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HIV and STI Testing and Related Factors Among Men Who Have Sex with Men in Estonia

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Abstract HIV and sexually transmitted infections (STI) testing rates among men who have sex with men (MSM) in Estonia are low. We collected data from 265 MSM in a national, online survey. Lifetime HIV testing was related to risky sexual behaviors and contacts with health care services, while lifetime STI testing was related only to contacts with health care services. In addition, some personal values were significant predictors of testing. For example, high achievement (personal success through demonstrating competence according to social standards) had a negative impact on lifetime HIV testing, and high interpersonal conformity (avoiding upsetting others) had a negative impact on lifetime STI testing. The results demonstrate the need to develop gay-friendly health services and to recognize the role of personal values and individual differences in values when designing attractive interventions to increase HIV/STI testing rates among MSM.

Keywords HIV · STI · Men who have sex with men · Testing · Personal values

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Introduction

Men who have sex with men (MSM) continue to be one of the groups at highest risk for HIV and sexually transmitted infections (STI) in the European Union (EU). The highest proportion of the total number of incident HIV cases in the EU in 2013 was reported among MSM (42 %). Additionally, in 2012 more than a third of gonorrhea infections (38 %) were reported among MSM [1, 2]. Despite the progress, current HIV testing coverage is not adequate in most settings in Europe and needs to be improved, so that all men who need testing can access it regularly [3].

Previous research has identified many factors related to the uptake of HIV testing among MSM. For example, older age, self-identified gay sexual orientation, better HIV-related knowledge, having been tested for STIs, history of STI, history of drug use, higher lifetime number of sexual partners, having health insurance, contacts with health care services, having a primary partner, and knowing the HIV-status of the primary partner have been found to be associated with having been HIV tested [4–12]. Fear of a positive result, perceived low risk of HIV infection, low knowledge of HIV transmission, less open about same-sex attractions and perceived discrimination towards MSM, HIV/AIDS-related stigmatizing and discriminatory attitudes, lower educational attainment, and structural barriers (such as not knowing where or not having the time or resources to test) have been found to be related to less testing in lifetime [4, 9, 13–21]. One factor identified as a barrier to HIV testing is internalized homonegativity (IH) [22–24]. IH has been described as internalization of negative attitudes and assumptions by persons with same sex attraction leading to feelings of guilt, inferiority and lack of self-worth and is associated with avoidance of HIV testing [25].

Correlates of testing for STIs other than HIV have received less attention but, like HIV testing, STI testing among MSM has been associated with younger age, higher levels of education, minority race, self-identified gay sexual orientation, having health insurance, visiting health care providers, disclosure of sexual identity or sex with men to health care provider, sexual risk behaviors, and alcohol and substance use [17, 26–28].

An important part of personal decision-making, including the decision to test for HIV and/or STIs, is personal values. Value research is an interdisciplinary field which has contributed to the research on social sciences but also on many other fields. For instance, values research in medical care showed, that men's values predict if they utilize screening tests for prostate cancer [29]. Values also influence the prevalence of risk-taking activities [30] and whether people make healthy behavioral choices [31]. Schwartz summarized definitions of the personal values, which are cognitive constructs that explain an individual's preferred life goals, principles, and behavioral priorities [32]. His theory identifies ten motivationally distinct value orientations that people in all cultures recognize, and it specifies the dynamics of conflict and congruence among these values. These value types are achievement, benevolence, conformity, hedonism, power, security, self-direction, stimulation, tradition, and universalism. Recently, confirmatory factor analyses of data supported the discrimination of the 19 values [33]. Together, these value types form a circumplex model. Personal values have been found to be related to choice behavior in real-life situations, where one must decide between behaviors after weighing the pros and cons of alternatives [33]. Thus values become extremely important in decisions, including sexual behavior and health screenings [29, 30]. According to our knowledge, there have been no studies to explore the link between HIV and STI testing and personal values among MSM.

Estonia, located in North-Eastern Europe, has a total population of approximately 1.3 million people [34]. HIV testing in Estonia can be recommended by any physician type based on clinical indications, risk assessment, or patient request. HIV testing is free [35].

