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Church Attendance in Men Who Have Sex With Men Diagnosed With HIV Is Associated With Later Presentation for HIV Care

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We demonstrate an interdependent relationship between sexual behavior and church attendance on timing of human immunodeficiency virus (HIV) diagnosis and presentation for care. Men who have sex with men (MSM) and who attend church are more likely to present with lower CD4$^+$ T-lymphocyte counts than MSM who do not attend church.

Keywords. HIV; AIDS; religion; church attendance.

A growing body of literature proposes that religious participation may promote healthy living and improve health-seeking behaviors [1–5]. Whereas most studies have focused on well-accepted, nonstigmatized diseases, less is known regarding religion's relationship to health and health-seeking behaviors for potentially stigmatized conditions such as human immunodeficiency virus (HIV), and the stigmatization of sexual behaviors that mediate risk for infection [6–13]. We were interested in understanding the relationship between history of HIV testing and timing of presentation for HIV care with church attendance in a population of HIV-infected persons presenting to an HIV clinic for the first time. We hypothesized that among persons who attend church, patterns of previous HIV testing and timing of presentation for care would differ based on same-sex vs opposite-sex sexual behavior [11, 14–16].

METHODS

This was a cross-sectional analysis of data from persons with HIV presenting to establish initial care at a university-associated HIV clinic in the southeastern United States (1917 Clinic). Since 2007, all new patients participate in an orientation visit during which trained staff conduct a semistructured interview. Information collected in this interview is linked to the patient's sociodemographic and laboratory data. Inclusion in these analyses required a diagnosis of HIV without receipt of previous outpatient HIV care, age ≥19 years, and responses to questions related to church attendance during the orientation visit. This study was approved by the University of Alabama at Birmingham Institutional Review Board.

Church attendance plus sexual behavior was the principal independent variable of interest. Sexual behavior was defined using self-report as men who have sex with men (MSM), men who have sex with women (MSW), and women who have sex with men (WSM). MSM included men who reported sex with only men and men who reported sex with men and women. To evaluate potential interactions between church attendance and sexual behavior, we created 6 categories: MSM, MSW, WSM, with each subset by church attendance (yes vs no). Race, age, insurance status, education, employment, and HIV load were selected a priori and included in models to elicit their associations and adjust for their potential contributions to each outcome.

The primary outcome was CD4$^+$ T-lymphocyte count (cells/μL) at the time of entry into HIV care (−30 to 90 days of visit). A cutoff of 200 cells/μL was used to dichotomize less advanced from advanced infection, consistent with recent recommendations [17, 18]. Self-reported history of previous HIV screening (yes/no) prior to the patient's positive result was the secondary outcome. A CD4$^+$ T-lymphocyte count of <200 cells/μL and no previous HIV screening were the events of interest. Using logistic regression, we evaluated the 2-way interaction between church attendance and the sexual behavior groups. These interaction terms formally assess whether the effect of church attendance and sexual behavior differ in the presence of the other. Separate univariate logistic regression models were fit for the remaining independent variables. Separate multivariable logistic regression models were fit for each outcome.

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RESULTS

A total of 508 patients met inclusion criteria: 60% were MSM, 21% MSW, and 18% WSM. Church attendance was reported by 56% of patients overall: 53% MSM, 59% MSW, and 64% WSM (Table 1). At presentation, approximately 32% of patients had an initial $CD4^+$ T-lymphocyte count of <200 cells/μL. We observed a significant interaction between church attendance and sexual behavior on the likelihood of a $CD4^+$ count of <200 cells/μL at the time of entry into care ($P = .02$; Table 2). Church-attending MSM were more likely (34% vs 20%) to have a $CD4^+$ T-lymphocyte count of <200 cells/μL when compared to non-church-attending MSM (adjusted odds ratio [OR], 2.2; 95% confidence interval [CI], 1.2–4.0; $P = .01$). For MSW and WSM there was no association between church attendance and $CD4^+$ T-lymphocyte count <200 cells/μL at the time of care entry.

