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A New Era of HIV: Psychology's Contributions to the Epidemic and Development of the Pre-Exposure Prophylaxis Determinants Scale

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This dissertation, A NEW ERA OF HIV: PSYCHOLOGY'S CONTRIBUTIONS TO THE EPIDEMIC AND DEVELOPMENT OF THE PRE-EXPOSURE PROPHYLAXIS DETERMINANTS SCALE, by CALEB CHADWICK was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree, Doctor of Philosophy, in the College of Education and Human Development, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chairperson, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty. The Dean of the College of Education and Human Development concurs.

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A NEW ERA OF HIV: PSYCHOLOGY'S CONTRIBUTIONS TO THE EPIDEMIC AND
DEVELOPMENT OF THE PRE-EXPOSURE PROPHYLAXIS DETERMINANTS SCALE

by

CALEB CHADWICK, M.Ed.

ABSTRACT

By 1991, the Human Immunodeficiency Virus (HIV) had claimed more than 250,000 lives in the United States (US; Chadwick, Zelaya & DeBlaere, 2017). That same year, the first clinical trials began to test the effectiveness of Antiretroviral Treatment (ART) to combat the virus (HIV.gov, 2017). By 1995, HIV/AIDS became the leading cause of death among Americans age 25-44 (Zuninga et al., 2008), becoming a modern epidemic of unprecedented proportions, particularly among sexual minority men. Over time, treatments for HIV improved in their scope and effectiveness, leading to our modern conceptualization of HIV as a chronic illness, rather than a terminal disease. Pre-exposure prophylaxis (PrEP) is a recently developed primary medical prevention method for HIV. Although clinical trials have demonstrated promising results in terms of efficacy, little is known regarding the attitudes of individuals most likely to benefit from PrEP treatment (e.g. sexual minority men). As such, the proposed study aims to address this gap in the research literature by contributing a psychological perspective on HIV and PrEP. Specifically, Chapter 1 provides a systemic literature review of the flagship psychological journals associated with subfields within the discipline (e.g. counseling psychology, men and

masculinity issues, sexual orientation diversity) uniquely suited to contribute expertise relevant to the HIV epidemic. Chapter 2 proposes to develop a scale measuring the psychosocial determinants of PrEP utilization. Based on the extant literature, four factors are proposed for the PrEP Determinants (PrEP-D) scale, including knowledge about PrEP, stigma, treatment attributes, and perceived effectiveness. Results of exploratory and confirmatory factor analyses using data collected from a sample of sexual minority men suggest the presence of four factors in the PrEP-D scale, consistent with the themes identified in the literature. The study also provides initial evidence of internal consistency, reliability, and construct validity.

INDEX WORDS: HIV, PrEP, Pre-Exposure Prophylaxis, Prevention, Gay, Bisexual, Sexual Minority, Stigma

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1 PSYCHOLOGY AND HIV

Introduction

In 1993, approximately 12 years after the first diagnoses of HIV/AIDS, a group of psychologists published a seminal call-to-action, urging psychologists to respond to the growing health epidemic with urgency (Kelly, Murphy, Sikkema & Kalichman, 1993). Given that no medical cure or vaccine yet existed, the authors asserted that behavior change was the primary method of HIV prevention. This assertion uniquely positioned psychologists at the front lines of HIV/AIDS defense (Kelly et al., 1993). The authors further urged that a new HIV/AIDS research agenda was needed to address the needs of an escalating epidemic, offering a number of specific priorities, including integrating the efforts of the many disciplines within psychology that might help in primary HIV response and prevention (Kelly et al., 1993).

Now in 2017, much has changed regarding HIV. Medical treatments have advanced to the point that HIV is no longer a terminal disease, and HIV positive individuals can live long, healthy lives. However, it is still the case that no cure or vaccine has been developed as a primary HIV prevention. Furthermore, the disease continues to present critical medical consequences and has a persistent disproportionate effect on certain groups, most notably sexual minority men (CDC, 2016). As such, in their role as behavioral scientists, psychologists remain uniquely positioned to contribute to HIV prevention efforts. Indeed, in a statement on the role of psychologists in the HIV/AIDS epidemic, the American Psychological Association (APA) stated that each specialty within the discipline of psychology is relevant in research methods and content to the issue of HIV/AIDS prevention, and psychologists are trained in a manner that might address the multicultural nature of the epidemic and its disproportionate effect on communities such as racial/ethnic and sexual minority men (APA, 2017a).

As HIV/AIDS continues to evolve as a public health concern, it is important then to evaluate how psychology has responded to this evolution, as well as to Kelly and colleagues' (1993) prescient call-to-action. In other words, given the long-standing call for psychologists to join the fight against HIV/AIDS, it is important to assess whether the field has responded to its full potential. Toward that aim, the current manuscript provides an integrative review of the HIV literature conducted from 1993 to the present in the field of psychology. More specifically, the current manuscript focuses on Kelly and colleagues' (1993) specific call for the subfields of psychology to contribute their unique expertise and focus to fight the HIV epidemic. This, in tandem with data indicating that HIV/AIDS represents a significant health crisis for sexual minority men in particular, suggests subfields of psychological study that may be particularly relevant for examination would include a) counseling psychology, b) sexual orientation diversity, and c) men's issues. Prior to systemic review of the flagship journals associated with these three subfields, a brief rationale for subfield relevance is provided.

Counseling Psychology

The subfield of counseling psychology is a general practice and health service provider specialty in professional psychology (APA, 2017b). Counseling psychology strives to help people with physical, emotional, and mental health issues across all phases of the lifespan (APA, 2017b). Even in these general terms, one could argue that counseling psychology is well-suited to contribute to the fight against HIV, as the disease and its impact live at the intersection of physical, emotional, and mental health. The relevance of counseling psychology becomes even clearer in the details of its organizational mission. Specifically, counseling psychology's relevance to HIV can be further delineated by four organizing principals, termed *pillars*: 1)

multiculturalism, 2) scholarship, engagement, and collaboration, 3) social justice and advocacy, and 4) prevention and promotion (APA, 2017b).

Pillar I: Multiculturalism

The multiculturalism pillar is intended to support and encourage diversity across various settings (e.g. graduate students, faculty, practitioners, researchers), as well as to expand engagement in multicultural research and practice (APA, 2017b). Specific goals within this pillar include: increasing research collaboration and maximizing research impact; consolidating multicultural resources for students and practitioners; providing platforms for advocates to address the needs of various populations; improving visibility and accessibility of current practitioners and researchers who demonstrate multicultural competence; and continually engaging in discourse around diversity-related current events (APA, 2017b). Indeed, with these specific goals in mind, the pillar of multiculturalism explicitly positions the field of counseling psychology to address the “multicultural nature of the epidemic” (APA, 2017a), particularly in psychological research on HIV. As stated earlier, HIV has a disproportionate impact on racial/ethnic minority communities and sexual minority men. This important area of health disparities, the nature of which will be outlined in greater detail later in this manuscript, fits neatly within the scope of the multiculturalism pillar. As counseling psychology is dedicated to multicultural issues in research and practice, the subfield is ideally situated to participate in HIV-specific scholarship, engagement, and collaboration.

Pillar II: Scholarship, Engagement, and Collaboration

The pillar of scholarship, engagement, and collaboration’s intention is to build a community of counseling psychologists who are actively collaborating in multiple fields of scholarship (APA, 2017b). In more specific terms, the pillar is meant to promote networking and connections

within the subfield to facilitate continued engagement in counseling psychology professional organization involvement and service (APA, 2017b). The spirit of the pillar, however, suggests that scholarship, engagement, and collaboration are related not only to long-term professional success, but also to the long-term success of the discipline (APA, 2017b). Collaborating not only within the field of psychology, but also with an interdisciplinary approach (i.e. with public health, medical fields) would be to the benefit of counseling psychologists and counseling psychology. Given the focus on collaborative scholarship, the potential is high for counseling psychology to contribute to HIV research alongside fields more traditionally associated with HIV research (i.e. public health and medical researchers) through a social justice and advocacy lens.

Pillar III: Social Justice and Advocacy

The pillar of social justice and advocacy represents a long-standing commitment from the field of counseling psychology to actively engage in professional practices that work toward a more just society. As a pillar of counseling psychology, the subfield aims to 1) increase awareness of legislative issues and calls through media (i.e. listservs, social media), and 2) promote social justice in research and practice (APA, 2017b). In line with its complementary relationship with the pillar of multiculturalism, the HIV epidemic is a major social justice issue in contemporary society. As a health disparities issue, and social public health concern, HIV warrants the attention of social justice and advocacy-minded counseling psychologists. Given the pillar's specific promotion of social justice-oriented research, it follows that counseling psychology might make a major contribution to psychological research on HIV, perhaps in the form of HIV prevention research.

Pillar IV: Prevention and Promotion

Prevention is one of the hallmarks of the field of counseling psychology (APA, 2017b). The pillar of prevention and promotion seeks to bolster the field's engagement in prevention-focused scholarship (APA, 2017b). This pillar has particular resonance with Kelly and colleagues' (1993) call-to-action, as they asserted that psychology, as a behavioral science, was positioned to combat HIV by helping to prevent new HIV infections via behavioral change. Given that counseling psychology is delineated from the other fields of psychology by its prevention focus, the subfield, perhaps more than any other subfield of psychology, should be uniquely equipped to answer the call to produce HIV prevention scholarship.

HIV Among Sexual Minority Men

As previously referenced in the current manuscript, HIV has a disproportional impact on sexual minority men. The overall risk for HIV infection in the United States (US) is approximately 1 in 99 (CDC, 2016). According to the CDC, men accounted for 81% of diagnoses of HIV infection between 2010 and 2014, as transmission rates for women overall decreased from prior years to makeup 19% of diagnoses (2016). However, among transgender women, rates are notably higher as on average 28% of transgender women tested positive for HIV (CDC, 2016). Among sexual minority men, who are identified in CDC reports as men who have sex with men (MSM), HIV transmission rates illustrate a critical disparity. Sexual minority men are currently an alarming 83 times more likely to become infected with HIV than their heterosexual male counterparts (CDC, 2016). These statistics illustrate not only the urgency of the ongoing HIV epidemic, but also highlight the rationale for relevant subfields of psychology to utilize their expertise to help combat HIV.

