Commentary

The Intersection of Youth, Technology, and New Media with Sexual Health: Moving the Research Agenda Forward

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A B S T R A C T

Youth bear a significant proportion of the sexually transmitted infection (STI)/HIV burden in the United States, CDC, 2010. Available at: http://www.cdc.gov/std/stats09/default.htm, with rates of some STIs increasing among youth of color and young men who have sex with men. Technology use among youth also continues to increase. The ubiquitous nature of technology use among youth offers a multitude of opportunities to promote youth sexual health and to prevent disease transmission and unplanned pregnancies. To date, there have been a handful of peer-reviewed articles published regarding the feasibility, acceptability, and effectiveness of using new media and technology for sexual health promotion. Despite recent publications, there is still a real need for high-quality research to understand the impact of different forms of new media use on youth sexual health, as well as to determine the best ways to harness technology to promote safer sex behaviors, both for the short- and long-term. In March 2011, Internet Sexuality Information Services (ISIS), National Institute of Mental Health (NIMH), and the Ford Foundation convened a meeting of scientists and technology experts to discuss how to effectively conduct sexual health promotion research using new forms of technology. The meeting was structured to cover the following topic areas: (*i*) research– community partnerships, (*ii*) institutional review board and ethical issues, (*iii*) theoretical frameworks, (*iv*) intervention approaches, (*v*) recruitment methods, and (*vi*) assessing impact. Presentations included case studies of successful technology-based HIV/STI prevention interventions for youth, which led to broader discussions on how to conduct research in this area. This article summarizes the meeting proceedings, highlights key points, offers recommendations, and outlines future directions.

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Youth bear a significant proportion of the sexually transmitted infection (STI) burden in the United States [1]. Among certain groups, rates of STIs are rising, including *Chlamydia* among African American young men and women [1] and HIV among young men who have sex with men [2]. The ubiquitous nature of technology and new media use among youth offers a multitude of opportunities to intervene to promote youth sexual health and to prevent disease transmission and unplanned pregnancies. Innovative sexual health promotion approaches have used technology to reach youth and change behaviors based on the premise that almost all U.S. youth use the web and mobile applications in their daily lives (e.g., texting, searching, and chatting) [3–5].

To date, there are few peer-reviewed articles published on the feasibility, acceptability, and effectiveness of using new media and technology to promote sexual health, particularly in the HIV prevention field [6–9]. Individual studies have looked at some of the key elements of Internet-based interventions, such as reach,

ability to serve vulnerable populations, ability to provide standardized information, ability to customize and tailor, interactivity, privacy, autonomy, portability, and cost-effectiveness [10–12]. In terms of mobile interventions, a recent review concluded that short message service, also known as text messaging, can be used successfully to promote short-term behavior change for a variety of health behaviors, including sexual and reproductive health [13,14]. However, there is still a considerable need for high-quality research to understand the impact of different forms of new media use on youth sexual health, as well as to determine the best ways to harness technology to promote safer sex behaviors, both for the short- and long-term.

The term new media is a broad term that refers to on-demand access to content anytime, anywhere, on any digital device, as well as interactive user feedback, creative participation, and community formation around the media content [15]. Some research has characterized new media as a medium that facilitates risky behaviors (sexual and otherwise) among populations most at risk for poor sexual health outcomes [16–20], although others have failed to find relationships between technology use and risky sexual behavior [21,22]. Recent research indicates that among youth posting on a teen dating site, 28% included risky content that has the potential to result in negative outcomes for youth [23,24]); young women were observed to post more risky content than young men. At the same time, many attendees and program interventionists see the Internet and other forms of new media as mediums of opportunity—places where reach, customization, and potential for behavior change are still uncharted territory. A recent RAND working paper on the influence of new media on adolescent sexual health cited the biggest challenge to the field as developing efficient measurement strategies that can be compared across research studies [25]. Valkenburg and Peter have also written about the risks and opportunities of online communication among adolescents, specifically referring to sexual self-exploration and unwanted sexual solicitation [26]. Other recent work has conceptualized technology as a "setting" critical to the development of sexual health among modern youth and highlighted the need to synergize interventions and support between off-line and technology "settings" [27]. It is clear that there is a significant need for research to both understand the impact of new media use on youth sexual health and to determine how to harness the reach and popularity of new media to promote short- and long-term healthy sexual behavior among youth.

