivity) (Bensley, 2004).

InSPOT was built with the Information-Motivation-Behavioral Skills (IMB) model ehealth behavior change as a foundation, such that individuals can access factual content, and receive support for behavior change initiation and skill building online (Bowen, M. L. Williams, Daniel, & S. Clayton, 2008). IMB has been found to be an empirically relevant framework for HIV and STI prevention interventions, (Amico, Toro-Alfonso, & J D Fisher, 2005; W A Fisher, J D Fisher, & Rye, 1995) as well as for web-delivered HIV/STI support and communication such as Internet-based computer-mediated interventions like InSPOT (Jeffrey D Fisher et al., 2004).

### **Data Collection:**

Index patients will be patrons of participating clinics that fit the inclusion criteria (See Discussed below). Index patients will complete computer-generated data fields as part of the e-card sending process. Before sending the e-card, the sender will be required to report certain characteristics: age, race/ethnicity, sex, sexual orientation, geographic location, gender, number of sex partners in the past 6 months, type of STI they were diagnosed with, and pick from a selection of possible reasons why they chose to use InSPOT to notify their sexual partner(s). No personal identifying information will be collected. Those data will be coded, assigned alphanumeric values, and combined to generate an individual tracking code (electronic bar-coding), linking their demographic and behavioral data to their later responses, including testing and treatment seeking behavior and test results of their e-card recipient(s). After he or she has sent an InSPOT e-card, we will invite the index patient to participate in a longer online survey and usability assessment of InSPOT. Informed consent will be obtained online and participants will receive a \$25 gift card upon survey completion. The proportion and demographics of invited e-card senders who initiate and complete the survey, including partial completion, will be measured. Those data will be key determinants of the feasibility of a future trial of the efficacy of InSPOT as a partner notification tool as compared to standard of care in cities that have InSPOT.

Data from the e-card recipient(s) will be collected both online and at participating STI/HIV clinics. Upon receiving the e-card, the e-card recipient will be asked online to report their testing intentions along with additional demographic and sexual risk behavior data. Individuals who indicate they will not get tested will be sent to a web page that provides sexual health information, and a message inviting them to take a survey, and receive a \$25 gift card for participation. Informed consent will be obtained via an online instrument prior to starting the survey. This process will be fully automated and self-driven. Data collected will be linked to the alphanumeric tracking code imbedded in the e-card sent from the index patient.

Individuals who indicate they will get tested will be provided clinic-locator information and a statement about the research study process. While at the clinic, they will be asked to provide confidential information, including tests performed and test results. They will be asked to write down or print a coupon with the alphanumeric tracking code from the e-card they received, and told that they will receive a \$5 gift card when they bring the code to the clinic. The \$5 gift card is provided to encourage participants to bring the alphanumeric tracking encrypted code to participating clinics. It is not substantial enough to offset the cost of travel expense and time in going to the clinic; thus, the \$5 gift card does not incentivize the act of seeking evaluation and testing.

### **Survey instruments:**

The data collection survey instruments will be developed using validated measures of sexual risk behavior (selected Project EXPLORE, Project RESPECT and other NIH and/or CDC projects) and will include validated scales from substance use (e.g. Addiction Severity Index), mental health (e.g. Beck Depression Index), and other sexual risk-taking behaviors. The data collection instruments will be completed online using custom technology (built in error checks, logic and skip patterns, etc.) to minimize survey time and maximize validity. The survey instrument will consist of an Internet-based structured interview. The instrument will be comprised of 95% close-ended questions (i.e. multiple choice and true/false), and 5% open-ended questions. Closed-ended questions will collect demographic data, behavioral data, and psychological analysis data. Open-ended will primarily collect data on opinions and suggestions on clinical operations, and feedback regarding the intervention tool. Each participant will have a unique identifier to reduce the likelihood of non-participants completing surveys or multiple completions by the same participant. Data collection instruments will be pilot tested by at least 10 persons and adjustments made before feasibility study implementation.

