

Adversity and Syndemic Production Among Men Participating in the Multicenter AIDS Cohort Study: A Life-Course Approach

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A growing number of epidemiological studies have detected significant health-related disparities among men who have sex with men (MSM) for many dangerous health conditions, ranging from psychosocial problems^{1, 2} to infectious and chronic diseases.^{3–6} A notable feature of these seemingly distinct public health epidemics is that they are often interconnected and manifest themselves among MSM in ways to suggest that they are mutually reinforcing, thereby creating a syndemic.^{7–11} A syndemic, as defined by the Centers for Disease Control and Prevention, is “two or more afflictions, interacting synergistically, contributing to excess burden of disease in a population.”¹² Syndemic conditions have been hypothesized to be a driving force for HIV transmission among MSM in the United States and abroad.^{7, 9} However, relatively little is known about the underlying pathways that explain the production and maintenance of syndemics among populations of MSM.

We tested a theory of syndemic production among MSM using data from a large cohort study, the Multicenter AIDS Cohort Study (MACS).¹³ The syndemic theory we investigated takes a life-course perspective on syndemic production among MSM and proposes that experiences of social marginalization, often starting at a very early age, place these men at greater risk for a combination of psychosocial health problems (i.e., depression, partner violence, stimulant use) that subsequently intertwine to drive risks related to HIV and other negative health outcomes.⁷ An empirically tested theory of syndemic production offers an explanation for the existence of syndemic conditions among MSM and may inform the development of innovative interventions to lower rates of psychosocial health problems and subsequent risk of HIV transmission.

Objectives. We tested a theory of syndemic production among men who have sex with men (MSM) using data from a large cohort study.

Methods. Participants were 1551 men from the Multicenter AIDS Cohort Study enrolled at 4 study sites: Baltimore, Maryland–Washington, DC; Chicago, Illinois; Los Angeles, California; and Pittsburgh, Pennsylvania. Participants who attended semiannual visits from April 1, 2008, to March 31, 2009, completed an additional survey that captured data about events throughout their life course thought to be related to syndemic production.

Results. Using multivariate analysis, we found that the majority of life-course predictor variables (e.g., victimization, internalized homophobia) were significantly associated with both the syndemic condition and the component psychosocial health outcomes (depressive symptoms, stress, stimulant use, sexual compulsivity, intimate partner violence). A nested negative binomial analysis showed that the overall life course significantly explained variability in the syndemic outcomes ($\chi^2 = 247.94$; $P < .001$; $df = 22$).

Conclusions. We identified life-course events and conditions related to syndemic production that may help to inform innovative interventions that will effectively disentangle interconnecting health problems and promote health among MSM. (*Am J Public Health.* 2013;103:79–85. doi:10.2105/AJPH.2012.300810)

METHODS

The Multicenter AIDS Cohort Study (MACS) is an ongoing, prospective cohort study of the natural history of HIV infection among MSM in the United States. Men were enrolled at 4 study sites: Baltimore, Maryland–Washington, DC; Chicago, Illinois; Los Angeles, California; and Pittsburgh, Pennsylvania. A total of 6972 men have been enrolled in the study since its inception in April 1984 (4954 in 1984–1985, 668 in 1987–1991, and 1350 in 2001–2003). The study design has previously been described,^{13–15} and we present here only methods relevant to the current substudy. Participants returned every 6 months for an interview, physical examination, and collection of blood for laboratory testing. The interview covered physical health, medical treatments, and sexual and stimulant use behaviors. More information about the MACS study, including

data collection instruments, can be found at <http://www.statepi.jhsph.edu/mac/mac.html>.

Substudy

Participants who attended semiannual MACS visits 49, 50, or both (April 1, 2008–March 31, 2009) were asked to complete an additional survey that captured data about events throughout their life course thought to be related to syndemic production⁷ (see Measures section for a detailed description of these domains). Of eligible participants, 87% opted to participate in the substudy. Participation in this substudy was voluntary and confidential, and participants could opt out without affecting their involvement in the ongoing MACS. The substudy survey took approximately 30 to 45 minutes, and participants were compensated for their time. All study procedures were reviewed and approved by the institutional review boards at all study sites.

