DETERMINANTS OF HIV TESTING IN EAST AFRICAN COMMUNITIES IN TORONTO

by

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AUTHOR'S DECLARATION FOR ELECTRONIC SUBMISSION OF A THESIS

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

Background. Previous evidence suggests that persons who have emigrated from HIV-endemic countries experience higher rates of HIV infection and delayed diagnosis. Despite this evidence, limited research has examined HIV testing in these populations.

Objectives. To examine factors associated with HIV testing, as well as motivations underlying testing behaviour, within five East African communities in Toronto.

Methods. Secondary data analyses were conducted using cross-sectional data collected in face-to-face interviews with people from Toronto's Ethiopian, Kenyan, Somali, Tanzanian, and Ugandan communities. Logistic regression techniques were employed to assess factors associated with "ever vs. never testing," "repeat vs. non-repeat testing," and "independent vs. directive testing." Reasons provided for testing and not testing were described.

Results. Individuals from all five communities were interviewed (n=270). Males were slightly over-represented (55.9%). The average age was 35.7 yrs (range 17-71). Three-quarters (75.6%) of the sample had been tested for HIV. Two-thirds (65.7%) of testers had tested more than once and 40.7% had independently decided to get their most recent test. 71.1% of testers reporting previous testing for immigration purposes. Testing behaviour varied greatly across communities. Ethnicity was predictive of "ever" and "repeat" testing. Risk behaviour (including multiple sex partners, concurrent sex partners, condom non-use, and/or improper condom use) was overwhelmingly *not* associated with testing. Fear of exposure through sexual activity was the most frequent reason for independent testing. Immigration authorities were the most common person to initiate directive testing, followed by physicians. Low perceived risk was the most common reason for not testing.

Conclusions. Testing rates within this population were quite high and the immigration process heavily impacted upon testing behaviour. Many determinants and motivations of testing have been identified and should be used to inform the design of interventions to promote testing behaviour in these communities. Nevertheless, many gaps have been identified by the current research and should be addressed by future research.

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TABLE OF CONTENTS

ABSTRACT III

ACKNOWLEDGEMENTS IV

TABLE OF CONTENTS V

LIST OF TABLES VIII

LIST OF FIGURES X

1. INTRODUCTION 1

2. LITERATURE REVIEW 3

2.1 Background: HIV/AIDS in Immigrant Populations 3
2.1.1 Prevalence *3*
2.1.2 Mode of Transmission *4*
2.1.3 Timing of Diagnosis *4*

2.2 The Canadian Context 5
2.2.1 HIV/AIDS Immigration Policy *5*
2.2.2 HIV/AIDS among Persons from HIV Endemic Countries *5*
2.2.3 Current Canadian Efforts and Initiatives *7*

2.3 Rates of HIV Testing 7

2.4 Covariates of HIV Testing 8
2.4.1 Sociodemographic Variables *9*
2.4.2 Behavioural Variables *11*
2.4.3 Psychosocial/Knowledge Variables *13*

2.5 Motivations for Testing 15
2.5.1 Active Versus Passive Testing *15*
2.5.2 Reasons for Testing *16*
2.5.3 Ethnic Differences *18*

2.6 Motivations for Not Testing 19
2.6.1 Reasons for Not Testing *19*
2.6.2 Ethnic Differences *21*

3. RESEARCH RATIONALE & OBJECTIVES 23

3.1 Rationale 23

3.2 Research Objectives 24

4. METHODOLOGY 25

4.1 Study Design 25

4.1.1 Study Population and Eligibility Criteria *25*
4.1.2 Sampling and Recruitment *26*
4.1.3 Interviews *27*
4.1.4 Ethical Considerations *28*

4.2 Variables of Interest 29
4.2.1 Main Variables *29*
4.2.2 Independent Variables *31*

4.3 Data Management and Analysis 34
4.3.1 Univariate Analyses *35*
4.3.2 Bivariate Analyses *35*
4.3.3 Multivariate Analyses *35*
4.3.4 Descriptive Analyses *39*

5. RESULTS 40

5.1 Survey Administration and Response 40

5.2 Description of Study Sample 42
5.2.1 Demographic Characteristics *42*
5.2.2 Behavioural Characteristics *44*
5.2.3 Psychosocial Characteristics *46*
5.2.4 HIV Testing Characteristics *47*

5.3 Factors Associated with HIV Testing (Research Objective 1) 50
5.3.1 Factors Associated with Ever Testing *50*
5.3.2 Factors Associated with Repeat Testing *60*

5.4 Motivation for Testing (Research Objective 2) 72
5.4.1 Factors Differentiating Between Independent vs. Directive Testing *72*
5.4.2 Reasons for Independent Testing *83*
5.4.3 Reasons for Directive Testing *84*

5.5 Motivations for Not Testing (Research Objective 3) 85
5.5.1 Reasons for Deciding NOT to Test *85*

6. DISCUSSION 89

6.1 Trends in Testing Behaviour 89
6.1.1 General Testing Trends *89*
6.1.2 Community Differences *91*
6.1.3 Gender Differences *91*

6.2 Determinants of Testing 92
6.2.1 Ever Tested *92*
6.2.2 Repeat Testing *95*
6.2.3 Independent Versus Directive Testing *98*
6.2.4 Summary and Synthesis of Determinants *100*

6.3 Motivation for Testing/Not Testing 101
6.3.1 Independent Testing *102*

6.3.2 Directive Testing *102*
6.3.3 Non-Testing *103*

6.4 Strengths and Limitations 104

6.5 Putting it into Practice: Practical Implications 106
6.5.1 Targeting Interventions *107*
6.5.2 Designing Interventions and Strategies *108*

6.6 Continuing the Work: Implications for Future Research 109

7. CONCLUSIONS 111

REFERENCES 112

LIST OF APPENDICES

Appendix A: Immigration and HIV Testing 120
Appendix B: Description of Studies Investigating Covariates of HIV Testing 121
Appendix C: Summary Chart of Factors Associated with HIV Testing 122
Appendix D: Description of Studies Investigating Reasons for Testing/Not Testing 123
Appendix E: Members of Research Team 124
Appendix F: Interview Questionnaire - List of Reasons for Deciding to Test 125
Appendix G: Interview Questionnaire – Who Suggested HIV Test? 126
Appendix H: Interview Questionnaire - List of Reasons for Deciding NOT to Test 127
Appendix I: Independent Variables and Related Questionnaire Items 128
Appendix J: Codebook for Open-ended Text Variables 140
Appendix K: Model Building for Logistic Regression Model to Predict Having Ever Tested for HIV 143
Appendix L: Model Building for Logistic Regression Model to Predict Repeat Testing 146
Appendix M: Model Building for Logistic Regression Model to Predict Independent Versus Directive Testing 150
Appendix N: Power Calculations for Selected Independent Variables using Sample Distributions and Alpha (0.05, 2-tailed) 154
Appendix O: The PRECEDE-PROCEED Planning Model 155

