Personality Traits and Adaptive HIV Disease Management: Relationships with Engagement in Care and Condomless Anal Intercourse Among Highly Sexually Active Sexual Minority Men Living with HIV

Conall O'Cleirigh, PhD,¹⁻³ Nicholas S. Perry, MS,^{1,4} S. Wade Taylor, PhD,^{3,5} Jessica N. Coleman,^{1,*} Paul T. Costa, Jr., PhD,⁶ Kenneth H. Mayer, MD,^{3,7,8} and Steven A. Safren, PhD¹⁻³

Abstract

Purpose: The purpose of this study was to identify systematic relationships between personality domains and engagement in HIV care and secondary HIV prevention among sexual minority men living with HIV.

Methods: This cross-sectional study examined the relationships between general personality traits of the Five-Factor Model of personality (e.g., Neuroticism and Conscientiousness) and engagement in medical care and condomless anal intercourse among a sample of highly sexually active sexual minority men living with HIV ($N=60$).

Results: Conscientiousness ($B=-0.01$, $P<0.05$), Openness ($B=-0.03$, $P<0.05$), and Extraversion ($B=-0.03$, $P<0.001$) were each associated with engaging in fewer episodes of condomless anal intercourse and Conscientiousness alone was significantly related to having fewer sexual partners ($B=-0.04$, $P<0.001$). Conscientiousness (odds ratio [OR]=1.07, confidence interval [CI]: 1.01–1.13) and Extraversion (OR=1.13, CI: 1.04–1.22) were both associated significantly with prevention service use. Conscientiousness alone was related to engagement in HIV medical case management ($B=-0.11$, $P<0.05$), whereas both Conscientiousness ($B=0.41$, $P<0.0001$) and Neuroticism ($B=-0.64$, $P<0.001$) were associated with perceived health. Furthermore, compared with the normative sample for the NEO-Personality Inventory-Revised, men in our sample scored significantly higher on Neuroticism and significantly lower on Conscientiousness ($P_s<0.05$).

Conclusion: These findings suggest that enduring individual differences may account, in part, for some of the high levels of condomless anal intercourse reported by this group, as well as engagement in and use of prevention services. We suggest strategies for engaging this group in secondary HIV prevention programs and initiatives.

Keywords: HIV, personality, secondary prevention, sexual minority men

Introduction

PERSONALITY TRAITS, GENERALLY defined as enduring tendencies or the characteristic patterns of behavior, thoughts, and emotions of a person,¹ have been linked to health behaviors and outcomes in a variety of patient populations and represent a useful framework for understanding relationships between individual differences and health.²

One widely used approach to measure and define such characteristics is the Five-Factor Model (FFM),³ which consists of five higher order personality domains: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Within each of these domains, there are six lower order nested facets that represent trait-related narrower characteristics. Despite relatively robust associations between the FFM personality traits and physical health across a range

¹Behavioral Medicine Program, Department of Psychiatry, Massachusetts General Hospital, Boston, Massachusetts.

²Department of Psychiatry, Harvard Medical School, Boston, Massachusetts.

³The Fenway Institute, Fenway Health, Boston, Massachusetts.

⁴Department of Psychology, University of Utah, Salt Lake City, Utah.

⁵Department of Social Work, Wheelock College, Boston, Massachusetts.

⁶Department of Psychiatry and Behavioral Sciences, Duke University School of Medicine, Durham, North Carolina.

⁷Harvard Medical School, Boston, Massachusetts.

⁸Division of Infectious Diseases, Beth Israel Deaconess Medical Center, Boston, Massachusetts.

*Present affiliation: Department of Psychology and Neuroscience, Duke University, Durham, North Carolina.

of chronic illnesses, far less is known about the relationships among these traits and health behaviors among sexual minority men living with HIV. Characteristic features of personality may be predictors of important health behaviors relevant to HIV and provide an informative context for the delivery of health interventions.