This substudy included 2512 completed surveys from 1843 unique individuals. Of those surveyed, 961 participants completed the survey at both visits 49 and 50. The remaining participants ($n = 590$) completed the survey only once. We included in the analysis only data from an individual's first completed survey. We excluded 104 men from the analysis because they did not report having had sex with a male partner at any point during their participation in the MACS, although they may have identified as MSM on entry into the study. We excluded an additional 188 men from analysis because either the substudy survey or the MACS study records were missing information needed to calculate the syndemic variable, leaving a final analytic sample of 1551 MSM.

Measures

Sociodemographic data. We obtained socio-demographic information from the MACS parent study (Table 1). Age was categorized as 40 years or younger, 41–50 years, 51–60 years, or 61 years or older. Educational status was categorized as high school or less, some college, college graduate, or at least some postgraduate education. Income was based on self-reported current annual earnings and categorized as less than \$20 000, \$20 000–\$39 999, \$40 000–\$59 999, or \$60 000 and higher. Educational status and income were measured at the time of the substudy survey. For regression analysis, we recoded demographic variables as dichotomous indicator variables with the following serving as the referents: age, 40 years or younger; race, non-Hispanic White; education, high school or less; and income, less than \$20 000.

Predictor variables. We derived predictor variables from the substudy survey to summarize a range of adverse conditions and events throughout the participant's life course from childhood to the present. For each of the scaled items, and unless otherwise noted, we deemed participants to have experienced each form of adversity if their mean score for the scale was in the highest tertile of all scores. We reverse coded scales when appropriate to ensure the higher scores were in the direction theoretically proposed (e.g., life satisfaction scores were recoded so that high values represented low satisfaction). Cronbach's alphas

are provided for each of the scales and were computed from the final analytic sample data.

Early life (aged < 18 years). Adversity variables were

- childhood satisfaction, a 6-item scale developed for this study indicating level of happiness or satisfaction before age 10 years (e.g., "I was a happy kid," "I was part of a happy family"; Cronbach's $\alpha = .891$);
- parental substance abuse, a single item indicating that a parent or guardian had a drug or alcohol problem before the participant was aged 18 years;
- parental domestic violence, a single item indicating witnessing physical violence between parents or guardians before the participant was aged 18 years;
- physical abuse, a single item indicating that a parent or guardian hit or beat up the participant before age 18 years;
- childhood sexual assault, a single item indicating that a person had "forced or frightened you into doing something sexually that you did not want to do" before age 18 years;
- childhood victimization, 5 questions regarding frequency of various forms of victimization (verbal, physical, emotional) during junior high or middle school (aged 13–15 years)¹⁶; response options ranged from *never to about once a week or more*;
- gay-related victimization, 5 questions regarding frequency of various forms of victimization that happened because they were, or were thought to be, gay or bisexual¹⁶;
- aggressive environment, 5 questions regarding frequency of witnessing various forms of victimization (verbal, physical, emotional) during junior high or middle school (aged 13–15 years)¹⁶;
- masculinity attainment, 22-item scale indicating self-perception of attainment of masculinity norms during high school (aged 16–19 years) adapted from the Experience of Shame Scale;¹⁷ participants indicated the frequency of related feelings or behaviors (e.g., "Try to cover up or conceal your mannerisms because you thought they were feminine or girl-like"; Cronbach's $\alpha = .955$); and
- social connectedness, a 20-item scale indicating perceived level of social connectedness during high school (e.g., "I felt like an outsider," "I was able to relate to my peers"; Cronbach's $\alpha = .951$).¹⁸

