

# A question of trust: user-centered design requirements for an informatics intervention to promote the sexual health of African-American youth

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## ABSTRACT

**Objective** We investigated the user requirements of African-American youth (aged 14–24 years) to inform the design of a culturally appropriate, network-based informatics intervention for the prevention of HIV and other sexually transmitted infections (STI).

**Materials and Methods** We conducted 10 focus groups with 75 African-American youth from a city with high HIV/STI prevalence. Data analyses involved coding using qualitative content analysis procedures and memo writing.

**Results** Unexpectedly, the majority of participants' design recommendations concerned trust. Youth expressed distrust towards people and groups, which was amplified within the context of information technology-mediated interactions about HIV/STI. Participants expressed distrust in the reliability of condoms and the accuracy of HIV tests. They questioned the benevolence of many institutions, and some rejected authoritative HIV/STI information. Therefore, reputational information, including rumor, influenced HIV/STI-related decision making. Participants' design requirements also focused on trust-related concerns. Accordingly, we developed a novel trust-centered design framework to guide intervention design.

**Discussion** Current approaches to online trust for health informatics do not consider group-level trusting patterns. Yet, trust was the central intervention-relevant issue among African-American youth, suggesting an important focus for culturally informed design. Our design framework incorporates: intervention objectives (eg, network embeddedness, participation); functional specifications (eg, decision support, collective action, credible question and answer services); and interaction design (eg, member control, offline network linkages, optional anonymity).

**Conclusions** Trust is a critical focus for HIV/STI informatics interventions for young African Americans. Our design framework offers practical, culturally relevant, and systematic guidance to designers to reach this underserved group better.

## INTRODUCTION

Sexually transmitted infections (STI), including HIV, are a significant public health concern for young people in the USA. Among 15–24-year-olds, 9.1 million new cases of STI, such as chlamydia, develop annually.<sup>1</sup> In 2010, 8293 new cases of HIV emerged in this group.<sup>2</sup> African-American youth have the highest rates of HIV and other STI of any racial group in the USA.<sup>2–3</sup> Social network

characteristics may explain these differential rates: with higher rates of HIV/STI in their social networks, African-American youth face greater odds of acquiring these infections during each sexual encounter.<sup>2–4–5</sup> Network-mediated social influence also affects HIV/STI-related risk behavior.<sup>6–7</sup> Therefore, interest is growing in social network-based HIV/STI prevention for youth,<sup>8–9</sup> especially using social technologies.<sup>10–11</sup> Although several offline network-based interventions have reduced HIV/STI-related risk behavior,<sup>12–14</sup> previous HIV/STI informatics interventions have rarely adopted a network-based approach.<sup>15–18</sup> Therefore, we sought to extend both HIV/STI prevention informatics and network intervention research by developing and evaluating a hybrid online/offline network intervention for African-American youth.

Design guidance is lacking for social network-based informatics applications promoting sexual health, particularly within underserved groups.<sup>19</sup> Therefore, to inform intervention development, we conducted a series of design-oriented focus groups with African-American youth in a US city with high HIV/STI prevalence. Unexpectedly, most youth recommendations focused on trust, pointing to an important cultural issue for designing consumer health informatics (CHI) applications, or '... any electronic tool, technology or system that is primarily designed to interact with health information users or consumers'.<sup>20</sup> Consequently, we present a novel trust-centered design framework for online HIV/STI prevention with African-American youth. We discuss the implications of these findings, then outline specific design choices salient to our framework. We conclude that trust should be a central design focus in CHI interventions for African-American youth.

## BACKGROUND AND SIGNIFICANCE

Whether online or offline, network-based HIV/STI prevention must make trust a central concern.<sup>21</sup> Trust is '...a state of favorable expectation regarding other people's actions and intentions'.<sup>22</sup> Or we may distrust, holding 'negative expectations'.<sup>23</sup> Trust in one's sexual partners is a predictor of condom use and HIV/STI risk.<sup>24–28</sup> Risk reduction requires both trust in prevention technologies, such as condoms and HIV/STI tests, and trust in HIV/STI interventions themselves.<sup>21</sup> Similarly, trust is a critical antecedent to the success of CHI interventions,<sup>29–30</sup> affecting how they are used: whether recommendations are followed,<sup>29–31</sup> whether

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users contribute content or participate in discussions,<sup>32 33</sup> and whether personal information is disclosed.<sup>34</sup> Although at a nascent stage,<sup>35</sup> health informatics research is thus increasingly focused on online trust promotion.