LIST OF TABLES

Table 1. Literature Identified Reasons for Testing 16
Table 2. Pre-HIV Test Concerns of Black African HIV Patients in London 19
Table 3. Literature Identified Reasons for Not Testing 21
Table 4. Response Rates for Independent Variables 41
Table 5. Sample Distribution of Gender and Ethnicity 42
Table 6. Proportion of Participants Engaging in Sexual Activity with African Partners, Concurrent Partners, and Partners who had Concurrent Sex. 45
Table 7. Proportion of Participants Who Have "Ever," "Repeatedly," and "Independently" Tested by Ethnicity 49
Table 8. Bivariate Associations Between Continuous Sociodemographic Variables and Ever Tested for HIV 51
Table 9. Bivariate Associations Between Categorical Sociodemographic Variables and Ever Tested for HIV 51
Table 10. Bivariate Associations Between Continuous Behavioural Variables and Ever Tested for HIV 52
Table 11. Bivariate Associations Between Categorical Behavioural Variables and Ever Tested for HIV 53
Table 12. Bivariate Associations Between Continuous Psychosocial Variables and Ever Tested for HIV 54
Table 13. Bivariate Associations Between Categorical Psychosocial Variables and Ever Tested for HIV 55
Table 14. Final Logistic Regression Model to Predict Ever Tested for HIV 59
Table 15. Bivariate Associations Between Continuous Sociodemographic Variables and Repeat Testing 60
Table 16. Bivariate Associations Between Categorical Sociodemographic Variables and Repeat Testing 61
Table 17. Bivariate Associations Between Continuous Behavioural Variables and Repeat Testing 62
Table 18. Bivariate Associations Between Categorical Behavioural Variables and Repeat Testing 63
Table 19. Bivariate Associations Between Continuous Psychosocial Variables and Repeat Testing 64
Table 20. Bivariate Associations Between Categorical Psychosocial Variables and Repeat Testing 65
Table 21. Final Logistic Regression Model to Predict Repeat Testing 70
Table 22. Bivariate Associations Between Continuous Sociodemographic Variables and Independent vs. Directive Testing 73
Table 23. Bivariate Associations Between Categorical Sociodemographic Variables and Independent vs. Directive Testing 73
Table 24. Bivariate Associations Between Continuous Behavioural Variables and Independent vs. Directive Testing 74
Table 25. Bivariate Associations Between Categorical Behavioural Variables and Independent vs. Directive Testing 75

Table 26. Bivariate Associations Between Continuous Psychosocial Variables and Independent vs. Directive Testing 76
Table 27. Bivariate Associations Between Categorical Psychosocial Variables and Independent vs. Directive Testing 77
Table 28. Final Logistic Regression Model to Predict Independent vs. Directive Testing ... 82
Table 29. Reasons for Independent Testing..... 83
Table 30. Who Suggested HIV Test and Why..... 84
Table 31. Reasons Provided for Never Testing for HIV 86
Table 32. Reasons for Believing "Not at Risk" 87

LIST OF FIGURES

Figure 1. Racial Differences in HIV-Infection Rates in Canada 6
Figure 2. Main Research Variables of Interest 30
Figure 3. HIV Testing Behaviour of Entire Sample 48
Figure 4. Proportion of Testers Who Have Had More Than One HIV Test.....48
Figure 5. Proportions of Testers Who Decided to Test Based on Their Own Decision Versus Someone's Suggestion 48
Figure 6. Interaction Effect of Heavy Alcohol Consumption by Gender on Repeat Testing 72

1. INTRODUCTION

HIV has become a major global health problem. In 2005, over 40 million people worldwide were living with HIV (UNAIDS, 2005). Although HIV has reached all corners of the earth, certain areas have been more strongly affected. The disease has hit Africa the hardest and HIV is now endemic in most countries south of the Sahara. Despite being home to just over 10% of the world's population, more than 60% of all HIV-infected individuals reside in sub-Saharan Africa (UNAIDS, 2005).

Within the developed world there are concerns that HIV prevalence rates are higher in communities that have emigrated from HIV endemic countries. Studies assessing HIV prevalence among immigrant groups have reported rates ranging from 1% and 7% (Adrien et al., 1999; Christenson & Stillstrom, 1995; Gras, Weide, Langendam, Coutinho, & van den Hoek, 1999; Kaplan, Kedem, & Pollack, 1998; Villarino, Geiter, Schilte, & Castro, 1994). This compares to an overall adult prevalence rate of 0.5% in North America, Western and Central Europe (UNAIDS, 2005). In addition to higher prevalence rates, certain immigrant populations appear to be diagnosed with HIV at a later stage of infection compared to people born in the host country (Boyd et al., 2005; Burns, Fakoya, Copas, & French, 2001; Couturier et al., 1998; Saul, Erwin, Bruce, & Peters, 2000). Such evidence suggests that while these populations are prone to higher HIV infection rates they are experiencing inadequate levels of HIV antibody testing.

Early HIV testing is extremely important for both the treatment and prevention of HIV. Although there is still no cure for AIDS, recent developments in medical treatments can effectively prolong and improve quality of life for individuals infected with HIV (Centers for Disease Control and Prevention, 1998; Hammer et al., 1996). Evidence has also

revealed that knowledge of seropositive status results in increased condom use and reduced needle sharing, signifying that increasing HIV testing rates may be able to reduce transmission (Dawson, Fitzpatrick, McLean, Hart, & Boulton, 1991; Desenclos, Papaevangelou, Ancellepark, 1993; Skrondal, Eskid, & Thorvaldsen, 2000; Wolitski, MacGowan, Higgins, & Jorgenson, 1997). Hence, it is imperative that public health professionals take additional steps to promote HIV testing within high-risk populations, including individuals from endemic regions.

In order to effectively promote HIV testing, it is important to first understand the testing behaviour of those at risk. This study provides a first step in understanding testing behaviour in East African communities by examining associations between HIV testing and sociodemographic, behavioural, and psychosocial variables within Toronto's East African communities; it also examines reasons this population provided for having received or not having received an HIV test.