It is estimated that there are approximately 9000 MSM in Estonia [36]. The latest studies among MSM in Estonia show low rates of HIV and STI testing compared to the recommended annual tests for sexually active MSM [3]. Thus, 33.0 % had tested for HIV and 34.5 % for STIs in the last 12 months, while 40 % had never tested for HIV [37]. There is limited information on the barriers to HIV testing among MSM in Estonia. In a study in 2008, 79 MSM in the capital city were interviewed on HIV testing practices. Of the 25 participants who reported no previous testing, 12 reported not considering it necessary, 7 reported

no opportunity, and 7 stated that they had had no time [38]. HIV prevalence among MSM is estimated to be approximately 2–3 % [35].

The aim of the current study was to assess the prevalence and correlates of HIV and STI testing among MSM in Estonia. We hypothesized that controlling for sociodemographic factors and risk behaviors, IH, openness of same-sex attractions (outness), and personal values would be associated with lifetime uptake of HIV and STI testing.

Methods

We conducted an internet-based study among MSM to explore HIV and STI testing and related factors among this population group. Eligibility criteria included: self-identified as male; living in Estonia; age 18 years and older; sexually attracted to men and/or have had sex (oral or anal) with a man. All the study materials were available in Estonian and Russian.

Measurements

The questionnaire was constructed within the Internet survey software Lyme Survey (http://www.limesurvey.org/). The survey included 144 mostly closed-ended questions. To reduce completion time, the survey was tailored by using intra-questionnaire filters wherever possible. The questionnaire's design was based on the previous experiences and the adaptation to Estonian and Russian has been described elsewhere [32, 37]. The questionnaire included the following domains:

– Sociodemographic data, including residential status (urban/rural) and steady male partnership.
– *Sexual orientation* Identity and behavioral dimensions of sexual orientation were assessed. A behavioral-based question asked about ever having sex with a male partner. For sexual orientation identity, respondents were to answer: "Which of the following options best describes how you think of your sexual orientation? (Please choose only one of the following options": gay or homosexual/bisexual/straight or heterosexual/any other term (please specify …)/I don't usually use a term/define myself).
– *Sexual behavior* Participants reported whether ever having sex with a male partner, unprotected anal intercourse (UAI) with casual male partners in the last 12 months, sex abroad (with someone not from Estonia), sex in gay social venue or sex-related venue. Participants were also asked to report the number of male casual partners in the last 12 months.

– *HIV and STI testing and history* To assess HIV testing history, we asked: "Have you ever been tested for HIV?" and "What was the result of your last HIV test?" To assess STI testing history, we asked: "Have you ever been tested for any STI (for example syphilis, gonorrhea, Chlamydia, trichomoniasis, genital herpes)?"; "Have you ever been diagnosed with any STI (for example syphilis, gonorrhea, Chlamydia, trichomoniasis, genital herpes)?"; and "Have you ever been taken anal swabs for STI diagnosis?"

– With regard to drug use, participants reported whether they had used illegal drugs (e.g., ecstasy, amphetamines, fentanyl) ever and in the last 12 months.

– CAGE questionnaire [39] was used to screen for alcohol abuse or dependence. It includes four yes/no items and refers to lifetime prevalence of problem drinking. The subjects responding affirmatively to two or more questions were classified as CAGE positive (problem drinkers with high likelihood of the presence of alcoholism).

– "Outness" was defined as the degree to which people are open about their sexual attraction with others. Respondents were asked: "Thinking about all the people who know you (including family, friends and work or study colleagues), what proportion knows that you are attracted to men?" Five answers were offered: "All or almost all"; "More than half"; "Less than half"; "Few"; and "None".

– Discussing sex between men with healthcare provider was assessed by: "Have you ever discussed sex between men with your family doctor or any other doctor?" The phrase "sex between men" was ambiguous as to not necessarily imply that the individual discussed their own experience or intent to have sex with men, but sex between men in general.

