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ANALYSIS OF POTENTIAL FACILITATORS TO USE OF HIV PRE-EXPOSURE PROPHYLAXIS (PrEP) IN A YOUNG TRANSGENDER POPULATION

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ANALYSIS OF POTENTIAL FACILITATORS TO USE OF HIV PRE-EXPOSURE
PROPHYLAXIS (PrEP) IN A YOUNG TRANSGENDER POPULATION

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in the
College of Pharmacy
at the University of Kentucky

By

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Lexington, Kentucky

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2022

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ABSTRACT OF THESIS

ANALYSIS OF POTENTIAL FACILITATORS TO USE OF HIV PRE-EXPOSURE PROPHYLAXIS (PrEP) IN A YOUNG TRANSGENDER POPULATION

Pre-exposure prophylaxis for HIV prevention (PrEP) is heavily under-utilized in transgender youth, a population which experiences high risk factors for contracting HIV and exhibits unique barriers to care. This retrospective study used a secondary data analysis of survey results from transgender youth between 16- and 24-years-old to analyze various exposures for association with PrEP use. It was hypothesized that medical gender affirming therapy, mental health care treatment, and HIV programming would be independently associated with increased use of PrEP in transgender youth. It was found that only HIV prevention services and programming related to HIV or gender identity were associated with an increased use of PrEP. Results indicate that HIV- and transgender-focused services outside of general primary care are the best way to improve PrEP access in this population.

KEYWORDS: Transgender Health, HIV Prevention, Pre-exposure prophylaxis, PrEP access, Transgender HIV, Transgender youth

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CHAPTER 1. BACKGROUND

1.1 Introduction

HIV is a life-long condition that can take enormous costs to treat over a person's life. Prevention is the most important element of reducing the HIV burden, from a population health, individual health, and cost-effectiveness standpoint. HIV prevention is readily available in the form of safe-sex practices such as condoms, as well as medications such as pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) for individuals at higher risk of exposure. However, there are barriers that exist that prevent at-risk individuals from knowing about and utilizing these options. PrEP is a uniquely important preventative measure, as when used consistently it can proactively protect individuals at the highest risk of transmission who for various reasons may not be able to rely on barrier measures. The transgender population faces heightened risk for HIV, but the prevention of HIV in this population has been studied less than in other notable high-risk populations, namely men who have sex with men (MSM) or injection drug users (IDU). The transgender population already faces unique barriers in the healthcare system due to stigma and a lack of education amongst healthcare providers on how to best approach and care for this population. Therefore, it is important to understand what factors affect access to HIV preventative care in this population so that this population can be better reached in the future.

1.2 HIV in the Transgender Population

Despite not being thought of as an at-risk population for HIV as commonly as MSM or IDU, transgender people do face an elevated risk of HIV. The nationally conducted

NHBS Trans survey found that out of 1,608 transgender women, 42% were HIV positive (Centers for Disease Control and Prevention, 2021b). A study of transgender youth (aged 16-24) found that 31% were HIV positive (Reisner et. al, 2017). These numbers are both significantly higher than the estimated prevalence of HIV in the general United States population, 0.3% (Centers for Disease Control and Prevention, 2021a).

The high prevalence of HIV in the transgender population can be explained by several risk factors. Clinical trials of PrEP found that transgender women had more risk factors for HIV than MSM, including more frequent transactional sex and higher average number of sexual partners (Grant, et al., 2016). Transgender women have also been found to be more likely to live at or below the poverty limit, be unemployed, and be homeless than MSM (Wilson et. al, 2020). All of these socioeconomic factors can contribute to HIV risk. Sex work is one consequence of poor socioeconomic status and workplace discrimination for transgender people. A national survey found that 34% of transgender women reported engaging in transactional sex (Centers for Disease Control and Prevention, 2021b). This is especially troublesome as transgender sex workers have been found to have an 8 times higher risk of developing HIV than cisgender sex workers (Sherman et. al, 2019). Sex work, in addition to poor self-esteem, transphobia, and poor health literacy, can contribute to other high-risk behaviors such as condomless anal sex. Sex workers are more likely to engage in this risky sexual behavior in order to make a living, and even more so when they experience gender discrimination and low self-esteem as a result. A national survey of transgender women found that 52.8% of transgender women reported having receptive condomless anal sex, which is one of the riskiest behaviors for contracting HIV (Centers for Disease Control and Prevention, 2021b).

Transgender youth especially have been shown to have high rates of risk factors for HIV development. Being assigned male at birth (AMAB) compared to being assigned female at birth (AFAB), nonbinary gender identity, medical gender affirmation, and sex work have all been identified as risk factors for STIs in transgender people aged 16-24 (Reisner et. al, 2019). A national survey of transgender youth found that over half of their study population had been homeless (50.3%) or suffered from poverty (53.6%), and almost half had participated in sex work (45.3%) (Jadwin-Cakmak et. al, 2019). A smaller study demonstrated that transgender adolescents between the ages of 14 and 18 had largely equivalent sexual practices to their cisgender peers (Number and gender of sexual partners, age of first sexual encounter), except for higher rates of anal sex (Maheux et. al, 2021). Despite having fairly similar sexual behaviors overall, lower socioeconomic status and more frequent anal sex and transactional sex may put transgender adolescents at increased risk for HIV.

1.3 HIV Care Continuum Integration

The HIV care continuum is an important concept that is relevant to all aspects of HIV prevention and treatment. It is a model that includes all stages of HIV treatment from diagnosis to maintained viral suppression. Introducing patients to the HIV care continuum and keeping them involved with it is an important part of treating patients as well as preventing them from spreading HIV to others. Establishing people in HIV care and prevention is in itself a large hurdle, due to stigma, ignorance, and other socioeconomic barriers such as cost and low health literacy. Transgender people are currently largely

under-reached by HIV care and require increased efforts and a more tailored approach to be integrated effectively.

Many barriers to HIV care have been identified for transgender people, including socioeconomic issues, cultural issues, and issues related to experiences within the healthcare system. These barriers include lack of care accessibility and security, providers' misunderstanding of the transgender community, lack of cultural competency of information systems and staff, HIV stigma, housing instability, substance abuse, mental health issues, low health literacy, violence, medication side effects, and perceived conflicts between transgender care and HIV care (Bocking et. al, 2020; Adams et. al, 2018; Hines et. al, 2017). Participation in sex work can introduce additional barriers as sex workers have a harder time keeping a consistent schedule with HIV care, and often must hide their HIV status to protect their source of income. Race can compound the discrimination experienced by transgender people in the healthcare system, which can become an additional barrier to HIV care. Studies in San Francisco demonstrated that among transgender women, the most likely participants to not be integrated in HIV care were those who had experienced discrimination due to both their race and gender status (Baguso et. al, 2019).

