Aus dem Institut für Public Health
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DISSERTATION

Trans*gressing Society: An Intersectional Perspective on the Access to Healthcare for Trans Identities

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Trans*gressive Gesellschaft: Eine intersektionale Perspektive auf den Zugang zur medizinischen Versorgung für trans Identitäten

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AIDS – Acquired Immunodeficiency Syndrome

AFAB – Assigned female at birth

AMAB – Assigned male at birth

CI – Confidence Interval

EMIS – European MSM Internet Survey

GAHT – Gender-affirming hormone therapy

HIV – Human Immunodeficiency Virus

LGBTI – Lesbian, Gay, Bisexual, Trans, and Inter

MSM – Men who have sex with men

OR – Odds Ratio

PrEP – Pre-Exposure Prophylaxis

TGD – Trans and gender-diverse

Abstract / Zusammenfassung

Introduction: Transmasculine people are those assigned female at birth (AFAB), but who live a male identity and trans non-binary people are those, who live a gender identity outside (or not exclusively) within the binary gender options of female and male. Both can be part of sexual networks of men-who-have-sex-with-men (MSM). This manuscript combines three analyses about the different circumstances regarding demographics, sexual behavior, sexual happiness and safety among European among trans MSM and German trans non-binary people in comparison to European assigned male at birth (AMAB; cis) MSM. Lacking data and health information about trans and gender-diverse (TGD) individuals in Europe (especially Germany) possess barriers to appropriate (sexual) health interventions for this population.

Methods: The analyses include 2 data sets. First, the outcomes of the European MSM Internet Survey (EMIS-2017) were used, which included both AFAB and AMAB MSM. Secondly, the data of the German PrApp Study was included, to depict the situation of current PrEP users in Germany. Both studies recruited their participants through community websites and social media for participation in an online survey. Parameters on sexual behavior, access to HIV prevention (i.e., HIV testing, PrEP), sexual happiness and safety of trans and cis participants were compared using descriptive methods and logistic regression models adjusting for age (EMIS-2017 German sub-sample & PrApp Study), country and employment (EMIS-2017 full dataset).

Parameters on sexual happiness and satisfaction with sexual safety among Germany-based trans MSM were analyzed and compared those to outcomes of MSM assigned male at birth (cis MSM) living in Germany using descriptive methods and logistic regression models adjusting for age.

Results: The EMIS-2017 study included 125,720 men (23,001 participants from Germany) and the PrApp Study included 4,350 respondents. In the European-wide EMIS-2017 sample 0.7% (n=1,049), in the German EMIS-2017 sub-sample 0.5% (n=122), and in the PrApp Study 1.5% (n=65) did not self-identify as cis.

In both studies, TGD respondents were younger, had less financial stability, were more likely to live with mental health issues or to be unhappy sexually, and displayed more

struggles negotiating safer sex, when compared to cis study respondents. TGD participants were also less likely living with diagnosed HIV, but also had lower odds of getting tested for HIV, having talked to a healthcare provider about PrEP or were actually taking PrEP. Those TGD respondents from Germany taking PrEP were more likely to take the drug on-demand, compared to cis PrEP users.

Conclusions: The (sexual) health inequalities of TGD people found in both studies highlight the need for targeted sexual health interventions that are based on the specific needs and vulnerabilities of this population in Europe (and especially Germany).

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Einleitung: Transmaskuline und nicht-binäre Menschen sind Teil von sexuellen Netzwerken von Männern, die Sex mit Männern haben (MSM). Dieses Manuskript kombiniert drei Analysen über die unterschiedlichen Gegebenheiten bzgl. Demografie, Sexualverhalten, sexueller Zufriedenheit und Safer Sex unter europäischen trans MSM und deutschen trans nicht-binären Menschen im Vergleich zu cis MSM. Fehlende Daten und Gesundheitsinformationen über trans- und genderdiverse (TGD) Personen in Europa stellen eine Barriere für angemessene (sexuelle) Gesundheitsversorgung für diese Gruppe dar.

Methoden: Die vorgelegten Analysen umfassen zwei Datensätze. Es wurden die Ergebnisse der Europäischen MSM-Internet Studie (EMIS-2017) verwendet, die sowohl trans als auch cis MSM einbezog. Zusätzlich wurden die Daten der deutschen PrApp-Studie verwendet, um die Situation der PrEP-Nutzer*innen in Deutschland darzustellen. Beide Online-Umfragen rekrutierten ihre Teilnehmenden über Community-Websiten und soziale Netzwerke. Parameter zum Sexualverhalten, zum Zugang zur HIV-Prävention (z.B. HIV-Tests, PrEP), zur sexuellen Zufriedenheit und zu Safer Sex von trans und cis Personen wurden mit Hilfe von deskriptiven Methoden und mittels logistischer Regressionsmodelle unter Berücksichtigung von Alter, Land und Erwerbstätigkeit verglichen.

Anhand der PrApp Studiendaten analysierten wir Parameter zur sexuellen und Safer Sex Zufriedenheit unter in Deutschland lebenden TGD-Personen und verglichen diese mit den Ergebnissen von cis Männern unter Anwendung von deskriptiven Methoden und logistischen Regressionsmodellen, die auf Alter adjustiert wurden.

Ergebnisse: Die EMIS-2017-Studie umfasste 125,720 Männer (23,001 Teilnehmende aus Deutschland) und die PrApp-Studie umfasste 4,350 Befragte. In der europaweiten

EMIS-2017-Stichprobe gaben 0,7% (n=1,049), in der deutschen EMIS-2017-Unterstichprobe 0,5% (n=122) und in der PrApp-Studie 1,5% (n=65) an, sich nicht als cis zu identifizieren. In beiden Studien waren TGD-Teilnehmende jünger, hatten weniger finanzielle Stabilität, lebten häufiger mit psychischen Problemen, waren sexuell unzufriedener und hatten mehr Probleme, Safer Sex auszuhandeln, als cis Teilnehmende. TGD-Teilnehmende lebten zwar seltener mit HIV, hatten aber auch eine geringere Wahrscheinlichkeit, sich auf HIV testen zu lassen, mit medizinischem Personal über PrEP gesprochen zu haben oder tatsächlich PrEP zu nehmen. TGD PrEP-Nutzer*innen aus Deutschland nahmen das Medikament mit höherer Wahrscheinlichkeit mit Unterbrechungen ein, verglichen mit cis PrEP-Nutzern.

Schlussfolgerung: Die in beiden Studien festgestellten Ungleichheiten bzgl. sexueller Gesundheit von TGD-Personen verdeutlichen erstmals die Hürden und den Bedarf an gezielten Maßnahmen, die auf die spezifischen Bedürfnisse und Vulnerabilitäten dieser Bevölkerungsgruppe in Europa abgestimmt sind.

1. Introduction

Trans and gender diverse (TGD) are umbrella terms to describe individuals whose gender identity does not align with the sex assigned to them at birth. This can refer to transfeminine identities (i.e., trans women), who are female but were assigned male at birth (AMAB), transmasculine identities (i.e., trans men), who are male but were assigned female at birth (AFAB), or trans non-binary identities, who have a gender that does not fit (exclusively) the normative gender binary of female or male. The lived experiences and realities of TGD people regarding sexual health risks and accessing (sexual) healthcare services differ from those whose gender identity matches the sex assigned to them at birth (hereafter referred to as cis).

1.1 HIV Prevalence in Trans Communities

TGD people who have sex with men (MSM), sex workers, people who inject drugs, and people who are incarcerated are considered part of a key population by the World Health Organization (WHO) because of their vulnerability to the human immunodeficiency virus (HIV) infection and acquired immunodeficiency syndrome (AIDS) (1). In particular, transfeminine identities are disproportionately affected by the HIV/AIDS. Globally, in the age group of 15–49, trans women are 13 times more likely to be living with HIV in comparison to cis women (2). Additionally, trans women of color carry a disproportionate burden of HIV and other STI infections (3-5). The most recent HIV Surveillance Report 2020, published by the US Centers for Disease Control and Prevention (CDC), indicates that when looking at HIV infections in TGD populations in the US, 92% occur in trans women, with a majority of those being trans women of Color (6).

Although data about transfeminine identities and HIV is already scarce, less is known about trans identities on the masculine or non-binary gender spectrum. Numbers estimating HIV prevalence in transmasculine people vary by study and region. A recent US-based systematic review demonstrated that 3.2% of the participants of the studies under review were living with HIV (4). A study from Zimbabwe among local sex workers demonstrated a 38% HIV prevalence level in transmasculine sex workers (7).

To date, the 2015 US Trans Survey is the largest survey among trans populations (n=27.715), and 35% of the respondents stated that they are trans non-binary (vs. 33% transfeminine, 29% transmasculine, and 3% crossdresser) (8). Although trans non-binary

people seemingly make up the majority of the trans population in the US, there is little information about their sexual health needs and vulnerabilities or HIV prevention or treatment drug efficacy in this population.

In general, estimating HIV prevalence in trans populations is difficult, as many studies have been linked to sexual health centers in urban areas, where a substantial number of the study participants includes trans community members with a potentially higher risk of HIV exposure compared to community members in other areas (9).

1.2 HIV Risk and Vulnerabilities Unique to TGD People

Multiple drivers account for higher HIV prevalence in TGD populations and understanding the intersection between this population and other WHO key populations is especially crucial. Overproportioned cases of new HIV infections (50.6%) in Europe are found among MSM (10), and as a key population, this group demonstrates high vulnerability to the epidemic (11). Many TGD individuals, especially trans men and other AFAB trans identities, consider themselves and their sexuality part of the MSM community and their sexual networks (12, 13). TGD people often engage in the sex industry to provide for their living, food, housing, or other goods. In contrast to the stereotypical assumption that only transfeminine people work as sex workers, many transmasculine and AFAB trans non-binary people work in the industry. For example, results from the 2015 US Trans Survey demonstrate that 19% of transmasculine and 23% of AFAB trans non-binary people work or have worked in the sex industry (8). Data from a US-based meta-analysis also indicated that 13.1% of transmasculine individuals participate in sex work (4).

TGD people are three times more likely to use illicit drugs compared to the general population (8). Transmasculine and trans non-binary identities (both AFAB and AMAB) have higher proportions of drug and alcohol use compared to transfeminine people (14). In cis MSM populations, alcohol and drug use have been found to elevate the risk for seroconversion (15, 16).

Additionally, TGD people experience incarceration at much higher rates compared to the general population, and TGD of color and those reporting homelessness at some point in their lives were more likely to have been arrested or incarcerated (8, 17, 18). Regardless of gender identity, imprisonment is seen as a driver for HIV infection, and access to HIV prevention programs, treatment, and care is limited in detention systems (19).

Besides the intersecting burden stemming from risks associated with being a member of the WHO's five key populations, transmasculine and AFAB trans non-binary individuals are at an increased risk of HIV infection. Not all, but many transmasculine and AFAB trans non-binary people make use of various medical gender-affirming technologies, such as gender-affirming hormone therapy (GAHT) or gender-affirming surgeries (e.g., mastectomy/top surgery, surgical removal of breast tissue; hysterectomy/ovariectomy, surgical removal of cervix/ovaries; metoidioplasty or phalloplasty/bottom surgery, gender-affirming genital surgery). Many TGD people use various terms to refer to their body parts, especially their genitals, and may not use typical anatomical/medical terms (20). However, studies have demonstrated that genital-affirming surgery among transmasculine and AFAB trans non-binary individuals is uncommon (8, 20). Further research has indicated that many trans MSM have receptive vaginal/front hole sex with cis men (20), and physical vaginal/front hole tissue changes attributed to GAHT may increase the risk for minor tissue injuries and the need for the use of lubricants. Subsequently, small internal injuries due to receptive intercourse may elevate the risk of HIV transmission (21).

Gender affirmation (i.e., someone's gender being correctly perceived by their environment) and access to gender-affirming treatment are directly linked to better mental health outcomes and positive body images (22, 23). A positive impact on bodily satisfaction (meaning the feeling of comfort in your own body) has been linked to positivity regarding sexual feelings in transfeminine people (24), and undergoing masculinizing top surgery has demonstrated significant improvement in sexual confidence in AFAB trans individuals (24, 25). However, the research suggests adverse sexual health outcomes in TGD people who struggle with a negative sexual body image. For example, negotiating the use of condoms during sexual contact is lower among those with a negative perception of their body (26).

Being affirmed and perceived in a male gender may ease access to new sexual networks and sexual encounters (i.e., MSM sexual networks and the gay scene) for trans MSM (27, 28), and some trans MSM may seek gender-affirmation through (sexual) relationships with cis men (29). When entering these new (sexual) spaces, trans MSM are confronted with navigating power imbalances when engaging sexually with cis men, and the vulnerability to HIV and other STIs is elevated. To avoid rejection and be positively affirmed in their gender identity, trans MSM may engage in sexual risk contact (20, 30),

and a lack of skills for negotiating safe(r) sex has been observed among this group (13, 31).

1.3 Access to Healthcare for TGD People

Various studies in different global settings have demonstrated that TGD individuals experience high levels of stigma and discrimination in healthcare services (8, 32-34), resulting in limited access to such. Across Europe, negative experiences in healthcare settings are more common for transmasculine people (32). In addition to discrimination, many healthcare providers lack the knowledge to offer competent care to TGD individuals (35, 36). Gendered stereotypes and gender binary expectations may aggravate this difficult situation for TGD individuals seeking healthcare (28). Socioeconomic disparities also play a role in the inaccessibility of healthcare for trans people (35), as many of the TGD community disproportionately live in or at the margins of poverty (8, 32, 33).

1.4 Access to HIV Prevention for TGD People

There are multiple ways to prevent HIV infection; however, many prevention options are directly linked to healthcare services. Combined with the aforementioned barriers to healthcare services for TGD people, some of these options are seemingly more difficult to access for members of the TGD community.

Early detection of HIV infection and initiation of treatment is an effective HIV prevention method (also known as Treatment as Prevention [TasP]) (37, 38). Research in the US has demonstrated that, despite the elevated risk of HIV infection, TGD individuals are less likely to test for HIV compared to cis MSM (39). Additionally, the current effects of the COVID-19 pandemic have negatively impacted the testing behaviors of affected populations (40). While the CDC has stated that the number of new HIV infections decreased in 2020, this is likely due to the limited access to healthcare services during the COVID-19 pandemic (6). Many regions in the US also saw a decline in HIV testing during the pandemic (41), and CDC-funded HIV testing decreased in trans populations by 47.3% from 2019 to 2020 (42).

Pre-Exposure Prophylaxis (PrEP) with Tenofovir disoproxil fumarate and Emtricitabine effectively prevent new HIV infections in certain populations (11, 43). However, access to PrEP and its effectiveness remain understudied in trans populations (44). A

recent sample from 2020 of sexually active US-based trans people (n=190; incl. transmasculine participants) demonstrated that little less than half (48%) of the participants had heard of PrEP (45). Another study found a low uptake of PrEP among transmasculine people despite fulfilling the PrEP eligibility criteria of the CDC (46, 47). Research has also demonstrated that although fulfilling such criteria, only about 11% of transmasculine respondents were prescribed PrEP for HIV prevention (46). Further research has demonstrated that only 18% of eligible trans men and trans women received a PrEP prescription, despite a 60% PrEP-eligibility rate in the study cohort (48). The same study additionally highlighted elevated levels of PrEP discontinuation among members of the trans community, who used PrEP in the past (48). Although some participants of both studies cited here received a prescription for Tenofovir disoproxil fumarate and Emtricitabine as PrEP, neither study reported if a prescription for the drug led to the uptake of PrEP (46, 48).

A study among European MSM displayed a general lack of basic knowledge around HIV, specifically in trans and AFAB men (28). The transmasculine participants were less knowledgeable about PrEP and less likely to use PrEP as a method for HIV prevention. Additionally, they were likelier not to know the concept of 'undetectable equals untransmissible' ('U = U') (28).

The global HIV Prevention Trials Network (HPTN) has conducted research on the effectiveness of the long-acting injectable Cabotegravir compared to daily oral preventive treatment with Tenofovir disoproxil fumarate/Emtricitabine as a modality to deliver PrEP in cis men and trans women who have sex with men (49) and sub-Saharan African cis women (50). Both studies have demonstrated the superiority of the injectable PrEP option; however, AFAB trans people were excluded from both trials.

Specifically for the German context, the German-Austrian HIV Pre-Exposure-Prophylaxis Guidelines recommend using PrEP for all individuals at substantial risk of HIV infection. This includes both cis and trans MSM; people who have anal/back hole sex without a condom; couples in which one of the partners is living with HIV (serodiscordant couples); and people who use drugs intravenously (51). However, it is unknown how many TGD people at risk of HIV infection have access to appropriate prevention methods and if they use them.

1.5 Data Gaps and Reasons for this Research

Little data exists specifically about the needs and vulnerabilities of AFAB trans people regarding HIV and other sexually transmitted infections. Most existing data stem from the anglophone North American context (Canada and USA), and data from the European region is still lacking. In Germany, no data has been published about the sexual health needs and vulnerabilities of trans people (regardless of their gender identity and sex assigned at birth). For AFAB trans people, the broad exclusion from HIV prevention trials globally and the dearth of research have created a health-threatening situation, especially for those vulnerable to HIV (e.g., trans MSM and AFAB trans sex workers).

This research generated primary data to lay the ground for future research. The analyses of the studies compare sexual behavior, sexual happiness, sexual risk exposure, and access and uptake of HIV prevention between AFAB trans people and cis men and found differences between the two study populations. The outcomes demonstrate the different backgrounds of both study groups and provide information on the potential different HIV prevention methods required to adequately cater to the prevention needs of cis men and AFAB trans people with a substantial risk for HIV new infection in Germany and Europe.

1.6 About the Studies Included in this Paper

Two data sets were used for this paper, of which three different analyses will be presented. The first data set used is based on the findings of the European MSM Internet Survey (EMIS-2017), a pan-European online survey to monitor MSM sexual behavior (52). Based on descriptive methods and logistic regression models, two analyses of the differing outcomes of cis and trans MSM are included in this paper (28, 53). The first analysis compares the results of all participants across Europe and the second analysis focuses on the German context.

The second results are based on the cross-sectional German “PrApp Study” that aimed to depict the use of Tenofovir disoproxil fumarate and Emtricitabine as PrEP and the sexual behavior of participants residing in Germany (54). Through descriptive methods and logistic regression, TGD respondents were compared to their cis counterparts (11).

2. Methods

2.1.1 The European MSM Internet Survey - EMIS-2017

Two analyses included in this paper are based on the data of the European MSM Internet Survey 2017 (EMIS-2017; www.emis2017.eu). The data for this community-recruited online survey was collected from October 9, 2017, to January 31, 2018. Participants were asked to fill out an online self-completion questionnaire, which was offered in 33 different languages. Study participants were recruited through websites, apps, and social media frequented by the study population (28, 52, 53).

The first analysis using data from the EMIS-2017 study compares the differences by gender identity and sex assigned at birth in European MSM (28). The second analysis focuses on the different outcomes of trans and cis MSM in Germany (53).

2.1.2 Participants of EMIS-2017

The inclusion criteria for the study were that respondents were MSM; that they had the legal age in their country to engage sexually with other men; that they gave information about their current gender identity and sex assigned at birth; that they had an understanding of the purpose of the study; and they consented to participate (28, 53).

For the European analysis, four study groups were constructed based on the answers given to questions around gender identity and sex assigned at birth: “AMAB-man” (assigned male at birth men = cis men), “AFAB-man” (assigned female at birth man), “AFAB-trans man” (assigned female at birth man), and “AMAB-trans man” (assigned male at birth man)[1]. The last group was not anticipated when the study design took place, and this will be addressed further in the Strengths and Limitations section. The distinction

[1] In the original publication of Hickson et al. (2020) “Sexual and Mental Health Inequalities across Gender Identity and Sex-Assigned-at-Birth among Men-Who-Have-Sex-with-Men in Europe: Findings from EMIS-2017” the acronyms “AFB” and “AMB” were used by the first author, despite other recommendations of trans people involved in the research. Throughout this manuscript only the acronyms “AFAB” and “AMAB” will be used.

between “AFAB-man” and “AFAB-trans man” was used because not all AFAB men identify on the trans spectrum and solely identify as men (more information is provided in the Strengths and Limitations section) (28).

For the second analysis of the sub-sample, which included participants from Germany, AFAB men were described as cis MSM, and self-identified AFAB “men” or “trans men” were defined as trans MSM. AMAB “trans men” were excluded from this analysis (53).

2.1.3 Variables of EMIS-2017

The study participants were asked various demographic and sexual health questions. Age for the German sub-analysis was summarized into five categories: 14–17, 18–29, 30–39, 40–49, and 50 and older. Regarding the financial situation, for the European analysis, the employment status of “Unemployed” or “Long-term sick leave/medically retired” was described as “not earning,” and for the German analysis, the question of whether participants are “living comfortably” or “not living comfortably” based on the current income was reported.

The EMIS-2017 captured different data describing the participants’ sexuality. For both analyses, participants were only included if they were (also) attracted to other men. The European analysis also describes the number of people (also) being attracted to women and people (also) being attracted to non-binary individuals (28, 53). For the German sub-sample, the following answers: “gay/homosexual,” “straight/heterosexual,” “bisexual,” “any other term,” and “I do not usually use a term.” were used. Whether the participants were in a relationship was described as single, unsure, and yes, I have a partner. Being out about the attraction to men was asked with the following question: “Thinking about all the people who know you (including family, friends, and work or study colleagues), what proportion know that you are attracted to men?” The response options were: “none,” “few,” “less than half,” “more than half,” and “all or almost all.” Assessing the involvement in sex work was determined with the question: “When was the last time a man paid you to have sex with him? By paid, we mean he gave you money, gifts, or favors in return for sex.” Recent sex work was defined as sex work within the last 12 months prior to study participation (28, 53).

A total of eight morbidity factors were determined and dichotomized. Mental health status was assessed in the EMIS-2017 study using the PHQ-4 to provide a combined indicator for anxiety and depression. A standardized system of “normal,” “mild,” “moderate,” and “severe” was used to describe the current situation of the participants. Asking about suicidal ideation was categorized into “yes, at least some days” or “never.” Sexual happiness was determined through a numerical scale from 1 to 10, and participants were asked, “On a scale of 1 to 10 (where 1 is the most unhappy and 10 is the most happy), how happy are you with your sex life?” Answers were dichotomized into “unhappy” (1–4) and “happy” (5–10). The percentage of potential alcohol dependency was assessed using CAGE-4 (28, 55). HIV status and infections with other STIs were captured through a simple “yes” or “no” answer when asked if participants ever received a positive HIV/STI test result. Additionally, participants were asked if they were newly diagnosed with HIV (or other STIs) within the 12 months prior to the study (28, 53).

For the European sample, there were three binary measures of sexual risk constructed regarding the number of steady and non-steady sexual partners. Within the past 12 months, prior to study participation, the risk group (1) was defined as having two or more steady condomless male intercourse partners; group (2) was having five or more non-steady male partners; and group (3) was defined as having sexual encounters without a condom with one or more non-steady male partners (with unknown HIV status) (28). Measuring the number of steady sexual contacts with male partners within the 12 months prior to study participation in the German sub-sample was counted in numbers of “0,” “1,” “2,” or “3 or more” and accounts of non-steady sexual encounters with men in the past 12 months prior to the study was categorized into four groups (0, 1–3, 4–10, and 11 or more) (53).

Regarding the use of stimulant drugs in relation to sex, participants were asked, “When was the last time you used stimulant drugs to make sex more intense or last longer? (Note: The stimulant drugs include ecstasy/MDMA, cocaine, amphetamine (speed), crystal methamphetamine (Tina, Pervitin), mephedrone, and ketamine).” The results include reports of drug use within four weeks prior to the study. Survey respondents were also asked, “Have you ever injected any drug to get high (other than anabolic steroids or prescribed medicines), or had someone else inject into you?” within 12 months

prior to the study participation. Additionally, the question “I worry about my recreational drug use” was included to measure the participants’ concerns (28).

Based on the Social Provisions Scale (56), “social integration” and “reliable alliance” subscales were built, ranging from 4–16. Half of the respondents were asked eight questions and the outcomes reported are of participants scoring lower than 10 on both scales. The other half was asked seven questions to assess an “internalized homonegativity” scale with a range from 0–6 (57), and the results reported are scores of three or more. Experiences of homophobia were assessed by asking, “When was the last time you had verbal insults directed at you because someone knew or presumed you are attracted to men?” Answers include incidents that occurred within the last 12 months (28).

Accessing HIV (and in parts other STI) testing and prevention were measured by different questions. Participants were asked, “When was the last time you had intercourse without a condom solely because you did not have a condom?” For the European analysis, results for the last 12 months prior to the study are reported. Further, HIV-negative participants were asked, “How confident are you that you could get PrEP if you thought you needed it?” The answers “I do not know,” “not at all confident,” or “a little confident” were combined and compared to other response options (“quite confident” and “very confident”) (28).

