Predictors of the International HIV–AIDS INGO Network Over Time

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The HIV–AIDS epidemic is one of the most challenging and significant health crises facing the world today. In order to cope with its complexities, the United Nations and World Health Organization have increasingly relied upon the resources offered by networks of HIV–AIDS nongovernmental organizations (NGOs). The research reported here uses evolutionary theory to predict the patterns of alliances and collaborations within the HIV–AIDS International Nongovernmental Organizations (INGO) network. The hypotheses are tested using 8 years of data from the Yearbook of International Organizations. The results showed that geographic proximity and common ties with intergovernmental organizations (IGOs) predict the pattern of alliances among HIV–AIDS INGOs. The best predictor of such alliances, however, is past relationships among these organizations.

Interorganizational communication and change are of increasing interest in communication studies (Jones, Watson, Gardner, & Gallois, 2004). Interorganizational communication research examines the formal and informal communication structures that emerge and dissolve among organizations (Monge et al., 1998; Stohl, 1993). This research draws beneficially on the substantial body of research on alliances and alliance networks in the organization theory literature (see Adams, 1980; Ahuja, 2000; Dyer, 1997; Eisenhardt & Schoonhoven, 1996; Gerlach, 1992; Gulati, 1995a, 1998; Khanna, Gulati, & Nohria, 1998; Koza & Lewin, 1998; Monge et al., 1998; Williamson, 1975; Zajac & Olsen, 1993). In this tradition, transaction cost-economics and the resource-based view of the firm have been employed most frequently as explanatory theories, positing that firms pursue collaborative arrangements to gain easier and more efficient access to scarce resources and to build countervailing power.

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Alliance theory and research has offered valuable insights into processes related to each of three general classes of alliance decisions made by organizations: the option to partner rather than act independently, choice of partners, and selection of governance mechanisms. The theories focus on these decisions from the point of view of organizations attempting to (a) use alliances to reduce uncertainty that threatens their performance or survival and (b) avert potential moral hazards that could arise from opportunistic behavior of alliance partners (Das & Teng, 1999). Such an organization-centric focus is valuable, but it need not be exclusive. We argue that organizational alliance decisions also can be influenced by higher level factors, including structures within populations of organizations and structures among organizational populations at a community level. A population of organizations is "all the organizations with the same form that are competing for resources" (Barron, 1999, p. 443). For example, colleges and universities constitute the population of organizations that compete for scarce student resources, albeit clearly segmented into different niches. A niche is defined as the distinct combination of resources that support a particular set of organizations within a population (Aldrich, 1999). A community is comprised of populations of organizations that fit into a particular collective environment (Hawley, 1986). Colleges and universities are part of the educational community, which includes government regulators, service providers, alumni, and resource providers. The research reported here draws on evolutionary theory to explicate alliance partner choice in the context of dynamics within and across these different analytical levels.

The theory and research reported here also focuses on partner choice in the nongovernmental organization (NGO) sector, an area largely ignored in prior alliance research but which recently has become an important area of increasing scholarly interest (e.g., Diani & McAdam, 2003; Keck & Sikkink, 1998; Khagram, Sikkink, & Riker, 2002; Smith, Chatfield, & Pagnucco, 1997). As Keck and Sikkink (1998) note, communication and information exchange are core functions of NGO alliance networks. At the organization level, the model developed in this article incorporates an antecedent found in studies of for-profit organizations: past alliances with the same partners. The model also expands the theoretical territory by incorporating homophily of organization type as an antecedent. At the population level, the model includes cohort effects and geographic clustering. At the community level, impacts from intergovernmental organizations (IGOs) are considered. The model is tested on alliances among members of the HIV–AIDS International NGO (INGO) populations over an 8-year period using data obtained from archival sources. Effective

partnerships in this sector have become critically important as AIDS has become a significant social problem throughout the world.

THEORY AND HYPOTHESES

Evolutionary Theory

Evolutionary theory was originally developed to explain the emergence and transformation of biological phenomena in the natural world (Darwin, 1859; Mendel, 1865; Wiesmann, 1885). Many social scientists and organizational scholars argue that evolutionary theory also can be used to understand social and organizational dynamics (e.g., Astley, 1985, Campbell, 1965, Hawley, 1986, Kauffman, 1993, McKelvey, 1997, Nelson & Winter, 1982). Following Campbell (1962), we argue that the evolutionary model of variation, selection, and retention (VSR) explains organizational dynamics, including alliance formation.

VSR

Variation is defined as changes in routines, competencies, resources, or forms. Variations can occur as the result of random events or as the result of planned human actions (Romanelli, 1999). The source of variations can be either within or among organizational populations as well as their individual or collective environments (Astley & Van de Ven, 1983). *Selection* is defined as the elimination of variation in organizational routines, the choice of one alternative over others (Nelson & Winter, 1982). *Retention* occurs when organizations choose to reaffirm past selections and maintain past routines by re-enacting them over time. Thus, retention is an ongoing process rather than a single event, because organizations must continuously enact their routines over time or they will decay (Weick, 1979). An example is the evolution of the March of Dimes (March of Dimes, 2005). This charity was initially formed to raise money to combat polio in the United States. When polio incidence dropped dramatically, the organization experienced a major perturbation in its niche. The organization had to change or go out of business. Among the variations explored were to reorient to other diseases that affected their target population: children. They selected to reinvent themselves as a charity working to prevent birth defects. The selection was retained by continuing practices related to securing and awarding funds for research on birth defects.

Organizational selection and retention at any point in time are constrained by past history of selection and retention, which is referred to as path dependence (Baum, 1999). According to Kauffman

(1993), organizations are constrained by path dependence, but also have opportunities for path creation. Path creation is defined as novel variations and selections that break from past selections. Evolutionary theory applies to processes that occur within organizational populations and their resource niches as well as to those that occur in communities comprised of different organizational populations in their respective environments. Resource niches contain those things which are necessary for the survival of the members of populations, such as faculty, students, and finances for each college and university alluded to in the previous example. Environments provide those resources for the entire community, such as regulatory and professional associations (e.g., accrediting bodies, the International Communication Association), and government funding of research. Two significant research foci exist under this broad evolutionary umbrella. The first is population ecology, which examines the dynamics that govern the growth and transformation of organizations within populations (Hannan & Freeman 1977, 1984). The second is community ecology, which focuses on relations among populations of organizations that comprise ecological communities (Hunt & Aldrich, 1998; Astley, 1985).