TABLE 1—Demographics of Overall Sample of Substudy Participants Identifying as Men Who Have Sex With Men: Multicenter AIDS Cohort Study, Baltimore, MD–Washington, DC; Chicago, IL; Los Angeles, CA; and Pittsburgh, PA; April 1, 2008–March 31, 2009

Characteristic	No. (%)
Age, y	
≤ 40	224 (14.4)
41–50	477 (30.8)
51–60	558 (36.0)
≥ 61	292 (18.8)
Study site	
Washington, DC–Baltimore	397 (25.6)
Chicago	282 (18.2)
Los Angeles	465 (30.0)
Pittsburgh	407 (26.2)
Race/ethnicity,	
Non-Hispanic White	1079 (69.6)
Hispanic	85 (5.5)
African American	301 (19.4)
Other	82 (5.3)
Educational status	
≤High school	222 (14.3)
Some college	357 (23.0)
College graduate	361 (23.3)
Postgraduate	605 (39.0)
Income, \$	
<20 000	386 (24.9)
20 000–39 999	312 (20.1)
40 000–59 999	260 (16.8)
≥ 60 000	516 (33.0)

Note. Individuals had the option to refuse to answer, thus totals may not equal n values. The sample size was $n = 1551$.

Period of coming out. The variable was internalized homophobia, rated on a 9-item scale indicating level of agreement with statements about sexuality (e.g., "tried to stop being attracted to men in general") during the period in which they were coming out (Cronbach's $\alpha = .925$). In keeping with the coding of the scale as previously validated, we coded internalized homophobia as positive if the participant agreed or strongly agreed with any of the items.¹⁹

Adulthood. The 2 adulthood variables were sexual assault, a single item indicating that “someone forced or frightened you into doing something sexually that you did not want to do” after age 18 years, and event discrimination, 10 items that may have happened because of discrimination at any point since age 18 years (e.g., fired from a job, prevented from buying or renting a home).²⁰

Past year. The 3 past-year variables were current marginalization, 9 items addressing discrimination and marginalization in the past 12 months (e.g., “You were treated with less courtesy than other people,” “You were called names or insulted”)²¹; internalized homophobia, rated on a scale identical to that described previously, although participants were asked specifically about the past 12 months (Cronbach’s $\alpha = .910$)¹⁹; and life satisfaction, measured using the same scale as for childhood satisfaction, adapted to be relevant to current perceptions (e.g., “I am a happy person,” “I have many friends”; Cronbach’s $\alpha = .844$).

Outcome Variables

We evaluated 5 specific psychosocial health conditions on the basis of the availability of psychosocial outcomes in the data set; they were measured at the time of the substudy:

1. stimulant drug use, defined as at least weekly use of crack, methamphetamine, cocaine, or ecstasy since last visit;
2. depressive symptoms, assessed using the Center for Epidemiological Studies Depression Scale,²² which screens for depressive symptomatology within the past week; individuals with a score of 16 or greater²³ were grouped as exhibiting depressive symptomatology;
3. stress, rated on a 14-item scale asking participants to indicate level of stress (5-point Likert scale ranging from *no stress* to *extreme stress*) over the past 12 months related to various daily tasks or conditions (e.g., job, finances, health, crime). Participants were coded as having stress if they averaged more than a little stress across all 12 items (Cronbach’s $\alpha = .964$)²⁴;
4. sexual compulsivity, an abbreviated version of the Compulsive Sexual Behavior Inventory,²⁵ a 10-item scale asking participants to indicate how often they felt symptoms of

sexual compulsion (rated on a 5-point Likert scale ranging from *never* to *very frequently*) over the past 5 years (e.g., had trouble controlling sexual urges, missed opportunities for productive and enhancing activities because of your sexual activity); participants were coded as having sexual compulsion if their average score was higher than occasionally experiencing compulsive behaviors across all 10 items (Cronbach’s $\alpha = .942$); and

5. intimate partner violence, defined as any reported experience of physical, mental, or emotional abuse over the past 5 years perpetrated by a boyfriend or other male sexual partner.²⁶

The primary dependent variable of interest was the syndemic variable, which was coded positive for individuals who endorsed any 2 or more of the 5 aforementioned psychosocial health conditions.