Specific design decisions can influence trust in CHI applications. Professional visual design may engender trust.<sup>36</sup> Quality markers, such as references, may increase user trust in information.<sup>36</sup> Trust may be enhanced with user participation in content production.<sup>37</sup> Trust may be promoted by responsiveness to user needs, as with system personalization.<sup>36 38</sup> References from users may also be used to promote the trust required for health-related transactions.<sup>39</sup> For example, reputation systems, like RateMDs.com, provide decision support for choosing healthcare providers, and recommender systems like the one embedded in PatientsLikeMe.com aid in treatment option assessment.

Although these design approaches may promote user trust in general, they do not account for group-level trusting patterns.<sup>40</sup> Trusting patterns vary among social groups in the USA,<sup>41</sup> reflecting group culture, or the 'system of meaning that underlies routine and behavior in everyday...life'.<sup>42</sup> In the USA, race is a significant determinant of differences in trust levels.<sup>41</sup> African Americans' greater distrust of healthcare institutions is linked to a history of unethical medical experimentation and unequal treatment in healthcare settings.<sup>43</sup> This distrust is linked to an inequity in health service usage,<sup>44 45</sup> potentially including CHI applications.<sup>46</sup> When compared to whites, African Americans are less likely to use personal health records,<sup>47 48</sup> and patient portals,<sup>49 50</sup> or to look for health information online.<sup>51</sup> These racial differences are not entirely explained by internet access differentials.<sup>48 50 51</sup> African Americans also express more concerns about online privacy than other racial groups.<sup>52</sup>

Given these differences, formative research must inform CHI intervention development to ensure effectiveness for African Americans.<sup>20 53</sup> Similarly, trust is a critical factor in the emerging practice of culturally informed design of CHI interventions for this group.<sup>19 53 54</sup> Therefore, an urgent need exists to investigate collective trust perceptions in order to inform the design of network-based informatics interventions, particularly those aspiring to engage African Americans. Sociological trust theory offers a useful bridge between the broad lens of culturally informed design and our specific trust focus.

### Theoretical framework: sociology of trust

Sociological trust theory highlights the collective basis of trust. Trust is a multilevel phenomenon, with (dis)trust carrying over between targets at different levels of social aggregation, including people, groups, technologies, and institutions.<sup>55</sup> Cultural factors, including norms, values, and symbols, tell us who or what to trust, and when to trust (the 'primary targets of trust').<sup>55</sup> The expectations underlying (dis)trust are systemically rooted in culture. Two key expectation types include: axiological trust, the morality of others—including honesty and benevolence<sup>23 55</sup> and instrumental trust, which concerns competence or reliability.<sup>55</sup> We also accord trust to 'secondary targets', or sources of information about the trustworthiness of people or things, including reputation and credentials.<sup>55</sup> As will be discussed, each of these trust targets and expectation types were important to participants.

Social contexts influence trust, partly by reinforcing trustworthy behavior.<sup>56</sup> Cultural factors, such as the internalization of social norms, tell us how to respond to someone's investment of trust in us. Trust is also made possible when groups can monitor their members<sup>57</sup> and enact social sanctions against them—whether or not this is actually done ('network closure'). Our investments in ongoing relationships with others also

facilitate trust.<sup>57</sup> Sociological theory, therefore, identifies trust as both a cultural phenomenon and a network capability; both insights helped us interpret user requirements and translate them into a design framework.

### Research aims and objectives

Using trust theory, we examine youth's intervention-relevant trust concerns and design preferences for a network-based informatics intervention focused on HIV/STI prevention. We aim to translate youth's perspectives into a trust-centered design framework to guide our own informatics intervention, as well as others focused on HIV/STI prevention for young African Americans.

