Motivators and barriers for HIV testing among men who have sex with men in Sweden

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Abstract

Aims

To explore motivators and barriers to HIV testing and to assess the factors associated with testing among men who have sex with men (MSM).

Background

Previous research has considered fear, worries and structural barriers as hindrances to HIV testing among MSM. However, few studies have included assessments of actual HIV testing when exploring barriers or motivators for such testing.

Design

The design of the study was a stratified cross-sectional online survey (n=2373).

Method

Factor analysis was conducted to analyse the barriers and motivators for HIV testing. Logistic regression analysis was conducted to assess predictors for HIV testing.

Results

Many MSM test for HIV regularly, and specific reasons for testing were having unprotected sex or starting/ending a relationship. A lack of awareness and a perception of being at low risk for exposure were common reasons for never being tested. Fear and anxiety as well as barriers related to the use of test services remain important hindrances for testing. Predictors associated with having been tested within the past 12 months were: younger age (15 – 25 years old compared with 47+); knowledge on where to take an HIV test on short notice as well as having talked with a counsellor, having received condoms for free, or having had unprotected anal intercourse with casual partners within the last 12 months.

Conclusion

Easily accessible test services offering testing and counselling on short notice should be available for all MSM. Outreach activities, distribution of free condoms, and testing at venues where MSM meet are important prevention add-ons that can contribute to increased awareness about HIV and testing.

Relevance to clinical practice

Test services must ensure confidentiality and health care professionals who meet MSM for testing need competency with regards to MSM sexual health needs.

What does this paper contribute to the wider global clinical community?

- Knowledge of motivators and barriers for HIV testing can be used to create awareness and to promote testing among MSM who have never been tested.
- Health care professionals and prevention workers offering HIV preventive services, including counselling and information on easily accessible HIV test services, contribute to testing among MSM – and this is a cornerstone of HIV prevention on a societal level.
- Prevention workers and health care planners should ensure that health care professionals meeting MSM for HIV testing are comfortable and competent to deliver easily accessible test services, including outreach testing, and can ensure confidentiality.

Key words

Men who have sex with men (MSM), HIV testing, HIV testing barriers, HIV testing motivators, factor analysis

Introduction

More than 30 years after the start of the global HIV epidemic, men who have sex with men (MSM) still account for the largest proportion of new HIV cases reported in the European Union (EU). Among the 30 000 HIV cases reported in 2014, MSM accounted for 42 percent (European Centre for Disease Control and Prevention 2015). A 33 percent increase in incidence was seen among MSM between 2004 and 2013 in the EU (European Centre for Prevention and Disease Control 2015) and in Sweden an increase of 74 percent among MSM was seen during the same time period. Sex between men is reported as the most common route of HIV transmitted within Sweden, every year accounting for about half of the reported endemic HIV cases (Public Health Agency of Sweden, M Axelsson, personal communication January 15, 2016).

Voluntary and confidential testing of HIV and other sexually transmitted infections (STIs) for MSM is considered a cornerstone of HIV prevention (European Centre for Prevention and Disease Control 2015). Previous Swedish surveys show that 70–80 percent of MSM have at some point been tested for HIV (Tikkanen 2008, 2010), and these estimates correspond to other studies in high-income country settings (Adam *et al.* 2014, Marcus *et al.* 2012). The Swedish studies, as well as studies from other settings, also show that certain subgroups of men, such as men born abroad and men who are employed, tend to be tested more often than others (Smittskyddsinstitutet 2013). However, most of these previous studies estimating HIV testing frequency or routines have not explored which factors contribute to or hinder testing.

The ongoing development and improvement of modern antiretroviral therapy (ART) and the introduction of Pre-Exposure Prophylaxis (PrEP) for HIV has led to increased health benefits for those living with HIV and those at risk for HIV. In Sweden, as in many European countries, HIV testing and ART are free of cost for the individual (European Centre for Prevention and Disease Control 2013). The percentage of people living with HIV receiving ART has increased over the last decade, and at present 96 percent of the Swedish MSM with a known HIV diagnosis are judged to be on effective antiretroviral treatment (as indicated by <50 HIV RNA copies/mL blood) (personal communication

with E-L Fredriksson, 2015-02-10, InfCareHIV, Karolinska University Hospital Huddinge). The ability to treat and thereby reduce morbidity and infectivity is beneficial at a population level and might lead to a social expectation that one should not refrain from HIV testing based on outdated beliefs of HIV as a fatal infection (Scott 2014). Deepened and renewed knowledge on MSMs' testing behaviour and motivations is valuable for health care staff and others working with HIV testing, counselling, and promotion of HIV testing in order to improve prevention work and disease control.

The aims of the present study were to explore motivators and barriers to HIV testing and to assess factors associated with testing among MSM in the era of ART.

Background

Commercial HIV tests for antibody detection became available in 1985 (Gaines *et al.* 2015) and over the years several studies worldwide have, in different ways, addressed questions on motivators and barriers for HIV testing among MSM. A literature review of early studies on reasons for and against HIV testing from 2002 comprised studies from various high-income settings between 1987 and 2001, many of which were conducted before, or contemporary with, the introduction of modern ART for HIV in 1996 (Flowers & Church 2002). Flowers and Church (2002) concluded that besides the perception of not needing testing due to previous safe sex behaviour, fear and anxiety related to testing, fear of a positive test result, fear of break of confidentiality, and concerns over social and economic consequences following a positive test result were reasons for not being tested. Common themes behind the reasons for being tested were perceived sexual risk-taking, relationship development, regular health screening, treatment availability, and desire to reduce fear and anxiety.

Subsequent quantitative and qualitative review articles including or focusing on MSM from different high-income country settings, include studies from between 1996 and 2009 (de Wit & Adam 2008, Deblonde *et al.* 2010, Lorenc *et al.* 2011). These reviews all conclude that a sense of having been at risk and a sense of benefiting from testing might promote testing, while fear, worries, and structural barriers related to the access to or confidentiality in test services are hindrances. Having a regular

testing routine is another commonly stated reason for testing found in several of the included studies. De Wit and Adam (2008) as well as Lorenc *et al.* (2011) show that fear can be either a motivator or barrier depending on the individual's personality and perception of risk.

