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Youth health outcomes from the Connect-to-Protect Coalitions to prevent adolescent HIV infections

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Abstract

We assessed the relationships among HIV-related social and behavioral outcomes resulting from an adolescent-focused HIV structural change initiative in eight urban sites operating Connect to Protect (C2P) coalitions. Over a 4-year period, annual cross-sectional panels of adolescents (N = 2,248) completed an audio-computer-assisted interview, providing data on satisfaction with their communities as adolescent-supportive environments, internalized HIV stigma, lifetime HIV-testing, lifetime sexual risk-taking, and number of sexual partners in the prior year. We used

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structural equation modeling to estimate hypothesized links between time since coalition mobilization to our social and behavioral outcomes. Over the 4 years, adolescents perceived their communities to become more supportive ($p < .05$). Positive perceptions of community support were associated with lower lifetime HIV sexual risk ($p < .05$). The effect of time on risk behavior was mediated by perceptions of community support. Stigma was unchanged over time. Stigma had damaging effects on risk behavior, effects which were also mediated by perceptions of community support. Special efforts are needed to address the deleterious effect of HIV stigma on high-risk urban adolescents.

Over 2 million adolescents worldwide are infected with HIV; 250,000 become newly infected annually. In 2014, HIV was the second leading cause of death among adolescents globally (World Health Organization, 2016). Although U. S. adolescents are less likely to die of the disease than their counterparts in other countries, incidence of adolescent HIV in the U. S. has risen dramatically (Johnson et al., 2014). In 2014, adolescents accounted for roughly 22% of new HIV diagnoses in the U. S. (Centers for Disease Control and Prevention, 2016). Adolescents are far less likely than adults to be aware of their HIV status and to access necessary prevention and care services (Hall et al, 2013; Phillips, Ybarra, Prescott, Parsons, & Mustanski, 2015). Young sexual minority men, particularly Black men, and Black adolescent women are at greatest risk, accounting for roughly 60% of new HIV diagnoses (Centers for Disease Control and Prevention, 2016). The disproportionate burden of disease on Black adolescents reflects gross societal inequities in the socio-structural determinants of health (Lightfoot, 2012; Prado, Lightfoot, & Brown, 2013). Entrenched racial disparities in HIV incidence underscore the importance of structural change to stem the tide of the HIV epidemic.

Structural changes are alterations to the physical, socio-cultural, political, and economic environment (Blankenship, Bray, & Merson, 2000; Gupta, Parkhurst, Ogden, Aggleton, & Mahal, 2008; Lieberman & Earp, 2015; Parkhurst, 2014; Sumartojo, 2000). Structural changes address social inequities by securing the minimum quality of life for all, distributing societal resources fairly, and achieving parity for those who are disenfranchised by current social arrangements. Structural changes to social determinants of risk can be enacted through a wide range of strategies including creating or modifying policies and institutional practices at the local, provincial, federal, and international level; altering social and community norms; redistributing resources; eliminating de facto privileges, and brokering new alliances (Lieberman & Earp, 2015).

Among the more popular and intuitively promising strategies for promoting structural change are those that capitalize on the mobilization of community members into coalitions. Community Coalition Action Theory (CCAT) (Butterfoss & Kegler, 2009; Kegler & Swan, 2011) – the leading theoretical model describing how coalition activity ultimately benefits individuals' health – indicates that well-run coalitions contribute to structural change by generating synergy among diverse community actors. Collaborative synergy fosters members' ability to plan and execute feasible action strategies none could readily pursue on their own. Well-laid and executed plans lead to the achievement of structural changes, which

in turn, improve the social environment for health and ultimately enable healthy behaviors at the individual level.

Although calls for structural approaches to disease prevention are not new, research on intentioned structural change interventions and their effects on public health behaviors is relatively recent. Researchers have been challenged by the extreme difficulty of achieving structural changes and credibly linking these to individual outcomes. Despite the promise of coalitions as a strategy for promoting structural change, the literature documenting social and behavioral health outcomes offers a mixed picture of their success (Cornish, Priego-Hernandez, Campbell, Mburu, & McLean, 2014). Although several high-profile studies have reported promising results (Clark et al., 2013; Paine-Andrews et al., 1999), the majority of research offers uncertain proof that community coalitions' achievements in facilitating structural change have readily discernable health benefits that can be confidently traced back to their activities (Anderson et al., 2015). As Sallis and Green observe, "evaluating unstandardized, constantly changing, community-directed, slow-moving changes that represent all the levels in the ecologic models from programs to policies has been challenging" (Sallis & Greene, 2012, p. S410). Evaluating the cascading effects of coalitions on structural change health outcomes requires tools and resources that exceed what is typically available to the task. Cornish et al. advocate incorporating social outcome indicators (e.g., perceived norms) that might plausibly change as a consequence of mobilization into theories of change that guide evaluative studies in this area (Cornish et al., 2014). Social outcomes related to the creation of health-enabling communities – communities characterized by positive health norms that citizens perceive support their well-being – may be key mechanisms linking coalition activity to health behaviors (Golden, McLeroy, Green, Earp, & Lieberman, 2015).