Culturally sensitive communication is greatly needed if transgender people are to be better integrated into HIV care and prevention services. Interviews with transgender women seeking care have revealed that stigma and discrimination are some of the most important barriers to HIV care in this population (Hines et. al, 2017). Transgender people in healthcare deal with being misgendered (referred to by pronouns that don't align with their gender identity), dead-named (called by the name they were formally known before

choosing a name that aligns with their gender identity), and harmful stereotypes or assumptions made by healthcare staff. Importantly, transgender people have shown better responses to staying in care when they feel systems and providers are affirming to their gender identity (Sevelius et. al, 2019; Munro et. al, 2017). Further, it has been identified that having an unmet need for medical gender affirmations, including hormones or surgeries, is associated with poor HIV treatment retention (Rosen et. al, 2019; Baguso et. al, 2019). On the other hand, it has been shown that transgender women who “pass” (are publicly perceived as the gender they identify with, not the one they are assigned at birth) may be less likely to bring up their gender identity, sexual risk factors, or HIV status and concerns with healthcare providers because they don’t want to change how they are perceived (Bocking et. al, 2020). Additionally, hormonal therapy for transitioning is associated with higher rates of discrimination among transgender women, which may contribute to lower retention in healthcare (Sha et. al, 2021). These findings indicate the need for healthcare providers to be able to treat transgender people as their preferred gender while still being able to appropriately find ways to discuss HIV risk factors. This is supported by recommendations that have been made for systems-level changes to healthcare systems, including education for all staff members, improved gender identity information recording in electronic health records, and more inclusive approaches to taking sexual histories (Deutsch, 2018).

Reducing the complexity of navigating the healthcare system is another way that has been shown to improve the involvement of transgender people in the HIV care continuum. Several studies have found evidence that having a care facilitator refer at-risk individuals from primary care to HIV treatment and prevention centers and set up

appointments for patients is one of the most effective facilitators for integrating transgender people into care (Hines et. al, 2017; Munro et. al, 2017; Rocha et. al, 2020). Approaches that reduce the difficulty of being seen by healthcare providers and that are specifically tailored to transgender care and/or HIV have shown increased retention of care, including PrEP-only clinics and a text-based service for transgender women in HIV care (Wilson et. al, 2021; Reback et. al, 2021). These approaches and other methods for improving transitions of care represent valuable opportunities for keeping transgender people in the HIV care continuum.

1.4 PrEP Use in the Transgender Population

An even bigger hurdle for HIV care in transgender people than treatment retention is prevention. Specifically, PrEP is heavily under-utilized as a preventative measure. Compared to MSM, transgender women are less likely to know of PrEP, discuss it with a healthcare provider, or take it (Wilson et. al, 2020). A recent national survey has found that while 90% of HIV-positive transgender women were currently taking antiretrovirals for treatment, only 32% of HIV-negative transgender women had used PrEP at any point in the past twelve months (Centers for Disease Control and Prevention, 2021b). While not all these HIV-negative women would have been indicated for PrEP, evidence shows that there is a large discrepancy in the number of transgender women who are indicated for PrEP and the number who utilize it. One study found that out of 180 transgender women aged 18-29, 62% were indicated for PrEP but only 5% had taken PrEP at any point (Kuhns et. al, 2016). There is even less data on PrEP in transgender men compared to transgender women, but it appears that there is still underutilization of PrEP in this population. One

survey of 843 transgender MSM living without HIV found that while 55.2% were indicated for PrEP, only 28.0% utilized PrEP (Reisner et. al, 2021). Even though there have not been trials of PrEP efficacy and safety specifically in transgender people, trials of PrEP medications have included a substantial and diverse number of transgender women (Grant et. al, 2016). Due to this, PrEP should be considered a safe and effective medication in all transgender people at high risk for HIV. In fact, according to some recommendations, any transgender person who asks a medical provider about PrEP is indicated for PrEP, as they may have risk factors that they are not willing to share with their providers due to perceived stigma (Deutsch, 2018).

Appropriate utilization of PrEP requires high awareness, high acceptability, and for barriers to access to be removed or minimized. Studies in transgender women have found that acceptability of PrEP tends to be high, but that awareness of PrEP tends to be low (Pacífico de Carvalho et. al, 2019). Lack of PrEP awareness can be attributed to the healthcare system's poor approach to transgender inclusivity as well as a lack of studies of and marketing for PrEP in this population (Sevelius et. al, 2016). In the last couple years, research and marketing for PrEP has improved, as can be evidenced by transgender individuals now being included in commercials for Truvada, but there may still be a deficit here. Several facilitators have been identified with PrEP awareness among transgender people and may give insight into how PrEP utilization can be improved in this population. Medical gender affirmation has been shown to be associated with greater PrEP awareness in transgender male and nonbinary youth (Andrzejewski et. al, 2021). In transgender people who do use PrEP, research participation was often the key to initiation of therapy. A study in Brazil from 2019 found that out of a sample of 322 transgender

women, the only ones who utilized PrEP had received it from participating in another research program, despite high risk factors throughout the sample (Ferreira et. al, 2019). Facilitators to PrEP uptake in transgender men have been shown to be similar to those found in transgender women: surgical gender affirmation, no experiences of discrimination in healthcare, and receiving health information from social media (Reisner et. al, 2021). When transgender women were consulted with on how best to improve HIV prevention access, the consensus was that an integrated approach to care and reduced stigma in the healthcare system were necessary to improve PrEP accessibility (Sevelius et. al, 2019). This is supported by results that demonstrated that transgender people at high-risk for HIV were more likely to use PrEP-only clinics compared to general primary care clinics (Wilson et. al, 2021).

Barriers that have been identified to PrEP use include cost, poor adherence, side effects, perceived potential interactions with hormone therapy, stigma, lack of transgender women in PrEP advertising, and poor experiences with healthcare workers (Pacífico de Carvalho et. al, 2019; Rael et. al, 2018; Watson et. al, 2020). Race may also be a barrier to PrEP uptake due to systemic discrimination in the healthcare system: one Florida study revealed that among 60 transgender women, African American women were the least likely to be aware of PrEP, and none of the African American women surveyed were using PrEP (Holder et. al, 2019). This was despite the African American transgender women in their sample having the highest number of risk factors for HIV, including multiple sexual partners, sex work participation, and condomless anal sex (Holder et. al, 2019). Transgender youth face additional barriers, often due to living with their parents with whom they do not wish to disclose their gender identity and/or HIV risk factors. A survey

of 15–24-year-old transgender youth identified that the need for frequent healthcare visits was a large barrier to PrEP in this age group, as it made privacy from parents more difficult (Horvath et. al, 2019). These youth were more likely to find PrEP acceptable if acquired through research programs or if they could receive PrEP as a long-acting injectable (Horvath et. al, 2019).

CHAPTER 2. SPECIFIC AIMS

2.1 Specific Aims & Hypotheses

Because the transgender population is at an elevated risk for HIV prevention, the underutilization of HIV preventative medications such as PrEP is a critical issue to be solved. Younger transgender individuals may face an even higher risk for contracting HIV, and less is known about ways to minimize barriers to and facilitate PrEP uptake in this subpopulation. This study aimed to analyze the proportion of transgender individuals aged 16-24 who utilized PrEP based on important facilitating factors.

The specific aims are as follows:

1. Evaluate whether the utilization of gender affirming medical therapy is associated with the use of HIV pre-exposure prophylaxis in transgender people aged 16-24.

It was hypothesized that transgender people aged 16-24 who received gender affirming medical therapy would be more likely to utilize HIV pre-exposure prophylaxis.

2. Evaluate whether the utilization of mental health care is associated with the use of HIV pre-exposure prophylaxis in transgender people aged 16-24.

It was hypothesized that transgender people aged 16-24 who were seen by mental health professionals would be more likely to utilize HIV pre-exposure prophylaxis.

3. Evaluate whether involvement in HIV- or transgender-focused programs or research studies is associated with the use of HIV pre-exposure prophylaxis in transgender people aged 16-24.