Recent studies confirm previous findings in general, as well as in different ethnic subgroups of MSM, but they also point out that structural factors related to socio-economic disparities and lack of access to health care services that are cultural and MSM sexual health sensitive might be important hindrances for HIV testing in certain subgroups of MSM (Behel *et al.* 2008, Joseph *et al.* 2014, Levy *et al.* 2014).

Altogether, more studies have focused on barriers than motivators for HIV testing, and not all studies have included assessments of the aspects correlated to actual testing. Many previous studies have also addressed barriers related to delayed testing and late HIV diagnosis (Berg 2013, Nelson *et al.* 2010, Schwarcz *et al.* 2011, Wiklander *et al*. 2015). We have found three studies, published in the past decade that have used exploratory factor analysis as a means of studying barriers for HIV testing among MSM (Awad *et al.* 2004, Gold & Karantzas 2008). Exploratory factor analysis is a multivariate statistical method that can be used to identify underlying dimensions through the regrouping of variables (Gaskin & Happell 2014, Yong & Pearce 2013). De Wit and Adam (2008) identify the need for studies that 'use a systematic approach to assess barriers and facilitators of HIV testing' (de Wit & Adam 2008, p.21) and to use measures that are not developed ad hoc. These recommendations have guided the present study.

Methods

We used MSM2013 survey data. MSM2013 was an anonymous cross-sectional online survey consisting of 70 questions on health, sexual behaviour, and HIV that was stratified on age and county of residence. The MSM2013 was built upon the questions from previous MSM surveys (Smittskyddsinstitutet 2013, Tikkanen 2008, 2010) with the addition of items from HIV testing barrier surveys undertaken in Sweden and elsewhere (Awad *et al*. 2014, Wiklander *et al*. 2015). The survey was distributed to in Sweden residing MSM who were members of the Scandinavian online gay

community, Qruiser. 14,514 community members were invited to participate, and 2,751 participants (19 percent) answered the survey. The data collection period was October 1–31, 2013. A detailed description of the methods has been published elsewhere (Persson *et al.* 2015). The data set used for analysis in the present study consisted of all the male participants who reported ever having had sex with a man, who were Swedish residents and who replied to more than just the socio-demographic background questions, all in all 2,373 men. The study was approved by the Regional Ethical Review Board in Stockholm, Sweden.

Measures

All participants were asked about their history of being tested for HIV. The following were possible responses: never tested, tested more than 5 years ago, tested 1–5 years ago, tested 6–12 months ago, tested less than 6 months ago, or do not remember. HIV test responses were re-categorized to never tested, tested > 1 year ago, and tested within the past 12 months.

Participants who reported ever having been tested for HIV were asked about the reasons for their most recent HIV test. They could indicate as many as applied to them from the following list of 13 reasons based on previous Swedish clinical surveys in an HIV and STI clinic targeting MSM (not published): 'I was in a new relationship', 'I ended a relationship', 'I regularly get tested for HIV', 'I had had unprotected anal intercourse with a new/casual partner', 'I had had unprotected oral sex with a new/casual partner', 'The condom slipped off or broke during sex', 'I had had sex with a person that I know has HIV', 'I had symptoms of HIV or another STI', 'My partner had symptoms of an STI or had had unprotected sex with someone else', 'I was contact traced for HIV or another STI', 'Health check/screening', 'Do not remember/do not know', and 'Other'.

Those who reported never having had an HIV test were asked about their reasons for never having been tested. Participants were asked to indicate those that applied to them from a list of 21 reasons. The list of reasons was built upon the previous work of Awad *et al*. (2004) and Wiklander *et al*. (2015) but was adapted to be applicable to respondents regardless of HIV status in a Swedish MSM context:

‘I did not think about it’, ‘I believe that I have not taken any risks’, ‘I am living in a monogamous relationship with a person who does not have HIV’, ‘I have been denied an HIV test by the healthcare system even though I have wanted one’, ‘I do not know where to get tested’, ‘The clinic is not open when I could go and get tested’, ‘It is difficult for me to get to a clinic’, ‘I do not trust the code of confidentiality in the healthcare system’, ‘I am afraid that staff or other visitors to the clinic will recognise me’, ‘I do not want to know my HIV status’, ‘I am afraid I will become ill’, ‘There is no cure for HIV, so I see no point in getting tested’, ‘I do not want to get tested because of the regulations in the Communicable Disease Prevention Act’, ‘I do not want to get tested because of how the Swedish Penal Code is applied to HIV’, ‘I am afraid I will lose my job’, ‘I am afraid I will lose my partner’, ‘I am afraid I will lose my family and/or friends’, ‘I am afraid the test result would have a negative influence on my sex life’, ‘I am afraid I will feel like a failure if I have HIV’, ‘I am afraid the test result would affect my chances of staying in Sweden’, and ‘Other’.

Participants who reported not having been tested for HIV within the past five years also answered questions on barriers for HIV testing that were similar to the questions for those who had never been tested. One response option differed from the other set and was only shown for this subset of participants: ‘I already know that I have HIV’.

The contents of the open-ended ‘Other’-responses for both motivators and barriers for testing were analysed and re-coded into existing response options when applicable. The remaining ‘Other’ responses as well as the ‘Do not remember/do not know’ responses were excluded from the factor analyses in the study.

The following socio-demographic and behaviour characteristics were dichotomized or re-categorized for the purpose of analysis in the logistic regression model (see below): age (15–25, 26–35, 36–46, 47+ years old), place of residence (inside or outside a metropolitan area), level of education (university degree or higher vs. no university education), origin (born in Sweden or abroad), number of casual unprotected anal intercourse sex partners over the past 12 months (0, 1, 2+), relationship

status (being in a steady relationship or not); knowledge of easily accessible HIV test services (yes vs. no), and contact with preventive services within the past 12 months including talking to a counsellor, receiving free condoms, reading on the Internet about HIV/STIs, or reading printed preventive material about HIV/STIs (no vs. one or several times), knowledge of HIV/STIs and routes of transmission.