More directly, the identified statistics illustrate the need to focus scholarship specifically on the health needs of sexual minority men. Given the tremendous historical and contemporary

impact of HIV on communities of sexual minority men, the need to address HIV for this population remains critical. Provided the stark contrast in HIV disparities, the current manuscript takes the position of explicitly addressing HIV among sexual minority men. As such, the subsequent literature review will only identify literature relevant to this population.

Psychological scholarship focusing on men's issues and sexual minority communities has a distinct opportunity to contribute pertinent focus and expertise to the HIV literature. For example, the psychological study of masculinity might provide crucial insight into interpersonal and intrapsychic factors that predict HIV risk among those men most effected by the epidemic (sexual minority men). Similarly, minority stress is a major area of focus in sexual orientation diversity research and could play a substantive role in sexual minority men's HIV testing behaviors and condom use, to offer only cursory potential lines of research. Indeed, it seems that the HIV epidemic could benefit greatly from focused attention by the subfields of psychological study mentioned here (men's issues, and sexual minority issues), and as such should be well-represented within the published literature in their flagship APA journals.

Placed within the framework of a seminal call for psychologist involvement in HIV research, and specific call to integrating the efforts of the many disciplines within psychology that might help in primary HIV response and prevention (Kelly et al., 1993), we move to investigate how the field has lived up to this call, with particular attention to journals that might capture the multicultural nature of the epidemic and disproportional representation of HIV among sexual minority men. The current systemic literature review aims to understand how the flagship journals associated with counseling psychology (*Journal of Counseling Psychology [JCP]*; *The Counseling Psychologist [TCP]*), men's issues (*Psychology of Men & Masculinity [PMM]*), and

sexual minority populations (*Psychology of Sexual Orientation and Gender Diversity; PSOGD*) have contributed to our modern conceptualization of HIV.

Method

Search Procedures

After an initial scoping review, publication searches were carried out using electronic database PsycINFO. PsycINFO is the American Psychological Association (APA) database for abstracts and citations of behavioral and social science research. Various iterations of the following terms were searched using and/or/+: “HIV,” “AIDS,” “HIV/AIDS,” “human immunodeficiency virus,” “acquired immunodeficiency syndrome.” Search results were limited by date (since 1993) and source journals, including “The Journal of Counseling Psychology (JCP),” “The Counseling Psychologist (TCP),” “Psychology of Men & Masculinity (PMM),” and “Psychology of Sexual Orientation and Gender Diversity (PSOGD).” This search yielded 621 articles. Given the focus of the current review, the researcher once again narrowed the search to reflect only articles specific to HIV among sexual minority men, using various iterations of the following terms using and/or/+: “gay,” “homosexual,” “bi,” “bisexual,” “sexual minority.” This search yielded 35 articles (JCP, $n = 7$; TCP, $n = 10$; PSOGD, $n = 6$; PMM, $n = 12$). The set of articles was then screened for relevance and duplication, and were limited to peer-reviewed published works that were empirical in nature, reducing total articles to 10 (JCP, $n = 4$; TCP, $n = 1$; PSOGD, $n = 3$; PMM, $n = 2$). The final review was limited to empirical articles to honor Kelly and colleagues’ (1993) specific identification of the need for a new research agenda relating to HIV. Among the 25 articles not included for final review, articles were excluded for lack of relevance to sexual minority men (e.g. studies on HIV among heterosexual men in South Africa; $n = 10$), duplication (e.g. the same study identified multiple times by PsycINFO; $n = 8$),

and lack of empirical nature ($n = 7$). Of the final 10 articles, the search identified 9 quantitative articles, and 1 qualitative article.

Results

HIV Risk ($n = 6$)

In general, the literature was split by two primary areas of focus: 1) HIV risk among HIV negative sexual minority men ($n = 6$), and 2) factors influencing the lives of HIV positive individuals ($n = 4$). Overall, the number of articles reflected a slightly disproportional interest in HIV risk. Of these articles, a majority of articles ($n = 5$) were specifically interested in sexual risk behaviors as at least one outcome of interest.

Sexual risk behavior ($n = 3$). Sexual risk behavior has long been a focus of HIV research, centering on behaviors associated with HIV risk, such as condom use, HIV testing, serosorting, HIV status disclosure, and substance use during or prior to sexual encounters. One study found in the systemic literature review was interested in the way minority stress moderated the relationship between perceived social norms of HIV risk behaviors (i.e. alcohol use, tobacco use, drug use, and sexual behavior) and reports of personal HIV risk behaviors among sexual minority men (Hamilton & Mahalik, 2009). Indeed, their study found that the link between perceived norms and health risk behavior was stronger for sexual minority men with high levels of minority stress (Hamilton & Mahalik, 2009). In other words, the link between perceptions of others' HIV risk behaviors and sexual minority men's own HIV risk behaviors was contingent upon minority stress (Hamilton & Mahalik, 2009).

Another study investigated risky sexual behavior in a sample of gay and bisexual men, using structural equation modeling to evaluate the mediating roles of substance use factors (expectations about the sexually enhancing effects of substance use and substance use during

sex) between internalized heterosexism (IH) and sensation seeking and unprotected anal intercourse (Kashubeck-West & Szymanski, 2008). The study found that both substance use factors mediated the relationship of sensation seeking to risky behaviors (Kashubeck-West & Szymanski, 2008). Further, greater sensation seeking was related to greater expectations about sexually enhancing effects of substances, which was in turn related to greater unprotected anal intercourse (Kashubeck-West & Szymanski, 2008). This study illustrates the importance and interconnection of diversity-related factors (i.e. minority stress) and HIV risk.

An additional relevant study investigated the relationship between objectification experiences and sexual risk behaviors among sexual minority men (Watson & Dispenza, 2014). In particular, this study assessed whether sexual objectification, objectification based on masculine appearance norm violations, and emotions associated with these experiences predicted sexual risk (Watson & Dispenza, 2014). Findings indicated that greater frequency of sexual objectification, as well as positive feelings associated with sexual objectification experiences, had a direct relationship to greater frequency of sexual risk behaviors (Watson & Dispenza, 2014). Further, negative feelings associated with masculine appearance norm violations were also associated with greater sexual risk behaviors (Watson & Dispenza, 2014).

Body image and gender roles ($n = 3$). Body image and gender role identification were of particular interest in a quantitative study on the influence of drive for masculinity and muscularity on HIV sexual risk behaviors among sexual minority men of color (Brennan et al., 2015). Their study found that drive for masculinity and muscularity were positively associated with HIV sexual risk behaviors, even after controlling for sociodemographic variables and internalized homophobia (Brennan et al., 2015). These findings suggest that disappointment with

one's muscularity, as well as endorsement of body image and penis size as indicators of masculinity, may play a role in HIV risk behaviors (Brennan et al., 2015).

Another study was interested in *machismo* as a predictor of HIV risk among Mexican American sexual minority men (Estrada, Rigali-Oiler, Arciniega & Tracey, 2011). The findings suggested that *machismo* was not a statistically significant predictor of sexual risk behavior (Estrada, Rigali-Oiler, Arciniega & Tracey, 2011). However, the authors did find that *traditional machismo* was significantly related to STD and HIV education levels (Estrada, Rigali-Oiler, Arciniega & Tracey, 2011). More specifically, their study found that participants reporting higher levels of *traditional machismo* had lower levels of STD and HIV education than those reporting lower levels of *traditional machismo*. Findings from this study highlight the importance of considering the role of masculinity as a potential predictor of various HIV risk factors among diverse sexual minority men.

One study was specifically interested in the predictive role of masculine gender role conformity on HIV testing among sexual minority men (Parent, Torrey & Michaels, 2012). Study findings indicated that heterosexual self-presentation (i.e. the desire to be perceived by others as heterosexual) was negatively associated with HIV testing after controlling for the effect of number of sexual partners (Parent, Torrey & Michaels, 2012). The authors assert that HIV testing is critical in HIV prevention, and that masculine gender role conformity may impede testing behaviors as testing may be perceived as an "outing" procedure (Parent, Torrey & Michaels, 2012).

HIV Positive Research ($n = 4$)

While not as highly represented within the identified literature, some studies were not explicitly interested in HIV risk factors. Instead, these studies focused on the experiences of HIV

positive individuals. Each of the identified studies were either specifically or distally interested in mental health factors among HIV positive individuals.

A quantitative study examined coping related to depression and help-seeking behaviors among HIV positive sexual minority men (Rood, McConnell & Pantalone, 2015). In particular, this study examined how combinations of coping strategies related to depression and HIV-related service utilization (Rood, McConnell & Pantalone, 2015). Results suggested that individuals who engaged in low levels of both functional (e.g. “Taking action to make the situation better”) and dysfunctional coping strategies (e.g. “Criticizing myself”) were significantly less likely than those who more frequently used functional strategies to engage in a range of critical HIV services (Rood, McConnell & Pantalone, 2015). Also, participants who more frequently used dysfunctional coping, regardless of functional coping use, reported higher levels of depression (Rood, McConnell & Pantalone, 2015). Findings from this study underscore the importance of coping in both mental health and HIV-specific health concerns.

Lyons and Heywood (2016) took a similar interest in mental health outcomes in their quantitative study on collective resilience as a protective factor for the mental health and well-being of HIV positive sexual minority men. Specifically, their study examined whether collective resilience is linked to better mental health outcomes among HIV positive sexual minority men (Lyons & Heywood, 2016). Their results indicated that a high level of collective resilience was linked to positive mental health and well-being outcomes (Lyons & Heywood, 2016). Men who demonstrated high collective resilience were significantly less likely to report depression, anxiety, stress, and internalized HIV stigma than men who demonstrated lower collective resilience (Lyons & Heywood, 2016). Similarly, men who demonstrated high collective resilience were more likely to report higher levels of well-being, life satisfaction, individual

resilience, and overall health than lower collective resilience participants (Lyons & Heywood, 2016).