Pilot testing will be done in order to examine feasibility, usability, and cost-effectiveness, as well as trends in engagement and retention of pilot controlled trial in patients and changes in patient sexual behavior. Data collection survey instruments will be pilot testing for a period of two to three months. I will conduct a pilot of the evaluation tools to unearth trends in key primary outcomes (i.e., patient engagement with the InSPOT partner notification tool, probability for retention and follow-up, and behavior. This data will be included in the construction of the Manual

of Procedures. The current study findings of the full evaluation, as well as associated Manual of Procedures, will serve as the pilot data for the development a subsequent R01. After Pilot testing the instruments and conducting the full evaluation, the PI will develop a proposal for conducting a randomized control trial of the HIV/STI partner notification tool InSPOT.

The *notification stage* begins the first part of the web-based recruitment phase. This phase is completely automated. The index patient will have opted to send an InSPOT e-card. Before sending an e-card, a preliminary page will appear asking the index patient demographic information (using drop-down menus) and why they chose to use InSPOT. This information will be coded and embedded into the e-card in the form of a tracking code.

*Notification stage* web-based recruitment phase example text:

1) Hi. To continue to make InSPOT better, please answer the following questions before sending your InSPOT e-card. We will not collect any personal identifying information. Your answers are anonymous. Please answer the following questions: (Example measures from e-card sending process) What is your age? What is your race/ethnicity? Why did you choose to use an InSPOT e-card to notify your partner(s)?, etc.

2) (Example measures from [The index patient completes and sends an e-card, next page appears] We are conducting a study of InSPOT users to further evaluate the service, would you like to participate in this study and receive a \$25 electronic gift card for your time? Yes or No, your answers will remain anonymous. ["Yes" links to informed consent page, then questionnaire]

In the *receipt stage*, the sex partner(s) will receive the InSPOT e-card from the index patient. The e-card will still be embedded with the tracking number of the index patient. The e-card will have three hyperlinked options (see Figure 2): (Option 1) "I plan on getting tested right away, where can I get tested"; (Option 2) "I plan on getting tested later but would like a little more information now"; (Option 3) "I don't plan on getting tested". Each hyperlinked option will lead to a sub-page.

Receipt stage example of options:

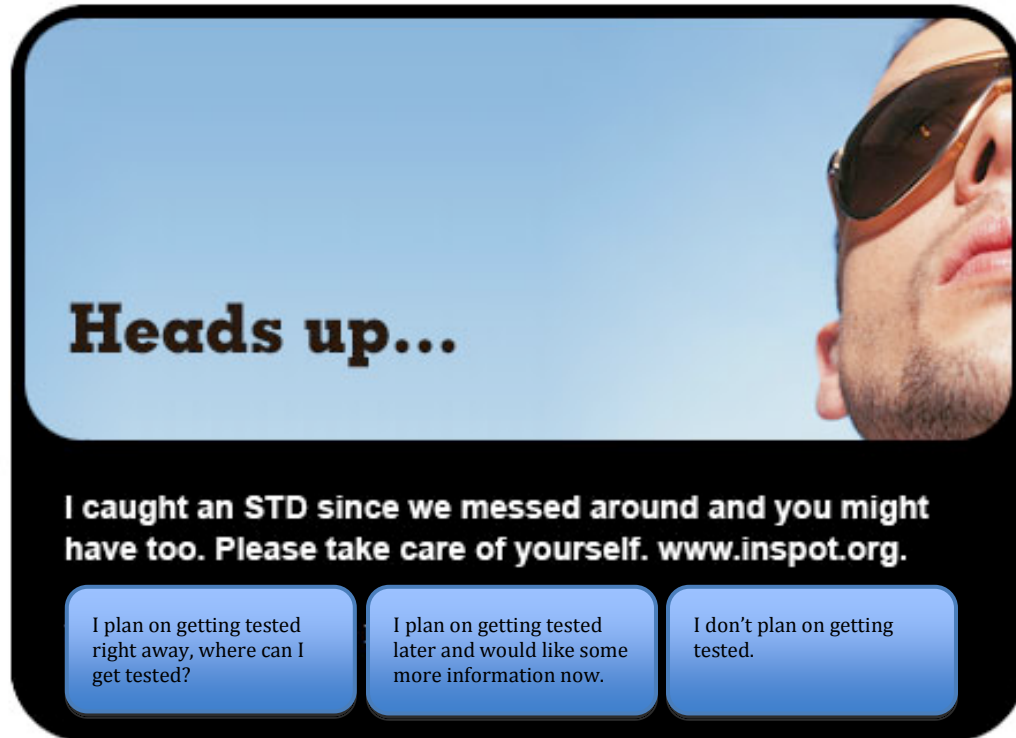
*Option 1:* The sex partner will be given the tracking code to print or write down, informed about how the code is linked to the e-card and any potential clinic visit. Recipients will be offered a \$5 gift card if they remember to take the tracking number with them to their clinic visit. There will also be a map of the participating clinic location.