The primary purpose of the current paper is to estimate the links between social outcomes that may result from coalitions' structural change achievements and health behaviors. We focus on coalitions established as part Connect-to-Protect (C2P), an initiative of the Adolescent Medicine Trials Network for HIV/AIDS Interventions (ATN). In 2006, the ATN mobilized 14 C2P coalitions located throughout the U. S. Coalitions operated in urban settings with sizeable adolescent HIV epidemics. Coalitions secured structural changes to reduce adolescents' exposure to HIV infection and increase their access to HIV testing. Coalitions' operations were centrally monitored by a technical support staff.

Coalitions were led by adolescent medicine clinical units (see Table 1). Staff convened representatives of local adolescent and HIV organizations, public health departments, faith-based institutions, schools, and businesses to join in coalition (Chutuape, Willard, Walker, Boyer, & Ellen, 2010; Straub et al., 2007). Members also came from organizations that specialized in serving Black and Latino youth, gay and bisexual youth of color, transgendered youth, and high-risk youth with a variety of specialized needs and concerns (e.g., homelessness, sexual exploitation and abuse, foster care). Some members were youth. Guided by place-based understandings of social determinants of HIV risk (Bernard et al., 2007) and CCAT, coalitions selected a target population of adolescents at risk (e.g., young gay and bisexual men, young women, youth who inject drugs) and a geographic area in their community on which to center their efforts (Straub et al., 2007; Ziff et al., 2006). Coalitions

determined the structural factors driving risk and their objectives by following a structured guide to root cause analyses (Willard, Chutuape, Stines, & Ellen, 2012).

Although coalitions sought to alter locally relevant root causes of risk, the coalitions shared overarching goals of fostering their communities' development as adolescent-supportive places and of reducing HIV stigma. These two factors were conceived of as the principal mechanisms for creating a health-enabling environment. HIV-related stigma's deleterious effects are well documented (Buseh, Kelber, Hewitt, Stevens, & Park, 2006; Arnold, Rebchook, & Kegeles, 2014; Kinsler, Wong, Sayles, Davis, & Cunningham, 2007; Radcliffe et al., 2010; Barker et al., 2012). Adolescent-responsive communities characterized by support were theorized to improve adolescents' health.

In this study, we seek to test the plausibility of the coalitions' basic causal logic by identifying the specific links between and differential effects of community support, anticipated HIV stigma, and HIV-related risk and protective behaviors among high-risk urban adolescents. Specifically, we hypothesize that (1) over time perceived community support will increase; (2) over time anticipated HIV stigma will decline; (3) anticipated HIV stigma will have a direct negative association with lifetime HIV testing; (4) anticipated HIV stigma will have a direct positive association with lifetime engagement in high-risk sexual partnerships and number of recent sexual partners; (5) perceived community support will have a direct positive association with lifetime HIV testing; and, (6) perceived community support will have a direct negative association with lifetime engagement in high-risk sexual partnerships and number of recent sexual partners (see Figure 1). We test these hypotheses using data collected from cross-sectional samples of youth residing in eight C2P coalition cities.

Methods

The ATN used an observational design in which adolescent outcomes are implicitly assumed to result from structural changes. Eight of the C2P coalitions participated in collecting data from adolescents once each year for 4 to 5 years, after which continued collection of these data became financially unviable. These eight coalitions completed 154 structural change objectives during the period we investigate. Achieved objectives included eliminating parental consent requirements for minor youth to access HIV testing in the Commonwealth of Puerto Rico, increasing access to adolescent-friendly HIV testing, expanding access to free condoms, increasing the availability of HIV-related information to adolescents, and creating safe zones for gay, bisexual, and transgender adolescents. In addition to collecting data from adolescents, C2P staff documented activities, member composition, member feedback, and the status of structural change objectives on an ongoing basis and in a standardized manner. Coalitions collected and reported these implementation data across their lifespan.

