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A new HIV prevention network approach: Sociometric peer change agent selection

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ABSTRACT

Internationally, the Peer Change Agent (PCA) model is the most frequently used conceptual framework for HIV prevention. Change agents themselves can be more important than the messages they convey. PCA selection is operationalized via heterogeneous methods based upon individual-level attributes. A sociometric position selection strategy, however, could increase peer influence potency and halt transmission at key network locations. In this study, we selected candidate PCAs based upon relative sociometric bridging and centrality scores and assessed their attributes in comparison to one another and to existing peer educators. We focused upon an emerging HIV epidemic among men who have sex with men in Southern India in 2011. PCAs selected based on their bridging score were more likely to be innovators when compared to other centrally-located PCAs, to PCAs located on the periphery, and to existing peer educators. We also found that sociodemographic attributes and risk behaviors were similar across all candidate PCAs, but risk behaviors of existing peer educators differed. Existing peer educators were more likely to engage in higher risk behavior such as receiving money for sex when compared to sociometrically selected peer changes agents. These existing peer educators were also more likely to exhibit leadership qualities within the overall network; they were, however, just as likely as other non-trained candidate peer change agents to report important HIV intravention behavior (encouraging condoms within their network). The importance of identifying bridges who may be able to diffuse innovation more effectively within high risk HIV networks is especially critical given recent efficacy data from novel HIV prevention interventions such as pre-exposure prophylaxis. Moreover, while existing peer educators were more likely to be leaders in our analysis, using peer educators with high risk behavior may have limited utility in enacting behavior change among sex worker peers or male clients in the network.

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Introduction

Internationally, the Peer Change Agent (PCA) model is one of the most frequently used conceptual frameworks for HIV prevention interventions (Medley, Kennedy, O'Reilly, & Sweat, 2009). Peer change agents (PCAs) are generally trained to use similar strategies to communicate HIV risk reduction messages among targeted peers (Kelly, 2004; Kelly et al., 1991; Latkin, Sherman, & Knowlton, 2003). Change agents themselves, however, can often be more important than the messages they convey. Oftentimes, the messages change

agents are trained to promote (e.g., circumcision) may be of limited interest to others, even to those at increased HIV risk (Schneider et al., 2010). In fact, when messages are of limited interest, those at increased HIV risk will tend to focus more on who the change agent is (Chaiken, 1980). Further, with uncertainty in a particular context or message, the reliance on more transparent change agent attributes within a network, such as obvious status signals, heighten in importance to the recipient (Podolny & Baron, 1997; Stuart, Hoang, & Hybels, 1999). Not only will recipients focus more on the change agent when messages are of limited interest or unclear, but they will base most of their decisions to accept or reject the message based on the agent's more transparent attributes within a network, such as obvious status signals. If we can determine the agents whose message will have the most network impact, we will begin to reduce the transmission rate to a low

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enough threshold where we can think concretely about HIV elimination (Holtgrave, 2010).

Selection of change agents based upon attributes

PCAs are commonly selected based on their individual attributes, but this method can be problematic. In contrast to similarities in PCA training approaches, PCA recruitment is often operationalized via a heterogeneous assembly of methods: self-selection, peer-nomination, key informants, ethnographic observation, surveys, and other approaches (Valente & Pumpuang, 2007). This heterogeneity in PCA selection reflects a diversity of selection criteria that focuses primarily upon a given individual's attributes. For example, PCAs may be selected because they share common conditions or behaviors with the target population (e.g., race, drug-use) (Colon, Deren, Guarino, Mino, & Kang, 2010; Fritz et al., 2011; Miller, Klotz, & Eckholdt, 1998; Outlaw et al., 2010); they may have superior communication skills (Kelly, 2004; NIMH, 2010); are considered popular or leaders within a community (Kelly, 2004); are charismatic (Cupples, Zukoski, & Dierwechter, 2010) or attractive (Starkey, Audrey, Holliday, Moore, & Campbell, 2009); are particularly motivated to impact their community (Kegeles, Hays, & Coates, 1996); they have connections to specific target individuals within a personal network of interest (Schneider, McFadden, et al., 2012) or no specific attribute other than being part of an injecting drug user network (Latkin et al., 2003). For example, a successful network intervention among injecting drug users did not select on any attribute or network position (Latkin et al., 2003). These attributes are sought independently or in combination, though the rationale behind each approach is often poorly characterized. The heterogeneity in attributes and referral approaches upon which PCAs are selected may explain why these interventions have had only modest potency and mixed efficacy when tested in resource-restricted settings (Latkin et al., 2008; NIMH, 2010; Schneider & Laumann, 2011).