Before describing the study in more detail, existing relevant literature will be reviewed. The following sections highlight key findings from this review, including 1) background information on HIV in immigrant populations, 2) an overview of the Canadian context, 3) HIV testing rates, 4) covariates of testing, and 5) motivations for testing behaviour.

2. LITERATURE REVIEW

2.1 BACKGROUND: HIV/AIDS IN IMMIGRANT POPULATIONS

It is expected that factors influencing the health status of immigrants will differ from the general population. These factors not only include cultural practices and beliefs, but also many factors related to the living conditions in the host country and the immigration process itself (i.e., language barriers, discrimination, socioeconomic status, access to services, social support networks). These factors are expected to contribute to poorer health outcomes among immigrants. While a "healthy immigrant effect"[1] clearly exists in Canada, this effect is likely due to health screening requirements embedded within Canada's immigration process; over time, immigrant health status converges with that of the general Canadian population (Ali, McDermott, & Gravel, 2004; Gee, Koybayashi, & Prus, 2004; McDonald & Kennedy, 2004), with some studies finding that immigrants eventually experience worse health status than native-born Canadians (Dunn & Dyck, 2000; Newbold, 2005; Newbold & Danforth, 2003). Specific health issues, including HIV/AIDS, can be expected to be similarly influenced by such factors.

2.1.1 PREVALENCE

Studies assessing HIV prevalence among immigrant and migrant groups have reported rates ranging from 1% and 7% (Christenson & Stillstrom, 1995; Gras et al., 1999; Kaplan et al., 1998; Villarino et al., 1994), including 1.3% among Haitians living in Canada (Adrien et al., 1999). This compares to an overall adult prevalence rate of 0.5% in North America, Western

[1] Recent immigrants often report better health outcomes than the general host population, including better self-rated health and fewer chronic diseases. This phenomenon has been termed the "healthy immigrant effect".

and Central Europe (UNAIDS, 2005). Many European countries have a high proportion of immigrants and migrants among their reported AIDS cases, and in all European Union countries, except for Spain, communities from sub-Saharan Africa are most profoundly affected (del Amo, Erwin, Fenton, & Gray, 2001). Hence, within developed countries, HIV infection disproportionately affects immigrant communities originating from HIV-endemic countries.

2.1.2 Mode of Transmission

While North American and Western European HIV/AIDS cases have been identified predominately in populations of men who have sex with men and injection drug users, this is not the case in most countries. The primary mode of transmission in sub-Saharan Africa and the Caribbean is heterosexual contact and the proportions of HIV among women are increasing in Eastern Europe and Asia (UNAIDS, 2005). Evidence also indicates that among communities that have emigrated from HIV-endemic countries, heterosexual contact is the primary mode of transmission (Public Health Agency of Canada, 2005a; Christenson & Stillstrom, 1995; Dougan et al., 2004; Gras et al, 1999; Manfredi, Calza, & Chiodo, 2001; MRC Collaborative Study Group, 1996; Scott et al., 1997). Gras et al. (1999) noted frequent reports of multiple sex partners, concurrent partnerships, and a history of sexually transmitted infection among Caribbean and African immigrants. This behaviour could lead to the amplification of heterosexual transmission in these populations.

2.1.3 Timing of Diagnosis

Immigrant populations appear to be more likely to receive a late HIV diagnosis compared to people born in the developed host country. British and French studies have presented evidence indicating that black Africans tend to be at a later stage of infection when they are

first diagnosed with HIV compared to non-Africans (Boyd et al., 2005; Burns, Fakoya, Copas, & French, 2001; Couturier et al., 1998; Saul, Erwin, Bruce, & Peters, 2000). These findings suggest inadequate levels of testing in populations that are already at higher risk of HIV infection.

2.2 THE CANADIAN CONTEXT

2.2.1 HIV/AIDS IMMIGRATION POLICY

Prior to 2002, Citizenship and Immigration Canada did not routinely screen immigration applicants for HIV. Effective January 15, 2002, policy changes made HIV testing a mandatory component of the immigration medical examination. This policy does not bar HIV-positive applicants from entry into Canada, although permanent resident applicants may be denied if it is believed that they will place "excessive demand" on Canada's health and social services (Canadian HIV/AIDS Legal Network, 2005; see Appendix A for more detail). While one might expect this policy to reduce rates of HIV infection among Canada's immigrant populations, it appears that these rates are continuing to rise.

2.2.2 HIV/AIDS AMONG PERSONS FROM HIV ENDEMIC COUNTRIES

Persons originating from countries where HIV is endemic are over-represented among Canadian HIV/AIDS cases. According to the 2001 census, only 1.5% of the Canadian population was born in HIV endemic countries; however, this group accounted for an estimated 7-10% of all prevalent HIV cases and 6-12% of all incident cases in 2002 (Public Health Agency of Canada, 2005b). In Ontario, 2.6% of population was from a country where HIV is endemic; yet this group accounted for an estimated 11% of prevalent HIV cases (Remis & Merid, 2004). A study of Montreal's Haitian population also points to higher

prevalence rates in communities originating from HIV-endemic countries (1.3%; Adrien et al., 1999). Furthermore, Ontario trends indicate HIV prevalence rates among individuals from HIV-endemic countries increased 82% between 1999 and 2004 (Remis, Swantee, Schiedel, Fikre, & Liu, 2006). Of HIV-positive individuals from endemic countries, an estimated 30-45% contracted the virus after arriving in Canada (Remis & Whittingham, 1999).

In Canada, Black, African and Caribbean communities encounter different HIV risks and modes transmission compared to the general Canadian population. Of AIDS cases originating in Ontario's African communities (1981-1998), being born in an HIV-endemic country was the only known HIV risk factor for 68.8% of men and 97.3% of women (Remis & Whittingham, 1999). Racial differences have been noted with respect to gender and mode of transmission (see Figure 1). Women accounted for 49.5% of all new HIV diagnoses (1998-2004) among blacks, but only 16.7% among whites; and heterosexual contact was the likely mode of transmission for 84.5% of blacks infected with HIV compared to 21.4% of whites infected with HIV (Public Health Agency of Canada, 2005a).

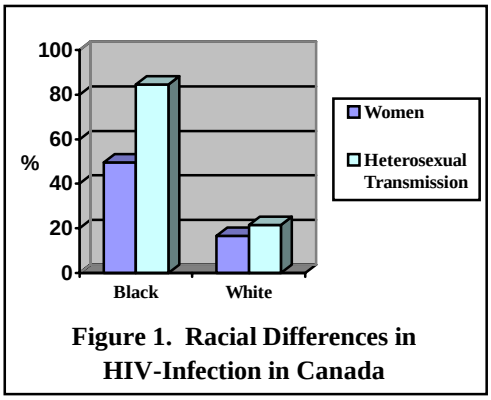

Figure 1. Racial Differences in HIV-Infection in Canada

Hence, existing data suggest that HIV/AIDS is a growing concern among Black Canadian, African and Caribbean communities. It is imperative that public health efforts to promote prevention and early detection within these communities be implemented before HIV rates further escalate.