Another study extended previous research connecting substance use to negative psychological outcomes. In this quantitative study, a higher level of methamphetamine use was found to be associated with elevated muscularity disturbance among 97 HIV positive sexual minority men (Jampel, Safren & Blashill, 2015). These results indicate that substance use, in this case, the use of methamphetamines, go beyond increasing risk for HIV transmission, to having a potential negative impact on mental and emotional health as well among HIV positive individuals (Jampel, Safren & Blashill, 2015).

In a related, but distinct line of inquiry, one study was interested in therapist homophobia, client sexual orientation, and source of client HIV infection as predictors of therapist reactions to clients with HIV (Hayes & Erkis, 2000). Their study found that therapists responded with less empathy, attributed less responsibility to the client for solving his problems, assessed the client's functioning to be worse, and were less willing to work with the client when the client's source of HIV infection was sexual, when the client was gay, and when the therapist reported higher levels of homophobia (Hayes & Erkis, 2009). This study suggests that understanding how HIV and sexual minority identity intersect in mental health treatment experiences could play a critical role in both mental and HIV-related health.

Clinical Implications

The contributions from the subfields of counseling psychology, men's issues, and sexual orientation diversity in psychology offer considerable insight into clinical perspectives related to HIV prevention and care. Within the subset of articles not focused on HIV positive individuals, most identified studies focused on HIV risk factors. In this regard, it appears that clinicians

should pay attention to several factors that play a role in determining risk for HIV, including substance use, internalized homophobia, conformity to gender roles, sexual objectification experiences, and body image.

Regarding alcohol and substance use, these factors may function as not only a general health factor, but as a factor explicitly linked to HIV risk. Along these lines, clinicians might screen regularly for substance use as part of standard clinical procedure, with particular attention to sexual encounters during or following alcohol or substance use. Indeed, alcohol and substance abuse have long been linked to negative mental health outcomes in their own right, and the studies identified in the current thematic literature review illustrate that it also relates to sexual risk behaviors, such as deciding to not wear condoms (e.g. Kashubeck-West & Szymanski, 2008). Further, among HIV positive sexual minority men, methamphetamine use was linked to muscularity disurbance (Jampel, Safren & Blashill, 2015), which as an element of body image, was linked to sexual risk behavior as well (e.g. Brennan et al., 2015).

In the identified literature, body image, in particular desire for muscularity, predicted elevation in sexual risk behaviors among sexual minority men of color (Brennan et al., 2015). Taken in concert with the Jampel, Safren, and Blashill's (2015) findings on body image among HIV positive men, it appears that body image is an important factor in sexual health in general, and in HIV specific sexual health among sexual minority men. In fact, experiences of sexual objectification, a social experience thematically related to body image, was also linked in the identified literature to HIV sexual risk behavior (Watson & Franco, 2014). With these study results in mind, clinicians may wish to assess for client body image when working with sexual minority men, particularly when substance abuse is a presenting factor. Clinical interventions, such as motivational interviewing and cognitive behavioral interventions, may prove beneficial

in reducing client risk for HIV, promoting positive self-esteem, and ameliorating substance abuse concerns.

Relatedly, clinicians working with sexual minority men may also find it helpful to screen for client endorsement of traditional gender roles and masculinity. In particular, it seems that endorsement of traditional masculinity beliefs is associated with lower levels of HIV education (Estrada, Rigali-Oiler, Arciniega & Tracey, 2011), and desire to be perceived as prototypically masculine is associated with lower rates of HIV testing (Parent, Torrey & Michaels, 2012). As such, it appears that masculinity is a factor highly relevant to HIV risk among men. In particular, it seems that social and intrapsychic alignment with traditional masculinity contributes to HIV risk via HIV education and testing behaviors. From a clinical framework, it may be beneficial for clinicians to be mindful of client perspectives on gender roles in light of their link to HIV related health. Some clients may find introductions to alternative perspectives on masculinity helpful during their time in therapy, and might be directed to resources such as *The Good Men Project*, an online resource directed at contextualizing masculinity within a less-rigid, and social justice-oriented framework. Taking a social justice approach may also prove beneficial when working with HIV positive clients as well.

In the limited research identified on HIV positive individuals, studies were aimed at identifying factors that might predict or disrupt negative mental health outcomes among sexual minority men, such as depression. One study found that collective resilience (Lyons & Heywood, 2016) was associated with greater personal resilience and well-being, as well as lower levels of depression. Similarly, another study (Rood, McConnell & Pantalone, 2015) found that functional coping strategies, characterized by items such as “Taking action to make the situation better” and “Concentrating my efforts on doing something about the situation,” were associated with lower

levels of depression among HIV positive participants. Both of these studies appear to reflect a potential psychological benefit of collective action. A growing body of literature would support this claim, as collective action has been found to buffer the discrimination → distress link (e.g. DeBlaere, Brewster, Bertsch, DeCarlo, Kegel & Pousseau, 2014), which may provide implications for HIV positive sexual minority men, who face the intersecting minority stress experiences associated with HIV positivity and sexual minority identification (e.g. Hamilton & Mahalik, 2008). As such, clients may benefit from clinical interventions aimed at HIV-specific social justice efforts, such as volunteering with local HIV service organizations. Such interventions may be especially resonant with psychologists informed by the social justice and advocacy pillar of counseling psychology.

Based on the research identified in the current thematic literature review, there are a number of steps clinicians can take to promote greater HIV-related health in the community. In particular, clinicians may contextualize or standardize substance use screenings, monitor and intervene around issues of body image, work toward deconstructing gender role beliefs, and promote social justice activism around HIV. While the identified literature is a helpful guide, psychology's role in HIV research and care may yet be defined by future directions.

Future Directions and Conclusion

Of notable absence in the current search was literature relevant to the cutting edge of HIV prevention. More specifically, no identified research reflected the recent revolutionary medical advancements in treatment as prevention (TasP) and pre-exposure prophylaxis (PrEP). Regarding TasP, researchers have estimated that the chances of transmitting HIV with an undetectable viral load are close to zero, or perhaps even zero (CDC, 2017). These study results, along with the development of an effective HIV prevention medication regimen (PrEP), suggest

an exciting new era in the prevention of HIV transmission. In 2012, PrEP became the first approved medical treatment for the prevention of HIV by the United States Food and Drug Administration (FDA; Holmes, 2012). Although TasP and PrEP are still relatively new as medical approaches to HIV prevention, it is essential that researchers make efforts to produce relevant and timely research. In other words, while research on sexual risk behaviors continues to be highly important, psychologists might also consider inquiry into TasP and PrEP to capitalize on the momentum from promising clinical trials results. For example, research investigating sexual minority men's beliefs around TasP and PrEP, or psychosocial determinants of utilizing PrEP, might bolster community interventions aimed at maximizing the effectiveness of HIV prevention interventions. Indeed, such research efforts would fall well within the scope of the journals identified in the current systemic literature review.

It is worth noting that psychologists are undoubtedly contributing to our knowledge in HIV research beyond what was identified in the current literature review. The subdiscipline of health psychology likely continues to lead the way. This is understandable, perhaps even appropriate, but the fields of counseling psychology, and psychologists with specific interest in men's issues and sexual minority populations are nonetheless uniquely suited to furthering our understanding in important ways for sexual minority men in particular, but the general population as well. With such great potential for the subfields of psychology identified in this paper to contribute unique focus and expertise to the HIV epidemic's persistent effect on communities of sexual minority men, the few articles identified in the current literature review, while substantive in content, do not illustrate a resounding response to Kelly and colleagues' (1993) call-to-action. Indeed, given that HIV is one of society's most pressing health concerns among sexual minority men, it is

disappointing that so few articles address this area of need in psychological journals interested in promoting health in this very community.

However, a new day has arrived in HIV research and scholarship. With the advent of TasP and PrEP, psychologists are once again positioned on the front lines of the battle to end HIV/AIDS. In order for TasP and PrEP to function to their full potential as HIV prevention methods, it is critical to understand what factors make these efforts most effective and most far-reaching. For example, in order for TasP to be effective, serodiscordant couples must understand the benefits and methods to achieving undetectable HIV viral loads. Additionally, such knowledge should tailor to the needs of the contemporary face of the HIV epidemic. More directly, future research should address the highly disproportional effect of HIV on Black and Latinx sexual minority men. Along these lines, I offer a statistic which once again highlights the modern manifestation of HIV: among young men who have sex with men, Black and Latinx communities accounted for 58% and 20% of new diagnoses within their age cohort (CDC, 2017). This statistic provides another lens through which to consider the multicultural nature of the epidemic and the importance of considering the influence of race/ethnicity and relevant marginalization in the evolving nature of HIV in the US. Along these lines, psychologists can help disseminate such knowledge, and can help the field understand what facilitates medication adherence and other TasP concerns, along with other factors relevant to HIV prevention. Similarly, for sexual minority men most likely to benefit from PrEP, it is a fundamental step that mental health, public health, and medical practitioners form a scientific understanding of the psychosocial determinants of PrEP utilization. Among those invested disciplines, psychologists are uniquely positioned as behavioral scientists to pursue related research agendas. Indeed, counseling psychologists as the standard-bearers of prevention scholarship and intervention in

psychology, are a yet-untapped and invaluable resource to the HIV epidemic. While it is certainly an exciting new day in the battle to end HIV/AIDS, the future will tell whether the legacy of social justice in psychology extends to one of the greatest health crises in modern history.

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2 DEVELOPMENT OF THE PRE-EXPOSURE PROPHYLAXIS DETERMINANTS

(PrEP-D) SCALE

Introduction

By 1991, the Human Immunodeficiency Virus (HIV) had claimed more than 250,000 lives in the United States (US) (Chadwick, Zelaya & DeBlaere, 2017). That same year, the first clinical trials began to test the effectiveness of Antiretroviral Treatment (ART) to combat the virus (HIV.gov, 2017). By 1995, HIV/AIDS became the leading cause of death among Americans age 25-44 (Zuninga et al., 2008), becoming a modern epidemic of unprecedented proportions, particularly among sexual minority men.