Populations

Hannan and Freeman (1977) introduced population ecology to explain the dynamics of organizational populations. Population ecology research examines a wide range of evolutionary processes including populations' vital rates (their founding, growth, and failure rates; Barron, 1999; Baum, 1996), their competitive and cooperative strategies (Barnett & Carroll, 1987), selection processes (Brittain, 1994), and niche partitioning and segregation practices (Dobrev, Kim, & Hannan, 2001; Swaminathan, 1995). Niche partitioning and segregation practices refer to a mature population process in which generalist organizations compete in the center of a market niche while specialist organizations thrive at the periphery. Continuing the college and university population example, niche partitioning would occur when traditional universities compete for high quality students of traditional age, while specialist universities, like universities specializing in online degrees, might thrive in the niche of nontraditional students.

The HIV–AIDS INGO form is an example of a population. NGO is an umbrella term for a variety of not-for-profit organizations that includes INGOs, national NGOs, social movement organizations, and transnational social movement organizations (Kriesberg, 1997). INGOs themselves can be coalitions of national NGOs, federations with national sections, or horizontally structured virtual organizations (Nelson, 2002). INGOs conduct a variety of service activities, such as exchange ideas,

promote member interests, coordinate and regulate member activities, provide education and propaganda to the public, conduct research and collect information, and conduct humanitarian activities (Chatfield, 1997). Thus, INGOs typically work within the status quo to provide services and to advocate for their members. By contrast, social movement organizations try to change the status quo and promote change, either nationally or transnationally. INGOs that target the same problem, such as HIV–AIDS INGOs can be considered a population of organizations.

Communities

Hawley (1950; 1982; 1986) and Astley (1985) introduced community ecology as a means of examining larger evolutionary processes beyond those that occur within populations and their niches. They argued that populations do not exist independently. Instead, multiple organizational populations share overlapping resource niches and are fundamentally tied to each other in ways that create ecological communities and their environments (Hunt & Aldrich, 1998). Community ecology theorists argue that organizational communities consist of coevolving organizational populations (i.e., populations that evolve together, typically along separate though related paths; Baum & Singh, 1994).

Members of communities and populations are tied together by commensalist and symbiotic relations. *Symbiosis* refers to dependencies between organizations that do not compete for the same resources (Hawley, 1986). Universities and research foundations are engaged in symbiotic relations (Aldrich, 1999). The foundations achieve their social and organizational goals by investing in university research, and the universities depend on the foundations to provide resources to conduct core scientific research activities. *Commensalism* has two meanings (Barnett & Carroll, 1987). The first refers to mutual dependence and cooperation among organizations that compete for the same resources, but in which each organization's actions can benefit the other (Hawley, 1986). For example, INGOs benefit from each other's efforts, because together they can educate the public about a problem and the need for action. They also can coordinate lobbying for resources from funding organizations. The second meaning of commensalism is competition for the same resources in which each organization's action can harm the other (e.g., competition between INGOs for members).

The ecological community in which the INGO population resides consists of populations of media producers, INGOs targeting different types of problems, national governments, economic industries, and intergovernmental organizations (IGOs) such as the United Nations (UN). The members of the populations that comprise this community are tied to each other by symbiotic and commensalist relations. For example, INGOs

engage in commensalist relations when they cooperate or compete for both funding and media attention. INGOs and media producers have a symbiotic relationship, in that INGOs provide stories and information of interest to the public and media provide publicity for INGO causes.

A Brief History of HIV–AIDS INGO Populations and Communities

HIV–AIDS INGOs present an important opportunity for the study of evolutionary processes in alliance formation for several reasons. First, the HIV–AIDS INGO sector has a short lifespan, offering the opportunity to study a population from its inception to the current time. Such a span is particularly beneficial for examining evolutionary processes (Carroll & Hannan, 2000). Second, these organizations represent a well-defined population of organizations that exists within a broader organizational community that impacts their partnering. This permits examination of dynamics across populations and levels of analysis to tap the broader ecology in which INGO partnerships are embedded. Third, partnering among these INGOs has varied over time, increasing as the population has aged. Fourth, funding challenges create conditions for competition as well as collaboration among partners in their search for resources to underwrite their activities. Finally, INGO research offers an eye on the world of interorganizational communication among an understudied organizational type. Such alliances differ from alliances in the for-profit sector in that organizations in INGO sectors share both core values and a common goal beyond their own survival (Keck & Sikkink, 1998). Some of the same concerns for sharing resources and trust building that have been extensively studied in the alliance literature, however, may also play a role in INGO alliance partner choice.

This section provides a brief timeline of the central INGOs that have been born as the HIV–AIDS epidemic has spread. This history provides a backdrop for understanding evolution in the formation of partnerships among organizations. It also provides some information on the ecological context in which collaboration and competition exist.

AIDS became a topic of global interest beginning with the first discovered case in the United States in 1981, although disease incidence can be traced back to the 1950s in Africa (Singhal & Rogers, 2003). In 1981, the U.S. Centers for Disease Control and Prevention began to track the disease (Baldwin, 2005; *The Global HIV–AIDS Epidemic: A Timeline of Key Milestones*, 2004; Gordenker, Coate, Jönsson, & Söderholm, 1995; Panem, 1988; Patton, 2002). In many parts of the world, each country created its own policy related to the control of AIDS. Several countries closed their borders (Baldwin, 2005; Panem, 1988). In response to discrimination levied against homosexuals as a way to stop the spread of AIDS, the Counsel of Europe met in 1983 to discuss the cultural implications of AIDS.

The year 1985 began a new phase characterized in its early period by increased global interest and in its later period by conflict and dissention among different INGOs. In 1985, the World Health Organization (WHO), a major IGO, decided to address the disease (Gordenker et al., 1995). At the same time, several international conferences formed to discuss AIDS as a global problem, providing opportunity for network-building among INGOs. Among these gatherings were the first symposium on AIDS in Africa and the first International Conference on AIDS (*The Global HIV–AIDS Epidemic: A Timeline of Key Milestones*, 2004).

Around 1987, activity surrounding the AIDS crisis accelerated (*The Global HIV–AIDS Epidemic: A Timeline of Key Milestones*, 2004; Gordenker et al., 1995), especially among IGOs. WHO officially formed its Global AIDS Programme (WHOGAP) and held its first meeting with HIV–AIDS NGO and INGO representatives. The UN also had its first meeting to address AIDS. In addition, the World Bank became involved in the AIDS issue. Finally, activist NGO and INGOs such as ACT-UP, a gay rights group, began a series of radical protests that generated significant media coverage (Altman, 1994; Patton, 2002).