## METHODS

### Intervention context

We initiated a quasi-experimental intervention study to test a community-based HIV/STI prevention intervention's efficacy for African-American youth in a high prevalence area of Michigan. The intervention's offline components include 'HOPE' (HIV/sexually transmitted disease outreach, prevention and education) parties, at which young people host facilitated HIV/STI education sessions for themselves and the people in their 'naturally occurring' social networks. Face-to-face HOPE parties were created in 2000 by YOUR Center, a local, faith-based non-profit organization.<sup>58</sup> The intervention's new informatics components are being developed to amplify the HOPE parties' effects by giving participants tools to promote and support safer sex in their social networks. We plan to leverage the HOPE party networks through an informatics intervention that will reinforce normative messages regarding risk reduction and support safer sex goal achievement. The planned informatics intervention will include applications for existing social network systems used by HOPE party participants, such as Facebook and Twitter, and a suite of standalone tools on a HOPE party website (to include an associated mobile application). We report here on focus groups initiated to inform the design of this informatics intervention.

### Study participants

This research was conducted in a midwestern, mid-sized urban area where young residents experience disproportionate HIV/STI rates.<sup>59 60</sup> The county has unemployment and poverty rates above the state average,<sup>61</sup> and the city's population is over 50% African American.<sup>61</sup> Participants included 75 African Americans who averaged 18.3 years of age (see table 1). More than half (71%) were women. The majority (88%) were heterosexual; 12% were lesbian, gay, or bisexual (LGB). Fifty-seven per cent had not completed high school. The majority (67%) were students or unemployed.

### Research design

Between 2009 and 2010, we conducted 10 semistructured focus group interviews with African-American youth, including one for LGB participants. We chose the focus group method because it can elicit group-level assessments, meanings, and processes.<sup>62</sup> The interviews, lasting from 90 min to 2 h, addressed young people's intervention-relevant perspectives and design preferences. The focus group discussion guide is published online as supplementary material to this paper. Focus groups had two facilitators and an average of eight participants. Participants were recruited through community-based organizations (CBO), churches, high schools, vocational programmes, and word of mouth. They completed a demographic survey and received a US\$20 honorarium.

Focus groups were audio recorded and transcribed. Transcripts were analyzed deductively using sociological trust theory and

**Table 1** Characteristics of study participants (n=75)

Characteristics	Number	Percentage
Gender		
Male	22	29
Female	53	71
Age		
Mean/median	18.3/18	
Range	14–25	
Sexual orientation		
Heterosexual	66	88
Gay/lesbian/bisexual	9	12
Education		
Grade 8 or less	3	4
Grades 9–12, no diploma	40	53
High school graduate or equivalent	11	15
Some college	16	21
Associate or Bachelor's degree	3	4
No response	2	3
Employment		
Full-time	1	1
Part-time	15	20
Unemployed or student	50	67
No response/other	9	12

inductively; both strategies used a qualitative content analytic approach<sup>63</sup> within NVivo software. Initially, three sample focus group transcripts, selected for their age/gender diversity, were discussed by three research team members. Sociological trust concepts and emergent themes were identified and used to construct a preliminary codebook. Using this codebook, data were coded by one research team member (TCV) and the team discussed the results. Additional emergent themes were identified and incorporated into the codebook after discussion. Memos developed using these codes formed the basis of this paper.

## RESULTS

### Intervention-relevant trust concerns

#### Personal and group trust

Participants expressed powerful expectations of morally questionable conduct by others in HIV/STI-related contexts, suggesting ‘personal trust’<sup>55</sup> as a design concern. For youth, HIV/STI infection was a sign that people did not care about themselves (see table 2). Participants also believed that people took negative experiences out on others. This presumed vengefulness was evident in their belief that people with HIV/STI deliberately infect others. Therefore, participants felt that sharing rumors about people perceived as intentionally spreading the disease was almost a public service. Participants also believed people were dishonest—particularly about revealing their HIV/STI status. They contended that widespread infidelity and irresponsibility contributed to the burden of HIV/STI in their community. Participants stated that self-protection was therefore essential, ‘Since you can’t trust nobody, you got to protect yourself’. Personal distrust was reinforced by distrust in the social groups to which residents belonged. Participants believed the social context, including unstable families and community disinvestment, supported immoral conduct.

