Disclosure, Ambiguity and Risk Reduction in Real-Time Dating Sites

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ABSTRACT

While social network capabilities are proliferating on many online services, research has focused on just a few popular social network sites. In this note, we consider a different kind of social network site, explicitly designed to support particular types of risky sexual activity among men who have sex with men (MSM). We consider the role of ambiguity built into the interface in how users manage self-disclosure and its association with articulating more friends-only or sexual connections on the site. Despite the site's explicit orientation toward risky sexual practices, we find indications that users mitigate potential public health issues through the practice of sero-sorting. We discuss how design considerations that may allow for easier entrance into a community can cause problems for long-term users, or generate potential public health issues.

Categories and Subject Descriptors

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Human Factors

Keywords

Social networks, interface design, exponential random graphs, public health

1. INTRODUCTION

Seeking out potential dates and spending time with friends are often done together offline, yet these two activities seem to reside in separate realms online. In fact, some of the largest dating sites, such as eHarmony or match.com, are oriented toward traditional dating practices and eschew social networking functionality in favor of creating a private and personal dating experience for their members. Though there is evidence that people use social network sites for dating activities, at times alongside traditional dating sites [10], most research on social network sites focuses on topics outside of romance.

In this paper we present a study of a real-time dating site with substantial social network functionality that is designed to support an alternative dating ecology of men who have sex with men (MSM) who are primarily HIV-positive. Although the vast majority of the users of this site identify as gay, we use the more neutral MSM term here [2, 6]. Researchers have long observed that the relative anonymity of the Internet allowed people, especially those with marginalized identities, to connect with similar others [12]. Homophily [13], the tendency of people to seek out others like

themselves (e.g. along race, age or education lines), is highly prevalent on dating sites [7]. There is also evidence that social network sites (SNSs) can provide more natural spaces for meeting potential dating or sexual partners, where the social network functions and context provide additional information for selecting a partner [10]. In the context of MSM and online dating, however, this ability to connect with similar others online has lead to varied consequences [2, 4]. Some MSM reported that negotiating condom use with a potential partner and revealing their HIV status was easier via a dating website or a newsgroup, thus reducing potential for abuse or sexual rejection [4]. Others described online dating through newsgroups, chat-rooms and dating sites as an easy source of partners for risky activities, such as unprotected casual sex [1]. In fact, MSM who tend to engage in high-risk sexual behaviors also tend to gravitate toward the use of the Internet for seeking out casual sex partners [11].

A logical question is whether dating and social network sites oriented toward MSM can use particular design features in their interfaces to enable negotiation of safer sex strategies even as these sites offer ways of meeting other MSM who seek to engage in high-risk sexual behavior. We discuss the role of ambiguity built into the interface of one such social network and dating site oriented toward MSM in how users manage self-disclosure as part of negotiating risky sexual practices. We consider potential public health issues involved in the use of such sites and how social network functionality and profile interface choices might be implicated in exacerbating or mitigating these issues.

1.1 Background

Thirty years into the HIV epidemic, mortality rates in the United States are going down. The development of highly active antiretroviral therapies (HAART) has improved the life expectancy and quality of life for HIV+ people. Yet new cases have been increasing in recent years, especially among younger MSM [6]. This is in part due to the re-emergence of unsafe sexual practices, including unprotected sex and the use of illegal drugs, such as methamphetamine. The success of HAART is sometimes seen as a factor in this trend by making living with HIV seem uneventful, especially for the younger MSM who do not have first-hand experiences with the horrors of the HIV epidemic of the 80s and 90s [5]. In a mixed HIV-status population, there is some evidence that sero-sorting (restricting sexual partners to those of the same HIV status) is an increasingly common sexual practice that can help reduce overall incidence of HIV [3]. This practice has been repeatedly observed on MSM online dating sites, where self-disclosure of individual HIV status in dating profiles is increasingly becoming a common practice [5].