In March 2011, ISIS, NIMH, and the Ford Foundation convened a meeting of more than 50 scientists and technology experts to discuss how to effectively conduct sexual health promotion research using new forms of technology. The meeting was structured to cover the following topic areas: (*i*) research– community partnerships, (*ii*) institutional review board (IRB) and ethical issues, (*iii*) theoretical frameworks, (*iv*) intervention approaches, (*v*) recruitment methods, and (*vi*) an assessment of impact. This article summarizes the meeting proceedings and key discussion points, offers recommendations to the researchers in this field, and outlines future directions.

Review of Meeting Proceedings

Research– community partnerships

Developing digital sexual education interventions requires engaging the communities for which the programs are intended.

This critical step enhances the relevance and value of the research, as well as its potential acceptability, reach, and impact. Attendees considered it critical to involve a community partner, such as a youth development agency or after-school program, early in the development process. When considering community partners for a project, researchers need to assess their capacity to participate. Although the partner may have collaboration (e.g., negotiation, problem solving) and logistical expertise (e.g., planning and organizing, outreach, program management), they may not have skills in conducting research, using new media and technology, and/or they may be uncomfortable with the sexual health subject matter.

Recommendations included engaging a community partner as a first step. The potential partner must be embedded and well respected in the community, interested in research, willing to actively participate in the project, and have the capability to facilitate ongoing two-way communication [28]. The staff of the partner organization must be comfortable with the subject matter and have a good relationship with the families of the youth they serve. Finally, an essential requirement is to hear the voices of the youth themselves.

IRB and ethical issues

IRBs are charged with ensuring the safety and well-being of study participants by regulating study procedures. There was a range of experiences with attendees' IRBs when planning and implementing online sexual health studies and interventions for youth. Due to the fast paced evolution of new technologies and social media approaches, IRBs require detailed explanation of the technologies and safety precautions being used. Additionally, since the focus of the research is on minors, additional protections are needed which can lead to delays in the review and approval of an IRB submission, compromising study timelines and budgets. With the constantly evolving world of technology, extended periods of waiting for approval can be problematic. Some attendees reported the need for more familiarity with the Internet and social media and lingering fears about protection of underaged subjects may lead IRBs to more closely scrutinize online protocols for sexual health research studies compared with protocols with an in-person approach to assess similar domains. This increased scrutiny included unforeseen questions regarding the scientific validity of the study, the rationale for collecting data or implementing interventions online instead of face-to-face, the handling and storage of these data, and the risk of data becoming identifiable. A lack of information in some cases may lead IRBs to be wary of the security levels implicit to the online research process, even when state-of-the-art procedures were being used and were well described in the protocols. Buchanan and Ess [29] found that only 30% of IRBs have had training regarding online research. Although focused more broadly on sexual health research among youth, Mustanski [30] lays out some helpful recommendations for working with IRBs. Given privacy and confidentiality concerns, it is surprising that few data exist on youths' perspectives on research regarding their online activities. One study by Moreno et al. [31] found that the majority of youth who had been included in a Facebook study had positive views toward using social networking sites for research purposes. More research is needed in this area.

Theoretical frameworks

Conceptual frameworks or theories are essential when designing and implementing intervention studies. Theories help us to understand why certain individuals are at increased risk for particular health behaviors, how to develop interventions to address these vulnerabilities, and what measures to use to evaluate the intervention. Although publications on the prevention of HIV/STIs among youth using new media do not consistently report the theoretical bases for the work, theories are critical for guiding research and, in the future, should be reported in publications.

The importance of using a theoretical basis was not contested by attendees; however, there was discussion regarding which theories were appropriate for work in this area. The dialogue focused on whether new theories were needed, whether integration of theories from other fields was warranted (e.g., engineering, communications, computer science, e-learning), or whether existing theories within the broader field of youth health promotion suffice (e.g., social cognitive theory [32], health belief model [33], transtheoretical model [34], the theory of planned behavior [35], and the information-motivation-behavior model [36].

The discussion on the need for new theories emerged from the limitations of existing theories. Attendees critiqued the limitations of using social cognition models to understand youth sexual behavior without taking into account other factors, such as partner characteristics, mood, affect, and pleasure. The second set of limitations had to do with the unique characteristics of conducting sexual health interventions using new media. One of the benefits of delivering interventions in these new media includes the frequency with which an intervention can be accessed and the ability of an intervention to be modified based on participants' responses. For example, mobile interventions have the potential to be targeted to an individual's changing behaviors and environment, as well as their baseline characteristics [37]. Therefore, models or theories could benefit from greater flexibility to respond to the dynamic nature of digital and mobile interventions [38,39].