It was hypothesized that transgender people aged 16-24 who were involved with programs or research studies focused on HIV or transgender health would be more likely to utilize HIV pre-exposure prophylaxis.

The rationale for the first hypothesis was that the lack of gender affirming medical therapy is a barrier to receiving HIV preventative care, as transgender youth may feel less comfortable in healthcare settings when they are not able to present themselves as the gender with which they identify. The rationale for the second hypothesis was that improved mental health could allow transgender youth to focus more on other aspects of their health including HIV prevention, and potentially avoid risky sexual behaviors such as condomless anal sex that have been associated with low self-esteem. The rationale for the third hypothesis was that programs focused specifically on either HIV or transgender health would be successful in improving PrEP uptake, as they remove many of the barriers to PrEP found in general primary care settings, such as discrimination or lack of education of providers on transgender patients.

2.2 Significance

As the transgender population faces high rates of HIV transmission and unique barriers to integration within the healthcare system, this study will provide additional insight into what barriers and facilitators to accessing HIV PrEP exist in this population.

By understanding these barriers and facilitators, we can learn to improve the ability of the healthcare system to reach at-risk transgender individuals who would benefit from HIV prevention, and thereby reduce HIV transmission, morbidity and mortality, and overall cost to the healthcare system.

2.3 Approach

A randomized control trial to evaluate the effects of gender affirming medical therapy and mental health services on PrEP uptake in transgender youth would require transgender youth to be randomized to not receiving potentially important medical services. For this reason, it would be unethical to conduct a randomized trial, and an observational study must be used. An ideal study design would be a widely distributed survey tool with questions specifically designed for the objectives of this study. This approach would necessitate a significant amount of time to develop an effective and culturally sensitive survey tool and then distribute it to a large enough population. This time would be even greater considering this is a hard-to-reach population that is often mistrusting of medical professionals. No large-scale survey studies have been performed yet in transgender youth that are focused on PrEP uptake. Studies that have focused on barriers to PrEP have mostly focused on adult transgender people, largely only included transgender women, and only focused on self-reported barriers rather than finding associations with actual PrEP use. This study instead utilizes a secondary analysis of a known dataset from a survey that has already been conducted in transgender youth at risk for HIV. This approach allows for a relatively large sample size to be used to analyze real-life data on what factors are associated with PrEP uptake in this population. Limitations of

this approach include inability to control for certain confounders, and inability to define exposures and outcome variables as would be most appropriate for this study’s objectives.

CHAPTER 3. METHODOLOGY

3.1 Overall Approach

This retrospective observational study utilized a secondary analysis of quantitative survey results to explore possible predictors of access to HIV pre-exposure prophylaxis in a young, transgender population. De-identified survey data was accessed under a data use agreement with the original NIH investigators through the NIH Data and Specimen Hub (DASH). Data analysis was performed using R version 3.6.1 software.

3.2 Data Source

The data source used for this study was the Adolescent Medicine Trials Network for HIV/AIDS Interventions (ATN) 130 study dataset. ATN 130 was titled “Assessing the Engagement of Transgender and Other Gender Minority Youth Across the HIV Continuum of Care”. ATN 130 was a mixed-methods study that collected both quantitative surveys and qualitative interviews from study participants (Jadwin-Cakmak et. al, 2019). The purpose of ATN 130 was to gather data on the experience of this population with HIV preventative services, and its similarity to the objectives of this study means that it contained many useful data elements that could be correlated with PrEP use. While ATN 130 assessed subjects for a history of using PrEP, PrEP-use was not a primary outcome analyzed for association with barriers and facilitators in ATN 130. The dataset contains participants who were transgender and other gender minority youth aged 16-24-years-old.

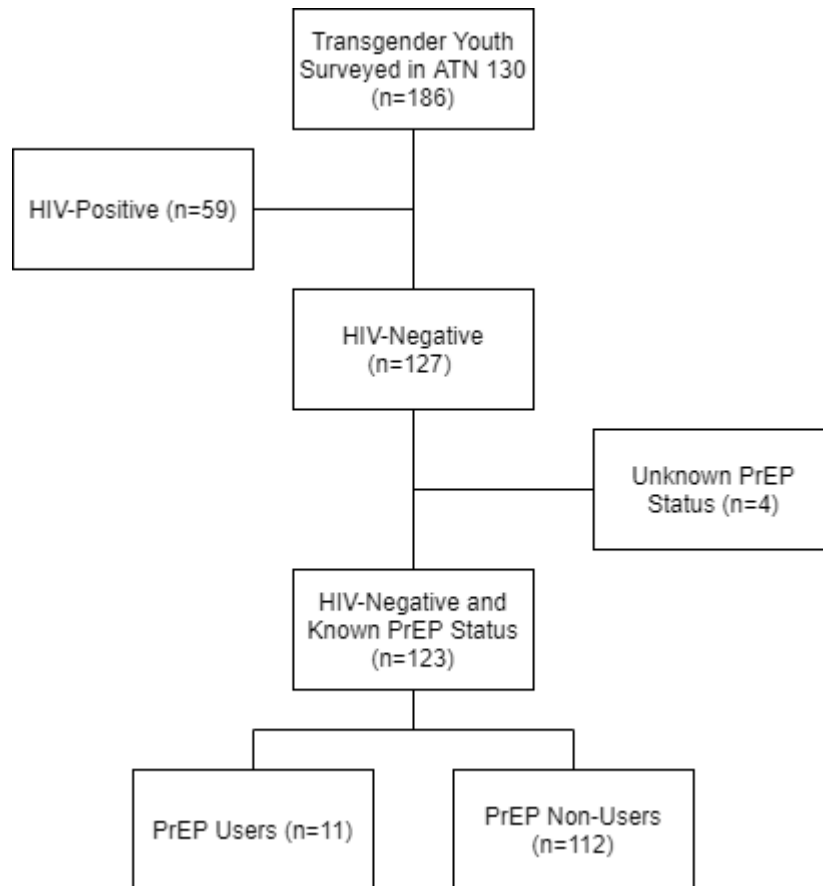
“Other gender minority youth” included individuals who had a nonbinary gender identity, i.e., they identified as a gender not strictly male or female. The surveys distributed to these participants contained questions about various experiences related to the HIV care continuum, as well as general demographic information. The surveys were carefully constructed to be clearly understandable to people of any level of health literacy, and culturally sensitive to transgender youth so as to not make subjects uncomfortable or offended. Surveys were distributed to transgender and other gender minority youth who presented at Adolescent Medicine Trials Unit (AMTU) sites located in one of fourteen cities (Baltimore, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, Memphis, Miami, New Orleans, New York City, Philadelphia, Tampa, and Washington D.C.) located throughout the United States. AMTU sites are locations within the Adolescent Medicine Trials Network dedicated to preventing and treating HIV in youth. Surveys could be distributed by medical providers, mental health professionals, case manager/care coordinators, HIV test counselors, or health educator/outreach workers who had a history of working with this population. Surveys were collected from July 15, 2015, to January 15, 2016. No exclusion criteria were used for choosing this survey population.