Statistical analysis

Descriptive data analysis was conducted for estimating overall HIV testing routines among all participants. Adjustment for stratification and non-response was completed for each stratum (age and county of residence) for point estimates. No adjustment was made in the subsequent step when describing participants' reasons for being tested/not being tested for HIV.

An exploratory factor analysis based on polychoric (tetrachoric) correlations between pairs of item responses was conducted for motivators and barriers separately (Gaskin & Happell 2014). Oblimin rotation was applied in order to see if factors showed high correlation, but it was 0.3-0.4 as highest, indicating low correlation (cf. Watson & Thompson 2006). Final analyses were therefore performed with varimax rotation. Parallel analysis was used to assess the optimal number of factors accounting for as much variance in the data as possible (Gaskin & Happell 2014). A cut-off of 0.30 was applied for item inclusion in interpretable factors (as previously applied by for example Awad *et al.* 2004). Items with two or more loadings >0.32 can be considered cross-loading items (Yong & Pearce 2013), and these were assigned to the single factor with the highest loading.

Polychoric correlations between the ordinal questions of knowledge of HIV or STIs were used in a Principal Components Analysis (PCA) to evaluate the explained variance of the data by different principal components (Holgado-Tello *et al.* 2010). The component, which explains the greatest amount of the variance in the data, was deemed to be meaningful as a means of data reduction (Gaskin & Happell 2014). The component was labelled *HIV/STI and routes of transmission*, and the PCA score for this component was used in the regression analysis.

Binary logistic regression analysis was conducted in order to assess predictors for HIV testing. Multiple imputations were applied using *multiple imputation chain equations* to account for the non-response (Little & Rubin 2002). Twenty imputed data sets were made with 50 iterations, and the results were weighted with Rubins formula (Little & Rubin 2002). Subsequently, the full data-set of 2,373 participants could be included in the regression model. Odds ratios with 95% confidence intervals (CIs) were computed. A significance level of $p < 0.1$ was applied when adjusting the backwards selection with regard to the exploratory approach. A value of $p < 0.05$ was considered statistically significant in the final model. Backwards selection, compared with forward selection, is known for having a tendency to overestimate the number of variables to include when data is scant, but was used because we had a large data-set and were taking an exploratory approach. Data were analysed using R version 3.1.2 (R Development Core Team, 2014).

Results

Descriptive data

Estimates adjusted for stratification showed that 43.1% (95% CI 40.6–45.5) reported having been tested for HIV within the past 12 months, while 30.9% (95% CI 28.7–33.2) had been tested more than one year ago. Only 2.4% (95% CI 1.6–3.1) reported that they did not remember when their most recent HIV test was. The majority of the participants (98.6%) who had ever been tested provided responses to questions on reasons for their most recent HIV test (missing n = 23) and they checked on average 1.35 item responses each, indicating that the majority only gave one reason.

Table 1 presents the reasons given for the most recent HIV test. The main reason, indicated by 39.8% of the participants, was routine testing (‘I regularly get tested for HIV’) followed by health check/screening (20.5%), a new relationship (17.6%), and unprotected anal intercourse (13.2%) or oral sex (11.9%). Five percent, or less, of the participants gave reasons such as contact tracing or experiencing symptoms of HIV/STI. It should be noted that 129 participants replied ‘Other’ and chose to formulate their own reason. For 26 of them, the answers could easily be categorized into already

existing reasons in the list. Among the remaining responses, the largest proportion could be grouped as ‘I wanted to know my HIV status’. Blood donation and getting an HIV test for work related reasons were also mentioned several times. We did not create new variables for any of the possible new response groupings.

A total of 626 participants (23.6%, 95% CI 21.7–25.6) had never been tested for HIV, and 623 (99.5%) of them replied to the subsequent question on reasons for never being tested (missing n = 3). Table 2 presents all of the reasons given for never being tested. Two thirds of the participants gave one or two reasons for never getting tested, and fewer than ten percent of the participants gave six or more reasons. The following three main reasons for never having been tested for HIV were related to unawareness or the perception of low risk exposure: ‘I believe that I have not taken any risks’ (58.9%), ‘I did not think about it’ (41.6%), and ‘I am living in a monogamous relationship with a person who does not have HIV’ (16.9). Among the remaining four response options indicated by more than 10% of participants, three were related to test services access and confidentiality. The remaining 14 response options were indicated by fewer than 10% of the participants each. Thirty-six participants replied ‘Other’, and 18 of these could be categorized into already existing reasons in the list. No meaningful groupings could be seen among the remaining ‘Other’ responses. In the next step of analysis, the data related to reasons for being tested and for not being tested were subjected to explorative factor analyses.

A total of 234 participants (10.3%, 95% CI 8.8–11.8) reported not having been tested for HIV within the past five years, and 230 (98.3%) of them replied to the subsequent question on reasons for not having been tested (missing n = 4). Responses were similar to responses among those who had never been tested, and the main reason specified was perception of low risk exposure: ‘I believe that I have not taken any risks’ (53.9%). Among the participants not tested within the past five years, 13.9% (n = 32) replied ‘I already know I have HIV’. Twice as many of the men who had not been tested within the past five years compared to those who had never been tested replied ‘I am in a monogamous relationship with someone who does not have HIV’ as the reason for not being tested recently.

Factor analysis of motivators for HIV testing

The factor analysis on motivators for HIV testing (subject to item ratio 1602/11 = 146) suggested that the eleven items should be grouped into six factors (table 3), the majority of which showed a low correlation between them. The six-factor solution accounted for 81% of the variance in the data. We labelled the six factors as 1) unprotected sex, 2) condom-failure, 3) sex partner related reasons, 4) ended relationship, 5) new relationship, 6) routine testers. From an analytical point of view, some of the factors can possibly be grouped further: factors 1 and 2 can both be interpreted as unprotected sex-related reasons, and factors 3, 4, and 5 could be relationship-related reasons.