In 1988 and 1989, IGO relations with INGOs and national NGOs intensified. In 1989, The UN Center for Human Rights became involved in the AIDS crisis. WHOGAP formed the Partnership Programme, through which it gave seed money to HIV–AIDS international NGOs and national NGOs. In 1992, this funding program was replaced by a flat 15% of this fund being distributed to countries to distribute to NGOs (Gordenker et al., 1995).

The 1980s was an era of great success for HIV–AIDS INGOs. Activist issues were being recognized by the international community, increased funding was available through both the WHOGAP and United National Development Programme (UNDP), and successful international conferences began to draw HIV–AIDS INGOs and NGOs together (*The Global HIV–AIDS Epidemic: A Timeline of Key Milestones*, 2004). In 1990, some fractures within the HIV–AIDS INGO community began to appear. At a conference in Paris, controversy surrounded the emergence of the International Coalition of AIDS Service Organizations (Gordenker et al., 1995). This organization was designed to help AIDS service organizations network and share resources. Designers of the organization, however, failed to consult the African AIDS service organizations in its creation. The result was that the African AIDS service organization voted all Europeans out of its caucus. The women's caucus voted out the men and the homosexual caucus voted out all of those without a human rights perspective on AIDS. The fissures and competition remained for several years.

In 1992, IGOs began to withdraw from the AIDS issue, leaving the issue solely in the hands of WHOGAP. INGOs formed more coalitions

between 1993 and 1996, as years of stability began to reign. A controversy in 1996 surrounding the WHOGAP led to the formation of UNAIDS which replaced WHOGAP (Patton, 2002).

With the advent of UNAIDS, the HIV–AIDS INGO networks entered a third phase. Since 1996, the AIDS organizational population has enjoyed great stability. UNAIDS continues to be the IGO coordinating body. More focus has turned to the issue of poverty as being interlinked with AIDS. The involvement of celebrities has spawned a proliferation of INGOs based in the United States and Western Europe. These changes, however, have occurred within a more stable community.

Alliance Partner Choice: Organization Level Influences

The study of INGO alliances is concerned with voluntary communication and other relationships, both formal and informal, between organizations in the populations that make up the community. Relationships can involve exchange of information or other resources, joint ventures to develop products, services or technologies, or coordinated action to influence national governments and IGOs.

Evolutionary Processes Favoring Past Partners

The choice of particular alliance partners is predicted by either resource complementarity (Richardson, 1972) or the social structural context of the two organizations (Coleman, 1990; Gulati, 1995a). Research in resource complementarity has found that two organizations are more likely to partner if they can mutually gain (Teece, 1986). Gulati (1995b) found that organizations that exist in complimentary niches are more likely to form alliances than those who are not. Research on social structural context focuses on prior alliance experience. Gulati (1995a) demonstrated that prior alliances predicted formation of joint ventures between organizations. One possible reason for this repetition is the amount of energy and time required to search for potential alliance partners (Burt, 1992). Once this energy has been used to find a satisfactory alliance partner, organizations can exploit that relationship in order to gain from the sunk costs (March, 1991). These factors all reflect evolutionary preferences based on concepts of path creation and subsequent path dependence of network ties within a population. Faulkner and Anderson (1987) describe this process as reproduction of relationships.

Structural inertia offers an additional evolutionary explanation for the repetition of partnerships (Hannan & Freeman, 1984). Structural inertia is defined as a slower rate of reorganization or change than the changes that are occurring in the environment (Hannan & Freeman, 1984), and tends to occur as organizations develop established patterns

with age. Once partners have chosen each other and alliances have been formed, structural inertia tends to stabilize the links relative to changes in the environment surrounding it. An evolutionary argument based on structural inertia suggests that alliance dyads are likely to persist over time rather than dissolve.

In combination, this theory and research suggests the following hypothesis:

H1: INGOs that have formed alliances with each other in the recent past are more likely to continue those alliances in the future than change to new alliances.

Homophily

One potential factor influencing the formation of alliances is homophily or the "selection of others who are similar" (Monge & Contractor, 2003, p. 223). Organizations vary in the extent to which they are similar to one another on a host of characteristics, such as size, age, products and services. Homophilous organizations are motivated to partner because they tend to have similar operating systems. Hannan and Freeman (1977) refer to this homophily as "competitive isomorphism" that arises from similarity of resource niches and environmental demands. This form of homophily facilitates joint operations (Chung, Singh, & Lee, 2000).

One important homophily characteristic that has been studied is organizational status. According to Chung et al. (2000) similarity of status facilitates equal commitment of the parties to the joint venture. Alliances where the partners commit unequally have a higher failure rate, since the organization that commits at a lower level will deliver insufficient effort and resources to the partnership. In the situation where uncertainty exists regarding the quality of output, as is true with NGOs (Keck & Sikkink, 1998), partnering with others of similar status serves a signaling function to sources of external resources, facilitating access to those resources (Chung et al., 2000). Li and Berta (2002) found that alliances in the U.S. banking industry tended to be governed by status homophily, that is, alliance partners in their study tended to be similar in status. Podolny (1994) and Chung, Singh, and Lee (2000) also found that status similarity was a predictor of alliance formation. Thus, status similarity appears to facilitate commensalist, cooperative relationships among structurally similar organizations.

Another potential source of homophily for INGOs is organizational type. According to Jönsson and Söderholm (1995), four distinct types of HIV–AIDS INGOs have evolved: activist, research, membership, and service. The goal of HIV–AIDS activist organizations is to promote the

rights of those that have HIV. HIV–AIDS INGO research organizations seek to find a cure, vaccine, or treatment. The third type of HIV–AIDS INGO is the membership organization. According to Altman (1994), these organizations developed to provide support and important information to their members. The fourth type of HIV–AIDS INGO is the AIDS service organization. These organizations provide medical care to AIDS patients, including hospice, drugs, or basic treatment.

A homophily rationale predicts that organizations of similar type would be in structurally similar positions in an overall network in the population or community. Following the logic based on competitive isomorphism and status similarity, partnering should tend to follow organization type. Similar types share similar foci, goals, and types of operations, offering the potential for commensalist cooperative relations. Similarity also would offer the opportunity to pool efforts in order to improve their position in the funding competition. Following a homophily rationale we proposed that similar types of organizations will more frequently select each other as partners.