2.2.3 CURRENT CANADIAN EFFORTS AND INITIATIVES

Within Ontario, many initiatives have already been undertaken to control and reduce the incidence of HIV among Black Canadian, African and Caribbean communities. In 1998, several agencies came together to form a working group, which later became known as the HIV Endemic Task Force (HETF). The HETF developed a *Strategy to Address Issues Related to HIV Faced by People in Ontario From Countries Where HIV is Endemic* (HETF, 2003). Since this strategy was developed, the HETF was reorganized into the *African and Caribbean Council for HIV/AIDS in Ontario (ACCHO)* and has undertaken many initiatives (for more information visit http://accho.ca). Other Canadian efforts and initiatives have been compiled in an annotated bibliography (available online at http://www.icad-cisd.com; Interagency Coalition on AIDS and Development, 2006). Although much work has been done and tremendous progress has been made, none of these studies or reports has specifically investigated determinants of HIV testing.

2.3 RATES OF HIV TESTING

Rates of HIV testing vary between study populations. In studies of general populations, the proportion of people who report ever testing for HIV ranged between 30% and 35% (Houston, Archibald, Strike, & Sutherland, 1998; Inungu, 2002; McGarrigle et al., 2005; Renzi Zantedeschi, Signorelli, & Osborn, 2001). Testing is much more common in high-risk populations where 62% to 97% of people have reported testing in their lifetime (Do et al., 2005; Houston et al., 1998; Kellerman et al., 2002; Pugatch, Anderson, O'Connell, Elson, & Stein, 2006; Schwarcz, Stockman, Delgado, & Scheer, 2004). Similarly, rates of repeat testing were higher among gay men (62% to 72%) than heterosexuals (32% to 40%; Leaity et al., 2000; Hightow et al., 2004; Norton et al., 1997). Two studies involving immigrant and

migrant populations reported rates of ever testing which were similar to those observed in general population studies (32% to 38%; Fenton, Chinouya, Davidson, & Copas, 2002; Stolte, Gras, Van Benthem, Coutinho, & van den Hoek, 2003).

2.4 COVARIATES OF HIV TESTING

In order to promote HIV testing in immigrant populations, it is essential to first understand testing behaviour within these populations. This includes understanding factors associated with repeat testing as it is imperative that persons at risk of HIV infection test repeatedly in order to gain the benefits of early diagnosis. However, only one British study has specifically examined HIV testing in African immigrant communities (Fenton et al., 2002) and no studies have focused on repeat testing in immigrant populations.

Literature was reviewed for any studies investigating covariates of having ever tested for HIV and repeat testing. Nine studies examining ever testing and five studies examining repeat testing were identified. In addition to the single study involving African immigrant communities, these study populations included Africans, general western populations, and men who have sex with men (See Appendix B for a description of the study designs and sample populations). The following sections summarize the associations between HIV testing and sociodemographic, behavioural, and psychosocial factors (see Appendix C for a summary of the results). Some findings from the non-immigrant populations are likely applicable to African immigrants, but socio-cultural factors are expected to result in several differences.

2.4.1 SOCIODEMOGRAPHIC VARIABLES

Age. Individuals between 25-34 years of age consistently had a higher proportion of people who had ever tested for HIV compared to younger and older age groups (Fenton et al., 2002; Flowers, Knussen, & Church, 2003; Gage & Ali, 2005; Houston et al., 1998; Kalichman & Simbayi, 2003; McGarrigle et al., 2005; Renzi et al., 2001). Repeat testers tended to be older than non-repeat testers (Fernandez, Perrino, Brown, Royal, & Vargal., 2003; Hightow et al., 2004; Norton et al., 1997).

Gender. No studies conducted in African immigrant or African populations detected a significant association between HIV testing and gender (Fenton et al., 2002; Gage & Ali, 2005; Kalichman & Simbayi, 2003). Studies of the general population produced mixed findings (Houston et al., 1998; McGarrigle et al., 2005; Renzi et al., 2001). The one study that examined gender association with repeat testing produced non-significant results (Hightow et al., 2004).

Ethnicity/Race. Black Africans (as well as other minorities) were more likely to test than whites (McGarrigle et al., 2005) and rates of testing varied across African immigrant communities of different ethnic origin (Fenton et al., 2002). These associations attenuated after adjustment for demographic and behavioural variables suggesting that much of the association between ethnicity and HIV testing was due to a differential distribution of other factors associated with HIV testing. Limited findings related to ethnicity and repeat testing were mixed and insufficient to draw conclusions (Hightow et al., 2004; Leaity et al., 2000).

Marital Status. A study involving African migrant communities noted that single individuals were significantly *less* likely to have ever had an HIV test compared to their

married counterparts (Fenton et al., 2002). This finding was in direct contrast to Canadian and British studies which reported that non-married individuals were *more* likely to have received HIV testing than married individuals (Houston et al., 1998; McGarrigle et al., 2005). In all three studies, associations were non-significant adjusting for demographic and behavioural variables. Africans may be more likely to receive a test in preparation for marriage, as it has been noted that marriage or a new relationship was a commonly cited reason for testing among Ugandans (Muller et al., 1992).

Education. Education appeared to be related to HIV testing in African and immigrant populations, although a similar association was not observed in western populations. African immigrants, Ugandans, and black South Africans with higher levels of education were more likely to test, even after controlling for demographic and/or behavioural variables (Fenton et al., 2002; Gage & Ali, 2005; Kalichman & Simbayi, 2003). In contrast, studies of Canadian and Italian general populations and Scottish gay men did not find any significant associations (Flowers et al., 2003; Houston et al., 1998; Renzi et al., 2001).

Socioeconomic Status. The relationship between income/social class and HIV testing behaviour was unclear. Two studies reported that *higher* socioeconomic status was related to increased rates of testing (Gage & Ali, 2005; McGarrigle et al., 2005) and one study reported that *lower* socioeconomic status was associated with increased testing (Houston et al., 1998).