Statistical Analysis

We used negative binomial regressions with robust error variances to evaluate the relationship between the life-course predictor variables, each of the 5 psychosocial outcome variables, and the syndemic variable controlling for demographic variables. We entered predictor variables that were significantly associated with the syndemic variable at $P \leq .05$ in these preliminary analyses into a hierarchical (nested) negative binomial regression model in which we entered sets of variables representing the following 4 life stages systematically into the hierarchical models, adding 1 set at a time: (1) early life events (before age 18 years), (2) period of coming out, (3) adulthood, and (4) past year. We used hierarchical block modeling to apply a life-course approach in which we viewed the events and conditions occurring during a specific life stage as having an aggregated impact on health outcomes. Hierarchical models make it possible to examine the unique contribution of each life stage while controlling for the previous stage. Thus, the order in which life stages are entered might have an impact on the results. We assessed multicollinearity in each block using the variance inflation factor. All variance inflation factor values were less than 10, suggesting a lack of within-block multicollinearity.²⁷ To investigate whether the impact of

the predictor variables on syndemic production varied by HIV status, we reran the multivariable regression models with HIV status as an effect modifier by including interaction terms of HIV status and each individual life-course predictor. We conducted all statistical analyses using SPSS version 19 (IBM, Armonk, NY).

RESULTS

Demographic characteristics of the substudy participants are presented in Table 1. Participants ranged in age from 23 to 84 years (mean = 52.0) at the time of participation in the substudy. The sample was predominately White (69.6%) with the remainder identifying as African American (19.4%), Hispanic (5.5%), or other (5.5%). Overall, participants were highly educated, with more than one third (39.0%) reporting at least some graduate school, and only 14.3% reporting less than a high school education. The range of incomes was diverse, with 24.9% of the men reporting an annual income of less than \$20 000 and 33% reporting an annual income of \$60 000 and higher.

To further understand syndemic conditions within this sample, we looked at the correlations between the 5 psychosocial health conditions (10 separate pairwise relationships). All conditions were significantly correlated with one another (Pearson’s $r_s = 0.055$ – 0.390 , all $P \leq .001$), with the exception of stimulant use and sexual compulsivity ($P = .032$). Frequency of syndemic conditions was as follows: 0 conditions = 660 (42.6%), 1 condition = 410 (26.4%), 2 conditions = 286 (18.4%), 3 conditions = 136 (8.8%), 4 conditions = 48 (3.1%), and all 5 conditions = 11 (0.7%).

Table 2 presents the associations between the hypothesized adverse life conditions and events and the outcomes of interest. The presence of each life-course event or condition was significantly associated with increased risk for the majority of evaluated psychosocial health outcomes and the syndemic variable. Of the early life event and conditions, childhood satisfaction, childhood victimization, self-perceptions of failing masculinity attainment, and low social connectedness had the strongest positive association with increasing numbers of syndemic conditions. Of the adult life experiences and conditions, event-level discrimination, current marginalization, and current life

TABLE 2—Adjusted Relative Risk of Life Course Events (Predictor Variables) and Psychosocial Health Outcomes Controlling for Age, Race, and Education Level: Multicenter AIDS Cohort Study, Baltimore, MD; Washington, DC; Chicago, IL; and Pittsburgh, PA; April 1, 2008–March 31, 2009