Procedures

The initial sample of adolescents was taken in the first year of mobilization and prior to the achievement of any objectives. Thereafter, annual cross-sectional surveys were taken using the same methods each time. Staff enumerated a set of popular congregation venues, such as

parks, bars, and coffee shops (Chutuape et al., 2009). Adolescents were approached in these venues by study staff. After consenting to be screened, adolescents completed a brief survey to determine their study eligibility (e.g., sexually active in prior 12 months, 12–24 years of age). Informed oral consent to participate in the longer interview was obtained only from those youth deemed eligible to participate. Oral consent procedures were employed at both stages of recruitment to preserve adolescents' anonymity. Eligible adolescents who consented to participate in the anonymous audio-computer assisted interview completed it on a laptop computer immediately. The interview was available in Spanish or English. Recruiters remained nearby to assist youth in completing the ACASI, should they need help. These study procedures were approved by the human subjects' review committee at each coalition site and by each institution at which study personnel who were not part of the coalitions was employed. All study sites received a waiver of parental consent for minor adolescents.

Measures

Adolescents reported current age in years, biological sex at birth (0 = male, 1 = female), and current gender identification (male, female, transgender). Adolescents indicated if they identified as gay, lesbian, bisexual, or heterosexual. We created a new dichotomous variable in which heterosexual was coded as "0" and all other sexual identities were coded as "1". Adolescents reported if they were White, Black/African American, mixed race, or other race and whether they were of Hispanic origin. Adolescents reported if they ever experienced homelessness (0 = no; 1=yes), whether or not they were currently in school (0 = no; 1 = yes), and their highest level of educational attainment.

Adolescents completed four items on satisfaction with their community's support for youth. The measure was developed for the present study and informed by the community concerns report method, which was developed for community participatory action research projects focused on citizen mobilization and neighborhood improvement efforts (Schriner & Fawcett, 1988; Suarez-Balcazar, Bradford, & Fawcett, 1988). A sample item read "How satisfied are you that people in your community are looking for new ways to support the youth like you?" Adolescents rated each item on a Likert-type scale ranging from 0 (very unsatisfied) to 4 (very satisfied). We summed their responses to each item. The mean score was 10.86 (SD = 3.40; Cronbach's α = .81).

To measure anticipated HIV stigma, we adapted items from the HIV Epidemiology Research Study (Smith, 1998) to create a 13-item scale. The HIV Epidemiology Research Study was a longitudinal cohort study of HIV-infected and uninfected adolescent and adult women. Previous adaptations of the scale have been used to measure anticipated STD and HIV stigma in adolescent populations (Cunningham, Tschann, Gurvey, Fortenberry, & Ellen, 2002; Cunningham, Kerrigan, Jennings, & Ellen, 2009; Fortenberry, et al., 2002). Adolescents responded to items such as "If you had HIV, people would be disgusted by you" on a Likert- type scale ranging from 1 (strongly agree) to 5 (strongly disagree). We reverse-coded items so that high values reflect high degrees of stigma. Responses were summed. The mean score was 44.50 (SD = 12.45; Cronbach's α = .94).

Behavioral items were derived from prior ATN studies. Adolescents responded to a single item asking if they had ever been tested for HIV (0 = no; 1 = yes). An index of lifetime HIV sexual risk was constructed using responses to five questions: (1) ever had sex with someone who injects drugs; (2) ever exchanged sex for drugs or money; (3) ever had sex with someone who you suspected of having HIV; (4) ever had sex with someone who you knew had HIV, or who you now know has HIV; and (5) ever had a sexually transmitted infection. Counts could range from 0 to 5, with 0 indicating no lifetime risk and 5 indicating high lifetime risk. The mean lifetime risk score was .79 (SD = 1.2; Cronbach's α = .68). Adolescents also reported on their number of sexual partners in the prior year. We created a dichotomous score in which having 1 partner was coded as "0" and having 2 or more partners was coded as "1".

We used time to assess intervention exposure. Time was coded using the precise dates when each coalition began to mobilize. Year one is treated as a reference category against which each subsequent year is compared.

Analyses

Prior to conducting analyses, we examined each variable for the extent of missing data and to assess whether missing data might introduce bias into model estimates. Guided by existing standards (Little & Rubin, 2002; Schafer, 1997), we used a 5% cutoff to assess missingness. If the proportion of missingness exceeds 5%, the missing data mechanism must be determined. When data are missing completely at random, any missing data treatment method works equally well. Two of our indicators exceeded the 5% threshold, lifetime HIV-risky sexual partnerships (6%) and HIV stigma (9%). We fit three logistic regression equations predicting whether youth were missing data on each of our outcome variables (McKnight, McKnight, Sidani, & Figueredo, 2007). The results did not support any association between the variables in our model and whether youth were missing information on their number of sexual partners in the prior year or HIV testing. Low perceived community support predicted missingness on our indicator of HIV-risky sexual partners [β = −.08 (SE = .030, Wald's X^2 = 8.56, $p < .01$], the only significant relationship we observed, suggesting our level of missinigness is close to missing completely at random. Examination of the covariance coverage tables indicate our data are trustworthy (lowest value = 86%). We calculated the intra-class correlation coefficient (ICC) for each study outcome to determine if the multivariate analysis required adjusting for the nesting of adolescents within coalitions (n=8). ICCS were close to zero or small (ICCs < 0.05), with the exception of HIV risky sexual relationships (ICC = .2). These tests (ICCs < 0.05) and the small coalition group size suggested no need for multilevel modeling to account for nesting of youth within coalition (Brown, 2015; O'Dwyer & Parker, 2014; Hox & Maas, 2002).