Area of Residence. Three out of four studies reported a significant association between "area of residence" and HIV testing, even after controlling for other variables. Studies in Uganda, Canada, and Britain noted that individuals living in larger cities (or regions with larger cities) were more likely to be tested for HIV, compared to people living

in smaller cities (Gage & Ali, 2005; Houston et al., 1998; McGarrigle et al., 2005). This finding may be due to increased availability of testing services and/or a higher prevalence of risky behaviour in urban settings. Limited research produced unclear findings regarding the link between area of residence and repeat testing (Jayaraman, Bush, Lee, Singh, & Preiksaitis, 2004; Leaity et al., 2000).

2.4.2 BEHAVIOURAL VARIABLES

Multiple Sex Partners. British and Italian population studies indicated that having more sexual partners was associated with ever testing for HIV (McGarrigle et al., 2005; Renzi et al., 2001); a study of men who have sex with men reported that having multiple sex partners was associated with repeat testing (Fernandez, Perrino et al., 2003). Studies of Ugandan men and London's African immigrants detected no significant relationship (Fenton et al., 2002; Gage & Ali, 2005). Therefore, while it appears that having had multiple sexual partners was associated with HIV testing in Western populations, this may not be the case for African populations.

Unprotected Penetrative Sex. In non-heterosexual populations unprotected penetrative sex was associated with increased testing (Maguen, Armistead, & Kalichman, 2000; Flowers et al., 2003) and repeat testing (Leaity et al., 2000; Norton et al., 1997). Contrary to these findings, black South Africans who had never been tested for HIV were also less likely to use condoms (Kalichman & Simbayi, 2003).

Previously Diagnosed with Sexually Transmitted Infection. Diagnosis of a sexually transmitted infection (STI), although not a "risky sexual behaviour" *per se*, is indicative of sexual risk and is hence included in this section. A previous STI diagnosis was significantly

associated with ever having received an HIV test (Fenton et al., 2002; Kalichman & Simbayi, 2003; McGarrigle et al., 2005) and repeat testing (Fernandez, Perrino et al., 2003; Leaity et al., 2000; Norton et al., 1997) in African, African immigrant, homosexual, and western general populations.

Perceived High-Risk Partner. A Canadian study noted that having a high-risk partner (including someone who was from an HIV endemic country, injected drugs, was bisexual, or had received blood or clotting factor between 1978-1985) was associated with having had an HIV test (Houston et al., 1998). A study of Hispanic men detected no significant association between repeat testing and perceived partner risk (Fernandez, Perrino et al., 2003).

Sex with a Prostitute/Paying for Sex. Having had sex with a prostitute (or paying for sex) was consistently associated with HIV testing, though the relationship generally attenuated after controlling for demographic and behavioural variables (Gage & Ali, 2005; Kalichman & Simbayi, 2003; McGarrigle et al., 2005; Renzi et al., 2001). Hence, paying for sex was related to HIV testing in African and Western populations, though this relationship may have been due to confounding.

Sexual Partners from Abroad. Individuals who acquired a new sexual partner from abroad were significantly more likely to have had an HIV test (McGarrigle et al., 2005). Such findings could have significant public health implications as research has indicated that 43-50% of immigrants have visited their home country in the past five years and that 10-50% engaged in sexual contact with a local partner during these visits (Fenton, Chinouya, Davidson, & Copas, 2001; Gras et al., 1999).

Men Who Have Sex With Men. In general Western populations, men who have sex with men were more likely to have tested for HIV (Houston et al., 1998; McGarrigle et al., 2005). No significant relationship was noted between having sex with men and repeat testing in a Canadian sample (Jayaraman et al., 2004). No studies examined this association in African populations.

Injection Drug Use. Injection drug users in Western countries were more likely to test than non-drug users (Houston et al., 1998; McGarrigle et al., 2005; Renzi et al., 2001). A study of black South Africans found that the majority of injection drug users had not been tested for HIV, though it was not clear how this proportion differed from the non-drug using population (Kalichman & Simbayi, 2003). Repeat testing did not seem to be significantly related to general drug use (Fernandez, Perrino et al., 2003; Hightow et al., 2004); however, it may be related to injection drug use (Jayaraman et al., 2004).

2.4.3 PSYCHOSOCIAL/KNOWLEDGE VARIABLES

Perceived Risk. African immigrants and British heterosexuals with higher perceived risk were significantly *more* likely to test for HIV (Fenton et al., 2002; McGarrigle et al., 2005). A non-significant trend among British men who have sex with men indicated that individuals with higher perceived risk were *less* likely to have been tested (McGarrigle et al., 2005). Although more evidence is needed to draw conclusion, these findings suggest that sexual orientation might play a mediating role in this association. No association was noted between perceived risk and repeat testing in a sample of Hispanic men who have sex with men (Fernandez, Perrino et al., 2003).

Knowing an HIV-Positive Individual. Knowing someone who is HIV-positive is an indicator of perceived risk and was associated with HIV testing (Renzi et al., 2001) and repeat testing (Leaity et al., 2000; Norton et al., 1997). Although these findings were not confirmed in a Ugandan population, the inability to detect a relationship could be the result of inadequate power given that 92.3% of the sample had a friend or relative living with HIV (Gage & Ali, 2005).

Perceived Barriers. Perceived barriers were related to HIV testing. Lower rates of testing were noted among non-heterosexuals who perceived more barriers to testing (Flowers et al., 2003; Maguen et al., 2000) and specific barriers were related to testing in African populations. For instance, black South Africans who had not been tested for HIV were more likely to hold stigmatizing beliefs relating to AIDS (Kalichman & Simbayi, 2003) and knowledge of a local testing site was associated with HIV testing in Uganda (Gage & Ali, 2005).

Perceived Benefits. Studies of black South Africans and Scottish Gay men presented evidence that testers were significantly more likely to perceive greater benefits of testing compared to non-testers (Kalichman & Simbayi, 2003; Flowers et al., 2003).

Perceived Testing Norms. Scottish gay men who had never received an HIV test were more likely to hold weaker perceived norms for HIV testing (i.e., a belief that most friends had tested for HIV) compared to people who had received a test (Flowers et al., 2003).

HIV/AIDS Knowledge. Ugandans with higher knowledge scores had greater odds of having tested (Gage & Ali, 2005), though it cannot be determined if this knowledge existed

prior to testing or if knowledge increased as a result of receiving HIV counselling at the time of testing.

2.5 MOTIVATIONS FOR TESTING

The previous section outlined many factors which are associated with testing. However, these factors alone present an incomplete picture as they ignore the motivations behind testing behaviour. The follow sections summarize what is known about reasons for testing.