As of 2011, over half of the individuals living with HIV in the United States were sexual minority men (and other men who have sex with men).⁴ Moreover, HIV prevalence is high and incidence rates among sexual minority men have remained steady.⁵ Compounding these high rates, of the estimated 647,700 sexual minority men living with HIV, approximately 16% are unaware of their HIV diagnosis, while only 38% are engaged in care, with 35% prescribed antiretroviral therapy (ART), and only a modest 30% are virally suppressed.⁴ The full spectrum of HIV treatment, care, and prevention includes linkage to and engagement in treatment, optimal adherence to ART, and virological suppression. Personality traits may influence engagement in care and related health behaviors in this at-risk population, which is most likely to be affected by HIV.

A small body of literature has linked personality to HIV disease management and long-term health outcomes. Specifically, Conscientiousness has been associated longitudinally with enhanced virological suppression, increased CD4 cell count, and lower depression and stress in a sample of men and women living with HIV.⁶ Similarly, Ironson et al.⁷ found Openness, Extraversion, and Conscientiousness to be related to slower declines in immune functioning over time among individuals living with HIV. In a review of literature, Shuper et al. found some evidence for associations between personality traits and sexual risk behavior among individuals living with HIV.⁸ This review highlighted the small number of studies ($N=26$) as a limitation, and nearly all of the studies that were reviewed measured sexually focused trait differences, such as sexual compulsivity, rather than general personality traits, such as those operationalized by the FFM. However, this review did document the relevance of personality traits as predictors of risky sexual behavior. Personality can be measured in a variety of ways, but is generally thought to be captured through behavioral expressions of underlying trait characteristics. Among other studies that have examined such domains in relation to sexual risk, the strongest evidence appears to be for associations between risk and higher levels of Neuroticism (specifically the impulsiveness facet).^{9,10} The existing studies of FFM traits and HIV risk have focused primarily on heterosexual samples^{6,7,9,10} and have not examined their relationships among sexual minority men, despite the high prevalence of HIV within this group.

Prevention efforts to reduce transmission of HIV among sexual minority men include promoting effective and consistent HIV treatment, as well as direct reduction of sexual transmission risk (i.e., condomless insertive or receptive anal intercourse with HIV-negative or HIV-unknown status partners). Effective treatment supports prevention by suppressing HIV virus and inhibiting sexual transmission of the virus from an infected to an uninfected partner.^{11,12} It is plausible that the acceptability, reach, and impact of secondary prevention programs may well be influenced by the personality characteristics of sexual minority men living with HIV, who report sexual transmission risk.

Moreover, among sexual minority men, it is likely that personality traits contribute to the relevant context for HIV

prevention and disease management to occur. For example, individual differences in Conscientiousness may influence how diligent sexual minority men living with HIV are in seeking out treatment and prevention services of their own accord. Alternatively, Neuroticism may bias sexual minority men who are high in that trait against perceiving outreach services positively. It is also likely that one's higher propensity to experience both sexual minority-specific distress and general distress may affect how one engages with HIV treatment and prevention interventions.

Current study

The current study addresses the gap in the research literature by examining the FFM personality traits and their relation to key health behaviors relevant for HIV prevention and treatment within a sample of sexual minority men living with HIV. We hypothesized that Conscientiousness would be associated positively and Neuroticism negatively with engagement in prevention and HIV case management services. We also hypothesized that, within our sample, Conscientiousness would be associated with less condomless anal intercourse and fewer sexual partners. Given the complex relationship between negative affect and sexual risk^{13,14} and the strong associations between Neuroticism and negative affect, we did not hypothesize a relationship between Neuroticism and condomless anal intercourse. We explored associations of Extraversion, Agreeableness, and Openness, but because these domains have shown fewer associations with health and health behaviors in previous literature, we did not make a priori hypotheses about the significance or direction of these associations.

Finally, we explored whether significant personality differences existed between our sample and the normative sample with which the NEO-Personality Inventory-Revised (NEO-PI-R) was developed. Because there are multiple factors that could cause sexual minority men living with HIV to endorse personality traits different from the normative sample, we aimed to use these exploratory results only as an approximate gauge of the magnitude of personality profile differences between our sample of men living with HIV reporting multiple episodes of condomless anal intercourse and the normative sample.