The participants were also asked if they had ever heard of PrEP; used PrEP; talked to a healthcare provider about PrEP (only HIV-negative respondents); received an HIV test result; diagnosed with HIV (only those who received an HIV test result); if yes to being diagnosed, which year they were diagnosed (within the past 12 months or longer); and had an STI test other than HIV (28, 53). Respondents were provided with an explanation of the concept of ‘undetectable = untransmissible’ (“U=U”) (58) and were asked how familiar they were with this concept. Possible responses were: “I knew this already,” “I was not sure about this,” “I did not know this already,” “I do not understand this,” and “I do not believe this.” Additionally, they were asked, “When was the last time you saw or heard any information about HIV or STIs specifically for men who have sex with men?” (within 12 months prior to the study) and if and where they received free condoms, with possible responses as follows: “free from clinics,” “free from gay bars/clubs,” “free from saunas,” or “free from gay or HIV community organizations” (28).

Participants were also asked if they knew their current HIV status, regardless if they had ever been tested. They were also asked, “Do you know where you could get an HIV test?” and “Do you know where you could get vaccinated against hepatitis B?” For both, the responses “no” or “not sure” were conflated, and men who have never tested for HIV and those vulnerable to hepatitis B (i.e., excluding those vaccinated or naturally immune) are the denominators for this variable (28). Safer sex self-efficacy in both analyses was assessed by the statements “the sex I have is always as safe as I want to be” and “I find it easy to say ‘no’ to sex I do not want,” to which participants could “agree” or “disagree” (28, 53).

2.1.4 Statistical Analysis of the EMIS-2017 Study

For the European sample, binary indicators reported are unadjusted levels of the four groups of participants (cis men, AFAB men, AFAB trans men, AMAB trans men). Odds ratios for the indicators were generated through multinomial regressions, and the three groups of trans participants were compared with the cis respondents. The outcomes were adjusted for demographic indicators, country of residence and age and unemployment status, because trans people experience discrimination at work at a much higher rate (28, 32).

For the German sub-sample of the EMIS-2017 study demographics, sexual behavior, sexual happiness, and satisfaction with sexual safety among German trans MSM were compared with outcomes of German cis MSM through descriptive methods and age-adjusted logistic regression models (53).

2.1.5 Ethical Approval of the EMIS-2017 Study

The Observational & Interventions Research Ethics Committee of the London School of Hygiene & Tropical Medicine approved this study (September 14, 2017; LSHTM ethics ref: 14421) (28, 53).

2.2.1 The German PrApp Study

The cross-sectional PrApp Study analyzed the use of PrEP in MSM residing in Germany. Participants were recruited through flyers at local HIV and STI testing sites and (anonymous) checkpoints, advertisements on three mobile applications (Grindr, Hornet, and

PlanetRomeo) for men who have sex with men (MSM), and banners and advertisements on a website targeted at the respective community (https://prepjetzt.de, accessed October 3, 2022). Recruitment was through two waves from July–October 2018 and April–June 2019 (11, 54, 59).

The questionnaire was provided in six different languages (German, English, French, Spanish, Arabic, and Turkish) to reach a wider audience. The online survey used VOXCO software and could be filled out on mobile devices (such as mobile phones and tablets) or desktop computers. At the end of the survey, the participants could enter a raffle for a gift certificate. Data security regulations were in accordance with German and European regulations (11, 54, 59).

2.2.2 Participants of the PrApp Study

To be included in this analysis, respondents had to be based in Germany, had to give an answer on their current gender identity and sex assigned at birth, and had to consent to participate in the study. During the first wave of the study, researchers did not include a question about sex assigned at birth, which was then added in the second study wave. This step is crucial to avoid inadequately subsuming TGD individuals who identify on the binary gender spectrum as “women” or “men” in the cohort of cis participants (11). There was no limitation in terms of participation in both study waves. However, if a respondent participated twice, the answers from wave two were removed and included only once in the analysis (11).

2.2.3 Variables of the PrApp Study

In wave one, TGD participants were identified if they answered beyond the binary categories of male and female (transgender or non-binary). In wave two, participants were included in the cohort of TGD individuals if their current gender identity was incongruent with their sex assigned to them at birth (11, 54).

Data collection included the participant’s ages, and they were categorized into four groups (18–29, 30–39, 40–49, and 50–80 years). Demographics such as income, country of origin, and the language used for filling out the survey were binarized (income “less than EUR 30,000/year” and “more than EUR 30,000/year”; country of origin “Germany” and “outside Germany”; and language “German” and “other than German”) (11).

The use of PrEP was classified into “daily” (consecutive daily use of the medication) and “on-demand” (the use of PrEP only around days of potential HIV exposure) (60). “Prescription” captured the formal source of PrEP from a medical healthcare provider, and “informal” described the PrEP source through social networks (i.e., friends), dealers, or obtaining PrEP online or from a different country (11, 54).

Regarding the use of condoms, the answers “always” and “often” were stratified, and the answers “half of the time,” “sometimes,” and “never” were combined to “half of the time or less.”

Counting the number of partners that participants engaged sexually with (both vaginal/front hole and/or anal/back hole intercourse) in the last six months prior to the study were assorted into three groups of 0–3, 4–10, and 10 or more (11).

2.2.4 Statistical Analysis of the PrApp Study

Absolute numbers and proportions are used for the presentation of categorical items. Continuous variables are demonstrated through medians and interquartile ranges (11, 54). Displaying different sexual behavior and using PrEP in cis and TGD participants were investigated using univariable and multivariable logistic regressions. The logistic regression analysis was performed using variables such as age, gross annual income, and country of origin to determine an adjusted odds ratio (aOR) (11). The influence of age must be considered as it may influence the income and potential migration of an individual. Additionally, in many cases, income determines the accessibility of healthcare services and the country of origin (i.e., based on language abilities).

Age may play an important role in income and migration, as well as income itself, and country of origin might impact access to healthcare and access to PrEP. If data for income and country of origin were missing, those participants were not included in the analysis. A Wald test was used to calculate the *p*-values (11).

2.2.5 Ethical Approval of the PrApp Study

The ethics committee of the Berlin Chamber of Physicians (Ref: Eth-14/18) gave their approval to the study protocol (11, 54).

3. Results

3.1.1 Sample Size of the EMIS-2017 Study

The European-wide analysis included the responses of 125,720 men. The respondents were living in the following 45 countries in and neighboring Europe (men living in Andorra, Liechtenstein, Monaco, and San Marino were included in adjacent countries): Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France (includes Monaco), Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy (includes San Marino), Latvia, Lebanon, Lithuania, Luxembourg, Malta, Moldova, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain (includes Andorra), Sweden, Switzerland (includes Liechtenstein), Turkey, Ukraine and United Kingdom (28).

The following analysis includes AMAB men (cis men; n = 124,673, 99.2%); AMAB trans men (n = 373, 0.3%); AFAB trans men (n = 498, 0.4%); and AFAB men (n = 176, 0.1%). The three groups, other than cis men, comprised 0.8% of the whole sample (n = 1047) (28).

For the German analysis, 23,001 individuals living in Germany were included, of which a total of 22,879 (99.5%) were AMAB men, 95 (0.4%) were AFAB trans men, and 27 (0.1%) were AFAB men. For this analysis, the two latter groups were merged into the category of trans MSM (*n* = 122). The analysis of the sub-sample excluded 56 AMAB trans men (53).

3.1.2 Demographics of the EMIS-2017 Respondents

The results demonstrate that AFAB trans men and AFAB men (median age 26.5 years) were younger than the AMAB participants (median age 37.5 years) of the European-wide respondents. Being out about their sexual attraction to men was least common in AMAB trans men, and they were more likely to have engaged in sex work recently. Cis men were less likely not to be earning money compared to the other three study groups. They were also more likely to be monosexual (i.e., only attracted to men), and attraction to women and (trans) non-binary people were mostly found in AFAB trans men (see Table 1) (28).

In the German sample, trans MSM were younger (median age 28.5 years) compared to cis MSM (median age 39 years). More than half (52.5%) of trans MSM were

found in the 18–29 age group compared to just over a quarter (26.4%) of cis MSM. Regarding income, similarities were found in the European sample. Based on their current income, not living comfortably was found more frequently among trans MSM (74.6% vs. 49.9%) compared to cis MSM (Table 2) (53). At a similar proportion, trans and cis MSM identified as “bisexual” (17.2% and 16.7%), but trans MSM were less likely to self-identify as “gay” or “homosexual” (48.4% vs. 78.3%) and used other terms more frequently (18.9% vs. 0.8%) or no term at all (13.9% vs. 3.6%). A higher probability of being single or having an uncertain relationship status was found among trans MSM (65.6% vs. 53.6% in cis MSM; see Table 2) (53).

Table 1: Demographic comparison of AMAB men, AMAB trans men, AFAB trans men, and AFAB men = Participants of the European MSM Internet Survey 2017 (n = 125,720) (28)

	AMAB men N=124,838	**AMAB trans men N=373**	**AFAB trans men N=498**	**AFAB men N=178**	**Probability (Chi-squared; ANOVA for age)**
Age: Median (range); Mean (s.d.) years	36 (14-89); 37.2 (12.8)	39 (16-83); 39.9 (14.8)	25 (15-79); 27.1 (9.1)	28 (17-64); 30.8 (11.1)	<0.001
Born abroad (%)	13.5	17.8	12.5	13.1	0.099
Single (%)	54.1	54.2	52.3	48.3	0.008
Not earning (%)	7.1	13.1	15.9	14.8	<0.001
Sexual attraction to women (%)	15.2	37.8	58.6	31.8	<0.001
Sexual attraction to non-binary people (%)	4.4	17.7	61.6	27.8	<0.001
Out about attraction to men (%)	58.8	35.2	74.9	60.6	<0.001
Recent sex work (%)	2.1	10.7	4.2	4.5	<0.001

Table 2: Demographic data of German trans MSM and cis MSM EMIS participants (n = 23,001) (53)

(Table 2 continuation on p. 19)

Variable	Trans MSM	Cis MSM	Univariable regression[1]	Regression adjusted for age[2]	p-value[3]
Overall	122 (0.5%)	22,879 (99.5%)	-	-	
Age (years)					
Median (IQR)	28.5 (23-37)	39 (29-49)	-	-	
14–17	4 (3.3%)	197 (0.9%)	1.92 (0.69–5.32)	-	0.211
18–29	64 (52.5%)	6,043 (26.4%)	1	-	-
30–39	27 (22.1%)	5,681 (24.8%)	0.45 (0.29–0.70)	-	**0.001**
40–49	19 (15.6%)	5,382 (23.5%)	0.33 (0.20–0.56)	-	**< 0.001**
50 and older	8 (6.5%)	5,576 (24.4%)	0.14 (0.06–0.28)	-	**< 0.001**

Table 2, continued (53)

Variable	Trans MSM	Cis MSM	Univariable regression[1]	Regression adjusted for age[2]	p-value[3]
Income					
Living comfortably	31 (25.4%)	11,466 (50.1%)	1	1	
Sexual identity					
Gay or homosexual	59 (48.4%)	17,918 (78.3%)	0.60 (0.36–0.99)	0.56 (0.34–0.93)	**0.024**
Bisexual	21 (17.2%)	3,818 (16.7%)	1	1	
Straight or heterosexual	2 (1.6%)	125 (0.6%)	2.91 (0.67–12.54)	2.63 (0.61–11.37)	0.196
Any other term	23 (18.9%)	175 (0.8%)	23.89 (12.97–44.01)	16.49 (8.87–30.66)	**< 0.001**
I don't usually use a term	17 (13.9%)	824 (3.6%)	3.75 (1.97–7.14)	3.24 (1.70–6.20)	**< 0.001**
Missing	-	19 (0.1%)	-	-	
Relationship Status					
Single or unsure	80 (65.6%)	12,257 (53.6%)	1.65 (1.13–2.40)	1.23 (0.84–1.81)	0.284
Steady partner	42 (34.4%)	10,599 (46.3%)	1	1	

[1]Univariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants. [2]Multivariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants adjusting for age. [3]p-values of adjusted regression. Statistically significant p-values ($p < 0.05$) are shown in bold.

3.1.3 Mental Health & Sexual Happiness of the EMIS-2017 Respondents

The European results demonstrated that AMAB men, AFAB trans men, and AFAB men were all more likely to suffer from poor mental health compared to cis men of the European EMIS-2017. Additionally, suicide/self-harm was significantly more likely to be found in AMAB men, AFAB trans men, and AFAB men and most likely found in AFAB trans men. Being AFAB was an indicator of significantly higher rates of anxiety and depression. Trans men (both AFAB & AMAB) were more likely to be sexually unhappy (see Table 3) (28).

Similar findings demonstrated the German sub-sample of which, based on their PHQ-4 score, trans MSM were more likely to live with depression and/or anxiety and to feel suicidal on some days compared to cis respondents. Trans MSM were also more often unhappy with their sex life (see Table 4).

Table 3: Mental health & sexual happiness indicators among European EMIS-2017 participants (n = 125,720) (28)

	Severe anxiety & depression (PHQ4) score			Thoughts of suicide / self-harm, last 2 weeks			Sexually unhappy (self-rating 1-4 out of 10)		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	7.6	1.00	1.00	20.7	1.00	1.00	22.3	1.00	1.00
AMAB trans men N=373	6.7	0.88 (0.58-1.33)	0.81 (0.53-1.24)	26.9	1.41 (1.12-1.78)	**1.38 (1.09-1.75)**	29.4	1.45 (1.15-1.81)	**1.41 (1.12-1.77)**
AFAB trans men N=498	22.7	3.55 (2.87-4.39)	**2.45 (1.97-3.04)**	50.1	3.84 (3.22-4.58)	**2.94 (2.46-3.52)**	35.3	1.90 (1.58-2.29)	**1.67 (1.39-2.02)**
AFAB men N=178	16.7	2.42 (1.63-3.61)	**1.86 (1.25-2.81)**	33.0	1.88 (1.37-2.58)	**1.55 (1.12-2.13)**	26.7	1.27 (0.90-1.79)	1.17 (0.82-1.65)

[1]Univariable logistic regression model with EMIS-2017 participants. [2]Multivariable logistic regression model with EMIS-2017 participants adjusting for age, country, and employment. Statistically significant p-values ($p < 0.05$) after adjustment are shown in bold. OR=Odds ratio; CI=Confidence Interval.

Table 4: Mental health & sexual happiness data of German trans MSM and cis MSM EMIS participants (n = 23,001) (53) (Table 4 continuation on p. 21)

Variable	Trans MSM	Cis MSM	Univariable regression[1]	Regression adjusted for age[2]	p-value[3]
Living with depression/anxiety					
Normal	42 (34.4%)	13,463 (58.8%)	1	1	
Mild	44 (36.1%)	6,190 (27.1%)	2.28 (1.49–3.48)	1.97 (1.29–3.02)	**0.002**
Moderate	15 (12.3%)	1,729 (7.6%)	2.78 (1.54–5.03)	2.14 (1.18–3.88)	**0.012**
Severe	18 (14.8%)	1,133 (5%)	5.09 (2.92–8.88)	3.90 (2.22–6.83)	**< 0.001**
Missing	3 (2.5)	364 (1.6%)			
Suicidal ideation					
Yes, at least some days	50 (41%)	3,523 (15.5%)	3.79 (2.64–5.44)	3.27 (2.27–4.72)	**< 0.001**
Never	72 (59%)	19,211 (84.5%)	1	1	-
Missing	-	-	-	-	-
Sexual happiness					
Unhappy (1–4)	41 (33.6%)	5,106 (22.3%)	1.89 (1.29–2.77)	1.82 (1.24–2.67)	**0.002**
Happy (5–10)	73 (59.8%)	17,182 (75.1%)	1	1	-
Missing	8 (6.6%)	591 (2.6%)	-	-	-

Table 4, continued (53)

[1]Univariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants. [2]Multivariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants adjusting for age. [3]p-values of adjusted regression. Statistically significant p-values ($p < 0.05$) are shown in bold.

3.1.4 Sexual Health, HIV/STI Status & Prevention of the EMIS-2017 Respondents

In contrast to the results above, AFAB and AMAB trans men and AFAB men were less likely to have been diagnosed with HIV or other STIs compared to cis participants of the European-wide study. Only a few non-cis respondents were diagnosed with HIV in the past 12 months prior to the study (see Table 5) (28). Outcomes from the German subsample also demonstrated that trans MSM were less likely to be living with HIV but were also less likely to have ever received an HIV test result (see Table 6) (53).

Table 5: HIV & STI diagnosis data of European EMIS-2017 participants (n = 125,720) (28) (Table 5 continuation on p. 22)

	Syphilis diagnosis last 12 months			**Gonorrhoea diagnosis last 12 months**			**Living with diagnosed HIV**		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	4.4	1.00	1.00	5.3	1.00	1.00	10.5	1.0	1.0
AMAB trans men N=373	4.5	1.02 (0.62-1.69)	1.01 (0.61-1.67)	2.0	0.37 (0.17-0.77)	**0.38 (0.18-0.80)**	7.1	0.66 (0.44-0.98)	**0.50 (0.33-0.76)**
AFAB trans men N=498	0.6	0.13 (0.04-0.41)	**0.14 (0.05-0.45)**	2.9	0.53 (0.31-0.90)	**0.48 (0.28-0.82)**	1.0	0.09 (0.04-0.21)	**0.12 (0.05-0.29)**
AFAB men N=178	2.3	0.51 (0.19-1.38)	0.54 (0.20-1.45)	1.7	0.32 (0.10-0.99)	**0.30 (0.10-0.94)**	3.5	0.31 (0.14-0.69)	**0.64 (0.16-0.83)**

	HIV diagnosis last 12 months		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	1.1	1.00	1.00
AMAB trans men N=373	0.0	--	--
AFAB trans men N=498	0.02	0.18 (0.03-1.31)	0.16 (0.02-1.13)
AFAB men N=178	0.00	--	--

Table 5, continued (28)

[1]Univariable logistic regression model with EMIS-2017 participants. [2]Multivariable logistic regression model with EMIS-2017 participants adjusting for age, country, and employment. Statistically significant p-values ($p < 0.05$) after adjustment are shown in bold. OR=Odds ratio; CI=Confidence Interval.

Table 6: HIV diagnosis data of German trans MSM and cis MSM EMIS participants (n = 23,001) (53).

Variable	Trans MSM	Cis MSM	Univariable regression[1]	Regression adjusted for age[2]	p-value[3]
Received HIV+ diagnosis					
Yes	3 (2.5%)	2,448 (10.7%)	0.21 (0.07–0.66)	0.33 (0.10–1.04)	0.059
No	118 (96.7%)	20,242 (88.5%)	1	1	-
Missing	1 (0.8%)	189 (0.8%)	-	-	-

[1]Univariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants. [2]Multivariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants adjusting for age. [3]p-values of adjusted regression. Statistically significant p-values ($p < 0.05$) are shown in bold.

3.1.5 Sexual Behavior & HIV/STI Prevention of the EMIS-2017 Respondents

In both analyses (European and German), trans participants (AFAB trans men, AFAB men; trans MSM) demonstrated less sexual risk behavior compared to cis participants. In the European sample, AFAB trans men were less likely to have multiple condomless steady and non-steady sexual partners. The results also indicate a significantly smaller number of condomless sexual interactions with a non-steady male partner of unknown HIV status for both AFAB trans men and AFAB men. Additionally, having difficulty saying no to sex they do not want was significantly more common among AFAB and AMAB trans men and AFAB men and was highest among AFAB trans men (see Table 7) (28).

Of the German sample, most trans respondents responded that they did not have a steady sexual partner and were also less likely to have multiple non-steady sexual partners compared to the cis sample. Using stimulant drugs for sex (chemsex) in the past 12 months before participation in the study was similar in both study groups (see Table 10).

German trans MSM were less likely ever getting tested for HIV compared to the cis sample (53). Disagreeing with the statements “The sex I have is always as safe as I want to be” was also more commonly found among trans MSM than among cis MSM (see Table 10) (53).

Although AFAB and AMAB trans men display less sexual behavior associated with HIV risk, they were less likely to have ever gotten an HIV test result in the first place and were less likely to have had an HIV test in the past 12 months before study participation

or underwent a comprehensive STI screening. They were also less knowledgeable about "U=U," to have never heard of PrEP, or were less likely to be offered a hepatitis vaccination. The use of PrEP as an effective HIV prevention method was more commonly found among cis respondents. Specifically, AFAB trans men were significantly less likely to use this prevention option. The results above are similar for AFAB men; however, the confidence interval overlaps the null hypothesis in some results (see Table 8 & 9) (28).

The number of trans MSM ever having tested for STIs (other than HIV) was smaller than those of cis MSM, and ever having tested for (non-HIV) sexually transmitted infections was less common than HIV testing among both study groups. Similarities of the German participants with the European results were found in regard to PrEP. Trans MSM were (numerically) less likely to have heard of PrEP before or being used by trans MSM compared to cis MSM. Talking to a healthcare provider about PrEP was also less common among trans respondents compared to cis participants of the study (see Table 10) (53).

Table 7: Risk and precaution behaviors among European EMIS-2017 participants (n = 125,720) (Table 7 continuation on p. 24) (28)

	Condomless intercourse with 2+ steady men, last 12m			**Sex of any kind with 5+ non-steady men, last 12m**			**Condomless intercourse with 1+ non-steady man of unknown HIV status, last 12m**		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	8.5	1.00	1.00	45.1	1.00	1.00	23.9	1.00	1.00
AMAB trans men N=373	14.0	1.74 (1.29-2.34)	**1.67 (1.24-2.26)**	39.3	0.75 (0.61-0.93)	**0.75 (0.60-0.93)**	20.2	0.80 (0.62-1.04)	0.79 (0.61-1.01)
AFAB trans men N=498	3.7	0.41 (0.26-0.65)	**0.44 (0.28-0.71)**	13.3	0.19 (0.14-0.24)	**0.21 (0.17-0.28)**	13.3	0.49 (0.38-0.63)	**0.51 (0.39-0.66)**
AFAB men N=178	7.5	0.87 (0.49-1.53)	0.91 (0.52-1.60)	25.6	0.42 (0.30-0.59)	**0.46 (0.32-0.64)**	8.5	0.30 (0.17-0.50)	**0.30 (0.18-0.51)**

	Stimulant drugs used to make sex last longer or more intense, last 4 weeks			**Injected drugs to get high, last 12m**			**Currently taking PrEP (among those not diagnosed HIV positive)**		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	5.3	1.00	1.00	1.2	1.00	1.00	3.1	1.00	1.00
AMAB trans men N=373	3.6	0.67 (0.39-1.17)	0.64 (0.37-1.12)	0.8	0.70 (0.22-2.17)	0.63 (0.20-1.97)	2.6	0.84 (0.43-1.63)	0.81 (0.42-1.58)

Table 7, continued (28)

	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AFAB trans men N=498	2.6	0.49 (0.28-0.84)	**0.55 (0.31-0.96)**	1.0	0.86 (0.36-2.08)	1.01 (0.42-2.45)	1.0	0.32 (0.13-0.78)	**0.39 (0.16-0.93)**
AFAB men N=178	2.3	0.43 (0.16-1.14)	0.46 (0.17-1.23)	0.0	--	--	1.8	0.57 (0.18-1.77)	0.63 (0.20-1.97)

[1]Univariable logistic regression model with EMIS-2017 participants. [2]Multivariable logistic regression model with EMIS-2017 participants adjusting for age, country, and employment. Statistically significant p-values ($p < 0.05$) after adjustment are shown in bold. OR=Odds ratio; CI=Confidence Interval.

