Original research

Estimating the percentage of European MSM eligible for PrEP: insights from a bio-behavioural survey in thirteen cities

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ABSTRACT

Objectives This paper aims to estimate the percentage of European men who have sex with men (MSM) who may benefit from pre-exposure prophylaxis (PrEP), applying the three most widely used HIV risk indices for MSM (MSM Risk Index, Menza score, San Diego Early Test (SDET) score) and drawing on a large-scale multisite bio-behavioural survey (Sialon II).

Methods The Sialon II study was a bio-behavioural survey among MSM implemented in 13 European cities using either time-location sampling or respondent-driven sampling. Biological and behavioural data from 4901 MSM were collected. Only behavioural data of HIV-negative individuals were considered. Three widely used risk indices to assess HIV acquisition risk among MSM were used to estimate individual HIV risk scores and PrEP eligibility criteria.

Results 4219 HIV-negative MSM were considered. Regardless the HIV risk score used and the city, percentages of MSM eligible for PrEP were found to range between 5.19% and 73.84%. Overall, the MSM Risk Index and the Menza score yielded broadly similar percentages, whereas the SDET Index provided estimates constantly lower across all cities. Although all the three scores correlated positively (r>0.6), their concordance was highly variable (0.01<CCC<0.62).

Conclusion Our findings showed the impact of different scoring systems on the estimation of the percentage of MSM who may benefit from PrEP in European cities. Although our primary aim was not to compare the performance of different HIV risk scores, data show that a considerable percentage of MSM in each city should be offered PrEP in order to reduce HIV infections. As PrEP is highly effective at preventing HIV among MSM, our findings provide useful, practical guidance for stakeholders in implementing PrEP at city level to tackle HIV infections in Europe.

INTRODUCTION

HIV transmission remains a challenging public health issue globally, despite intensive efforts to prevent new infections through health promotion and timely diagnosis and treatment. Preventive strategies and actions developed and delivered worldwide over the last 30 years among key populations have had a considerable impact on the epidemic. However, such a trend has not necessarily been seen among men who have sex with men (MSM), where infections have continued to increase accounting for 38% of all new HIV diagnoses in Europe in 2018.[1]

During the last decade, the use of antiretroviral treatment as prevention has been advocated for MSM at high risk of HIV infection.[2] Pre-exposure prophylaxis (PrEP) is a biomedical preventive strategy that HIV-negative individuals can take prior to sexual contact to reduce their risk of HIV acquisition per single sexual act. Data indicate that PrEP is highly effective among MSM in reducing HIV incidence.[2 3] In 2012, the US Food and Drug Administration approved the use of PrEP as a regimen to prevent HIV infection among people at risk. Similarly in Europe, recent studies have shown both the efficacy and cost-benefit of PrEP.[2 4–7] Consequently, the European Centre for Disease Prevention and Control, WHO, the European AIDS Clinical Society and the European Medicines Agency have recommended the use of PrEP among MSM as part of national comprehensive HIV and other STIs prevention programmes.[8–10]

However the evidence, PrEP availability within the European Union (EU) continues to be limited. Indeed, recent studies suggest that almost 500 000 MSM are not able to access PrEP despite their desire to use it.[11] This situation is partly due to different European Member States (MS) being at very different stages of policy and implementation. For instance, while some countries remain in the early stages of developing national guidelines for the implementation of PrEP, others are much more advanced and have already started to deliver it routinely as a part of their national HIV/STI prevention strategies. In particular, among the 13 cities where our Sialon II study was implemented, all but 4 cities (Bratislava, Bucharest, Sofia, Vilnius) currently have PrEP programmes available at the national level. Unsurprisingly perhaps, one of the main challenges in implementing PrEP

is the allocation of adequate funding and the estimation of the percentage of potential PrEP users who may wish to access it. Early estimates regarding PrEP need have relied mainly on end-user intentions or expressions of willingness to use it. However, HIV self-perceived and clinically assessed risk may not necessarily converge; resulting in people at high risk of HIV acquisition not receiving PrEP. Therefore, the possibility of estimating the percentage of eligible PrEP users among MSM is an important step to ensure national prevention strategies are feasible and effective.