– *Internalized homonegativity* We used a short form of the Reactions to Homosexuality scale [37, 40] that included seven of the original items loading on three factors: personal comfort with a gay identity, social comfort with gay men, and public identification as a gay. The responses were indicated by using a seven-point Likert-type scale (1 = strongly disagree, 7 = strongly agree). All the items were coded at analysis so that a higher score indicated higher internalized homonegativity. The reliability (Cronbach alpha) of the measure was 0.76.

– Personal values were measured with Schwartz's Value Survey, adapted into Estonian [32]. In addition to the original items, we added four items describing different aspects of health as a value: mental, emotional, social, and physical health [29]. Participants were asked to rate the importance of each of the values as guiding principles in their lives. Each value was evaluated on a 6-point scale ranging from 1 ("Not like me at all") to 6 ("Very much like me"). Personal values were centralized around participants' personal mean value score across the questionnaire, and thus scores reflect value priorities over the person's other values. The reliability (Cronbach alpha's) of the measures was acceptable-good for all subscales: from 0.72 (Universalism) to 0.87 (Stimulation).

Recruitment and Promotion

The study was promoted through the Estonia-based gay online social media, gay community organizations, national network of anonymous HIV testing sites, and youth counseling centers. The advertisements directed users to an opening page of the study, which described the study aims and informed potential respondents that their data would be anonymous, that no IP addresses were saved, and that the survey software did not install cookies or any other trace files on computers. Once started, the survey had to be completed. Following submission, all the respondents were directed to a landing page that provided further information about HIV and STI testing and prevention options. All the participants who completed the questionnaire were offered free and anonymous HIV/STI testing as an incentive. The sample selection and testing during the study have been described in detail elsewhere [41]. The survey was accessible online from April to September, 2013.

Statistical Analysis

Statistical analyses were performed with STATA 11.0 (StataCorp LP. College Station, TX). Descriptive statistics were used to characterize participants. The associations between the participants' characteristics and HIV and STI testing ever in lifetime were evaluated by using the Pearson Chi squared test and Fisher exact test (for categorical variables) and t test with unequal variances (for continuous variables with normal distribution) or Paired Sample Wilcoxon Signed Rank test (for continuous variables with non-normal distribution), followed by the univariate logistic regression. For the examination of the relationships of values and HIV/STI behavior, we computed the Spearman's rank correlation. For multivariable logistic regression, HIV and STI testing ever in lifetime were adjusted for the age and factors significantly associated in the univariate analysis (at $p < 0.05$). Because there were multiple, potentially correlated indicators of variables in this analysis, multicollinearity among these variables was assessed; intercorrelation among the independents above 0.80 was considered to be problematic. For significant bivariate

predictors that were multicollinear with each other, the variable thought to be theoretically most important in the analysis was chosen and retained in each final multivariable model, whereas the others were dropped.

Ethical Committee

The study was approved by the Tallinn Medical Research Ethics Committee. Before answering the questions, all the participants were required to indicate that they understood the aims and methods of the study and that they consented to take part.

Results

Overall, 430 people began the questionnaire and 301 (70.2 %) completed and submitted responses. Of these 301, 36 (12.3 %) did not meet the inclusion criteria (18 were not residents of Estonia, 10 were not MSM, and 8 were under 18 years of age). Thus, analyses were based on a sample size of 265 with 25.7 % (n = 68) consented to HIV/STI testing.

Table 1 presents sociodemographic, behavioral, and health-related data of the participants based on HIV and STI testing ever in lifetime, including the univariate analysis of the association of these variables with testing.

In general, the mean age of MSM was 32.3 years (median 31; SD 9.7 years, range 18–67 years). Majority completed the questionnaire in Estonian (89.8 %; n = 238) and 10.2 % (n = 27) in Russian. By occupation, 84.9 % (n = 225) were working full- or part-time. 43.0 % (n = 114) had higher education. By residential status, 87.2 % (n = 231) were living in larger towns and 12.8 % (n = 34) in rural areas.