*Option 2:* The e-card recipient is linked to a page with disease-specific sexual health information, the same information about the tracking

number and participating clinics as Hyperlink 1, and a map of local testing services.

*Option 3:* The e-card recipient is linked to a page with more information about STIs and is asked to help evaluate InSPOT by completing a survey. Participants give their informed consent online and those who complete the survey receive a \$25 gift card.

Figure - 5



This is from a friend at  the [STD] Internet Notification Service for Partners Or Tricks.

Finally, in the *follow-through stage*, the e-card recipient has chosen hyperlink option 1 (I plan on getting tested) and has elected to help evaluate InSPOT. This option provided the participant with locations of participating clinics, a coupon with the embedded tracking code number, reminder about participant anonymity, and a brief description of the process. The recipient takes the tracking code to a participating clinic. Clinician's will be at all clinics to receive participants as patients of the clinic for testing and to collect InSPOT tracking numbers. The participant informs the clinician about their InSPOT tracking number, and is offered a \$5 gift card in exchange for bringing back the tracking code.

Research assistants will also be stationed at the clinic to administer a computer-assisted survey for data collection at the clinic after the participant gets tested. The research assistant offers the patient the opportunity to participate in a computer-assisted survey. The participant gives informed consent and upon completion receives a \$25 gift card. The research assistant reminds the participant

that the information will only be linked to the tracking number and that no personal identifying information will be collected.

Participants who get tested at a non-participating facility will be given the option of taking the computer-assisted survey for a \$25 gift card, after they have been tested. Participants will only be given this option if they indicate they will be testing at a different location. This option will be provided on the 'participating clinics' page. They will be given the same tracking code that was originally imbedded in the e-card and a link to the online, post HIV/STI testing, survey. To deter early and dishonest completion of the survey, the tracking code will act as a key, only allowing the participant to take the survey after three weeks (21days), to provide sufficient time for testing. After three weeks, the participant will be able to gain access to the survey. In the survey they can provide information on where they were tested, for what STI, as well as the standard demographic questions and sexual history assessment provided in the other surveys.

### **Threats to internal validity and validity maintenance:**

The frequency of e-card recipients who choose to get tested after receiving an InSPOT e-card might be affected by previous history of STI testing. Incorporating questions about testing frequency will provide the data necessary to control for previous history of STI testing when we analyze the data. A partner of an index patient may experience physical health changes (i.e. STI symptoms) between the time they were exposed and the time they received an InSPOT e-card. If recipients of InSPOT e-cards become symptomatic and get tested before receiving an InSPOT e-card, or get tested because of the sexual exposure, the recipient may ignore the InSPOT e-card or just indicate that they will not get tested. We will try to control participants that get tested before receiving an e-card by incorporating questions about previous health care seeking behavior in the survey for e-card recipients who report no intention to get tested.

"Testing" (taking previous surveys with related content) may affect the validity of survey responses related to STI/HIV knowledge because the index participants might have already been asked certain questions related to their sexual behavior before participating in the study survey. The participant may also be given information by clinicians and will have had an opportunity to obtain additional information on their own, immediately after their STI diagnosis, yet before their participation in the study survey. This would directly affect questions related to the amount and type of health information gained from being referred to and visiting the InSPOT website.