Methods

Procedure

This cross-sectional study recruited sexual minority men living with HIV at their primary healthcare clinic in Boston, MA (via medical provider referrals and flyers), and from the larger community (e.g., bars and clubs). Participants were eligible if they were at least 18 years old, self-reported being a sexual minority male, self-reported living with HIV, and reported multiple episodes of condomless anal intercourse with HIV-negative or unknown status partners in the previous 3 months. Participants ($N=60$) first completed written informed consent with a trained study staff member. They then completed a battery of standardized measures assessing sexual behavior, engagement in HIV prevention services, engagement in HIV care, and substance use and mental health. The Institutional Review Board of Fenway Health approved all study procedures. Participants were compensated \$100 for participation. Demographic characteristics of the sample are reported in Table 1.

TABLE 1. SAMPLE DEMOGRAPHICS ($N=60$)

<i>Demographics</i>	<i>Mean (SD)</i>
Age	43 (9.1)
Years since HIV diagnosis	12.64 (7.41)
Condomless anal intercourse ^a	11.5 (13.9)
Number of sexual partners past 3 months	9 (9)
Education	%
High school or lower	25
Some college	40
College degree	21.7
Some graduate or graduate degree	13.3
Income	
Less than \$6,000	21.7
\$6,000–\$11,999	25.0
\$12,000–\$17,999	21.7
\$18,000–\$23,999	6.7
\$24,000–\$29,999	11.7
\$30,000 or greater	13.3
Race	
White	43.3
African American/Black	50
Other	6.7
Sexual orientation	
Homosexual or gay	75
Bisexual	20
Heterosexual or straight	3.3
Other	1.7

^aWith HIV-negative/unknown status partners.
SD, standard deviation.

Measures

Demographics. Participants completed standard self-report measures of age, income, education, race, and sexual orientation.

Personality. The NEO-PI-R is a well-validated measure of general personality traits, specifically designed to assess the FFM of personality.¹⁵ It consists of 240 self-report items using a five-point Likert scale (1 “strongly disagree” to 5 “strongly agree”). The five major domains of the NEO-PI-R are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Each domain is comprised of six facet scales, providing a comprehensive and detailed assessment of normal adult personality in terms of emotional (Neuroticism), interpersonal (Extraversion), experiential (Openness), attitudinal (Agreeableness), and motivational (Conscientiousness) styles. Each facet is assessed through eight self-report items. Within Openness, the facets are fantasy, esthetics, feelings, actions, ideas, and values. Within Conscientiousness, the facets are competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Within Extraversion, the facets are warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotions. Within Agreeableness, they are trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. Within Neuroticism, the facets are anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability. Adequate internal consistency was observed for four of the five personality domains (Cronbach’s

alpha: $O=0.70$, $C=0.84$, $E=0.77$, $N=0.86$). Internal consistency for the Agreeableness domain was marginal with Cronbach’s alpha = 0.66). The internal consistency of the individual facets (Cronbach’s alpha: range: 0.79–0.91) was adequate.

HIV medical case management. Participants completed self-report measures of the year they were diagnosed with HIV, the year they started with an HIV case manager, and which HIV medications they were currently taking.

Prevention service use. A single, self-report item was used to measure engagement in prevention service use: “Have you had contact with an HIV prevention outreach worker in the past 12 months?”

Condomless sexual behavior. Participants completed questions on their sexual behaviors in the previous 3 months, including the number of episodes of condomless anal intercourse (receptive or insertive), the HIV status of their sexual partners (if known), and their number of sexual partners. The variable for condomless anal intercourse was the number of acts of condomless insertive or receptive anal intercourse with HIV-negative or unknown status partners in the previous 3 months.