Selection of change agents based on network position: the opinion leader

In the context of HIV prevention, the most common approach to selecting change agents based upon network theory is the popular opinion leader model (POL) (Kelly et al., 1991). The POL approach does not sociometrically identify change agents (i.e. calculate their positions within networks based upon the patterns of ties), but uses ethnographic observation to identify individuals who appear popular and are thus likely to be leaders. Grounded in social diffusion theory (Rogers, 2003), the POL approach includes recruitment and training of popular network members from a target population to promote HIV prevention messages and behavior change through interpersonal communication. Popular people often occupy important positions of prestige and visibility (Bonacich, 1987) and, as noted in diffusion studies, may be influential in the spread of ideas and behaviors. If a new behavior seems to be one that will be embraced by the community, the opinion leader may adopt it earlier than others in the community. Subsequently, many others will see the behavior of these POLs, which reinforces the acceptability of the new behavior, and its adoption by others will be accelerated (Valente, 2010). Some recommend using POLs to accelerate diffusion of HIV prevention innovations; however, such leaders may already be overburdened given their status as leaders (Borgatti, 2006). In addition, behavior changes that are less compatible with existing norms (e.g., unorthodox HIV prevention strategies) or have the potential to change power dynamics may be adopted less by POLs because POLs have a vested interest in maintaining the status quo (Cancian, 1979). The effectiveness of

POL interventions can be further limited by several factors, including: heterogeneous and overlapping networks, inadequate network assessments, and the POL's public position. While it has been found to be effective in settings where the social network has well-specified boundaries (Laumann, Marsden, & Prensky, 1989), recent findings from a transnational randomized controlled POL intervention suggest that the POL condition was no better in changing behavior and incident HIV/STDs than the control condition (NIMH, 2010). There are, however, suggestions that contamination may have occurred between POL and control venues in this study and thus it might be possible that these POLs were serving as bridging actors bringing persuasive HIV prevention messages and behavior change to control groups (Schneider & Laumann, 2011). This lack of efficacy combined with the potential for change agents to have acted as bridges, warrants newer and more rigorous network approaches to change agent identification and a potential focus on bridging actors.

Using network metrics to select change agents: bridging actors

Advancing upon this network informed logic, an alternative approach to increase the potency of peer influence might be to select PCAs based in whole or in part upon their *network position*. This approach would consider network structure through mathematical formalism (Freeman, 2004) and similar formalist approaches have been successful in business organization-based interventions (Burt, 2005). Network positions are calculated for each person in a network based upon the pattern of ties that link individuals to one another. These can for example represent individuals who are centrally located within a network, those that bridge different groups that are otherwise not connected and those that are on the periphery. By using this approach we move beyond traditional peer outreach models. We aim to identify PCAs based upon particular features of their network positions, positions that could enhance the diffusion of innovative HIV prevention interventions. A benefit of utilizing a structural approach to identify PCAs is the ability to select them based upon network-measured positions, which are variable, as opposed to the classically-defined and centrally-located "opinion leaders." This method of selection allows us to identify candidates who connect across groups of otherwise disconnected individuals (such individuals are known as "bridging actors"). Locating new bridging actors may be a more effective way to accelerate change (Burt, 2005). Bridging actors may be more efficient diffusion agents than overly burdened centrally located PCAs because they have fewer interconnected alters to persuade (Holme & Ghoshal, 2009); they can thus devote more energy to persuading and thereby be more effective change agents. Additionally, bridging actors may be more receptive to behavior change since they have less pressure to support prevailing norms and behaviors (Cancian, 1979) or incur a reputation cost for advocating new and potentially disapproved behavior (Burt, 2010). Finally, candidates occupying bridging positions may possess useful attitudinal dispositions such as being open to new ideas and practices (Laumann, 1973; Valente & Fujimoto, 2010). By virtue of their boundary-spanning positions, bridging actors often have both early access to novel information and also experience in communicating this information across diverse audiences (Burt, 2010). Moreover, though bridging actors have access to less direct ties to individuals in a given network than individuals with denser network structures, bridging actors have more potential to spread innovative ideas and effect change because of the nature of their position in the network (Burt, 2010; Fernandez & Gould, 1994). Despite these findings within the organizational/business literature, there is no empirical evidence that we are aware of to support or refute the importance of bridging actors in the diffusion of

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