Moreover, there will be two clinic sites that will be participating in this study. Each clinic will have several research assistants collecting data. There is possibility of interviewer bias due to how data are collected. In order to strengthen the validity of the data collected by the research assistants, the survey will be standardized and research assistants will receive group training and have a data collection manual. Again, all survey tools will be tested for content validity and will be pilot tested by at



least 10 persons and adjustments made before feasibility study implementation. Research assistants analyses will be paired and compared for inter tater reliability.

Participation in the study is voluntary. Because participants are not randomly selected, selection bias is possible because there may differences among those who choose to participate in the study versus those who do not, potentially limiting the generalizability of our findings. As mentioned above, all participants in the study will be individuals who have recently used InSPOT to notify their sex partners of a potential exposure to an STI or HIV, or participants who have received an InSPOT e-card. Because all e-card senders will be individuals who test positive for an STI/HIV, the data may also be affected by personal selection bias. Lastly, there is potential bias in that we are only querying users of the InSPOT service, assuming that they have Internet access. While the digital divide has lessened in the US, it is still existent. The investigators will take all necessary steps to reduce bias that results from Internet use and knowledge. Similarly to addressing testing frequency, I will also incorporate questions about computer-mediated Internet use to provide the data necessary to control for bias that arise from the participants ability or frequency to use computer-mediated internet access..

### **Data analysis:**

Data will be collected on the frequency and percentage of participants by group (senders, recipients who seek testing, recipients who do not seek testing) who provide demographic and behavioral information at the three points in the study ( e.g. notification stage, receipt stage, and follow-through stage) in order to determine the feasibility of collecting data in these manners for future research. Several factors may contribute to missing data, e.g a value not being relevant to a particular case; inability to record a response when the data were collected, or a question being ignored by users because of privacy concerns (Shalabi, Najjar, & Kayed, 2006). In case of missing data, the system for analysis as outlined in the Manual of Procedures, will be to either ignore the node of data completely, or to try to take it into account (i.e. finding the missing data's most probable value, use the value "missing" or "unknown", or "NULL" as a separate value for the data (Shalabi et al., 2006). Estimates of participation and data completion will be calculated with 95% confidence intervals.

Data will be analyzed using parametric and non-parametric methods for categorical and continuous measures. These methods will enable me to describe the characteristics of users by age, race/ethnicity, sexual orientation, gender of sex partners and sexual risk behavior, as well as type of disease selected for notification; to describe the frequency of notifications per user by user characteristics; and to describe the proportion of those who test positive by type of STI, time to follow-up with counseling and care, and referral to HIV/STI prevention programs. I will use Fischer's Exact Test, Chi square Test and Student's T Test or Wilcoxon Rank Sum Test, respectively and as appropriate to the proper analysis of the data. Significance will be assessed at  $p < .05$ . Moreover, to describe the STI/HIV-related treatment outcomes by the characteristics of InSPOT user and InSPOT recipient, and to analyze

the number of cards sent and received by disease type by demographic and behavioral characteristics of senders and recipients a cross-sectional analysis will be performed adjusting for various co-factors in a multivariate model. Factors with univariate associations with outcomes of a p-value < .1 will be retained in multivariate analyses. Model fitness will be assessed for all data sets and repeated modeling will be performed to identify the best fit while retaining standard demographic (age, sex, race/ethnicity) and behavioral measures (ie: number of sex partners in past six months).