3.3 Inclusion & Exclusion Criteria

Subjects were excluded from analysis who were HIV-positive at the time they completed the survey, as these individuals would have no reason to utilize HIV prevention such as PrEP. Individuals who had tested negative or were unaware of their HIV status due to a lack of testing history were included, as they could potentially be indicated for PrEP. While having a negative HIV test is required before initiating PrEP, individuals who had no history of being tested for HIV were considered negative and could have been

referred for HIV testing if PrEP was otherwise indicated. Individuals were also excluded who did not respond to the survey question related to history of PrEP use. In order to maintain a widely representative sample and avoid reducing power of the study, no other exclusion criteria were used. Subjects of any gender minority group were included, including transgender females, transgender males, non-binary, gender neutral, and demi-gender individuals. The final study sample contained n=123 transgender individuals aged 16-24 who were either HIV-negative or unaware of their HIV status, after excluding the 59 HIV-positive individuals and 4 individuals with unknown PrEP history from the 186 total subjects contained within the ATN 130 dataset.

Figure 3.1 Flow Chart of Sample Selection



3.4 Exposures

Several exposures were identified based on the survey questions included in the dataset that could be used to answer the study hypotheses. In order to determine whether mental health service access was associated with higher uptake, the exposure used for analysis was whether or not the subject had a visit with a healthcare professional in the past 12 months. Exposures related to gender affirming therapy included a primary exposure of whether or not medical gender affirming therapies (including hormones, pubertal blockers, or any surgery related to gender expression) had ever been used, and secondary exposure variables of use of hormones for gender affirming therapy, social gender affirmation (living full-time in their preferred gender identity), legal gender affirmation (changing name and gender on official documentation), experience with HIV preventative services being focused towards transgender individuals, having a healthcare provider knowledgeable about transgender health, and having a family supportive of gender identity. Another exposure, history of avoiding healthcare due to gender identity, was included as a negative factor related to gender affirmation, to see if it affected PrEP use negatively. These secondary exposures were picked as they were related to a positive history of gender affirmation. Other primary exposures included were a history of involvement with any HIV prevention service (including risk reduction counseling, demonstrations on how to properly use condoms, programs for couples or groups focused on reducing the risk of acquiring HIV by changed behavior), or participation in any program (including research studies, support groups, or counseling sessions) related to HIV, sexual risk, relationships, gender identity or expression, or sexuality. Exposures were defined based on responses of participants to ATN 130 survey questions as defined in Appendix A.

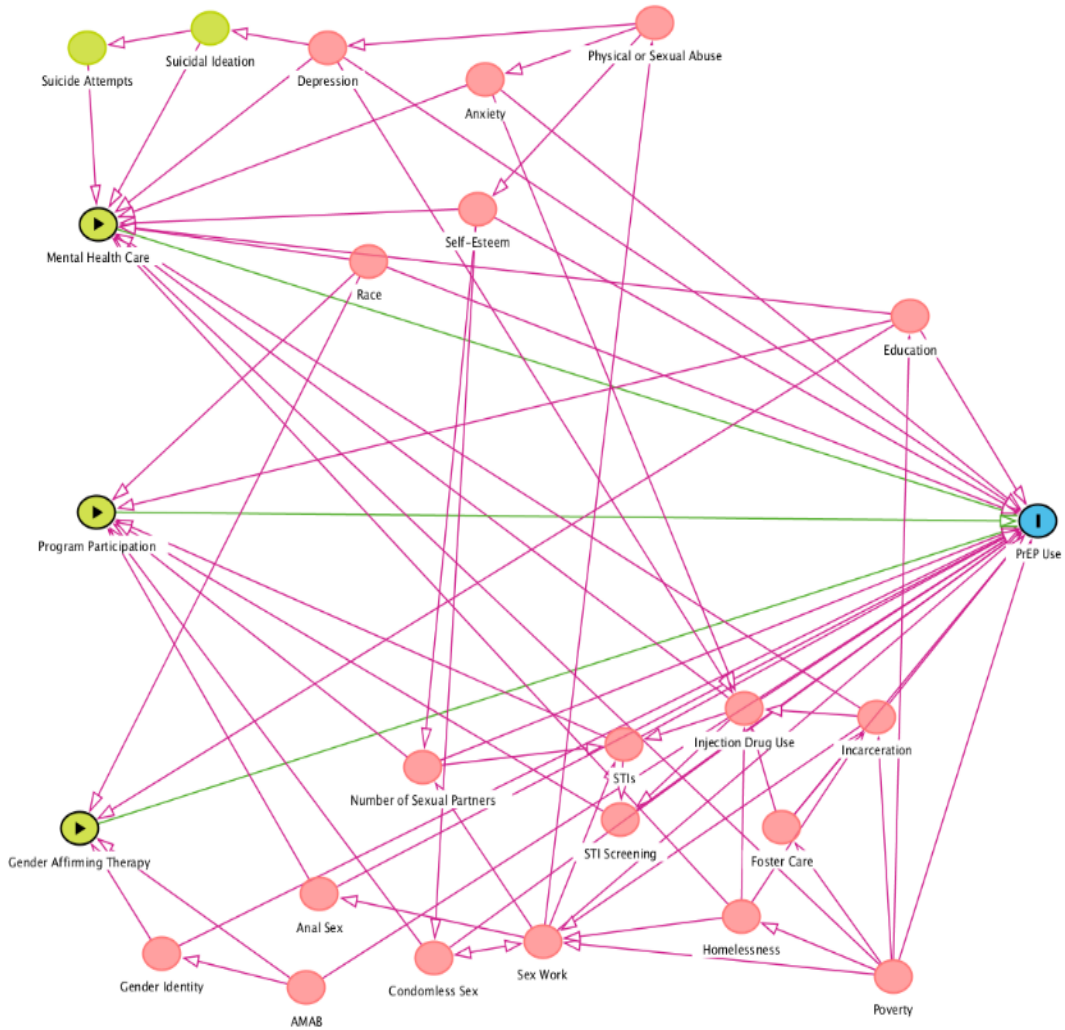
3.5 Outcomes

The primary outcome of this study was PrEP use. PrEP use was defined as a binary variable based on the response of participants to the survey item: “Have you ever taken HIV medication before sex because you thought it would lower your chances of getting HIV (also known as PrEP)?”. Based on this, the outcome of PrEP use included all individuals who had ever used PrEP. Timing of PrEP initiation or duration of PrEP therapy could not be determined from the dataset.

3.6 Confounding

Potential identifiers were identified based on factors that had been identified in the literature that may affect PrEP uptake as well as any of the primary exposures. These included demographics such as age, gender identity (transgender female, transgender male, and nonbinary) and being assigned male at birth (AMAB), race, and education. Socioeconomic factors included foster care, homelessness, poverty (history of receiving governmental assistance programs was used as a measure), and incarceration. Factors related to mental health included depression, anxiety, self-esteem, suicidal ideation, suicide attempts, and physical or sexual abuse ever or before the age of 15. Sexual risk factors were also included a history of sex work, injection drug use, STI screening, STIs, sexual history based on sexual partners in the past 6 months, and sexual history of anal sex, condomless sex, and anal condomless sex. A directed acyclic graph was constructed to illustrate the proposed relationships between these confounders and the exposure and outcome variables and can be seen in Figure 3.2. Potential confounders were assessed for statistically significant differences between the two outcome groups and included in Table 1. Detailed definitions of demographics and confounders available in Appendix 2.