Over the years, a number of indices have been developed and validated (mainly in the USA) to assess an individual's risk and identify MSM that could potentially be offered PrEP. The most widely accepted scoring systems include the 4-item Menza score,[12] the 7-item HIV Incidence Risk Index for MSM (HIRI-MSM)[13] and the 4-item San Diego Early Test (SDET) score.[14]

To our knowledge, these indices have never been used to estimate the percentage of potential PrEP users at community level. Using data from a European bio-behavioural survey (Sialon II) carried out in 13 cities among MSM populations and applying the above-mentioned HIV risk scoring systems, this current paper estimates and compares the percentage of MSM potentially eligible for PrEP at city level. The main objective of this paper therefore is to estimate the number of MSM who may benefit in each city of using PrEP independently from their risk self-assessment or request.

MATERIALS AND METHODS
A detailed description of the Sialon II methodology has been published elsewhere.[15] Here, we present the main methodological aspects related to this secondary analysis.

Study design and setting
Sialon II was a multicentre bio-behavioural survey with the concomitant collection of biological (oral fluid (OF) or blood specimens) and behavioural data. The survey was implemented in 13 European cities during April 2013 to November 2014 using a dual-frame sampling strategy. Time-location sampling (TLS) or respondent-driven sampling (RDS) was used based on formative research. TLS was used in nine cities: Brussels, Sofia, Hamburg, Warsaw, Lisbon, Ljubljana, Barcelona, Stockholm and Brighton. RDS was used in four cities: Verona, Vilnius, Bucharest and Bratislava.

Sample size
Sample size estimates were calculated based on the former Sialon I project and other available studies.[16] Assumed HIV prevalence in the target population of 15%, a precision of 5%, a significance level of 95% and a design effect of 2.0 provided a random clustered sample size of n=392 per study site. Accounting for possible invalid samples, a final target sample per city of n=408 (TLS) and n=400 (RDS) was planned.

Data sources and measurements
Behavioural data, sociodemographic characteristics, sexual and testing behaviour and HIV status were collected through a self-completion questionnaire (note: the questionnaire was not designed specifically to collect information relating to PrEP). To allow for sampling weight calculations, items were included on venues attendance (TLS) and network size (RDS). All participants irrespective of the sampling method were asked to provide a biological specimen (OF or blood).

Participants
Men were included if they had any kind of sex with another man during the 12 months before enrolment, provided written informed consent and agreed to donate an OF or blood specimen (TLS and RDS, respectively). Men younger than 18 years were excluded. For this analysis, participants with an OF/serum positive HIV test result were excluded to ensure estimates are based on actual potentially eligible PrEP users (ie, MSM who are HIV negative).

Calculation of HIV risk scores
Outcome variables were three indices to identify MSM at risk of acquiring HIV: a revised CDC version of the HIRI-MSM called the MSM Risk Index,[13 17] the Menza score[12] and the Amsterdam version of the SDET score.[14 18] Individual scores were calculated on the basis of the items of the Sialon II questionnaire. Some minor adjustments for generating the HIV risk scores were needed as our questions differed slightly from the items used in the original indices (table 1). All changes were conservative; in other words, the estimates presented in this paper are likely to underestimate the percentage of MSM eligible for PrEP.

Statistical analysis
Following the calculation of risk scores, analysis was carried out separately for all 13 participating cities. To calculate the sampling weights, a procedure was devised based on previous publications and methodological guidelines.[15 19 20] All point estimates are reported with their respective sample size, 95% CIs and estimated design effect (DE). In order to assess the concordance between the percentage of PrEP eligible users based on the three HIV risk scores, Lin's concordance correlation coefficient (CCC) and Bland-Altman limits of agreement were used.[21 22] Pearson's r correlation was used to estimate the linearity of the estimates.

RESULTS
This analysis is based on 4219 HIV-negative MSM recruited across 13 European cities as part of the Sialon II study (TLS n=3010; RDS n=1209). A general description of the overall sample is available in the Sialon II core publications.[23 24] Our estimates based on three HIV risk acquisition scores are presented in table 2 and figure 1, organised by city to illustrate how the risk scores perform across cities.

Overall, our estimates of potentially eligible PrEP users are broadly similar for both the MSM Risk Index and the Menza score, although the SDET Index produces consistently lower estimates across all cities, compared with the other two. City comparisons show that Sofia is the city with the highest estimates of eligible PrEP users regardless of the risk index (64.69%, 73.84% and 23.57% for MSM Risk Index, Menza and SDET scores, respectively). In contrast, Bucharest, Verona and Vilnius show the lowest percentages, although not uniformly on all scores. The MSM Risk Index and Menza scores produce very similar estimates of eligible PrEP users in Bratislava, Bucharest and Vilnius, whereas Ljubljana is the only city where the estimates obtained using the Menza is lower than that using the MSM Risk Index (33.62% vs 46.28%). As far as the SDET Index is concerned, Ljubljana shows a potential PrEP user estimate far higher than other cities with comparable estimates obtained using Menza and the MSM Risk indices. Hamburg shows a considerable percentage of potential PrEP users when SDET and Menza indices are used, whereas the MSM Risk score estimate is much lower.