Activity Timeline/Work Plan	Year 1 (qtr)				Year 2 (qtr)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
InSPOT Site	x							
Participating Clinic Training/Development of Clinic Staff	x	x						
Modified InSPOT Site Usability testing		x						
Evaluation Launch			x					
Data Collection			x	x	x	x		
Baseline Assessment			x					
Six Week Evaluation Assessment			x					
Three Month Evaluation Assessment				x				
Six Month Evaluation Assessment					x			
Nine Month Evaluation Assessment						x		
Data Analysis							x	x
Travel to study meetings				x		x		
Travel to present study findings					x		x	x
Dissemination of Findings								x
Preparing R01								x

### ***Implementation Evaluation***

#### **Questions to guide the process evaluation:**

1. Is the evaluation process following the Manuel of Procedures and properly allocating resources?
2. Who is responsible for data management?
3. Were the barcodes collected properly and reliably?
4. Are the assigned people managing and primarily responsible for recruitment of participants in the clinics?
5. Do evaluation staff work and coordinate efficiently with clinic staff and other health care agencies? Again, how will you know?
6. Are the clinic staff members correctly following and executing the guidelines in the Manuel of Procedures?

## ***Human Subjects Research/ Protection of Human Subjects***

### **Human subject involvement and characteristics:**

I will apply for Institutional Review Board (IRB) approval for human subjects research related to all Specific Aims (1-3). Each specific aim requires data collection from InSPOT e-card users, either senders or recipients. I will seek to recruit up to 1200 persons, either senders (600) or recipients (600) of the e-card service at the clinics (participant/partner 1:1 ratio). Senders will be people recently diagnosed with an STI or HIV, and residents of the U.S. All study participants will be asked to provide informed consent electronically. A database storing verification on all electronically-endorsed consent forms will be kept separately from other databases and will be password-protected. Only PIs from this study will have access to these data.

### **Sources of material:**

Data will be collected anonymously via online surveys identified with encrypted codes embedded in the original sent e-card. Data collected from e-card recipients will also be connected to the encrypted codes embedded in their cards received. Data collected from online surveys will be housed on a secure server, and used to generate estimates of participation and data completion, to analyze the correlates of those outcomes and identify any mediating variables. These data will be collected anonymously. The only record linking the participants will be stored separately from any other databases and protected by password.

### **Potential Risks:**

For all participants in this study, there is some risk regarding the reporting of STI/HIV test results and sexual risk behavior information that might generate psychological distress. Some individuals might feel uncomfortable disclosing HIV and STI information, and personal behavior, even in an anonymous survey. Participants will be reassured of their privacy and anonymity. There are no anticipated physical or legal risks faced by participants, as STI/HIV test results will never be associated with any personal identifying information. Given the personal nature of the evaluation survey items, however, it is possible that the participants in the survey may experience some anxiety in completing the survey.

### **Recruitment and Informed Consent:**

Participants of all ages are self-recruited by virtue of their personal decision to use InSPOT, or their receipt of an InSPOT e-card, Participants will be reminded at various points in the study that study participation is voluntary and that they can choose not to answer particular questions or to end the study at any time. We will request a waiver of parental permission from the Institutional Review Board to include persons under 18 in the study. Per state statutes, minors are allowed to consent for contraceptive services, STI testing and pregnancy testing without parental consent. As the risks of the research are minimal, requiring parental permission would likely decrease adolescent participation in this online research

project. This waiver of parental permission will not adversely affect the rights and welfare of the subjects. All adolescents under the age of 18 will be encouraged to seek the support of a parent or another adult prior to participation in the study. This language will be included in the online consent forms. In addition, the PIs will establish procedures to allow adolescents to seek assistance on a confidential basis after completing questionnaires in both study cities.

Participants will sign an electronic consent form, but will not be asked to disclose any personal identifying information on any study assessments. These procedures constitute minimal harm and no identifiers will be used on data collection instruments except encrypted codes associated with the originally sent e-card. Participants taking the online surveys will be directed to a website where they can learn about the study, its risks, benefits, alternatives and complete the informed consent process online, save a copy for their records and check a box to indicate their consent to participate (in lieu of a signature). At participating clinics, trained research assistants will ask permission to record e-card recipients' tests taken and will inform participants of their right to refuse to answer any questions and to terminate participation at any time. Participants will be informed that their responses are anonymous.