Figure 3.2 Directed Acyclic Graph



3.7 Statistical Analysis

Statistical analysis was performed using R version 3.6.1. Summary statistics were used to describe the sample. Categorical variables were described with percentages, and frequencies were described with mean \pm standard deviations. Primary analyses were bivariate utilizing chi-square and Fisher exact tests for categorical variables, and two-tailed t-tests for continuous variables. For categorical variables, chi-square tests were used except

where any expected counts were less than 5, in which case Fisher exact tests were used. All tests were performed with 95% confidence intervals.

Two secondary analyses were conducted to eliminate potential confounding. These confounder analyses were selected based on confounders expected to have the greatest effect on PrEP use and the exposures of the study. The first included only assigned male at birth (AMAB) subjects, as these subjects may be more likely to be indicated for PrEP due to sexual risk behaviors. The other secondary analysis that was conducted excluded all uninsured patients, as they would be less likely to be able to afford PrEP or use other mental health services or gender affirming medical therapy.

CHAPTER 4. RESULTS

4.1 Overall Sample Description

The study sample consisted of 123 subjects, of whom 112 had never used PrEP and 11 had used PrEP. The baseline characteristics of PrEP users and non-PrEP users are described in Table 4.1. The average age of the sample was 20.5 ± 2.35 years. The overall study population was fairly diverse within the category of transgender youth aged 16 to 24. While many studies on PrEP in transgender people focus on transgender women, this study included 55.3% transgender women, 23.6% transgender men, and 21.1% nonbinary individuals. 65.6% of the study population were AMAB. The study sample was 30.1% Hispanic or Latino, 28.5% white, 56.9% black, 4.1% Native American or Alaska natives, 1.6% Asian or Pacific Islander, and 8.9% mixed or another race. PrEP users were more

likely to be transgender female (p=0.02) and AMAB (p=0.01). In all other aspects PrEP users and non-users were similar.

	Total Sample (n=123)		No PrEP Use (N=112)		PrEP Use (n=11)		Test Statistic	P- value
Age	20.50	2.35	20.46	2.31	21.00	2.76	-0.54	0.4652
<i>Gender Identity</i>								
Transgender Female	68	55.28%	58	51.79%	10	90.91%	9.19	0.0221
Transgender Male	29	23.58%	29	25.89%	0	0.00%	0.00	0.0652
Non-binary	26	21.14%	25	22.32%	1	9.09%	0.35	0.4548
AMAB	80	65.57%	69	62.16%	11	100.00	∞	0.0152
<i>Ethnicity</i>								
Hispanic/Latino	37	30.08%	34	30.36%	3	27.27%	0.86	1
<i>Race</i>								
White	35	28.46%	32	28.57%	3	27.27%	0.94	1
African American or Black	70	56.91%	62	55.36%	8	72.73%	2.14	0.3478
Native American or Alaska Native	5	4.07%	5	4.46%	0	0.00%	0.00	1
Asian or Pacific Islander	2	1.63%	2	1.79%	0	0.00%	0.00	1
Other	11	8.94%	11	9.82%	0	0.00%	0.00	0.596
<i>Education</i>								
Less than High School Diploma	41	33.33%	39	34.82%	2	18.18%	0.42	0.3334
High School Diploma or GED	45	36.59%	39	34.82%	6	54.55%	2.23	0.2079
College	37	30.08%	34	30.36%	3	27.27%	0.86	1
<i>Mental Health</i>								
Depression	71	57.72%	67	59.82%	4	36.36%	0.39	0.2003
Anxiety	74	60.16%	70	62.50%	4	36.36%	0.35	0.1127
High Self-Esteem	92	74.80%	83	75.45%	9	81.82%	1.46	1
Suicidal Ideation	75	60.98%	69	61.61%	6	54.55%	0.75	0.7494
Attempted Suicide	50	40.65%	48	42.86%	2	18.18%	0.30	0.1966
Physical or Sexual Abuse Ever	47	40.52%	42	39.62%	5	50.00%	1.52	0.5234

Table 4.1 Demographic Characteristics and Presence of Potential Confounders in Study Sample								
Physical or Sexual Abuse Under Age of 15	58	50.88%	53	51.46%	5	45.45%	0.14	0.7051
<i>Socioeconomic</i>								
Health Insurance	105	85.37%	96	85.71%	9	81.82%	0.75	0.6631
Cost Prevented Healthcare Access in Past 6 Months	29	23.58%	27	24.11%	2	18.18%	0.70	1
Regular Healthcare Site	96	84.21%	86	83.50%	10	90.91%	1.97*	1
Foster Care	22	19.30%	21	20.39%	1	9.09%	0.39	0.6881
Homelessness	60	49.18%	54	48.65%	6	54.55%	0.14*	0.709
Government Assistance	62	55.86%	58	58.00%	4	36.36%	0.42	0.2093
Incarceration	42	34.43%	38	34.23%	4	36.36%	1.10	1
<i>HIV Risk Factors</i>								
Sex Work	48	39.02%	43	38.39%	5	45.45%	1.33	0.7494
Injection Drug Use	5	4.20%	4	3.67%	1	10.00%	2.88	0.3603
STI Screening History	79	64.75%	71	63.96%	8	72.73%	1.50	0.7451
STI History	26	21.31%	23	20.72%	3	27.27%	1.43	0.6997
Sex with Male in Past 6 Months	71	58.20%	63	56.76%	8	72.73%	2.02	0.3563
Sex with Female in Past 6 Months	26	21.31%	26	23.42%	0	0.00%	0.00	0.1181
Sex with Transgender in Past 6 Months	25	20.49%	22	19.82%	3	27.27%	1.51	0.6945
Anal Sex in Past 6 Months	47	38.21%	41	36.61%	6	54.55%	2.07	0.331
Condomless Sex in Past 6 Months	74	60.16%	67	59.82%	7	63.64%	1.17	1
Condomless Anal Sex in Past 6 Months	31	25.20%	27	24.11%	4	36.36%	1.79	0.4664
Frequency of Anal Sex in Past 6 Months	9.77	31.47	8.92	28.65	18.45	53.68	-9.53	0.3397
Frequency of Condomless Sex in Past 6 Months	18.83	42.33	18.61	42.32	21.09	44.53	-2.48	0.8536
Frequency of Condomless Anal Sex in Past 6 Months	2.84	12.08	2.36	10.29	7.73	23.98	-5.37	0.1603

*Test statistic is a chi-square. All other categorical variables use Fisher's exact test due to an expected cell count <5.

4.2 Primary Analysis

Prevalence of exposure variables across PrEP users and non-users in the total study sample is described in Table 4.2. No exposures related to mental health care or gender affirmation were found to be significantly associated with PrEP use. Participation in any HIV prevention services was associated with higher PrEP use, with 90.9% of PrEP users having program participation compared to only 50.45% of PrEP non-users (p=0.01). Program participation was also strongly associated with PrEP use, with 90.91% of PrEP users claiming participation and only 39.09% of PrEP non-users claiming participation (p=0.01).