Table 1 HIV risk score items, associated scores and adaptations

Items	MSM Risk Index[17] Response	Points	Adaptation(s)	Menza[12] Response	Points	Adaptation(s)	Amsterdam SDET[18] Response	Points	Adaptation(s)
Age (years)	How old are you today? <18 / 18–28 / 29–40 / 41–49 / >49	0 / 8 / 5 / 2 / 0	None	Not considered; –	–	–	Not considered; –	–	–
No. of partners	In the last 6 months, how many men have you had sex with? >10 / 6–10 / 0–5	7 / 4 / 0	None	Does your patient/client report 10 or more male sexual partners in the prior year? Yes / No	3 / 0	We collected this information in a 6-month timespan. However, we considered those reporting at least 10 sexual partners in the previous 6 months.	At least 10 male sex partners during the last 12 months. Yes / No	2 / 0	Based on adjustments previously published,[18] considering a 6-month timespan, we reduced the number of total sexual partner at >5.
CRAI	In the last 6 months, how many times did you have CRAI? 1 / 0	10 / 0	Sexual role is asked only during last AI. Only those who reported having had a receptive role during their last AI were considered as fitting this question.	Not considered; –	–	–	CRAI and at least 3 male sex partners during the last 12 months. Yes / No	3 / 0	Based on adjustments previously published,[18] considering a 6-month timespan, we reduced the number of partners with whom the study participant had had CRAI at >3. In addition, sexual role is asked only during last AI.
HIV+ partners	In the last 6 months, how many of your male sex partners were HIV positive? >1 / 1 / 0	8 / 4 / 0	HIV status is asked only for those study participants who had CAI in the last 6 months.	Does your patient/client report unprotected AI with a partner with positive or unknown HIV status in the prior year? Yes / No	1 / 0	We collected this information in a 6-month timespan. However, we considered those reporting CAI with HIV positive or unknown HIV status partner(s) in the previous 6 months.	Not considered; –	–	–
CAI with HIV+ partners	In the last 6 months, how many times did you have CIAI with a man who was HIV positive? >5 / 0–4	6 / 0	Sexual role is asked only during last AI. We considered those reporting CIAI during their last AI with at least a steady in the last 6 months, fitting this item. For those reporting CIAI with non-steady partners, we considered only those who had more than 5 NSP.	Not considered; –	–	–	CIAI with HIV-positive male sexual partners during the last 12 months. Yes / No	3 / 0	Sexual role is asked only during last AI. We considered only those reporting CRAI during their last AI.
Drug use	In the last 6 months, have you used methamphetamines such as crystal or speed? Yes / No	6 / 0	–	Has your patient/client used methamphetamine or inhaled nitrites (popper) in the prior 6 months? Yes / No	11 / 0	Use of drugs is asked only during last AI. We consider that those who reported the use of amphetamines had indeed used methamphetamine.	Not considered; –	–	Use of drugs is asked only during last AI. We consider only those who reported the use of amphetamines had indeed used methamphetamine.
Bacterial STIs	Not considered; –	–	–	Does your patient/client have gonorrhoea, chlamydia or syphilis, or does he have a history of these infections? Yes / No	4 / 0	We considered only those participants who have been diagnosed in the last 12 months.	Bacterial STIs diagnosis in the last 12 months. Yes / No	2 / 0	None
Min-Max score		0–45			0–19			0–10	
Threshold for eligibility		>10			>1			>3	

AI, anal intercourse; CAI, condomless anal intercourse; CIAI, condomless insertive anal intercourse; CRAI, condomless receptive anal intercourse; ; NSP, non steady partner(s); SDET, San Diego Early Test.