Table 8: Indicators of unmet health promotion needs among European EMIS-2017 participants (n = 125,720) (28) (Table 8 continuation on p. 25)

	Low social integration and/or reliable alliance			**High internalized homonegativity**			**Disagrees with 'The sex I have is always as safe as I want to be'**		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	11.6	1.00	1.00	12.3	1.00	1.00	11.1	1.00	1.00
AMAB trans men N=373	19.8	1.89 (1.30-2.73)	**1.72 (1.19-2.51)**	15.8	1.35 (0.85-2.12)	1.34 (0.85-2.12)	10.3	0.92 (0.66-1.29)	0.88 (0.63-1.24)
AFAB trans men N=498	16.3	1.49 (1.06-2.10)	1.28 (0.91-1.82)	1.1	0.08 (0.02-0.32)	**0.07 (0.02-0.29)**	14.3	1.34 (1.04-1.72)	1.28 (0.99-1.65)
AFAB men N=178	14.5	1.30 (0.66-2.53)	1.19 (0.61-2.35)	12.8	1.05 (0.54-2.05)	0.97 (0.50-1.88)	14.9	1.40 (0.92-2.12)	1.35 (0.89-2.05)

	Disagrees with 'I find it easy to say 'no' to sex I don't want'			**Condomless intercourse solely because lacked condom, last 12m**			**Concerned about drug use**		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	8.5	1.00	1.00	25.7	1.00	1.00	4.5	1.00	1.00
AMAB trans men N=373	12.8	1.58 (1.16-2.14)	**1.61 (1.18-2.19)**	32.0	1.36 (1.09-1.70)	**1.36 (1.10-1.70)**	4.4	0.98 (0.59-1.61)	0.91 (0.54-1.53)
AFAB trans men N=498	22.8	3.18 (2.58-3.93)	**2.79 (2.26-3.45)**	15.6	0.53 (0.42-0.68)	**0.48 (0.38-0.61)**	3.8	0.86 (0.54-1.36)	0.76 (0.48-1.20)
AFAB men N=178	15.3	1.95 (1.29-2.94)	**1.78 (1.18-2.69)**	23.4	0.89 (0.62-1.26)	0.82 (0.58-1.17)	4.0	0.90 (0.42-1.92)	0.82 (0.39-1.76)

Table 8, continued (28)

	Not confident to access PEP (among those without diagnosed HIV)			Not heard of PrEP			Does not know U=U		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	59.9	1.00	1.00	36.5	1.00	1.00	42.3	1.00	1.00
AMAB trans men N=373	67.8	1.41 (1.12-1.77)	**1.46 (1.15-1.84)**	70.3	4.13 (3.29-5.18)	**4.19 (3.33-5.27)**	61.7	2.20 (1.78-2.72)	**2.28 (1.84-2.82)**
AFAB trans men N=498	67.0	1.36 (1.13-1.64)	1.17 (0.97-1.42)	41.4	1.23 (1.03-1.47)	1.18 (0.99-1.41)	43.8	1.07 (0.89-1.27)	0.99 (0.83-1.18)

	Not sure / I don't know HIV status			Does not know where to HIV test (among those never HIV tested)			Does not know where to get hepatitis B vaccination (among those vulnerable to it)		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	3.8	1.00	1.00	41.2	1.00	1.00	54.1	1.00	1.00
AMAB trans men N=373	9.0	2.50 (1.74-3.58)	**2.47 (1.72-3.54)**	47.5	1.29 (0.91-1.85)	**1.70 (1.18-2.47)**	56.7	1.11 (0.84-1.46)	1.08 (0.82-1.42)
AFAB trans men N=498	2.2	0.57 (0.31-1.03)	**0.48 (0.26-0.87)**	48.0	1.31 (1.01-1.71)	1.01 (0.77-1.32)	59.3	1.23 (0.99-1.53)	1.09 (0.88-1.36)
AFAB men N=178	6.3	1.69 (0.91-3.10)	1.49 (0.81-2.76)	48.5	1.34 (0.83-2.18)	1.09 (0.67-1.77)	55.4	1.05 (0.72-1.53)	0.97 (0.66-1.41)

[1]Univariable logistic regression model with EMIS-2017 participants. [2]Multivariable logistic regression model with EMIS-2017 participants adjusting for age, country, and employment. Statistically significant p-values ($p < 0.05$) after adjustment are shown in bold. OR=Odds ratio; CI=Confidence Interval.

Table 9: Exposure to (positive sexual health and negative homophobic) interventions among European EMIS-2017 participants (n = 125,720) (28) (Table 9 continuation on p. 26)

	Saw or heard information about HIV/STIs for MSM, last 12m			Got free condoms from NGOs, clinics, bars or saunas, last 12m			Tested for HIV in last 12m (among those not already diagnosed with HIV 12m ago)		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	74.3	1.00	1.00	32.6	1.00	1.00	56.0	1.00	1.00
AMAB trans men N=373	56.8	0.46 (0.37-0.56)	**0.47 (0.38-0.57)**	21.7	0.57 (0.45-0.74)	**0.54 (0.42-0.70)**	43.8	0.61 (0.50-0.76)	**0.61 (0.49-0.75)**
AFAB trans men N=498	75.7	1.08 (0.88-1.32)	0.99 (0.81-1.22)	40.3	1.40 (1.17-1.67)	**1.55 (1.30-1.86)**	36.4	0.45 (0.38-0.54)	**0.46 (0.38-0.55)**
AFAB men N=178	71.0	0.85 (0.61-1.17)	0.80 (0.58-1.12)	30.3	0.90 (0.65-1.24)	0.95 (0.69-1.32)	42.4	0.58 (0.43-0.78)	**0.58 (0.43-0.77)**

Table 9, continued (28)

	Comprehensive STI screen last 12m (among those not already diagnosed with HIV 12m ago)			Ever been offered any hepatitis vaccination			Ever spoken to about PrEP at health service (among those not diagnosed with HIV)		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	12.9	1.00	1.00	56.4	1.00	1.00	9.7	1.00	1.00
AMAB trans men N=373	8.4	0.62 (0.42-0.90)	**0.60 (0.41-0.88)**	43.2	0.59 (0.47-0.73)	**0.60 (0.48-0.75)**	6.2	0.56 (0.36-0.88)	**0.56 (0.36-0.88)**
AFAB trans men N=498	7.7	0.56 (0.40-0.78)	**0.59 (0.42-0.82)**	41.9	0.56 (0.46-0.68)	**0.59 (0.49-0.72)**	6.4	0.64 (0.45-0.92)	**0.64 (0.45-0.92)**
AFAB men N=178	8.8	0.65 (0.38-1.11)	0.67 (0.40-1.14)	50.3	0.78 (0.58-1.06)	0.82 (0.60-1.11)	10.3	1.08 (0.65-1.78)	1.08 (0.65-1.78)

	Received verbal insults because attracted to men, last 12 months		
	%	OR (95%CI), unadjusted[1]	OR (95%CI), adjusted[2]
AMAB men N=124,838	20.8	1.00	1.00
AMAB trans men N=373	26.8	1.40 (1.11-1.77)	1.55 (1.21-1.97)
AFAB trans men N=498	36.4	2.19 (1.82-2.63)	1.43 (1.19-1.72)
AFAB men N=178	31.3	1.73 (1.26-2.39)	1.33 (0.96-1.84)

[1]Univariable logistic regression model with EMIS-2017 participants. [2]Multivariable logistic regression model with EMIS-2017 participants adjusting for age, country, and employment. Statistically significant p-values ($p < 0.05$) after adjustment are shown in bold. OR=Odds ratio; CI=Confidence Interval.

Table 10: Sexual behaviour & HIV/STI prevention data of German trans MSM and cis MSM EMIS participants (n = 23,001) (53) (Table 10 continuation on p. 27/28)

Variable	Trans MSM	Cis MSM	Univariable regression[1]	Regression adjusted for age[2]	p-value[3]
Sex is always as safe as I want					
Agree	100 (82%)	20,386 (89.1%)	1	1	-
Disagree	22 (18%)	2,394 (10.5%)	1.87 (1.18–2.98)	1.77 (1.11–2.82)	**0.016**
Missing	-	99 (0.4%)	-	-	-

Table 10, continued (53)

Variable	Trans MSM	Cis MSM	Univariable regression[1]	Regression adjusted for age[2]	p-value[3]
Number of steady sexual partners in the past 12 months					
0	92 (75.4%)	13,350 (58.4%)	1	1	-
1	27 (22.1%)	6,940 (30.3%)	0.56 (0.37–0.87)	0.51 (0.33–0.79)	**0.002**
2	3 (2.5%)	1,074 (4.6%)	0.42 (0.31–1.32)	0.40 (0.13–1.28)	0.123
3 or more	0 (0%)	1,348 (5.9%)	-	-	-
Missing	-	194 (0.9%)	-	-	-
Number of non-steady sexual partners in the past 12 months					
0	74 (60.7%)	8,531 (37.3%)	1	1	-
1–3	28 (22%)	6,129 (26.8%)	0.53 (0.34–0.81)	0.54 (0.35–0.84)	**0.006**
4–10	13 (10.7%)	4,373 (19.1%)	0.34 (0.19–0.62)	0.36 (0.20–0.64)	**0.001**
11 or more	7 (5.7%)	3,518 (15.4%)	0.23 (0.11–0.50)	0.26 (0.12–0.57)	**0.001**
Missing	-	328 (1.4)	-	-	-
Chemsex in the past 12 months					
Yes	10 (8.2%)	2,145 (9.4%)	0.86 (0.45–1.64)	0.89 (0.46–1.70)	0.715
No	111 (91%)	20,420 (89.3%)	1	1	-
Missing	1 (0.8%)	314 (1.4%)	-	-	-
Ever received an HIV test result					
Yes	71 (58.2%)	17,411 (76.1%)	0.44 (0.31–0.63)	0.63 (0.43–0.93)	**0.018**
No	50 (41%)	5,390 (23.6%)	1	1	-
Missing	1 (0.8%)	78 (0.3%)	-	-	-
Ever tested for STIs					
Yes	55 (45.1%)	12,427 (54.3%)	0.67 (0.47–0.96)	0.84 (0.58–1.21)	0.358
No	67 (54.9%)	10,215 (44.7%)	1	1	-
Missing	-	237 (1%)	-	-	-
Ever talked to healthcare provider about PrEP					
Yes	2 (1.6%)	1,644 (7.2%)	0.22 (0.05–0.87)	0.22 (0.06–0.91)	**0.036**
No	119 (97.5%)	21,121 (92.3%)	1	1	-
Missing	1 (0.8%)	114 (0.5%)	-	-	-

Table 10, continued (53)

Variable	Trans MSM	Cis MSM	Univariable regression[1]	Regression adjusted for age[2]	p-value[3]
Ever used PrEP					
Yes	1 (0.8%)	491 (2.2%)	1	1	-
No	121 (99.2%)	22,234 (97.2%)	0.37 (0.05–2.68)	0.40 (0.06–2.88)	0.363
Missing	-	154 (0.7%)	-	-	-

[1]Univariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants. [2]Multivariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants adjusting for age. [3]p-values of adjusted regression. Statistically significant p-values ($p < 0.05$) are shown in bold.

3.2.1 Sample Size & Demographics of the PrApp Study Respondents

The total number of responses from current PrEP users residing in Germany in this study is 4,350, of which 1,728 participants responded in the first wave, and 2,622 participated in the second wave of the study. In the first wave, the total number of trans and gender-diverse (TGD) respondents was 0.9% (16/1,712) and 1.9% (49/2,622) in wave number two (see Table 11).

In the first wave, the results included seven trans participants, four intersex participants, and four non-binary participants. In the second wave, based on the responses, 16 trans male or male and assigned female at birth participants, four trans female or female and assigned male at birth participants, one intersex participant, 25 non-binary participants, and three participants indicated ‘other’ for their gender identity were identified. The results found that TGD participants were younger compared to cis respondents, with a median age of 29 years (37 years in cis respondents) (see Table 11). More than half of the TGD participants (52.3%) were aged 18–29 years, in contrast to a bit more than one-fifth (21.6%) of cis PrEP users in Germany (11).

The socioeconomic disposition of TGD respondents was worse than those of cis respondents. More than half of TGD participants (56.9%) indicated having a gross annual income of EUR 30,000 or less, compared to 22.6% of cis participants. The origin of TGD participants was also more likely to be from outside of Germany. Just over one-third (33.8%) of TGD participants (compared to 18.5% of cis participants) who were PrEP users were not from Germany. Additionally, more TGD individuals (35.4%) compared to cis respondents (13.5%) responded to the survey in languages other than German (see Table 11) (11).

Table 11: Demographic data of trans and gender diverse (TGD) and cis male pre-exposure prophylaxis (PrEP) users: Results of univariable and multivariable regression (n = 4,350) (11).

Variable	TGD participants	Cis participants	Univariable regression[1]	p-value	Regression adjusted for age[2]	p-value[3]
Overall	65 (1.5%)	4,285 (98.5%)				
Age (years)						
Median (IQR)	29 (26–34)	37 (30–45)				
18–29	34 (52.3%)	924 (21.6%)	2.8 (1.6–4.8)	**<0.001**		
30–39	21 (32.3%)	1,584 (37.0%)	1			
40–49	5 (7.7%)	1,191 (27.8%)	0.3 (0.1–0.8)	**0.021**		
50–80	5 (7.7%)	586 (13.7%)	0.6 (0.2–1.7)	0.378		
Gross annual income						
<30,000 Euro	37 (56.9%)	968 (22.6%)	6.3 (3.5–11.4)	**<0.001**	4.4 (2.4–8.2)	**<0.001**
≥30,000 Euro	16 (24.6%)	2,653 (61.9%)	1		1	
Missing	12 (18.5%)	664 (15.5%)	–		–	
Origin						
Germany	22 (33.8%)	2,509 (58.6%)	1		1	
Outside Germany	22 (33.8%)	791 (18.5%)	3.2 (1.7–5.8)	**<0.001**	2.5 (1.3 –4.5)	**0.004**
Missing	21 (32.3%)	985 (23%)	–		–	
Language						
German	42 (64.6%)	3,707 (86.5%)	1		1	
Other language[4]	23 (35.4%)	578 (13.5%)	3.5 (2.1–5.9)	**<0.001**	2.6 (1.5 –4.4)	**0.001**

[1] Univariable logistic regression model with 4,285 cis and 65 TGD current PrEP users in Germany. [2] Multivariable logistic regression model with 4,285 cis and 65 TGD current PrEP users in Germany, adjusted for age. [3] p-values of age-adjusted regression. Statistically significant p-values ($p < 0.05$) are shown in bold. [4] The online survey was available in German, English, French, Spanish, Arabic and Turkish.

3.2.2 PrEP Use, HIV Testing Uptake & Sexual Behavior of the PrApp Study Respondents

Daily use of PrEP as an HIV prevention method was most common among all study participants. However, on-demand or intermittent use was more common among TGD study participants (43.1%) in comparison to cis respondents (29.3%) (see Table 12). Obtaining PrEP from informal sources (buying/getting it abroad, on the Internet, from dealers or friends) was found in more than one-quarter of TGD respondents (26.2%) in contrast to 14.7% of cis PrEP users in Germany. During PrEP use, TGD and cis study respondents reported similar testing behaviors. However, numerically TGD respondents were less likely to get tested for HIV before initial PrEP use (76.9% in TGD and 86.4% in cis) (see Table 12) (11).

For the questions about the number of vaginal/front hole and anal/back hole sexual interactions during the six months prior to the study and condom use, similar results were found in both groups of respondents. Having had 4–10 anal/back hole and/or vaginal/front hole sexual partners was found in 29.2% of TGD participants in comparison to 31% of cis respondents. Moreover, 46.2% of TGD and 47.9% of cis participants reported having had ten or more anal/back hole and/or vaginal/front hole sexual partners in the six months before the study participation (see Table 12). One-fifth (20%) of both study groups responded to having used condoms always or often, but the TGD participants were more likely to use condoms half of the time or less compared to cis participants (67.7% vs. 72.5%) (11).

Table 12: Pre-exposure prophylaxis (PrEP) use and sexual behaviour of trans and gender diverse (TGD) and cis male PrEP users (n = 4350) (11) (Table 12 continuation on p. 31)

Variable	TGD participants	Cis participants	Univariable regression[1]	p-value	Regression adjusted for age[2]	p-value[3]
Overall	65 (1.5%)	4,285 (98.5%)				
Type of PrEP use						
Daily	33 (50.8%)	2,902 (67.7%)	1		1	
On demand	28 (43.1%)	1,256 (29.3%)	2.0 (1.1–3.7)	**0.020**	1.9 (1.0–3.5)	**0.037**
Missing	4 (6.2%)	127 (3.0%)	–		–	
PrEP source						
Prescription	39 (60.0%)	3,269 (76.3%)	1		1	
Informal	17 (26.2%)	631 (14.7%)	2.2 (1.2–4.3)	**0.017**	1.8 (0.9–3.5)	0.091
Missing	9 (13.8)	385 (9.0%)	–		–	
Condom use						
Always/often	13 (20.0%)	857 (20.0%)	1.1 (0.6–2.3)	0.714	1.0 (0.5–2.0)	0.976
Half the time or less	44 (67.7)	3,107 (72.5%)	1		1	
Missing	8 (12.3%)	321 (7.5%)	–		–	
Number of anal (back hole)/vaginal (front hole) sexual partners within the last 6 months						
0–3 partners	8 (12.3%)	613 (14.3%)	1		1	
4–10 partners	19 (29.2%)	1,327 (31.0%)	1.3 (0.4–4.1)	0.639	1.4 (0.4–4.4)	0.558
>10 partners	30 (46.2%)	2,051 (47.9%)	1.9 (0.7–5.4)	0.240	2.0 (0.7 –5.7)	0.211
Missing	8 (12.3%)	294 (6.9%)	–		–	

Table 12, continued (11)

Variable	TGD participants (%)	Cis participants (%)	Univariable regression[1]	p-value	Regression adjusted for age[2]	p-value[3]
Tests before starting PrEP						
Yes	50 (76.9%)	3,704 (86.4%)	1		1	
No	3 (4.6%)	150 (3.5%)	2.1 (0.7–7.1)	0.208	1.7 (0.5–5.6)	0.397
Missing	12 (18.5%)	431 (10.1%)	–		–	-
Tests during PrEP use						
Yes	47 (72.3%)	3,382 (78.9%)	1		1	
No	7 (10.8%)	369 (8.6%)	1.3 (0.5–3.3)	0.618	1.1 (0.4–2.8)	0.845
Missing	11 (16.9%)	534 (12.5%)	–		–	

[1] Univariable logistic regression model with 3,258 cis and 44 TGD current PrEP users in Germany. Participants with missing data for income and country of origin were excluded from the analysis. [2] Multivariable logistic regression model with 3,258 cis and 44 TGD current PrEP users in Germany, adjusted for income and origin. [3] p-values of age-adjusted regression. Statistically significant p-values ($p < 0.05$) are shown in bold.

4. Discussion

The ‘one size fits all’ approach does not apply to the different experiences, needs, and vulnerabilities of the different identities within the male spectrum. In the past, transfeminine identities have been falsely subsumed in HIV prevention trials among cis MSM, whereas transmasculine individuals who may identify as MSM have mostly been excluded from those trials until today. The analyses included in this paper can be used to portray the experiences of European transmasculine, AFAB men, and non-binary identities (only in the analysis of the PrApp study) in relation to their sexual health and compare the outcomes to those of cis men. The data presented from the German context shed light on the sexual health needs of trans MSM and the use of PrEP in gender-diverse communities in Germany for the first time (11, 28, 53).

A uniting factor in all three analyses is that trans men, AFAB men, and gender-diverse individuals face adverse socioeconomic dispositions. In contrast to cis men, this group is struggling financially at a much higher rate, which has been found in previous studies (8, 61, 62). There might be different reasons for this situation. The younger age of trans men, AFAB men, and gender-diverse individuals in both studies and experiences of discrimination in education and professional settings might account for this outcome (8, 11, 28, 33, 53). There are different reasons why individuals work in the sex industry, and one of the reasons might be financially difficult circumstances. In both studies, non-cis participants were more likely to engage in sex work, which might increase their risk of HIV and other STI infections (4).

The results of higher levels of mental health-related issues and suicidality among trans men and AFAB men in the EMIS-2017 study are in accordance with the outcomes of previous studies (8). While researchers have suggested that individuals with mental health issues are more frequently getting tested for HIV, poor mental health indicates higher HIV prevalence (62). As testing rates among transmasculine persons are generally low, it is unclear if transmasculine identities with poor mental health are getting tested more often (39). Additionally, the European analysis suggests that AFAB study participants are more likely to identify as bisexual, pansexual, or label themselves with other terms. Researchers have found that bisexual people are more likely to have mental health-related issues than individuals attracted to only one gender (63). As access to gender-affirming care positively influences the mental health of trans people (22), research on the correlation between access to gender-affirming care and HIV testing in

trans identities is necessary. Additionally, combined mental and sexual health services could be beneficial specifically for the transmasculine community (11, 28, 53).

Sexual risk behavior differed between the EMIS-2017 and the PrApp study. Where the EMIS-2017 AFAB trans men and AFAB men were less likely to engage in multiple sexual partners, similarities in the number of sexual partners were found between TGD and cis respondents of the PrApp study. Researchers have suggested that trans people are less likely to be considered dating partners (64), which might be one of the reasons why they engage with a lower number of steady and non-steady partners. Additionally, trans people more frequently indicate having difficulties initiating sexual contact (65), and trans men often experience anxiety when thinking about their sex life (66). AFAB trans men and AFAB men (trans MSM in the German analysis) are more often found to be unhappy with their sexual life, which is also directly linked to struggling to find sexual partners. Being positively affirmed in their gender by cis MSM has been found to lower psychological distress and anxiety in trans MSM (67) and may influence the levels of sexual (un-) happiness in trans MSM (11, 28, 53).

Although sexual health risk measured by the number of steady and non-steady partners was lower in AFAB trans men and AFAB men, the EMIS-2017 results demonstrated an additional layer of risk. AFAB respondents were more likely to have difficulties saying no to sex they do not want and that the sex they have is not always as safe as they want. The lack of safer sex negotiation skills among trans men was found in previous research and poses a great risk for HIV and other STI exposure for this group (28, 31, 53).

Access to sexual health services was limited in multiple ways. In accordance with the findings of previous research on testing frequencies in trans populations (39, 68), the analyses presented here depict a similar picture. The results from the EMIS-2017 demonstrate that AFAB trans men and AFAB men are less likely to be diagnosed with HIV but also get tested less often than cis respondents. Previous US-based research has demonstrated that testing rates for HIV and other bacterial STIs are low among trans MSM, particularly among younger participants (69). Being affirmed in their gender identity by cis MSM increases HIV testing among trans MSM (67).

In contrast to the findings of the EMIS-2017 study, the PrApp found no remarkable difference in HIV and STI testing between trans and cis respondents (11, 28, 53). To overcome identity-based stigma in healthcare settings or other structural barriers (i.e., pandemic-related obstacles accessing healthcare), research about HIV self-testing has

demonstrated positive results. For example, increasing uptake of HIV testing among trans men was found through HIV self-testing (70). Such testing opportunities require further research to explore HIV prevention effectiveness in transmasculine and AFAB trans populations.

However, differences between both study groups regarding the use of PrEP were found in both studies. Based on multiple factors, trans people, especially transmasculine identities, face several barriers in the healthcare system, affecting access to sexual health services. Globally trans people face high levels of stigma and discrimination when entering the healthcare sector. The outcomes of a European-wide study among Lesbian, Gay, Bisexual, Trans, and Inter (LGBTI) people has demonstrated that 34% of the trans participants were confronted with discrimination in healthcare or social service settings. Germany was one of the leading countries with disproportionate discrimination rates of 40% (33). An additional study from Europe demonstrated that trans men face discrimination stemming from healthcare providers (32); combined with fear of discrimination, this leads to postponing or avoiding healthcare, specifically by transmasculine identities (61). An additional layer of barriers is based on stereotypical assumptions about how and with whom trans men engage sexually. Stereotypical images and the lack of knowledge that some trans men are part of MSM sexual networks may influence sexual health service provision (71). Appropriate testing and prevention options may not be presented to transmasculine individuals facing an elevated risk of engaging sexually with other men by healthcare providers (11, 28, 53).

Although the EMIS-2017 data was collected before the formal rollout of PrEP in Germany, the European sample also demonstrated that AFAB trans men and AFAB men were less likely to have heard about PrEP, talked to their healthcare provider about PrEP, or used PrEP. Missing conversations about PrEP with healthcare providers and the low uptake of PrEP among transmasculine people has been demonstrated in previous research (28, 46, 47, 53).

The PrApp study also found that the TGD study respondents were more likely to obtain PrEP from informal sources and used PrEP “on-demand” more often than cis respondents. Not every trans person wishes to undergo physical gender-affirming steps, such as gender-affirming hormonal treatment. However, based on the lack of data on the efficacy of “on-demand” PrEP use in TGD people under gender-affirming hormonal treatment, there is no current recommendation for “on-demand” PrEP use for transmasculine individuals engaging in vaginal/front hole penetrative sex (44). Unfortunately, the PrApp

study did not ask if TGD respondents underwent any hormonal gender-affirming treatment, but the findings raise concerns about if they are using PrEP correctly. There is a great need for more clinical trials on the “on-demand” use of PrEP in the trans population, as well as more education and distribution of resources for both PrEP users and providers (11). Specifically targeted sexual health education, such as the brochure “Trans. Schwul. Teil der Szene.” (“Trans. Gay. Part of the Community.”) published by the Deutsche Aidshilfe (German AIDS Service Organization), can be used as valuable resources to spread adequate information (11, 28, 53)..