	No PrEP Use (n=112)		PrEP Use (n=11)		Test Statistic		P-value	
Seen by Mental Health Professional	62	55.36%	7	63.64%	1.41	0.754		
Medical Gender Affirming Therapy	67	59.82%	7	63.64%	1.17	1		
Hormones for Gender Affirmation	66	58.93%	7	63.64%	1.22	1		
Living Full-Time in Preferred Gender Identity	86	76.79%	8	72.73%	0.81	0.7198		
Legally Affirmed Gender	23	21.90%	3	27.27%	1.33	0.708		
Transgender-Focused HIV Prevention Experience	33	57.89%	4	40.00%	0.49	0.3241		
Provider Knowledgeable About Transgender Health	77	70.64%	10	90.91%	4.12	0.286		
Family Supportive of Gender Identity	69	65.71%	9	81.82%	2.33	0.3363		
Gender Identity Prevented Healthcare Access in Past 6 Months	25	22.32%	0	0.00%	0.00	0.118		
HIV Prevention Service Participation	56	50.45%	10	90.91%	6.60*	0.01021		
Program Participation	43	39.09%	10	90.91%	15.29	0.00109		

*Test statistic is a chi-square. All other categorical variables use Fisher's exact test due to an expected cell count <5.

4.3 Secondary Analyses

Secondary analyses supported the results of the primary analyses. Table 4.3 describes the differences in exposures between PrEP users and non-users when only AMAB participants were included. This analysis contained 80 AMAB participants compared to the 123 total study participants. The same two variables were the only exposures found to be associated with PrEP use. The proportions of PrEP users and non-users who claimed these two exposures were nearly identical in this confounder analysis as in the primary analysis containing the total sample. All PrEP users from the total study sample were AMAB.

	No PrEP Use (n=69)		PrEP Use (n=11)		Test Statistic	P- value
Seen by Mental Health Professional	33	47.14%	7	63.64%	1.03	0.3091
Medical Gender Affirming Therapy	39	55.71%	7	63.64%	1.39	0.7492
Hormones for Gender Affirmation	37	52.86%	7	63.64%	1.55	0.7462
Living Full-Time in Preferred Gender Identity	57	81.43%	8	72.73%	0.61	0.4474
Legally Affirmed Gender	11	15.71%	3	27.27%	1.99	0.3927
Transgender-Focused HIV Prevention Experience	27	65.85%	4	40.00%	0.35	0.1627
Provider Knowledgeable About Transgender Health	53	77.94%	10	90.91%	2.80	0.4457
Family Supportive of Gender Identity	42	61.76%	9	81.82%	2.75	0.311
Gender Identity Prevented Healthcare Access in Past 6 Months	10	14.29%	0	0.00%	0.00	0.3427
HIV Prevention Service Participation	40	57.97%	10	90.91%	7.12	0.0457
Program Participation	27	39.13%	10	90.91%	10.23*	0.0013

*Test statistic is a chi-square. All other categorical variables use Fisher's exact test due to an expected cell count <5.

The second confounder analysis which included only participants with health insurance also found the same two exposures to be associated with PrEP use. Proportions of PrEP users and non-users in the insured population were similar with the proportions in the total population. Nine of the eleven PrEP users from the study population had health insurance.

Table 4.4 Exposures in PrEP Users and Non-Users Among Insured Subjects						
	No PrEP Use (n=96)		PrEP Use (n=9)		Test Statistic	P-value
Seen by Mental Health Professional	57	59.38%	7	77.78%	2.38	0.477
Medical Gender Affirming Therapy	61	63.54%	7	77.78%	2.00	0.4879
Hormones for Gender Affirmation	59	61.46%	7	77.78%	2.18	0.4791
Living Full-Time in Preferred Gender Identity	73	77.66%	6	66.67%	0.58	0.4317
Legally Affirmed Gender	21	22.11%	3	33.33%	1.75	0.4277
Transgender-Focused HIV Prevention Experience	27	56.25%	3	37.50%	0.47	0.4507
Provider Knowledgeable About Transgender Health	67	71.28%	8	88.89%	3.20	0.4382
Family Supportive of Gender Identity	61	64.89%	7	77.78%	1.88	0.7146
Gender Identity Prevented Healthcare Access in Past 6 Months	22	22.92%	0	0.00%	0.00	0.1986
HIV Prevention Service Participation	47	49.47%		88.89%	8.04	0.0338
Program Participation	37	38.95%		88.89%	14.39	0.00243

CHAPTER 5. DISCUSSION & CONCLUSION

5.1 Discussion

The study population was shown to have high risk factors for HIV, despite low PrEP use. Over a quarter of the study population (25.2%) participated in condomless anal sex, and over half (60.2%) participated in condomless sex in the past six months at the

time of survey. Over a third of the population had participated in transactional sex (39.0%). Despite this high risk, only 8.9% of the study population used PrEP. This demonstrates that PrEP is being highly under-utilized in young transgender individuals. PrEP users and non-users were highly similar in terms of demographics and potential confounders. The only significant differences in PrEP users and non-users were gender identity and assigned gender at birth. PrEP users were almost entirely transgender women (90.1%) and entirely AMAB. Transgender women are often thought of as having more risk factors than transgender men, partially due to higher rates of anal sex. This difference does not appear to impact upon the results of this study, however, as the same significant associations were found when only AMAB individuals were included in the study (Table 4.3). The other confounder analysis, excluding those without health insurance, also revealed no differences from the primary analysis (Table 4.4).

HIV preventative services and program participation (related to HIV, sexual risk, relationships, gender identity or expression, or sexuality) were found to be associated with PrEP use. 90.9% of PrEP users had utilized HIV prevention services compared to only 50.5% of non-users ($p=0.01$). While many transgender youths who participated in HIV preventative services such as risk reduction counseling or condom demonstrations did use PrEP, almost all transgender youth who used PrEP had participated in one of these services. These HIV preventative services seem to be an important facilitator to PrEP use. HIV preventative services, which as defined by this study included many simple and non-time-consuming services, seem to be associated with greater PrEP use. General HIV preventative education programs, risk reduction counseling, and condom information sessions may be a great and cost-effective way to improve PrEP use and reduce HIV in

transgender youth. The other exposure found to be associated with PrEP use, program participation, showed an even greater association. "Program participation" here includes interventions, research studies, support groups or individual counseling sessions about HIV, sexual risk, relationships, gender identity, gender expression, or sexuality. While 90.9% of PrEP users participated in one of these programs, only 39.1% of PrEP non-users had participated ($p=0.01$). What this seems to indicate is that larger interventions focused on HIV, transgender health, or other topics related to sexuality and gender seem to be the greatest facilitator to PrEP use. Previous studies had indicated that research programs which distributed PrEP directly to participants were one of the most acceptable forms of acquiring PrEP for transgender youth. Another common finding is that transgender-focused programs are much more effective for HIV prevention and treatment with transgender people. The results of this study seem to confirm those findings. From the results of this study, it would appear that transgender youth who only see routine primary care (84.2% of this study population had a regular site to receive healthcare) and do not additionally access some form of HIV- or transgender health-focused program or service are very unlikely to receive PrEP, even if their risk factors for HIV are high. As confounding was not entirely controlled for in this study, there could be some bias in that transgender youths who were more at-risk for HIV were both more likely to participate in these programs and also be more likely to use PrEP. However, it is worth keeping in mind that risk factors for HIV such as condomless sex use and sex work were similar between PrEP users and non-users in the study population.