1.2 Research context

Data reported in this paper come from a real-time online dating website, aimed at the MSM community as a place to locate partners for engagement in specific risky behaviors including drug use

and unprotected sex. This site is designed and marketed for short-term sexual encounters as the primary goal. By signing up and using the site users explicitly indicate their openness to a particular type of one-time sexual encounter regardless of what other goals they might have for joining the site. The site has a mobile version, but not a mobile app. Although the site has users worldwide, it is primarily US and Canada-focused. Unusual for dating sites (even those for MSM), this site has explicit support for social network features, allowing users to publicly identify others as friends, sexual partners, and/or relationship partners. The network is reciprocal: one individual initiates the link, selecting the link type from a limited list, and the other must approve the link and the link type before it is publicly displayed. The site requires users to indicate a range of demographic information including age, race, smoking, HIV status, drug use and relationship status. Users must provide an answer for all of these demographic variables; omitting or hiding them is not an option. However, in most of these attributes, there is an option "Ask Me" presumably designed as a way to explicitly indicate the need for further negotiation among the users. "Ask me" is an ambiguous response that suggests openness to further discussion while providing users with an option to limit self-disclosure. With this site, we have a unique opportunity to explore how risk is both mitigated and exacerbated not only through choices of partners articulated on such a social network, but also through explicit design choices on a website.

2. METHODOLOGY

We gathered network data along with demographic attributes by examining the individual users' profile web pages. This was done by starting with a single seed user and following all of the connections in a breadth-first fashion until the entire network of social relationships was examined. Data collection took place over the course of three days, in August 2011. The use of semi-public information like this has been a source of concern in the past [15]. We have addressed these concerns by ensuring that this particular site's Terms of Use allowed for this kind of non-commercial data collection, by anonymizing the site itself and by presenting all of the analyses at the population not the individual level.

2.1 Analysis

The site has many small "islands" of 2-5 otherwise unconnected individuals, but the largest component of the network was a, sparsely connected network of 13,442 individuals. Because our interest was centered on health implications of such a large, demographically and geographically diverse, and interconnected group, we restricted our analysis to this single component of the network. The demographic attributes, including HIV status and social network link type were selected by the users from a drop-down list of a small number of options on their profiles. In limited cases we were not able to automatically extract these demographic attributes from the profile; these were left as missing data.

3. RESULTS

3. 1 Descriptive Statistics

We recoded to binary the following demographic user attributes: race (recoded to white (1)/ non-white (0)), relationship status (recoded to single (1)/ not single (0)), personal HIV status (recoded to positive (1)/ negative (0)), openness to an HIV+ partner (recoded to open (1)/ not open (0)), and openness to drug use (recoded to

yes (1)/no (0))[1]. Age was also extracted; in later analysis, we created a dummy variable for age indicating whether users were too young to remember life before HAART or not, using a cut-off age of 25. Finally, we also collected the number of connections on each profile, separating these connections into 'friends only' and 'sexual' connections as indicated by the users. Given this site's

Variable Name	N w/ Answer	Mean	St. Dev	Min	Max	N w/ 'Ask Me'
Age	13391	40	9.13	17	76	N/A
White	12749	0.76	0.43	0	1	566
Single	8998	0.81	040	0	1	4081
HIV+	9610	0.68	0.47	0	1	3801
Partner HIV+	7903	0.96	0.20	0	1	5529
Drug Use	7177	0.67	0.47	0	1	6255
Friend links	13442	0.27	1.29	0	87	
Sexual links	13442	2.72	6.05	0	369	

Table 1: Descriptive statistics

explicit purpose of supporting sexual interactions rather than dating or other types of relationships, the explicit distinction between a 'friends only' and a 'sexual' connection is important analytically. Not surprisingly, users tended to have far more sexual rather than 'friends only' connections. Descriptive statistics for each variable are presented in Table 1. We also show how many individuals chose "Ask Me" as a response for each of the variables.

3.2 Interface choices

Our first set of analyses considers the role of ambiguity in self-reporting sensitive health-related information on profiles. Using 'Ask Me' as a way to limit self-disclosure was an explicit interface design choice made by the designers of the site (for instance, other sites allow users to omit some attributes all together). We consider whether such ambiguity is associated with evidence of risky sexual behavior. Predictably, users were more reluctant to disclose sensitive information. While less than 20% of the users were unwilling to disclose their race or sexuality (the majority of our sample self-identified as gay), nearly 30% were unwilling to disclose their own HIV status, 41% were unwilling to indicate their preference for potential partner HIV status and more than 45% did not report drug use preferences.