To assess the theorized relationships among variables, we used structural equation modeling (SEM). We selected SEM because it provides precise standard errors, better approximating true population estimates, while accounting for measurement error. SEM also has the advantage of capably detecting mediational effects, even with small samples (Iacobucci, Saldhana, & Deng, 2007), and of addressing non-normally distributed variables. Formal tests of normality (e.g., the Shapiro-Wilk test, $p < .0001$) indicated that our mediators and

outcome variables are non-normally distributed. We treated HIV-risky sexual relationships as a count variable, and lifetime HIV testing and number of sexual partners in the prior year as categorical, which allowed us to use a non-linear transformation (e.g., a link function) (Muthén, Muthén, & Asparaouhov, 2016). To improve the precision of the parameter estimates and address non-normality in our mediators, we used bootstrapping (10,000 replications) with grand mean centering of our mediators (Davidson & MacKinnon, 2007; Hoyle & Gottfredson, 2014; Sainani, 2013). We fit the model as a negative binomial model, given the inclusion of a count variable and the AIC, BIC values and mean and variance for the measure of HIV risky sexual partnerships indicate data are overdispersed (Allison, 2012). We used listwise deletion procedures to handle missing data. We included in the model as covariates age, sex at birth, and sexual identity. The significance of direct and indirect effects was computed on each outcome. We used MPlus version 8 for SEM analyses. We used Stata version 12 for computing basic descriptive and summary statistics.

Results

Participants

2,284 racially and ethnically diverse adolescents completed the interview and comprise our analytic sample (see Table 2). The sample was majority male (65.4%). Roughly a third of the sample reported a heterosexual sexual identity. The average age was 20.13 years old (SD=2.62).

Descriptive Statistics

Correlations among predictor and outcome variables in the model are shown in Table 3. Correlations suggest these constructs are sufficiently distinct, with the sole exception of the covariate variables sexual orientation and gender identity, which are moderately correlated (R=.62).

Test of C2P Logic Model

Accounting for youth's age, sexual orientation, and gender, the hypothesized model provided an acceptable fit to the data ($X^2(1) = 58.33$, $p < .001$). Model estimation terminated normally. We display the fitted structural equation model in Figure 2. Decomposed direct and indirect effects appear in Table 4. As we show, our first hypothesis was partially supported. We observed that community support improved from time 1 to time 2 (β = .430, SE = .201, β* = 2.135, $p < .05$) and time 1 to time 4 (β = .493, SE = .199, β* = 2.472, $p < .05$), but was not significantly different from baseline at time 3 (β = .273, SE = .206, β* = 1.327, p = ns). Levels of HIV stigma were unchanged at all time points (Time 2 β = .634, SE = .774, β* = .820, p = ns; Time 3 β = −.201, SE = .752, β* = −.268, p = ns; Time 4 β = .300, SE = .742, β* = .405, p = ns), disconfirming our second hypothesis.

Regarding behavioral outcomes, we observed no significant relationships for any of our predictor variables and lifetime engagement in HIV testing. Anticipated HIV stigma approached, but did not obtain significance (β = .008, SE = .004, β* = 1.948, p = .051) in predicting greater number of recent sexual partners. Anticipated HIV stigma also approached, but not obtain significance in predicting greater high-risk sexual partnerships (β

= −.005, SE = .003, β* = −1.920, p = .055). Thus, we found little evidence in support of hypothesis three, four, or five in these data. Perceived community support (β = −.035, SE = .016, β* = −2.227, p < .05) significantly predicted lower number of sexual partners in the prior year. Perceived community support (β = −.043, SE = .009, β* = −4.773, p < .01) also significantly predicted fewer lifetime high-risk sexual relationships. These findings confirm hypothesis six. Indirect effects tested using bootstrapped standards errors were non-significant, with two exceptions. The indirect effect of time on high-risk sexual partnerships was significant at times 2 (β = −.022, SE = .010, β* = −1.901, p < .05) and 4 (β = −.023, SE = .010, β* = −2.231, p < .05). Community support perceptions mediated the association between time and avoidance of high-risk sexual partnerships at time 4 (β* for time 4 indirect effect via community support = −2.149, p < .05). The indirect effect of time on high-risk sexual partnerships via community support approached, but did not attain statistical significance (p = .057, ns). In addition, we observed a significant inverse effect of stigma on perceived community support was observed (β = −6.542, SE = .949, β* = −6.890, p < .01), implying that perceptions of community support mediate the relationship between stigma and engaging in high-risk sexual partnerships and the number of sexual partners reported in the prior year.