By sexual orientation, 72.5 % (n = 192) considered themselves homosexual, 23.0 % (n = 61) bisexual, and the rest 4.5 % (n = 12) were either heterosexual or not sure. Overall, 97.7 % (n = 259) reported ever having sex, out of them 96.9 % (n = 251) reported sex with a man. 35.5 % (n = 92) had a steady male partner at the time of the study. 53.8 % (n = 135) had ever had sex abroad, and 45.7 % (n = 118) had engaged in sex in a gay-related venue. 65.1 % (n = 155) had engaged in UAI with a male partner in the last 12 months. 63.8 % (n = 169) had at least one casual partner in the last 12 months, with 24.9 % (n = 42) reporting 10 or more casual partners.

Prevalence of problem drinking with high likelihood of the presence of alcoholism was high—32.8 % of the sample (n = 87) reported CAGE scores above the cut-off level. 46.0 % (n = 122) had ever used illegal drugs.

The mean IH score of the total sample was 1.9 (median 1.7; SD 1.2; range 0.2–5.7). Overall, 21.9 % of men

(n = 58) were out to more than half of all of those who knew them, and 16.2 % (n = 43) were out to no one. Close to one third (27.2 %; n = 72) had discussed sex between men with a doctor.

More than two quarters of the total sample (70.1 %; n = 185) had ever tested for HIV; 36.6 % (n = 97) in the last 12 months. The most common locations of last tests included anonymous HIV testing sites (49.7 %; n = 92), health care setting (24.9 %; n = 46), and gay-related venues (7.6 %; n = 14). Self-reported HIV prevalence was 3.0 % (n = 8); 4.3 % among those ever tested. 51.2 % (n = 132) reported ever testing for STIs; 19.0 % (n = 49) in the last 12 months. Of the total sample, 23.8 % (n = 63) had ever been diagnosed with an STI (47.7 % of those ever tested). Finally, 8.3 % (n = 11) reporting ever testing for an STI had also had an anal swab taken, with 81.8 % (n = 9) reporting discussing sex between men with a doctor. Among those who had not had anal swabs taken, only 36.6 % reported having discussed sex between men with a doctor (p = 0.01).

The correlates of personal values with HIV and STI testing are presented in Table 2.

Table 3 presents the results of multivariable logistic regression for HIV and STI testing ever in lifetime. Both models were statistically significant (HIV testing: χ^2 123.82; p < 0.0001; R^2 0.45; STI testing: χ^2 106.92; p < 0.0001; R^2 0.33). HIV testing ever in lifetime was related to: sex in gay-related venue (AOR 4.62; 95 % CI 1.47–14.51), UAI in the last 12 months (AOR 3.28; 95 % CI 1.19–9.07), discussing sex between men with a doctor (AOR 6.06; 95 % CI 1.45–25.26), STI test ever in lifetime (AOR 16.08; 95 % CI 5.48–47.17), and achievement (AOR 0.31; 95 % CI 0.14–0.69). STI testing ever in lifetime was related to: age (AOR 1.06; 95 % CI 1.02–1.11), discussing sex between men with a doctor (AOR 2.41; 95 % CI 1.05–5.52), HIV test ever in lifetime (AOR 9.98; 95 % CI 4.02–24.77), and interpersonal conformity (AOR 0.64; 95 % CI 0.45–0.91).

Discussion

Our data reveal low HIV and STI testing rates among MSM in Estonia. Despite high rates of risky sexual behaviors, one-third of the sample reported never testing for HIV and fewer reported STI testing. A relationship between age and STI testing was observed with older men more likely to test for STIs in the lifetime (most likely the lifetime cumulative effect). The majority of our sample (89 %) was under 45 years of age, comprising mostly men who started their sexual life in the 1990s and later. This was the period when homosexuality was decriminalized, anonymous HIV testing became available, and public health campaigns promoted HIV testing [35]. These factors

Table 1 Univariate factors associated with HIV and STI testing ever in lifetime among MSM in Estonia, 2013