H2: INGOs are more likely to form organizational alliances with organizations of the same organizational type than with those of a different type.

Alliance Partner Choice: Population Level Influences

Founding Cohort

A key vital rate in evolutionary theory is organizational births, which are also called *foundings.* Pfeffer (1983) and Aldrich (1999) distinguish one type of impact based upon founding as a "cohort effect." Pfeffer (1983) defines a cohort effect as "the tendency to choose and associate with others from within the same tenure group" (p. 339). Pfeffer further explains that this effect is based on the recognition that organizations differ based upon their experiences. Organizations that have similar experiences during certain life stages may be similarly influenced by those experiences. There are three distinct eras within the HIV–AIDS INGO population. First, one cohort of organizations formed as early responders to the emergence of the HIV–AIDS epidemic. Second, another cohort formed under the leadership of WHOGAP. Finally, a third set of HIV–AIDS INGOs was founded while UNAIDS regulated worldwide AIDS activity. We therefore hypothesized an evolutionary cohort effect:

H3: INGO dyads in a common cohort are more likely to form alliances than INGO dyads in different cohorts.

Geographic Proximity

Both population ecology theory and alliance formation models pose that alliance partners engage in an initial exploration phase, characterized by information seeking (Aldrich, 1999; Banassi, 1993; Kanter, 1994; Ring & Van de Ven, 1994; Zajac & Olsen, 1993). Jaffe, Thajtenberg and Henderson (1993) and Rosenkopf and Almeida (2003) demonstrated that organizational knowledge flows tend to be localized because searching local information may be less costly than searching more globally. Such localized search processes can cause organizations to limit the number of alliance partners they consider for a particular need. Continued localized searches may lead to large localized structures. For example, Saxenian (1990) and Oleinik (2004) demonstrate that industrial districts, or the concentration of particular industries within small geographic areas, are developed through a continued preference for localized searches. Saxenian (1990) argues that Silicon Valley represents one version of this district. Localized searches also are expected to impact INGO alliance exploration. Also, organizational populations in the same geographic area will have access to similar geography-related environmental resources, such as factor costs, labor pool, and political opportunity structures (Keck & Sikkink, 1998) that will facilitate a certain degree of competitive isomorphism. As a result,

H4: INGO dyads headquartered in the same region are more likely to form subsequent alliances than INGO dyads that are headquartered in different regions.

Alliance Partner Choice: Community Level Influences

Powell et al. (2005) recently completed an extensive study of community network evolution. Their work examined the intertwined development of five organizational populations that comprise the biotechnology community over 9 years: biotechnology firms, pharmaceutical companies, venture capitalists, government regulatory agencies, and research universities. Powell et al. demonstrated how a preference for a diversity of network relations led to a decentralized structure in this community. Additionally, they demonstrated how activities from external research partnerships led to cohesive subnetworks.

In a similar way, the INGO population is potentially affected by the population of intergovernmental organizations, like the UN and the WHO. Powell et al. (2005) argued that investment of venture capital shapes the basic structure of alliances in the biotechnology industry due to symbiotic relations with the industry they fund. Similarly, investments by IGOs have the potential to impact the INGO industry powerfully

because IGOs provide major investments in INGOs (Jönsson & Söderholm, 1995; Smith, 1997). In Powell et al.'s research, one of the ways that these external populations influence the biotechnology network is through common ties to external partners. Similarly, INGOs may differ based on whether they are connected to the same IGOs. This similar connection increases the likelihood of alliance formation, as the partners are given legitimacy through indirect linkages (Powell et al., 2005). The common partner also can serve as a node for information sharing between alliance partners and for deterrence of opportunism (Chung et al, 2000). Accordingly:

H5: INGO dyads that have similar relations with IGOs are more likely to subsequently form alliances than INGO dyads that have dissimilar relations with IGOs.

METHOD

Sample

Data were obtained from the archives of the *Yearbook of International Organizations (YIO),* published by the Union of International Associations (UIA). The *YIO* provides the most extensive coverage of nonprofit organizations by any source, public or private (Keck & Sikkink, 1998; Smith, 1996, 1997). UIA is a nonprofit clearinghouse for this information and keeps its records up to date by constantly scanning Web documents and both government and INGO publications (*UIA as a Registry of International Non-Profit Organizations*, 2003). In general, the organizations included in the *YIO* must be international in some sense, so local level NGOs and national NGOs with no international concerns are not included. In addition, some organizations that formed and disbanded rather quickly may not be included. Keck and Sikkink (2000) found that most organizations were included in the *YIO* within a few years of their founding. Data about recent history therefore may not be as complete as data about founding in previous years.

The online 2001 version of the *YIO* was used to determine the list of INGOs. INGOs that disbanded before 2001 were included in the 2001 *YIO* and listed as inactive. All INGOs whose description or name included HIV, AIDS or SIDA[1] were included.[2] A list of IGOs was garnered from the links reported by the HIV–AIDS INGOs in 2001. Regional offices were not included as listings.

The resultant data set spanned the years from 1983, when the first new HIV–AIDS INGO was formed, to 2001. The first 9 years of the life of this population showed no alliances; the first reported HIV–AIDS INGO alliance occurred in 1993. This study focused on partner selection;

accordingly, the valid data set included the 8 years from 1993 to 2001 when partnerships were present. A total of 103 HIV–AIDS INGOs were active at least 1 year; founding dates were available for 96. The average life span of an HIV–AIDS INGO in the sample, including INGOs currently active in 2001, was approximately 4 years ($n = 96$; $M = 4.30$; $SD = 4.11$).[3] Of these 96, the average lifespan of an HIV–AIDS INGO that died ($n = 32$) was approximately 3 years ($M = 3.06$; $SD = 3.47$). The average lifespan of an HIV–AIDS INGO that was still active in 2001 was almost 5 years ($n = 64$; $M = 4.92$; $SD = 4.28$).

Procedures

All of the variables in this analysis were either coded as, or transformed to, network analysis matrices. Graduate student coders were trained in both data entry and coding from the *YIO*. These coders entered data from 1983 until 2000 from printed volumes. Coders entered 2001 data from the new online edition of the *YIO*.