Discussion

C2P was established to advance structural changes to lower adolescents' risk of exposure to HIV. Structural changes emphasized policies and practices to improve access to accurate health information, condoms, and HIV testing, and to bolster communities' ability to respond to at-risk adolescent's HIV-related needs. We explored whether changes in social outcomes that might plausibly result from C2P mediated youth behavioral health outcomes. Providing empirical support for theorized linkages among individual's health behaviors, social-normative community perceptions, and structural changes brought about by coalitions has proved troubling for its difficulty. Although this study followed a small number of coalitions over a brief period and used an observational design, our results add value to this emergent area of inquiry.

Our results affirm theoretically important relationships among structural change activity, social outcomes, and the 'downstream' behaviors intervenors hope to influence. Specifically, we observed adolescents' level of satisfaction with their community's supportiveness mediated HIV-related risk behavior, after accounting for age, sexual identity, and sex. Adolescents who perceived they lived in caring, responsive communities reported lower lifetime HIV-risky sexual partnerships. These results underscore the importance of community social context for the development of behavioral risk. Residing in caring communities improves the odds adolescents avoid high-risk behaviors. We also found community satisfaction increased over time, consistent with what we would expect to result from structural change to build community capability, and that the effect of change over time was mediated through community support. The logical link between modifiable perceived community conditions and individual youth behavior finds some support in our data, suggesting the potential of interventions such as C2P.

In these data, community support mediated HIV stigma's effects, establishing a clear pathway through community support to engagement in HIV risk. The effect of anticipated HIV stigma was strong and posed harmful effects on HIV-risk behaviors. As others have observed (Breet, Kagee, & Seedat, 2014), this finding runs counter to stress-buffering models of social support, which hold that when perceived support is strong, stigmas' influence will be mitigated. Over the short 4-year timeframe we examined, C2P coalitions were unsuccessful at lowering anticipated HIV stigma and at disrupting the relationship between HIV stigma and risk behavior. These data highlight the need to intervene on HIV stigma over prolonged periods and call for increased intervention research focused on shifting these perceptions. Interventions that focus broadly on reducing HIV stigma while building adolescent supportive communities might best reduce adolescents' risk behaviors.

Limitations

Limitations of the present work should be noted. We accrued our sample by approaching adolescents in community venues to seek their participation. Without a mechanism in place to create a probabilistic time-space sample (Muhib et al., 2001), this process may introduce unknown biases into the sample's composition. We cannot be certain the adolescents in the study represent the at-risk populations of adolescents in C2P cities. Similarly, we only focused on a subset of the C2P sites. Whether findings generalize to other C2P sites remains unknown. Moreover, because youth were targeted in venues where high-risk youth congregate, the range of scores on our outcome variables is undoubtedly restricted. It is possible, given restriction of range, that we have underestimated the strength of the associations among variables we have studied. A further limitation derives from the cross-sectional observational study design, which preclude drawing confident causal inferences. Although the effects we observe are plausible and consistent with existing theory, it remains possible the proposed order of effects is incorrect. It is also possible that mediators we did not measure are of greater importance in predicting the outcomes we examined. Additionally, like most research in this area, we cannot attribute observed changes to any specific achievement to which coalitions contributed.

Conclusion

Addressing structural causes of adolescent's risk of HIV exposure reflects an urgent priority. Adolescent vulnerability to HIV derives from a complex array of structural factors that facilitate or limit youth's access to healthful norms and health-promoting resources. Altering structural factors to create health-supportive communities is a necessary complement to individually-oriented intervention efforts. Testing theories for how structural interventions work can help refine non-individually focused intervention approaches. Better understanding of the cross-cutting mechanisms that may lead to youth's HIV risk behavior allows for the development of structural interventions to increase protective community ecological processes and to interrupt those that lead to negative behavioral outcomes. Although we were unable to find support for C2P's early effects on HIV stigma, our findings suggest that with time, coalitions' structural achievements may have affected a key social outcome that is closely tied to adolescents' HIV-risk behavior: community support. Our work provides partial support for the basic logic that protective community processes can be enhanced and that youth's risk behaviors may be reduced by so doing. Coupled with effective strategies to

reduce HIV stigma, building a community's responsiveness to adolescent needs through coalition efforts like C2P remains a promising strategy to lowering adolescent HIV risk.