#### Institutional trust

Participants doubted the benevolence of institutions in relation to their HIV/STI response. Some believed that the government did not care what happened to African Americans and that

doctors had self-serving motives. However, nurses, especially those in schools, were thought to be more impartial and information shared with them would be confidential. Perceived judgment by teachers at school left some skeptical of school-based sex education (SBSE). Although churches were important to many, some youth felt that church-goers were judgmental regarding sexuality. CBO were viewed as more helpful than other organizations due to their honesty and HIV/STI awareness-building programmes.

#### Technological trust

Sociological theory asserts that trust ‘carries over’ between targets; similarly, youths’ personal trust concerns were amplified when communicating about HIV/STI with information technologies. Given the sensitive nature of HIV/STI issues, these concerns focused on privacy and safety. Therefore, while youth wanted better access to HIV/STI information, they perceived high social costs in looking for it. Participants feared technology-facilitated privacy breaches. For example, people said mobile phones may be stolen or ‘borrowed’, so personal messages could be viewed by others and easily forwarded, and sometimes altered in the process. With an intervention focus on HIV/STI, participants worried about the spread of negative gossip on the internet. This seemed plausible because such gossip frequently focused on sexuality, including allegations of promiscuity. Frequent online fighting was also a concern in an intervention context, because fighting often focused on infidelity accusations—sometimes accompanied by claims regarding HIV/STI transmission. Participants felt that the potential for online fighting was exacerbated by a lack of accountability on social media.

Participants’ technological trust also focused on HIV/STI prevention technologies, including condoms and HIV tests. For youth, suitable modes of HIV/STI prevention conformed largely to recommended strategies: limiting one’s sexual partners, condom use, and HIV/STI screening. Although most advocated condom use, some youth distrusted the reliability of condoms—an ‘instrumental distrust’.<sup>55</sup> Such fears may have been reinforced by SBSE that emphasized condom failure.<sup>64</sup> Participants did not state whether their distrust of condoms was linked to condom failure experiences, but some felt they were insufficiently informed about effective condom use: ‘us in our community don’t always get taught about lubrication... that’s looked down upon, but... that could be why it’s breaking.’

Similarly, many participants espoused the belief that HIV/STI testing was an important self-protective strategy. Several planned to get tested with any new partners. Test results were also seen as a reliable certification of disease-free status. Yet, a significant minority expressed distrust in HIV test results; this was linked to confusion about how long test results remained accurate and the time period between HIV infection and a positive test result.

#### Trust in information

As mentioned, sociological theory characterizes information as a ‘secondary’ target of trust.<sup>55</sup> Participants reported inconsistent access to trusted information about HIV/STI. In a state where SBSE policy is decided locally, some youth went to schools that did not provide any SBSE. Adults often had difficulty speaking frankly with youth about sexual health. Participants said this left them with critical knowledge gaps, ‘(t)he education, the knowledge of how to catch the STDs are not there. We think we know but you really don’t know.’ At times, people were forced to gain information from untrusted sources, ‘...growing up, I had to learn from the streets what an STD was.’