	HIV testing ever in lifetime			STI testing ever in lifetime		
	Proportion tested	OR (95 % CI)	p value	Proportion tested	OR (95 % CI)	p value
Sociodemographic data						
Age, mean (median, SD, range)						
Tested	32.8 (31.0; SD 9.5; range 18–62)	1.0 (1.0–1.1)	0.1	34.7 (32.0; SD 9.8; range 20–61)	1.1 (1.0–1.1)	<0.001
Not tested	30.8 (29.0; SD 9.7; range 18–67)			29.7 (27.5; SD 9.1; range 18–67)		
First language						
Estonian	167/238 (71 %)	1.0		121/238 (52 %)	1.0	
Russian	18/27 (67 %)	0.8 (0.4–2.0)	0.7	11/27 (44 %)	0.7 (0.3–1.7)	0.4
Residential status						
Urban	168/231 (73 %)	1.0		121/231 (54 %)	1.0	
Rural	17/34 (50 %)	0.4 (0.2–0.8)	0.006	11/34 (32 %)	0.4 (0.2–0.9)	0.02
Education						
Primary/secondary	98/151 (65 %)	1.0		60/151 (41 %)	1.0	
Higher	87/114 (77 %)	1.8 (1.0–3.1)	0.03	72/114 (66 %)	2.8 (1.7–4.6)	<0.001
Occupation						
Working full or part time	159/225 (71 %)	1.0		117/225 (53 %)	1.0	
Other (retired, student, long-term sick leave etc.)	26/40 (65 %)	0.8 (0.4–1.5)	0.4	15/40 (40 %)	0.6 (0.3–1.2)	0.1
Sexual orientation and behaviour						
Sexual orientation						
Homosexual	148/191 (78 %)	1.0		101/185 (55 %)	1.0	
Bisexual	29/61 (48 %)	0.3 (0.1–0.5)	<0.001	26/61 (43 %)	0.6 (0.3–1.1)	0.1
Other	8/12 (67 %)	0.6 (0.2–2.0)	0.3	5/12 (42 %)	0.6 (0.2–1.9)	0.4
Male regular partner						
No	108/173 (63 %)	1.00		81/173 (48 %)	1.0	
Yes	77/92 (84 %)	3.0 (1.6–5.7)	0.001	51/92 (57 %)	1.4 (0.8–2.4)	0.2
Sex in a gay-related venue						
Never	85/147 (58 %)	1.0		61/147 (42 %)	1.0	
Yes	100/118 (86 %)	4.3 (2.3–7.9)	<0.001	71/118 (62 %)	2.4 (1.4–3.7)	0.001
Sex abroad						
Never	74/130 (57 %)	1.0		45/130 (35 %)	1.0	
Yes	111/135 (82 %)	3.4 (2.0–6.0)	<0.001	87/135 (66 %)	3.6 (2.2–6.0)	<0.001
Casual partners in the last 12 months						
None	58/96 (60 %)	1.0		33/94 (35 %)	1.0	
One or two	40/52 (77 %)	2.2 (1.0–4.7)	0.05	28/52 (54 %)	2.2 (1.1– 4.3)	0.03
Three or more	87/116 (75 %)	2.0 (1.1–3.5)	0.02	71/112 (63 %)	3.2 (1.8– 5.7)	<0.001
Unprotected anal sex with a man in the last 12 months						
No	57/110 (52 %)	1.0		48/110 (44 %)	1.0	
Yes	128/155 (83 %)	4.3 (2.5–7.6)	<0.001	84/155 (56 %)	1.6 (1.0–2.7)	0.05
Sexual orientation						
Homosexual	148/191 (78 %)	1.0		101/185 (55 %)	1.0	
Bisexual	29/61 (48 %)	0.3 (0.1–0.5)	<0.001	26/61 (43 %)	0.6 (0.3–1.1)	0.1
Other	8/12 (67 %)	0.6 (0.2–2.0)	0.3	5/12 (42 %)	0.6 (0.2–1.9)	0.4