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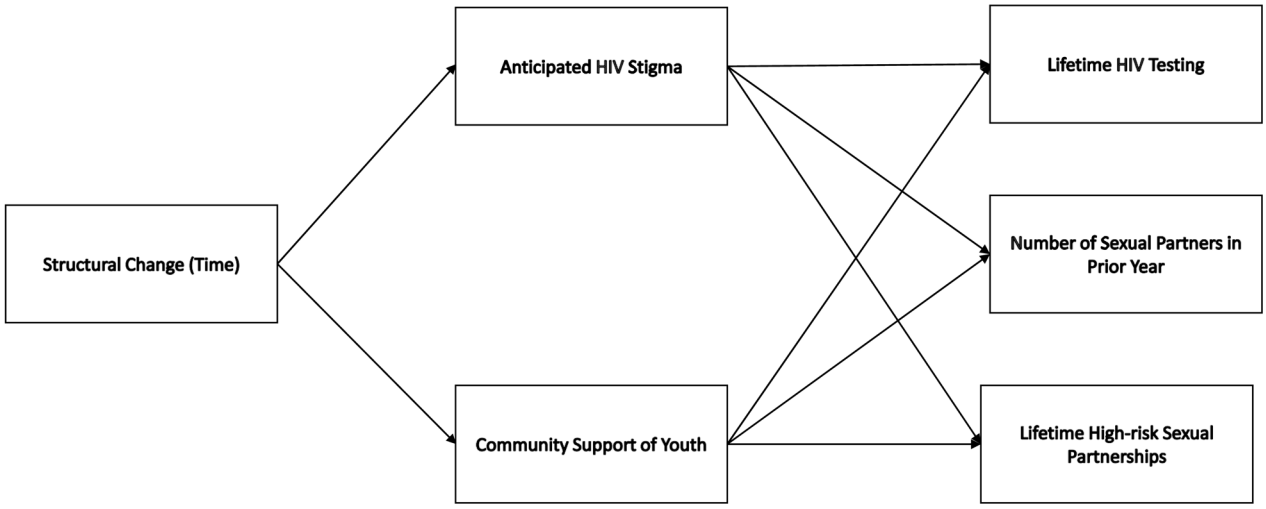

Figure 1.
Hypothesized structural equation model

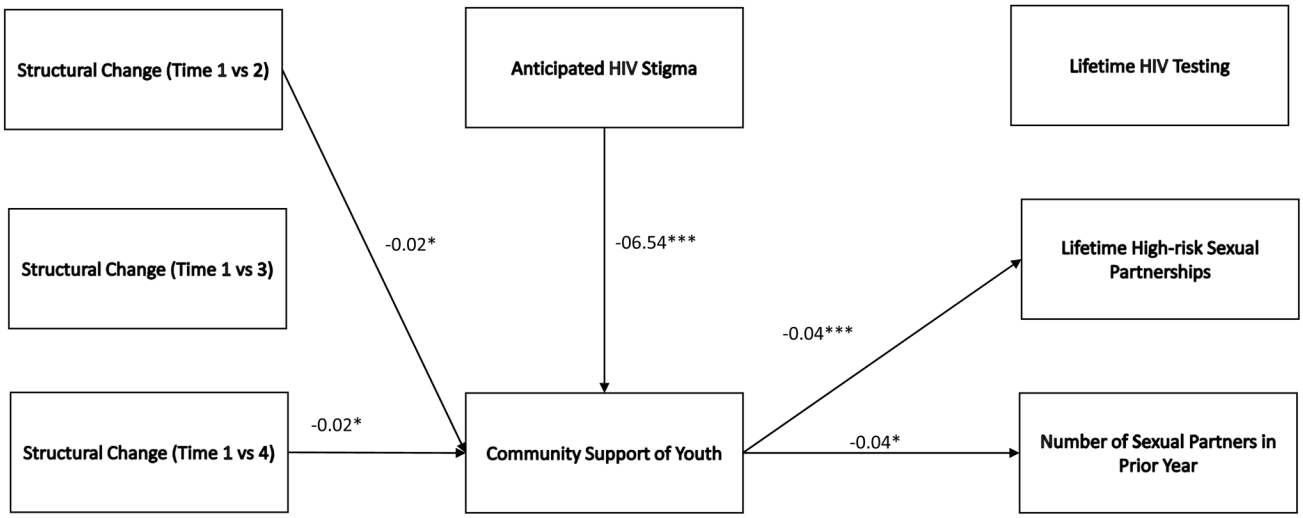

Figure 2.