3.3 Self-disclosure as predictors of connections

We were interested in whether selecting an ambiguous answer rather than explicitly self-reporting attributes such as HIV status or openness to drug use might be related to having more or fewer connections on the site. Specifically, we hypothesized that ambiguity may be associated with more explicitly articulated friends-only connections while openness may be related to more sexual connections. In our sample 171 individuals indicated 'Ask Me' for every attribute. Conducting analyses with and without these individuals in the dataset produced identical results thus the regressions we present include them. We used regression analysis with robust standard errors to test whether limiting self-disclosure on the profile is associated with the number of sexual or friend links [14]. In both models we controlled for the presence of the other kind of links as having friends and sexual links had a positive correlation (r=0.28, p<.0001). We found that greater ambiguity (the total number of questions answered with "Ask Me") had a significant

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[1]Although this is displayed on-line as just "drug use," in practice, this is understood to mean methamphetamine use.

negative association with the presence of both friend (beta=-0.017, $p<0.05$, $R^2=0.07$) and sexual partner links (beta=-0.059, $p<0.001$, $R^2=0.08$). That is, greater disclosure was associated with a greater number of articulated online connections.

In order to understand which kind of self-disclosure might matter more or less, we conducted two regressions with robust standard errors, entering five dummy variables indicating if a user disclosed a piece of information or used Ask Me for race, relationship status,

	Friend links		Sexual links	
	Beta	*St. err*	*Beta*	*St. err*
Intercept	0.14***	0.04	2.84**	0.22
Friend links			1.25	0.71
Sexual links	0.06***	0.01		
Ask Me – Race	-0.07*	0.023	-0.14	0.20
Ask Me – Single	-0.03	0.03	-0.30*	0.13
Ask Me – HIV+	-0.02	0.03	0.20	0.12
Ask Me – Partner	0.02	0.04	-0.52***	0.13
Ask Me – Drugs	-0.04	0.02	-0.39***	0.09
	$R^2=0.07$		$R^2=0.08$	
*** p < .001		** p < .01		* p < .05

Table 2: Predicting number of connections

HIV status, preference for sexual partner HIV status and attitude toward drug use. Thus we isolated the role of each 'Ask Me' keeping all other variables constant. Results presented in Table 2 suggest a different pattern for sexual links vs. friend links.

Results indicate that having sexual links was associated with having friends-only links but not vice-versa suggesting that users primarily pursued sexual interactions on the site. This was expected given the explicit purpose of the site. Ambiguity about information that directly pertained to potential sexual interaction such as relationship status, partner HIV status preference and attitude toward drug use were significantly associated with fewer sexual links. While we realize that the models explain under 10% of variance in the data, we feel this result is still of interest. There are no doubt many individual factors unavailable to us for analysis that are important predictors of decisions behind articulation of sexual or friend contacts. Yet these results indicate that interface choices may be implicated in such decisions as well.

3.4 Network Characteristics
The large component is estimated to be about 10% of the total users of the web site, but it had only 20,113 total edges ($d = .00022$). Thus the number of dyadic ties per person followed a "power law" distribution, with most users displaying few ties and exponentially fewer displaying many ties. The median individual had one connection, and the mean number of ties per person was 2.992 (Std. Dev = 6.51). However, there is a long tail with the most prolific user displaying over 400 total connections.

3.5 Homophily in Relationships
Our key question was the degree to which homophily, especially in self-reported HIV status and openness to risky behaviors predicted relationships. We tested this with exponential random graph models (ERGM), as described in [9]. ERGMs help address the dependencies in network data, which cannot be adequately addressed with traditional methods like regression analysis [8]. The estimate returned by the ERGM model is the log-odds of the attribute predicting the existence of a link; for these results this is where both sides of the link have the same value of the attribute. We stratified the sample into friends-only links and sexual connection links based

on the fact that regression analyses revealed the two are correlated but not identical. The results of the complete ERG models are shown in Table 3.

Being open to drug use predicted that both friends and sexual connections would share the sentiment. We also saw evidence for sero-sorting: openness to a partner's HIV status was a significant predictor of a sexual link, as was having the same sero-status. Further evidence of this being intentional sero-sorting is that these attributes showed few associations in the case of friend connections.