**Protection Against Risk:**

Maintaining anonymity of the participants will be a top concern for all involved in the project. Data collection is anonymous and names, contact information or other personal identifiers of survey participants are never recorded. Encrypted unique tracking codes will be used lieu of identifying information.

**Potential benefits of the proposed research to the subjects and others, and importance of the knowledge to be gained:**

There is no direct benefit to study participants for their participation in the study. The study may benefit others in the future through the improvement of an online HIV/STI partner notification system, and resulting reduction in STIs, including HIV, in the US.

**Data and safety monitoring plan:**

Because of the low-risk nature of this behavioral research project, most of the information regarding data safety and monitoring has already been included in prior sections. My research team is experienced in conducting HIV/STI prevention intervention research online. We have never had a breach of confidentiality, nor have we ever observed any significant adverse effects. We do not foresee any new data safety or monitoring problems for this feasibility study.

**Inclusion of women and minorities:**

We will include both men and women in this study. We expect female participation to be less than 50% however, current InSPOT usage trends point to a larger male population of users. As previously mentioned, as the digital divide has

lessened (Pew Research Center, 2009b, 2005), Internet use in the U.S. is close to 90%. People of all sexual, ethnic and racial backgrounds, as well as socio-economic status, use the Internet. However, because STDs and HIV disproportionately affects sexual and racial/ethnic minorities in the U.S., we expect InSPOT users and study participants similarly to over-represent those groups.

**Inclusion of Children:**

Youth between the ages of 15-17 will be eligible to take surveys in the evaluation study. We believe that the evidence of HIV risk among youth aged 16-17 is sufficiently substantial to justify their inclusion in this study.

**Vertebrate Animals:**

N/A

***Dissemination plan:***

The evaluator will meet with the staff four times during the study to review the evaluation process and to assess data collection (see timeline/work plan). Formative findings will be presented at the six and nine-month assessment meetings. Following the nine-month assessment, a full analysis will be conducted and summative findings will be disseminated to the project staff to help refine the program. An executive summary will be produced from the findings and will be sent to political, government, and private sector stakeholders (i.e. local departments of public health, academic public health institutions, as well as clinical and community health institutions) to demonstrate the effectiveness of the program and encourage dissemination of the intervention. The executive summary will be further abridged into leaflet form and usability tested for dissemination to clinics and health facilities for public consumption.

## Conclusion

I undertook three research projects -all complementary to one another- that will result in two publishable articles and one evaluation to be submitted for funding. The overall goal of my dissertation was to contribute to the quickly emerging literature of New Media in public health, and to enhance sexual health intervention by developing a new social ecological model that fully took into consideration computer-mediated communication (CMC), Social Media and other forms of New Media. Additionally, my dissertation sought to begin the difficult work of understanding the unique processes necessary to evaluate a New Media intervention. My aim was to explore how New Media enhances public health intervention, research and action.

What I found was that New Media applications in the health field range widely, from health-oriented social networking tools and interactive health web pages to online personal health assessment applications. As previously mentioned, public health organizations that specifically target youth sexual health are increasingly recognizing the relevance and potential applications of New Media to sexual health promotion, particularly in youth age 12 to 17 and young adults age 18 to 29 (Bolam, McLean, Pennington, & Gillies, 2006b; Della, Eroglu, Bernhardt, Edgerton, & Nall, 2008b; Eichenberg & Brahler, 2007; Haug, B. Strauss, & Kordy, 2007). Health-oriented, interactive social networking tools can provide personal health assessments, resource information, community support, knowledge exchange, and assistance to help health workers stay engaged and support the populations they wish to serve (Lariscy et al., 2010), particularly youth.