Perceived health. Self-perceived health was measured using an item from the SF-12 Health Survey, a widely used and well-validated measure.¹⁶ Participants rated their current state of health from 0 (“death”) to 100 (“perfect health”).

Analysis plan

Factor scores for the domains of the FFM were calculated according to the Professional Manual for the NEO-PI-R.¹⁵ We chose to focus on the broader personality dimensions (i.e., Neuroticism, Openness, Extraversion, Agreeableness, and Conscientiousness) in our regression analyses because of our conceptual focus on personality as representing broad trait-like vulnerabilities for health, as well as our limited statistical power to conduct analyses at the facet level. First, regression analyses were conducted to examine the relationship between HIV treatment, prevention, and condomless anal intercourse and NEO-PI-R factor scores for the personality domains. Specifically, in models for continuous outcomes (engagement in care, perceived health), separate ordinary least squares (OLS) regressions were used. For all analyses with a dichotomous outcome (prevention service use), logistic regression was used. For models of count outcomes (number of sexual partners, episodes of condomless anal intercourse), separate negative binomial regressions were used. All models included age and education as covariates, as they were related to either our predictors or outcome of interest in each model.

Finally, independent *t*-tests were conducted comparing our sample of sexual minority men living with HIV with the normative adult male sample from the NEO-PI-R on all domains (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). Independent *t*-tests were then conducted comparing our sample with the normative sample on the personality facets within any domains that significantly differentiated our sample from the normative one.

Results

Personality domains

Independent samples *t*-tests compared means of our sexual minority male sample with the normative adult male sample on the NEO-PI-R. The results indicate that our sample scored significantly higher on Neuroticism by greater than one standard deviation ($M=99$, standard deviation [SD]=24.6; $t=8.52$, $P<0.05$) and significantly lower on Conscientiousness than the normative group by approximately one standard deviation ($M=75.2$, $SD=19.9$; $t=5.72$, $P<0.05$). Correspondingly, within these domains, sexual minority men in this sample scored significantly higher on all of the facets of Neuroticism: anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability (all P s <0.05). Similarly, participants in our sample scored significantly lower on five of the six facets of Conscientiousness: competence, dutifulness, achievement striving, self-discipline, and deliberation (all P s <0.05). However, they did not differ significantly on order ($P>0.10$). No significant differences were observed for Agreeableness, Extraversion, or Openness (all P s >0.1).

Personality and HIV prevention

Regression results of the associations between personality traits and HIV-related outcomes are reported in Table 2. The findings demonstrated that the Conscientiousness domain was significantly related to the number of episodes of condomless anal intercourse in models controlling for total episodes of sexual intercourse. In models using the same covariates, Neuroticism was not significantly related to sexual risk behaviors. Conscientiousness was also associated with reporting fewer sexual partners in the past 3 months, although Neuroticism was not significantly associated. See Table 2 for complete results.

Conscientiousness was significantly associated with having accessed one-on-one prevention services, although Neuroticism was not. Results of OLS regression indicated that Conscientiousness was significantly associated with having an HIV case manager, such that higher Conscientiousness predicted obtaining a case manager at an earlier year, controlling for years since diagnosis. However, Neuroticism was not significantly associated.

In addition, both Openness and Extraversion demonstrated significant negative associations with number of recent episodes of condomless anal intercourse. Extraversion also was significantly positively associated with accessing prevention service use. Agreeableness was not significantly associated with any health-related or health behavior outcome (all P s >0.08).

Perceived health

In models controlling for participants being on antiretroviral medication (ART) and years since diagnosis (in addition to the covariates age and education), Conscientiousness (positively) and Neuroticism (negatively) were both found to be significantly associated with perceived health. None of the other personality domains was significantly associated with perceived health (all P s >0.10).