Fitted structural equation model of community support and stigma on lifetime HIV testing, high-risk sexual partnerships, and number of sexual partners. Model controls for age, gender, and sexual orientation. Standardized estimates are shown. Insignificant paths are not shown.

Table 1

C2P Convening Sites (N=13)

State	Site	Youth Target Population	Years of Coalition Operation	Collected 4-year youth outcomes?
CA	Children's Hospital of Los Angeles	Gay and bisexual males	2006–2016	Yes
CA	University of California at San Francisco	Gay and bisexual males	2006–2011	Yes
DC	Children's National Medical Center	Gay and bisexual males	2006–2016	Yes
FL	University of South Florida, Tampa	Females	2006–2016	Yes
FL	Children's Diagnostic and Treatment Center, Ft. Lauderdale	Females	2006–2011	No
FL	University of Miami School of Medicine	Females	2006–2016	No
IL	John H. Stroger Jr. Cook County Hospital, Chicago	Females	2006–2016	Yes
LA	Tulane University Health Sciences Center, New Orleans	Females	2006–2016	No
MD	University of Maryland, Baltimore	Gay and bisexual males	2006–2011	Yes
NY	Montefiore Medical Center, Bronx	Females	2006–2016	No
NY	Mount Sinai Medical Center, Manhattan	Gay and bisexual males	2006–2011	Yes
PA	Children's Hospital of Philadelphia	Gay and bisexual males	2006–2016	No
PR	University of Puerto Rico, San Juan	Injection drug users	2006–2011	Yes
TN	St. Jude's Research Hospital, Memphis	Females	2006–2016	No

Table 2

Demographic Characteristics of Study Respondents (N=2,284).

Characteristic	Mean	SD
Age	20.13	2.63
	n	Valid %
Gender Identity		
Male	1493	65.4
Female	736	32.2
Transgender	54	2.4
Sexual Identity		
Gay/Lesbian	988	43.3
Bisexual	420	18.4
Heterosexual	811	35.5
Unsure	65	2.8
Hispanic/Latino Ethnicity	1204	52.7
Race		
Black	913	40.3
White	280	12.4
Mixed Race	686	30.3
Other	384	17.0
In School		
Yes	1383	60.6
No	899	39.4
Highest Level of Educational Attainment		
Less than High School Graduate	540	23.8
High School Graduate or GED	874	38.6
Some College or Post-Secondary Education	649	28.6
College Graduate or Greater	204	9.0
Ever Homeless		
Yes	554	24.3
No	1730	75.7
C2P City of Residence		
Tampa, FL	147	6.4
Los Angeles, CA	227	9.9
Washington, DC	214	9.4
Chicago, IL	246	10.8
San Juan, PR	676	29.6
Manhattan, NY	268	11.7
San Francisco, CA	319	14.0
Baltimore, MD	187	8.2

Table 3

Correlations among Predictor and Outcome Variables (N = 2,284)

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Age	–										
2. Gender	−.27***[a]	–									
3. Sexual Orientation	−.22***[a]	.62***[a]	–								
4. Community Support	−.08***	.04[a]	.08***[a]	–							
5. Stigma	−.15***	.20[a]	.20[a]	−.13***	–						
6. Ever Tested	.26***[a]	−.24***[a]	−.28***[a]	−.01[a]	−.10***[a]	–					
7. High Risk Score	.20***	−.26***[a]	−.30***[a]	−.12***	−.11***	.26***[a]	–				
8. Number of Partners	.09***	−.26***[a]	−.23***[a]	−.07**	−.01	.13***[a]	.25***	–			
9. Year 2	−.02	−.002[a]	−.01[a]	.024	.02	−.03[a]	.03	.02	–		
10. Year 3	−.004	.000[a]	.01[a]	−.002	−.02	.001[a]	−.01	.000	−.32***	–	
11. Year 4	.05*	.000[a]	−.01[a]	.03	−.004	.02[a]	−.001	−.02	−.33***	−.33***	–

[a]Point Biserial Correlations

*$p < .05$.

**$p < .01$.

***$p < .001$.

Table 4

Decomposition of standardized effects on lifetime HIV testing, 2 or more partners in last year, and HIV risky sexual relationships (N=2,284).