Additionally, peer-led services, such as CliniQ in London, UK (https://cliniq.org.uk/), can help to reduce access barriers to healthcare stemming from discrimination. Peer-led sexual health education has been connected to reduced HIV acquisition risk (72). Currently, in Germany, only two peer-led services offer sexual health services to trans people. In Berlin, Checkpoint BLN (Berlin) offers monthly peer testing and counseling (73), and in Munich, the Münchner Aidshilfe (Munich AIDS Service Organization) runs a similar service every three months (74). However, both services do not provide transmasculine-specific services, and the trans MSM community would benefit from targeted services (11, 28, 53).

4.1 Strengths & Limitations of the EMIS-2017 & PrApp Study

Both studies innovatively used data to depict the lived realities of trans MSM and trans PrEP users. The analyses presented in this paper are the first results of the specific needs and vulnerabilities of AFAB trans men, AFAB men, and other trans identities in Europe and, specifically, in Germany. Both for Europe and Germany, the results are the largest sample of transmasculine people (and non-binary, only in the PrApp Study) included in sexual health research to date. The data collected allows the first comparison of trans and cis MSM in relation to sexual health, providing a path for a better understanding of the needs of the trans MSM community and the possibility of targeting services to their sexual health needs more appropriately. Trans community members were consulted to review measures on gender identity and sex assigned at birth, and for the German subsample of the EMIS-2017 Study and the German PrApp Study, the analyses and drafting of the manuscript were conducted by a transmasculine researcher from Germany. However, the small sample size of trans participants in the EMIS-2017 and PrApp Study only

allows a glimpse of the lived experiences of this community, and further research is required (11, 28, 53).

In the initial data collection of the EMIS-2017 Study, the group of AMAB trans men was not anticipated. In the European context, with its diversity as a continent, a different understanding of gender identities and the use of many different languages describing gender diversity may contribute to the formation of this group. Additionally, for the German analysis, grouping trans-identified men with people assigned female at birth who identify simply as “men” is not ideal, as the latter group might reject an identification as trans. However, this seemed like the best choice for the analysis as a comparable group compared to cis men. It should also be highlighted that self-identification of trans people is a sensitive topic (11, 28, 53).

The samples of both data sets are self-selecting, although this does not guarantee an equal representation of different gender identities on the masculine spectrum. Transmasculine identities are often underrepresented in MSM studies. Subsequently, measures of the studies are self-reported and errors may occur (11, 28, 53).

5. Conclusions

The outcomes presented in this paper provide insights into the lived realities, vulnerabilities, sexual (risk) behavior, sexual happiness, and health promotion needs of European AFAB trans and non-binary people, particularly those living in Germany. The results demonstrate relative disadvantages in contrast to cis men. The difference between both groups was particularly present in relation to demographic factors (i.e., income), mental health and suicidality, sexual happiness, safer sex negotiation, uptake of HIV/STI testing, and HIV prevention in the form of PrEP, where the outcomes of AFAB trans men, AFAB men, and non-binary individuals were inferior to those of cis men (11, 28, 53).

Sexual health services, sexual health prevention campaigns, and especially HIV/STI prevention research need to improve how well they include the trans and gender-diverse population in their work. Capacity-building strategies tailored to the needs of transmasculine identities could improve health-seeking behaviors, safer sex and sexual boundary negotiation skills, sexual satisfaction, and decrease the risk of HIV/STI infections and related health inequalities in this population, especially those engaging sexually with other men. For the German context, healthcare providers and health policymakers need to learn more about the heterogenous aspects of transmasculine identities, their multifaceted demographic backgrounds, their bodily diversity, and the various ways this community lives their sexuality. Subsequently, sexual health interventions should be tailored to the needs of transmasculine individuals who have been neglected in the global HIV response (11, 28, 53).

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Eidesstattliche Versicherung

„Ich, Max Nicolai Tristan Appenroth, versichere an Eides statt durch meine eigenhändige Unterschrift, dass ich die vorgelegte Dissertation mit dem Thema: „Trans*gressive Gesellschaft: Eine intersektionale Perspektive auf den Zugang zur medizinischen Versorgung für trans Identitäten // Trans*gressing Society: An Intersectional Perspective on the Access to Healthcare for Trans Identities“ selbstständig und ohne nicht offengelegte Hilfe Dritter verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel genutzt habe.
Alle Stellen, die wörtlich oder dem Sinne nach auf Publikationen oder Vorträgen anderer Autoren*innen beruhen, sind als solche in korrekter Zitierung kenntlich gemacht. Die Abschnitte zu Methodik (insbesondere praktische Arbeiten, Laborbestimmungen, statistische Aufarbeitung) und Resultaten (insbesondere Abbildungen, Graphiken und Tabellen) werden von mir verantwortet.

Ich versichere ferner, dass ich die in Zusammenarbeit mit anderen Personen generierten Daten, Datenauswertungen und Schlussfolgerungen korrekt gekennzeichnet und meinen eigenen Beitrag sowie die Beiträge anderer Personen korrekt kenntlich gemacht habe (siehe Anteilserklärung). Texte oder Textteile, die gemeinsam mit anderen erstellt oder verwendet wurden, habe ich korrekt kenntlich gemacht.

Meine Anteile an etwaigen Publikationen zu dieser Dissertation entsprechen denen, die in der untenstehenden gemeinsamen Erklärung mit dem Erstbetreuer, angegeben sind. Für sämtliche im Rahmen der Dissertation entstandenen Publikationen wurden die Richtlinien des ICMJE (International Committee of Medical Journal Editors; www.icmje.og) zur Autor*innenschaft eingehalten. Ich erkläre ferner, dass ich mich zur Einhaltung der Satzung der Charité – Universitätsmedizin Berlin zur Sicherung Guter Wissenschaftlicher Praxis verpflichte.

Weiterhin versichere ich, dass ich diese Dissertation weder in gleicher noch in ähnlicher Form bereits an einer anderen Fakultät eingereicht habe.

Die Bedeutung dieser eidesstattlichen Versicherung und die strafrechtlichen Folgen einer unwahren eidesstattlichen Versicherung (§§156, 161 des Strafgesetzbuches) sind mir bekannt und bewusst.“

Datum Unterschrift

Declaration of Contribution to Publications

Max Nicolai Tristan Appenroth contributed to the subsequent publications as following:

Publication 1: Appenroth, M.N.; Koppe, U.; Hickson, F.; Schink, S.; Hahne, A.; Schmidt, A.J.; Weatherburn, P. & Marcus, U. “Sexual Happiness and Satisfaction with Sexual Safety Among German Trans Men Who Have Sex with Men: Results from EMIS-2017” JIAS Journal of the International Aids Society. 2022; 25 (S5): e25992.

Contribution in detail: Schmidt, A.J.; Hickson, F.; Weatherburn, P. and Marcus, U. designed the study. Schink, S. and Marcus, U. prepared the German subdata set for preanalysis. Appenroth, M.N.; Koppe, U. and Marcus, U. performed the analysis presented in this manuscript. Appenroth, M.N. wrote the first original draft and prepared tables 1 & 2 in the original publication (table 6 in this manuscript). All authors reviewed and revised the manuscript and agreed to its publication in this form (53).

Publication 2: Appenroth, M.N.; Marcus, U.; Albrecht, S.; Jansen, K.; Gunsenheimer-Bartmeyer, B.; Bremer, V. & Koppe, U. “Similar Sexual Behaviors, yet Different Outcomes: Comparing Trans and Gender-Diverse and Cis PrEP Users in Germany Based on the Outcomes of the PrApp Study” Sexes Journal. 2022; 3 (1): 178-188.

Contribution in detail: Koppe, U.; Marcus, U.; Jansen, K.; Gunsenheimer-Bartmeyer, B. & Bremer, V. designed the study. Koppe, U. and Albrecht, S. were involved in data preparation. Koppe, U. coordinated the study. Appenroth, M.N. and Koppe, U. performed the analysis. Appenroth, M.N. wrote the first draft of the manuscript and prepared tables 1 & 2 in the original publication (tables 7 & 8 in this manuscript). All authors reviewed the manuscript, contributed to it, and agreed to the published version of the manuscript (11).

Publication 3: Hickson, F.; Appenroth, M. N.; Koppe, U.; Schmidt, A. J.; Reid, D. & Weatherburn, P. “Sexual and Mental Health Inequalities Across Gender Identity and Sex-Assigned-at-Birth Among Men-Who-Have-Sex-with-Men in Europe: Findings from EMIS-2017” International Journal of Environmental Research and Public Health. 2020; 17 (20): 7379.

Contribution in detail: Schmidt, A.J.; Hickson, F.; Weatherburn, P. and Marcus, U. designed the study. Hickson, F. analyzed and evaluated the data. Hickson, F.; Appenroth, M. N.; Koppe, U. wrote the first original draft of the manuscript. Hickson, F. prepared table 1-5 in the original publication (tables 1-5 in thus manuscript). Schmidt, A. J.; Reid, D. & Weatherburn, P. reviewed and revised the manuscript. All authors have read the published version of the manuscript and agreed to its publication (28).

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Signature, Date, and Stamp of the First Supervising Professor

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Signature of the Doctoral Candidate

Printed Copies of the Publications

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RESEARCH ARTICLE

Sexual happiness and satisfaction with sexual safety among German trans men who have sex with men: results from EMIS-2017

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Abstract

Introduction: The population of men-who-have-sex-with-men (MSM) includes people who are on the masculine spectrum but were assigned female at birth (AFAB), that is trans MSM. This study aims to identify current circumstances regarding sexual happiness and safety among German trans MSM. To date, there is no health information about trans MSM in Germany, limiting the ability of MSM sexual health programmes to meet their needs.

Methods: Data were used from the European MSM Internet Survey (EMIS-2017), where people identifying as men and/or trans men were recruited through dating apps for MSM, community websites and social media to participate in an online survey. We analysed parameters on sexual happiness and satisfaction with sexual safety among Germany-based trans MSM and compared those to outcomes of MSM assigned male at birth (cis MSM) living in Germany using descriptive methods and logistic regression models adjusting for age.

Results: In total, 23,001 participants from Germany were included, of which 122 (0.5%) indicated to be AFAB (i.e. trans MSM). Trans MSM were markedly younger than cis participants (median age: 28.5 vs. 39 years).

Trans MSM more often reported being unhappy with their current sex life (adjusted odds ratio [aOR] = 1.82, 95% CI 1.24–2.67), had higher odds of disagreeing with the statements "the sex I have is always as safe as I want" ([aOR] = 1.82, 95% CI 1.24–2.67) and "I find it easy to say no to sex that I don't want" ([aOR] = 1.80, 95% CI 1.18–2.77).

Trans MSM were more likely to not be living comfortably financially ([aOR] = 2.43, 95% CI 1.60–3.67) and to be living with severe anxiety and/or depression ([aOR] = 3.90, 95% CI 2.22–6.83). Trans MSM were less likely to have ever tested for HIV ([aOR] = 0.63, 95% CI 0.43–0.93).

Conclusions: Sexual happiness, control of sexual boundaries, satisfaction with sexual safety, financial security, mental wellbeing and HIV testing were all lower in German trans MSM compared with cis MSM. Tailored sexual health interventions, contextualized with regard to needs and vulnerabilities, could address this inequality.

Keywords: trans MSM; trans men; gender diversity; HIV prevention; sexual happiness; MSM

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1 | INTRODUCTION

In the past 5 years, human immunodeficiency virus (HIV) prevention and research among men-who-have-sex-with-men (MSM) has increasingly included transmasculine people. Yet, little is known about individuals who are on the masculine spectrum and whose gender is different from their sex assigned at birth. HIV prevention and other sexual health data about trans MSM are scarce.

The World Health Organization has declared trans people as a key population in regard to HIV exposure [1] and this community, especially trans women of colour, is disproportionately affected by HIV and other sexually transmitted infections (STIs) [2–4]. However, little is known about trans community members who were assigned female at birth (AFAB; i.e. trans men, transmasculine individuals and AFAB men) [2]. A U.S.-based analysis of trans-inclusive research found laboratory-confirmed HIV infections in 3.2% of transmasculine participants [3]. Estimations suggest that currently, 1.2 million people are living with HIV in the United States [5], which represents about 0.36% of the U.S. population. Accordingly, transmasculine people appear to be more likely living with HIV than the general population. Due to a lack of research, estimations about HIV prevalence in transmasculine

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communities in other global regions are not possible at this point.

Although experiencing a possible elevated risk for HIV, testing rates among transmasculine people appear lower compared to cis gay and bisexual men [6]. Additionally, access and uptake of HIV pre-exposure prophylaxis (PrEP) have been limited in this group [7, 8]. Both issues were associated with poor knowledge of healthcare providers about the specific HIV risks and vulnerabilities of transmasculine individuals [6]. Many transmasculine people engage sexually with cis men [9–12]. Physical changes accompanying gender-affirming hormones (i.e. vaginal/front hole tissue changes and a greater need for using lubricants, when engaging in vaginal/front hole sex) [13] and difficulties navigating safer sex discussions [14–16] put transmasculine people at risk for STI/HIV infections. This risk comes alongside a lack of knowledge about trans-lived realities among healthcare providers. In healthcare settings, trans people are often confronted with gendered body stereotypes (e.g. norms like "all men have a penis"), heteronormative expectations (e.g. "trans men sexually engage only with cis women"), lack of trans-competent treatment knowledge by healthcare providers [17], alongside experiences of discrimination [18–21].

Overall sexual satisfaction in trans communities is understudied. Barriers to sexual satisfaction among trans individuals are difficulties creating sexual encounters and being afraid of sexual contact in general [22]. A study sample (n = 518) collected at three gender clinics in Belgium, the Netherlands and Germany included results of 307 trans women and 211 trans men. The results showed that 26% of trans women and 32% of trans men who indicated sexual problems found it difficult to initiate sexual contact. Additionally, 21% of trans women and 22% of trans men reported being afraid of sexual contact. Another study with cis and trans participants from Canada and the United States, regardless of their sexual orientation, found that 87.5% would not date a trans person [23]. Heterosexual cis men (96.7%) and cis women (98.2%) were most likely not to be interested in dating a trans person. Respondents identifying as bisexual, queer or non-binary (48.3%) were more likely to consider trans individuals as potential dating partners. An Australian-based study among trans people showed that 42.2% of trans men were anxious when thinking about their sex life [24].

When discussing a fulfilling sexual life in trans communities, it is crucial to acknowledge the importance of gender affirmation (e.g. being gendered correctly by others). Gender affirmation is directly linked to improved mental health [25], and although not all trans people undergo physical changes to align their bodies with their gender identity, access to such gender-affirming treatment minimizes negative body images [26]. Gender-confirming treatment has a positive influence on sexual feeling in trans women, but a greater impact is attributed to bodily satisfaction (e.g. feeling comfortable in a person's own body) [27]. Sexual confidence significantly improved in AFAB trans people who underwent masculinizing chest surgery [27, 28]. Besides multiple barriers to healthcare, the research found that sexual body image worries in trans populations are linked with poor sexual health outcomes. Higher self-esteem and sexual satisfaction were associated with stronger condom negotiation skills [29].

Currently, information on sexual happiness and sexual safety among trans MSM in Germany is lacking. The data about this group in Germany, collected through the European MSM Internet Survey 2017 (EMIS-2017) and presented in this article, is the first of its kind, and it will depict risks and vulnerabilities in regard to HIV/STIs faced by this community.

2 | METHODS

The data used for this analysis come from the European MSM Internet Survey 2017, a community-recruited online survey (EMIS-2017; www.emis2017.eu). Fieldwork occurred from 9 October 2017 to 31 January 2018 for self-completion of the questionnaire. Community-based recruitment occurred on targeted websites, apps and social media. Responses were included if individuals: identified as MSM, were legally old enough (in their country) to have sex with men, understood the purpose of the study and gave their consent to participate. A more detailed description of the methods has been published previously [30].

Based on the German EMIS sub-sample, we compared demographics, sexual behaviour, sexual happiness and satisfaction with sexual safety among German trans MSM with outcomes of German cis MSM using descriptive methods and logistic regression models adjusting for age.

2.1 | Participants

The analytic sub-sample for this paper was EMIS respondents living in Germany who provided valid responses about their sex assigned at birth and current gender identity.

In this report, we define trans MSM as people who are "men" or "trans men" (by self-identification) and female assigned at birth, and who are sexually attracted to and/or have sex with men. "Men" assigned male at birth (AMAB) are referred to as "cis" in this analysis. "Trans men" AMAB were excluded from this study.

2.2 | Outcome variables

The study asked for a number of demographic and sexual health information. The way in which questions were asked in detail with answer options has been described elsewhere [14].

Age was recorded in years and collapsed into five categories (14–17; 18–29; 30–39; 40–49; 50 and older). Financial coping was categorized into "living comfortably" and "not living comfortably" on current income. The sexual identity included the answers "gay/homosexual," "straight/heterosexual," "bisexual," "any other term" and "I don't usually use a term." Partnership status was dichotomized as "single or unsure" and "steady partner," and HIV diagnosis was captured through a "yes" or "no" answer to the question of whether participants ever received a positive HIV test result.

As for mental health, EMIS-2017 used the PHQ-4 to provide a combined indicator for anxiety and depression. Answers were measured with a standardized system of "normal," "mild," "moderate" and "severe." The question about feeling suicidal was categorized into "yes, at least some days" or "never."

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A numerical scale from 1 to 10 was offered to gather data about sexual happiness, and participants were asked "On a scale of 1 to 10 (where 1 is the most unhappy and 10 is the most happy), how happy are you with your sex life?" Answers were dichotomized into "unhappy" (1–4) and "happy" (5–10).

The answer regarding the number of steady male sexual partners in the past 12 months was categorized as "0," "1," "2," or "3 or more," and the answer to the question about the number of non-steady male sexual partners in the past 12 months was grouped into four categories (0, 1–3, 4–10 and 11 or more).

Participants were asked whether they "agree" or "disagree" with the statements "the sex I have is always as safe as I want to be" and "I find it easy to say 'no' to sex I don't want" to assess their safer sex self-efficacy [14].

Questions regarding HIV testing and prevention (ever having received an HIV test result; ever had an STI test other than HIV; ever heard of PrEP; ever used PrEP; ever talked to a healthcare provider about PrEP) were dichotomized to "yes" or "no."

2.3 | Ethical approval

The study received approval from the Observational & Interventions Research Ethics Committee of the London School of Hygiene & Tropical Medicine (14 September 2017; LSHTM ethics ref: 14421) [14].

3 | RESULTS

We included 23,001 individuals living in Germany participating in EMIS-2017 who either reported that they were AMAB and identified as men (n = 22,879; 99.5%) or who indicated having been AFAB but who identified as trans men (n = 95; 0.4%) or men (n = 27; 0.1%). AFAB trans men and men were grouped into the category of trans MSM (n = 122) for this analysis. The 56 respondents who indicated being AMAB and who identified as a "trans man" were excluded from this analysis.

3.1 | Demographics

Participating trans MSM were considerably younger (median age 28.5 years [IQR 23–37]) compared to cis MSM (39 years [IQR 29–49]). Over half (52.5%) of trans MSM were aged 18–29 compared to about a quarter (26.4%) of cis MSM.

Trans MSM were much more likely to not be living comfortably on their current income (74.6% vs. 49.9%, age-adjusted odds ratio [aOR] = 2.43, 95% CI = 1.60–3.67) compared to cis MSM (Table 1).

3.2 | Sexuality and relationship status

While similar proportions of trans and cis MSM identified as "bisexual" (17.2% and 16.7%), trans MSM were less likely to identify as "gay" or "homosexual" (48.4% vs. 78.3%; [aOR] = 0.56, 95% CI = 0.34–0.93) and were more likely to use other terms (18.9% vs. 0.8%; [aOR] = 16.49, 95% CI = 8.87–30.66) or no term (13.9% vs. 3.6%; [aOR] = 3.24, 95% CI = 1.70–6.20). Trans MSM (65.6%) were numerically more likely to report being single or of unsure relationship status (vs. 53.6% in cis MSM; [aOR] = 1.23, 95% CI = 0.84–1.81) (Table 1).

3.3 | Mental health

14.8% of trans MSM had a PHQ-4 score suggesting they are living with depression and/or anxiety compared to 5.0% of cis MSM ([aOR] = 3.90, 95% CI 2.22–6.83).

Trans MSM were more likely than cis respondents to feeling suicidal on some days ([aOR] = 3.27, 95% CI 2.27–4.72) (Table 1).

3.4 | Sexual happiness and satisfaction with sexual safety

Trans MSM were more likely than cis MSM to report being unhappy with their current sexual life (33.6% vs. 22.3%; [aOR] = 1.82, 95% CI 1.24–2.67). Additionally, they were more likely to disagree with the statements "The sex I have is always as safe as I want to be" ([aOR] = 1.77, 95% CI 1.11–2.82) and "I find it easy to say 'no' to sex I don't want" ([aOR] = 1.80, 95% CI 1.18–2.77) (Table 2).

3.5 | Sexual behaviour

About three quarters (75.4%) of trans participants reported having no steady sexual partner (vs. 58.4% of cis MSM) and trans MSM were less likely to have multiple non-steady sexual partners (1–3 non-steady sexual partners [aOR] = 0.54, 95% CI 0.35–0.84; 4–10 non-steady sexual partners [aOR] = 0.36, 95% CI 0.20–0.64; 11 or more non-steady sexual partners [aOR] = 0.26, 95% CI 0.12–0.57) compared to the cis sample. Engagement in stimulant drug use for sex (chemsex) in the past 12 months prior to the study was comparable between the study groups ([aOR] = 0.89, 95% CI 0.46–1.70) (Table 2).

3.6 | HIV and HIV prevention

Trans MSM were less likely to have ever received an HIV test result (58.2% vs. 76.1%; [aOR] = 0.63, 95% CI 0.43–0.93) and were less likely to have been diagnosed with HIV (2.5% vs. 10.7%; [aOR] = 0.33, 95% CI 0.10–1.04) compared to cis MSM.

Ever having been tested for (non-HIV) STIs was less common than HIV testing among both study groups. Even though the proportion of trans MSM that tested for other STIs was numerically smaller than for cis MSM, the confidence interval overlaps the null value, and this difference might have arisen by chance (reported 45.1% vs. 54.3%; [aOR] = 0.84, 95% CI 0.58–1.21).

Trans MSM were numerically less likely to have heard of PrEP (45.1% vs. 59.3%; [aOR] = 0.81, 95% CI 0.57–1.16) and were also less likely to have talked to a healthcare provider about PrEP (1.6% vs. 7.2%; [aOR] = 0.22, 95% CI 0.06–0.91). Subsequently, while PrEP use was uncommon overall, it was numerically even less likely to have ever been used by trans MSM (0.8% vs. 2.8%; [aOR] = 0.40, 95% CI 0.06–2.88) (Table 2).

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Table 1. Demographic and mental health data of trans MSM and cis MSM EMIS participants (*N* = 23,001)

Variable	Trans MSM	Cis MSM	Univariable regression[a]	Regression adjusted for age[b]	*p*-value[c]
Overall	122 (0.5%)	22,879 (99.5%)	–	–	
Age (years)					
Median (IQR)	28.5 (23–37)	39 (29–49)	–	–	
14–17	4 (3.3%)	197 (0.9%)	1.92 (0.69–5.32)	–	0.211
18–29	64 (52.5%)	6043 (26.4%)	1	–	–
30–39	27 (22.1%)	5681 (24.8%)	0.45 (0.29–0.70)	–	**0.001**
40–49	19 (15.6%)	5382 (23.5%)	0.33 (0.20–0.56)	–	**<0.001**
50 and older	8 (6.5%)	5576 (24.4%)	0.14 (0.06–0.28)	–	**<0.001**
Income					
Living comfortably	31 (25.4%)	11,466 (50.1%)	1	1	
Not living comfortably	91 (74.6%)	11,413 (49.9%)	2.98 (1.98–4.48)	2.43 (1.60–3.67)	**<0.001**
Sexual identity					
Gay or homosexual	59 (48.4%)	17,918 (78.3%)	0.60 (0.36–0.99)	0.56 (0.34–0.93)	**0.024**
Bisexual	21 (17.2%)	3818 (16.7%)	1	1	
Straight or heterosexual	2 (1.6%)	125 (0.6%)	2.91 (0.67–12.54)	2.63 (0.61–11.37)	0.196
Any other term	23 (18.9%)	175 (0.8%)	23.89 (12.97–44.01)	16.49 (8.87–30.66)	**<0.001**
I don't usually use a term	17 (13.9%)	824 (3.6%)	3.75 (1.97–7.14)	3.24 (1.70–6.20)	**<0.001**
Missing	–	19 (0.1%)	–	–	
Partnership status					
Single or unsure	80 (65.6%)	12,257 (53.6%)	1.65 (1.13–2.40)	1.23 (0.84–1.81)	0.284
Steady partner	42 (34.4%)	10,599 (46.3%)	1	1	
Living with depression/anxiety					
Normal	42 (34.4%)	13,463 (58.8%)	1	1	
Mild	44 (36.1%)	6190 (27.1%)	2.28 (1.49–3.48)	1.97 (1.29–3.02)	**0.002**
Moderate	15 (12.3%)	1729 (7.6%)	2.78 (1.54–5.03)	2.14 (1.18–3.88)	**0.012**
Severe	18 (14.8%)	1133 (5%)	5.09 (2.92–8.88)	3.90 (2.22–6.83)	**<0.001**
Missing	3 (2.5)	364 (1.6%)			
Suicidal ideation					
Yes, at least some days	50 (41%)	3523 (15.5%)	3.79 (2.64–5.44)	3.27 (2.27–4.72)	**<0.001**
Never	72 (59%)	19,211 (84.5%)	1	1	
Missing	–	–			

[a]Univariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants.
[b]Multivariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants adjusting for age.
[c]*p*-values of age-adjusted regression. Statistically significant *p*-values ($p < 0.05$) are shown in bold.
Abbreviations: EMIS, European MSM Internet Survey; IQR, interquartile range; MSM, men who have sex with men.