Discussion

This study is the first of which we are aware, among a group of sexual minority men living with HIV who reported

TABLE 2. REGRESSION MODELS OF RELATIONSHIPS BETWEEN HIV PREVENTION AND TREATMENT OUTCOMES AND NEO DOMAINS ($N=60$)

Variables	Neuroticism			Conscientiousness			Openness			Agreeableness			Extraversion		
	B	Wald/ <i>t</i> (df)		B	Wald/ <i>t</i> (df)		B	Wald/ <i>t</i> (df)		B	Wald/ <i>t</i> (df)		B	Wald/ <i>t</i> (df)	
HIV prevention															
# Episodes SCAI ^a	0.01	0.786 (1)		-0.01*	8.304		-0.03*	5.46 (49)		-0.01	0.89 (49)		-0.03**	6.76 (49)	
# Sexual partners	-0.01	0.672	95% CI	-0.04**	16.10	95% CI	-0.02	3.00 (47)		-0.01	1.20 (47)		-0.01	1.13 (47)	
Prevention service use	1.00	(-0.13-0.95)		1.07*	(1.01-1.13)		1.03	(0.97-1.08)		OR	95% CI		OR	95% CI	
										1.00	(0.94-1.06)		1.13*	(1.04-1.22)	
HIV treatment															
Case management ^b	-0.03	-0.90 (49)		-0.11*	3.17 (49)		-0.05	-0.64 (49)		-0.07	-0.97 (49)		-0.01	-0.14 (49)	
Perceived health ^c	-0.64**	-4.06 (45)		0.41***	2.47 (45)		-0.01	-1.08 (45)		0.00	0.02 (45)		-0.02	-1.65 (45)	

All models are adjusted for age and education.

^aModels for condomless anal intercourse also controlled for total episodes of sexual intercourse.

^bModels for case management also controlled for years since diagnosis.

^cModels for perceived health also controlled for being on ART and years since diagnosis.

* $P<0.05$, ** $P<0.001$, *** $P<0.0001$.

SCAI, serodiscordant condomless anal intercourse; OR, odds ratio; B, unstandardized beta weight; df, degrees of freedom; CI, confidence interval; ART, antiretroviral therapy.

high levels of condomless anal intercourse, to demonstrate relationships between scores on broad personality traits and condomless anal intercourse, perceived health, and utilization of prevention and case management services.

Our findings suggest that sexual minority men living with HIV who have very low levels of trait Conscientiousness (i.e., more than one SD below the normative mean) may be particularly vulnerable to engaging in serodiscordant condomless anal intercourse. Those who engage in condomless anal intercourse could potentially expose themselves to sexually transmitted infections (STIs) or infection with another medication-resistant strain of HIV. They could also expose their serodiscordant sexual partners to HIV (if not adherent to their antiretroviral medication) and all of their partners to possible STIs. This lack of deliberation and the unwillingness or inability to plan for or enact less risky sexual practices or to act on priorities that may protect their partners' sexual health may well be enduring patterns of behavior associated with the lower observed scores on the Conscientiousness facets of self-discipline, dutifulness, and deliberation, respectively. Conscientiousness was also associated with fewer numbers of sexual partners in the previous 3 months. It is, thus, quite possible that higher levels of Conscientiousness are associated with health protective effects. Those participants whose responses indicated higher Conscientiousness may have incorporated steps to protect the sexual health of themselves and that of their partners. These findings are broadly consistent with earlier work linking Conscientiousness to better HIV disease management and improved clinical outcomes.^{6,7}

Conscientiousness was also independently associated with accessing prevention services, receiving an HIV case manager earlier, and perceiving oneself to be healthier. Components of Conscientiousness may promote linkage to and engagement in HIV care and prevention by enhancing motivation toward and production of healthy behaviors. Higher levels of these health promotion behaviors could lead to greater health and, in turn, affect self-perceptions of health status.

Openness was also associated with fewer recent episodes of condomless anal intercourse. Openness is characterized by a willingness to explore new feelings, values, or ideas. Those high in Openness are focused on increasing their knowledge and are sensitive to their surroundings and the larger environment. This quality of individuals high in Openness could make them more comfortable discussing sensitive topics, such as condom use with a new partner.