Factor analysis of barriers to HIV testing

The factor analysis of reasons for never having been tested for HIV (subject to item ratio 623/20 = 31) suggested that the twenty items should be grouped into nine factors (Table 4), the majority of which showed a low correlation between them. The nine-factor solution accounted for 89 percent of the variance in the data. Four of the factors were single-item factors. Two of these indicated that the participants did not consider themselves to need an HIV test: 1) no risk taking and 2) have not thought of it. The other two single-item factors were both related to a lack of easily accessible test services: 3) having been denied HIV test and 4) do not know where to get tested. For analytical purposes, these last two factors can be placed under the same umbrella as two other factors also relating to test service structure and availability: 5) concerns related to confidentiality and being recognized by staff or other visitors combined with not being monogamous (possibly related to the worries of being recognized by other visitors) and 6) test services' locations and opening hours. The remaining three factors could all be associated with anxiety and fear related to a potential positive test result. Factor 7 comprised six items, including several items related to the participant's own health but also to fear of social consequences with regards to the Communicable Disease Prevention Act and the Swedish penal code. Factor 8 was related to social consequences and focused on the loss of one's partner, family, friends, or job. Factor 9 combined the fear of not being able to stay in Sweden and potential feelings of failure if found to be HIV positive, and this led us to interpret this factor as migration and/or asylum related.

Predictors of HIV testing within the past 12 months

We applied a binary regression model for the analysis of predictors for being tested for HIV within the past 12 months (Table 5). Age, unprotected anal intercourse with one or more casual partner(s) within the past 12 months, knowledge of where to take an HIV test on short notice, having received condoms for free within the past 12 months, talked with a counsellor within the past 12 months, and having read preventive information about HIV/STIs on the Internet within the past 12 months were significant predictors of having been tested for HIV ($p \leq 0.05$). Residence, country of origin, education, relationship status, having read printed preventive information within the past 12 months and knowledge on HIV, STIs and routes of transmission were not significantly related to HIV testing ($p > 0.05$). The final multivariate regression model identified the following factors associated with having been tested for HIV within the past 12 months: younger age (15–25 years old compared with 47+ years old), university education, unprotected anal intercourse with one or more casual partner(s) within the past 12 months, knowledge on where to take an HIV test on short notice, having talked with a counsellor within the past 12 months and having received condoms for free within the past 12 months.

Discussion

Analysis of behavioural data from MSM2013 shows that 9 out of 10 participants had had sex with one or more men within the past 12 months. Condom use during the most recent sexual encounter was reported by less than half of the men who reported having had anal intercourse. These results altogether indicate that many men, regardless of relationship status and condom use, could benefit from being tested for HIV and STI but, as has been documented by others, subgroups of men with high risk behaviour and a high number of sexual partners may also be considered for prescription of PrEP (European Centre for Prevention and Disease Control 2015). Just over 40 percent of the study participants reported having been tested for HIV within the past 12 months, a proportion that is similar to other high-income country settings (Adam *et al.* 2014, Marcus *et al.* 2012). Regular testing was the most commonly specified reason and was also a distinct high-loaded factor in the factor analysis of

motivators. Our results confirm the findings of Deblonde *et al.* (2010) and Lorenc *et al.* (2011) that having a routine for regular testing is a common reason for testing. While public health authorities in several countries give recommendations on testing intervals for MSM, Sweden does not (European Centre for Prevention and Disease Control 2015). Ending and starting a relationship were also both indicated as common reasons for the most recent HIV test.

Berg (2013) shows that low levels of knowledge about HIV transmission and HIV testing as well as not knowing that HIV testing is free are associated with never having been tested for HIV. In the present study, no significant association was seen between knowledge of HIV, STIs and routes of transmission and having been tested within the past 12 months. However, information on where to get easily accessible HIV test services was highly associated with having been tested within the past 12 months. Having talked to a counsellor and having received condoms for free were also strong predictors of having been tested within the past 12 months. No significant association was found between origin and having been tested within the past 12 months. At the same time, one of the factors in the factor analysis of barriers for HIV testing suggested that newly arrived immigrants may incorrectly think that a positive HIV test result could affect their chances of staying in Sweden, something that to our knowledge has not been found in previous studies of barriers for HIV testing. These results altogether stress the importance of preventive and test-promoting activities for MSM. Outreach prevention workers in venues where MSM meet are important for offering counselling, condom distribution, and reminders of testing, including information on legal rights related to testing such as the right to be tested anonymously.

Because MSM-targeted test services are only available in the metropolitan areas in Sweden we expected study participants in these areas to have been tested more often. Health care providers in Stockholm experience that non-metropolitan residents come for testing at clinics known for being gay friendly or for testing at the Pride festival that is held in the city. However, the MSM2013 study results (not shown here) show that the majority of men in non-metropolitan areas had their most recent test at STI clinics or a primary health care centre, clinics that are available all over the country. Several

previous studies have emphasized the importance of structural hindrances for MSM health. Pachankis *et al.* (2015) show that in parts of Europe with high stigma towards MSM, these men use testing services to a lower extent than in others parts of Europe and they do not feel open about discussing sexuality in testing services. It has also been suggested that health professionals who 'promote gay self-acceptance and facilitate activities aimed at enhancing contacts among gay people' are valuable for MSM mental health and overall wellbeing (Berg *et al.* 2015). The present study's results emphasize how important it is that all test service providers take an approach that is sensitive to sexual orientation and that they provide HIV and STI testing based on the patient's sexual history. In order for health care professionals to give adequate counselling and diagnose STIs correctly, such as rectal and pharyngeal infections, it is important that patients are able and comfortable with disclosing their sexual orientation (Schmidt *et al.* 2013).

As indicated in previous studies, health care services that are culturally sensitive and competent in matters of MSM sexual health are structurally important and can play a key role in reducing barriers for testing among subgroups of MSM (Joseph *et al.* 2014). This is emphasized by one barrier (Table 4, barrier 9) that could be interpreted as being related to immigration and an unsubstantiated fear of not being able to stay in Sweden if the HIV test result is positive. The EMIS2010 results for Sweden specifically showed that men who were offered counselling, including disclosure of history of sexual practice, at their most recent HIV test rated the test occasion as being of higher quality than those who were not offered such counselling opportunities (Smittskyddsinstitutet 2013). This implies that counselling and MSM-tailored and easily accessible preventive services increase men's motivation to go for their first HIV test and for those who test negative to come back to be tested again whenever needed.