**Table 2** Youths' intervention-relevant trust concerns

Personal trust (axiological/moral (dis)trust)	
Caring	'...if they cared they wouldn't have gotten it in the first place by having unprotected sex...'
Vengefulness	'...there was going around a picture of a guy in (city name) passing around AIDS... I passed it on to everybody, because, he don't care...'
Dishonesty	'If they do have disease, they're not really gonna tell you.'
Infidelity	'...you can be with one person and they can do... other stuff... so having sex period... is putting yourself at risk.'
Irresponsibility	'People are not being responsible here.... Everybody know everybody, everybody done did everybody.'
Group trust (network closure/accountability)	
Family instability	'A lot of people don't care (for themselves) because they ain't got nobody to care for them.'
Community disinvestment	'...everything leaving (city name)... it's not safe any more... like it can be with the STDs, it can be with the crime... we just don't care.'
Institutional trust (benevolence)	
Government	'The Center of Disease Control, they know that African Americans are dying out... from HIV and AIDS. What are they doing about it?... sex education in seventh grade. It's like they want us to die out.'
Healthcare providers	'P1: And I think some doctors just become doctors to be nasty. P2: And to get money. Some just, like I said, doctors get a paycheck. They don't really care...' '...the (school) nurses... since they are 'certified' they cannot talk about you...'
Teachers	'...teachers... know you, judge you, and they like to talk about you.'
Churches	'...you don't talk about (sexuality) because it's supposedly bad... (with) that kind of an attitude... questions are shoved under the carpet.'
CBO	'(Name of CBO)... they answer your questions, they're up front...'
Technological trust	
Information technologies (privacy and safety)	
Social costs of HIV/STI-related information seeking	'...if we are embarrassed or it's too personal, we can... use the internet and not have to talk to people about it.'
Technology-facilitated privacy breaches	'...the messages may be shown to other people... people may change your original text message...'
Negative gossip	'When we do speak upon it, it's more of just gossip... what such and such done her.'
Fighting	'...they're talking about who's sleeping with whose man. (The internet is) trouble.'
Prevention technologies (instrumental (dis)trust)	
Reliability of condoms	'...no matter who it is... make sure you use a condom...' The last time I learned about HIV and STDs is the...seventh grade... I learned that even though you use a condom, you can still get it.'
Accuracy of HIV tests	'... before we get intimate or get serious, we should both go get checked together.' ...maybe you don't have it this time, maybe... it's sitting there in your body not coming out 'til five years later. You turn thirty, how I got this? "I don't know."'
Trust in information (secondary targets of trust)	
Credentials of experts	'...you never know by touching hands, I know that you can't... but... I still don't want to touch it cause you, they might come up with a new invention, and it might come out in the air and you can get it...'
Reputation and rumor	'They said most of the people in the (apartment complex) had it and trying to pass it down... a lot of people messing with the same person.' 'They be lying sometimes. They steal somebody's phone and just take a picture. And be like, "she got this. They got this. Don't mess with them"... they be mad at them.'

CBO, community-based organization; STD, sexually transmitted disease; STI, sexually transmitted infection.

Furthermore, participants in four focus groups rejected the research-based information they had received about HIV transmission, advocating the view that HIV can spread through toilet seats, saliva, and shaking hands. These beliefs may be interpreted as a lack of trust in experts' credentials, including those accorded by healthcare institutions.

For youth, information about others' reputations was critical to HIV/STI-related decisions. Participants said that reputation-oriented rumors circulated consistently, rapidly and widely through mobile technologies. Some doubted the motives of people who circulated such rumors and questioned their veracity. Nevertheless, participants still avoided people thought to have HIV/STI, 'I ain't gonna say I believe what this person is telling me... it might be true. It might not... but... I'll probably stay clear away from them.'

### Design feature preferences

Participants' design preferences often aligned with their aforementioned trust concerns, informing development of a

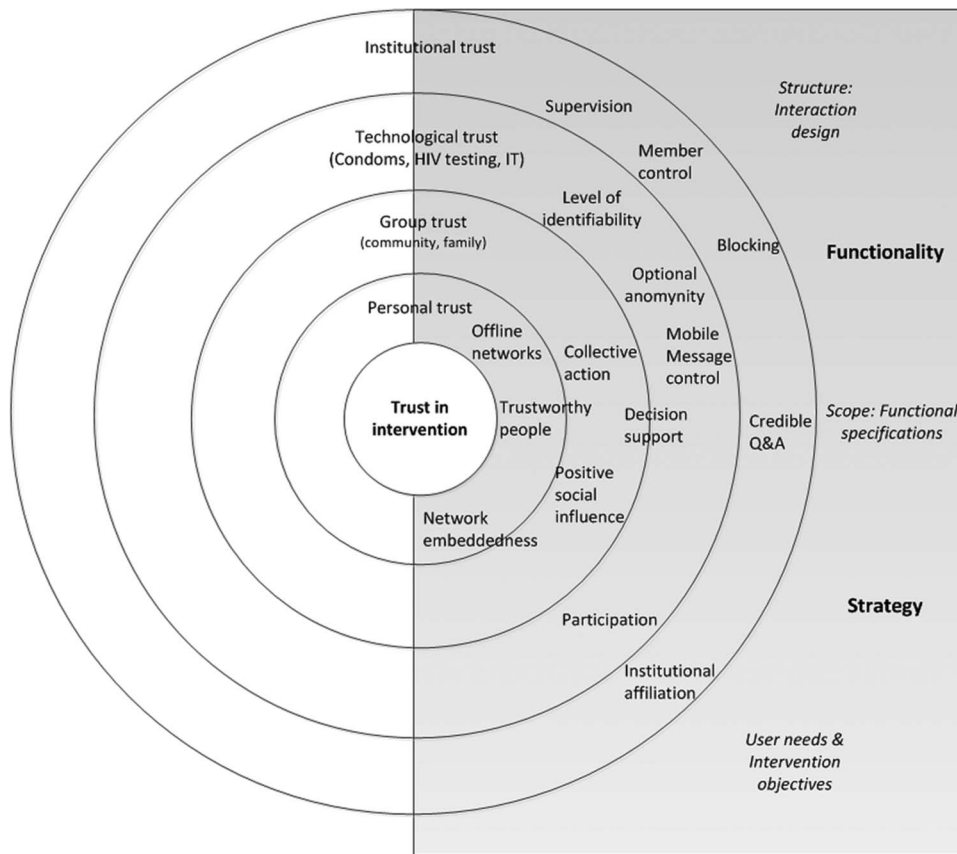
trust-centered design framework that incorporates recommendations about intervention strategy and functionality (figure 1).