4 | DISCUSSION

The data analysis from the European MSM Internet Survey 2017 (EMIS-2017) demonstrates differences in a range of sexual health indicators between trans and cis MSM in Germany. Trans MSM were less likely to access sexual health services (spoken to about PrEP and received HIV/STI test results) and were less likely to have their sexual health needs met (being aware of PrEP, being able to say "no" and only doing things I don't regret). They were also less likely to engage in sexual risk behaviours (multiple partners) and less likely to engage in precautionary behaviour (taking PrEP). They were both less likely to be living with diagnosed HIV and less likely to be happy with their sex life.

These differences were large enough to be detected despite a relatively small number of trans MSM in the sample. The findings present a first outline of the sexual health profile of trans MSM in Germany.

Looking at the results of this study, trans MSM were more likely to not live comfortable financially. Socio-economic disadvantages in trans MSM found here align with previous findings [18, 31, 32]. This may be attributed to the relatively younger age of trans participants, but also to discriminatory experiences in education and work settings [18, 21].

The high levels of mental health problems and suicidality among trans MSM participants of the EMIS-2017 align with previous research showing that trans individuals are disproportionately affected by mental health-related issues and

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Table 2. Sexual behaviour and HIV/STI prevention data of trans MSM and cis MSM EMIS-2017 participants (*N* = 23,001)

	Trans MSM	Cis MSM	Univariable regression[a]	Regression adjusted for age[b]	*p*-value[c]
Overall	122 (0.5%)	22,879 (99.5%)			
Sexual happiness					
Unhappy (1–4)	41 (33.6%)	5106 (22.3%)	1.89 (1.29–2.77)	1.82 (1.24–2.67)	0.002
Happy (5–10)	73 (59.8%)	17,182 (75.1%)	1	1	–
Missing	8 (6.6%)	591 (2.6%)	–	–	–
Sex is always as safe as I want					
Agree	100 (82%)	20,386 (89.1%)	1	1	–
Disagree	22 (18%)	2394 (10.5%)	1.87 (1.18–2.98)	1.77 (1.11–2.82)	**0.016**
Missing	–	99 (0.4%)	–	–	–
I find it easy to say no to sex I don't want					
Agree	94 (77.1%)	19,952 (87.2%)	1	1	–
Disagree	28 (23%)	2767 (12.1%)	2.15 (1.41–3.28)	1.80 (1.18–2.77)	**<0.001**
Missing	–	160 (0.7%)	–	–	–
Number of steady sexual partners in the past 12 months					
0	92 (75.4%)	13,350 (58.4%)	1	1	–
1	27 (22.1%)	6940 (30.3%)	0.56 (0.37–0.87)	0.51 (0.33–0.79)	**0.002**
2	3 (2.5%)	1074 (4.6%)	0.42 (0.31–1.32)	0.40 (0.13–1.28)	0.123
3 or more	0 (0%)	1348 (5.9%)	–	–	–
Missing	–	194 (0.9%)	–	–	–
Number of non-steady sexual partners in the past 12 months					
0	74 (60.7%)	8531 (37.3%)	1	1	–
1–3	28 (22%)	6129 (26.8%)	0.53 (0.34–0.81)	0.54 (0.35–0.84)	**0.006**
4–10	13 (10.7%)	4373 (19.1%)	0.34 (0.19–0.62)	0.36 (0.20–0.64)	**0.001**
11 or more	7 (5.7%)	3518 (15.4%)	0.23 (0.11–0.50)	0.26 (0.12–0.57)	**0.001**
Missing	–	328 (1.4)	–	–	
Chemsex in the past 12 months					
Yes	10 (8.2%)	2145 (9.4%)	0.86 (0.45–1.64)	0.89 (0.46–1.70)	0.715
No	111 (91%)	20,420 (89.3%)	1	1	–
Missing	1 (0.8%)	314 (1.4%)	–	–	–
Received HIV-positive diagnosis					
Yes	3 (2.5%)	2448 (10.7%)	0.21 (0.07–0.66)	0.33 (0.10–1.04)	0.059
No	118 (96.7%)	20,242 (88.5%)	1	1	–
Missing	1 (0.8%)	189 (0.8%)	–	–	–
Ever received an HIV test result					
Yes	71 (58.2%)	17,411 (76.1%)	0.44 (0.31–0.63)	0.63 (0.43–0.93)	**0.018**
No	50 (41%)	5390 (23.6%)	1	1	–
Missing	1 (0.8%)	78 (0.3%)	–	–	–
Ever tested for STIs					
Yes	55 (45.1%)	12,427 (54.3%)	0.67 (0.47–0.96)	0.84 (0.58–1.21)	0.358
No	67 (54.9%)	10,215 (44.7%)	1	1	–
Missing	–	237 (1%)	–	–	–

(*Continued*)

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Table 2. (Continued)

	Trans MSM	Cis MSM	Univariable regression[a]	Regression adjusted for age[b]	*p*-value[c]
Ever heard of PrEP					
Yes	55 (45.1%)	13,567 (59.3%)	0.78 (0.55–1.12)	0.81 (0.57–1.16)	0.256
No	66 (54.1%)	8872 (38.8%)	1	1	–
Missing	1 (0.8%)	440 (1.9%)	–	–	–
Ever talked to healthcare provider about PrEP					
Yes	2 (1.6%)	1644 (7.2%)	0.22 (0.05–0.87)	0.22 (0.06–0.91)	**0.036**
No	119 (97.5%)	21,121 (92.3%)	1	1	–
Missing	1 (0.8%)	114 (0.5%)	–	–	–
Ever used PrEP					
Yes	1 (0.8%)	491 (2.2%)	1	1	–
No	121 (99.2%)	22,234 (97.2%)	0.37 (0.05–2.68)	0.40 (0.06–2.88)	0.363
Missing	–	154 (0.7%)	–	–	–

[a]Univariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants.
[b]Multivariable logistic regression model with 122 trans and 22,879 cis EMIS-2017 participants adjusting for age.
[c]*p*-values of adjusted regression. Statistically significant *p*-values ($p < 0.05$) are shown in bold.
Abbreviations: EMIS-2017, European MSM Internet Survey 2017; MSM, men who have sex with men; PrEP, pre-exposure prophylaxis; STI, sexually transmitted infections.

suicidal ideation [18]. Although studies have found higher HIV testing rates among people living with mental health problems, HIV prevalence is higher among people affected by poor mental health [33]. It is unclear if higher testing rates can be found among transmasculine individuals living with mental health-related problems, as testing rates are comparably low in this group [6]. Trans MSM could specifically benefit from combined and integrated mental and sexual health services.

Sexual risk behaviour measured by the number of sexual partners differed within both study groups. Cis participants were more likely to engage more with steady and non-steady sexual partners compared to trans participants. This finding may reflect results from other studies where trans participants reported difficulties initiating sex and fear of sexual activity [22, 24]. Barriers of finding sexual contacts and that trans people are not considered as dating partners may account for lower numbers of sexual partners found in this analysis.

Additionally, sexual unhappiness in trans MSM may be directly linked to difficulties in finding sexual partners. This study showed that cis participants were more likely to be satisfied with their current sexual life, and more trans MSM indicated not being satisfied with their sex life. Sexual (dis-) satisfaction in trans MSM may be directly linked to gender dis-affirmation by cis MSM, leading to higher levels of psychological distress and anxiety in trans MSM [34].

This data analysis suggests lower levels of HIV testing among trans MSM and even lower frequencies for other STI testing. This finding aligns with other research reporting low testing frequencies in trans populations [6, 35]. A cross-sectional online study in the United States found high rates of trans MSM who have never tested for HIV or bacterial and viral STIs, especially among younger participants [36]. Trans MSM receiving positive gender affirmation by cis MSM had higher HIV testing frequency [34].

Lower testing rates might be associated with negative experiences of trans people in healthcare settings. An analysis based on the 2015 U.S. Transgender Survey showed that specifically transmasculine participants postponed or even avoided seeking healthcare due to anticipated discrimination in healthcare settings [32]. A European-wide study among Lesbian, Gay, Bisexual, Trans and Inter people found that 34% of the trans respondents experienced discrimination in healthcare or social service settings, with disproportionately higher rates in Germany (40%) [21]. A previous study among trans people in Europe showed that trans men were especially vulnerable to discrimination by healthcare providers [37]. Besides the experiences of discrimination, stereotypical assumptions about the sexuality and sexual practices of trans MSM may lead to inadequate service provision [38]. A poor risk assessment by healthcare providers, specifically in the field of sexual health, may cause a lack of appropriate testing and prevention opportunities.

The analysed data were collected in 2017 before the formal rollout of PrEP in Germany. Lacking knowledge on the side of healthcare providers about lived realities of trans MSM may contribute to the fact that trans MSM in this sample were less likely to have heard about PrEP, talked to a healthcare provider about PrEP or ever used PrEP. These findings align with previous studies that showed low PrEP uptake in transmasculine individuals and a lack of conversations with healthcare providers about this drug [7] and country-specific barriers to PrEP uptake in trans individuals in Germany have been described previously [39]. That 2.5% of the trans MSM in this sample are living with diagnosed HIV illustrates the large benefit gap when only 0.8% of those who are not positive are using PrEP. While trans MSM group risk may be lower than

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that of cis MSM, it is higher than that of the general population (see Introduction). PrEP services and promotions for MSM should be trans inclusive, and trans MSM-specific programmes should be considered.

In 2020, the Deutsche Aidshilfe (German AIDS Service Organization) published a brochure developed by and targeted to transmasculine individuals who have sex with men [40]. This brochure is the only published sexual health information inclusive of the target population in German. Regarding service provision, for example, CliniQ in London/UK is a sexual health clinic operated by and for trans people (https://cliniq.org.uk/). Given the shared experience of discrimination in healthcare settings by trans people and the reduced risk for HIV acquisition through peer-led education [41], peer-led sexual health services are a very much-needed intervention for the trans community. However, such services are only offered periodically in two cities in Germany. The Checkpoint BLN (Berlin) offers peer-testing and counselling for trans, nonbinary and inter individuals once a month [42]. The Münchner Aids-Hilfe (Munich AIDS Service Organization) runs a counselling service for trans and inter people. Every 3 months for 3 hours, HIV/STI-testing is offered on a peer basis [43]. Both opportunities are for the wider trans and inter community, and sexual health services specifically targeted at transmasculine identities are missing.

The study has a few limitations. The small sample size of German trans MSM in this study only allows a small insight into the lived experiences of this community, and further research is needed. MSM recruited online differ from the general MSM population by over-representing MSM identifying as gay and reporting more sexual risk behaviours [44]. In all self-selection surveys, participants with lower education levels are underrepresented.

We are aware that grouping together "trans men" and people AFAB who refer to themselves simply as "men" is not ideal, as the latter group might reject an identification as trans. However, for more appropriate analysis, this seemed like the best choice, but we wish to highlight that the matter of self-identification of trans people is a sensitive topic.

However, this analysis opens a path for a better understanding of the needs of trans MSM and the possibility to target their sexual health needs in a more appropriate way. Trans community members were consulted to review measures on gender identity and sex assigned at birth, and the analysis, as well as drafting of the manuscript, have been conducted by a transmasculine researcher from Germany.

5 | CONCLUSIONS

This research presents the first data about trans men and AFAB men who have sex with men (trans MSM) living in Germany and shows their comparative disadvantage. The outcomes demonstrate complex aspects of sexual happiness of trans MSM, negotiating safer sex and sexual boundaries. Lower uptake of HIV and STI testing and talking to healthcare providers about HIV prevention methods, such as PrEP, may be connected to potential experiences of discrimination in healthcare settings faced by many trans people.

Sexual health services need to expand their efforts to include this population in their prevention strategies, outreach and care. For example, community-informed safer sex negotiation and sexual boundary trainings or peer-led sexual health interventions may reduce the overall risk of HIV/STI exposure, improve the uptake of sexual health services and enhance satisfaction with sexual life in trans MSM. Taking these outcomes and other existing data into account, sexual health interventions need to be tailored to meet the needs and vulnerabilities of trans MSM in the German context and beyond.

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COMPETING INTERESTS

The authors declare no competing interests.

The funder defined the primary population (men who have sex with men) and morbidities (sexually transmitted infections) of concern. The funder had no role in the collection, analyses or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

AUTHORS' CONTRIBUTIONS

AJS, FH, PW and UM designed the study. SS and UM prepared the German subdata set for pre-analysis. MNA, UK and UM performed the analysis presented in this manuscript. MNA wrote the first original draft. All authors reviewed and edited the manuscript.

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DATA AVAILABILITY STATEMENT

The EMIS-2017 dataset used for this analysis has been obtained from the London School of Hygiene and Tropical Medicine under a data transfer agreement that prohibits sharing the dataset publicly. Although we cannot make study data publicly accessible at the time of publication, all authors commit to make the data underlying the findings of the study available in compliance with the JIAS Data Availability Policy.

Data requests should be addressed to the London School of Hygiene and Tropical Medicine Research Operations Office Data Management Lead (alex.hollander@lshtm.ac.uk), the first author (Max.appenroth@charite.de) and the Principal Investigator of EMIS-2017 (Peter.Weatherburn@lshtm.ac.uk). Individuals requesting data should present their research objective(s) and enclose a list of requested variables. To protect the confidentiality of participants, data sharing is contingent upon appropriate data handling and good scientific practice by the person requesting the data and should furthermore be in accordance with all applicable local requirements.

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Similar Sexual Behaviour yet Different Outcomes: Comparing Trans and Gender Diverse and Cis PrEP Users in Germany Based on the Outcomes of the PrApp Study

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Abstract: Little knowledge about pre-exposure prophylaxis (PrEP) use in trans and gender diverse (TGD) communities in Germany exists. The PrApp Study collected data on PrEP use and sexual behaviour among PrEP users in Germany. Descriptive methods and logistic regression were used to describe PrEP use among TGD and cis persons. A total of 4350 PrEP users in Germany were included, with 65 (1.5%) identified as TGD. Compared to cis participants, TGD participants were younger (median age 29 vs. 37 years) and more likely to have a lower income (adjusted odds ratio (aOR) = 4.4; 95% confidence interval (CI) = 2.4–8.2) and be born outside Germany (aOR = 2.5; 95% CI = 1.3–4.5). On-demand PrEP use was higher in TGD participants (aOR = 1.9; 95% CI = 1.0–3.5) and numerically more TGD obtained PrEP from informal sources (aOR = 1.8; 95% CI = 0.9–3.5). Testing behaviour, condom use, and number of sexual partners were comparable between both groups. Socioeconomic disparities may constitute structural barriers for TGD people to access PrEP, leading to more informal and on-demand use. PrEP providers need to reduce access barriers for TGD PrEP users and provide information on safe PrEP use for this population.

Keywords: trans and gender diverse people; pre-exposure prophylaxis (PrEP); HIV prevention

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1. Introduction

Trans and gender diverse (TGD; see Abbreviations) people do not identify with their sex assigned at birth. TGD people can identify as male/masculine (i.e., trans men) or female/feminine (i.e., trans women). At times, they oppose the normative gender labels of male and female and identify outside of the gender binary or do not solely identify as male or female (i.e., non-binary, gender non-conforming, agender, etc.; see 'Abbreviations').

Although data about HIV prevalence in TGD individuals is scarce, studies have found that trans women especially are at elevated risk for human immunodeficiency virus (HIV) transmission [1,2] and trans people are considered a key population by WHO/UNAIDS [3]. Key populations are defined as such because of a higher prevalence of HIV infections among these specific groups and their sexual partners. Globally, trans women aged 15–49 years are 13 times more likely to be living with HIV compared to cis peers [4]. HIV prevalence in transmasculine and trans non-binary populations is under-researched and there is very little data. A recent study based in the USA found that 10% of trans men in the study were HIV positive [5]. A European-wide study among men who have sex with men (MSM) showed that 4.5% of assigned female at birth (AFAB) men (incl. trans men; see 'Abbreviations') were HIV positive [6]. Another study among Zimbabwean transmasculine sex workers showed that 38% were living with HIV [7].

About 50% of HIV infections in Western and Central Europe can be found among MSM and they are considered as a population disproportionately affected by the global HIV epidemic [8]. Additionally, a gender identity such as TGD often intersects with a MSM sexuality or sexual networks cross within these groups [9,10], which can render this population more vulnerable to HIV exposure.

Pre-exposure prophylaxis (PrEP) with tenofovirdisoproxil/emtricitabine has been shown to be effective in preventing an infection with HIV in certain populations [11]. However, very few studies address the use and efficacy of PrEP in the TGD community [12].

Stigma and discrimination in healthcare settings affect HIV prevention and the uptake of HIV treatment [13]. TGD people experience high levels of stigma and discrimination in healthcare settings globally. Overall, 33% of the 2015 U.S. Transgender Survey respondents (n = 27,715) reported having had at least one negative experience with a healthcare provider in the year prior to the study [14]; and a European-based study found that 34% (in Germany, 40%) of the TGD participants (n = 19,445; in Germany, n = 2815) experienced discrimination when accessing healthcare or social services [15].

Based on the lack of sufficient data on the efficacy of 'on demand' PrEP use (taking PrEP not on a daily basis) in TGD people undergoing gender affirming hormone treatment (GAHT), this type of PrEP use is currently not recommended for this population [16]. Research indicates that PrEP efficacy is influenced by GAHT with both oestrogen and testosterone [17–19]. Specifically, for transmasculine individuals engaging in vaginal/front hole penetrative sex, regardless of hormone intake and with no genital affirming surgery, research has shown a lower PrEP concentration in vaginal/front hole tissue compared to anal/back hole tissue [20]. Additionally, TGD individuals undergoing GAHT with testosterone may experience changes to vaginal/front hole tissue, leading to higher infection risk when engaging in vaginal/front hole penetrative sex [19]. Therefore, PrEP on demand may not provide sufficient protection from HIV infection in some TGD people. However, a recent study showed that daily oral PrEP to be effective in TGD people using either oestrogen or testosterone.

A recent study in US coastal metropolitan cities has found that trans women had good knowledge about PrEP [21,22]. Moreover, a nationwide study in the USA among self-reported HIV-negative and sexually active trans people, which also included transmasculine participants, found that 48% of respondents (n = 190) had heard about PrEP [23]. Further studies among transmasculine study populations have found high PrEP eligibility according to the Centers for Disease Control and Prevention (CDC) criteria but a low uptake of the drug [24,25]. One study showed that only about 11% of transmasculine participants fulfilling the CDC criteria received a prescription for PrEP [24]. Another study showed about 60% PrEP eligibility in both trans men and trans women, but only about 18% of those eligible were ever prescribed PrEP. High levels of PrEP discontinuation among TGD (former) PrEP users were found in the same study [26]. In both studies that showed the percentages of PrEP prescriptions, it was not indicated if receiving a prescription actually led to the uptake of PrEP [24,26]. A European-wide study among MSM found that trans and AFAB men were lacking basic knowledge about HIV [6]. The results show that they had less knowledge about PrEP and were less likely to be taking PrEP; they were also less likely to have heard about the concept of 'U = U' ('undetectable equals untransmissible').

According to the German-Austrian HIV Pre-Exposure-Prophylaxis Guidelines, PrEP should be offered to individuals with substantial HIV infection risk (i.e.,: MSM and trans people, who engage in condomless anal/back hole sex; serodiscordant couples; intravenous drug users) [27].

The cross-sectional 'PrApp Study' was initially designed to research PrEP use among MSM residing in Germany [28]. The data analysed here compares the outcomes of TGD and cis male PrEP users in Germany. Both groups share a similar sexual network, and the focus of this analysis is to look at sexual (risk) behaviour in both populations. We highlight the demographic and socioeconomic differences between both groups and how that might interfere with an individual's access to PrEP.

2. Methods

This cross-sectional study analysed the use of PrEP among MSM in Germany. Recruitment of current and former PrEP users was done via local community HIV and sexually transmitted infection (STI) testing clinics, three dating apps used by MSM, and a community-run website (https://prepjetzt.de, accessed on 18 February 2022) [28]. Participants for the study were recruited in two waves: the first wave during July–October 2018 and the second wave during April–June 2019.

Eligible participants were asked to fill out an anonymous online survey available in German, English, French, Spanish, Arabic, and Turkish. The online survey was accessible through mobile phones or desktop computer using VOXCO software. Once the respondents completed the survey, they had the choice to enter a raffle for gift certificates. Data and analysis security conformed with the German and European data security regulations [28] and study respondents were informed about that prior to giving their informed consent for participation.

2.1. Participants

For this analysis we included current PrEP users from Germany, who answered the questions about their current gender identity and sex assigned at birth, and who gave their consent to participate in the study. In Wave 1, this study only asked for current gender identity and not for sex assigned at birth. Gender diversity in Wave 1 was determined based on answers beyond the categories of male or female (i.e., trans, non-binary). However, this did not capture the gender identity of TGD individuals adequately and was therefore altered for Wave 2. Some members of the TGD community solely identify with the binary options of male and female and would not choose options such as 'trans male' or 'trans female'. Without asking for sex assigned at birth, those individuals would falsely be subsumed under cis study participants.

Participants were able to participate in both waves of the study. For those who did, their answers from Wave 2 were eliminated from the dataset so they were only included once in the dataset.

2.2. Variables

TGD participants were defined as indicating a gender identity beyond the categories of male or female (Wave 1) or whose gender identity did not match their indicated sex assigned at birth (only in Wave 2).

The analysis included a number of demographic variables, as described previously [28]. Participants were grouped into four age categories ('18–29', '30–39', '40–49', and '50–80' years) and gross annual income was binarized into 'less than EUR 30,000/year' and 'more than EUR 30,000/year'; participants were also binarized regarding their country of origin ('Germany' and 'outside Germany') and the language used to fill out the questionnaire ('German' and 'other than German').

PrEP use was divided into 'daily' and 'on demand' use. 'Daily' use refers to the intake of PrEP consecutively on a daily basis, whereas 'on demand' describes PrEP use only in the days around a potential risk contact [29]. Two options were provided regarding the source of PrEP: 'prescription' indicated a formal prescription by healthcare providers, whereas 'informal' includes access to PrEP through friends, dealers, or online/abroad purchases of the medication [28].

The use of condoms during PrEP use was also categorized into two strata: one combined the answers 'always' and 'often', whereas the other combined the responses 'half of the time', 'sometimes', and 'never'.

The number of sexual vaginal/front hole and/or anal/back hole partners within the last 6 months prior to the study was grouped into '0–3', '4–10' and '10 or more'.

Uptake of HIV testing prior to and during PrEP use was answered with a simple 'yes' or 'no' question.

2.3. Statistical Analysis

The data of categorical variables is presented in absolute numbers or proportions. Medians and interquartile ranges are used to display continuous variables. Differences in cis and TGD participants were analysed using univariable and multivariable logistic regression. For the regression analysis, age, gross annual income, and country of origin covariates were used to calculate an adjusted odds ratio (aOR). Age may play an important role when looking at income and migration, as well as income itself, and country of origin might impact a person's access to healthcare in general and access to PrEP. Participants with missing data for income and country of origin were excluded from the analysis. *p*-values were calculated using Wald test.

2.4. Ethical Approval

The ethics committee of the Berlin Chamber of Physicians (Ref: Eth-14/18) approved this study.

3. Results

3.1. Demographics of TGD and Cis PrEP Users

In this study, we included a total of 4350 current PrEP users from Germany. A total of 1728 participated in the first wave and 2622 in the second wave. The proportion of TGD-identified respondents was 0.9% (16/1712) in the first wave and 1.9% (49/2622) in the second wave (see Table 1).

Table 1. Demographic data of trans and gender diverse (TGD) and cis male pre-exposure prophylaxis (PrEP) users (n = 4350): Results of univariable and multivariable regression.