Table 1 continued

	HIV testing ever in lifetime			STI testing ever in lifetime		
	Proportion tested	OR (95 % CI)	p value	Proportion tested	OR (95 % CI)	p value
Outness						
Family members know about being interested in men						
Less than half	84/142 (59 %)	1.0		64/139 (46 %)	1.0	
More than half	91/105 (87 %)	4.5 (2.3–8.6)	<0.001	60/102 (59 %)	1.7 (1.0–2.8)	0.05
Friends know about being interested in men						
Less than half	64/113 (57 %)	1.0		51/111 (46 %)	1.0	
More than half	117/143 (82 %)	3.4 (2.0–6.1)	<0.001	77/139 (55 %)	1.5 (0.9– 2.4)	0.1
Acquaintances know about being interested in men						
Less than half	101/166 (61 %)	1.0		80/165 (48 %)	1.0	
More than half	64/72 (89 %)	5.1 (2.3–11.4)	<0.001	40/68 (59 %)	1.5 (0.9– 2.7)	0.2
Internal homonegativity, mean (median, SD, range)						
Tested	1.8 (1.5; SD 1.1; range 0.3–5.7)	0.7 (0.6–0.9)	0.008	1.9 (1.5; SD 1.2; range 0.3–5.7)	0.9 (0.7–1.1)	0.2
Not tested	2.2 (2.2; SD 1.2; range 0.3–5.0)			2.0 (1.8; SD 1.1; range 0.3–5.0)		
Health and health care						
Illegal drug use ever						
No	94/142 (66 %)	1.0		71/143 (51 %)	1.0	
Yes	91/122 (75 %)	1.5 (0.9–2.6)	0.1	61/122 (52 %)	1.0 (0.6–1.7)	0.9
CAGE score						
0–1	121/178 (68 %)	1.0		93/178 (53 %)	1.0	
2–4	64/87 (74 %)	1.3 (0.7–2.3)	0.4	39/87 (46 %)	0.8 (0.4–1.3)	0.3
STI/HIV test ever						
No	65/133 (49 %)	1.0		11/79 (14 %)	1.0	
Yes	120/131 (92 %)	11.4 (5.6–23.1)	<0.001	120/185 (67 %)	12.4 (6.1–25.2)	<0.001
STI ever						
No	130/202 (65 %)	1.0				
Yes	55/63 (87 %)	3.6 (1.7–8.3)	0.001			
Discussed sex between men with a doctor						
No	110/183 (60 %)	1.0		75/180 (42 %)	1.0	
Yes	65/71 (92 %)	7.2 (3.0–17.5)	<0.001	53/70 (76 %)	4.4 (2.3–8.1)	<0.001

may account for the similar HIV testing rates across different age groups.

HIV testing, but not STI testing, was related to sexual risk behaviors, such as sex in a gay-related venue or unprotected anal intercourse, in multiple regression analysis. There are a few likely explanations including that MSM who engage in higher-risk sex test more frequently as part of a reasoned decision-making process [4]. A likely scenario is that HIV rapid-testing campaigns have been conducted in these venues and could account for the almost 8 % indicating that a gay-oriented bar, club, or sauna was the last location of testing [35]. Therefore, MSM frequenting gay-related venues may have had easier access to HIV testing as well as contacts with health personnel, which may have encouraged testing also in other sites (e.g., anonymous HIV counseling sites). Another factor related to HIV testing was recent risk behavior (UAI in the last 12 months), which is supported by previous research trends among MSM [10, 12, 42].

HIV and STI testing were related to contacts with health care services with HIV testing higher among persons tested for STIs and vice versa. At the same time, almost one-tenth of participants who had ever had an STI had never been tested for HIV. This was especially true about those

Table 2 The correlates of personal values with HIV and STI testing ever in lifetime among MSM in Estonia, 2013

Personal values	Lifetime HIV testing		Lifetime STI testing	
	Spearman ρ	p value	Spearman ρ	p value
Self-direction thought	0.11	0.1	0.1	0.1
Self-direction action	0.02	0.7	0.02	0.8
Stimulation	0.06	0.3	0.06	0.4
Hedonism	0.01	0.9	−0.05	0.4
Achievement	−0.16	0.01	−0.1	0.1
Power dominance	−0.07	0.2	0.02	0.8
Power resources	−0.08	0.2	−0.01	0.8
Face	−0.18	0.004	−0.18	0.005
Security personal	0.07	0.2	0.03	0.6
Security social	0.02	0.8	0.1	0.1
Tradition	−0.14	0.02	−0.02	0.8
Conformity rules	−0.06	0.4	−0.05	0.4
Conformity interpersonal	−0.04	0.5	−0.2	0.01
Humility	−0.1	0.1	−0.1	0.1
Benevolence caring	0.06	0.3	−0.07	0.3
Benevolence dependability	0.08	0.2	−0.07	0.3
Universalism concern	0.2	0.0002	0.1	0.03
Universalism nature	0.02	0.8	0.1	0.04
Universalism tolerance	0.1	0.02	0.01	0.8
Mental health	0.04	0.6	0.01	0.9
Emotional health	0.1	0.1	0.01	0.8
Social health	−0.03	0.7	−0.05	0.4
Physical health	0.04	0.5	0.2	0.01