Measures

Organization Type

Each INGO was coded for one of the four organizational types discussed earlier based on the aims and descriptions in the 2001 *YIO*, specifically, as activist, service, research, or membership organizations. The coding of the research assistants working as a pair was compared to that of the senior author, who worked alone. The coder reliability between the two coders and first author was $Kappa(71) = 0.961$, $p < 0.01$. The first author's coding was used for the analysis.

Geographic Regions

The following regional classification system from the *YIO* (Smith, 1996), which breaks the world into eight regions, was used to code the headquarter locations: (a) Africa ($n_{1993} = 1$; $n_{2001} = 10$), (b) Asia ($n_{1993} = 0$; $n_{2001} = 3$), (c) Middle East ($n_{1993} = 0$; $n_{2001} = 0$), (d) Australia, New Zealand, and Pacific Islands ($n_{1993} = 0$; $n_{2001} = 2$), (e) Europe (West) ($n_{1993} = 5$; $n_{2001} = 14$), (f) Europe (East) and the former Soviet Union ($n_{1993} = 0$; $n_{2001} = 0$), (g) North America (excluding Mexico) ($n_{1993} = 4$; $n_{2001} = 15$), and (h) South and Central America, Mexico, and the Caribbean ($n_{1993} = 0$; $n_{2001} = 4$). This variable was entered verbatim from the *YIO*; as a result, no intercoder reliability statistic was necessary.

Founding Cohort

Each INGO was dummy coded to be included in one of three cohorts. The first cohort included all INGOs that were founded before

1985. The second cohort included INGOs founded from 1985 until 1996, the years when WHOGAP was the primary IGO involved in the AIDS issue. The third cohort was from 1996 until 2001, the years when UNAIDS was the primary IGO involved in the AIDS issue. As this variable was entered verbatim from the *YIO*, no intercoder reliability statistic was necessary.

Alliance Partner Choice

Alliance relations were coded from two types of links reported in the *Yearbook*: "collaborates with" and "links with." Collaboration is defined by UIA as a formal relation identified by the organization. There are different terms in the *YIO* that are used for this, since organizations self-describe these relations (J. M . Nebel, March 1, 2002, editor of *Yearbook of International Organizations*, personal communication). "Links with" is defined by the UIA as an identified but uncorroborated relationship (J. M . Nebel, 2002, personal communication). Uncorroborated in this context refers to relationships that were identified by only one source. "Collaborates with" indicates a relationship identified by both parties. These two types of relations ("collaborates with" and "links with") were added to create "alliance linkages." With the relations specifically identified in the source, no measure of intercoder reliability was required.

Relations with IGOs

The *YIO* reports which INGOs are financed by which IGOs. Based on these reports, INGOs can be categorized according to the degree to which they are financed by the same IGOs. With the links entered verbatim from the Yearbook, no intercoder reliability statistic was necessary. Relations with IGOs include all three types: collaborates with, links with, and financed by.

Analysis

Network analysis techniques were used to test the research hypotheses: specifically, multiple regression quadratic assignment procedure (MRQAP; Krackhardt, 1988). UCINET 6.53 was used as the network analysis software for this procedure (Borgatti, Everett & Freeman, 2002). MRQAP is similar to traditional multiple regression analysis in that multiple independent variables simultaneously or sequentially predict a single dependent variable. In MRQAP, however, both the independent and dependent variables are matrices. Thus, analysis of each hypothesis related the matrix of links between INGOs to the matrices of predictor variables.

Each hypothesis was tested for each of three separate time frames: independent variables from 1993 predicted alliances in 1995 ($N = 33$), from 1996 predicted alliances in 1998 ($N = 52$), and from 1999 predicted alliances in 2001 ($N = 79$). Thus, three separate MRQAP analyses were completed for each of the hypotheses. Earlier years were not included, because alliances among HIV–AIDS INGOs were not reported in the *Yearbook* before 1993. Two-year intervals were chosen because the life span of the average INGO was only 4 years ($n = 96$; $M = 4.30$; $SD = 4.11$). This time frame also is consistent with previous research on the effect of prior alliance experience on future collaborations (Podolny, 1994). The criterion applied was that if a hypothesis was supported in all three of the time frames, it was considered to be fully supported. If a hypothesis was supported in one or two time frames, it was considered to be partially supported.

For organizations founded or disbanded between the predictor years and predicted years, an additional step was needed to make the number of nodes (organizations) in different years comparable for the statistical analysis. For organizations that were born during the time period, nodes were added to the prior years to reflect their nascent period. For organizations that died, nodes were added to the subsequent years to reflect their postmortem period. Thus, these added nodes do not represent actual organizations but are simply placeholders for organizations that either were not yet born or that had died. The number of placeholder nodes added to make the matrices comparable varied: 1993 and 1995 ($n = 22$ added; total nodes = 33), 1996 and 1998 ($n = 4$ added, total nodes = 52), and 1999 and 2001 ($n = 34$ added, total nodes = 79). As noted earlier, the second time period was one of great stability, with few births and deaths between 1996 and 1998, and thus has the fewest placeholder nodes.

H1 posed that INGOs that had alliances in the past were more likely to have alliances with the same others in the future. In order to test this hypothesis, alliances for years 1993, 1996, and 1999 were used to predict alliances in 1995, 1998, and 2001. These predictor matrices were entered as separate independent variables in their respective MRQAP equations.

H2 predicted that INGOs were more likely to subsequently form alliances with similar types of organizations than with those that were dissimilar. Similarity was modeled as a link between two organizations at Time 1 (i.e., 1993, 1996, 1999) in a proximity matrix based on organizational type (i.e., membership, activist, research, or service). If both organizations shared the same attribute at Time 1, they were coded as a "1" to indicate that they were "similar." If they did not have the same attribute, they were coded "0" to indicate that they were not linked by similarity. These similarity matrices were then entered into the MRQAP.

H3 predicted that INGOs within the same cohort were more likely to subsequently form alliances than those who were in different cohorts. Same cohort was coded as links between two organizations at Time 1

(i.e., 1993, 1996, 1999) in a proximity matrix. Cohort matrices were created based on the same cohort membership (i.e., births before 1985, or between 1985 and 1996, or between 1996 and 2001). These cohort matrices were then entered into the MRQAP.

H4 proposed that organizations from the same geographic region were more likely to form alliances. In order to test this hypothesis, a proximity matrix was constructed for organizations headquartered in common regions for years 1993, 1996, and 1999. Organizations headquartered in the same region were coded as a link between the two organizations. There were a few missing values due to the absence of identified regional headquarter in 1993 ($n = 5$), 1996 ($n = 13$), and 1999 ($n = 2$). These matrices were entered into the MRQAP analyses.