Table 2 HIV acquisition risk scores among European MSM enrolled in the Sialon II study

City	Sample size*	HIRI-MSM ≥10			Menza >1			SDET >3		
		Point estimate	95% CI	Estimated design effect	Point estimate	95% CI	Estimated design effect	Point estimate	95% CI	Estimated design effect
Barcelona	338	36.73	28.25 to 45.21	4.24	52.83	44.94 to 60.72	3.42	10.82	8.41 to 13.22	0.82
Bratislava†	380	46.20	39.14 to 53.14	2.12	49.00	42.09 to 55.87	2.04	21.2	15.50 to 26.98	2.12
Brighton	334	37.89	31.49 to 44.30	1.14	51.91	41.13 to 62.70	3.04	17.14	12.84 to 21.44	0.85
Brussels	332	41.07	33.20 to 48.95	3.71	53.91	44.97 to 62.84	4.65	18.88	13.80 to 23.95	2.43
Bucharest†	147	30.00	19.96 to 40.06	1.84	29.1	19.68 to 38.51	1.65	5.19	1.82 to 8.55	0.89
Hamburg	340	31.25	23.74 to 38.75	2.56	49.14	39.05 to 59.23	3.99	21.22	15.43 to 27.01	1.96
Lisbon	302	30.42	23.39 to 37.44	1.89	40.51	31.31 to 49.70	2.85	12.12	5.22 to 19.03	3.63
Ljubljana	331	46.28	39.68 to 52.87	2.59	33.62	23.50 to 43.75	6.80	21.05	16.30 to 25.79	2.01
Sofia	344	64.69	58.31 to 71.06	0.36	73.84	68.20 to 79.48	0.33	23.57	15.80 to 31.34	0.68
Stockholm	338	31.60	25.87 to 37.33	1.09	36.98	30.27 to 43.68	1.38	13.31	7.21 to 19.42	2.32
Verona†	368	33.7	27.36 to 39.96	1.77	26.9	20.14 to 33.68	2.34	9.96	5.84 to 14.04	1.88
Vilnius†	314	29.4	23.07 to 35.70	1.66	26.6	20.59 to 32.57	1.59	9.52	5.84 to 13.11	1.32
Warsaw	351	39.35	33.84 to 44.83	0.74	47.38	37.95 to 56.81	2.08	13.75	8.44 to 19.05	1.38

*Participants with HIV-positive laboratory test results were excluded.
†Indicates RDS sampling.
HIRI-MSM, HIV Incidence Risk Index for MSM; MSM, men who have sex with men; RDS, respondent-driven sampling; SDET, San Diego Early Test.

The CCC between the MSM Risk score and the Menza score is 0.62 (95% CI 0.31 to 0.92; r=0.73). The same coefficient between the Menza score and the SDET score yields 0.09 (95% CI 0.00 to 0.19; r=0.65), while between the MSM Risk score and the SDET score the CCC is 0.11 (95% CI 0.01 to 0.22; r=0.728). Figure 2 shows the concordance correlation graph and the limits of agreement plot comparing the different estimates based on the three HIV risk scores. Figure 2(A1) presents the agreement between the MSM Risk score and the Menza score. The latter seems to overestimate the percentage of potential PrEP users with the exception of few cities (Ljubljana, Vilnius and Verona). The Bland-Altman limits of agreement (figure 2(A2)) confirms the overall overestimate with all estimates laying within the 95% CI and Ljubljana right on the upper limit. Figure 2(B1) shows the agreement between the MSM Risk score and the SDET score. Compared with the SDET, the MSM Risk score overestimates the percentage of potential PrEP users for all cities. Although the Bland-Altman's limits of agreement (figure 2(B2)) confirms this finding, all estimates but Sofia lay within the 95% CI with Hamburg on the lower limit. The comparison of SDET score versus the Menza score (figure 2(C1)) shows the overestimated percentages of MSM eligible for PrEP. In this case as well, Sofia lays outside the 95% CI (figure 2(C2)).

DISCUSSION

Previous attempts to estimate the need for PrEP have often relied solely on end-user intentions to use PrEP. A recent paper reported that 17.4% or 500 000 MSM (95% CI 420 000 to 610 000) in EU countries who would be 'very likely' to use PrEP if they could access it.[11] This estimate is based on a self-reported intention that could potentially be determined by an individual's perception of their own risk of HIV acquisitions and/or their perception(s) of the benefit of using PrEP.