### Intervention strategy

Participants' aforementioned perspectives on institutions suggested that CBO might provide trusted institutional affiliations for an intervention. As table 3 shows, participants wanted CBO to reach more people. Perhaps because of personal distrust, network embeddedness, including endorsement by trusted people, was also thought to be an ingredient of intervention success. Youth also wanted to participate in an intervention, from promoting it to writing blogs to educating younger people.

### Intervention functionality

The most desired intervention feature was credible information, provided via articles or question and answer (Q&A) services. In line with their institutional trust patterns, desired Q&A services might connect them to nurses or CBO staff. For example, youth responded positively to the prospect of texting questions to a



**Figure 1** Trust-centered design framework for informatics-based, social network intervention for HIV/sexually transmitted infections prevention.

nurse. The next most desired intervention functions were decision support aids. As per their inconsistent trust in prevention technologies, the most popular possibility was recommendations about condoms and lubrication, and videos on correct usage. Participants also wanted information about confidential local services, such as HIV/STI testing sites and sources of free condoms. Several wanted application features that would identify sources of risk, including specific people and neighborhoods. To help assess individual risk, participants requested scenarios and interactive evaluation tools. A few desired personal stories to give the information more life.

Participants wanted ‘good role models’ and other trustworthy people to be with them in an intervention. Relatedly, there was interest in creating profiles for couples. Although some youth preferred to connect online only with people they had met offline, a few felt open to making new, trustworthy friends in an intervention context. Several wanted an intervention to facilitate collective action to help the whole community get involved in prevention. A desire existed for positive social influence from peers to be part of an intervention.

#### Interaction design

Participants wanted optional anonymity when using an intervention and a choice regarding their level of identifiability (including online pseudonyms)—log-ins, profiles and friends should not be mandatory. They were also concerned about possible privacy breaches associated with unsolicited mobile messages. Therefore, they responded more positively to the idea of initiating mobile communication, such as with Q&A services.

Because participants worried about the potential for negative interactions, they looked to intervention providers to institute

safety mechanisms. Participants expressed a desire for supervision, like moderation on a discussion board. For example, LGB youth feared discrimination and thought prevention would require supervision. Participants wanted to choose with whom they interacted. Membership control features, such as reporting, and individualized solutions, such as blocking, were mechanisms identified for doing so. Participants felt a connection to offline networks, such as partners and close friends, also increased online safety.

#### DISCUSSION

Results of this study highlight a need to revisit the undifferentiated approaches to online trust that prevail in health informatics. Supporting a collective approach, trust issues were central to African-American young people. In line with a cultural interpretation, participants’ concerns referred to multiple targets. Their design preferences also went beyond established online trust-promoting strategies. As part of this, they advocated for intervention features, such as positive social influence and collective action, which align with sociological theory’s insights regarding the collective basis of trust. Therefore, we present a new, trust-centered design framework for a network-based HIV/STI prevention informatics intervention with this population. This framework summarizes participants’ design preferences systematically, while conceptually organizing them with the aid of sociological theory’s concept of trust targets.