2.5.1 ACTIVE VERSUS PASSIVE TESTING

Receiving an HIV test can occur through an active or passive process. Some individuals independently decide to be tested and actively seek out HIV testing. Many others passively receive a test because it is offered or suggested by a third party (e.g., doctor's recommendation, prenatal screening, blood donation, immigration purposes, insurance requirement). People who undergo HIV antibody testing through active versus passive processes likely differ on many characteristics.

It has been noted that among heterosexual migrant groups (Afro-Surinamese, Dutch Antilleans, and West Africans) residing in Amsterdam, the majority of participants had received passive testing (71%); and compared to passive testers, active testers were significantly more likely to be male, have more lifetime partners, have higher levels of education, and to be from a household with middle or unknown income (Stolte et al., 2003). General population studies in Italy (Renzi et al., 2001) and Britain (McGarrigle et al., 2005) suggested that men were more likely to seek voluntary testing, whereas women were more

likely to receive non-voluntary testing. Non-voluntary testing among women was greatly attributed to antenatal screening.

2.5.2 REASONS FOR TESTING

Understanding the motivations behind testing is important so that public health strategies can be aimed at increasing motivation in the general population. A number of studies have explored the reasons people provided for deciding to receive HIV antibody tests. These studies have obtained a wide range of responses (see Table 1) from diverse study populations (see Appendix D). Many of the reasons suggested that the individual underwent passive testing (i.e., being tested as part of a screening program or due to medical findings), while other reasons suggested a more active process to testing (i.e., risk of HIV, primary and secondary prevention, and psychological factors).

Three studies specifically examined reasons for HIV testing among HIV-positive black African immigrants (Boyd et al., 2005; Burns et al., 2001; MRC Collaborative Study Group, 1996). These studies suggested that experiencing suggestive symptoms was the most common reason for receiving an HIV test in African immigrant

Table 1. Literature Identified Reasons for Testing

Screening:
- Antenatal screening[1,2,3,4,5,6]
- Blood donation[2,3,4]
- Hospital care/Drug withdrawal program[3,4]
- Required for insurance[2], mortgage[2], job[4], military[4]

Medical:
- Symptoms[1,3,6, 11,]
- HIV+ child[3, 6]
- Physician recommendation[11]

Risk:
- Perceived risk[2,3,4, 11]
- High-risk behaviour[1]
- Known or suspected sexual contact with HIV+ person[3, 6, 10, 11]
- Distrust of sexual partner[10]

Transmission Reduction:
- Prevent transmission to partner/significant others[5,7, 12]
- New relationship/planned marriage[3,8, 10]
- Partner's suggestion[4]

Prevention:
- General health check[2,4,7]
- Early access to medical treatment[5,7,9, 12]

Psychological:
- Reduce personal anxiety/gain peace of mind[5,9]
- Planning for the future[9, 10, 12]

[1] Boyd et al., 2005*
[2] McGarrigle et al., 2005
[3] MRC Collaborative Study Group, 1996*
[4] Renzi et al., 2001
[5] Riess et al., 2001
[6] Burns et al., 2001*
[7] Bonney et al., 2004
[8] Leaity et al., 2000
[9] Flowers & Church, 2002
[10] Muller et al., 1992†
[11] Wortley et al., 1995
[12] van Dyk & van Dyk, 2003†

**Sample included African immigrants*
†Conducted in African population

populations. Symptoms were cited as a reason for testing by 34-47% of all participants. An additional 5-12% tested due to a child being diagnosed with HIV infection (Burns et al., 2005; MRC Collaborative Study Group, 1996). Nine to 21% of participants were tested during antenatal screening. Finally, a substantial proportion of participants cited risk-related reasons for testing, including engaging in high-risk behaviour (40%; Boyd et al., 2005), high perceived risk (25%; MRC Collaborative Study Group, 1996); and sexual contact with someone known to be HIV-positive (15%; Burns et al., 2001). While these studies provided some insight into testing motivation of HIV-positive African immigrants, they did not shed light on reasons for testing among HIV-negative individuals.

Two studies explored reasons for testing in Ugandans (Muller et al., 1992) and South Africans (van Dyk & van Dyk, 2003), both including HIV-positive and HIV-negative individuals. Among Ugandans, the most common reasons for testing included: planning for the future (35%), a planned marriage or new relationship (27%), illness/disease or death of a sexual partner (20%), and distrust of a sexual partner (14%). Most (87.3%) of the South Africans (black and white) believed that all people should know their HIV status. The reasons provided for this belief were related to prevention of transmission (49.5%), access to treatment (3.4%), enhancing surveillance and awareness programs (2.6%), as well as preparing for death and the future of children, and preparing a will (1.0%).

While the above studies contribute to the understanding of testing motivation in African immigrant populations, a complete picture cannot be drawn without further research in these populations.

2.5.3 ETHNIC DIFFERENCES

Four British articles discussed ethnic differences in HIV testing between black Africans and whites. Evidence indicated that black Africans were more likely than whites to have been tested due to symptoms, antenatal care, or diagnosis of an HIV-positive child; whereas white patients were more likely to actively request a test and to state they were tested due to high perceived risk, engaging in high-risk behaviour, or known contact with an HIV-infected individual (Boyd et al., 2005; Burns et al., 2001; MRC Collaborative Study Group, 1996). Additionally, Erwin, Morgan, Britten, Gray, and Peters (2002) documented that only 28% of black Africans (versus 45% of white Londoners) suspected that they were HIV-positive before testing, suggesting that the Africans were less likely to perceive themselves as susceptible to HIV infection.

Ethnic differences in testing as a result of perceived risk may be attributable to different modes of transmission. In one study of HIV-infected women, none of the black women reported injection drug use as the probable route of infection, compared to 55% of whites. Overall, white women were more likely to report perceived risk as a reason for testing; however, similar proportions of black Africans and heterosexually infected white women reported testing due to perceived risk (MRC Collaborative Study Group, 1996). This evidence suggested that heterosexual contact was likely perceived as less risky than other risk behaviour (i.e., injecting drugs) and hence provided less motivation to test.

2.6 MOTIVATIONS FOR NOT TESTING

2.6.1 REASONS FOR NOT TESTING

It is also important to understand the reasons that people provide for *not* receiving an HIV test so that efforts can be made to reduce potential barriers to testing. This area of research has received much less academic attention in the published literature. No studies specifically looked at non-testers in immigrant populations; however, several studies may help to identify potential reasons for non-testing in this population.

One study examined pre-HIV test concerns among a group of HIV-positive black Africans (Erwin et al., 2002). As can be seen in Table 2, many of the concerns were related to the individuals' family, children, and partners; HIV stigma and discrimination; and legal rights and entitlements as an immigrant. While these concerns are of interest, all participants in this study had been tested for HIV, making it impossible to know which of these concerns (if any) would be strong enough to tip the decisional balance toward not testing.