Over time, treatments for HIV improved in their scope and effectiveness, leading to our modern conceptualization of HIV as a chronic illness, rather than a terminal disease. However, even as a chronic illness, HIV infection, particularly when unmanaged, is associated with numerous serious, even lethal, health concerns (e.g. heart disease, cognitive impairment, and opportunistic infections; Ye, 2015) and remains a major focus of medical research and public health initiatives. Further, HIV continues to have a starkly disproportional effect on sexual minority men. The Center for Disease Control (CDC, 2016) reports that sexual minority men continue to be the group most heavily affected by HIV in the US, estimating that while making up only approximately four percent of the male population, sexual minority men account for more than three-fourths (78%) of new infections among men and nearly two-thirds (63%) of new infections overall. Although the rates of new infections among sexual minority men have stabilized, the number of new infections among the youngest sexual minority men (age 13-24) has increased an alarming 22% (CDC, 2016). These statistics highlight the need for future research, particularly prevention-related research, to focus not only on sexual minority men, but

young sexual minority men. In response to the importance of addressing the disparities in new infection rates, as well as the efficacy of contemporary treatments for HIV, medical research foci have partially shifted from treatment of HIV toward preventive medical interventions. This shift in foci yielded a tremendous breakthrough with the advent of pre-exposure prophylaxis (PrEP) to prevent HIV transmission.

PrEP became the first medical treatment approved for prevention of HIV in July, 2012 (Holmes, 2012). The CDC (2017) describes PrEP as a way for people who do not have HIV, but are at substantial risk of getting HIV, to prevent transmission by taking a daily pill (brand name Truvada). Truvada contains two medicines (tenofovir and emtricitabine), which are commonly used as part of a combination treatment for HIV (CDC, 2017). When someone who is taking PrEP is exposed to HIV, these medicines prevent HIV from establishing a permanent infection (CDC, 2017).

PrEP Clinical Trials

PrEP has been shown to reduce risk of HIV infection among treatment-adherent individuals considered “high risk” (Grant, Lama, Anderson & McMahan, 2010), although it is considerably less effective when adherence levels are sub-optimal (CDC, 2017). More specifically, the landmark iPrEx study (Grant et al., 2010) found that among gay and bisexual men given PrEP, participants were 44% less likely overall to get HIV than those taking a placebo. Among participants with detectable levels of PrEP in their blood (indicating treatment adherence), PrEP reduced the risk of infection as much as 92% (Grant et al., 2010). Among heterosexual, sexually active women and men, PrEP reduced risk of HIV infection by 62%, although again participants infected with HIV had far less of the medication in their blood, indicating sub-optimal treatment adherence (Thigpen et al., 2012). Among women and men who

did not have HIV in serodiscordant couples (i.e. couples in which one partner has HIV and the other(s) do not), those who received PrEP were 75% less likely to become HIV positive in comparison to the placebo group (Baeten et al., 2012). Consistent with other clinical trials, for participants in the serodiscordant couples study who were treatment adherent, PrEP reduced HIV risk by up to 90%. No clinical trials have found any significant safety concerns with daily oral PrEP, although some trials reported side effects such as mild upset stomach and loss of appetite (CDC, 2017). The already encouraging effectiveness of PrEP can be further bolstered when used with other HIV prevention methods, such as condoms (CDC, 2017), suggesting that PrEP is a critically important new tool for preventing transmission of HIV.

A New Era of Prevention

Overall, the results from PrEP clinical trials indicate a promising new era in the treatment and prevention of HIV. Indeed, in the updated National HIV/AIDS Strategy, updated to 2020 (HIV.gov, 2017), full access to comprehensive PrEP services for those whom it is appropriate and desired and support for medication adherence for those using PrEP are identified areas of recommended focus for research and public health initiatives. In efforts to implement this strategy, the Federal Interagency Workgroup, co-chaired by the Director of the Office of National AIDS Policy and the Director of the HHS Office of HIV/AIDS and Infectious Disease Policy, has taken specific actions related to promoting utilization of PrEP (HIV.gov, 2017).

Specifically, the “PrEP Framework” has been developed and released to aid Federal efforts to increase knowledge and awareness of PrEP, support its use, and identify gaps in response efforts (HIV.gov, 2017). Of particular relevance to the current proposed study, the PrEP Framework explicitly states that “understanding the determinants for use” of PrEP “helps target efforts in scaling up PrEP” (HIV.gov, 2017, p. 9). Given the current study’s interest in measuring

identified attitudes toward PrEP, results and implications should be of interest to future HIV research and public health interventions aligned with research goals identified by the PrEP Framework and National HIV/AIDS Strategy.

“Determinants for Use” of PrEP

In line with the National HIV/AIDS Strategy, many researchers have begun to identify and investigate factors that appear to be “determinants for use” of PrEP. Certainly, it is still the case that much of the PrEP research literature is oriented to medical concerns (e.g. clinical trials). However, a growing body of research has positioned certain psychosocial factors as important theoretically, and empirically, to the utilization of PrEP. Given the nascent state of non-medical research (e.g. psychology research not involving clinical trials) on PrEP, this area of research has been exploratory in nature, and therefore limited in scope, but nevertheless establishes an essential conceptual framework for future research, which includes both potential outcomes of interest, as well as predictors.

Outcomes

Willingness. One of the primary areas researchers have investigated relating to PrEP utilization is devoted to understanding willingness to use PrEP. The vast majority of studies investigating willingness to use PrEP have asked single-item yes-no questions, such as “Would you be willing to try PrEP” (e.g. Young, Li & McDaid, 2013; Leonardi, Li & Tan, 2011). Given that PrEP is a new, paradigm-shifting intervention, this line of inquiry has been important in identifying whether populations considered appropriate for PrEP would be open, in the most general of terms, to taking PrEP to prevent HIV.

One notable exception took a more nuanced approach to the construct of “willingness” as it relates to PrEP use. In their 2012 study, Holt and colleagues used seven items to measure

willingness, where participants responded with their agreement to statements on a 5-point Likert scale. One example item is “I’m going to take PrEP as soon as it becomes available” (Holt, et al., 2012). While no psychometric data other than reliability was provided or published on this scale, it nevertheless demonstrates a need in the literature for increasingly sophisticated research questions about PrEP utilization. In particular, this scale represents a way by which researchers have operationalized likelihood of PrEP utilization when PrEP is appropriate. An important next step in the literature then, is understanding and operationalizing the constructs which serve as determinants (or predictors) of “willingness” or likelihood of using PrEP when PrEP is indicated.

Predictors

Knowledge about PrEP. HIV prevention researchers have a logical interest in community knowledge about PrEP. A basic and necessary precursor to utilization of PrEP is having heard of it as an HIV-prevention method. Reflecting this fundamental starting point, initial investigations into knowledge about PrEP have focused on awareness of it as an HIV-prevention tool. Specifically, much of the extant knowledge-oriented PrEP literature asks if study participants have ever heard of PrEP or once-a-day pills to prevent HIV (e.g. Young, Li, & McDaid, 2013). Again, as the literature extends beyond these initial and fundamental questions, it is essential to work toward a more nuanced understanding of community knowledge of PrEP. It seems of particular importance that the literature not only reflect awareness of PrEP, but understanding of critical issues related to its use, such as its form (a once-daily pill), effectiveness, and adherence-related issues. Indeed, knowledge about PrEP is not only necessary for eventual utilization, but vital for making an informed personal choice. PrEP stigma, another area of interest to HIV researchers, often relies on misinformation in its role as a barrier to PrEP utilization.

Stigma. Stigma is a widely-researched phenomenon with critical implications for the effectiveness of PrEP's role in the National HIV/AIDS Strategy. HIV stigma has been consistently identified as a significant predictor of HIV testing behaviors (Earnshaw, Bogart, Dovidio, & Williams, 2013), seeking treatment for HIV once infected (Chesney & Smith, 1999), serostatus disclosure, and treatment adherence once treatment has begun (Mahajan et al., 2008). Unfortunately, there is potential for parallel process in stigma predicting PrEP utilization. Indeed, stigma could function as a barrier to PrEP utilization, and may stem from societal stigma about sexual orientation and stigma about HIV (Jackson, et al., 2012). Along these lines, one study (Jackson, et al., 2012) adapted items from an HIV stigma scale to assess stigma related to taking PrEP. Sample items included, "I am concerned if I take HIV prevention medication someone I know might see me", and "Nurses and doctors will treat people who take the medication as if they are contagious" (Jackson, et al., 2012). While the scale was found to be reliable with a sample of men who have sex with men in China (Cronbach's alpha = .86), no further psychometric data has been published on the PrEP-adapted HIV stigma scale.

Further, while Jackson and colleagues adapted items from an HIV stigma measure, it is important to consider how PrEP stigma might be distinct from HIV stigma. Qualitative research has identified multiple PrEP stigmas that can differ according to particular social context (e.g. Haire, 2015; Calabrese & Underhill, 2015). This includes the stigma of being associated with HIV (which may also relate to other stigmas such as sexual orientation, sex work, and/or drug use), the stigma of PrEP being perceived as a less-responsible condom alternative (Haire, 2015), and the stigma of PrEP being perceived as a prevention method only suitable for the sexually promiscuous (e.g. "Truvada whore"; Calabrese & Underhill, 2015). PrEP users have reported feeling stigmatized for using PrEP by medical providers, friends, and sex partners (Liu, et al.,

2014). In particular, PrEP users reported stigma from medical providers who are unwilling to prescribe PrEP or appear judgmental about their decision to use PrEP, as well as stigma from individuals who believe PrEP will lead to increased sexual risk-taking or will divert resources away from HIV-positive people (Liu, et al., 2014). Based on the literature, it seems that PrEP stigma, while in many ways related to HIV stigma, is a unique construct warranting distinct measurement. In fact, PrEP stigma appears to draw not only from knowledge about PrEP, but also from perceptions of the various attributes of treatment, such as access to PrEP (e.g. at HIV clinics versus primary care) and required HIV testing.