In our sample, Extraversion was also associated with fewer recent episodes of condomless anal intercourse and with having recently accessed HIV prevention services. Extraversion is characterized, in part, by assertiveness, warmth, and positive emotions. These characteristics could make it easier to manage the complex negotiations of condom use with a serodiscordant sexual partner. These same characteristics of Extraversion could also make it more likely that an individual higher in this personality trait would be more actively engaged in one's community and care about community well-being (i.e., HIV prevention within the local sexual minority population). Those high in Extraversion may also be more likely to have and maintain social supports. This may be particularly important for those living with HIV as HIV disproportionately affects individuals who are marginalized or coping with multiple stigmatized identities (sexual minorities, racial minorities, and substance users).¹⁷ Furthermore, Openness and Extraversion have

each been associated with slower HIV disease progression over time in a diverse sample of men and women living with HIV.⁷ Thus, these personality traits among sexual minority men living with HIV might confer broad health-related benefits. These putative explanations await empirical verification.

Neuroticism was not related to indices of condomless anal intercourse or number of recent sexual partners. Evidence from previous studies suggests a relationship between higher levels of Neuroticism (specifically the impulsiveness component) and increased rates of sexual risk behavior.^{9,10} For example, impulsiveness, a characteristic of Neuroticism, may predispose sexual minority men to poor self-regulation of urges and, in turn, lead to impaired sexual decision-making. The absence of a relationship between Neuroticism and sexual risk behaviors in our sample may be accounted for by a number of factors. First, our analyses controlled for the total number of sexual episodes, which may have attenuated the relationship between condomless anal intercourse and Neuroticism. Second, the restricted range in our sample across both variables may also account for the lack of association. Specifically, men living with HIV who did not engage in sexual risk behaviors in the previous 3 months were not included in our sample and the sample mean for Neuroticism was more than one standard deviation above the normative sample. These restricted ranges may well have limited our ability to uncover a relationship. Third, the sample size for the current investigation is modest and we may not have had the statistical power to detect small effect sizes.

Trait Neuroticism was independently associated with perceiving one's health to be subjectively lower, although it was not significantly associated with any of the other health-relevant behaviors. It is possible that individuals high in trait Neuroticism may experience greater somatic symptoms or misattribute their psychological distress as physical symptoms. In addition, Neuroticism's influence on perceived health may reflect a cognitive barrier for sexual minority men living with HIV to seek services or treatment if psychological and physical distress are frequently conflated.

Findings from the current study largely converge with previous literature linking personality traits to health, but extend these findings in sexual minority men living with HIV who report multiple recent episodes of condomless anal intercourse acts. Conscientiousness has been found elsewhere to be associated with greater engagement in health protective behaviors in the general population, such as increased physical activity and lower substance use.¹⁸ Accordingly, Conscientiousness has been linked to improved health outcomes in other chronic illnesses beyond HIV.^{19–21} Neuroticism has similarly been linked to worse health outcomes in patient populations in some studies.^{21–23} However, the evidence for associations between Neuroticism and health has been more inconsistent.^{20,24,25}

In light of these results, prevention programs for sexual minority men living with HIV could take into account these individual personality differences, which likely moderate receipt, perception, or enactment of HIV health behaviors, in ways that would maximize their success, for example, by allowing for flexibility around secondary prevention program participation (i.e., drop-in clinics, open group enrollment, no minimum attendance requirements, focused outreach, and incentivized participation). Sexual minority men who are low in Conscientiousness may be more opportunistic or event driven in seeking healthcare, rather than consistently vigilant about their health. These men, in particular, may benefit from having

ready access to tailored prevention information, such as through Internet sexual health forums or online prevention resources. For those low in Conscientiousness, it is plausible that they will respond better to sexual health messaging that emphasizes personal health and protecting oneself from STIs, rather than public health messages focused on preventing transmission of HIV. Low Conscientiousness may predispose sexual minority men living with HIV to be less actively engaged in managing their chronic illness. These recommendations are consistent with our earlier work that found a prospective relationship between low Conscientiousness and accelerated HIV disease course.⁶

The relationships observed here between Conscientiousness and sexual risk behaviors may also have specific implications for HIV-negative sexual minority men. It is reasonable to hypothesize that trait levels of Conscientiousness could affect HIV testing behavior, condom use, and adherence to pre-exposure prophylaxis. Structuring primary HIV prevention programs to address sexual health among sexual minority men low in Conscientiousness may help to increase the effect sizes associated with primary prevention interventions in this risk group.