Table 2. Pre-HIV Test Concerns of Black African HIV Patients in London

Statement	% Very Worried
• Effects on your family if you were HIV positive	74
• Discrimination if you were HIV positive	68
• Fear of dying	66
• Not being able to make plans for the future if you were HIV positive	64
• Not being able to have children if you were HIV positive	60
• Effects on your work if you were HIV positive	55
• Partner's reaction if you were HIV positive	49
• Bumping into someone you knew at the HIV clinic	48
• What the Home Office might do if they found out you were HIV positive	40
• That your children might be taken away if you were HIV positive	32
• Whether you were entitled to medical care	28
• Where to go for an HIV test	20
• The attitudes of the clinic staff	13
• How to communicate with clinic staff	12

Reference: Erwin et al, 2002, p 38

A second study explored reasons for not testing in South Africans, including both blacks and whites. While the majority of the participants believed that people should know their HIV status, a few believed it was not advisable for all people. Common reasons for this belief were that seropositive status would result in depression (67%) and rejection (12%); that there was no point in knowing because no treatment options were available (13.9%); and that most people would not know how to care for themselves if they discovered they were HIV-positive (5%). Again, while these findings are interesting, their interpretation with respect to black African immigrants are limited: first, because participants were residing in their country of origin rather than a developed Western country, and second, because they reflected the opinions of people who believed in principle that testing was not the best option for everyone rather than actual reasons for why people decided not to test.

Three qualitative studies involving African and Caribbean communities in Canada and Australia suggest other potential barriers to testing (African and Caribbean Council on HIV/AIDS in Ontario, 2006; University of Melbourne, 2006; Tharao, Massaquoi, & Teclom, 2006). Low perceived risk was a common theme in all three of these studies. People felt that HIV was a problem "back home" in Africa and in local gay communities – but not the communities they were living in. All three studies also noted that stigma, discrimination, and fear within their communities might deter testing. Language barriers and confidentiality issues were identified as barriers to accessing HIV treatment and services, and may also apply to testing services. These studies did not specifically examine non-testing behaviour; however, the common themes discussed above could easily be obstacles to testing.

In addition to the above studies, other researchers have explored reasons for not testing in Western countries. These reasons, along with those stated above, have been

summarized in Table 3. Reasons for not testing were often related to: 1) the belief that testing was unnecessary, 2) concerns relating to the testing process, 3) the psychological impact of an HIV-positive diagnosis, and 4) concerns regarding treatment. As a final note, it is worth mentioning that one study (Inungu, 2002) reported that 58% of participants had no particular reason for not having received an HIV test. This may indicate that a large proportion of non-testers are not opposed to testing but rather have not experienced motivation to seek a test.

Table 3. Literature Identified Reasons for Not Testing

Testing is Unnecessary:
- Having only one sex partner since last test[1]
- Obtained a negative test in past year[1]
- Consistent condom use[1]
- Low perceived risk[2,3,5,6,7]

Problems with Testing Process:
- Concerns about confidentiality[2,3,5,6,7]
- Mistrust of health-care professionals[4]
- Anxiety over awaiting test results[2]
- Do not like needles[3]
- Do not believe test results are accurate[2,3]
- Language barriers[5,6,7]

Psychological Consequences of Positive Test:
- Fear of discrimination and rejection[2,3,4,5,6,7]
- Concern regarding ability to cope with positive test result[1,4]
- Concerns about disclosing HIV positive status[4]

Treatment for HIV/AIDS:
- Treatment may not be affordable or accessible[1,2,3]
- Do not believe anything can be done if positive[3]

Other:
- Doctor/HMO did not recommend it[3]
- No particular reason[3]

[1] Bonney et al., 2004
[2] Flowers & Church, 2002
[3] Inungu, 2002
[4] van Dyk & van Dyk, 2003†
[5] African and Caribbean Council on HIV/AIDS in Ontario, 2006*
[6] University of Melbourne, 2006*
[7] Tharao et al., 2006*

**Involving African immigrant populations*
†*Involving African populations*

2.6.2 ETHNIC DIFFERENCES

Although no studies actually compared barriers to testing between black Africans and whites, some evidence can be drawn from the literature which suggest potential differences. It is likely that individuals of African origin possess a greater fear of stigmatization than whites. In a British study, Anderson and Doyal (2004) conducted in-depth interviews with 62 HIV-positive women from 11 African countries. Nearly all of these women (95%) discussed the highly stigmatized nature of HIV, particularly within the African community. There was also a high lack of disclosure, with 16% admitting they had not told a single person of their HIV status. This finding was consistent with another British study

that noted black Africans were less likely than whites to disclose their serostatus to their partner, family, friends, or colleagues (Erwin et al., 2002). In fact, 15% of blacks (compared to 3% of whites) had not told any family or friends (including their partner) of their diagnosis.

Also noteworthy, a study conducted in South Africa revealed a strong mistrust of health-care professionals that prevented many people from obtaining a test (van Dyk & van Dyk, 2003). While such mistrust was not revealed in any of the studies conducted in western countries, it is possible a similar sense of mistrust may be harboured among recent African immigrants residing in western countries. Mistrust may even be stronger in an unfamiliar host country, and perpetuated by racial stereotypes and discrimination.

3. RESEARCH RATIONALE & OBJECTIVES

3.1 RATIONALE

Testing behaviour within immigrant groups will likely differ from the general Canadian population due to a number of factors (e.g., cultural attitudes and beliefs, access to services, discrimination). Since an understanding of testing behaviour is essential for designing effective public health interventions to encourage testing, there is a need for culturally specific research to facilitate such understanding. However, no studies have specifically examined HIV testing in Canadian immigrant communities. Additionally, limited research on covariates of HIV testing and reasons for testing/non testing among immigrants has been conducted in any developed country. This research deficit causes alarm for several reasons: 1) Canada is a tremendously ethno-diverse country which is home to 282,600 African immigrants (Statistics Canada, 2001); 2) Canadian data and evidence from other countries have shown that immigrants from HIV endemic countries have higher rates of HIV infection; 3) these immigrants are more likely to receive a late diagnosis, indicating inadequate levels of testing; and 4) early knowledge of seropositive status is important for effective treatment and prevention of HIV transmission. The current study has countered this lack of research by exploring the following research objectives.

3.2 RESEARCH OBJECTIVES

1. To determine what factors are associated with HIV testing and repeat testing in five East African Communities (Ethiopian, Kenyan, Somali, Tanzanian, and Ugandan) in Toronto.