	Number of TGD Participants (%)	Number of Cis Participants (%)	Univariable Regression [1]	*p*-Value	Regression Adjusted for Age [2]	*p*-Value [3]
Overall	65 (1.5%)	4285 (98.5%)				
Age (years)						
Median (IQR)	29 (26–34)	37 (30–45)				
18–29	34 (52.3%)	924 (21.6%)	2.8 (1.6–4.8)	**<0.001**		
30–39	21 (32.3%)	1584 (37.0%)	1			
40–49	5 (7.7%)	1191 (27.8%)	0.3 (0.1–0.8)	**0.021**		
50–80	5 (7.7%)	586 (13.7%)	0.6 (0.2–1.7)	0.378		
Gross annual income						
EUR < 30,000	37 (56.9%)	968 (22.6%)	6.3 (3.5–11.4)	**<0.001**	4.4 (2.4–8.2)	**<0.001**
EUR ≥ 30,000	16 (24.6%)	2653 (61.9%)	1		1	
Missing	12 (18.5%)	664 (15.5%)	-		-	
Origin						
Germany	22 (33.8%)	2509 (58.6%)	1		1	
Outside Germany	22 (33.8%)	791 (18.5%)	3.2 (1.7–5.8)	**<0.001**	2.5 (1.3–4.5)	**0.004**
Missing	21 (32.3%)	985 (23%)	-		-	
Language						
German	42 (64.6%)	3707 (86.5%)	1		1	
Other language [4]	23 (35.4%)	578 (13.5%)	3.5 (2.1–5.9)	**<0.001**	2.6 (1.5–4.4)	**0.001**

[1] Univariable logistic regression model with 4285 cis and 65 TGD current PrEP users in Germany. [2] Multivariable logistic regression model with 4285 cis and 65 TGD current PrEP users in Germany, adjusted for age. [3] *p*-values of age-adjusted regression. Statistically significant *p*-values ($p < 0.05$) are shown in bold. [4] The online survey was available in German, English, French, Spanish, Arabic and Turkish.

In our sample, 1.5% (n = 65) identified as trans, non-binary or intersex, or indicated a gender identity that did not match their sex assigned at birth. In Wave 1, 7 participants identified as trans, 4 as intersex, and 4 as non-binary. In Wave 2, 16 identified as trans male or male and assigned female at birth, 4 as trans female or female and assigned male at birth, 1 as intersex, 25 as non-binary, and 3 as 'other'. With a median age of 29 years (interquartile range (IQR) = 26–34), TGD participants were younger than cis respondents

(37 years; IQR = 30–45; Table 1). The majority of TGD respondents (52.3%) were 18–29 years old, compared to 21.6% of cis PrEP users.

Being a TGD participant was associated with a lower gross annual income (Table 1): 56.9% of participating TGD individuals had an income of EUR 30,000 or less per year, compared to 22.6% of cis participants (aOR = 4.4; 95% confidence interval [CI] = 2.4–8.2, $p < 0.001$).

Additionally, TGD participants were more likely to originate outside of Germany. About one-third (33.8%) of TGD compared to 18.5% of cis PrEP users were originally not from Germany (aOR = 2.5; 95% CI = 1.3–4.5, $p = 0.004$). Furthermore, a larger proportion of TGD respondents (35.4%) compared to cis respondents (13.5%) filled out the survey in languages other than German (aOR = 2.6; 95% CI = 1.5–4.4, $p = 0.001$) (see Table 1).

3.2. PrEP Use and Testing Behaviour of TGD and Cis PrEP Users

The majority of the study participants used PrEP daily. However, TGD respondents (43.1%) showed higher on-demand or intermittent PrEP use compared to cis respondents (29.3%) (aOR = 1.9; 95% CI 1.0–3.5, $p = 0.037$; Table 2). More than a quarter of TGD PrEP users (26.2%) obtained PrEP from informal sources (buying/getting it abroad, on the Internet, from dealers or friends) compared to 14.7% of their cis counterparts (aOR = 1.8; 95% CI = 0.9–3.5, $p = 0.091$).

Table 2. Pre-exposure prophylaxis (PrEP) use and sexual behaviour of trans/gender diverse (TGD) and cis male PrEP users ($n = 4350$).

	Number of TGD Participants (%)	Number of Cis Participants (%)	Univariable Regression [1]	*p*-Value	Regression Adjusted for Age [2]	*p*-Value [3]
Overall	65 (1.5%)	4285 (98.5%)				
Type of PrEP use						
Daily	33 (50.8%)	2902 (67.7%)	1		1	
On demand	28 (43.1%)	1256 (29.3%)	2.0 (1.1–3.7)	**0.020**	1.9 (1.0–3.5)	**0.037**
Missing	4 (6.2%)	127 (3.0%)	-		-	
PrEP source						
Prescription	39 (60.0%)	3269 (76.3%)	1		1	
Informal	17 (26.2%)	631 (14.7%)	2.2 (1.2–4.3)	**0.017**	1.8 (0.9–3.5)	0.091
Missing	9 (13.8)	385 (9.0%)	-		-	
Condom use						
Always/often	13 (20.0%)	857 (20.0%)	1.1 (0.6–2.3)	0.714	1.0 (0.5–2.0)	0.976
Half the time or less	44 (67.7)	3107 (72.5%)	1		1	
Missing	8 (12.3%)	321 (7.5%)	-		-	
Number of anal (back hole)/vaginal (front hole) sexual partners within the last 6 months						
0–3 partners	8 (12.3%)	613 (14.3%)	1		1	
4–10 partners	19 (29.2%)	1327 (31.0%)	1.3 (0.4–4.1)	0.639	1.4 (0.4–4.4)	0.558
>10 partners	30 (46.2%)	2051 (47.9%)	1.9 (0.7–5.4)	0.240	2.0 (0.7–5.7)	0.211
Missing	8 (12.3%)	294 (6.9%)	-		-	
Tests before starting PrEP						
Yes	50 (76.9%)	3704 (86.4%)	1		1	
No	3 (4.6%)	150 (3.5%)	2.1 (0.7–7.1)	0.208	1.7 (0.5–5.6)	0.397
Missing	12 (18.5%)	431 (10.1%)	-		-	

Table 2. *Cont.*

	Number of TGD Participants (%)	Number of Cis Participants (%)	Univariable Regression [1]	*p*-Value	Regression Adjusted for Age [2]	*p*-Value [3]
Tests during PrEP use						
Yes	47 (72.3%)	3382 (78.9%)	1		1	
No	7 (10.8%)	369 (8.6%)	1.3 (0.5–3.3)	0.618	1.1 (0.4–2.8)	0.845
Missing	11 (16.9%)	534 (12.5%)	-		-	

[1] Univariable logistic regression model with 3258 cis and 44 TGD current PrEP users in Germany. Participants with missing data for income and country of origin were excluded from the analysis. [2] Multivariable logistic regression model with 3258 cis and 44 TGD current PrEP users in Germany, adjusted for income and origin. [3] *p*-values of age-adjusted regression. Statistically significant *p*-values ($p < 0.05$) are shown in bold.

TGD and cis participants were comparable in their testing behaviour during PrEP use. TGD PrEP users (76.9%) were numerically less likely to get tested than cis PrEP users (86.4%) before starting to take the drug (aOR = 1.7; 95% CI = 0.5–5.6, $p = 0.397$) (see Table 2).

3.3. Sexual Behaviour of TGD and Cis PrEP Users

Regarding the number of sexual partners for vaginal/front hole and anal/back hole intercourse within the 6 months prior to the study and condom use, we found similar proportions between both groups: 29.2% of TGD participants (vs. 31% in cis respondents) had 4–10 anal/back hole and/or vaginal/front hole sexual partners (aOR = 1.4; 95% CI = 0.4–4.4, $p = 0.558$) and 46.2% (vs. 47.9% in cis respondents) had 10 or more anal/back hole and/or vaginal/front hole sexual partners (aOR = 2.0; 95% CI = 0.7–5.7, $p = 0.211$) during the 6 months prior to the study (see Table 2).

4. Discussion

This analysis of the study included 4350 current PrEP users from Germany, with 65 participants (1.5%) identified as TGD. Demographically, TGD participants were comparably younger than cis participants, were living with less income, were more likely to have their descent from somewhere outside of Germany, and filled out the survey more often in languages other than German. The results show both higher informal, as well as 'on demand' PrEP use in TGD participants and similar testing frequency before starting PrEP und during PrEP use was found among both study groups.

The TGD respondents of this survey were, on average, younger than the cis respondents. More than half of the TGD people in this study were aged 18–29 years (median age = 29 years). Despite elevated risk for new HIV infection in adolescents and young adults on a global level [30], the young age of the participating PrEP users in this study might indicate a positive trend regarding accessing HIV prevention in younger cohorts. However, recruiting through dating apps (i.e., Grindr, PlanetRomeo, Hornet) might account for the younger participants in this study. The comparably younger age of the TGD participants might be one factor associated with the low income of this group. The finding of low income in TGD participants in this analysis aligns with studies that have shown that TGD people are disproportionately often living with very little income or even living in poverty due to various reasons [14,15]. Financial difficulties may be one reason as to why TGD individuals are more likely to engage in sex work [5], which might also expose them to an even greater risk of acquiring HIV and other STIs.

Costs related to testing and acquiring PrEP might pose a barrier to accessing this HIV prevention tool. During the study period, PrEP was only available through private prescriptions with self-payment of EUR 50/month in Germany [31]. Thus, a lower income may have constituted a considerable access barrier to PrEP. Coverage of PrEP by statutory health insurances started in September 2019. It is believed that this step has made PrEP available to a wider audience since then [32]. Even though PrEP is covered by statutory health insurance since September 2019, a quarterly co-payment of 10€ is still required. This

might still pose a barrier for TGD people with low income to access PrEP in Germany. Additionally, not every person in Germany has access to statutory health insurance as (undocumented) migrants, refugees, etc., often do not have formal access to statutory health insurance coverage. The TGD PrEP users in this sample were more likely originating from outside Germany and might be affected by this structural barrier. Furthermore, it is unclear if cost coverage for PrEP has also made a positive change to accessibility for the TGD community. Unmet needs (i.e., regional distribution issues) with regard to access to PrEP in cis MSM have been described before [33].

TGD people are often affected by stigma and discrimination in healthcare settings globally [14,15] and barriers to accessing healthcare may even be higher when it comes to sexual health. In addition to negative experiences in healthcare settings and despite being eligible for PrEP, many TGD patients are not being prescribed the drug [24]. This might be related to a lack of knowledge in healthcare providers about the potential risks and vulnerabilities of TGD people and their sexual networks. In the absence of medical prescriptions, TGD people have to rely more often on informal PrEP use. A previous analysis of this data has shown that informal PrEP use was associated with having a country of origin outside of Germany [28]. Similarities were found among this sub-sample and TGD participants more often responded to the survey in a language other than German. Those participants may reside in Germany only transiently or have an unclear immigration status. Additionally, language barriers and not knowing the German health system may impede them to seek health advice overall. In those cases, access to statutory health insurance may be compromised and access to PrEP medication from informal sources might be easier.

Besides using PrEP from informal sources, we have also observed that a higher percentage of TGD people used PrEP 'on demand' than cis users. Being TGD does not always include physical gender affirmative changes, but many TGD people decide to have gender affirming hormonal treatment (GAHT). As mentioned in the introduction, due to insufficient data on the efficacy of 'on demand' PrEP use in TGD people undergoing GAHT, daily PrEP intake is recommended for TGD people undergoing GAHT and to those engaging in vaginal/front hole penetrative sex, regardless of gender affirming testosterone use [12]. Although our study did not ask for gender affirming steps such as GAHT, the more prevalent use of PrEP on demand among TGD PrEP users in our findings is concerning, as some TGD PrEP users might also undergo GAHT parallel. More data from clinical trials on the efficacy of on-demand PrEP use in this population, as well as more education of healthcare providers around the body diversity of TGD PrEP users and their needs, is therefore necessary.

A similar proportion of TGD and cis PrEP users reported being tested before starting PrEP and during PrEP use. The Austrian-German Guidelines for HIV pre-exposure prophylaxis recommend thorough STI and HIV testing before starting PrEP. The recommendation is HIV and syphilis testing every 3 months and chlamydia and gonorrhea testing every 3–6 months during PrEP intake [27]. Since the coverage of PrEP by statutory health insurances in 2019, mandatory HIV and STI testing prior to and during the use of PrEP is fully covered by insurance. Prior to this, quarterly co-payments for testing ranged between 10€ to over 100€. A previous analysis of this study (without segregating TGD and cis participants) found that infrequent testing while using PrEP was associated with obtaining PrEP from informal sources [28]. We did not find any evidence that testing behaviour before and during PrEP use was different between TGD and cis participants. However, obtaining PrEP from informal sources by TGD PrEP users might be related to inaccessibility of adequate and low-cost testing options and general healthcare access barriers.

In this analysis we found similar numbers of sexual partners and comparable frequency of condom use in between both study populations. This study was promoted through MSM dating apps, community websites, and local community HIV/STI testing clinics, and it did not specifically ask about the gender identity of the participant's sexual partners and the specific sexual practices (except number of vaginal/front hole or anal/back

hole sexual partner and condom use) they engage in. More research about sexual partners and practices of TGD people (especially transmasculine and non-binary individuals) is needed to determine HIV risk exposure and potential benefit of PrEP for this community.

Beyond that, this analysis has provided the first insights that the sexual healthcare needs of TGD people are currently not adequately met in Germany. Healthcare policy makers, sexual health providers, and stakeholders in the German HIV response need to become more aware of the specific vulnerabilities and needs of TGD people to minimize HIV infection risk for this population.

Strengths and Limitations

This study is the first of its kind to give an idea of the experiences and circumstances of TGD PrEP users in Germany, covering various aspects regarding the inaccessibility (i.e., income, barriers to accessing healthcare, etc.) of PrEP for this community and highlighting the need for further research.

TGD persons were not included in the initial planning of the study but were consulted after completion of the first wave. With input and recommendations from a TGD community member and public health expert (who also led the analysis and writing of the manuscript), the study guide and questionnaire were adjusted for greater inclusion of TGD identities and more diverse body representations.

There are a number of limitations to this analysis. We are aware that the sample size of the TGD study population is small. Additionally, trans men, trans women, and trans non-binary people have some shared, but also in some regards different vulnerabilities and needs regarding HIV prevention and care. However, given the small sample size, it made sense to group the various identities within the trans and gender diverse spectrum together. The wide range of some of the confidence intervals might indicate that some findings have arisen due to chance. The results do give an indication of the current situation of TGD PrEP users, but further research is needed to appropriately portray the lived realities and experiences of this group. Moreover, this study delivers initial findings on the sexual health prevention needs in TGD people and a study to address these needs in TGD communities in Germany conducted by the Deutsche Aidshilfe (German AIDS Service Organization) in collaboration with the Robert Koch Institute is underway [34].

Some individuals, whose gender identity does not match the sex assigned to them at birth, do not use the term 'trans' for self-identification. By not having asked for sex assigned at birth in the first wave, this study might have excluded TGD participants who identify solely as male or female (not identifying as 'trans' men or 'trans' women). By not having asked about (receptive) vaginal/front hole intercourse (only anal/back hole intercourse) in the first wave, this study initially missed gathering important data on potential sexual contacts of the TGD community. This was altered in the second wave where we asked for both (receptive) vaginal/front hole and anal/back hole intercourse.

The study was not specifically aimed at TGD communities or promoted in TGD-specific community places. The community members included were PrEP users who had access to the recruitment settings (dating apps, community checkpoints, and STI/HIV clinics, etc.) and they may not represent the TGD population adequately.

5. Conclusions

Despite similar sexual behaviour (i.e., condom use and number of sexual partners), this analysis showed various disparities regarding the different PrEP regimens (daily vs. on demand) and accessibility of PrEP (prescription vs. informal) among TGD and cis PrEP users in Germany. Access to PrEP for members of the TGD community may be compromised for various reasons (i.e., income disparities, access barriers to and discrimination in healthcare, etc.). Additionally, HIV prevention programmes in Germany (and beyond) need to be aware of the multi-faceted intersectional and demographic aspects (i.e., language, income, etc.) that influence access to sexual health services and HIV prevention tools (such as PrEP) for TGD individuals. This study, among others, has shown that urgent action such

as reducing access barriers to (sexual) healthcare services, educating healthcare providers on the TGD realities, and including the TGD community in research is required to minimize the HIV risk exposure for this community.

Author Contributions: U.K., U.M., K.J., B.G.-B. and V.B. designed the study. U.K. and S.A. were involved in data curation. U.K. coordinated the study. M.N.A. and U.K. performed the analysis. M.N.A. wrote the first draft. All authors reviewed and contributed to the manuscript. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement: The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

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Conflicts of Interest: UK owns 'Exchange-traded fund' (ETF) shares, which may include stocks of pharmaceutical companies that produce or develop PrEP. The other authors declare no conflicts of interest. The promotion of the study was provided by the dating apps (Grindr, PlanetRomeo, Hornet), the prepjetzt.de (accessed on 18 February 2022) website, and the community checkpoints free of charge.

Abbreviations

Throughout the manuscript we use different terms to refer to and to describe the diversity within the trans and gender diverse community. Language is constantly changing, and at the time of publication we use the following terms and acronyms in our manuscript:

AFAB	Assigned Female at Birth [35]
AMAB	Assigned male at birth [35]
GAHT	Gender affirming hormone treatment (i.e., with testosterone, oestrogen, and/or hormone blockers) [16]
Genderqueer	A person, who identifies with a different gender than their sex assigned to them at birth. They often identify outside of the binary of male and female, or not exclusively as male or female [36,37]. Their gender-expression may align or may differ from their gender identity (i.e., a genderqueer person does not always have to look 'androgynous') → similar to (trans) non-binary
Trans and gender diverse (TGD)	TGD is being used as an umbrella term to refer to individuals, whose current gender identity does not match the sex assigned to them at birth [35]. This can include trans men, trans women, trans non-binary, genderqueer people, etc.
Transfeminine	A person, who was AMAB and who presents predominantly as female, and identifies (mostly) on the female and/or non-binary spectrum [38]
Trans man	A person, who was AFAB and identifies and presents (stereotypically) as a man [39]
Transmasculine	A person, who was AFAB and presents predominantly as male, and identifies (mostly) on the male and/or non-binary spectrum [40]
(Trans) Non-Binary	A person, who identifies with a different gender than their sex assigned to them at birth. They often identify outside of the binary of male and female, or not exclusively as male or female [37]. Their gender-expression may align or may differ from their gender identity (i.e., a non-binary person does not always have to look 'androgynous'). Many, but not all non-binary individuals also use the term trans for self-identification → similar to genderqueer
Trans woman	A person, who was AMAB and identifies and (stereotypically) as a woman [41]

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Sexual and Mental Health Inequalities across Gender Identity and Sex-Assigned-at-Birth among Men-Who-Have-Sex-with-Men in Europe: Findings from EMIS-2017

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Abstract: Some men who have sex with men (MSM) were assigned female at birth (AFB) and/or identify as trans men. Little is known about how these men differ from other MSM. We compared sexual and mental health indicators from the European MSM Internet Survey (EMIS-2017), comparing men AFB and/or currently identifying as trans men with those assigned male at birth (AMB) who identified as men. EMIS-2017 was an opportunistic 33-language online sexual health survey for MSM recruiting throughout Europe. We used regression models adjusting for age, country of residence and employment status to examine differences across groups. An analytic sample of 125,720 men living in 45 countries was used, of which 674 (0.5%) were AFB and 871 (0.7%) identified as trans men. The two sub-groups were not coterminous, forming three minority groups: AFB men, AFB trans men and AMB trans men. Minority groups were younger and more likely unemployed. Anxiety, depression, alcohol dependence and sexual unhappiness were more prevalent in sex/gender minority men. Conversely HIV and STI diagnoses were less common. AMB trans men were most likely to have sexual risk behavior with steady partners and to have unmet health promotion needs, and were least likely to be reached by interventions. Sex assigned at birth and trans identification were associated with different sexual and mental health needs. To facilitate service planning and to foster inclusion, sex-assigned-at-birth and current gender identity should be routinely collected in health surveys.

Keywords: trans men; homosexuality; transgender; LGBT; anxiety; depression; STIs; HIV; community survey

1. Introduction

The population of men who have sex with men (MSM) includes people who were assigned female at birth (AFB) and who now identify as men or as trans men. Indeed, attraction to men appears to be considerably more common among AFB and trans-identified men than among men assigned-male-at-birth (AMB), with one multimode, respondent-driven sampling survey of trans men suggesting almost two-thirds currently had sex with or were sexually attracted to men [1]. We should, therefore, expect a larger proportion of MSM to be trans than among the general population of men.

Sexual opportunity structures for trans MSM are changing rapidly [2]. The rise of virtual meeting places and increasing visibility of trans men in gay spaces are changing expectations and opportunities. For example, in March 2016, the trans man and model Aydian Dowling was featured on the cover of the UK's Gay Times magazine, the winner of Mr Leather International 2019, Jack Thompson, is a trans man, and there is a growing market for pornography featuring sex between cis men and trans people with diverse bodies [3].

Compared with other adult men, MSM suffer a disproportionate burden of sexual and mental ill health, as well as drug-related harms. Health risks and precautions are not evenly distributed among MSM and health inequalities in the general population are reproduced among sexual minorities [4,5]. Since trans people disproportionately suffer from poor health and health-related quality of life [6], we might expect trans MSM to disproportionately suffer poor sexual health relative to other MSM. Sexual health among MSM is related to mental health and substance use. Trans people are more likely to self-harm than cis people and trans men in particular are at a greater risk for non-suicidal self-injury [7]. In addition, studies in the USA consistently find high levels of self-harm and suicidal ideation, planning and attempts both among trans people generally [6,8] and young trans people in particular [9].

It has long been noted that when people with little power negotiate the balance between pleasure and danger in a sexual field, they are at greater risk of more significant harms than those with more power [10]. People with less power, social or sexual capital are invariably at greater risk of rejection or disappointment when seeking physical and emotional pleasure and satisfaction. Qualitative studies have explored the meanings Chilean trans MSM attach to sex and sexuality [11] as well as the challenges trans men face in negotiating sex within gay communities in the USA [12] and Canada [2]. Other qualitative research in the USA suggests trans MSM frequently have cis MSM partners, that behaviors presenting risk for sexually transmitted infections (STIs) and conception are common, and that commonly unmet sexual health needs included procedural knowledge of the gay scene and safer sex negotiation skills [13,14]. On the other hand, increasing bodily comfort, confidence and masculinization through transition may lead to new opportunities for sexual activities, including within gay communities [15].

The behavioral outcomes of these varying forces are unclear. Two earlier studies from the USA claimed that sexual risk behaviors are common among trans MSM [13,14]. However, both have very small samples (N = 17 and N = 45 respectively) producing extremely wide margins of confidence. More recently, an Australian survey of 'FTM transgender people' (FTM standing for 'female to male') characterized the sexual risk of this population as 'unpredictable' [16] To date, we know of no large-scale comparison of the sexual behavior of AFB and AMB MSM.

The two major barriers to health care for trans people are prejudice and ignorance in health care providers. Experience of discrimination from health care providers is common among all trans people across Europe and may be particularly high among trans masculine people [17]. Among providers willing to help there is a lack of knowledge on treating diverse bodies [18]. These problems can extend to specialist services. In the UK, trans people report that practitioners in mental health and gender identity services tend to be poorly informed about trans issues and the realities of trans people's lives [19]. The normative binary expectations of practitioners are likely to be part of this.

In an observational study among users of USA city STI clinics, 96% (66/69) of trans men identified as gay or bisexual and 75% (58/77) had sex with men, 49% (76/120) had ever tested for HIV of which 13% (10/76) had received a positive diagnosis [20]. By contrast, a 2015 large-scale online self-completion transgender survey in the USA found 58% of trans men had been tested for HIV, of which 0.6% had received a positive diagnosis [6]. HIV infection prevalence among trans men in the USA has been estimated through a recent systematic review to be 3.2% (95% CI 1.4–7.1%) [8]. The picture appears diverse across North America, with none of the 158 trans MSM recruited through respondent driven sampling in Ontario, Canada, having received a positive HIV diagnosis [21]. Among the 69 trans men

(living across the globe) in an open-access online survey on Health and Rights for MSM, 68 reported being HIV negative [22]. Little is known about HIV among trans MSM in Europe.

Sexual and mental health promotion programs for MSM which aim for inclusivity require planning data that distinguish trans-identified men and those AFB from the majority of MSM. The current analysis provides an overview of mental and sexual health inequalities between sex/gender minority and majority MSM. We consider inequalities using multiple measures across five health domains (demographic, morbidities, behaviors, health promotion needs, intervention experience). This is an appropriate approach at the current time when little is known about how the minority group AFB/trans MSM differs from the majority AMB MSM.