H5 predicted that organizations that have similar relationships with IGOs were more likely to form alliances. In order to test this hypothesis it was necessary to create a co-membership matrix, which contained the number of common links that each INGO pair possessed with the set of IGOs. To do so, an affiliation matrix of INGO-IGO relations was constructed. An INGO was considered affiliated if "collaborates with," "links with," or "financed by" ties existed from the INGO to the IGO. Each row represented an INGO and each column represented an IGO in the matrix. This affiliation matrix was then transformed to an organization-by-organization co-membership matrix, where links represented a common IGO tie. A co-membership matrix was created for years 1993, 1996, and 1999. These matrices were entered into the MRQAP analyses.

RESULTS

Table 1 presents the number of HIV–AIDS INGOs, the number of alliances, and the density of the alliance network. In 1993, only one alliance existed between HIV–AIDS INGOs. The largest density of organizations in the populations was in 1998 and the largest number of ties was in 2001. Figure 1 graphically displays the 2001 HIV–AIDS alliance network.

Table 2 displays the QAP correlations between variables and Table 3 displays the MRQAP results. H1 predicted that INGO dyads that have formed alliances in the recent past were more likely to form alliances subsequently. The INGO dyad that had an alliance in 1993 was not more likely to form an alliance in 1995 ($\beta_{1995} = -.01$, $p = .27$). The alliances in 1996 and 1999, however, were significantly related to alliances in 1998 ($\beta_{1998} = .40$, $p < .001$) and 2001 ($\beta_{2001} = .50$, $p < .001$) respectively. Thus, H1 was partially supported.

TABLE 1
Descriptive Statistics

	Number of INGOs	*Density*	*Number of ties*
1982	0	0	0
1983	0	0	0
1984	0	0	0
1985	0	0	0
1986	0	0	0
1987	1	0	0
1988	1	0	0
1989	3	0	0
1990	11	0	0
1991	11	0	0
1992	10	0	0
1993	10	.01	1
1994	17	.01	3
1995	33	.01	14
1996	51	.01	23
1997	56	.01	31
1998	45	.01	12
1999	48	.01	26
2000	51	.01	28
2001	65	.01	56

H2 predicted that INGO dyads of the same organizational type would be more likely to form alliances than INGO dyads of different organizational types. Organizational type was not a significant predictor in any of the three MRQAPs (β_{1995} = -.040, p = .14; β_{1998} = .01, p = .38; β_{2001} = .03, p = .09). H2 therefore was not supported.

H3 predicted that INGO dyads in the same cohort would be more likely to form alliances than INGO dyads in different cohorts. In 1995 (β_{1995} = -.08, p = .12) and 1998 (β_{1998} = -.01, p = .27) cohort was not a significant predictor of alliances among INGOs. On the other hand, common cohort in 1999 was a significant predictor of alliances in 2001 (β_{2001} = .05, p = .04). H3 therefore was partially supported.

H4 predicted that INGO dyads that were geographically proximate would be more likely to subsequently form alliances than INGO dyads that were not geographically proximate. INGO dyads located in the same region were not significantly related to alliances among INGOs in 1995 (β_{1995} = -.05, p = .12). On the other hand, geographic proximity was

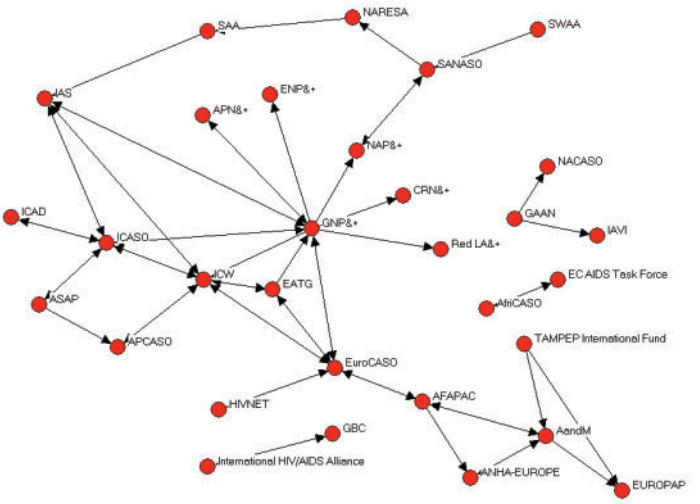

Figure 1. Graph Displaying Network of Alliances Among HIV–AIDS INGOs in 2001
NOTE: Isolates (INGOs not connected to any other INGO) were removed to simplify the figure.

significantly related to alliances in 1998 ($\beta_{1998} = .05$, $p = .05$) and 2001 ($\beta_{2001} = .05$, $p = .02$). H4 therefore was partially supported.

H5 predicted that INGO dyads that had similar relations with IGOs would be more likely to form subsequent alliances. The affiliations that INGO dyads had with IGOs in 1993 were not significantly related to subsequent alliances in 1995 ($\beta_{1995} = .00$, $p = .18$). In 1996, the affiliations that INGO dyads had with IGOs were significantly related to subsequent alliances in 1998 ($\beta_{1998} = .17$, $p < .001$). Common affiliations with IGOs were not significantly related to alliances among INGOs in 2001 ($\beta_{2001} = .02$, $p = .11$). Thus, H5 was partially supported.

In summary, H1, H3, H4, and H5 were partially supported, which provides evidence that prior linkages, cohorts, geographic proximity, and relational similarity are predictors of interorganizational alliance formation. H2, relating homophily of organizational type to alliance formation, was not supported. It is interesting to note that the hypotheses were generally better supported by the data from the two later time periods, when the networks were more fully developed, than by the data from the first time period, which represents the early years of the population.