Recently, a Canadian study among MSM found that 48.3% HIV-negative participants who perceived themselves as at low risk, met a behaviourally based criterion for PrEP prescription.[25] In Thailand, another study found even larger discrepancies.[26] A Belgian study also showed that self-reported risk perception was not a good indicator for PrEP eligibility.[27] This suggests that simply using self-perceived HIV risk as an indicator of PrEP eligibility can lead to widely varying estimates of potential PrEP beneficiaries. The consequences of such variation relate to potentially continued and/or increased HIV transmission, and may add to cost-effectiveness of public health expenditure, that is, allocating resources to implement PrEP at country level by not accurately targeting those most in need.
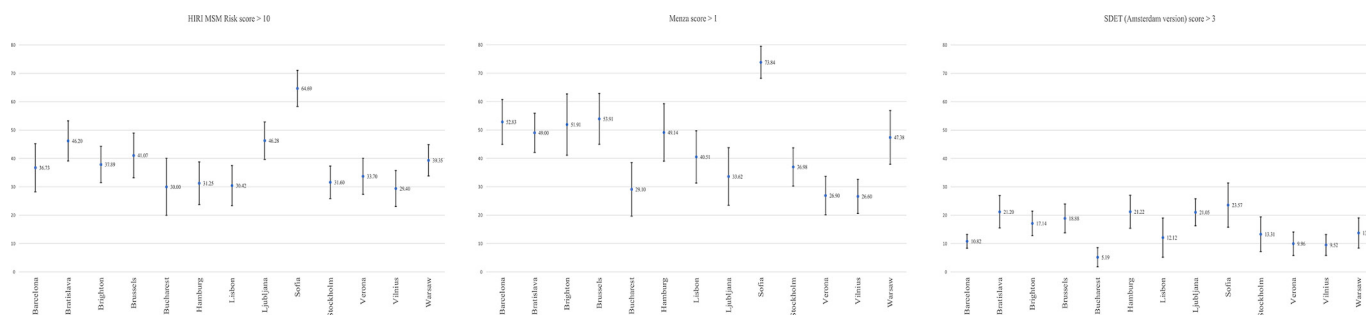

Figure 1 HIV risk scores among European men who have sex with men (MSM) enrolled in the Sialon II study (participants with positive HIV laboratory test results were excluded). CDC, Centre for Disease Prevention and Control.
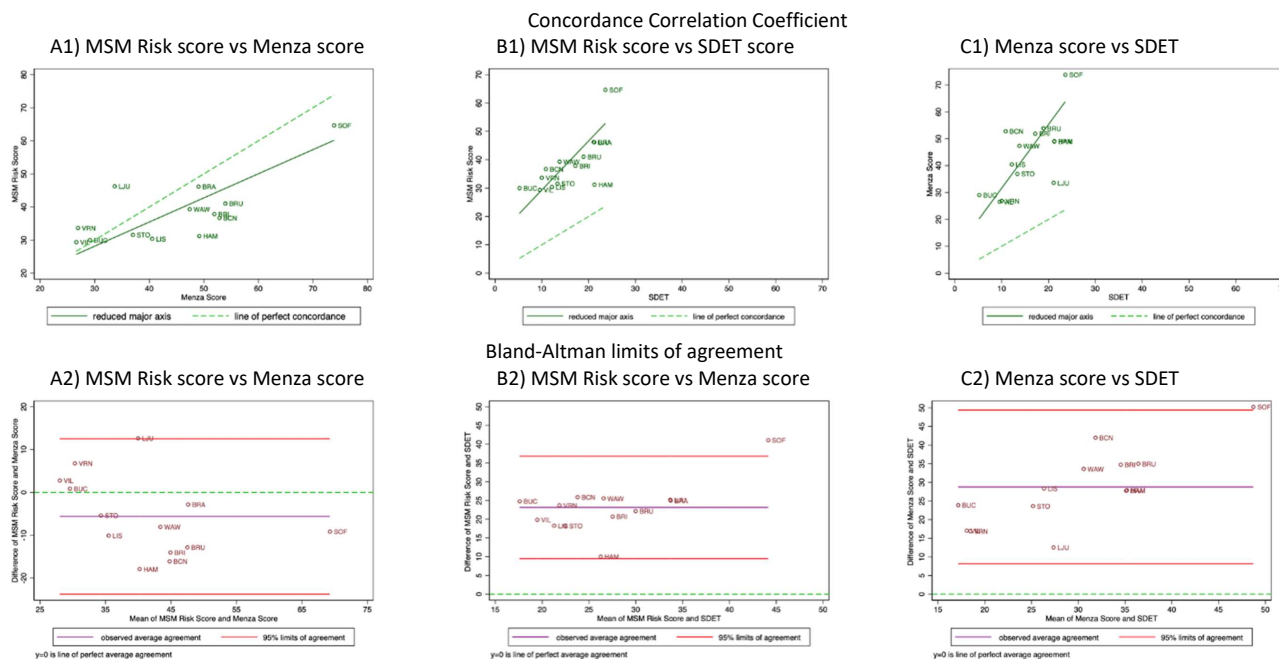
Figure 2 Estimates of men who have sex with men (MSM) potentially eligible for pre-exposure prophylaxis (PrEP) and their concordance correlation coefficient and Bland-Altman limits of agreement.