2. Materials and Methods

2.1. Design

The European MSM Internet Survey 2017 (www.emis2017.eu) was an online sexual health needs assessment using community-based recruitment to a self-completion questionnaire. The survey occurred only online. Potential respondents were offered a choice of 33 languages with which to engage (see Appendix A). Fieldwork occurred 9th October 2017 to 31st January 2018. The methods are described in detail elsewhere [23]. The research design received a favorable opinion from the Observational & Interventions Research Ethics Committee of the London School of Hygiene & Tropical Medicine (14 September 2017; LSHTM ethics ref: 14421).

This analysis considers only those men who: lived in a country in Europe with 100 or more respondents; were sexually attracted to men; reported their sex assigned at birth (0.4% did not); and were aged above the age of sexual consent in their country of residence and under 90 years.

2.2. Measures

This is the first large-scale community survey recruiting sufficient MSM to consider within group differences by gender identity and sex assigned at birth. We were testing no specific hypothesis but instead were building a picture of differential sexual health among a heterogenous group of men.

We used validated measures of anxiety and depression, potential alcohol dependence, internalized homonegativity and social support. The majority of other measures had been used previously in EMIS-2010, and the face validity of all measures was ensured through testing during development (see [23]).

2.2.1. Independent Demographics

There is no single survey item that provides a valid measure of sex/gender [1]. We based our question design on the two-step format recommended by the Centre for Excellence in Transgender Healthcare [24].

Current gender identity was an inclusion criterion and was a compulsory question. Respondents were asked "What is your current gender identity?" with responses: Man; Trans man; Woman; Trans woman; Non-binary gender. Appendix A provides these terms in the multiple languages of the survey. 'Non-binary' did not always have an evident translation and several languages used the English compound word.

Those who indicated woman, trans woman or non-binary gender were told "This survey is for people who identify as men (cis and trans). You are very welcome to read and complete the rest of the survey however we will be unable to use your data".

Sex assigned at birth was not a compulsory question and followed the current gender identity item. All men were asked "What sex were you assigned at birth?" with responses: Male; Female; Decline to state. There was no 'intersex' response option. At the time of the study, no country had introduced an intersex option for birth certificates long ago enough for people to now be old enough to

have sex. Only Malta had introduced an intersex option to birth certificates and people were able to change their sex assigned at birth retrospectively. EMIS-2017 did not try to measure this.

Using the two binary variables (assigned male or female at birth; current identification as a man or trans man), we constructed four sex-gender groups—the large majority 'AMB-man' and three minority groups: 'AFB-man', 'AFB-trans man' and 'AMB-trans man'. The size of this last group (people assigned male at birth who now identify as trans men) was unexpected and is addressed further in the results.

2.2.2. Other Demographics

Age was asked in years.

Men were asked "Which country do you currently live in?". The response was inserted into the subsequent question "Were you born in <country currently living in>?". The proportion indicating 'no' to the latter is reported as born abroad.

Single current relationship status was measured by asking "Do you currently have a 'steady partner', that is a lover or spouse that means you are not 'single'?" with responses: No, I am single; Yes, I have a steady partner; I'm not sure/it's complicated. The proportion indicating 'No, I am single' is reported.

Men were asked "Which of the following best describes your current occupation?" and offered eight employment status categories. The proportion indicating either 'Unemployed' or 'Long-term sick leave/medically retired' is reported as not earning.

Sexual attraction was measured separately for attraction to men, women and non-binary people with the question "Who are you sexually attracted to?" All men in this analysis are attracted to men. The proportions also attracted to women and to non-binary people are reported.

Out about attraction to men was measured with the question "Thinking about all the people who know you (including family, friends and work or study colleagues), what proportion know that you are attracted to men?" with response options: None; Few; Less than half; More than half; All or almost all. The proportion out to more than half, almost all or all is reported.

Recent sex work was assessed with two steps. Men were asked "When was the last time you were paid by a man to have sex with him? By paid we mean he gave you money, gifts or favors in return for sex". Those who indicated they had been paid for sex in the last 12 months were asked "In the last 12 months, how often have you been paid by a man to have sex with you?" The proportion indicating 3 or more times is reported.

2.2.3. Morbidities

We used eight indicators of morbidity, each of which we dichotomized.

To assess anxiety and depression we used the Patient Health Questionnaire-4 [25] and report the percentage scoring 'severe'.

In addition, we appended the item 'Thoughts that you would be better off dead, or of hurting yourself in some way?' to the PHQ4 and report any thoughts of self-harm in the last 2 weeks.

To assess overall satisfaction with sex life we asked "On a scale of 1 to 10 (where 1 is the most unhappy and 10 is the most happy), how happy are you with your sex life?" and provided a 1-10 scale with 1 labelled 'most unhappy' and 10 labelled 'most happy'. Intermediate numbers were not labelled. The percentage indicating a score of 4 or less is reported.

To assess alcohol dependency, we used CAGE-4 [26] and report the percentage indicating potential dependency.

Men were asked "Have you ever been diagnosed with HIV?" and the percentage indicating 'yes' is reported.

Those who indicated they had been diagnosed with HIV were asked "Were you diagnosed with HIV within the last 12 months?". The proportion of all men who were diagnosed with HIV in the last 12 months is reported, excluding those who were diagnosed more than 12 months previously.

For syphilis and gonorrhoea separately, men were asked "Have you ever been diagnosed with syphilis/gonorrhoea?" and those indicating 'yes' were asked "When were you last diagnosed with syphilis/gonorrhoea?". The percentages diagnosed with syphilis and gonorrhoea in the last 12 months is reported.

2.2.4. Health-Related Behaviors

We constructed binary measures for five substance use and/or sexual risk behaviors, and one HIV precaution behavior.

Men were told "In this survey, we use 'sex' to mean physical contact to orgasm (or close to orgasm) for one or both partners" and that "we use the term 'intercourse' (fucking, screwing) to mean sex where one partner puts their penis into the other partner's anus or vagina, whether or not this occurs to ejaculation; 'intercourse' does not include oral sex or the use of dildos".

Similarly, they were told we use the term 'steady partners' to refer to "boyfriends or husbands that mean you are not 'single', but not to partners who are simply sex buddies" and the term 'non-steady partners' to mean "men you have had sex with once only, and men you have sex with more than once but who you don't think of as a steady partner (including one night stands, anonymous and casual partners, regular sex buddies)".

Men were asked about the number of their steady and non-steady sexual partners, intercourse partners and condomless intercourse partners in the last 12 months. Those who had condomless intercourse with a non-steady partner were asked "In the last 12 months have you had intercourse without a condom with a non-steady partner whose HIV status you did not know or think about at the time?".

From answers to the above, we constructed three binary measures of sexual risk: (1) having 2 or more steady condomless male intercourse partners in the last 12 months, (2) having 5 or more non-steady male partners last 12 months; and (3) having condomless intercourse with one or more non-steady male partners of unknown HIV status in the last 12 months.

Men were asked "When was the last time you used stimulant drugs to make sex more intense or last longer? (Note: The stimulant drugs include ecstasy/MDMA, cocaine, amphetamine (speed), crystal methamphetamine (Tina, Pervitin), mephedrone and ketamine.)" We did not use the word 'chemsex' and report the proportion reporting affirmatively for the last 4 weeks.

For drug injecting, we report the proportion of men who answered 'Yes, within the last 12 months' to the question "Have you ever injected any drug to get high (other than anabolic steroids or prescribed medicines), or had someone else inject into you?"

The precaution behavior we report concerns HIV pre-exposure prophylaxis (PrEP), about which respondents were prompted for awareness and knowledge before being asked "Have you ever taken PrEP?". We report the proportions reporting 'Yes, on a daily basis and I'm still taking it' and 'Yes, when I have needed it but not daily' combined. The denominator excludes men ever diagnosed with HIV.

2.2.5. Health Promotion Needs

In EMIS, health promotion needs were defined as the opportunities, capabilities and motivations to enact precautionary behaviors. We measured the extent to which 12 sexual health promotion needs were met.

Two indicators concerned needs related to multiple health behaviors: social support and freedom from internalized homonegativity. Respondents were randomly allocated to one or other of these two indicators (to reduce respondent burden) and consequently sample size for these two indicators is half that of others.

One half of respondents were asked 8 questions forming the 'social integration' and 'reliable alliance' subscales of the Social Provisions Scale [27]. Each subscale gives a score from 4 to 16. We report the proportion of men who scored less than 10 on either scale.

The other half were asked 7 questions forming an 'internalised homonegativity' scale running from zero to 6 [28]. We report the proportion scoring over half-way on the scale, i.e., 3 or more.

Need for safer sex efficacy was measured through the proportion disagreeing with the statements 'The sex I have is always as safe as I want to be' and 'I find it easy to say 'no' to sex I don't want'.

Need for access to condoms was measured with the question "When was the last time you had intercourse without a condom solely because you did not have a condom?". We report the proportion indicating the last 12 months.

Concern about drug use was measured by agreement with 'I worry about my recreational drug use'.

Access to HIV post-exposure prophylaxis (PEP) was measured by asking men "How confident are you that you could get PEP if you thought you needed it?" and combining the proportions indicating 'I don't know', 'Not at all confident' or 'A little confident' (other response options were 'quite confident' and 'very confident'). The denominator excludes men ever diagnosed with HIV.

All men were asked "Have you heard of PrEP?" and the proportion indicating 'no' is reported as a measure of PrEP unawareness.

'U=U' is shorthand for 'undetectable = untransmissible', the fact that suppressed HIV viremia results in non-infectiousness [29]. Knowledge of U = U was measured with the statement 'A person with HIV who is on effective treatment (called 'undetectable viral load') cannot pass their virus to someone else during sex'. Knowledge in EMIS was measured by offering men statements they were told are true and asking them "Did you know this already?". The response options were: I knew this already; I wasn't sure about this; I didn't know this already; I don't understand this; I do not believe this. The proportion indicating any answer but the first is reported as indicator of need for knowledge.

Lack of knowledge of HIV status was measured by the proportion indicating 'not sure/I don't know' to the question "What do you think your current HIV status is (whether or not you've ever tested for HIV)?".

Access to clinical services was measured by asking men who had never tested for HIV "Do you know where you could get an HIV test?" and by asking men who were vulnerable to hepatitis B "Do you know where you could get vaccinated against hepatitis B?". For each, the proportions reporting 'No' or 'Not sure' are combined and the denominator is men who have never tested for HIV and those vulnerable to hepatitis B (i.e., excluding those vaccinated or naturally immune) respectively.

2.2.6. Health Intervention Exposure

We report 6 indicators of intervention coverage, a key characteristic of their performance, and one indicator the negative intervention of verbal abuse.

Coverage of MSM STI/HIV education was measured by asking "When was the last time you saw or heard any information about HIV or STIs specifically for men who have sex with men?". We report the proportion indicating the last 12 months.

To measure the coverage of free condom distribution schemes men were asked "Where have you got condoms from in the last 12 months". The proportion indicating at least one of 'Free from clinics', 'Free from gay bars/clubs', 'Free from saunas' or 'Free from gay or HIV community organisations' is reported.

HIV testing coverage was reached through a number of questions. Men were asked "Have you ever received an HIV test result?" and those who indicate 'yes' were asked "Have you ever been diagnosed with HIV?". Those indicating 'yes' again were asked "In which year were you initially diagnosed HIV positive?" and those indicating 2016 (the year before the survey) were asked "Were you diagnosed with HIV within the last 12 months?". Men who had ever received an HIV test result but had never been diagnosed with HIV were asked "When did you last have an HIV test?". From responses to these questions we report the proportion of men reached by HIV testing in the last 12 months. The denominator excludes men diagnosed with HIV more than 12 months earlier.

An indicator of comprehensive screening for STIs in the last 12 months was constructed from several questions, including anal swabbing, as described in [30].

The reach of the Hepatitis Vaccine Offer was measure by asking all men "Have you ever been offered any hepatitis vaccination by a health service?" and the proportion indicating 'No' or 'Not sure' is reported.

The reach of the PrEP Assessment Conversation was measured by asking "Has anyone at a health service in <country of residence> ever spoken to you personally about PrEP?" and we report the proportion indicating 'No' or 'I don't know'. The denominator excludes men living with diagnosed HIV.

Finally, while the preceding interventions meet needs, we measured one intervention that undermines needs: homophobic abuse. Men were asked "When was the last time you had verbal insults directed at you, because someone knew or presumed you are attracted to men?". The proportion indicating affirmatively for the last 12 months is reported.

2.2.7. Analysis

For each binary indicator, we report its unadjusted level in each of the four sex-gender combinations. We then carried out multinomial regressions to generate odds ratios for each indicator in each of the three trans minority groups compared with the cis majority, adjusting for country of residence, age and unemployment status. The latter was selected as trans people disproportionately and heavily suffer employment discrimination [17].

To characterize the three minority sub-populations, we compared odds ratios for indicators being positive across sex assigned at birth and gender identity, and across the four levels of sexual health indicator (intervention exposure, health promotion needs, risk and precaution behaviors, morbidities).

3. Results

3.1. Sample Size and Primary Outcomes

The analytic sample comprised 125,720 men living across the following 45 countries in and neighboring Europe (men living in four microstates were merged with adjacent countries): Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France (includes Monaco), Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy (includes San Marino), Latvia, Lebanon, Lithuania, Luxembourg, Malta, Moldova, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain (includes Andorra), Sweden, Switzerland (includes Lichtenstein), Turkey, Ukraine and United Kingdom.

Overall, 0.7% (n = 871) indicated their gender identity was 'trans man' and 0.5% (n = 674) indicated they were assigned female at birth. Although they were closely associated, these two groups were not coterminous (i.i. not all the men who indicated being AFB also indicated 'trans man' and not all of those who indicated 'trans man' also indicated AFB).

In the following, we compare four groups: AMB men (n = 124,673, 99.2%); AMB trans men (n = 373, 0.3%); AFB trans men (n = 498, 0.4%); and AFB men (n = 176, 0.1%). We refer to the first group as the majority and the latter three as minorities (collective n = 1047, or 0.8% of the whole sample). We refer to the second and third groups collectively as 'trans identified men' and the third and fourth groups collectively as 'AFB men'.

3.2. Demographics Difference

Table 1 describes the majority and the three minority groups.

Table 1. Description of four sex-assigned-at-birth/current-gender-identity subgroups of men who have sex with men (MSM), European MSM Internet Survey 2017.

Demographic	AMB Men N = 124,838	AMB Trans Men N = 373	AFB Trans Men N = 498	AFB Men N = 178	Probability (Chi-Squared; ANOVA for Age)
Age: Median (range); Mean (s.d.) years	36 (14–89); 37.2 (12.8)	39 (16–83); 39.9 (14.8)	25 (15–79); 27.1 (9.1)	28 (17–64); 30.8 (11.1)	<0.001
Born abroad (%)	13.5	17.8	12.5	13.1	0.099
Single (%)	54.1	54.2	52.3	48.3	0.008
Not earning (%)	7.1	13.1	15.9	14.8	<0.001
Sexual attraction to women (%)	15.2	37.8	58.6	31.8	<0.001
Sexual attraction to non-binary people (%)	4.4	17.7	61.6	27.8	<0.001
Out about attraction to men (%)	58.8	35.2	74.9	60.6	<0.001
Recent sex work (%)	2.1	10.7	4.2	4.5	<0.001

Identifying as a trans man was most common among respondents living in Finland (3.8%), Iceland (2.8%), Sweden (2.5%), Luxembourg (1.8%), Estonia (1.4%), Romania (1.1%), Malta (1.0%) and the UK (1.0%). No respondent in Latvia or Bosnia and Herzegovina identified as a trans man.

Having been assigned female at birth was most common among respondents living in Finland (4.8%), Iceland (2.8%), Estonia (1.9%), Sweden (1.4%), Denmark (1.1%), Norway (1.1%) and the UK (1.1%). No respondent in Cyprus, Luxembourg, Slovenia, Bosnia and Herzegovina or North Macedonia indicated they were assigned female at birth.

While the two AFB groups were younger than the majority, the AMB trans men were older. The AMB trans men were also less out about their sexual attraction to men than the other three groups and were more likely to have recently sold sex.

All three minority groups were more likely than the majority to be not earning. All three minority groups were much less likely to be monosexual (i.e., sexually attracted to men only), with the AFB trans men being particularly likely to be also attracted to women and to non-binary people.

3.3. Morbidity Inequalities

Table 2 shows eight measures of morbidities across the four sex-at-birth/gender identity combinations.

No measure of poor mental health was found to be higher in AMB men than in the three minority groups. All three minority groups were significantly more likely to have had thoughts of suicide/self-harm than the majority and was particularly high in AFB trans men. Severe anxiety and depression were significantly more common in both AFB groups and sexual unhappiness was more prevalent in both groups of trans identified men. AFB trans men also had a significantly higher probability of indicating alcohol dependence.

By contrast, no indicator of STI was more common in any minority group compared with the majority ABM men. All three minority groups had significantly lower odds of living with diagnosed HIV, although the prevalence among AMB trans men approached that of AMB men. Very few of the minority groups had been diagnosed with HIV in the past 12 months. All three minority groups were also significantly less likely to have been diagnosed with gonorrhoea and the AFB trans men were significantly less likely to have been diagnosed with syphilis.

Table 2. Morbidity indicators across four sex-assigned-at-birth/current-gender-identity subgroups of MSM.

Group	Severe Anxiety & Depression (PHQ4) Score			Thoughts of Suicide/Self-Harm, Last 2 Weeks			Sexually Unhappy (Self-Rating 1–4 Out of 10)		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	7.6	1.00	1.00	20.7	1.00	1.00	22.3	1.00	1.00
AMB trans men N = 373	6.7	0.88 (0.58–1.33)	0.81 (0.53–1.24)	26.9	1.41 (1.12–1.78)	**1.38 (1.09–1.75)**	29.4	1.45 (1.15–1.81)	**1.41 (1.12–1.77)**
AFB trans men N = 498	22.7	3.55 (2.87–4.39)	**2.45 (1.97–3.04)**	50.1	3.84 (3.22–4.58)	**2.94 (2.46–3.52)**	35.3	1.90 (1.58-2.29)	**1.67 (1.39–2.02)**
AFB men N = 178	16.7	2.42 (1.63–3.61)	**1.86 (1.25–2.81)**	33.0	1.88 (1.37–2.58)	**1.55 (1.12–2.13)**	26.7	1.27 (0.90–1.79)	1.17 (0.82–1.65)

Group	Alcohol Dependence Indicated (CAGE-4)			Living with Diagnosed HIV			HIV Diagnosis Last 12 Months		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	18.3	1.00	1.00	10.5	1.00	1.00	1.1	1.00	1.00
AMB trans men N = 373	20.7	1.17 (0.90–1.50)	1.16 (0.90–1.50)	7.1	0.66 (0.44–0.98)	**0.50 (0.33–0.76)**	0.0	–	–
AFB trans men N = 498	26.3	1.60 (1.31–1.96)	**1.46 (1.20–1.79)**	1.0	0.09 (0.04–0.21)	**0.12 (0.05–0.29)**	0.2	0.18 (0.03–1.31)	0.16 (0.02–1.13)
AFB men N = 178	22.3	1.28 (0.90–1.83)	1.21 (0.85–1.73)	3.5	0.31 (0.14–0.69)	**0.64 (0.16–0.83)**	0.0	–	–

Group	Syphilis Diagnosis Last 12 Months			Gonorrhoea Diagnosis Last 12 Months		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	4.4	1.00	1.00	5.3	1.00	1.00
AMB trans men N = 373	4.5	1.02 (0.62–1.69)	1.01 (0.61–1.67)	2.0	0.37 (0.17–0.77)	**0.38 (0.18–0.80)**
AFB trans men N = 498	0.6	0.13 (0.04–0.41)	**0.14 (0.05–0.45)**	2.9	0.53 (0.31–0.90)	**0.48 (0.28–0.82)**
AFB men N = 178	2.3	0.51 (0.19–1.38)	0.54 (0.20–1.45)	1.7	0.32 (0.10–0.99)	**0.30 (0.10–0.94)**

OR = Odds ratio; CI = Confidence Interval; * adjusted for age, country and employment; emboldened results are significant at $p < 0.05$ after adjustment.

3.4. Risk and Precaution Behavior Inequalities

Table 3 shows six measures of sex- and drug-related behaviors.

Table 3. Risk and precaution behaviors across four sex-assigned-at-birth/current-gender-identity subgroups of MSM.

Group	Condomless Intercourse with 2+ Steady Men, Last 12m			Sex of any Kind with 5+ Non-Steady Men, Last 12m			Condomless Intercourse with 1+ Non-Steady Man of Unknown HIV Status, Last 12m		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	8.5	1.00	1.00	45.1	1.00	1.00	23.9	1.00	1.00
AMB trans men N = 373	14.0	1.74 (1.29–2.34)	**1.67 (1.24–2.26)**	39.3	0.75 (0.61–0.93)	**0.75 (0.60–0.93)**	20.2	0.80 (0.62–1.04)	0.79 (0.61–1.01)
AFB trans men N = 498	3.7	0.41 (0.26–0.65)	**0.44 (0.28–0.71)**	13.3	0.19 (0.14–0.24)	**0.21 (0.17–0.28)**	13.3	0.49 (0.38–0.63)	**0.51 (0.39–0.66)**
AFB men N = 178	7.5	0.87 (0.49–1.53)	0.91 (0.52–1.60)	25.6	0.42 (0.30–0.59)	**0.46 (0.32–0.64)**	8.5	0.30 (0.17–0.50)	**0.30 (0.18–0.51)**

Group	Stimulant Drugs Used to Make Sex Last Longer or More Intense, Last 4 Weeks			Injected Drugs to Get High, Last 12m			Currently Taking PrEP (among those not Diagnosed HIV Positive)		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	5.3	1.00	1.00	1.2	1.00	1.00	3.1	1.00	1.00
AMB trans men N = 373	3.6	0.67 (0.39–1.17)	0.64 (0.37–1.12)	0.8	0.70 (0.22–2.17)	0.63 (0.20–1.97)	2.6	0.84 (0.43–1.63)	0.81 (0.42–1.58)
AFB trans men N = 498	2.6	0.49 (0.28–0.84)	**0.55 (0.31–0.96)**	1.0	0.86 (0.36–2.08)	1.01 (0.42–2.45)	1.0	0.32 (0.13–0.78)	**0.39 (0.16–0.93)**
AFB men N = 178	2.3	0.43 (0.16–1.14)	0.46 (0.17–1.23)	0.0	–	–	1.8	0.57 (0.18–1.77)	0.63 (0.20–1.97)

OR = Odds ratio; CI = Confidence Interval; * adjusted for age, country and employment; emboldened results are significant at $p < 0.05$ after adjustment.

Sexual risk behaviors were generally less common in the minority groups. AFB trans men were particularly less likely to have multiple condomless steady intercourse partners or multiple non-steady partners. Both AFB groups were significantly less likely to have had condomless intercourse with a non-steady male of unknown HIV status.

The exception was having multiple condomless steady partners, which was more common in the AMB trans men than in the majority. Sexual precaution in the form of PrEP usage was also less common in the minority groups, significantly so for the AFB trans men.

3.5. Health Promotion Need Inequalities

Table 4 shows twelve indicators of unmet health promotion needs across the sex assigned at birth/gender identity combinations.

Table 4. Indicators of unmet health promotion need across four sex-assigned-at-birth/current -gender-identity subgroups of MSM.