	Friend links n = 1796 edges	Sexual links n = 18317 edges
Main Model		
Drug Use	0.431 ***	0.397 ***
Partner HIV+	0.106 *	0.334 ***
HIV +	0.102	0.159 ***
Rel. Status	0.241 ***	0.127 ***
Age	.110	0.174 ***
Race	.063	0.047 **
Ask Me Model		
Total Ask Me's	-0.128 ***	-0.091 ***
*** p < .001	** p < .01	* p < .05

Table 3: Exponential Random Graph Model Results

We found that relationship status had a stronger association with a friendship than in with a sexual tie. That is, individuals in a relationship were more likely to indicate friendship with other coupled individuals. In addition, age and race were significant factors in sexual relationships, but not in friendships. These two attributes suggest that traditional categories associated with homophily were not as critical for friendships articulated on this website.

We also observed a small, yet significant result in the level of ambiguity, number of 'Ask Me' responses in the profile. For both the friend and sexual connections, greater ambiguity in a user's profile compared to a potential connection was negatively associated with the presence of the connection. People willing to self-disclose sensitive information seemed to expect or motivate the same of their connections.

4. DISCUSSION

4.1 Ambiguity as Interface Choice
Providing options for managing levels of self-disclosure in a social network profile is a logical interface design decision. While traditional dating and social network site designs focus on providing information fields for potential conversation starters, in this particular context it was precisely such starter information that could be withheld, but marked as "negotiable" actively or by default. By design, users were unable to simply skip a particular attribute. Every attribute was displayed on their profiles but some could be marked with 'Ask Me'. We found that attributes that were potentially areas of negotiation among the participants (e.g. potential partner's preferred HIV status or attitudes toward drug use) were less likely to be revealed via the profile than attributes that were not negotiable, but still sensitive (e.g. own HIV status or current relationship status). Basic information, such as sexuality or race, was most likely to be revealed perhaps because it was also implicitly communicated in the fact that the site was oriented toward gay men and in the choice of photos users posted.

SNSs in general tend to invest substantial resources into encouraging their users to disclose ever more information. Our findings illustrate that even minute design decisions such as requiring answers to particular attribute inquiries or allowing different forms of ambiguity can have differing consequences. Some demographic and personal attributes can be communicated explicitly or implicitly via a range of options, such as specified fields, photos, and expressions of approval or support. Others, such as, for example personal HIV status or preferences for sexual partner HIV status, are deeply personal and must be handled with care. The minutiae of design decisions around profile options deserves particular attention because even the smallest changes can result in substantial differences for user interactions.

4.2 Self-disclosure and "Success"

Articulations of a sexual or a friend connection on such a dating site can be construed as displays of a kind of success. Our data illustrate that greater self-disclosure was associated with higher levels of such "success", here, defined as more connections. Ambiguity was a bit of a double-edged sword. While it could provide a degree of protection in revealing sensitive personal information, potentially helping people feel more at home on this site, those who took advantage of this option consistently displayed fewer connections. Most importantly, it was ambiguity in expressing preferences for partner HIV status and drug use that appeared most strongly associated with fewer sexual links. Arguably, this kind of information is most important for speeding up a successful negotiation of a fleeting sexual encounter. Such information could likely be used as indicators for risk reduction practices (serosorting, drug use) in concert with personal HIV status. There is no one correct design for managing self-disclosure: ease of use must be balanced against complexity and community development. Critically, designers need to consider approaches that may help enculturation and easing into a new community, especially one as fraught with risks and fears such as for example becoming HIV+. For example, how might we design profile interfaces to support individuals who are in the process of adjusting to their new and possibly frightening HIV+ status and thus exploring sites that are part of this new to them community? In future work, we will consider whether the use of "ask me" is an enculturation step into an HIV+ status.

4.3 Homophily and Health Implications

Sero-sorting remains controversial as a safer sexual practice especially when it is done in lieu of condom use. Although [3] suggests it may be a viable harm reduction strategy, the risks of superinfection as well as transmission of other STDs remain. While our data suggest some sero-sorting in environments with high expectations of risky sexual activity combined with drug use, these are not large effects. Attraction, especially in the face of risk, remains difficult to understand and model.

Sero-sorting is a particularly risky choice for HIV- MSMs. In one study, over half of all HIV infections were caused by individuals who believed they were negative [4]. One real risk is that niche websites may serve to provide a false sense of confidence about potential partner's HIV status. This is an area where HCI research may be able to help: a change as simple as adding a field for last test date may alter some risks associated with using such a site. Such small design suggestions are important when considering a range of SNSs that have emerged to support niche communities engaging in risky activities.

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