In order to reduce self-perception bias, in this paper we estimated the percentage of potential PrEP users on a population level, using a set of validated indices that are commonly used by clinicians to assess PrEP indication at individual level. Our data show the minimum percentages of MSM population, in each city, that should be offered PrEP to have an impact on HIV epidemic. These percentages represent the lower level of PrEP implementation at city-level, as WHO recommends access to PrEP for anyone who belongs to an high HIV incidence population, regardless of the use of HIV risk scoring systems.

Both the MSM Risk Index and the Menza scores identify large percentages of MSM who could be eligible for PrEP use, and even the SDET, with much lower estimates overall, identifies a significant percentage of MSM who met the criteria for PrEP prescription in all cities. Importantly, our estimates are higher than the percentage of HIV-negative MSM who reported to have ever taken PrEP in a survey carried out 4 years after Sialon II was conducted (European-MSM-Internet-Survey 2017).[28] In addition, PrEP eligibility, as assessed using HIV risk scores, refers to a past risk. It has to be considered that MSM who may have not taken risk so far and, therefore, are not eligible for PrEP yet, would anyway benefit from PrEP use in terms of likelihood in engaging in HIV high-risk behaviours in the coming months. The objective estimates of MSM eligible for PrEP as provided in this paper, along with the larger percentage of MSM who may benefit from PrEP use and the recently described disparities in MSM's PrEP uptake,[29] indicates that, despite the concerted PrEP promotion efforts of civil society and public health organisations across EU member states, a large gap in PrEP access exists.[11]

The variation of the estimates by the three different indices in our analysis most likely reflects the different factors and the scoring algorithms used in their calculation. The CDC version of MSM Risk Index and the Menza score provided broadly similar ranges of percentages of MSM potentially eligible for PrEP compared with SDET. Both the similarity between MSM

Risk Index and Menza score and their difference with the SDET are reflected in the size of concordance coefficients: the SDET Index performs very differently compared with the other two. These results are consistent with the different ways in which the scores have been developed and validated. In fact, the CDC version of MSM Risk Index and the Menza score are based on a common approach in terms of variables to be considered in the algorithm and reflect the validation samples. The characteristics of the MSM cohorts used to validate the scores, particularly related to age and drug use, may have had a significant impact. Only the MSM Risk Index considers age, inversely with scores increasing for younger adults. Neither Menza nor SDET consider age in their calculation algorithm. Thus, the MSM Risk Index will lead to higher estimates in cities with younger MSM populations. This is reflected in our data: in cities with <10% of Sialon II participants being older than 44 years (Bratislava, Bucharest, Ljubljana, Sofia and Warsaw[23]), our estimates are higher compared with cities with older participants (Barcelona, Hamburg, Lisbon).[23] For the Menza score drug use is central, with the weight originally assigned being larger than the sum all other items. Thus, in Bratislava, Hamburg, Sofia, Stockholm, Vilnius and Warsaw with use of poppers being more frequent,[30] estimates of those potentially benefiting from PrEP are higher. The SDET, again, takes a different approach, only considering sexual behaviour and previous bacterial infections. Given the well-established associations between the use of recreational drugs and HIV infection risk within MSM populations[30] and the possibility that sexual risk behaviours considered by the score do not capture all aspects, the SDET estimates of MSM eligible for PrEP use may be underestimated. Therefore, in cities with larger percentages of MSM diagnosed with bacterial STI(s) in the previous year (Brussels, Bucharest, Hamburg, Sofia), a larger percentage of MSM would be identified as potentially benefiting from PrEP. Of all cities, the estimates for Sofia are highest regardless of the risk index considered. We suggest that this is due to

the young age, extensive popper use and the frequent diagnosis of at least one bacterial STI in the previous year, resulting in high estimates for all three risk scores.