Treatment attributes. Treatment attributes represent a practical challenge for individuals considering taking PrEP to prevent HIV. Embedded within much of the research on PrEP are inquiries related to perceived concerns for such issues. In their conjoint analysis on the participant ratings of acceptability of PrEP, Shrestha and colleagues (2017) composed six two-level PrEP program attributes related to overall acceptability of PrEP use: cost (insurance cost versus out-of-pocket), side effects (none versus nausea/dizziness), efficacy of treatment (95% versus 75%), dosing (once daily versus pro re nata [i.e. as needed]), treatment setting (HIV clinic versus drug treatment clinic), and required frequency of HIV testing (every 6 versus every 3 months). Of the six attributes, only cost, efficacy, and side effects were found to be significantly related to acceptability of PrEP as an HIV prevention method among participants. Similarly, one qualitative study identified the themes of cost, side effects, adverse effects of intermittent use/discontinuing PrEP, and general treatment accessibility as determinants of PrEP utilization (Brooks et al., 2011). Another study whose primary aim was to evaluate willingness to take PrEP, found that a majority of sexual minority men sampled (52.1%) were categorized as “concerned” about taking PrEP due to specific attributes of PrEP treatment, including side

effects and adherence requirements. Similarly, Zhou and colleagues (2012) found that concerns for side effects and cost were significantly associated with decreased willingness to take PrEP. Other studies have found similar results, where side effects and cost (Bauermeister et al., 2013; Gersch et al., 2014), along with access to appropriate medical care (Hubach et al. 2017) functioned as determinants of PrEP utilization. Taken in sum, the literature indicates that these practical and systemic treatment-related concerns present a major consideration for people considering PrEP. As individuals weigh financial cost, physical concerns, and personal burden (e.g. frequent HIV testing), they will also likely take into consideration their perceptions of the effectiveness of PrEP.

Perceived effectiveness. As indicated by the literature from PrEP clinical trials, there is genuine reason to be optimistic about the positive influence of a once-daily pill to prevent HIV transmission. However, the dissemination of this research may not have a straightforward translation into public perception. Indeed, there is a documented history of difficulty translating promising clinical trials results from other forms of HIV prevention. For example, in spite of compelling findings supporting HIV treatment as prevention (TasP) as an effective method of HIV prevention, research findings suggest that sexual minority men are likely to be skeptical of TasP (Holt, 2013). Similarly, researchers utilizing the HIV Optimism/Skepticism Scale have found variability in perceptions of the efficacy of HIV treatments, despite a legacy of findings suggesting that HIV treatment is highly effective (Chen, 2014). We can ascertain from the research on the perceived effectiveness of HIV treatments that people would be less likely to take PrEP if they perceive it to be less effective (i.e. 75% vs. 95%), thus being able to identify potential perception bias (and ultimately convey the effectiveness of PrEP) is critical. While no such research has yet been conducted related to PrEP, history indicates that perceived

effectiveness, regardless of research data, may function as an important determinant of PrEP utilization.

PrEP Literature Moving Forward

Overall, in the short period of time since the advent of PrEP, the literature has made substantial strides in clinical trials establishing efficacy, as well as in establishing an initial screening of psychosocial factors that may determine PrEP utilization. In particular, willingness to consider taking PrEP, PrEP knowledge, PrEP stigma, treatment attributes, and generalized HIV treatment pessimism have received notable attention in the research literature. However, given the stage of progress in the PrEP literature as a whole, the research to date has been necessarily constrained in scope to initial questions intended to justify viability of implementing PrEP on a large scale. As indicated by their shift in research focus, the National HIV/AIDS Strategy has been convinced that PrEP is not only viable, but potentially paradigm-shifting, and has asked the research community to work toward understanding what factors might determine utilization of PrEP.

As PrEP continues to establish itself as a preventative intervention, it will be important to have tools that aid in asking nuanced questions so that clinicians can better assess client concerns and public health practitioners can develop focused, efficient community interventions. Indeed, much of the research on determinants of PrEP use thus far has understandably come from public health and medical researchers. However, many of the factors identified as potential determinants of PrEP use are psychological in nature, positioning psychologists as critical front lines investigators of these complex psychological processes. Psychology has a long and storied history of developing the very type of psychosocial measurements needed to further the literature on understanding the determinants of utilization of PrEP. In order to contribute to the pressing

social justice issue that is HIV, psychologists are historically and thematically poised to make a major contribution to the next phase of empirical research. By developing a measure of the psychosocial determinants of utilization of PrEP, the current study aims to facilitate future research on HIV prevention through contribution of a psychometrically-sound instrument.

The Present Studies

The purpose of the present studies is to develop the PrEP Determinants (PrEP-D) Scale to assess four hypothesized dimensions of psychological determinants of utilization of PrEP to prevent HIV. In Study 1, consistent with the procedures utilized in prior scale development studies (e.g., Davis et al., 2015; Brewster et al., 2016), items will be developed on the basis of prior literature and experts' feedback. For Study 1, items will be administered following expert review and subsequent revision to a sample of undergraduate sexual minority men. We will use exploratory factor analysis (EFA) to determine the scale's factor structure and inform initial scale revisions, such as removing or revising items. We expect that the EFA results will provide support for the hypothesized four-factor structure of the PrEP-D Scale. Based on prior research, (e.g. Brooks et al., 2011; Young & McDaid, 2013), the EFA is expected to reflect dimensions of psychological determinants of PrEP utilization, such as knowledge about PrEP (e.g. how it works, how it is taken), stigma around PrEP use (e.g. being called a "Truvada whore"), PrEP treatment attributes (e.g. cost, access, side effects), and perceived PrEP effectiveness. In Study 2, we plan to replicate the factor structure based on the revised scale via confirmatory factor analysis (CFA). Additionally, in Study 2, we will seek to provide initial evidence of construct validity for the PrEP-D. Specifically, correlations between the PrEP-D and the AIDS Health Beliefs Scales (AHBS, Zagumny & Brady, 1998) will be examined to establish convergent validity. The AHBS is a measure designed to assess perceived severity of HIV/AIDS, beliefs

around treatment benefits, HIV susceptibility, and perceived barriers to treatment (Zagumny & Brady, 1998). In particular, I hypothesize significant positive correlations between the PrEP-D's perceived effectiveness and knowledge subscales and the AHBS's benefits of prevention subscale due to the subscales' measurement of parallel constructs relating to awareness and utilization of HIV prevention methods. Further, I hypothesize the stigma and treatment attributes subscales of the PrEP-D to correlate positively and significantly with the AHBS's barriers to engaging in preventions subscale due to the subscales' measurement of parallel constructs relating to perceived impediments to HIV prevention. Given that the AHBS measures HIV-specific constructs related to treatment determinants, we believe this measure will aid in establishing initial evidence of the PrEP-D's validity. Detailed correlation hypotheses are provided in Study 2 analyses.

Study 1: Exploratory Factor Analysis

Method

Participants. I recruited a national sample of 502 study participants who identified as sexual minority men. For study 1, I split the sample randomly and used 251 of the 502 total participants for analysis. For the entire sample, participants ranged in age from 18 to 79 years old ($M = 55.58$, $SD = 59$, $Mdn = 13.95$). Approximately 84% of the sample identified as White, 8% as Latino, 4% as African American/Black, 3% as Asian American or Pacific Islander, 1% as Native American/American Indian, and 2% as other races or ethnicities (e.g., multiracial). In terms of gender, 100% of participants identified as men. Regarding sexual orientation, on a 1 to 5 continuum of exclusively gay to exclusively heterosexual, approximately 84% of participants identified as exclusively gay, 7% as mostly gay, 5% as bisexual, 2% as queer, and less than 1%

identified as mostly heterosexual, asexual, or pansexual, and no participants identified as exclusively heterosexual.

Approximately 32% of participants reported having earned a 4-year college degree, 29% reported earning a professional or graduate degree (e.g., Ph.D), 24% had some college experience, 9% had earned a high school diploma, 7% had some post-college professional or graduate experience. Additionally, about 49% of participants self-identified as middle class, 22% as working class, 20% as upper-middle class, 8% as lower class, and 1% as upper class. Participants reported living in all regions of the country with about 24% residing in the Southeast, 24% in the Southwest, 21% in the Northeast, 19% in the Midwest, 8% in the Northwest, and less than 1% in other regions (e.g. Mid-Atlantic, US Territories). Moreover, about 43% of participants reported residing in urban regions, 43% in suburban areas, and 14% in rural areas of the US.

Procedure. Research participants were recruited via an Internet survey distributed by the research engine Qualtrics. Internet surveys that are not compromised by repeat responses or random response patterns have been found to provide results comparable to those from pen-and-paper surveys (Gosling, Vazire, Srivastava, & John, 2004). Through partial funding from Georgia State University's Hayden-Waltz Doctoral Dissertation Award, Qualtrics recruited all study participants. Qualtrics utilizes a proprietary computer software program that automates the process of conducting surveys, including participant identification and recruitment. Participants are typically chosen from pre-arranged pools of respondents who have agreed to be contacted for participation in surveys, polls, and market research. Participants were compensated by Qualtrics for their participation at a cost of \$6 per participant. Prior to beginning the survey, participants were administered an informed consent, which provided details on the purpose of the study (i.e.,

understanding attitudes toward PrEP), informed of study inclusion criteria (i.e., 18 years of age, reside in North America, identify as a sexual minority male), study measures, and a debriefing form. After being asked an inclusionary question on eligibility, participants were directed to the survey instrument. The current study is interested in the perceptions of sexual minority men, therefore, participants who did not identify as such were excluded. The survey took approximately 30 minutes to complete. The survey also included three validity questions placed throughout the survey (e.g., “please respond *strongly disagree*”) to identify errant or random responding.

Instruments.

Development of the PrEP-D Scale. A pool of items was developed to assess potential determinants of utilization of PrEP. Item development was informed by prior literature on PrEP attitudes and barriers, including qualitative and quantitative articles describing perceptions of PrEP by sexual minority men (e.g. Holt et al., 2013; Saberi et al, 2012; Young & McDaid, 2012), and theoretical and empirical scholarship addressing implementing PrEP as prevention to HIV (e.g. Shrestha et al., 2017; HIV.gov, 2017; Whiteside et al., 2011). Initial items in the pool were developed to reflect themes identified in this literature (i.e. knowledge about PrEP [$n = 19$], PrEP stigma [$n = 17$], perceived effectiveness of PrEP [$n = 16$], and treatment attributes of PrEP [$n = 20$]). This pool of 72 items was then reviewed by six experts on HIV and PrEP (i.e., social and medical science faculty members and doctoral researchers whose programs of research address issues of HIV and HIV prevention, including PrEP) and scale development. These expert reviewers provided feedback about item clarity, content validity, and item construction and also made suggestions for expansion and deletion of items.