A recent study suggests that the importance of fear as a barrier for HIV testing is decreasing (Adam *et al.* 2014). Such a trend could be plausible given that with modern ART HIV is no longer a fatal disease and that the proportion of MSM diagnosed with HIV who are on effective ART is high in Sweden. However, our results showed that several fear-related reasons for not being tested were

specified by the study participants. The factor analysis revealed three fear-related barriers showing that fear still plays an important role for not being tested or for delaying being tested. These factors include dimensions of inadequate knowledge on HIV and current treatment opportunities. This indicates that test promotion should include both general test-encouraging messages and updated information on the benefits of knowing one's HIV status. Prevention workers could clearly benefit from involving MSM, regardless of their HIV status, in planning and implementing of test promotion (European Centre for Prevention and Disease Control 2015, Strömdahl *et al.* 2015).

Fear of being recognized by staff or other visitors at the clinic was the fear-related reason given most often. This emphasizes, and confirms results from previous studies that confidentiality must be a cornerstone for testing services (Awad *et al.* 2004). Some men might prefer drop-in clinics while others are best served if they can make an appointment knowing that they do not have to wait with other visitors in a waiting room. Not all MSM identify themselves as homosexual or bisexual, and some might prefer visiting a general STI clinic rather than MSM-targeted test services. In Sweden, you have the right to anonymous HIV testing within the healthcare system, but MSM2013 study participants comment that they experience that primary health care centres deny anonymous testing and rarely have routines for making appointments without recording the patient's personal identification number.

Promotion of self-testing is an alternative for men who fear a lack of confidentiality (Awad *et al.* 2004, Wood *et al.* 2014). HIV tests for home-use are not currently approved in Sweden, but they can be ordered online from abroad. Another testing option is testing in non-clinical settings. Previous studies show that client satisfaction is high with community based rapid HIV testing services in high income country settings (Thornton *et al.* 2012). However, clients tend to have concerns with confidentiality and the provision of post-test counselling in community settings (Thornton *et al.* 2012). Further, the cost per HIV diagnosis is highly dependent on the selection of suitable outreach settings for reaching most-at-risk-populations and the cost might be higher than in clinical settings (Shrestha *et al.* 2008). HIV testing services outside the health care system rarely include opportunities such as STI

testing, vaccination, and counselling, services that can be beneficial for the individual as well as society. An attempt at venue-based syphilis testing has shown promise (Read *et al.* 2013), and currently there are several projects in Sweden where health care professionals and NGOs have common outreach projects for testing for HIV and STIs. If community-based test services can include more services than a rapid test, e.g. through cooperation with health care providers participating in the outreach initiatives, they hold promise for further benefitting the target population.

To our knowledge, the present study is the only recent study looking at both motivators and barriers for HIV testing in the same survey and combining this with an analysis of predictors of actual HIV testing. De Wit and Adam (2008) request studies of barriers for HIV testing that go beyond listing reasons for not being tested. An important contribution of the present study is that the extensive MSM2013 data set gave us unique opportunities to conduct factor analysis of both motivators and barriers for HIV testing in a key population for prevention. Our factor analysis resulted in three factors very similar to the findings of Awad *et al.* (2004) implying some amount of cross-validation. Different study aims and the fact that MSM2013 included 21 barrier response options while the Awad study (2004) had 13 response options could possibly explain the differences. We also find reason to suggest cross validation with the Wiklander *et al*. (2015) study although their study population were people newly diagnosed with HIV rating barriers to HIV testing retrospectively. They had 18 response options, of which 15 matched ours, and their factor analysis resulted in four factors out of which three factors were similar to ours. Altogether, the studying of barriers for HIV testing is a research field that has been under constant development since the end of the 1980's and the present study is a contribution different from other recent studies in the sense that the respondents were a broad range of internet using MSM regardless of HIV status not tied to sampling at specific metropolitan areas, venues or clinical settings.

Having predefined response options on motivators and barriers for testing gave us the opportunity to conduct factor analysis (Holgado-Tello *et al.* 2010). Motivators for testing have previously been less studied than barriers and to our knowledge, motivators have not previously been subject to factor

analysis. We encourage researchers in other settings to further develop on the empirical indicators of motivators for testing. If using similar response options as MSM2013, future studies can conduct confirmative factor analysis in order to study cross-validation. Studies on motivators for testing can also easily be included in studies conducted at test sites. Visitors who are to be tested are highly likely to be clear about their motives for being tested and any recent risk-taking behaviour.

While the MSM2013 had the strengths of a large sample size, stratified random sampling and a wide range of respondents in terms of age and place of residence, a higher response rate would have been desirable. This is a challenge that many public health researchers face nowadays. Limitations of the MSM2013 survey have been described in detail elsewhere (Persson *et al*. 2015). Future survey questions focusing on motivators and barriers for HIV testing could preferably be constructed somewhat differently to increase analysis possibilities. The questions in MSM2013 on reasons for being tested and not being tested had binary response options. Response options allowing for greater variability have also been recommended by Awad *et al.* (2004), and these should be developed in future surveys in order to capture nuances to a greater extent. Instead of letting participants specify as many responses as they want to, one could let them specify a given number of their most important reasons. Many participants chose to formulate motivators for being tested themselves rather than specifying reasons on the list that was provides. Depending on future study aims, there could also be advantages in letting participants themselves formulate reasons for and for not being tested. However, this would require different methods for statistical analysis.

Conclusion

Perception of sexual risk-taking behaviour motivates men to have an HIV test but easily accessible and MSM-friendly testing services and counselling outside the healthcare system also contribute to being tested. By studying motivators for HIV testing, this study has provided new knowledge that can be used by health care professionals, planners, and testing services themselves in order to adapt and offer needs-based testing for MSM.

Unawareness of risk and low perception of risk are the main reasons for not being tested for HIV. Fear, confidentiality, and structural hindrances also remain important barriers for testing. In order to decrease barriers for testing, HIV testing services should be easily accessible, and include offerings that can benefit MSM such as counselling and STI testing. Outreach activities at venues where MSM meet are important prevention add-ons that can contribute to increased testing.