Our data show clearly that the choice of risk index has important implications for all stakeholders involved including policy makers, public health services and PrEP users themselves. Given the different risk score algorithms, different estimates are to be expected which implies that the direct comparisons of the percentage of eligible PrEP users are only meaningful when considering the characteristics of the populations and items used in the scoring systems. In addition, these scores have been developed for clinical purposes, primarily on a data-driven approach and without theoretical underpinnings from behavioural and social sciences. This means that they may reflect the specific sociocultural and historical context in which these indices were developed (US cohorts with mostly white non-Hispanic MSM). Future European studies addressing these wider issues of theoretical underpinning and validation are important issues not only for the European context.

In terms of the limitations of our analysis, it is important to note that the sampling methodology on which Sialon II was based (TLS and RDS) can result in quite different sample characteristics which may persist even after applying weighting corrections.[15] In most Western European cities, the percentage of young MSM aged ≤25 years in the samples is smaller than in the central/eastern European cities. This could impact on the estimates of the scores, particularly when age is considered as in the MSM Risk Index. Another important limitation is that, at the time of the Sialon II survey (2013–14) PrEP was neither well known nor available outside of studies and trials, therefore the Sialon II questionnaire was not designed specifically to collect data necessary to calculate precisely the three indices used in this current article.

In order to estimate the various risk scores, some minor adaptations were required (table 1). These adaptations however, were made relatively conservatively so it is arguably likely that the percentage of eligible PrEP users is underestimated for all scores. Nevertheless, caution should be used when extending our findings to MSM of different cities and social contexts, as the survey was based on 13 European cities and contextual factors not measured in the survey might have had an impact on the data and related estimates.

Answering the question which risk index is more valid and whether asking directly to the individuals about their self-perceived risk leads to more accurate estimates, would require longitudinal validation studies. Independent of the index, health services and policy makers need to be mindful of local demographics (above all age) and behavioural (above all drug use) patterns among MSM if choosing one of the three indicators discussed here to assess eligibility for PrEP. The pattern of results confirms that roll-out of PrEP should be considered widely, however, this study also shows that adopting different approaches to risk assessment will lead to significantly different estimates of potential PrEP beneficiaries. Considering this, the possibility of combining the estimates provided by the three HIV risk indices according to the specific city/region demography and behaviours should be considered carefully.

A significant percentage of European MSM should be offered PrEP and even considering only the lowest estimates obtained in our study, the allocation of funding for PrEP should be increased significantly to meet the needs of this vulnerable population. The available evidence about PrEP efficacy, safety and scalability is now overwhelming. It is now a matter of political willingness, although many factors may play a role, to allocate sufficient funding to reduce the burden of HIV among MSM.

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Key messages

► Pre-exposure prophylaxis (PrEP) is highly effective at preventing HIV among MSM; however, there is still uncertainty on how best to identify those to whom PrEP provision should be prioritised.

► The three most widely used HIV risk indices in the MSM population yielded different estimates with poor concordance, particularly when the San Diego Early Test score is considered.

► Regardless of the HIV risk index used, a considerable percentage of European MSM, higher than that have had access so far, should be offered PrEP in order to reduce new HIV infections.

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Supplementary materials – Sialon II items

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1.   **Which year were you born?**   19 |__|__|

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12. In the last 12 months, have you been <u>tested</u> for sexually transmitted infections other than HIV?

Yes ☐ 1

No ☐ 2   Go to question 14

I prefer not to answer ☐ 9   Go to question 14

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13. In the last 12 months, have you been <u>diagnosed</u> with the following *(please answer each item)***:**

	Yes	No	I do not know	I prefer not to answer
a. Syphilis	☐ 1	☐ 2	☐ 8	☐ 9
b. Gonorrhoea	☐ 1	☐ 2	☐ 8	☐ 9
c. Chlamydia	☐ 1	☐ 2	☐ 8	☐ 9
d. Anogenital warts	☐ 1	☐ 2	☐ 8	☐ 9
e. Genital herpes	☐ 1	☐ 2	☐ 8	☐ 9
f. Lymphogranuloma venereum (LGV)	☐ 1	☐ 2	☐ 8	☐ 9
g. Urethral outflow/itching	☐ 1	☐ 2	☐ 8	☐ 9
h. Hepatitis B	☐ 1	☐ 2	☐ 8	☐ 9
i. Hepatitis C	☐ 1	☐ 2	☐ 8	☐ 9

Supplemental material

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Sex Transm Infect

> **From this point onwards we would like you to focus on the <u>last 6 months</u> and your <u>male non-steady partners</u>.**
>
> **"Non-steady partners"** refer to 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, sex buddies)**.**
>
> By **"sex"** we mean any kind of sex involving physical contact with another person, including oral sex and mutual masturbation.