Following incorporation of proposed revisions and deletions, the final item pool included 71 items for inclusion in Study 1. Respondents were asked to reflect on statements (e.g., “PrEP is only for people who are careless”) and asked to report their level of agreement with that statement on a 7-point Likert scale (1 = *strongly agree* to 7 = *strongly disagree*).

Results

Prior to randomly splitting the dataset for conducting primary analyses, data were evaluated for missingness, normality assumptions, and suitability for factor analysis. Regarding missingness, no data were missing from the current sample. The researcher also examined possible violations of normality assumptions, and the data met recommendations at the univariate (e.g. skewness > | 3.00 | and kurtosis > | 10.00 |; Weston & Gore, 2006) level. Regarding multivariate normality, no cases were identified as multivariate outliers when inspecting Mahalanobis distances ($ps < .001$; Tabachnick & Fidell, 2007). Further, a Kaiser-Meyer-Olkin value above .90 (.92; Tabachnick & Fidell, 2001) and significant Bartlett’s tests of sphericity $\chi^2 = 20146.08, p < .001$ (George & Mallery, 2009; Tabachnick & Fidell, 2001) indicated that the data were suitable for EFA.

An initial EFA analyzing the correlation matrix of the PrEP-D scale was conducted using no rotation and no specified number of factors for retention. Multiple criteria were evaluated to determine the structure of the PrEP-D, including Kaiser’s rule, evaluation of the scree plot, and parallel analyses. Regarding Kaiser’s rule (Kaiser, 1960), factors with eigenvalues greater than one are recommended for retention (Pituch & Stevens, 2016). For the current study, 15 factors had eigenvalues greater than one. The scree plot was also examined, and following the recommendation to retain all eigenvalues in the sharp descent prior to the first factor in the line where the eigenvalues level off (Cattell, 1966), three factors were indicated for retention. Parallel

analysis was also conducted and supported a five-factor solution. Parallel analysis compares the eigenvalues of the existing dataset to those of 1,000 randomly generated datasets. One retains factors until the next eigenvalue (in this case the sixth factor) explains less than the eigenvalue of the randomly generated dataset. More specifically, in the current study the eigenvalues for the first five factors were higher in the actual dataset (i.e., 15.38, 8.95, 3.74, 2.78, 2.63) than in the parallel analysis (i.e., 2.3, 2.18, 2.09, 1.95, 1.9), which argues for retention of the first five factors. Next, communalities were examined and items that moderately related (i.e., communalities less than .5) to each other after controlling for the total score on the latent construct were dropped (Funk & Rogge, 2007), resulting in removal of 8 items with communalities ranging from .42 to .50¹. Taken together, I proceeded with testing the retention of three to five factors for the PrEP-D scale.

Three to five factor models were examined utilizing principal axis factoring (PAF) with promax rotation. An oblique rotation was utilized because I anticipated that the factors would be correlated (Worthington & Whitaker, 2006). Each of the models were evaluated based on meaningfulness and interpretability of the identified factors, as well as item-retention criteria intended to promote internal consistency reliability (DeVellis, 2003). In particular, at this stage of scale development, each factor needed to have at least 3 items to be retained. First, an EFA was conducted specifying a five-factor solution. The five-factor solution provided five interpretable factors and explained 52.80% of the variance. However, the fifth factor had only one item loading at least .50 on the latent construct, indicating that the five-factor solution does not meet criteria for simple solutions, thus suggesting that five or more factors are not indicated

¹ Analyses were also run including the items removed due to communalities. The results indicated equivalent findings in terms of factor retention (the fifth factor had only two items loading at least .50 on the latent construct), but resulted in poorer subsequent model fit. As such, removing items due to communalities was included in final analyses.

for retention. Next, an EFA was conducted specifying a four-factor solution. The four-factor solution provided four interpretable factors with at least three items per factor and explained 49% of the variance. Item factor loadings ranged from .36 to .82 (Factor 1), .49 to .88 (Factor 2), .34 to .9 (Factor 3), and .31 to .81 (Factor 4). Similarly, an EFA was conducted specifying a three-factor solution, which provided three interpretable factors with at least three items per factor. The three-factor solution explained 44.71% of the variance. Item factor loadings ranged from .45 to .75 (Factor 1), -.3 to .78 (Factor 2), and .47 to .88 (Factor 3). Given that the three-factor solution explained less of the total variance, indicated negative items loadings on primary factors, and that the factor loadings were generally higher for the four-factor solution, the findings of this initial evaluation of the factor structures suggested a four-factor solution for the PrEP-D.

Additionally, the body of literature suggests that choosing to retain more factors than are needed is less detrimental to the analysis than eliminating factors that are needed (e.g. Pett et al., 2003), further supporting a four-factor solution for the PrEP-D.

Next, the pattern coefficients for the four-factor solution were examined for magnitude of item factor loadings and cross-loadings. Items were dropped ($n = 39$) if they did not load at least .50 on their primary factor or had a cross-loading over .25 on any secondary factor (Factor 1 ($n = 12$), Factor 3 ($n = 2$), and Factor 4 ($n = 2$), DeVellis, 2003), resulting in retention of 32 items. As can be seen in Table 1, the range of item loadings for Factor 1 was .57 to .83, Factor 2 was .57 to .88, Factor 3 was .52 to .90, and Factor 4 was .54 to .81. The items with the highest loadings for each factor supported the theorized dimensions of Knowledge About PrEP: “I am well-educated on PrEP”; PrEP Stigma: “Taking PrEP might make people think less of me”; Treatment Attributes: “I am concerned about my access to PrEP treatment”; and Perceived Effectiveness:

“I am confident PrEP will reduce my chances of becoming HIV positive.” The final factors accounted for 24.52%, 14.09%, 6.10%, and 4.29% of the variance in items, respectively.

To establish a final version of the PrEP-D, I ran a Pre-CFA using Mplus (Version 6.11) to ensure the identified model provides an acceptable fit to the data. Further, the Pre-CFA facilitated creating a more parsimonious model by identifying items for removal and improving model fit. First, using the version of the PrEP-D established in prior steps of Study 1, items were constrained to load on their respective factors. Model fit was determined through the use of absolute and incremental fit indices: the comparative fit index (CFI), the standardized root-mean-square residual (SRMR), the root mean square error of approximation (RMSEA), and χ^2 . According to Weston and Gore (2006) in their review of model fit guidelines, the criteria for acceptable fit are $CFI \geq .90$ and $RMSEA$ and $SRMR \geq .10$ (e.g. Hu & Bentler, 1995) with more stringent criteria of $CFI \geq .95$, and $RMSEA \geq .05$ (e.g. Hu & Bentler, 1999; Quintana & Maxwell, 1999). The model provided an acceptable fit to the data ($CFA = .93$; $RMSEA = .09$, 90% confidence interval (CI) [.09 .11]; $SRMR = .08$; $\chi^2 = 1077.09$, $p < .001$). Modification indices (i.e. change of chi-square in a model if a parameter is changed), which are provided in the output of the Pre-CFA analyses, were followed to identify items for removal ($n = 16$) to help create a more parsimonious and better-fitting model. More specifically, items were selected due to high potential improvement to the model's chi-square, and CFAs were run iteratively to evaluate model fit to the data without the respective item in order to identify the most parsimonious and best fitting model to the data. Figure 1 provides an overview of item retention process. Using the final version of the PrEP-D, I ran a final Pre-CFA to determine model fit, and the four-factor model provided a good fit to the data ($CFA = .98$; $RMSEA = .07$, 90% confidence

interval (CI) [.06 .08]; SRMR = .05; $\chi^2 = 218.15, p < .001$). For Study 1, internal consistency reliabilities for the four factors were .83, .81, .89, and .83 respectively.

Study 2: Confirmatory Factor Analysis

Method

Participants and procedure. Study 2 utilized the same recruitment procedure, methodology, and data cleaning procedures described in Study 1. We utilized the remaining 251 participants for Study 2. To control for order effects, the order of measures was randomized.

Measures

PrEP Determinants Scale (PrEP-D). To confirm the factor structure and model-based reliability results obtained in Study 1, Study 2 includes items from the final version of the PrEP-D. Scores are generated by computing means scores for each of the 4 subscales. Due to the valence of the 7-point Likert scale (1 = *strongly agree* to 7 = *strongly disagree*), all items are reverse scored to aid in interpretation of correlations between the PrEP-D and AHBS subscales. As such, higher scores for the subscales indicate higher levels of knowledge about PrEP, greater PrEP stigma, higher levels of concern regarding treatment attributes, and higher levels of perceived effectiveness.

AIDS Health Belief Scale. The AIDS Health Belief Scale (AHBS, Zagumny & Brady, 1998) is a 16-item scale developed to measure the four components of the Health Belief Model as they relate to HIV/AIDS (i.e., Perceived Severity of Contracting HIV, Perceived Benefits of Prevention Methods, Perceived Susceptibility to Contract HIV, and Perceived Barriers to Engaging in HIV Prevention Behaviors), although only Perceived Benefits of Prevention Methods and Perceived Barriers to Engaging in HIV Prevention Behaviors subscales were utilized in the current study. Participants are asked to respond to AHBS items on a six-point

Likert scale ranging from (1 = *strongly disagree* to 6 = *strongly agree*), where there is no neutral option. The AHBS generates a total score in addition to scores for each of the subscales; higher scores indicate higher HIV-related health beliefs. Example items from each subscale of the AHBS include: “I believe that the chances of contracting AIDS can be significantly reduced by using a condom.” (perceived benefits); “It is embarrassing (to me) to buy condoms.” (perceived barriers). High internal consistency reliabilities have been found among samples of university students for both of the subscales used in the current study: Perceived Benefits of Prevention Methods ($\alpha = .93$), and Barriers to Engaging in HIV Prevention Behaviors ($\alpha = .92$; Zagumny & Brady, 1998). Regarding validity, both of the utilized AHBS subscale scores have been found to correlate significantly (Benefits of Prevention positively; Barriers to Engaging negatively) with a measure of attitudes toward condom use (Scandell & Wlazelek, 2002). Internal consistency reliabilities were found to range from adequate to acceptable for the barriers to prevention ($\alpha = .63$) and benefits of prevention ($\alpha = .73$) subscales.