TABLE 2
Means, Standard Deviations and Pearson QAP Correlations

Parameters		*Density*	*SD*	*Org. type*	*Common cohort*	*IGO relations*	*Past alliances*	*Common region*
Common organizational type	1993	0.03	0.16					
	1996	0.22	0.41					
	1999	0.23	0.42					
Common cohort	1993	0.07	0.25	0.44*				
	1996	0.35	0.48	0.09				
	1999	0.22	0.42	0.04				
Common IGO relationship	1993	0.00	0.00	0.00	0.00			
	1996	0.02	0.14	-0.01	0.14*			
	1999	0.01	0.09	0.02	0.08*			
Past alliances	1993	0.00	0.03	0.19*	0.11	0.00		
	1996	0.01	0.09	0.07*	0.10*	0.45*		
	1999	0.00	0.23	0.04*	0.04*	0.13*		
Common region	1993	0.03	0.17	0.25*	0.52*	0.00	-0.01	
	1996	0.14	0.35	0.06	0.10	0.06	0.11*	
	1999	0.07	0.26	0.04	0.15*	0.20*	0.13*	
Current alliances	1995	0.01	0.11	-0.02	0.04	0.00	-0.00	-0.02
	1998	0.01	0.08	0.03	0.05*	0.35*	0.48*	0.10*
	2001	0.01	0.10	0.05*	0.06*	0.11*	0.52*	0.13*

NOTE: * Indicates significance at $p < 0.05$

DISCUSSION

This study was motivated by interorganizational communication research that examines the communication structures that emerge, morph, and dissolve among organizations in a population. The research reported in this article examined the evolutionary dynamics surrounding partner selection within the HIV–AIDS INGO population over an 8-year period beginning with the population's first alliance in 1993 and continuing through the network of alliances present in 2001. The analysis used 2-year lagged measures of evolutionary mechanisms to predict future partner selection at three points in time: 1995, 1998, and 2001.

TABLE 3
MRQAP Results for Regressions of 1993 on 1995, 1996 on 1998, and 1999 on 2001

Hypothesis	*Parameters*		*1995*	*1998*	*2001*
1	Past cooperative relationship	Standardized coefficient	-0.01	0.40	0.50
		(Unstandardized)	(0.02)	(0.33)	(0.74)
		Proportion significance	0.27	0.00	0.00
2	Common organizational type	Standardized coefficient	-0.04	0.01	0.03
		(Unstandardized)	(-0.03)	(0.00)	(0.01)
		Proportion significance	0.14	0.38	0.09
3	Common cohort	Standardized coefficient	0.08	-0.02	0.05
		(Unstandardized)	(0.04)	(-0.00)	(0.00)
		Proportion significance	0.12	0.28	0.04
4	Common region	Standardized coefficient	-0.05	0.05	0.05
		(Unstandardized)	(-0.03)	(0.01)	(0.02)
		Proportion significance	0.12	0.05	0.02
5	Common IGO relationship	Standardized Coefficient	-0.00	0.17	0.02
		(Unstandardized)	(-0.00)	(0.09)	(0.03)
		Proportion significance	0.18	0.00	0.11
		R^2	0.01	0.26	0.27
		(*Adj.* R^2)	(0.00)	(0.25)	(0.27)

Evolutionary theory is a distinctive approach to the study of alliance dynamics, recognizing the embeddedness of actors in larger populations and communities and the influence of past choices on current alliance choices (Baum, Calabrese, & Silverman, 2000; Gerlach, 1992; Gulati, 1998; Hite & Hesterly, 2001; Koza & Lewin, 1999; Sydow & Windeler, 1998). Evolutionary influences on partner selection between organizations were examined across two embedding levels: the population and community. Prior research on partner selection has given insufficient attention to population and community level influences. Indeed, past research had not studied intact populations but rather sampled from them. This study was designed to demonstrate these multilevel influences on partner selection among all the organizations in a specific population.[5]

The first evolutionary mechanism at the organizational level was structural inertia in alliance patterns. Structural inertia means that as organizational structures age, their rate of change relative to their environment declines (Hannan & Freeman, 1984). The prediction that organizations would select past partners for new partnerships was upheld for the two later time periods but not for the initial one. This finding can be partly explained by the lack of alliances in 1993 ($n = 1$ alliance, *density* = 0.001). It can also be partly accounted for by the rapid increase in the

number of organizations subsequent to 1993 ($N_{1993} = 10$, $N_{1995} = 33$) which would offer more opportunities for developing alliance experience. Once the population somewhat stabilized in 1996, past alliances were a very strong predictor of future INGO alliances.

The second mechanism at the organizational level was homophily, which was posited to be a motivator for commensalist cooperative relationships that would evolve over time. Past alliance studies have found that organizations with status similarity tend to form relationships (Chung et al., 2000; Li & Berta, 2002). In this study, INGOs of a similar organizational type were predicted to select each other as partners because they share similar foci, goals, and types of operations. Existing in the same resource niche, they were likely to be structurally similar due to "competitive isomorphism" (Hannan & Freeman, 1977). The results showed, however, that similarity of organizational type was not a significant predictor of alliances among INGOs across any of the time periods. Perhaps a more comprehensive indicator of homophily is needed, including such factors as organizational size, membership demographics, and amount of funding.

The third mechanism was cohort effect at the population level. A cohort effect is the influence of being formed during the same era as others in the cohort and thereby experiencing a similar history. This common background often leads to a preference for alliances among members of a similar organizational cohort (Pfeffer, 1983). Organizational cohort was a significant predictor of alliances among INGOs only in the third time period. This time period was the first set of years when all three cohorts were present, because the third cohort births began in 1996. Due to a 2- to 3-year delay from birth until inclusion in the *YIO*, membership in the third cohort was only a possibility in the last MRQAP (1999–2001). The results suggest the possibility that there are significant differences only between these cohorts and the third cohort. Another possible explanation is that cohort effects may also take time to develop, and the population was still relatively new at the time of the research.

The fourth mechanism was geographical proximity at the population level. Evolutionary theory and past research suggests that organizations tend to use local searches for both knowledge and potential alliance partners (Jaffe et al., 1993; Oleinik, 2004; Rosenkopf & Almeida, 2003; Saxenian, 1990). Also, organizational populations in the same geographic area will have access to similar geography-related resources that will facilitate a certain degree of competitive isomorphism. In this research, regional proximity predicted alliances among INGOs in 2001, but not 1995 or 1998. One explanation may be that early in the evolution of the population there were not a significant number of INGOs across regions to offer many local alliance partners. In 1993, only Africa, the United

States, and Western Europe headquartered any HIV–AIDS INGOs. At that time, only one African HIV–AIDS INGO existed. In 1996, the number of HIV–AIDS INGOs in Western Europe outnumbered HIV–AIDS INGOs in all other regions. An alternative explanation may be that INGOs required several years to explore adequately the options for alliances with other INGOs within a particular region. Finally, advances in communication and information technology have been shown to reduce barriers of time and space. Geographically proximate organizations may have more global reach, exposing them to a greater diversity of media, labor pools, production factors, and political opportunity structures. This diversity may have reduced geographic pressures toward isomorphism within regions.