16. In the last 6 months, how many male *non-steady* partners have you had sex with? *(If you are not sure, please give an estimation.)*

Number of male non-steady partners (0 if none) |__|__|__|

I prefer not to answer   ☐ 999

17. In the last 6 months, how many male *non-steady* partners have you had <u>anal intercourse</u> with? *(If you are not sure, please give an estimation.)*

Number of male non-steady partners (0 if none) |__|__|__|

I prefer not to answer   ☐ 999

18. In the last 6 months, how many male *non-steady* partners have you had <u>unprotected (without condom) anal intercourse</u> with? *(If you are not sure, please give an estimation.)*

Number of male non-steady partners (0 if none) |__|__|__|

I prefer not to answer   ☐ 999

19. How many of those you had <u>unprotected (without condom) anal intercourse</u> with were:

HIV positive (0 if none) |__|__|__|

With unknown HIV status (0 if none) |__|__|__|

HIV negative (0 if none) |__|__|__|

I prefer not to answer   ☐ 999

> ***From this point onwards we would like you to focus on the last 6 months
> and your male steady partners.***
> *"Steady partners"* refer to boyfriends or husbands that mean you are not "single", but not to
> partners who are simply sex buddies.
> By *"sex"* we mean any kind of sex involving physical contact with another person, including oral sex
> and mutual masturbation.

---

20. In the last 6 months, how many male *steady* partners have you had sex with? *(if you are not sure, please give an estimation)*

Number of male steady partners (0 if none) |__|__|__|

I prefer not to answer ☐ 999

---

21. In the last 6 months, how many male *steady* partners have you had <u>anal intercourse</u> with? *(if you are not sure, please give an estimation)*

Number of male steady partners (0 if none) |__|__|__|

I prefer not to answer ☐ 999

---

22. In the last 6 months, how many male *steady* partners have you had <u>unprotected (without condom) anal intercourse</u> with? *(if you are not sure, please give an estimation)*

Number of male steady partners (0 if none) |__|__|__|

I prefer not to answer ☐ 999

---

23. In the last 6 months, how many of those you had <u>unprotected (without condom) anal intercourse</u> with were? *(if you are not sure, please give an estimation)*

HIV positive (0 if none) |__|__|__|

With unknown HIV status (0 if none) |__|__|__|

HIV negative (0 if none) |__|__|__|

I prefer not to answer ☐ 999

---

27. <u>Last time</u> you had anal intercourse, were you …

		Yes	No	I prefer not to answer
a.	penetrated (fucked) <u>with</u> a condom?	☐ 1	☐ 2	☐ 9
b.	penetrating (fucking) <u>with</u> a condom?	☐ 1	☐ 2	☐ 9
c.	penetrated (fucked) <u>without</u> a condom?	☐ 1	☐ 2	☐ 9
d.	penetrating (fucking) <u>without</u> a condom?	☐ 1	☐ 2	☐ 9

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28. Last time you had anal intercourse, what did you think about your <u>partner/s HIV status</u> before having sex? *(Tick as many as apply)*

I thought he was HIV negative ☐ 1

I knew he was HIV negative ☐ 2

I thought he was HIV positive ☐ 3

I knew he was HIV positive ☐ 4

I knew he was unsure about his HIV status ☐ 5

I didn't have any thoughts about his HIV status ☐ 6

I do not remember ☐ 7

I prefer not to answer ☐ 9

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Sex Transm Infect

30. Before or during your last anal sexual intercourse, did you use the following? *(please answer each item)*

		Yes	No	I prefer not to answer
a.	Alcohol	☐ 1	☐ 2	☐ 9
b.	Poppers	☐ 1	☐ 2	☐ 9
c.	Ecstasy	☐ 1	☐ 2	☐ 9
d.	Viagra/Kamagra/Cialis	☐ 1	☐ 2	☐ 9
e.	Hashish/marijuana	☐ 1	☐ 2	☐ 9
f.	Cocaine	☐ 1	☐ 2	☐ 9
g.	Amphetamine	☐ 1	☐ 2	☐ 9
h.	GHB	☐ 1	☐ 2	☐ 9
i.	Other (specify): _____	☐ 1	☐ 2	☐ 9

35. Have you ever injected drugs? *(Drugs injected for medical purposes or treatment of an illness do not count.)*

Yes ☐ 1

No ☐ 2

I prefer not to answer ☐ 9