45 years old and older (25 % with an STI had never been tested for HIV). We did not inquire about the timing of an STI diagnosis, so it is possible that among older age groups STIs had been at least partly diagnosed before the 1990s (since that time HIV testing has been recommended for all people suspected to have an STI [35]). The significance of STI service use as a predictor of HIV testing has been demonstrated elsewhere. Men who contract other STIs and/ or those who visit sexual health clinics are much more likely to be offered and accept an HIV test as a result of their health-seeking behavior [12]. These associations reinforce the importance of using STI services for HIV testing and prevention [10].

HIV and STI testing were more prevalent among men who discussed sex between men with their doctor. Not surprisingly, disclosure of sexual activity to a healthcare provider is a strong predictor of STI testing [27]. Even though we did not inquire regarding the timing of these discussions and whether they took place during the HIV/ STI testing, health professionals need to pay more attention to possible risk factors of men coming for testing. As MSM may still be stigmatized, health professionals trained to address the needs of MSM may have a substantial impact on the reduction of HIV and STIs.

The mean IH score of our sample was 1.9 (SD 1.2), which was somewhat higher than observed in 2010 (1.7; SD 1.2) [37]. IH and outness measures were associated with HIV testing in bivariate analyses, but not when controlling for other factors. This could indicate that there are other factors which mask these effects (if real) or mitigate them by use of the actual variable if not exclusively linked to IH and outness. Perhaps with a larger sample size, we would have a study powered to detect smaller differences. However, the study was promoted in gay-oriented websites as the largest health study of MSM in Estonia, and part of the criteria for participating in the study was being self-identified as an MSM, which likely means that individuals who participated in the current study were more comfortable with their identity. This could be one of the reasons why these MSM-specific indicators were not related to HIV testing. Self-reporting of IH is also affected by social desirability; therefore, men may have underreported their feelings of self-stigma, as has been suspected in related studies [4].

STI testing was not related to IH and only marginally related to outness. One possible explanation may lie in the reasons for testing, which are also demonstrated by a larger proportion ever tested for HIV than STIs. Men may test for STIs due to symptoms or contact with a person with

Table 3 Multivariate factors associated with HIV and STI testing ever in lifetime among MSM in Estonia, 2013