The results of this study did not support the other hypotheses. Neither being seen by a mental health professional nor gender affirming medical therapy were found to be

associated with PrEP use. There are several factors that may influence this. The study may have simply been underpowered to reveal an association, or confounding may not have been sufficiently controlled for. One explanation for why gender affirming therapy did not reveal an association with PrEP use could be that gender affirmation can be both a facilitator and barrier to HIV prevention and PrEP use. While gender affirmation may make transgender youths feel more comfortable and therefore more willing to seek care, they may also fear stigmatization by healthcare professionals to a greater extent (Sevelius et. al, 2019; Munro et. al, 2017; Bocking et. al, 2020; Sha et al., 2021). Further, transgender youth who are identified as their preferred gender identity by healthcare providers may enjoy this feeling, and not want to risk being stigmatized by bringing up HIV risk factors. Another issue is that the definition of mental health treatment as an exposure may have not been appropriate. Mental health treatment was defined by whether or not an individual had participated in at least one discussion with a mental health provider in the past 12 months. This indicator tells little about the overall mental health treatment of the participant. It would have been more illuminating if the mental health care could have been further broken down by type of provider and number of appointments.

There are some important characteristics of this study population that should be kept in mind when considering these results. One is related to the age of this population, 16-24. Age did not seem to play an effect in PrEP use based on the results of this study, as PrEP users and non-users were essentially the same age (average age of PrEP users=21.0, average age of non-users=20.5). However, at this age, many if not all of the participants are likely still on their parent's health insurance plan, and/or living with their parents. These could be factors that make youth feel less comfortable accessing HIV prevention

services or PrEP if they are worried about having potential conversations with their parents about HIV risk. However, for this study population it is worth noting that family support tends to be relatively high, with 67.2% of the sample saying that they feel their family is supportive of their gender identity. This is likely higher family support than can be expected in the general population. It is worth noting that for this high family support, as well as the high access to a regular healthcare site, and the fact that all of this sample had been in contact with an AMTU site or professional (including physicians, counselors, and case workers) indicates that this sample may have had many factors that made it easier for this population to access PrEP. A bias inherent to the selection of this sample through AMTU sites, such as community centers or healthcare clinics, means that everyone in this sample was seen at least once by some sort of professional that could offer help with transgender or HIV issues. This would indicate that this study population may be more likely to get PrEP if needed than other transgender youth. This makes the severe underutilization of PrEP seen in this sample even more stark.

Due to the exploratory nature of this study and its low power, it may be worth briefly discussing some of the non-statistically significant results. While the differences were not enough to reach statistical significance in this population, PrEP users were more likely to report having a healthcare provider who was knowledgeable about transgender health (90.9% to 70.6% in non-users) and to report having a family supportive of their transgender identity (81.8% to 65.7% in non-users). PrEP users also reported zero instances in which they avoided healthcare due to their gender identity, while 22.3% of non-users reported having done this in the past six months. These factors may play a role and could be explored in future studies with larger power.

This study has several important limitations to keep in mind. First, the study is likely underpowered due to the sample size (n=123). It is possible that a larger sample size would have revealed additional factors to be associated with PrEP use. Additionally, the nature of the dataset itself implies limitations inherent to survey results and secondary analyses. Not all factors could be controlled for appropriately if the original survey tool did not collect information on them or if they were defined differently than what would be most appropriate for this study. The timing of exposures and outcomes could only be understood as they were defined by the survey tool. For example, the outcome, PrEP use, was defined as the use of PrEP at any time in history, whereas the outcomes were defined as either having occurred in the last 12 months or at any time in history. Due to this, it is possible that the “exposures” occurred or began after the “outcomes”, which distorts the view of the relationship being studied. It would be more appropriate if information was available on when PrEP was started in relation to exposures such as mental health treatment or medical gender affirmation. The analysis also relies on the subjective responses of study participants, which are subject to misremembering, misunderstanding, or subjects choosing not to respond to certain questions that made them feel uncomfortable. In a few of the bivariate analyses conducted, the total sample was smaller than n=123 due to missing responses from one or more subjects. Overall, the responses to the survey tool are believed to be largely reliable, however, due to the survey being completely anonymous, allowing subjects to only answer questions they feel comfortable answering, and all portions of the survey being phrased in a culturally sensitive and well-explained manner as to not be confusing. The population of this study is also a limitation to how its results can be extrapolated. While the sample for this study was diverse in terms

of gender identity, race, ethnicity, and geographical region within the United States, it only contains subjects from a limited age range and subjects from urban environments. Due to these restrictions, the results from this study cannot be used to make any statements about transgender people over the age of 24 or who live in rural or suburban communities. Another limitation is that due to the nature of this being an observational study, potential confounders could not be fully controlled. Additionally, not all potential confounders identified could be determined using the survey tool generated. This study did not utilize propensity scoring in order to control for the confounders identified. Another important limitation is that it was not possible to accurately determine PrEP indication for each study participant due to the nature of the dataset. If this could have been determined, the study could have excluded all participants who were not indicated for PrEP and the analysis could have focused only on appropriate PrEP use rather than total PrEP use. This outcome would have been more beneficial in revealing how to improve effective HIV prevention. Finally, a limitation is that PEP was not able to be included in the analysis due to no questions on PEP in the ATN 130 survey. While PEP is utilized much less than PrEP for HIV prevention, it does factor into medical HIV prevention and not assessing its use may skew results.

Future studies on barriers and facilitators to PrEP in transgender people could expand upon this study in several ways. It would be interesting to analyze the differences in PrEP association with various types of HIV preventative services and programs to determine if any had a greater significance. While the results of this study indicated that HIV prevention services as a whole and program participation as a whole both were associated with greater PrEP use, future studies could break down the association across

various types of services and programs in order to determine what approaches are the most effective at increasing PrEP uptake. Future studies could also increase the study size and potentially include a wider age range of transgender people. A survey designed specifically around PrEP use could be particularly helpful in defining variables for analysis more appropriately.

5.2 Conclusion

The results of this study indicate that the best predictors of PrEP use in transgender youth are participation in HIV preventative services and programs, including research studies, focused on HIV, gender identity, or sexuality-related topics. This is indicative that the main ways this population are currently being reached for HIV prevention are HIV- or transgender-focused prevention programs or services, including research studies. This is important as transgender youth may be unlikely to use PrEP when needed if they are only seen at routine primary care. The need for transgender- and HIV-focused preventative efforts is highlighted. More needs to be known about what types of these preventative services and programs are the most effective at improving appropriate PrEP use.

APPENDICES

APPENDIX 1. Coding of Exposures from ATN 130 Dataset

Exposure	Survey Question	Positive Response(s)
Seen by Mental Health Professional	“Now I would like to ask you if, in the past 12 months, you have seen a psychiatrist, psychologist, marriage & family therapist, or social worker about the way you were feeling or behaving?”	Yes
Medical Gender Affirming Therapy	“Have you accessed any medical interventions to affirm your gender (for example, hormones, surgeries to transition)?”	Yes
Hormones for Gender Affirmation	“Have you accessed any medical interventions to affirm your gender (for example, hormones, surgeries to transition)?”	Hormones (estrogen or testosterone)
Living Full-Time in Preferred Gender Identity	“Do you live full-time in your identified gender?”	Yes
Legally Affirmed Gender	“Have you legally affirmed your gender (i.e., name change, gender marker change on documents)?”	Yes
Gender Identity Prevented Healthcare Access in Past 6 Months	“In the past 6 months, have you had any problems getting health or medical services because of your gender identity or gender presentation?”	Yes
Transgender-Focused HIV Prevention Experience	“When you have received HIV prevention services or programs, how specific were they to your needs as a transgender or gender nonconforming person?”	Very specific to transgender and gender nonconforming people; or Mostly specific to transgender and gender nonconforming people
Provider Knowledgeable About Transgender Health	“Please indicate the extent to which you agree or disagree with this statement: The provider where I most often receive health care services is knowledgeable about transgender and gender nonconforming health.”	Strongly agree; somewhat agree; or neutral