Table 1. Population Characteristics (N = 508)

Characteristic	No. (%)
Sexual behavior	
MSM	307 (60)
MSW	109 (21)
WSM	92 (18)
Church attendance	
No	221 (44)
Yes	287 (56)
Church attendance (N/Y) + sexual behavior	
N + MSM	143 (28)
Y + MSM	164 (32)
N + MSW	45 (9)
Y + MSW	64 (13)
N + WSM	33 (6)
Y + WSM	59 (12)
Race[a]	
White	186 (37)
African American	313 (62)
Other	7 (1)
Age, y, median (Q_1-Q_3)[b]	33 (26–43)
Insurance status	
Private	196 (39)
Public	72 (14)
None	240 (47)
Education[c]	
Diploma/GED or less	203 (41)
Some college or more	291 (59)
Currently employed	
No	198 (39)
Yes	177 (35)
NR	133 (26)
HIV screening prior to diagnosis	348 (71)
HIV load, $\log_{10}$, median (Q_1-Q_3)	4.6 (3.8–5.2)
$CD4^+$ T-lymphocyte count, cells/μL, median (Q_1-Q_3)	319 (131–520)

Abbreviations: GED, general equivalency diploma; HIV, human immunodeficiency virus; MSM, men who have sex with men; MSW, men who have sex with women; NR, not reported; WSM, women who have sex with men.

[a] Race not reported for 2 participants.

[b] Reported per 10 years.

[c] Education not reported for 14 participants.

Approximately 29% of participants reported never having had an HIV test prior to the positive result. There was also a significant interaction between church attendance and sexual behavior on history of HIV screening ($P = .012$). In the adjusted model, women who did not attend church more often reported no previous HIV testing when compared to women who did attend church (59% vs 32%; adjusted OR, 0.3; 95% CI, .1–.8; $P = .01$; Table 3). In unadjusted models, church-attending MSM more often reported no history of previous HIV testing than non-church-attending MSM (21% vs 12%; unadjusted OR, 1.9; 95% CI, 1.0–17.0; $P = .041$). In adjusted models, statistical significance was not maintained (adjusted OR, 1.6; 95% CI, .8–3.3; $P = .2$). In MSW, there was no association with church attendance and self-reported prior HIV testing.

DISCUSSION

We report an interdependent association between church attendance and sexual behavior on timing of HIV diagnosis as determined by $CD4^+$ T-lymphocyte count and patterns of HIV testing. HIV-infected MSM who reported current church attendance were more likely to present with advanced disease and less likely to report a history of previous HIV screening than non-church-attending MSM. Church-attending WSM were no more or less likely to present with advanced disease but were more likely to report previous HIV screening. For MSW, church attendance did not predict the likelihood of presenting with advanced HIV disease or history of HIV screening.

Although provocative, the described association between same-sex sexual behavior, church attendance, and $CD4^+$ T-lymphocyte count at entry into care lacks a causal link and should be interpreted with caution. One possible explanation for our findings is that norms held by some religious organizations regarding same-sex sexual behavior may influence willingness of their same-sex members to participate in HIV screening and early presentation for care. Other explanations include denial of risk among churchgoing MSM or reverse causality, the idea that HIV-infected persons may turn to religion as they become more ill despite a formal diagnosis [19]. Although church-attending MSM presented with lower $CD4^+$ T-lymphocyte counts than non-church-attending MSM, the majority reported previous HIV screening. In our cohort, history of HIV testing was collected as a dichotomized variable

Table 2. CD4+ T-Lymphocyte Cell Count[a]