	HIV testing ever in lifetime		STI testing ever in lifetime	
	AOR (95 % CI)	p value	AOR (95 % CI)	p value
Age	0.95 (0.89–1.02)	0.1	1.06 (1.02–1.11)	0.005
Residential status				
Urban	1.00		1.00	
Rural	0.96 (0.27–3.48)	0.9	0.47 (0.16–1.40)	0.2
Education				
Primary/secondary	1.00		1.00	
Higher	0.83 (0.30–2.30)	0.7	1.66 (0.81–3.41)	0.2
Male regular partner				
No	1.00			
Yes	0.79 (0.24–2.63)	0.7		
Sex in a gay-related venue				
Never	1.00		1.00	
Yes	4.62 (1.47–14.51)	0.009	0.86 (0.39–1.88)	0.7
Sex abroad				
Never	1.00		1.00	
Yes	0.51 (0.18–1.45)	0.2	1.90 (0.87–4.15)	0.1
Casual partners in the last 12 months				
None	1.00		1.00	
One or two	1.57 (0.45–5.50)	0.5	0.85 (0.33–2.20)	0.7
Three or more	0.72 (0.25–2.09)	0.6	1.72 (0.74–3.97)	0.2
Unprotected anal sex with a man in the last 12 months				
No	1.00		1.00	
Yes	3.28 (1.19–9.07)	0.02	0.87 (0.40–1.88)	0.7
Sexual orientation				
Homosexual	1.00			
Bisexual	0.33 (0.11–1.02)	0.06		
Other	9.99 (0.57–175.3)	0.1		
Family members know about being interested in men				
Less than half	1.00		1.00	
More than half	1.43 (0.39–5.27)	0.6	1.30 (0.62–2.75)	0.5
Friends know about being interested in men				
Less than half	1.00			
More than half	1.52 (0.44–5.28)	0.5		
Acquaintances know about being interested in men				
Less than half	1.00			
More than half	2.01 (0.51–8.42)	0.3		
STI/HIV test ever				
No	1.00		1.00	
Yes	16.08 (5.48–47.17)	<0.001	9.98 (4.02–24.77)	<0.001
Discussed sex between men with a doctor				
No	1.00		1.00	
Yes	6.06 (1.45–25.26)	0.01	2.41 (1.05–5.52)	0.04
Internal homonegativity	1.17 (0.74–1.83)	0.5		
Achievement	0.31 (0.14–0.69)	0.004		
Face	0.65 (0.31–1.36)	0.2	0.69 (0.41–1.16)	0.2
Tradition	0.72 (0.44–1.18)	0.2		
Universalism concern	1.36 (0.77–2.38)	0.3	0.75 (0.63–1.48)	0.9

Table 3 continued

	HIV testing ever in lifetime		STI testing ever in lifetime	
	AOR (95 % CI)	p value	AOR (95 % CI)	p value
Universalism tolerance	1.21 (0.57–2.58)	0.6		
Universalism nature			1.11 (0.81–1.53)	0.5
Conformity interpersonal			0.64 (0.45–0.91)	0.01
Physical health			1.30 (0.92–1.82)	0.1

known/suspected to have STI, but for HIV more because of general HIV awareness and specific testing campaigns.

Our data demonstrate that some select personal values are significant predictors of reported HIV and STI testing among MSM. Measured values which reduce testing include: public image, traditions (respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provides), high achievement (personal success through demonstrating competence according to social standards), and high interpersonal conformity (avoiding upsetting others). At the same time, men who highly value tolerance, concern of others and physical health, may more likely participate in HIV and STI testing.

Our study represents the first instance in which participants' personal values have been systematically measured in relation to HIV and STI testing. The results reveal that there are personal values that reduce people's willingness for HIV and STI testing. Although changing values among adults is complex [42, 43], it could be beneficial to develop health related information tailored to particular values including consideration of these personal values when designing interventions to increase HIV/STI testing rates [30].

Limitations

There are several potential limitations to the study. Our definition of MSM was quite wide. The eligibility criteria included both behavioral aspect (men who have had sex with men in lifetime) and sexual attraction to men. While we attempted to recruit a diverse sample, it is still an Internet-based convenience sample, therefore people with better Internet access and comfort with technology may have been more overly represented. However, Internet-recruited MSM samples have been shown to approximate the regional distribution of MSM [44, 45]. The study framework did not allow us to identify respondents who did not finish the survey. Therefore, we know nothing about MSM who did not complete the survey. An incentive for participation included free HIV and STI testing, therefore persons interested in testing may have been more

likely to participate; however, only a quarter of participants accessed testing and given the number of free and anonymous HIV testing campaigns targeting MSM in Estonia this may not have been a heavy influence [35]. As all data were self-reported, social desirability and recall bias may have played a role. Some HIV-infected MSM may have been unaware of their status. To ensure anonymity, we did not collect IP addresses; consequently, it was possible for one person to submit two or more questionnaires. Finally, the study's cross-sectional design precludes assessment of the causal direction of associations between presumed predictors and HIV and STI testing.

Conclusions

The findings document low rates of HIV and STI testing and demonstrate that more effective testing approaches are needed, such as targeted awareness-raising regarding testing and development of gay-friendly sexual health services.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval The study was approved by the Tallinn Medical Research Ethics Committee and has been performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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