Family Supportive of Gender Identity	“In general, how supportive is your family of your gender identity?”	Very supportive; or somewhat supportive
HIV Prevention Service Participation	“In the past 6 months, have you accessed HIV prevention services or programs (for example, risk reduction counseling, demonstrations on how to properly use condoms, programs for couples or groups focused on reducing the risk of acquiring HIV by changed behaviors)?”	Yes
HIV- or Gender Identity-Focused Program Participation	“Other than this study, ATN 130, have you ever participated in any programs, interventions, research studies, support groups or individual counseling sessions about HIV, sexual risk, relationships, gender identity, gender expression, or sexuality?”	Yes

APPENDIX 2. Coding of Demographics and Confounders from ATN 130 Dataset

Demographic or Confounder	Survey Question	Positive Response(s)
Age	“How old are you?”	Fill-in-the-blank before “years”
<i>Gender Identity</i>	“What is your current gender identity?”	
Transgender Female	“	“Trans female/Trans woman”; or “Female” if also answers “Male” to sex assigned at birth
Transgender Male	“	“Trans male/Trans man”; or “Male” if also answers “Female” to sex assigned at birth
Non-binary	“	“Genderqueer/ Gender non-conforming”; or “A gender not listed here”
AMAB	“What sex were you assigned at birth, meaning what the doctor put on your original birth certificate?”	“Male”
<i>Ethnicity</i>		
Hispanic/Latino	“Are you of Hispanic (Spanish) or Latino heritage?”	“Yes”
<i>Race</i>	“In addition to knowing whether or not you are of Hispanic/Latino ethnic heritage, what is your racial background?”	
White	“	“White”
African American or Black	“	“Black/African American”

Native American or Alaska Native	“	“Native American/Alaskan Native”
Asian or Pacific Islander	“	“Asian/Pacific Islander”
Other	“	“Mixed”; or “Other”
<i>Education</i>	“What is the highest level of education or grade you have completed?”	
Less than High School Diploma	“	“None, no formal schooling”; “Eighth grade or less”; or “More than eighth grade but did not complete High School”
High School Diploma or GED	“	“High School Graduate”; or “GED”
College	“	“Some college/technical education”; “Technical School Graduate”; “College Graduate”; “Some graduate school”; or “Master’s degree or above”
<i>Mental Health</i>		
Depression	GAD-7 Screening	Score of 10+
Anxiety	PHQ-2 Screening	Score of 3+
High Self-Esteem	“I feel that I’m a person of worth, at least on an equal plane with others.”	“Definitely agree”; or “Mostly agree”

Suicidal Ideation	“In your lifetime did you ever seriously consider attempting suicide, that is taking some action to end your own life?”	“Yes”
Attempted Suicide	“In your lifetime, did you attempt suicide, that is try to kill yourself?”	“Yes”
Physical or Sexual Abuse Ever	“Have you ever been slapped, punched, kicked, beaten up, or otherwise physically or sexually hurt by a boyfriend/girlfriend, spouse, or some other intimate partner?”	“Yes”
Physical or Sexual Abuse Under Age of 15	“Were you ever physically or sexually abused as a child under age 15 years-old?”	“Yes”
<i>Socioeconomic</i>		
Health Insurance	“What kind of insurance do you currently use to pay for healthcare? (Check all that apply)”	Any answer except “No insurance”
Cost Prevented Healthcare Access in Past 6 Months	“Was there a time in the past 6 months when you needed to see a doctor, but could not because of cost?”	“Yes”
Regular Healthcare Site	“Where do you most often receive your health care services?”	Any answer except “Don't have regular source of healthcare”; or “Don't seek healthcare”
Foster Care	“Have you ever been a ward of the court/state (DCFS, foster system, court-appointed group home, etc.)?”	“Yes”
Homelessness	“Have you ever been homeless in your lifetime?”	“Yes”
Government Assistance	“Have you or your family ever received assistance from the Aid to Families with Dependent Children (AFDC), Temporary Assistance for Needy Families (TANF), food stamp, or free lunch programs?”	“Yes”
Incarceration	“Have you ever been incarcerated (been put in jail or prison, or held overnight after an arrest) or put in juvenile detention (juvy)?”	“Yes”
<i>HIV Risk Factors</i>		

Sex Work	<p>“People define sex work in many different ways. For the following questions when we say sex work, we mean trading sexual activity or favors for food, money, a place to sleep, drugs or other goods. Have you ever traded sexual activity or favors for food, money, a place to sleep, drugs or other material goods?”</p>	“Yes”
Injection Drug Use	<p>“Have you injected drugs to get high (IDU) in the last 6 months? (This does not include testosterone injections or hormone injections)”</p>	“Yes”
STI Screening History	<p>“Have you EVER been screened by a doctor or other provider for a Sexually Transmitted Infection (STI), other than HIV? STIs include things such as Chlamydia, trichomoniasis (trich), syphilis, gonorrhea (clap), genital herpes, or genital warts (HPV).”</p>	“Yes”
STI History	<p>“Have you EVER been told by a doctor or other provider that you had a Sexually Transmitted Infection (STI), other than HIV? STIs include things such as chlamydia, trichomoniasis (trich), syphilis, gonorrhea (clap), genital herpes, or genital warts (HPV), other than HIV?”</p>	“Yes”
Sex with Male in Past 6 Months	<p>“During the past 6 months, have you had oral, anal, or vaginal sexual contact with a male partner(s)? By male partners, we mean partners who were assigned a male sex at birth and who identify as male. This does not include transgender partners.”</p>	“Yes”
Sex with Female in Past 6 Months	<p>“During the past 6 months, have you had oral, anal, or vaginal sexual contact with a female partner(s)? By female partners, we mean partners who were assigned a female sex at birth and who identify as female. This does not include transgender partners.”</p>	“Yes”
Sex with Transgender in Past 6 Months	<p>“During the past 6 months, have you had oral, anal, or vaginal sexual contact with a transgender partner(s)? By transgender partners, we mean partners who were assigned a sex at birth that is different from their current gender identity.”</p>	“Yes”
Anal Sex in Past 6 Months	<p>48 separate survey questions asking the frequency of different behaviors involving anal sex in the past 6 months</p>	Filling in 1 or more as the response to any

		of these questions
Condomless Sex in Past 6 Months	82 separate survey questions asking the frequency of different behaviors involving sex without a condom in the past 6 months	Filling in 1 or more as the response to any of these questions
Condomless Anal Sex in Past 6 Months	24 separate survey questions asking the frequency of different behaviors involving anal sex without a condom in the past 6 months	Filling in 1 or more as the response to any of these questions
Frequency of Anal Sex in Past 6 Months	48 separate survey questions asking the frequency of different behaviors involving anal sex in the past 6 months	Sum of fill-in-the-blank responses to each question
Frequency of Condomless Sex in Past 6 Months	82 separate survey questions asking the frequency of different behaviors involving sex without a condom in the past 6 months	Sum of fill-in-the-blank responses to each question
Frequency of Condomless Anal Sex in Past 6 Months	24 separate survey questions asking the frequency of different behaviors involving anal sex without a condom in the past 6 months	Sum of fill-in-the-blank responses to each question

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