The fifth mechanism tested at the community level was common IGO relationships. H5 predicted that common past IGO relationships would be related to future alliances among INGOs. Common IGO relationships were a significant predictor of alliance partnerships among INGOs only in 1998. It may be that the IGO population had more influence at some times and less at other times. Also, UNAIDS formed in 1996, creating a major new coordinating IGO for HIV–AIDS initiatives. Different IGOs may have different levels and types of facilitation of relationships among INGOs with whom they are linked. The same IGO may also change relations with INGOs over time. For example, under the leadership of James Wolfenson from 1995 to 2005, the World Bank dramatically increased its efforts to develop ties with NGOs of all types, including HIV–AIDS INGOs (Mallaby, 2004).

Implications

An evolutionary perspective dictates that interorganizational relations be studied as a dynamic process. Organizational communication research, however, often examines organizing at one point in time. By examining the evolution of alliances among INGOs over a considerable time span, this study demonstrated that the predictors studied show different patterns across time periods. A cross-sectional view of any of these time periods would lead to very different conclusions than a dynamic view.

The findings on the role of IGOs in relation to the INGO alliances suggest that future examination of such networks should consider other community level factors. For example, political scientists refer to the "political opportunity structure," which relates to the openness of the political structure and the accessibility of political resources to transnational advocacy networks (Keck & Sikkink, 1998). Community factors also include, for example, access to technology and to global media outlets as information conduits.

Further examination of geographic proximity is needed, given the nonsignificant findings of this study. The regional breakdown used in this research is consistent with prior INGO research. Nevertheless, some have argued that there is a North–South divide across NGOs that corresponds roughly to developed versus less developed countries (Nelson, 2002). A potentially valuable new direction for future theory and research is to develop this idea, collect data that permits assigning INGOs to one or the other side of this divide, and test the proposal empirically. Also, more consideration should be given to assessing evolutionary mechanisms that drive alliances that cross regional barriers.

New linkages are developing within the HIV–AIDS community that can have important implications for INGOs. Recently, IGOs have developed new affiliations with major pharmaceutical companies (UNAIDS, 2002). As the pharmaceutical industry develops closer relations and perhaps becomes a more cooperative player in the community, dynamics in the HIV–AIDS INGO and IGO population are likely to be altered. More research to understand the impact of this recent development needs to be undertaken.

Finally, there is a need to study a variety of different populations of different ages. In this study, there were low network (relational) densities among HIV–AIDS INGOs. Given that there has been tremendous growth in the extensity (Held, McGrew, Goldblatt, & Perraton, 1999) of NGO populations and the density of network ties (Smith, 1997), investigation of older, more established populations may shed light on later-life dynamics.

These findings also have important implications for policymakers from organizations like the UN, U.S. International Development Agency, Bill Gates Foundation, and WHO. One of the concerns for these organizations, and other policy makers, should be the low density of ties among HIV–AIDS INGOs. This low density is an indication of poor interorganizational cooperation and communication in the network. More effort should be made by these funding agencies to increase cooperation and connectivity among HIV–AIDS INGOs.

Second, policymakers should note that the regions with the largest AIDS population (Africa) and the fastest growing AIDS population (Eastern Europe and Asia) lack INGO resources (UNAIDS, 2003). There has been growth in the number of African HIV–AIDS INGOs over the time period of this study. There has been, however, no growth in the number of HIV–AIDS INGOs in Eastern Europe and Asia. Additionally, in 2001, HIV–AIDS INGOs showed a preference for forming alliances within region, instead of across region. This means that although there are many HIV–AIDS INGOs in Western Europe and North America, these INGOs preferred not to align with the less resource rich INGOs in Africa and Latin America. Policymakers should make every effort to encourage HIV–AIDS INGO activity in the places most impacted by AIDS.

Limitations

There are several important limitations to the current study. Even though the *YIO* is the most comprehensive listing of INGOs and their linkages, it is not without flaws. First, it only includes information on internationally oriented NGOs. There are thousands of community-based and nationally-based HIV–AIDS NGOs (Altman, 1994) that are not examined in this study. Second, the *YIO* is only published once a year, and thus changes that occur within that year may be overlooked. Third, because it often takes the editors several years to include an NGO in the *YIO* (Keck & Sikkink, 1998), INGOs that emerge and then disband quickly may not have been included in the volume.

A second limitation has to do with the time intervals selected for analysis. The choice of the 2-year interval was based upon the variance in ties over time and the life span of the typical INGO. A 2-year span is also consistent with time frames employed in the substantial body of research on partnerships among for-profit organizations. Nevertheless, it is possible that selection of different intervals may have yielded different results. Also, in order to examine the networks across time it was necessary to introduce placeholder nodes to represent nascent or postmortem organizations. Adding such nodes to the network increases its sparseness, and makes it more difficult to obtain significant findings.

Third, reliance on archival sources meant that there were variables that could not be included in the research, such as commensalist competitive ties. Other organizational attribute variables of interest include annual budget, number of members, and leadership changes. These variables did not exist for most of the records in the *YIO*.

CONCLUSION

One of the main indicators of globalization is that problems are larger than a single nation–state (Scholte, 2000). Infectious diseases, especially viruses, have the ability to move around the world as quickly as the millions of global travelers can carry them. Solutions that take advantage of global organizational structures are relevant to addressing global health problems. As INGOs develop more partnerships to address global concerns, network dynamics will be of increasing importance to both theory and practice.

NOTES

1. SIDA is an acronym for "El síndrom de inmunodefciencia adquirida," the equivalent of AIDS in Spanish.

2. A list of these organizations is available at the first author's website: www.ndsu.nodak.edu/ndsu/shumate.

3. Life span was calculated based upon estimates from when the organizations appeared and disappeared from the *YIO* and from founding dates and inactive dates reported. There was insufficient information in a few cases to determine lifespan ($n = 7$).

4. Proportion significance is the "proportion of random trials yielding a coefficient with an absolute value as large as or larger than observed" (Borgatti, Everett, & Freeman, 2002).

5. This research studied the entire population of HIV–AIDS INGOs and thus the obtained results are descriptive of population level parameters irrespective of the obtained statistical significance. We report inferential statistics to permit generalization to the larger population of NGOs, such as those that focus on women's issues or environmental issues.

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