	CD4 Count ≥200 Cells/μL n = 343	CD4 Count <200 Cells/μL n = 165	Unadjusted OR (95% CI)	Adjusted OR (95% CI)[b]
Church attendance + sexual behavior[††]				
No + MSM	114 (80)	29 (20)	Ref	Ref
Yes + MSM	108 (66)	56 (34)	2.0 (1.2–3.4)**	2.2 (1.2–4.0)*
No + MSW	22 (49)	23 (51)	Ref	Ref
Yes + MSW	36 (56)	28 (44)	0.7 (.4–1.6)	0.5 (.2–1.2)
No + WSM	22 (67)	11 (33)	Ref	Ref
Yes + WSM	41 (69)	18 (31)	0.9 (.4–2.2)	0.9 (.3–2.7)
Race				
White	132 (71)	54 (29)	Ref	Ref
African American	205 (65)	108 (35)	1.3 (.9–1.9)	1.3 (.8–2.3)
Age, y, median (Q_1-Q_3)[c]	30 (25–41)	36 (30–46)	1.5 (1.3–1.8)****	1.4 (1.1–1.7)**
Insurance status				
Private	136 (69)	60 (31)	Ref	Ref
Public	42 (58)	30 (42)	1.6 (.9–2.8)[†]	1.7 (.8–3.8)
None	165 (69)	75 (31)	1.0 (.7–1.6)	1.1 (.7–1.8)
Education				
Diploma/GED or less	129 (64)	74 (36)	Ref	Ref
Some college or more	206 (71)	85 (29)	0.7 (.5–1.1)[†]	0.9 (.5–1.4)
Currently employed				
No	124 (63)	74 (37)	Ref	Ref
Yes	120 (68)	57 (32)	0.8 (.5–1.22	1.3 (.7–2.2)
NR	99 (74)	34 (26)	0.6 (.4–0.9)*	0.6 (.4–1.1)
HIV load, $\log_{10}$, median (Q_1-Q_3)	4.3 (3.4–4.9)	5.1 (4.7–5.7)	2.36 (1.9–3.0)****	2.5 (2.0–3.2)****

Abbreviations: CI, confidence interval; GED, general equivalency diploma; HIV, human immunodeficiency virus; MSM, men who have sex with men; MSW, men who have sex with women; NR, no response; OR, odds ratio; WSM, women who have sex with men.

[a] Data are presented as No. (%) unless otherwise designated. Missing data were not included in the analysis except for employment.

[b] ORs and 95% CIs were calculated using logistic regression (modeling CD4 <200 cells/μL) adjusted for church attendance, sex partner group (including the interaction between church attendance + sex partner group), race, insurance status, education, employment, $\log_{10}$ viral load, and age.

[c] Reported ORs are per 10 years.

* $P \leq .05$.

** $P < .01$.

**** $P < .0001$.

[†] $P < .1$.

[††] Church*sex partner group interaction: P without covariates: .061; P with covariates: .021.

without capture of timing of last negative HIV test or frequency of previous testing. This information would be helpful in understanding if later presentation is linked to differences in HIV screening patterns among churchgoing MSM.

The purpose of this study was to examine the relationship between church attendance and sexual behavior on timing of presentation for HIV care as reflected by CD4+ T-lymphocyte count and history of HIV screening. However, it is important to acknowledge that as a group, MSW carried a high burden of advanced HIV and are unlikely to report HIV screening [20, 21]. This vulnerability may stem from a perceived low risk for HIV among heterosexual men. Promotion of HIV testing in church communities may offer a valuable venue to reach churchgoing MSW (and MSM) who might not otherwise seek out HIV screening. In contrast to heterosexual men, women who attended church more often reported previous HIV testing. Even so, 32% of churchgoing women initiating HIV care had not received prior HIV testing, suggesting a benefit of implementing church-based HIV screening programs among women as well.

This study has several limitations. Church attendance is a relatively imperfect measure and does not distinguish between the potential influences of religious participation, religious beliefs, or the religious community. This study was performed in the Southeast, a region where religious organizations play an important role in community structure [22]. There was a high proportion of African Americans in our study population, a

Table 3. History of HIV Screening[a]