Results

The purposes of Study 2 were to (a) confirm the factor structure of the PrEP-D Scale using a national sample of sexual minority men, (b) provide evidence of internal consistency reliability of the PrEP-D, and (c) provide initial evidence of construct validity of the PrEP-D Scale.

To confirm the factor structure of the PrEP-D, CFA was conducted using Mplus (Version 6.11). Using the version of the PrEP-D determined in the prior study, items were constrained to load on the factors identified in Study 1. As in Study 1, model fit was determined through the use of absolute and incremental fit indices: CFI, SRMR, RMSEA, and χ^2 . In accordance with model fit guidelines (Weston & Gore, 2006; Hu & Bentler, 1995; Quintana & Maxwell,

1999) , the four-factor model provided a good fit to the data (CFI = .99; RMSEA = .06, 90% confidence interval (CI) [.05, .07]; SRMR = .04; $\chi^2 = 189.44, p < .001$). Factor loadings, which are detailed in Table 2 along with standard error terms, were all statistically significant and standardized values ranged from .61 to .97. For the current study, the internal consistency reliabilities for the PrEP-D's subscales were as follows: Perceived Effectiveness ($\alpha = .83$), Knowledge ($\alpha = .80$), Stigma ($\alpha = .89$), Treatment Attributes ($\alpha = .83$). Thus, the results of Study 2 supported the four-factor structure and internal consistency of the PrEP-D.

Regarding construct validity of the PrEP-D, correlations between the final version of the PrEP-D scale and the AHBS were examined. In particular, the researcher hypothesized positive, statistically significant correlations between the PrEP-D's Perceived Effectiveness and Knowledge subscales and the AHBS's Benefits of Prevention ($M = 4.99; SD = .83$) subscale. In the current study, the AHBS's Benefits of Prevention subscale was significantly correlated with the Perceived Effectiveness subscale ($r = .11; p < .05$), but not the Knowledge subscale ($r = -.01; p = .55$). Further, the researcher hypothesized the Stigma and Treatment Attributes subscales of the PrEP-D would correlate positively and significantly with the AHBS's Barriers to Engaging in Prevention ($M = 2.; SD = .84$) subscale. As hypothesized, the PrEP-D's Stigma ($r = .24; p < .001$) and Treatment Attributes subscales ($r = .19; p < .001$) were significantly and positively correlated with the AHBS's Barriers to Engaging in Prevention subscale. Because the factor structure obtained in Study 1 was confirmed in Study 2, descriptive statistics are reported for the total sample in Table 3.

Discussion

The present studies seek to contribute to the national effort to fight HIV by providing a formalized, psychometrically sound instrument to facilitate inquiry into the factors that

determine utilization of PrEP to prevent HIV. With the Pre-Exposure Prophylaxis Determinants (PrEP-D) Scale as a tool, researchers invested in preventing HIV can work toward understanding the psychosocial nuances of PrEP-related decision making. With that understanding in place at local and national levels, intervention and outreach efforts can be more focused, efficient, and effective at reaching targeted populations with targeted messaging. In other words, the PrEP-D Scale can be used to help get PrEP to those who might most benefit.

In the present studies, we developed the PrEP-D Scale and used factor analysis to determine and replicate the scale's factor structure. In Study 1, results supported the theorized four-factor structure. Also as theorized, the four factors represent key psychosocial elements (knowledge about PrEP, PrEP stigma, treatment attributes, and perceived effectiveness) that may determine PrEP utilization. As noted previously, the highest loading items for each factor provides a helpful indication of the nature of each latent construct, including Knowledge About PrEP: "I am well-educated on PrEP"; PrEP Stigma: "Taking PrEP might make people think less of me"; Treatment Attributes: "I am concerned about my access to PrEP treatment"; Perceived Effectiveness: "I am confident PrEP will reduce my chances of becoming HIV positive."

Regarding subscale intercorrelations for the PrEP-D, I anticipated significant correlations between the PrEP-D's four factors. However, the Treatment Attributes subscale was not found to correlate significantly with the Knowledge About PrEP subscale. Although this was unexpected, the Treatment Attributes may be measuring a construct with a notable difference from the Knowledge About PrEP subscale. In particular, the Knowledge subscale focuses on participants' understanding and awareness of PrEP as a medication/treatment. In contrast, the Treatment Attributes items focus considerably on concerns related to the systems around PrEP that are ultimately independent of the medication/treatment itself (i.e. health insurance security,

providers' knowledge about PrEP). As such, the relationship between those two factors may not have been strong enough to reach statistical significance. The Stigma and Perceived Effectiveness subscales, both of which correlate with each of the other subscales, share characteristics with both sides of this divide. In particular, they are oriented to PrEP medication/treatment specific foci (i.e. concerns around others seeing the medication [Stigma]; believing the medication could work for them [Perceived Effectiveness] and on systems concerns (i.e. being treated differently by doctors and nurses [Stigma]; believing that PrEP is viable in the longterm [Perceived Effectiveness]). I believe this conceptual variance in identifying personal, PrEP-specific, and systems-related determinants of PrEP is a particular strength of the scale. It should also be noted that since all of the subscales do not correlate, generation of total scores is not indicated for the PrEP-D₂. However, the pattern of correlations present an unexpected, but potentially useful conceptual distinction between the PrEP-D's factors. More specifically, the Perceived Effectiveness and Knowledge subscales are significantly and positively correlated ($r = .43; p < .001$), and a similar relationship was found between the Stigma and Treatment Attributes subscales ($r = .49; p < .001$). Further, the negative correlations between the first grouping (Perceived Effectiveness and Knowledge) and the second grouping (Stigma and Treatment Attributes) suggest the possibility that these groupings of factors might have a useful, additional layer of interpretability. In particular, the two groupings of factors might represent factors that indicate and counter-indicate use of PrEP to prevent HIV³.

² A general higher order model was tested using CFA to further assess the appropriateness of generating a total score for the PrEP-D. However, the model did not provide a good fit to the data (CFI = .89; RMSEA = .11, 90% confidence interval (CI) [.10, .12]; SRMR = .11; $\chi^2 = 1931.59, p < .001$).

³ An additional higher order model was tested using CFA to assess the appropriateness of generating two additional scores: a) PrEP Indicated, and b) PrEP Counter-Indicated. The model provided an adequate fit to the data (CFI = .93; RMSEA = .09, 90% confidence interval (CI) [.08, .10]; SRMR = .08; $\chi^2 = 1375.26, p < .001$).

The stability of the scale's structure was supported by CFA in Study 2. Further, in Study 2, further evidence was provided for the PrEP-D's internal consistency reliability and initial support for construct validity was obtained. More specifically, the PrEP-D demonstrated adequate internal consistency reliability and its items are face-valid. However, contrary to the hypotheses, the analyses utilizing the AHBS measure provided inconsistent evidence of construct validity. Although the findings suggested that the PrEP Stigma and Treatment Attributes subscales correlated with the Barriers to Treatment subscale, the lower internal consistency reliability value for the Barriers to Treatment subscale was unexpected. Scores for the Barriers to Treatment subscale were found to be generally consistent with the current study's sample ($M = 2.29$; $SD = .84$) when compared to findings reported with the instrument development sample ($M = 2.90$; SD not reported), and the internal consistency reliability falls within the range of "adequate," "satisfactory," or "sufficient," particularly when a scale has as few items ($n = 4$) as the Barriers to Treatment subscale (Taber, 2018). Further, although the AHBS's Benefits of Prevention was found to have acceptable internal consistency reliability, it was only found to correlate significantly with the Perceived Effectiveness subscale, but not the Knowledge About PrEP subscale. In contrast to prior findings, the Benefits of Prevention subscale was found to have higher means scores by more than 1 standard deviation for the current sample ($M = 4.99$; $SD = .83$) than the instrument development sample for the AHBS ($M = 4.13$; SD not reported). This finding appears to suggest that the current sample has a generally higher estimation of the benefits of engaging in HIV prevention efforts than did the sample used to develop the AHBS. Although no clear conclusions were identified regarding the unexpected findings for the AHBS's performance and relationship to the PrEP-D, the author offers two potential factors that may have influenced these findings: 1) sample demographics and 2) temporal context. First, in regard

to sample demographics, the AHBS was developed utilizing a sample of mixed-gender undergraduate students and does not report sample sexual orientation. These demographic characteristics contrast the current sample in regard to age, gender, and presumably sexual orientation. Such considerations, particularly given the disproportional impact of HIV on sexual minority men, could result in discrepant patterns in item response between the two samples. Second, regarding temporal context, the nature of HIV and the semantics used when discussing HIV have changed considerably since the AHBS was developed. The AHBS, which was developed in 1998, utilizes language that represents a different social and medical context for HIV/AIDS. Much of the scale utilizes language specifically pertaining to AIDS (as opposed to HIV) and includes items that contrast to the modern conceptualization of HIV as a chronic illness, rather than a lethal diagnosis. One such item “I would rather have any terminal illness than AIDS” offers a particularly strong example of this concern. Such items may have elicited reactions from participants in the current study at both cognitive (e.g. confusion) and emotional (e.g. anger) levels that may have led to response patterns that may differ from responses patterns obtained from the time the AHBS was developed. As such, more evidence of construct validity for the PrEP-D is needed. Once such evidence is obtained through future research, the PrEP-D should provide a much-needed tool for clinical and research endeavors relating to HIV prevention.

Each of the PrEP-D’s subscales has distinct utility. Researchers and professionals who focus on public health awareness may be particularly interested in the Knowledge About PrEP or Perceived Effectiveness subscales. Indeed, it may prove critical to know which communities indicate less PrEP awareness or lower perceptions of PrEP’s ability to reduce HIV risk. Tailored and targeted education and awareness initiatives could help such professionals to specifically

address one of the modern HIV epidemic's most confounding challenges: disproportional rates of HIV among Black and Latino sexual minority men. For example, using the PrEP-D as an investigatory tool, future research might find that Black sexual minority men in the Southeast region of the US might indicate lower levels of perceived effectiveness while indicating levels of knowledge that suggest saturation of interventions aimed at raising awareness. If this were the case, organizations could begin to shift their research efforts from raising awareness to addressing factors that reduce perceived effectiveness (e.g. systemic concerns relating to trust of medical providers; disseminating more personalizable or relevant research findings).