Sexual minority men living with HIV who have higher levels of Neuroticism are likely more vulnerable to life stress and emotional distress, which could limit their ability to engage consistently in protected behaviors during times when stressors are high. Secondary prevention programs that can address these characteristics may reap the benefit in terms of their program effectiveness. Such programs could include stress management, referral and linkage to mental health services or substance use treatment, and medical case management, which could support learning and enacting effective risk prevention strategies and fuller engagement in HIV care.

Finally, Neuroticism and Conscientiousness likely operate through multiple cognitive and behavioral pathways to influence HIV health. In the current study, we identified one potential secondary variable for intervention that is associated with this personality style (e.g., perceived health). Prevention interventions that aim to increase the accuracy of self-perceptions of health may help minimize cognitive barriers to care.

Limitations

The results of the current study are best considered in the context of its limitations. First, given the cross-sectional design, these findings are correlational and we cannot make any interpretations about causality. Although personality traits are generally considered relatively stable from early development onward, future research using longitudinal designs could link more definitively general personality traits to HIV health outcomes over time. This type of design could also be used to test potential cognitive or behavioral mechanisms between personality traits and HIV health. Reported differences between our sample and the sample on which the NEO-PI-R was normed should be interpreted with caution as our sample may differ from the normative sample on more than just HIV status and sexual identity and it is probable that these groups differ on background characteristics. Although we have speculated on several mechanisms (e.g., cognitive appraisals of health services, self-perceived health, stress exposure, and coping) to provide future direction for the field, more empirical research among other vulnerable populations of sexual mi-

nority men is needed. All of the measures in the current study utilized self-report. Therefore, the data may be subject to measurement bias, which may be particularly concerning to the extent that personality features influence response or reporting styles. Furthermore, although we linked personality traits to important health behaviors relevant for HIV care, we lacked biological data (e.g., CD4 cell count, viral load, STIs) to confirm whether condomless anal intercourse constituted HIV transmission risk (i.e., occurred while the partner living with HIV had a detectable viral load), and so, our findings only address the condomless sexual behavior component of transmission risk. This also precluded us from assessing whether personality directly influenced biological endpoints of HIV in our sample. Previous research has found associations between immune system functioning and some of these personality domains in HIV, and future research in this area should include multimethod assessments of HIV health (i.e., self-report, biological measures).^{6,7} Finally, our sample was relatively small and the internal consistency of the Agreeableness domain was marginal, as such, our findings should be considered preliminary. Replication of our results in larger samples of individuals living with HIV is needed.

Conclusion

Our findings suggest that the personality factors of Conscientiousness, Openness, and Extraversion account, in part, for some of the variation in condomless anal intercourse among sexual minority men living with HIV. Conscientiousness and Extraversion were also associated with use of prevention and case management services. Both Conscientiousness (positively) and Neuroticism (negatively) were strongly related to perceived health. Enduring individual differences, therefore, influence use of services across the spectrum of HIV care, are related to risk for sexual transmission of HIV, and may help to interpret sexual minority men's self-reports of their own health. A consideration of our patients' personality traits in the provision of treatment and prevention services may well improve disease course and help to offset new infections.

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Author Disclosure Statement

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Address correspondence to:
 Conall O’Cleirigh, PhD
 Behavioral Medicine Program
 Department of Psychiatry
 Massachusetts General Hospital
 1 Bowdoin Square, 7th Floor
 Boston, MA 02114

E-mail: cocleirigh@mgh.harvard.edu