A strength of our framework’s theoretical grounding is that it aligns CHI intervention design with insights regarding the cultural basis of trust. Therefore, we offer interventionists an approach for addressing trust as a system of collective meaning, with the implication that designers should focus effort on connecting their CHI applications with a group’s pre-existing

**Table 3** Trust-centered design preferences

System strategy	
User needs and intervention objectives	
Institutional affiliation	'(CBOs)... are really... influential... as far as promoting awareness... but y'all could be more aggressive and get your names out more.'
Network embeddedness	'...they be like "I ain't going it unless my boy doing it." ...Try to best suit how people is...'
Participation	'...teach... you will feel better...' 'Where we could write a blog.' 'Have us promote your website.'
System functionality	
Functional specifications	
Credible Q&A services	'...if you're talking to somebody that you know is a... professional about it, you might get more facts.... Not just he said, she said.'
Decision support	
Recommendations of condoms and lubrication, with use instructions	'...how to put a condom on... the proper ways.'
Local resources	'...more places they felt comfortable that it was going to be confidential.'
Identification of high-risk places	'...what area codes have more sexually transmitted disease(s)...'
Identification of high risk people	'...the type of people who have... an STD...'
Interactive risk assessment tools	'...different questions... when they answer it... tell them, "you could be at a risk of this or at risk of that."'
Scenarios	'...what can result from what you're doing. Just scenarios. Like this happened, this happened.'
Personal stories	'...get somebody they age that's going through the problem.' '...people (with HIV/AIDS)... discuss... how they caught it... and how they're dealing with it and how everybody treating them from it.'
Trustworthy people	'Trying to find out this about this. It'd have to be somebody you... trust.'
Collective action	'When... it's something that can affect the black community... people want to be involved.'
Positive social influence	'Why can't we have some positive peer pressure within the community?'
Interaction design	
Optional anonymity	'...the option to either have a user name or just go on as "guest".'
Level of identifiability	'I don't want... my picture and my profile on a sexually transmitted disease website... Because everybody in (name of city) knows each other and stuff gets started real easily.' '...anonymous discussion wouldn't be too bad where there's no picture.'
Mobile messages	'...one of your friends might have your phone and then it gets around to everybody.'
Offline networks	'I'd rather be in there... with my friend... he have my back or I got they back...' '...we all interested to have... new friends... even a website buddy.'
Supervision	'...it should be moderated... in case somebody who is just out there to find a site to start a mess.'
Membership control	'You can report them, and... they can get booted off the site.'
Blocking	'...I have to block somebody (on Facebook) today.'

CBO, community-based organization; Q&A, question and answer; STD, sexually transmitted disease.

cultural associations regarding trust. Furthermore, sociological trust theory asserts that there is a 'carry over' between varied trust targets, including those at different levels of social aggregation. This insight highlights the importance of the social context of a CHI intervention regarding HIV/STI to its acceptance. Related design choices echo work in non-health contexts to build trust by leveraging offline relationships.<sup>65 66</sup> However, our framework goes further in suggesting that interventionists should concern themselves with positioning their efforts in collaboration with people and institutions that young African Americans already trust. Such concerns broaden the lens of traditional CHI application design practice, and extend health informatics investigations of trust beyond the better articulated area of data security.

To address technological trust, our framework proposes a new application area for user reference aggregation. Decision support features, such as recommender systems, could address instrumental distrust in condoms and HIV/STI tests by providing reviews or ratings of them, and the personal value of risk-reduction behaviors. Such aggregate recommendations may facilitate well-placed trust in prevention technologies and behaviors, while exerting positive social influence. For example, participants' interpersonal distrust can be read partly as a critique

of behavioral norms in their community. Yet, publicly available normative information concerning HIV/STI is limited because preventive behaviors, such as condom use, are typically pursued privately.<sup>67</sup> Online recommendations may facilitate the communication and visibility<sup>68</sup> of norms, making them more amenable to deliberate change.