Group	Low Social Integration and/or Reliable Alliance			High Internalised Homonegativity			Disagrees with 'The Sex I Have is always as Safe as I Want to Be'		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	11.6	1.00	1.00	12.3	1.00	1.00	11.1	1.00	1.00
AMB trans men N = 373	19.8	1.89 (1.30–2.73)	**1.72 (1.19–2.51)**	15.8	1.35 (0.85–2.12)	1.34 (0.85–2.12)	10.3	0.92 (0.66–1.29)	0.88 (0.63–1.24)
AFB trans men N = 498	16.3	1.49 (1.06–2.10)	1.28 (0.91–1.82)	1.1	0.08 (0.02–0.32)	**0.07 (0.02–0.29)**	14.3	1.34 (1.04–1.72)	1.28 (0.99–1.65)
AFB men N = 178	14.5	1.30 (0.66–2.53)	1.19 (0.61–2.35)	12.8	1.05 (0.54–2.05)	0.97 (0.50–1.88)	14.9	1.40 (0.92–2.12)	1.35 (0.89–2.05)

Group	Disagrees with 'I find it easy to say 'no' to sex I don't want'			Condomless Intercourse Solely because Lacked Condom, last 12m			Concerned about Drug Use		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	8.5	1.00	1.00	25.7	1.00	1.00	4.5	1.00	1.00
AMB trans men N = 373	12.8	1.58 (1.16–2.14)	**1.61 (1.18–2.19)**	32.0	1.36 (1.09–1.70)	**1.36 (1.10–1.70)**	4.4	0.98 (0.59–1.61)	0.91 (0.54–1.53)
AFB trans men N = 498	22.8	3.18 (2.58–3.93)	**2.79 (2.26–3.45)**	15.6	0.53 (0.42–0.68)	**0.48 (0.38–0.61)**	3.8	0.86 (0.54–1.36)	0.76 (0.48–1.20)
AFB men N = 178	15.3	1.95 (1.29–2.94)	**1.78 (1.18–2.69)**	23.4	0.89 (0.62–1.26)	0.82 (0.58–1.17)	4.0	0.90 (0.42–1.92)	0.82 (0.39–1.76)

Group	Not Confident to Access PEP (among those without Diagnosed HIV)			Not Heard of PrEP			Does not Know U=U		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	59.9	1.00	1.00	36.5	1.00	1.00	42.3	1.00	1.00
AMB trans men N = 373	67.8	1.41 (1.12–1.77)	**1.46 (1.15–1.84)**	70.3	4.13 (3.29–5.18)	**4.19 (3.33–5.27)**	61.7	2.20 (1.78–2.72)	**2.28 (1.84–2.82)**
AFB trans men N = 498	67.0	1.36 (1.13–1.64)	1.17 (0.97–1.42)	41.4	1.23 (1.03–1.47)	1.18 (0.99–1.41)	43.8	1.07 (0.89–1.27)	0.99 (0.83–1.18)
AFB men N = 178	66.1	1.31 (0.95–1.80)	1.19 (0.86–1.65)	47.4	1.57 (1.17–2.12)	**1.53 (1.13–2.06)**	43.2	1.04 (0.77–1.40)	0.99 (0.73–1.34)

Group	Not Sure / I don't know HIV status			Does not Know Where to HIV Test (Among Those Never HIV Tested)			Does not Know Where to Get Hepatitis B Vaccination (Among Those Vulnerable to It)		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	3.8	1.00	1.00	41.2	1.00	1.00	54.1	1.00	1.00
AMB trans men N = 373	9.0	2.50 (1.74–3.58)	**2.47 (1.72–3.54)**	47.5	1.29 (0.91–1.85)	**1.70 (1.18–2.47)**	56.7	1.11 (0.84–1.46)	1.08 (0.82–1.42)
AFB trans men N = 498	2.2	0.57 (0.31–1.03)	**0.48 (0.26–0.87)**	48.0	1.31 (1.01–1.71)	1.01 (0.77–1.32)	59.3	1.23 (0.99–1.53)	1.09 (0.88–1.36)
AFB men N = 178	6.3	1.69 (0.91–3.10)	1.49 (0.81–2.76)	48.5	1.34 (0.83–2.18)	1.09 (0.67–1.77)	55.4	1.05 (0.72–1.53)	0.97 (0.66–1.41)

OR = Odds ratio; CI = Confidence Interval; * adjusted for age, country and employment; emboldened results are significant at $p < 0.05$ after adjustment.

We found no evidence that unmet need varies across sex/gender with regard to concern about drug use, access to hepatitis B vaccination or not having sex as safe as is wanted.

Indicating not finding it easy to say 'no' to unwanted sex was significantly more common in all three minority groups and was highest among AFB trans men.

The minority groups were not always in the greatest unmet need with regard to health promotion. Internalized homonegativity, which facilitates many different risks and thwarts many precautions [28], was particularly absent among the AFB trans men. AFB trans men were also significantly less likely to have had condomless intercourse solely because of a lack of a condom (an indicator of poor condom access) and to state they were not sure of or did not know their current HIV status (a generalized need for preventing HIV transmission).

On the other hand, the group of AMB trans men in particular appear to need basic HIV education—they were four times more likely to have never heard of PrEP and more than twice as likely to not know U=U. They were also most likely to need social support, certainty of their HIV status, access to HIV testing, condom access, and confidence to access PEP.

3.6. Health Intervention Coverage Inequalities

Table 5 shows six indicators of service coverage and one indicator of the negative intervention of verbal insults.

Table 5. Exposure to (positive sexual health and negative homophobic) interventions among four sex-assigned-at-birth/current-gender-identity subgroups of MSM.

Group	Saw or Heard Information about HIV/STIs for MSM, Last 12m			Got Free Condoms from NGOs, Clinics, Bars or Saunas, Last 12m			Tested for HIV in Last 12m (among Those not already Diagnosed with HIV 12m ago)		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	74.3	1.00	1.00	32.6	1.00	1.00	56.0	1.00	1.00
AMB trans men N = 373	56.8	0.46 (0.37–0.56)	**0.47 (0.38–0.57)**	21.7	0.57 (0.45–0.74)	**0.54 (0.42–0.70)**	43.8	0.61 (0.50–0.76)	**0.61 (0.49–0.75)**
AFB trans men N = 498	75.7	1.08 (0.88–1.32)	0.99 (0.81–1.22)	40.3	1.40 (1.17–1.67)	**1.55 (1.30–1.86)**	36.4	0.45 (0.38–0.54)	**0.46 (0.38–0.55)**
AFB men N = 178	71.0	0.85 (0.61–1.17)	0.80 (0.58–1.12)	30.3	0.90 (0.65–1.24)	0.95 (0.69–1.32)	42.4	0.58 (0.43–0.78)	**0.58 (0.43–0.77)**

Group	Comprehensive STI Screen Last 12m (Among Those not Already Diagnosed with HIV 12m ago)			Ever been Offered any Hepatitis Vaccination			Ever Spoken to about PrEP at Health Service (Among Those not Diagnosed with HIV)		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	12.9	1.00	1.00	56.4	1.00	1.00	9.7	1.00	1.00
AMB trans men N = 373	8.4	0.62 (0.42–0.90)	**0.60 (0.41–0.88)**	43.2	0.59 (0.47–0.73)	**0.60 (0.48–0.75)**	6.2	0.56 (0.36–0.88)	**0.56 (0.36–0.88)**
AFB trans men N = 498	7.7	0.56 (0.40–0.78)	**0.59 (0.42–0.82)**	41.9	0.56 (0.46–0.68)	**0.59 (0.49–0.72)**	6.4	0.64 (0.45–0.92)	**0.64 (0.45–0.92)**
AFB men N = 178	8.8	0.65 (0.38–1.11)	0.67 (0.40–1.14)	50.3	0.78 (0.58–1.06)	0.82 (0.60–1.11)	10.3	1.08 (0.65–1.78)	1.08 (0.65–1.78)

Group	Received Verbal Insults Because Attracted to Men, Last 12m		
	%	OR (95% CI), Unadjusted	OR (95% CI), Adjusted *
AMB men N = 124,838	20.8	1.00	1.00
AMB trans men N = 373	26.8	1.40 (1.11–1.77)	1.55 (1.21–1.97)
AFB trans men N = 498	36.4	2.19 (1.82–2.63)	1.43 (1.19–1.72)
AFB men N = 178	31.3	1.73 (1.26–2.39)	1.33 (0.96–1.84)

OR = Odds ratio; CI = Confidence Interval; * adjusted for age, country and employment; emboldened results are significant at $p < 0.05$ after adjustment.

For only one indicator was service coverage better among a minority group than among the majority—AFB trans men were most likely to have got free condoms in the past 12 months. This accords with the same group being least likely to have engaged in condomless intercourse in the last 12 months solely because they lacked a condom (see Table 4).

Conversely, AFB trans men were least likely to have tested for HIV or received a comprehensive STI screening in the past 12 months, or to ever have been offered hepatitis vaccination.

All interventions measured provided significantly less coverage of AMB trans men than of the AMB majority.

4. Discussion

4.1. Limitations and Strengths

Our survey has a number of limitations. Firstly, the sample is self-selecting. Although large, this is no guarantee of representativeness. Comparison of EMIS-2010 respondents with a nationally representative sample of MSM in the UK demonstrated that the EMIS sample was adequately representative of men who had sex only with men [31]. However, there is an entirely unknown trans men's bias. Secondly, all the measures are self-reported. Although widely used for sexual health research, this will inevitably introduce reporting error. Thirdly, the large number of statistical tests undertaken will result in Type 1 errors. We are attempting to build an overview of the situation of sex/gender minority MSM and no one measure should be given undue weight.

Conversely, this is the largest sample of AFB and trans MSM ever reported on and allows comparison with other MSM on a range of identical measures. The sample has very high geographic coverage and is comprehensive for a single global region. In addition, the age and identity biases of the survey can be surmised from those of EMIS-2010 [32]. Our questions were sensitive to sex and gender variations and our sexual behavior and STI testing questions were designed to be valid and acceptable to men of diverse bodies.

4.2. Terminology

Inevitably, EMIS-2017 was designed within the sex/gender binary whilst also being aware of it. There is increasing recognition that sex, gender and sexuality can and do occur in any combination and that transition occurs within each independently of the other two. Indeed, each of sex, gender and sexuality are in themselves multi-faceted concepts rather than unitary constructs, with component parts that may not always coincide.

Trans people have diverse bodies and a variety of ways to describe their gender identities. Some have chosen to change their bodies through hormones and/or surgeries, others have chosen not to, and some intend to. Anatomical variations need to be taken into consideration when talking about the sexual health of trans MSM because identity terms do not unambiguously signify body configurations.

EMIS-2017 was defined as being a survey for people who identify as a man or a trans man. Some respondents ticked 'trans man' when asked for their gender identity and then indicated that they were assigned male at birth. We did not anticipate this group of AMB trans men in its size or distinct profile. They are the oldest of the four groups, with the highest proportion of migrants (18%), and are most likely to be selling sex (11%). Compared to the majority group, this sub-group was more likely to have thoughts of suicide and self-harm and to be unhappy with their sex lives. They were also less likely to be diagnosed with HIV or gonorrhoea, despite being more likely to engage in sexual risk with steady (but not non-steady) partners. Compared to the majority they had more unmet health promotion need and less service coverage.

As we do not have any additional information about this group, we cannot give any interpretation about who they might be. At this point, we acknowledge a group of people who were AMB and identify as trans men whose demographic, sexual and mental health profiles are distinct from those AFB and those not identifying as trans. Ethnographic and qualitative research is needed to better understand the sex/gender/sexuality variations of lived experience as well as the fluid terminology used to name them.

4.3. Sexual Attraction and Behavior

Our own and other evidence suggest that trans people are more likely bi- or pansexual than cis people. There is also evidence that bisexual people suffer a disproportionate burden of mental ill health compared to all mono-sexualities (i.e., people attracted to only one sex/gender combination)—see [33] for a recent review. Further research might usefully disentangle the multiple social hierarchies multi-sexual trans people suffer within.

Our findings support qualitative research [13] which suggests trans MSM often lack safer sex negotiation skills and confidence. All three trans groups, specifically the AFB, were significantly more likely to indicate that they find it hard to say 'no' to sex they don't want. Bodily insecurity may result in sexual disempowerment, where a fear of outright sexual rejection results in acquiescence to sexual risk behaviors [15]. Targeted (sexual) assertiveness training [34] could address this widespread unmet need.

4.4. Sexual Health

Our findings contrast with earlier findings in two studies from the USA, that sexual risk behaviors are common among trans MSM [13,14]. In addition to small sample sizes, in one of these [13], the sample of 17 trans men were recruited through social and medical services for trans gender people and included five men (29%) who were involved in sex work. The authors recognize the possibility that their sites of recruitment created the high levels of risk observed and our data support this interpretation. The other study [14] was a quantitative survey of 45 trans men using diverse community recruitment methods. Among these men, 60% had anal sex in the last 12 months, of which 60% did not always use a condom (i.e., 36% had condomless intercourse in the last 12 months) and 69% had vaginal intercourse of which 69% did not always use a condom (i.e., 48% had vaginal condomless intercourse). Unfortunately, the authors do not cross-tabulate these measures, so the overall proportion engaging in condomless intercourse of any type is not known.

Another source of differences in findings are varying health cultures between the USA and Europe. For example, in a nationwide online survey of a community-recruited convenience sample of 12,832 MSM, 192 people nominated 'trans gender male' as their gender identity. Among these, 61% received the result of an HIV test in the last 12 months (the authors do not address the issue of those already diagnosed with HIV). [35]. In our current survey, the figure was 39% (among those identifying as trans men). Despite the methodological similarities, there is no necessary contradiction due to the differences in testing cultures between continents. More research is needed among men AFB and trans men in Europe to compare our findings to.

The relative absence of sexual risks observed in our sample does accord with the relative lower levels of STI diagnoses reported, as well as the higher levels of sexual dissatisfaction.

With regard to diagnoses of infections, it should be noted that all three minority groups were less likely to have tested for HIV or to have had a comprehensive STI screen in the last 12 months, than were the majority group. The proportions we found were higher than previously reported [36], where only 18.7% of trans MSM in Ontario, Canada indicated having HIV tested within the last 12 months.

Qualitative studies have identified barriers for HIV/STI testing, which included fear about positive results, difficulties in accessing healthcare institutions, a lack of trans-related knowledge among providers, and limited testing capacities of providers [36]. Healthcare providers that offer testosterone therapy monitoring and transition-related care have been identified as valuable points for trans MSM to access sexual health services [37].

In a large community-based survey of people living with HIV in the UK, 0.4% (4/970) of the MSM were trans while 80% (4/5) of the trans men were MSM [38]. So, in the UK at least, while trans MSM are under-represented among MSM with HIV (i.e., trans MSM do not appear to have elevated rates of HIV compared to cis MSM), trans MSM are very over-represented among trans men with HIV (i.e., sex with men is the major risk factor for trans men to acquire HIV).

HIV surveillance has been criticized for failing to record trans status in the USA [39] and in Europe [40]. The proportion of men living with diagnosed HIV in this survey was lower in the three

minority groups (AMB men, 10.5%; AMB trans men, 7.1%; AFB trans men, 1.0%; AFB men, 3.5%). This was not because minority group men are not testing for HIV. Testing was lower in minority groups compared with the majority, but substantial proportions were tested in the previous 12 months (AMB men, 56.0%; AMB trans men, 43.8%; AFB trans men, 36.4%; AFB men, 42.4%).

Our results are concordant with results from a recent systematic review [8] that estimated the HIV prevalence in AFB trans men to be 3.2% (95% CI 1.4–7.1%). European studies of HIV prevalence among trans MSM have been limited by small sample sizes and study settings (e.g., STI clinics) and have yielded varying results between 0% and 8.3%. [14,15,20,22,36]. Our findings estimate self-reported HIV prevalence in a considerably larger group of AFB/trans MSM in a multinational setting.

We also found a much lower incidence of gonorrhoea and chlamydia diagnoses than clinic-based USA studies have (e.g., [20]). This is to be expected given that clinic attenders are more sexually active, have greater sexual risk and are more likely to be seeking treatment for symptomatic infection.

A recent study about the sexual heath of trans men in the USA showed that almost one quarter (24.3% of n = 1808) fulfilled the current eligibility criteria for PrEP based on the USA's Centers for Disease Control and Prevention (CDC) guidelines [41]. Out of those participants, who were eligible for PrEP (n = 439), only 10.9% (n = 48) were actually taking PrEP. Another study among trans MSM in the USA (n = 857) showed that while 55.2% fulfilled the CDC criteria of PrEP eligibility, only 21.8% of the eligible were taking PrEP [42]. PrEP efficacy specifically in trans men is currently unknown and unlikely to be investigated in a clinical trial of sufficient size in the near future. Our study shows that knowledge about PrEP and communication about PrEP with health services is poorer in all three minority groups. This result is also consistent with the reasons for low uptake of PrEP in [41]. However, to date, there are no trials with PrEP that include trans or AFB men.

4.5. Mental Health

With regard to anxiety and depression, we found lower prevalence than in recent studies with smaller and more narrowly recruited samples [21,43]. Our findings on self-harm are in accord with a recent review [7].

Alcohol and other substances may reduce anxiety related to body dysphoria but may also limit safer sex negotiation [14]. In this sample, specifically AFB trans men showed a higher prevalence of both suicidal ideation and self-harm. This group also showed a significantly higher likelihood of potential alcohol dependency, 26%, which is close to the 32% measured by [21].

Striking among the AFB trans men was the virtual absence of internalized homonegativity (but not its absence among AFB men).

4.6. Abuse

An increase in violence and discrimination can be assumed at the intersection of a gay/queer and trans identity. Research in the USA suggests that, among cis men, gay and bisexual men are less trans prejudiced than heterosexual men [44]. However, trans inclusivity in queer spaces is contingent and situational [45]. Reisner and colleagues [46] found that trans MSM who experience gender non-affirmation by their cis gender male partners (measured with a four-item scale) were more likely to experience psychological distress and anxiety than those with gender affirming partners. Additionally, those experiencing gender non-affirmation (78% of n = 843) were less likely to get tested for HIV and more likely to engage in condomless intercourse. Expressions of disapproval and hostility to desire for men among trans men can come from cis MSM, as well as cis and trans heterosexuals. This may explain the elevated levels of verbal abuse experienced by trans MSM compared to cis MSM and accords with heightened experience of violence and harassment among trans people compared with non-trans LGB people [17].

While living authentically is the goal, trans people must employ a variety of avoidance strategies to protect their safety in everyday life. Strategies vary by sex, gender and stage of transition [47]. For trans MSM, gay sex scenes are another 'hot spot' where discrimination often takes place, added

to clothing stores, recreational facilities and rest rooms. Health promotion could profitably provide platforms for trans MSM to explore and share successful management strategies to achieve the best sex with the least harm.

4.7. Drug Use

Drug use was as common in the minority groups as it was in the majority, including sexualized drug use. MSM have substantially higher rates of use of all substances than the general population [48,49]. LGBT drug services need to be accessible and appropriate to trans people, including chemsex services for MSM. However, recent injecting drug use was uncommon in all groups and we found no significant differences between them. Existing drugs services based on the needs of opiate injectors are unlikely to meet the needs of this group and LGBT dedicated drugs services may be required.

4.8. Unmet Health Promotion Needs

No health promotion need was more poorly met among AFB trans men than in the majority and some were better met. By contrast, AMB trans men were significantly more likely to have unmet needs across a range of indicators, perhaps most importantly social support (as this is a health promotion need related to multiple risk and precaution behaviors).

5. Conclusions

Health inequalities across sex assigned at birth/gender identity combinations are apparent among MSM and do not all trend in the same direction. Inequalities exist in the coverage of interventions and services, the extent of unmet health promotion needs, levels of risk and precaution behaviors and in morbidity outcomes.

Trans men and men assigned female at birth are overlapping and heterogenous groups. The term 'trans man' was selected in the survey by both AFB and AMB people. This may be an artefact of the survey design. However, since we observed distinct profiles of the three minority sub-groups of MSM, this seems unlikely to have arisen by chance. We also detected differences by trans-identification among those AFB (i.e., between those who identify as a 'trans man' and those who identify as a 'man').

Mental health is poorer in AFM/trans MSM than in the majority. Conversely, AFM/trans men as a group are less likely to be diagnosed with STIs. Only one indicator of sexual risk behavior (condomless intercourse with multiple steady male partners in the last 12 months) was higher in a minority group, the AMB trans men. Significantly fewer AFB trans men engaged in all four of the sexual risk indicators, as did AFB men for two of them. AFB trans men were also less likely to be using PrEP.

It is clear that AFB men and trans men are part of gay communities and have the potential for sex with each other and with AMB men. It is also clear that all people have the right to develop their personal sexual safety needs and that all groups of MSM have the capacity to improve their sexual health.

HIV and sexual health programs for MSM are not equally accessible to all MSM. A lack of culturally competent care for trans MSM was noted over a decade ago in San Francisco [14]. It is the responsibility of health care providers to offer appropriate and competent care for sex/gender minority MSM. Inclusive programs serve both sexual and mental health. In terms of sexual health services, a range of interventions delivered by diverse providers will best meet the diverse needs of populations. Inclusive interventions are those which are proficient for trans/AFB MSM across the range of ethnic, class and cultural differences. Moreover, services for MSM at different points in their lives (e.g., starting and stopping sex, maintaining and leaving relationships, engaging in and escaping chemsex, seeking an STI screen) should be able to service trans/AFB MSM as competently as the MSM majority. Competent services include awareness of the range of ways in which transitions occur, body diversity, and changes in desire, as well as social and economic aspects that influence a person's decision to seek gender affirmation.

The routine collection of sex-assigned-at-birth and current gender identity in general population health surveys (as well as MSM surveys) will facilitate planning and increase inclusion. Qualitative research could better understand the experiences and identities of those who indicated 'trans men' and who were assigned male at birth. Broadening knowledge about subgroups often neglected in sexual health research will reduce stigma and discrimination in both healthcare settings and MSM communities.

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Appendix A

Table A1. Gender identity terms used in the European MSM Internet Survey (EMIS) 2017 response sets.

English	Man	Trans Man	Woman	Trans Woman	Non-Binary Gender
Albanian	Mashkull	Mashkull Transgjinor	Grua	Grua Transgjinore	Papercaktuar (Non-binary gender/Genderqueer)
Arabic	رجل	رجلمتحول	إمرأة	إمرأةمتحول	ثنائيغيرجنس
Bulgarian	Мъж	Транс мъж	Жена	Транс жена	Джендър неутрален
Croatian/Serbian	Muškarac	Trans muškarac	Žena	Trans žena	Rodno neutralan
Czech	Muž	Trans muž	Žena	Trans žena	Non-binary
Danish	Mand	Transmand (fra kvinde til mand)	Kvinde	Transkvinde (fra mand til kvinde)	Andet, herunder interkøn
Dutch	Man	Transman	Vrouw	Transvrouw	Genderfluïde
Estonian	Mees	Transmees	Naine	Transnaine	Mitte-binaarne (Non-binary gender)
Filipino Cebuano	Laki	Trans nga laki	Bayi	Trans nga bayi	Non-binary nga katawohon
Filipino Tagalog	Lalaki	Lalaking trans	Babae	Babaeng trans	Kasariang non-binar
Finnish	Mies	Transmies	Nainen	Transnainen	Muunsukupuolinen (ei-binäärinen)
French	Homme	Homme trans	Femme	Femme trans	Genre non-binaire
German	Mann	Trans*mann	Frau	Trans*frau	Geschlechtsneutral / nichtbinär
Greek	Άνδρας	Τρανς άνδρας	Γυναίκα	Τρανς γυναίκα	Δεν αυτοπροσδιορίζομαι με κανένα από τα δυο κυρίαρχα φύλα (non binary)
Hebrew	رجل	متحول رجل	إمراة	متحول إمراة	جنس غير ثناني
Hungarian	Férfi	Transz férfi	Nő	Transz nő	Nem-bináris nemű
Italian	Uomo	Uomo trans	Donna	Donna trans	Genere non-binario
Latvian	Vīrietis	Transseksuālis: no vīrieša uz sievieti	Sieviete	Transseksuālis: no sievietes uz vīrieti	Dzimumneitrāls (Ne binārs dzimums)
Lithuanian	Vyras	Transeksualas: vyras, buvęs moterimi	Moteris	Transeksualas: moteris, buvusi vyru	Belytis (nesitapatinu nei su vyru, nei su moterimi, nei su abiems)
Macedonian	Маж	Транс маж	Жена	Транс жена	Не бинарен пол
Maltese	Raġel	Raġel trans	Mara	Mara trans	Bla distinzjoni ta' ġeneru
Norwegian	Mann	Transperson - kvinne til mann	Kvinne	Transperson - mann til kvinne	Ikke-binær
Polish	Mężczyzna	Trans-mężczyzna	Kobieta	Trans-kobieta	Niebinarna tożsamość płciowa
Portuguese	Homem	Homem trans	Mulher	Mulher trans	Género não binário
Romanian	Bărbat	Bărbat trans	Femeie	Femeie trans	Gen ne-binar
Russian	Мужчина	Транс-мужчина	Женщина	Транс-женщина	Небинарный гендер
Slovak	Muž	Transrodový muž	Žena	Transrodová žena	Nebinárna osoba (pohlavne neutrálna)
Spanish	Hombre	Hombre transexual	Mujer	Mujer transexual	Género no binario
Swedish	Man	Transman	Kvinna	Transkvinna	Icke-binär
Turkish	Erkek	Trans Erkek	Kadın	Trans Kadın	Kadın/Erkek ikili cinsiyet sistemi dışında
Ukrainian	Чоловік	Транс-чоловік	Жінка	Транс-жінка	Небінарний гендер(не відносите себеоднозначно ні до чоловіків, ні до жінок)

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List of Publications

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- Appenroth, M.N.; Marcus, U.; Albrecht, S.; Jansen, K.; Gunsenheimer-Bartmeyer, B.; Bremer, V. & Koppe, U. “Similar Sexual Behaviors, yet Different Outcomes: Comparing Trans and Gender-Diverse and Cis PrEP Users in Germany Based on the Outcomes of the PrApp Study” Sexes Journal. 2022; 3 (1): 178-188. (No Impact Factor yet)
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