Characteristic	Previous HIV Test (n = 348)	No Previous HIV Test (n = 144)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)[b]
Church attendance + sexual behavior[††]				
No + MSM	122 (88)	17 (12)	Ref	Ref
Yes + MSM	126 (79)	34 (21)	1.9 (1.0–16.5)*	1.6 (.8–3.3)
No + MSW	20 (47)	23 (53)	Ref	Ref
Yes + MSW	29 (47)	33 (53)	1.0 (.5–2.2)	1.0 (.4–2.3)
No + WSM	13 (41)	19 (59)	Ref	Ref
Yes + WSM	38 (68)	18 (32)	0.32 (.13–.80)*	0.29 (.11–.76)*
Race				
White	139 (78)	40 (22)	Ref	Ref
African American	205 (67)	99 (33)	1.7 (1.1–2.6)*	1.4 (.8–2.4)
Age, y, median (Q_1-Q_3)[c]	31 (26–41)	37.5 (28–50)	1.6 (1.3–1.8)****	1.3 (1.1–1.6)*
Insurance status				
Private	137 (73)	51 (27)	Ref	Ref
Public	39 (58)	28 (42)	1.9 (1.1–3.5)*	1.0 (.5–2.2)
None	172 (73)	65 (27)	1.0 (.7–1.6)	0.9 (.5–1.5)
Education				
Diploma/GED or less	126 (63)	73 (37)	Ref	Ref
Some college or more	213 (76)	66 (24)	0.5 (.4–0.8)**	0.9 (.6–1.5)
Currently employed				
No	126 (66)	66 (34)	Ref	Ref
Yes	130 (76)	40 (24)	0.6 (.4–0.9)*	0.9 (.5–1.5)
NR	92 (71)	38 (29)	0.8 (.5–1.3)	0.8 (.5–1.4)
HIV load, $\log_{10}$, median (Q_1-Q_3)	4.58 (3.8–5.1)	4.7 (3.4–5.2)	1.0 (.8–1.1)	1.0 (.8–1.2)

Abbreviations: CI, confidence interval; GED, general equivalency diploma; HIV, human immunodeficiency virus; MSM, men who have sex with men; MSW, men who have sex with women; NR, no response; OR, odds ratio; WSM, women who have sex with men.

[a] Data are presented as No. (%) unless otherwise designated. Missing data were not included in the analysis except for employment.

[b] ORs and 95% CIs were calculated using logistic regression (modeling no previous HIV test) adjusted for church attendance, sex partner group (including the interaction between church attendance + sex partner group), race, insurance status, education, employment, $\log_{10}$ viral load, and age,

[c] Reported ORs are per 10 years.

* $P \leq .05$.

** $P < .01$.

**** $P < .0001$.

† $P < .1$.

†† Church*sex partner group interaction: P without covariates: .0063. P with covariates: .012.

group in which religion may hold a particularly influential position [23]. Our results may not represent less religious populations. Moreover, the high prevalence of church attendance reported by MSM in our population may influence our observations. Although we have attempted to adjust for potential confounders, we acknowledge that church attendance may merely associate with the actual causal factor(s), and work is under way to understand predictors of church attendance in our population. As an example, Schur et al reported a relationship between later presentation for HIV care and rurality [24]. If persons living in rural communities are more likely to attend church, then rurality rather than church attendance might explain later presentation. There were twice as many MSM as MSW and WSM in our population. We may not have had sufficient power to identify a correlation between church attendance and later presentation to care for these less well-represented groups.

Despite these limitations, we believe that our findings have important implications. Our results highlight the relationship between sexual behavior and church attendance on time of HIV diagnosis and presentation for care. The modifying role of church attendance on late presentation for care in MSM is a novel and potentially important finding. To position themselves as partners in health for all their members, some religious communities may need to explore reasons why their HIV-infected MSM members might present with more advanced

disease than non-church-attending MSM. Our findings support the need for further research into the role of religion and religious beliefs on HIV testing and care-seeking behaviors.

Notes

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Potential conflicts of interest. N. J. V. W. has served as a consultant to Genocea Biosciences. M. M. has served as a consultant for Merck, BMS, and Gilead and has received grant support from BMS, Definicare, and Pfizer. A. W. has served as a consultant for Definicare. E. W. H. has served as a consultant for MedHelp, Rib-X Pharm, and Cempra; receives research support from GlaxoSmithKline, Becton Dickinson, Hologic/Gen-Probe, Roche Molecular, Cepheid, and Cempra; and has received book royalties, payment for educational presentation development, or travel funds from McGraw-Hill, Becton Dickinson, and Cempra. All other authors report no potential conflicts.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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