The Treatment Attributes subscale may be of particular interest to policy makers or to those with investment in systemic concerns in public health. Targeted interventions around ameliorating treatment attributes concerns (i.e. cost, access), may be crucial in helping get PrEP to those who would most benefit. Parallel to other subscales, having a better understanding of which groups of individuals express higher levels of treatment attribute concerns could particularly help streamlining policy and public-health efforts. For example, if some specific geographic (i.e. rural) areas indicate higher levels of concern about treatment attributes, efforts could be made to make PrEP more easily accessed for those communities. Mobile PrEP clinics could be piloted to help bring the doctor and medication to such communities. Such efforts would be more feasible and cost-effective with more specific information on who is concerned about the attributes of PrEP treatment. The PrEP-D offers a potentially potent tool in such efforts.

Similarly, with a better understanding of PrEP stigma (and who it most effects), strides could be made in mediating the degree to which PrEP stigma functions as a barrier to HIV prevention. For example, medical professionals such as nurses and doctors may wish to discuss

stigma-related concerns when consulting with their patients about their sexual health and may choose to develop strategies for navigating such stigmas (e.g. patients choosing to “disguise” medications to avoid being outed or experiencing stigma/rejection; strategically selecting check-up appointment times and locations to avoid peak-hours or encountering individuals that could recognize the patient). Along these lines, mental health professionals may be particularly well-suited to intervening around PrEP stigma and could help to ameliorate internalized stigma and develop functional strategies for tolerating experienced stigma and avoiding stigmatizing experiences when possible and appropriate. Given the potential clinical utility of the PrEP Stigma subscale, clinicians may wish to use the PrEP Stigma subscale as a screening item in settings with a particular interest in sexual health or HIV prevention. Similarly, researchers can facilitate clinical efforts by designing research to help understand how PrEP Stigma functions as a predictor of PrEP utilization. For PrEP Stigma, as with each of the PrEP-D subscales, understanding how, for whom, and to what degree these subscales/constructs lead to more optimal utilization of HIV prevention strategies is essential to improving HIV prevention efforts and moving toward an HIV-free generation.

It is within this context of providing practical insight around PrEP utilization that potential for the PrEP-D becomes clearest. The unexpected exploratory finding regarding generating PrEP Indicated and PrEP Counter-Indicated scores highlights the PrEP-D’s potential utility. Researchers and public health officials could assess whether their communities might benefit from PrEP-related outreach and intervention. Clinicians could assess individual patients for the appropriateness of PrEP intervention. Put plainly, invested parties could have a clear way to identify whether PrEP is a good idea. Then, given the nature of the identified subscales, those same invested parties can make efficient investments in either raising PrEP knowledge and

awareness, intervening around accurate perceptions of PrEP's effectiveness, reducing PrEP-related stigma, or ameliorating concerns around access and other treatment attributes. In this regard, the PrEP-D could be a powerful tool in the fight to end HIV and reduced HIV disparities.

Limitations and Future Research

The present studies had several limitations. First, although a major asset of the present studies was a national sample of sexual minority men, the sample was predominantly White and the average age was higher than the average age in the United States. As such, a crucial next step is to establish norms on targeted samples. Given the disproportional rates of HIV in the United States, it seems especially important to establish norms among young Black and Latino sexual minority men. It is important to note as well that Black women are also at significant and rising risk for HIV, and they are not represented in the current studies.

A similar second limitation of the current study was that participants were recruited via online survey and as such represent only those sexual minority men who were identified by recruitment and felt motivated enough to participate. This is a well-documented challenge in HIV-prevention research, where it is often an aspect of marginalization that some individuals are not identified during research recruitment or may not wish to participate. For example, individuals with high levels of a variety of stigma concerns (e.g. sexual orientation, HIV, PrEP) may interpret research participation as a potential avenue for experiencing stigmatization such as being "outed." Although these concerns are difficult to avoid, future research may wish to utilize clinical samples in partnership with organizations engaging in face-to-face HIV prevention efforts (e.g. AID Atlanta; Howard Brown Health Center).

Third, the current studies use a cross-sectional, correlational design, which is a common standard in scale-development studies that use EFA, CFA, and validity analyses. However, given

that the PrEP-D scale is intended to measure what determines utilization of PrEP, a logical next step would involve longitudinal design. For example, it would be highly informative for a future study to investigate among PrEP-naïve individuals which of the subscales are dynamic over time, as well as how changes in subscale score might relate to observed PrEP uptake among study participants. Along these lines, future research might use experimental designs to explore how intervention across the factors related to PrEP use (e.g. workshops on navigating stigma; alternative service delivery locations; PrEP peer counseling) might lead to subsequent PrEP utilization.

Conclusion

Overall, the present studies offer the PrEP-D as a new and essential tool in helping researchers and clinicians work toward optimizing the effectiveness of HIV prevention efforts. By systematizing inquiry into the factors associated with PrEP utilization, we can move toward a better understanding of what might predict the effectiveness of PrEP, one of the most revolutionary developments in the fight to end HIV. Importantly, the PrEP-D will help the field understand the nature and function of knowledge about PrEP, PrEP stigma, the attributes of PrEP treatment, and the perception of PrEP's effectiveness. Perhaps even more critically, it can also help illuminate how and why there are still some marginalized groups of sexual minority men firmly at the epicenter of the modern HIV epidemic. With this in mind, it is my greatest hope that the PrEP-D can be a tool for reducing the disproportional impact of HIV on sexual minority men (particularly Black and Latino sexual minority men) and move the community one step closer to an HIV-free generation.

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APPENDICES

Appendix A Table 1

EFA Four-Factor Solution of the PrEP-D

PrEP-D Items	Perceived Effectiveness	Knowledge About PrEP	PrEP Stigma	Treatment Attributes
44. I am confident PrEP will reduce my chances of becoming HIV positive	.82			
43. Taking PrEP will protect me from becoming HIV-positive	.79			
50. PrEP is effective enough for me	.74			
45. PrEP is not a good longterm option for me	.72			
38. PrEP would not work for me	.60			
36. PrEP is effective at preventing HIV	.57			
61. I am well-educated on PrEP		.88		
62. I am familiar with the possible side-effects of PrEP		.87		
64. I am able to educate others on PrEP		.81		
63. I know how to access PrEP treatment		.72		
60. I am well-educated on HIV		.66		
51. I am familiar with the research on PrEP to prevent HIV		.66		
2. Prior to this survey I was familiar with the term PrEP		.65		
59. I have noticed advertisements on PrEP in my community		.61		
58. I have noticed advertisements on PrEP in the media		.59		
57. I have talked with friends about PrEP		.58		
1. Prior to taking this survey I had heard of a once daily medication to prevent HIV		.57		
11. Taking PrEP might make people think less of me			.90	
12. People will treat me differently if I am on PrEP			.89	
4. I am worried people would think I am promiscuous if they knew I were taking PrEP			.73	
15. PrEP will lead to increased risky sexual behaviors in my community			.73	

9. People will consider me a Truvada whore if they knew I were taking PrEP	.69
13. Potential partners will reject me if I take PrEP	.67
10. I wouldn't trust someone who took PrEP	.66
5. PrEP is only for people who are careless	.59
7. Nurses and doctors might treat me differently if they knew I were taking PrEP	.58
3. I am worried people would think I'm HIV positive if they knew I were taking PrEP	.52
32. I am concerned about my access to PrEP treatment	.81
31. I worry that my medical provider may not be willing to prescribe PrEP	.70
29. I worry about taking PrEP and then having a lapse in insurance coverage	.67
30. I am concerned that my medical provider may not be educated about PrEP	.62
35. I would take PrEP if it weren't for the side effects	.54

Appendix B

Table 2

CFA Standardized Factor Loadings and Standard Error

PrEP-D Items	Standardized Factor Loadings	SE
<u>Factor 1</u>		
44. I am confident PrEP will reduce my chances of becoming HIV positive	.90**	.02
36. PrEP is effective at preventing HIV	.83**	.02
43. Taking PrEP will protect me from becoming HIV-positive	.78**	.03
50. PrEP is effective enough for me	.61**	.04
<u>Factor 2</u>		
61. I am well-educated on PrEP	.97**	.02
64. I am able to educate others on PrEP	.79**	.03
58. I have noticed advertisements on PrEP in the media	.68**	.04
60. I am well-educated on HIV	.65**	.04
<u>Factor 3</u>		
12. People will treat me differently if I am on PrEP	.94**	.01
11. Taking PrEP might make people think less of me	.93**	.01
9. People will consider me a Truvada whore if they knew I were taking PrEP	.80**	.03
4. I am worried people would think I am promiscuous if they knew I were taking PrEP	.74**	.03
<u>Factor 4</u>		
31. I worry that my medical provider might not be willing to prescribe PrEP	.87**	.02
32. I am concerned about my access to PrEP treatment	.87**	.02
30. I am concerned that my medical provider may not be educated about PrEP	.76**	.03
29. I worry about taking PrEP and then having a lapse in insurance coverage	.62**	.04

Note. ** $p < .001$

Appendix C
Table 3

Descriptives and Bivariate Correlations for the Total Sample

Scale	1	2	3	4	5	<i>M</i>	<i>SD</i>	<i>α</i>
1. Perceived Effectiveness	-					4.85	1.12	.83
2. Knowledge About PrEP	.43**	-				4.32	1.48	.80
3. PrEP Stigma	-.13*	-.14**	-			2.93	1.48	.88
4. Treatment Attributes	-.12**	-.07	.49**	-		3.62	1.48	.83
5. AHBS Perceived Benefits	.11*	-.01	-.07	-.07	-	4.99	.84	.73
6. AHBS Perceived Barriers	-.03	.03	.24**	.19**	-.33**	2.29	1.06	.63

Note. * $p < .05$, ** $p < .01$, *** $p < .001$, ^a $p = .05$.

Appendix D
Figure 1

Phases of Item Deletion