Following sociological theory, our framework contends that an intervention could influence group trust by facilitating network closure, with 'trustworthy' behavior being a potential result. Therefore, sociological trust theory provides a theoretical basis for designing CHI interventions that promote group monitoring and accountability. In our case, building on youths' desire for participation, an intervention could provide youth with opportunities to disclose their HIV/STI-related intentions and actions voluntarily, perhaps through a Facebook application or standalone reputation system. As requested, and building on couple-centered HIV/STI prevention,<sup>69</sup> an intervention could also allow couples to share information about their commitments. Such public statements could hold people accountable to themselves and others. Although the success of such approaches requires positive youth involvement, this could be facilitated by training and support. For our intervention, the availability of a cadre of educated HOPE party participants offers advantages.

Trust-centered design aligns with contextual models of sexual health that treat youth risk behavior as the endpoint of influences including peer networks, families, communities, and institutions.<sup>70</sup> Using sociological trust theory as a basis for design, an intervention could address such contextual risk factors through (as youth requested) collective action, thus building on findings from community informatics<sup>71–72</sup> and offline interventions that created health-based social movements.<sup>73</sup> Young people could thus be moderators of web-based discussion, conduct outreach, or disseminate pro-safer sex messages through their online social networks. There may also be a place for online activism that engages the wider community, such as e-petitions or online event organizing.

Our design framework is unique in explicitly addressing reliance on rumors for HIV/STI-related decision-making. Rumor circulation is unsurprising given participants' perceptions of authoritative risk information. Rumors are 'unverified and instrumentally relevant information statements'<sup>74</sup> that emerge when information is unavailable or distrusted.<sup>75</sup> Therefore, a plausible solution would be, as requested, to provide the aforementioned Q&A services. User responsiveness is an established approach for engendering online trust,<sup>32–38</sup> and appropriate professional involvement may confer credibility. Because mobile technologies are used most often to search for HIV/STI information,<sup>76</sup> a mobile platform may be appropriate—if youth initiate this communication.

As per previous informatics research,<sup>32</sup> an intervention should give participants a choice about their anonymity and identifiability. Nevertheless, participants wanted to interact at an online HIV/STI prevention intervention with trustworthy people. Youth could thus be encouraged to recruit their trusted friends to participate, and interventionists could offer offline activities that allow youth to build relationships before online engagement. For our intervention, the offline HOPE parties offer a useful platform for this. The training and support of good role models, such as HOPE party hosts, and the involvement of professionals could help ensure desired interactions. Still, the preponderance of negative online behavior<sup>77</sup> reinforced the need for institutionally supported safety components, such as supervision and blocking.

Several limitations of this paper should be noted. We conducted focus groups with African-American youth in one city. Therefore, we are unable to generalize results to a wider population. The study also focused on HIV/STI, conditions with unique social characteristics that may have heightened trust-related concerns. Therefore, generalizability to other health issues is unknown. The majority of our sample was female; young women may be more sensitive to trust and safety issues than young men. People concerned with trust might seek a role in designing our informatics intervention. However, the theme of trust emerged in all focus groups, despite the stated purpose of simply helping to design an HIV/STI prevention intervention. Participants' trust in CBO should also be interpreted in light of a CBO's role in hosting several focus groups. Although external confirmation is required, results informed the development of a novel design framework that offers much-needed insight into the culturally specific design requirements of young African Americans in the context of HIV/STI prevention. We will apply this design framework in ongoing intervention design, and look forward to tracking its potential contribution to intervention acceptance and use.

Moreover, in contrast to previous work, our results demonstrate the potential value of adopting a collective approach to trust within the CHI field. While perhaps particularly important

within our study context, we contend that trust-centered design holds promise for better reaching socioeconomically marginalized groups whose challenging life circumstances may render questions of trust and distrust central to daily living.

## CONCLUSION

Trust is a critical, multifaceted concern for young African Americans as they consider using an informatics intervention for HIV/STI prevention. Participants' concerns extended beyond those typically considered in the context of online trust. Based on consistent expression of such trust issues, we presented a new, trust-centered design framework as a contribution to the field of culturally informed design. Our approach holds promise for more effective engagement of African-American youth in informatics interventions for HIV/STI prevention, as well as, potentially, other groups and health contexts in which trust must be intentionally cultivated.

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