Life-Course Events	Sexual Compulsivity, ARR (95% CI) or No. (%)	Stress, ARR (95% CI) or No. (%)	Stimulant Drug Use, ARR (95% CI) or No. (%)	Intimate Partner Violence, ARR (95% CI) or No. (%)	Depressive Symptoms, ARR (95% CI) or No. (%)	Syndemic, ARR (95% CI)
Early life events (< age 18 y)						
Childhood satisfaction	1.62** (1.22, 2.13)	1.57** (1.30, 1.90)	...	...	1.82** (1.48, 2.22)	1.45** (1.20, 1.74)
Parental substance abuse	...	...	1.78** (1.21, 2.61)	...	...	...
Parental domestic violence	...	...	1.81** (1.19, 2.74)	1.35** (1.01, 1.64)	...	...
Physical abuse	1.34* (1.08, 1.77)	1.40** (1.15, 1.70)	...	1.33** (1.11, 1.59)	...	1.42** (1.18, 1.71)
Sexual assault	1.59** (1.17, 2.16)	1.25* (1.01, 1.55)	...	1.25* (1.01, 0.155)	...	1.27** (1.03, 1.57)
Childhood victimization	1.43* (1.08, 1.90)	1.54** (1.28, 1.87)	1.56* (1.04, 2.35)	1.27* (1.05, 1.51)	1.62** (1.32, 1.99)	1.51** (1.26, 1.82)
Gay-related victimization	1.36** (1.02, 1.82)	1.28** (1.5, 1.56)	...	...	1.32* (1.07, 1.64)	1.24* (1.02, 1.50)
Aggressive environment	...	1.38** (1.15, 1.68)	...	1.32** (1.10, 1.59)	...	1.21* (1.01, 1.46)
Masculinity attainment	2.52** (1.91, 3.32)	1.60** (1.33, 1.93)	...	1.33** (1.11, 1.59)	1.64** (1.34, 2.01)	1.60** (1.34, 1.92)
Social connectedness	2.07** (1.57, 2.71)	1.48** (1.22, 1.79)	...	...	1.85** (1.51, 2.26)	1.51** (1.26, 1.82)
Period of coming out						
Internalized homophobia	1.89** (1.42, 2.50)	1.45** (1.20, 1.76)	...	1.33** (1.11, 1.60)	1.38* (1.07, 1.79)	1.55** (1.29, 1.87)
Adulthood (≥ age 18)						
Sexual assault	...	1.62** (1.29, 2.04)	...	1.32* (1.05, 1.67)	1.40* (1.13, 1.74)	1.41* (1.12, 1.78)
Event discrimination	1.58** (1.16, 2.14)	1.81** (1.47, 2.24)	...	1.52** (1.25, 1.85)	1.78** (1.34, 2.10)	1.85** (1.51, 2.28)
Past year						
Current marginalization	2.04** (1.52, 2.75)	2.58** (2.08, 3.19)	1.52* (1.02, 2.48)	1.88** (1.55, 2.27)	1.74** (1.41, 2.15)	2.60** (2.11, 3.19)
Internalized homophobia	...	1.43** (1.17, 1.76)	...	...	1.50** (1.20, 1.87)	1.38** (1.13, 1.68)
Life satisfaction	2.30** (1.74, 3.04)	2.86** (2.36, 3.47)	1.72** (1.14, 2.58)	1.28* (1.07, 1.53)	3.65** (2.95, 4.53)	2.88** (2.39, 3.47)
Total with condition	208 (13.4)	449 (28.9)	97 (6.3)	496 (32.0)	387 (25.0)	

Note. ARR = adjusted relative risk; CI = confidence interval.
* $P < .05$. ** $P < .01$.

satisfaction were most highly associated with syndemics.

When we evaluated HIV status as an effect modifier of life-course adversity on syndemic production, the only significant ($P \leq .05$) interaction term was that containing childhood victimization (HIV status \times childhood victimization, $b = -0.290$, $P = .004$). When this interaction was probed for conditional effects, we found that childhood victimization was significantly associated with syndemic production for both HIV-positive and HIV-negative individuals; however, the risk ratio associated with experiencing childhood victimization was greater for HIV-negative individuals (1.71; $P < .001$ vs 1.27; $P = .001$).