Furthermore, cost effectiveness in health research and intervention has always been a goal of public health (Hawn, 2009; Price et al., 2009; Beckjord et al., 2007), and various forms of New Media have been found to be more cost effective than traditional methods of communication (Niiranen, Lamminen, Niemi, Mattila, & Kalli, 2003; O'Brien & Renner, 2000; Price et al., 2009). In our current global economic crisis, the costs of health research and public health interventions are becoming increasingly important in decision-making on how we can improve public health in general, and youth sexual health specifically (Hawn, 2009; Beckjord et al., 2007). Health research and evaluation are fundamental to effective health interventions, and health interventions are intrinsically tied to better health outcomes (Kirk et al., 2003; L. E. Gavin et al., 2010b). Thus, it is imperative that we find new cost efficient ways of conducting health research and evaluation, as well as more effective intervention methods to positively affect health outcomes. New Media appear to offer a critical avenue in this regard.

As previously mentioned, government funding sources and new grant opportunities are strongly encouraging innovations in health research and intervention strategies that improve efficacy and reduce cost (Wyatt & F. Sullivan, 2005; Randeree, 2009; Eysenbach, 2008). New Media and the power of the Internet continue to advance, grow, and facilitate new forms of social interaction, information sharing, and community building. This advancement and growth provide unique opportunities for innovation and cost reduction. Public health leaders and researchers trying to reach and interact with large and specific populations, while combating economic and structural shortcomings, may be able to look at New Media and the power of the Internet as a potential solution.

Moreover, the social ecological model –a public health standard- acknowledges multiple levels of impact on people’s health and supposes the integration of social contexts to establish a larger and more holistic picture in studying and addressing public health problems (Oetzel et al., 2006). The archival data from the case study and key informant interviews which provided critical information for this dissertation was undertaken to help unearth the processes through which technology for youth sexual health -and public health in general- are applied to public health. The data were also used to model the social ecological applicability of New Media technology to promote critical and innovative interventions. The result was the Duo-Social Ecological model.

The Duo-Social Ecological model acknowledges an Internet-based social ecology that has parallel levels of impact. It thus provides an analysis of the “Virtual” domain at each corresponding level of the “Actual” domain, such as interpersonal relationships (e.g. social network friends vs. real life friends), institutions (web pages vs. offices), and communities (forums vs. neighborhoods), and in the process enhances the relevance of the ecological model for today’s New Media driven world. This dissertation demonstrated how virtual communities and their members share common barriers to healthfulness. Behavior change becomes more achievable when barriers to healthy behaviors are decreased. Thus, it can be surmised that the most effective approach to individual health is in the combined efforts to eliminate barriers to health at not only all traditional levels of the social ecological system (individual, interpersonal, organizational, community, mass media, and societal), but also in both the individual’s “Actual” and “Virtual” existences. Lastly, like many of its predecessor models, I believe the Duo-Social Ecological model can be used as an observational qualitative research model, and also in experimental settings or to develop interventions. Again, however, application and rigorous evaluation are paramount.

Additionally, a growing number of public health organizations can turn to New Media tools as they actively seek innovative health solutions during the current economic recession. As previously mentioned, national governmental institutions, like the Center for Disease Control and Prevention (CDC) and US Department of Health and Human Services, support the use of New Media in public health as general use of these technologies by the public continues to increase (Greiginger, 2009). Further, tools such as ISIS’s InSPOT demonstrate how New Media can be helpful for positive sexual health development and reducing the further spread of disease. Unfortunately, evaluation of New Media in public health campaigns has lagged behind (Hesse et al., 2005).

In conclusion, if public health is to better study and address health disparities and promote cost effective public health practice, particularly in the area of sexual health with youth, it must seriously look at New Media as both a tool for and point of intervention. Understanding and contributing to the current literature is necessary to facilitate dialogue surrounding applications of New Media in public health. Fully taking into consideration the social ecological effects of New Media technology, both in real life and on the Internet, is crucial in mapping out points of impact and obtaining a more holistic picture of such challenging and important public health issues as youth sexual health and STD prevention. Lastly, evaluating applications of New Media technology is fundamental to demonstrating or disproving its efficacy and potential effectiveness. This dissertation, which looked at applications of New Media technology in youth sexual health promotion

and HIV/STI prevention, and explored New Media in public health practice, in many ways breaks new ground and contributes to the difficult work of addressing these gaps.



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