Relevance to clinical practice

The findings of the study have implications for nursing practice as well as nursing education, and practise and education of other health professionals and health care planners. All of these fields could benefit from knowledge on barriers and motivators for HIV testing among MSM and subgroups of MSM such as immigrant MSM. Based on our results, there is a prerequisite that health professionals working in test services have competency about sexual health with regards to MSM. Talking with MSM about sexuality and sexual behaviour requires training and practice. Further, guaranteeing confidentiality and the right to anonymous testing is essential. Health care planners should ensure that test services targeting MSM for HIV testing have these competencies and get continuous training when needed. Further, test services are preferably complemented by outreach work to promote testing.

Table 1. Motivators for the most recent HIV test

When you were last tested for HIV, what was your reason for getting tested? (You can give multiple answers.)	Number of "Yes" responses	Per cent of "Yes" responses
I regularly get tested for HIV	637	39.8
Health check/screening	329	20.5
I was in a new relationship	282	17.6
I had had unprotected anal intercourse with a new/casual partner	211	13.2
I had had unprotected oral sex with a new/casual partner	191	11.9
Open-ended 'other' responses	103	6.4
Do not remember/do not know	89	5.6
I ended a relationship	87	5.4
I was contact traced for HIV or another STI	72	4.5
I had symptoms of HIV or another STI	69	4.3
My partner had symptoms of an STI or had had unprotected sex with someone else	35	2.2
I had had sex with a person I know has HIV	28	1.8
The condom slipped off/broke during sex	24	1.5

Table 2. Barriers for HIV testing among participants who reported never having been tested.

Why have you never been tested for HIV? You can give multiple answers.	Number of "Yes" responses	Percent of "Yes" responses
I believe that I have not taken any risks	367	58.9
I did not think about it	259	41.6
I am living in a monogamous relationship with a person who does not have HIV	105	16.9
I am afraid that staff or other visitors to the clinic will recognise me	97	15.6
I do not know where to get tested	93	14.9
I am afraid I will feel like a failure if I have HIV	87	14.0
I do not trust the code of confidentiality in the healthcare system	63	10.1
I am afraid I will lose my family and/or friends	55	8.8
I am afraid the test result would have a negative influence on my sex life	55	8.8
I am afraid I will become ill	54	8.7
I am afraid I will lose my partner	36	5.8
I do not want to know my HIV status	31	5.0
I do not want to get tested because of the regulations in the Communicable Disease Prevention Act	29	4.7
It is difficult for me to get to a clinic	28	4.5
The clinic is not open when I could go and get tested	27	4.3
I do not want to get tested because of how the Swedish Penal Code is applied to HIV	20	3.2
Open-ended 'other' responses	18	2.9
I am afraid I will lose my job	11	1.8

I have been denied an HIV test by the healthcare system, even though I have wanted one	9	1.4
There is no cure for HIV, so I see no point in getting tested	9	1.4
I am afraid the test result would affect my chances of staying in Sweden	4	0.6

Table 3. Six-factor solution of motivators for HIV testing among participants reported having ever been tested.

	Factors					
	1	2	3	4	5	6
	Unprotected sex	Condom failure	Sex partner related reasons	Ended relationship	New relationship	Routine testers
% variance accounted for	0.18	0.11	0.13	0.14	0.13	0.11
I had had unprotected oral sex with a new/casual partner	**0.88**	-0.02	0.15	0.07	0	-0.05
I had had unprotected anal intercourse with a new/casual partner	**0.83**	0.11	0.02	0.04	0	0.09
I had had sex with a person I know has HIV	*0.42*	-0.10	**0.62**	0.19	0.09	0.02
I had symptoms of HIV or another STI	*0.37*	*0.39*	**-0.52**	-0.26	-0.06	*-0.33*
My partner had symptoms of an STI or had had unprotected sex with someone else	0.08	0.13	**0.84**	-0.29	-0.17	-0.10
I ended a relationship	0.06	0.30	0.12	**0.59**	*0.46*	-0.01
I regularly get tested for HIV	0.04	0.05	-0.04	-0.01	-0.12	**0.97**
The condom slipped off/broke during sex	0.03	**0.92**	-0.01	0.07	0	0.06
I was in a new relationship	-0.06	-0.07	-0.14	0.11	**0.92**	-0.16
I was contact traced for HIV or another STI	-0.10	0.03	0.08	**-0.86**	0	0
Health check/screening	*-0.37*	*-0.37*	-0.28	*0.42*	**-0.54**	*-0.38*

The highest factor loading for each item is marked in bold. Cross-loading-items >0.32 are marked in italics.

Table 4. Barriers for HIV testing among participants who reported never having been tested.

	Factors								
	1	2	3	4	5	6	7	8	9
	No risk-taking	Have not thought of it	Denied test	Do not know where to get tested	Confidentiality /recognition	Location and opening hours	Personal fear and social consequences	Loss	Residence in Sweden
% variance accounted for	0.08	0.06	0.06	0.07	0.11	0.10	0.20	0.16	0.07
I do not want to get tested because of how the Swedish Penal Code is applied to HIV	0.15	0.04	0.12	0.01	0.18	0.07	**0.92**	0.13	0.17
I do not want to get tested because of the regulations in the Communicable Disease Prevention Act	-0.12	-0.03	-0.04	0.06	0.06	-0.07	**0.82**	0.31	0.20
I do not want to know my HIV status	*-0.35*	-0.23	-0.02	-0.25	0.04	0.08	**0.80**	0.11	-0.01
There is no cure for HIV, so I see no point in getting tested	0.22	0.10	0.19	0.29	-0.01	*0.41*	**0.69**	0.27	-0.21
I am afraid I will become ill	-0.23	-0.05	-0.15	0.20	0.04	0.10	**0.65**	*0.33*	*0.46*
I am afraid the test result would have a negative influence on my sex life	-0.05	0.10	-0.31	0.14	0.02	0.25	**0.57**	*0.51*	0.21
I am afraid I will feel like a failure if I have HIV	-0.16	0.04	-0.21	0.15	0.10	0.16	*0.34*	*0.51*	**0.64**
I am afraid the test result would affect my chances of staying in Sweden	*0.40*	0.09	*0.36*	-0.10	0.11	0.08	0.32	0.18	**0.70**
I am afraid I will lose my partner	-0.04	-0.13	0.22	0.02	0.04	0.06	0.29	**0.84**	0.02
I am afraid I will lose my family and/or friends	-0.05	0.07	0	0.04	0.19	0.13	0.24	**0.87**	0.22
The clinic is not open when I could go and get tested	-0.07	-0.04	-0.07	-0.03	0.08	**0.87**	0.22	0.07	0.14