Results of the nested regression model of blocked life-course events predicting number of syndemic conditions are presented in Table 3. Early life events contributed significantly to the prediction of syndemics after controlling

for sociodemographic (context) factors with childhood victimization, and masculinity attainment remained significant after controlling for other childhood factors. Block 4, which included sexual assault and event discrimination, improved the model; however, only the latter predictor remained independently significant after controlling for all other previously entered variables. The events and conditions of the past year (block 5) had the largest impact on the overall model with 2 of the 3 included variables in that block remaining significant after controlling for all other variables in the model.

DISCUSSION

Previous research has observed a relationship between experiences of adversity, mainly social discrimination and marginalization, and negative health outcomes among MSM,^{21,28,29}

however, the extant literature does not, to our knowledge, include an empirical test of the theory of syndemic production⁷ by investigating the relationship between exposure to adversity across the life course and current syndemic conditions. In this investigation, the majority of hypothesized negative life-course events and conditions were significantly associated with both syndemic conditions and the component psychosocial health conditions in the analyses. In multivariable nested block analysis, current forms of adversity, namely discrimination, marginalization, and general life satisfaction, accounted for the largest contribution to the overall life-course model after controlling for all other factors. However, early life events also contributed significantly to the overall model, with childhood victimization and sense of masculinity attainment remaining significant after controlling for all other factors. Notably, the stimulant use

TABLE 3—Nested Negative Log-Binomial Regression of Life-Course Events Predicting Syndemic Production, Controlling for Age, Race, and Education Level: Multicenter AIDS Cohort Study, Baltimore, MD–Washington, DC; Chicago, IL; Los Angeles, CA; and Pittsburgh, PA; April 1, 2008–March 31, 2009

Life-Course Events	Cumulative Likelihood Ratio, χ^2	Cumulative <i>df</i>	Block $\Delta\chi^2$	Block 1 & 2, Risk Ratio	Block 1–3, Risk Ratio	Block 1–4, Risk Ratio	Block 1–5, Risk Ratio
Sociodemographics	101.51***	9					
Early life events	115.99***	16	14.48*				
Childhood satisfaction				1.18	1.18	1.18	1.01
Physical abuse				1.18	1.17	1.14	1.09
Sexual assault				1.16	1.15	1.01	1.09
Childhood victimization				1.25*	1.25*	1.8	1.11
Gay-related victimization				0.99	1.00	0.95	0.96
Masculinity attainment				1.31*	1.27*	1.25*	1.16
Social connectedness				1.17	1.15	1.08	0.86
Period of coming out	116.15***	17	0.16				
Internalized homophobia					1.20	1.17	1.03
Adulthood (\geq age 18 y)	123.77***	19	7.62*				
Sexual assault						1.16	1.02
Event discrimination						1.58***	1.26
Last year	247.94***	22	124.17*				
Current marginalization							2.05***
Internalized homophobia							1.19
Life satisfaction							2.36***

* $P \leq .05$. *** $P \leq .001$.

variable was not significantly associated with most of the independent variables in the unadjusted analyses. Although why this was the case is unclear, it may be in part because the MACS cohort is, on average, substantially older than population estimates of ages at greatest risk for stimulant use, abuse, and dependence.³⁰ Despite the lack of independent and significant associations for the stimulant use outcome variable in these data, stimulant use may still contribute to overall syndemic conditions in other samples, particularly among younger men.

Some limitations of this study must be noted. First, this study relied on the self-report of retrospective, cross-sectional data. Thus, participant responses may be subject to social desirability and recall bias, which may result in underestimation of the effects because the most vulnerable men may be the ones underreporting or self-medicating to lessen the impact, and thus recall, of past negative events. The retrospective and cross-sectional nature of these data may also produce different results than had the same constructs been measured using longitudinal data collection methods.