	Lifetime HIV Testing			>2 Partners Last Year			HIV Risky Sexual Relationships		
Direct Effects	**Estimate**	**BSE**	**95% CI[a]**	**Estimate**	**BSE**	**95% CI[a]**	**Estimate**	**BSE**	**95% CI[a]**
Age	0.18***	0.02	[0.14, 0.23]	0.01	0.02	[−0.03, 0.05]	0.08***	0.01	[0.06, 0.11]
Sexual Orientation									
Other [Ref.]	-	-	-	-	-	-	-	-	-
Heterosexual	−0.92***	0.16	[−1.24, −0.62]	−0.51***	0.13	[−0.76, −0.26]	−0.80***	0.09	[−0.99, −0.63]
Sex at birth									
Male [Ref.]	-	-	-	-	-	-	-	-	-
Female	−0.31*	0.16	[−0.61, −0.01]	−0.90***	0.13	[−1.16, −0.66]	−0.44***	0.10	[−0.63, −0.25]
Year 1 [Ref.]	-	-	-	-	-	-	-	-	-
Year 2	−0.19	0.14	[−0.47, 0.09]	0.12	0.14	[−0.17, 0.38]	0.12	0.08	[−0.05, 0.20]
Year 3	−0.03	0.15	[−0.33, 0.26]	0.04	0.14	[−0.23, 0.31]	0.04	0.09	[−0.14, 0.20]
Year 4	−0.03	0.15	[−0.33, 0.26]	−0.06	0.14	[−0.32, 0.21]	0.03	0.09	[−0.14, 0.20]
Community Support	0.02	0.02	[−0.01, 0.05]	−0.04*	0.02	[−0.07, −0.004]	−0.04***	0.01	[−0.06, −0.03]
HIV Stigma	−0.00	0.01	[−0.01, 0.01]	0.01*	0.00	[0.00, 0.02]	−0.01*	0.003	[0.01, 0.00]
HIV Stigma with Community Support	−6.54***	0.95	[−8.53, −4.65]						
Indirect Effects									
Year 2 → outcome	0.01	0.01	[−0.01, 0.03]	−0.01	0.01	[−0.04, 0.02]	−0.02**	0.01	[−0.04, −0.004]
Year 2→ HIV Stigma → Outcome	−0.00	0.01	[−0.01, 0.01]	0.01	0.01	[−0.01, 0.02]	−0.00**	0.01	[−0.01, 0.01]
Year 2→ Community Support → Outcome	0.01	0.01	[−0.00, 0.03]	−0.02	0.01	[−0.04, 0.00]	−0.02**	0.01	[−0.04, −0.00]
Year 3 → outcome	0.01	0.01	[−0.01, 0.03]	−0.01	0.01	[−0.04, 0.01]	−0.01	0.01	[−0.03, 0.01]
Year 3→ HIV Stigma → Outcome	0.00	0.00	[−0.01, 0.01]	−0.00	0.01	[−0.02, 0.01]	−0.00	0.00	[−0.01, 0.01]
Year 3→ Community Support → Outcome	0.01	0.01	[−0.01, 0.02]	−0.01	0.01	[−0.03, 0.00]	−0.01	0.01	[−0.03, 0.01]
Year 4 → outcome	0.01	0.01	[−0.01, 0.04]	−0.02	0.01	[−0.04, 0.01]	−0.02**	0.01	[−0.05, −0.01]
Year 4→ HIV Stigma → Outcome	−0.00	0.00	[−0.01, 0.01]	0.00	0.01	[−0.01, 0.02]	−0.00	0.00	[−0.01, 0.01]
Year 4→ Community Support → Outcome	0.01	0.01	[−0.00, 0.03]	−0.02	0.01	[−0.04, 0.00]	−0.02**	0.01	[−0.04, −0.00]

	Lifetime HIV Testing			>2 Partners Last Year			HIV Risky Sexual Relationships		
Direct Effects	**Estimate**	**BSE**	**95% CI[a]**	**Estimate**	**BSE**	**95% CI[a]**	**Estimate**	**BSE**	**95% CI[a]**
Total effects									
Year 2	−0.18	0.14	[−0.46, 0.10]	0.10	0.14	[−0.18, 0.37]	0.10	0.08	[−0.07, 0.26]
Year 3	−0.03	0.15	[−0.32, 0.26]	0.03	0.14	[−0.24, 0.30]	0.02	0.09	[−0.15, 0.20]
Year 4	−0.02	0.15	[−0.32, 0.28]	−0.07	0.14	[−0.34, 0.19]	−0.07	0.14	[−0.34, 0.19]

Note. BSE = Bootstrap Estimate of the Standard Error.

[a]Bootstrap Estimate of the Standard Error and Bootstrap 95% Confidence Intervals (10,000 samples).

t $p < 0.1$.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$