I am afraid I will lose my job	0.17	0.12	0.14	0.24	0.16	0.30	0.21	**0.77**	0.08
I do not trust the code of confidentiality in the healthcare system	0.10	-0.08	-0.04	0.29	**0.76**	0.24	0.16	0.31	-0.25
I do not know where to get tested	-0.17	0	0.05	**0.91**	0.24	0.05	0.05	0.15	0.04
I am afraid that staff or other visitors to the clinic will recognise me	-0.09	-0.12	0.02	0.24	**0.80**	0.19	0.01	0.26	0.27
I have been denied an HIV test by the healthcare system, even though I have wanted one	-0.05	-0.05	**0.94**	0.06	-0.02	0.06	0	0.14	0.03
It is difficult for me to get to a clinic	-0.14	0.09	0.19	0.12	0.23	**0.79**	-0.08	0.32	-0.02
I did not think about it	-0.1	**0.93**	-0.04	0.02	-0.05	0.04	-0.09	0.06	0.02
I believe that I have not taken any risks	**0.92**	-0.17	-0.07	-0.16	-0.08	-0.15	-0.14	-0.02	0.04
I am living in a monogamous relationship with a person who does not have HIV	0.24	-0.43	0.03	0.23	**-0.59**	0.06	-0.22	0.27	-0.19

The highest factor loading for each item is marked in bold. Cross-loading-items >0.32 are marked in italics.

Table 5. Multivariate logistic regression for predicting HIV testing within the past 12 months (n = 2,373)

Variable		*Full model*		*Reduced model*	
		HIV test within the past 12 months	*p*-value	HIV test within the past 12 months	*p*-value
		OR (95%CI)		OR (95%CI)	
Age	15–25	1		1	
	26–35	0.91 (0.67–1.24)	0.545	0.92 (0.67–1.25)	0.590
	36–46	0.85 (0.63–1.16)	0.306	0.83 (0.62–1.13)	0.238
	47+	0.53 (0.40–0.72)	0.000	0.51 (0.38–0.69)	0.000
Education	Other	1			
	University	1.21 (0.98–1.49)	0.078	1.24 (1.01–1.52)	0.041
Residence	Non-metropolitan area	1			
	Metropolitan area	1.13 (0.91–1.40)	0.263		
Country of origin	Abroad	1			
	Sweden	0.86 (0.64–1.15)	0.311		
Relationship status	Single	1			
	Not single	0.82 (0.67–1.00)	0.054	0.82 (0.67–1.00)	0.051
Number of male UAI sex partners in past 12 months	0	1			
	1	1.59 (1.17–2.16)	0.003	1.59 (1.18–2.16)	0.003
	2+	1.34 (1.04–1.73	0.024	1.34 (1.04–1.73)	0.024
Knowledge on where to take an HIV test with short notice	No	1			
	Yes	5.43 (4.23–6.96)	0.000	5.35 (4.17–6.85)	0.000
Talked to a counsellor within the past 12 months	No	1			
	Yes	3.43 (2.73–4.29)	0.000	3.45 (2.77–4.30)	0.000
Received free condoms within the past 12 months	No	1			
	Yes	1.51 (1.20–1.89)	0.000	1.51 (1.22–1.88)	0.000
Read preventive information on the Internet within the past 12 months	No	1			
	Yes	1.34 (1.03–1.73)	0.026		
Read printed preventive material within the past 12 months	No	1			

	Yes	0.81 (0.63–1.03)	0.088		
Knowledge of HIV, STI, and routes of transmission		0.88 (0.76–1.02)	0.085	0.87 (0.75–1.01)	0.069

References

Adam PC, de Wit JB, Bourne CP, Knox D & Purchas J (2014) Promoting regular testing: an examination of HIV and STI testing routines and associated socio-demographic, behavioral and social-cognitive factors among men who have sex with men in New South Wales, Australia. *AIDS and Behavior* **18**, 921-932.

Awad GH, Sagrestano LM, Kittleson MJ & Sarvela PD (2004) Development of a measure of barriers to HIV testing among individuals at high risk. *AIDS Education and Prevention* **16**, 115-125.

Behel SK, MacKellar DA, Valleroy LA, Secura GM, Bingham T, Celentano DD, Koblin BA, Lalota M, Shehan D, Torian LV & Young Men's Survey Study G (2008) HIV prevention services received at health care and HIV test providers by young men who have sex with men: an examination of racial disparities. *Journal of Urban Health* **85**, 727-743.

Berg RC (2013) Predictors of never testing for HIV among a national online sample of men who have sex with men in Norway. *Scandinavian Journal of Public Health* **41**, 398-404.

Berg RC, Weatherburn P, Ross MW & Schmidt AJ (2015) The Relationship of Internalized Homonegativity to Sexual Health and Well-Being Among Men in 38 European Countries Who Have Sex With Men. *Journal of Gay & Lesbian Mental Health* **19**, 285-302.

De Wit JB & Adam PC (2008) To test or not to test: psychosocial barriers to HIV testing in high-income countries. *HIV Medicine* **9 Suppl 2**, 20-22.

Deblonde J, De Koker P, Hamers FF, Fontaine J, Luchters S & Temmerman M (2010) Barriers to HIV testing in Europe: a systematic review. *European Journal of Public Health* **20**, 422-432.

European Centre for Prevention and Disease Control (2013) Thematic report: HIV treatment, care and support. Monitoring implantation of the Dublin Declaration on Partnership to Fight HIV/AIDS in Europe and Central Asia: 2012 progress report. European Centre for Prevention and Disease Control, Stockholm.

European Centre for Prevention and Disease Control (2015) HIV and STI prevention among men who have sex with men. European Centre for Disease Prevention and Control, Stockholm.