Second, we evaluated the psychosocial health outcomes that make up the syndemic variable using varying reporting periods. For example, the Center for Epidemiological Studies Depression Scale questions assessed depressive symptomatology within the past week, whereas the intimate partner violence questions covered the past 5 years. Third, study participants' average age was 52 years; therefore, the findings may not represent those of a younger cohort of gay men. Future research should attempt to replicate this study with a cohort of younger MSM because the social context in which they are maturing is likely quite different from that of those who came of age several decades ago. Additionally, the MACS cohort is a convenience sample of MSM, which would limit the generalizability of this study's findings. Finally, the measure of internalized homophobia at the time an individual was coming out did not fit neatly into the life-course model given individual differences. This block was placed between childhood and adulthood in the hierarchical block model, but an individual may have come out at any point during these

life stages. This fact is especially important given that in this sample, level of internalized homophobia while coming out was highly associated with the age at which an individual came out ($\beta = -0.236$, $P = .001$).

Despite these limitations, this study has important implications. Notably, this study extends syndemic theory by examining past events associated with the development of syndemic conditions. Several studies have demonstrated a relationship between the presence of a syndemic and HIV risk behaviors, HIV seroprevalence, and HIV incidence^{8,9,31} but to date the origins of syndemics have only been suggested theoretically.⁷ We also identified several factors associated with syndemic development and have therefore provided a foundation from which to think about the prevention of both syndemic development and the resulting increase in HIV risk.

Additionally, we included stress and sexual compulsivity as syndemic conditions. Previous studies have evaluated many different co-occurring conditions within the syndemic framework, including substance use, intimate

partner violence, and psychological distress, yet we were able to demonstrate that these other negative psychosocial health outcomes were also correlated with known syndemic conditions.

We also found that using a life-course perspective to build a hierarchical model of syndemic production was successful in explaining substantial variance in the syndemic outcome. Conceptualizing syndemic production as the result of lifelong adversity may help explain why some MSM develop a syndemic and some do not. This model also suggests that early life events and conditions before age 18 years have an impact on syndemic production in later life. These findings underscore the importance of early intervention for young MSM who may already be experiencing or beginning to develop a syndemic.² For young MSM, who may or may not yet have considered their sexuality or begun to self-identify as a sexual minority, the victimization and adversity they experience have an impact on their adult health. The ability to eliminate or lessen these events among MSM may not only have a direct impact on healthy development during childhood and adolescence but also contribute to health outcomes in adulthood.

The primary value in studying syndemic production among MSM is not only to understand how syndemics are formed but also to identify innovative approaches to intervention that will effectively disentangle interconnecting health problems and promote health among MSM. Our test of this theory of syndemic production has suggested several avenues by which innovative health promotion interventions among MSM might be developed and tested for efficacy. A notable finding of this study is that homophobic marginalization at multiple stages across the life course has measurable deleterious effects on health among MSM, suggesting that interventions should be designed to prevent syndemic production across different stages of men's lives. For example, interventions to prevent school bullying and to help families support youths and young adults as they navigate the coming-out process might well prevent the downstream development of psychosocial health problems and in the process prevent increased risk for HIV transmission. Moreover, it is important that a large number of men in our sample reported experiencing multiple forms of

homophobic discrimination and yet reported none of the syndemic health problems. It seems clear that MSM have substantial reservoirs of resilience and that understanding how these strengths support health may also yield important insights into the development of efficacious interventions. Thus, ongoing refinements and testing of syndemic theory are likely to lead to important new insights in the understanding of health among MSM communities and in the development of efforts to promote health in marginalized communities. ■

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Contributors

R. Stall originated the study and supervised all aspects of implementation. A. L. Herrick led the development of the article, including writing and analyses. S. H. Lim, M. W. Plankey, J. S. Chmiel, and A. Carrico provided guidance in the statistical analyses. D. Ostrow, M. W. Plankey, S. Shoptaw and J. Chmiel are involved with the MACS parent study and helped guide and implement the substudy. T. T. Guadamuz, U. Kao, and all other authors contributed to the conceptualization of the study and to the analytic strategies and interpretation and helped to review drafts of the article.

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Human Participant Protection

This study was reviewed by the institutional review boards at all participating sites.

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