The majority of attendees endorsed the benefits of using existing theories, yet noted that modifications are needed to address the unique features of interventions delivered online or through mobile devices [40]. There was general support for theories to more adequately address the specific mechanism of action for behavior change and the modality (e.g., game, video) most likely to be effective for changing specific outcomes in the digital and mobile arenas.

Intervention approaches

Discussion about intervention approaches was divided neatly into three sections: concept, development, and dissemination.

During the proposal development phase, there is a need to consider how their project will be responsive to changes in the technological context, as well as keep up with the pace of youth culture. The time from application to funding can be lengthy, and projects often span multiple years, so attendees suggested that a concrete plan for how to approach technological changes, as well as updates in cultural trends, be incorporated into proposals. Given the changing nature of technology and youth culture, there may be value in describing the proposed technological and cultural context rather than naming a specific technology (e.g., "social networking" rather than "myspace"). It was also sug-

gested that technology be used as a game changer, rather than a tool to implement what is already being done off-line, and that this could be highlighted in the innovation section of proposals. Information technology partners, as collaborators, need to be included in the idea generation phase.

The technological landscape will continue to change even as an intervention program is being developed. To grapple with this rapid change, it was suggested that there might be value of having a "sandbox" or incubator where they can constantly engage with emerging technology. For example, some academic centers maintain internal Web sites used as a forum for exploring the functionality of new technologies as they emerge. Lessons learned from these types of Web sites can then be incorporated into the creation of specific interventions that are timely and relevant.

If a program is shown to be effective, issues of wide-scale dissemination and implementation arise. For traditional HIV prevention programs (e.g., small group, face-to-face, and individual), the Centers for Disease Control and Prevention have developed a process for replicating efforts by packaging the intervention and disseminating it together with support for implementation (see http://www.effectiveinterventions.org/). None of the interventions, which have been packaged for dissemination, are yet technology-based, and few have kept up with trending youth culture. Currently, there are no models for how this could occur. Further complicating matters is the need for the technology to be hosted, maintained, and supported, which requires resources not currently contained within many community organizations or research grants after the data are collected and shared. Additionally, if proprietary technology was used to design and implement the intervention, it may not be possible to freely disseminate it within public health realms. All of these considerations need to be incorporated into the plan for intervention design and dissemination.

Recruitment methods

Recruiting diverse samples of youth and young adults online is challenging, despite the fact that there is no longer a digital divide in terms of technology usage by socioeconomic status, race, or ethnicity among youth [41]. Strengths and weaknesses of recruitment strategies for digital, new media, and mobile interventions, including social media and banner ads, respondent-driven sampling (RDS; original and modified), and a combination of in-person, online, and print efforts were identified by attendees.

Banner ads have been the most common way to recruit participants into online research, yet they are no longer as effective as they once were, and evidence shows that youth using social media may be reluctant to respond to them [42,43]. Although banner ads get more impressions (people who see the ads) than ever before because of the overall increase in Internet usage, the click-through rates to research surveys and protocol pages have decreased significantly. The high cost of designing ads and purchasing premium ad space has contributed to their declining use.

In response to reduced attention to banner ads and concerns about youth reluctance to engage with persons outside their own personal social networks online [42], alternative online recruitment strategies are being undertaken. Parallel to the popularity of social networking sites, network-based online referral strategies (e.g., RDS) have gained popularity [44]. RDS involves the recruitment of initial respondents (i.e., "seeds"); seeds are then

asked to recruit friends to enroll in the study. Their friends can also recruit other friends in multiple waves. Once seeds and their friends are recruited, contact with researchers can occur via in-person conversation, e-mail, text message, or phone call. There are no discernible differences in enrollment of participants between these different types of contact; however, researchers should strive to offer youth different contact modes (e.g., e-mail, text message) to maximize recruitment [45].

A combination of marketing efforts works best for recruitment for new media or mobile studies. Methods such as online personal networks, Web site postings, face-to-face in community settings (health fairs or other events), social networking and search engine ads, and advertisements in college newspapers were all mentioned in the discussion. Investigators use various techniques for eligibility screening, including both in-person and online screeners. Particularly among youth and minority populations, in the absence of face-to-face cues, nonverbal signals, and validated documentation of eligibility, some recruitment efforts were hampered by the online screeners [46]. Whenever possible, eligibility criteria should not be too obviously displayed to discourage those who might use the criteria to guide data entry in an attempt to fraudulently obtain study incentives [47].