Flowers P & Church S (2002) To test or not? HIV antibody testing amongst gay men. *Culture, Health & Sexuality* **4**, 43-65.

Gaines H, Albert J, Axelsson M, Berglund T, Gisslen M, Sonnerborg A, Blaxhult A, Bogdanovic G, Brytting M, Carlander C, Flamholc L, Follin P, Haggar A, Hagstam P, Johansson M, Naver L, Persson Blom J, Samuelson A, Ström H, Sundqvist M, Svedhem Johansson V, Tegmark Wisell K, Tegnell A & Thorstensson R (2015) Six-week follow-up after HIV-1 exposure: a position statement from the Public Health Agency of Sweden and the Swedish Reference Group for Antiviral Therapy. *Infectious Diseases*, **28**, 1-6.

Gaskin CJ & Happell B (2014) On exploratory factor analysis: a review of recent evidence, an assessment of current practice, and recommendations for future use. *International Journal of Nursing Studies* **51**, 511-521.

Gold RS & Karantzas G (2008) Thought processes associated with reluctance in gay men to be tested for HIV. *International Journal of STD & AIDS* **19**, 775-779.

Holgado-Tello F, Chacón-Moscoso S, Barbero-García I & Vila-Abad E (2010) Polychoric versus Pearson correlations in exploratory and confirmatory factor analysis of ordinal variables. *Quality & Quantity* **44**, 153-166.

Joseph HA, Belcher L, O'Donnell L, Fernandez MI, Spikes PS & Flores SA (2014) HIV testing among sexually active Hispanic/Latino MSM in Miami-Dade County and New York City: opportunities for increasing acceptance and frequency of testing. *Health Promotion Practice* **15**, 867-880.

Levy ME, Wilton L, Phillips G, 2nd, Glick SN, Kuo I, Brewer RA, Elliott A, Watson C & Magnus M (2014) Understanding structural barriers to accessing HIV testing and prevention services among black men who have sex with men (BMSM) in the United States. *AIDS and Behavior* **18**, 972-996.

Little RJA & Rubin DB (2002) *Statistical analysis with missing data*, 2nd edn. Wiley, Hoboken, New York.

Lorenc T, Marrero-Guillamon I, Llewellyn A, Aggleton P, Cooper C, Lehmann A & Lindsay C (2011) HIV testing among men who have sex with men (MSM): systematic review of qualitative evidence. *Health Education Research* **26**, 834-846.

Marcus U, Hickson F, Weatherburn P, Schmidt AJ & Network E (2012) Prevalence of HIV among MSM in Europe: comparison of self-reported diagnoses from a large scale internet survey and existing national estimates. *BMC Public Health* **12**, 978.

Nelson KM, Thiede H, Hawes SE, Golden MR, Hutcheson R, Carey JW, Kurth A & Jenkins RA (2010) Why the wait? Delayed HIV diagnosis among men who have sex with men. *Journal of Urban Health* **87**, 642-655.

Persson KI, Tikkanen R, Bergström J, Berglund T, Thorson A & Forsberg BC (2015, in press) Experimentals, Bottoms, Risk-reducers and Clubbers: Exploring diverse sexual practice in an internet-active high-risk behaviour group of men who have sex with men in Sweden. *Culture, Health & Sexuality*.

Read PJ, Knight V, Bourne C, Guy R, Donovan B, Allan W & McNulty AM (2013) Community event-based outreach screening for syphilis and other sexually transmissible infections among gay men in Sydney, Australia. *Sexual Health* **10**, 357-362.

Schmidt AJ, Hickson F, Weatherburn P, Marcus U & Network E (2013) Comparison of the performance of STI screening services for gay and bisexual men across 40 European cities: results from the European MSM Internet Survey. *Sexually Transmitted Infections* **89**, 575-582.

Schwarcz S, Richards TA, Frank H, Wenzel C, Chin Hsu L, Chin C-SJ, Murphy J & Dilley J (2011) Identifying barriers to HIV testing: personal and contextual factors associated with late HIV testing. *AIDS Care* **23**, 892-900.

Scott JB (2014) *Risky Rhetoric: AIDS and the Cultural Practices of HIV Testing*, 2nd edn. Southern Illinois University, Carbondale.

Shrestha RK, Clark HA, Sansom SL, Song B, Buckendahl H, Calhoun CB, Hutchinson AB & Heffelfinger JD (2008) Cost-effectiveness of finding new HIV diagnoses using rapid HIV testing in community-based organizations. *Public Health Reports* **123 Suppl 3**, 94-100.

Smittskyddsinstitutet (2013) EMIS 2010 Sverige. Svenska resultat från den europeiska internetundersökningen EMIS 2010 : en studie om män som har sex med män. Smittskyddsinstitutet, Solna.

Strömdahl S, Hickson F, Pharris A, Sabido M, Baral S & Thorson A (2015) A systematic review of evidence to inform HIV prevention interventions among men who have sex with men in Europe. *Euro Surveillance* **20**.

Thornton AC, Delpech V, Kall MM & Nardone A (2012) HIV testing in community settings in resource-rich countries: a systematic review of the evidence. *HIV Medicine* **13**, 416-426.

Tikkanen R (2008) *Person, relation och situation : riskhandlingar, hivtest och preventiva behov bland män som har sex med män*. Hälsa och samhälle, Malmö högskola, Malmö.

Tikkanen R (2010) *MSM-enkäten : riskhandlingar, hivtest och preventiva behov bland män som har sex med män*. Hälsa och samhälle, Malmö högskola, Malmö.

Wiklander M, Brannstrom J, Svedhem V & Eriksson LE (2015) Development and psychometric testing of a barriers to HIV testing scale among individuals with HIV infection in Sweden; The Barriers to HIV testing scale-Karolinska version. *Health and Quality of Life Outcomes* **13**, 185.

Wood BR, Ballenger C & Stekler JD (2014) Arguments for and against HIV self-testing. *HIV/AIDS* **6**, 117-126.

Yong AG & Pearce S (2013) A Beginner's Guide to Factor Analysis: Focusing on Exploratory Factor Analysis. *Tutorials in Quantitative Methods for Psychology* **9**, 79-94.