A multipronged approach to recruitment is most likely to generate a large, diverse, and valid sample of the target audience. Combining online and off-line efforts appears to generate the largest and highest-quality samples. Researcher recruitment expectations should be established with a mind-set to respect the cultural norms of the online recruitment venue, being mindful that youth are curtailing their online activities to assist with study activities.

Assessing impact

This topic was highly debated at the meeting. The question central to the discussion was how impact should be measured when implementing technological and new media interventions around HIV prevention and sexual health? Because baseline assessments are sometimes absent or assessment varies greatly among different studies, it is difficult to compare outcomes. Even with relatively small effect size, given their broad reach, technology-based interventions may have the potential for significant impact.

Although all agreed that randomized controlled trials remain the gold standard of research, there are other methodological approaches for technology-based interventions that would take into account how quickly technology changes. Additional challenges include maintaining discrete study groups, particularly surrounding the issue of contamination. In fact, in studies using new social media, contamination may represent a critical strength, as it translates to maximum reach and exposure of target populations to the intervention. An earmark of success for social media is that an asset goes "viral," implying that it has strong motivational appeal and relevance to the population. Study designs such as stepped wedge designs and case studies may offer innovation for interventions using new media. Commercial market research strategies may provide alternative study design guidance. Market researchers tend to look at the impact of particular campaigns and projects rather than randomized controlled trials that are designed to measure efficacy.

To date, most clinical trials of Internet-based interventions have only proven short-term behavior change [8]. The discussion focused on the possible reasons for this lack of sustained behav-

ior change. Speculation included the short attention span of youth who grew up with the Internet, mismatch of interventions adapted for use online that are based on in-person efficacy, and necessity of continuous incentives and motivational rewards for long-term engagement in the social media world.

The issue of whether intervention fidelity can be assessed accurately with new media interventions is critical. Exposure to a message is not equivalent to "dosage." Whether a youth receives a message (exposure) is relatively easy to assess. A greater challenge is determining whether the youth read the message, understand the message, and consequently change their off-line behaviors as a result of their experience.

Engagement is also equally difficult to measure. Because new media encourage relationships between people and content, including the organizations that provide the content, measuring the quality of these relationships is key to quantifying the effectiveness of a health behavior change intervention. Deeper analysis of the demographics of the visitors, length of time spent on the site, referral sources, and measurement of the overall quality of interactions and experiences is necessary, although there is no single tool or defined process currently available.

Conclusion

The phrase "new media" is not a misnomer; instead, it accurately reflects the fact that not only has there been a revolution in access and engagement with media but also a constant evolution or "newness." What is hot and current in 2012 is likely to be either passé or revised in 2013. The pace of this constant evolution presents unique issues throughout the research process for those seeking to develop relevant evidence-based HIV prevention and other sexual health interventions for youth.

Key recommendations arose from this half-day researchers' meeting to inform the field of youth sexual health promotion and ensure rigorous future research efforts. Figure 1 provides recommendations by study phase, and the following points enumerate the key recommendations:

- Community: Find a community partner that is in synch with youth culture and comfortable with technology, and engage them in the research study from the start.
- IRBs: Institute universal training across universities and other organizations for IRB members regarding the unique attributes of new media research, and include expert information technology representation on all IRBs, whenever possible, to consult on technology-based applications.
- IRBs: Build IRB protocols from the outset that are expansive and flexible and that provide for contingency plans for realistic risks.
- Theoretical framework: Use theoretical models to move beyond answering effectiveness questions to gaining an understanding of the specific mechanism of action of technology and social media interventions.
- Intervention approach: Incorporate concrete plans for integrating technological changes into research plans from the outset. Develop technology in a scalable and portable environment to allow for future dissemination and maintenance.
- Recruitment: Use a multipronged approach that considers users of various technologies to generate a large, diverse, and valid sample of a particular target audience.
- Recruitment: Vary the time of day, offer multiple options for incentives, and ensure timely responses to e-mail and text
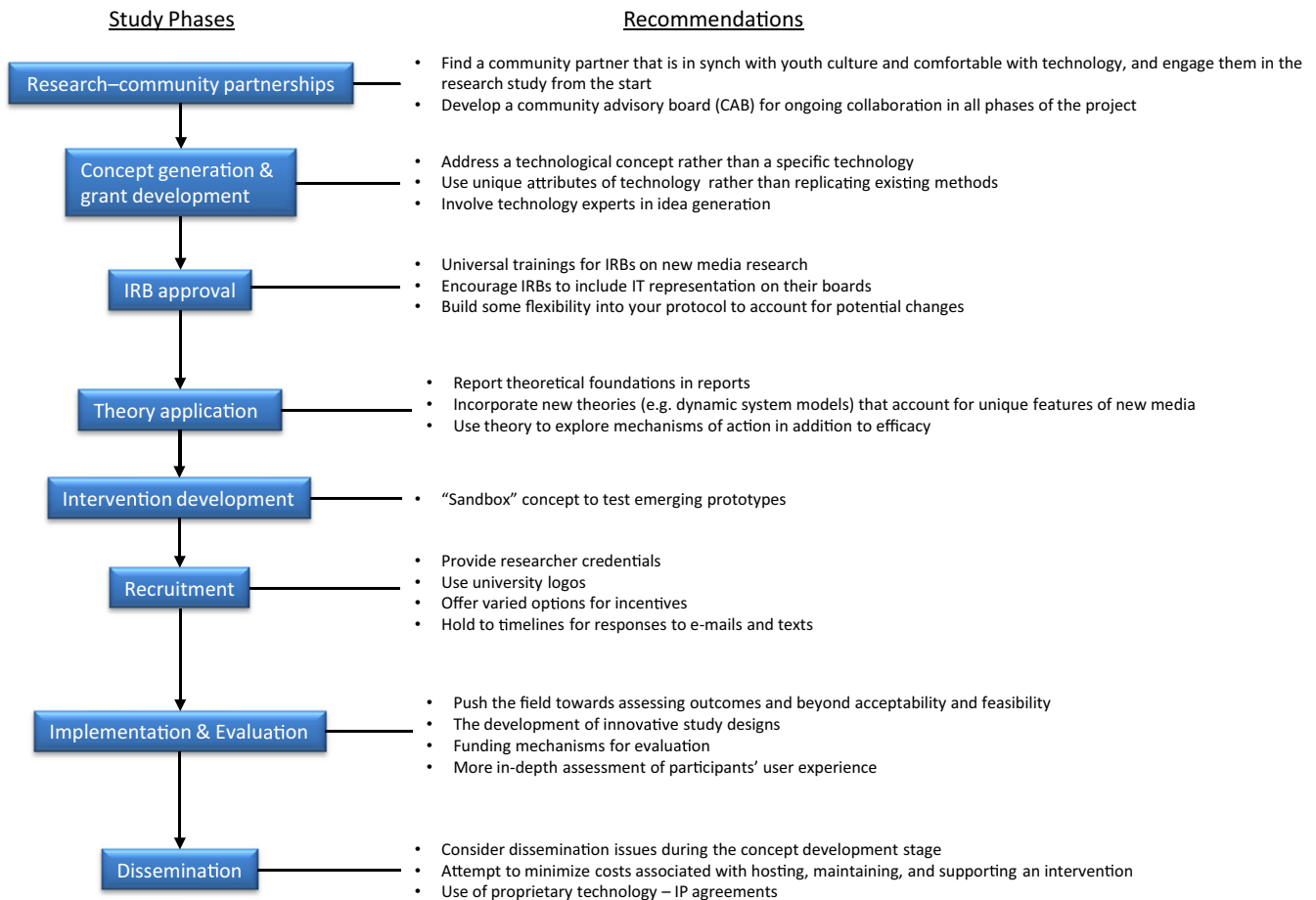
Study Phases   Recommendations

Figure 1. Recommendations for new media research by study phase.

messages to optimize success in online recruitment of youth samples.

- Impact and measurement: Move beyond the assessment of acceptability and feasibility to trials assessing behavioral and health outcomes.

Today's sexual health researchers, including those working within the HIV/STI and unplanned pregnancy prevention rubric, need to constantly engage with emerging technology to stay abreast. Philanthropists and government funding institutions also need to stay current, developing flexible funding mechanisms that foster an interdisciplinary research environment, which encourages low-cost agile research efforts. Changes are needed to proactively move the field forward and disseminate results quickly to reach the goal of a next generation of sexually healthy mature adults.

Acknowledgments

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