2. To determine what factors differentiate between people who receive an HIV antibody test because of a) their own decision to get tested versus b) someone suggesting they should be tested.

    i) For people who independently decided to test, to describe the reasons they provided for making this decision.

    ii) For people who followed a suggestion to test, to describe who suggested it and why.

3. To examine the reasons provided for deciding NOT to get tested for HIV.

4. METHODOLOGY

The following secondary data analyses were based on data collected by a multi-disciplinary research team at the University of Toronto (see Appendix E). Although data collection was not complete at the time of these analyses, an initial sample of the data was used. The following sections provide details of the study design used for data collection, as well as the variables and statistical techniques that have been used in these analyses.

4.1 STUDY DESIGN

A cross-sectional survey was employed to collect a wide range of information (including HIV and other health-related data) from five East African Communities in Toronto. A community participatory approach was used to ensure the study was relevant to community needs, culturally appropriate, and received maximum community acceptance. As part of this participatory approach, a feasibility study involving community members and key stakeholders was conducted (Calzavara, Tharoa, & Myers, 2000), and a Community Advisory Committee (CAC) was established. Findings from the feasibility study and input from the CAC were incorporated into the study design.

4.1.1 STUDY POPULATION AND ELIGIBILITY CRITERIA

All individuals comprising Toronto's Ethiopian, Kenyan, Somali, Tanzanian, and Ugandan communities were targeted. Eligibility criteria included men and women who 1) emigrated from (or have parents who emigrated from) any of these five countries, 2) lived in the Greater Toronto Area, 3) were 16 years of age or older, 4) were fluent in English, and 5) were able to communicate with the interviewer without the assistance of a third person. The

present analyses were based on the first 271 completed interviews, which took place between October 2004 and January 2006[2].

4.1.2 SAMPLING AND RECRUITMENT

The study was promoted within the five target communities prior to recruitment and throughout data collection. Presentations were made to community leaders and organizations; promotional materials were distributed *via* community organizations; and advertisements were placed in community newsletters and newspapers.

The research team initially intended to use existing community lists to recruit a representative sample of the target population; however, they later moved to the use of a convenience sample. Early in the study it became clear that the few lists that existed were outdated and/or inaccessible due to privacy and confidentiality issues. As a result, the research team created their own sampling frame using a variety of methods – primarily canvassing community locations known to be frequented by the target populations (e.g., commercial and social venues, apartment complexes). This method ensured that individuals who did not use community services were included in the study. Additionally, awareness of the study was spread through the communities by word of mouth, resulting in further recruitment.

[2] Although not included in the current analyses, the full sample will include one hundred participants from each community for a total sample size of five hundred.

4.1.3 INTERVIEWS

A structured survey instrument was developed by the research team through the compilation and adaptation of several existing tools, including questions from the *Canadian Community Health Survey*, the *Ontario First Nations AIDS and Health Lifestyle Survey*, and the *Pathways and Barriers to Mental Health Care for Ethiopians in Toronto* study. The survey collected information on demographics; culture, immigration, community, and spirituality; health status and social relationships; health care utilization; health behaviour; sexual behaviour; knowledge, attitudes and beliefs about HIV/AIDS; health screening and HIV testing; and employment and income.

Given the sensitive nature of the questionnaire, great care and consideration were awarded to survey development. Literature on maximizing the reliability and validity of sexual behaviour questions was reviewed at length. The survey was pre-tested with 25 individuals (including both men and women who ranged in age, HIV status and who represented each community) to ensure questions were clear and culturally appropriate. Findings from the pre-test were used to modify some of the interview questions. The need to gain consensus on sensitive question items resulted in compromises that left some of the questions less than perfect[3] (Kimberly Gray, personal communication, October 18, 2005).

[3] For example: Based on feedback gained during pre-testing, data regarding the gender of sex partners were collected by asking if partners had been 1) all male, 2) both male and female, or 3) all female. It later became apparent that the wording of this question might have rendered the data unreliable (see discussion in Section 5.2.2).

Surveys were administered during face-to-face interviews lasting approximately one hour. Participants and interviewers were gender-matched and participants were given a choice of location (University of Toronto, private meeting room in community location, or participant's home) and ethnicity of the interviewer. These choices were provided to increase participation rates and response reliability[4]. While most of the information was collected orally, the survey included a self-completed portion relating to sexual behaviour to maximize the reliability of sensitive question items (Dare & Cleland, 1994; Davoli, Perucci, Sangalli, Brancato, & Delluomo, 1992; Johnson, Wadsworth, & Wellings, 1994). At the end of the interview, all study participants were asked if they would be willing to provide an anonymous saliva specimen for HIV testing. This component of the study was completely optional and was not used in the present analyses.

4.1.4 Ethical Considerations

Participation in this study was completely voluntary, confidential, and anonymous. Oral informed consent was obtained from all research participants. All participants received $15, an HIV information pamphlet, and contact information for relevant service organizations.

Several measures were taken to protect participant confidentiality. Completed surveys were stored in a locked cabinet at the study office. All electronic databases and computerized information were password protected. Numeric identification codes, rather than participant names, were used in conjunction with survey data.

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[4] These choices were provided based on feedback received from the community.

The research team holds the responsibility and obligation of disseminating research findings to all interested parties, including the five East African Communities, in an accurate and sensitive manner. HIV/AIDS is an exceedingly sensitive topic and has been investigated in an already vulnerable population. It is of paramount importance that all findings be reported in a sensitive manner to prevent further stigmatization of this population. The research team and the Community Advisory Committee are responsible for ensuring that any potential negative impact on the community is minimized.

The University of Toronto Human Subjects Review Committee granted ethical approval to this study on November 2, 2001. The University of Waterloo's Office of Research Ethics granted full ethics clearance for the current secondary data analyses on January 3, 2006.

4.2 VARIABLES OF INTEREST

4.2.1 MAIN VARIABLES

Several main variables were examined to fulfil the research objectives. Figure 2 provides an overview of the main variables examined in this study and how they relate to the research objectives.

The first research objective was to explore potential associations with HIV testing and repeat testing behaviour. To assess history of HIV testing, participants were initially asked, "Have you ever been tested for HIV/AIDS?" Responses were coded as "yes" or "no."[5]

[5] Participants who did not know if they had been tested (n=9) were excluded from all analytic analyses.

Those who had tested were asked, "How many times have you been tested for HIV?" They were categorized as "non-repeat testers" if they tested only once and "repeat testers" if they tested more than once.

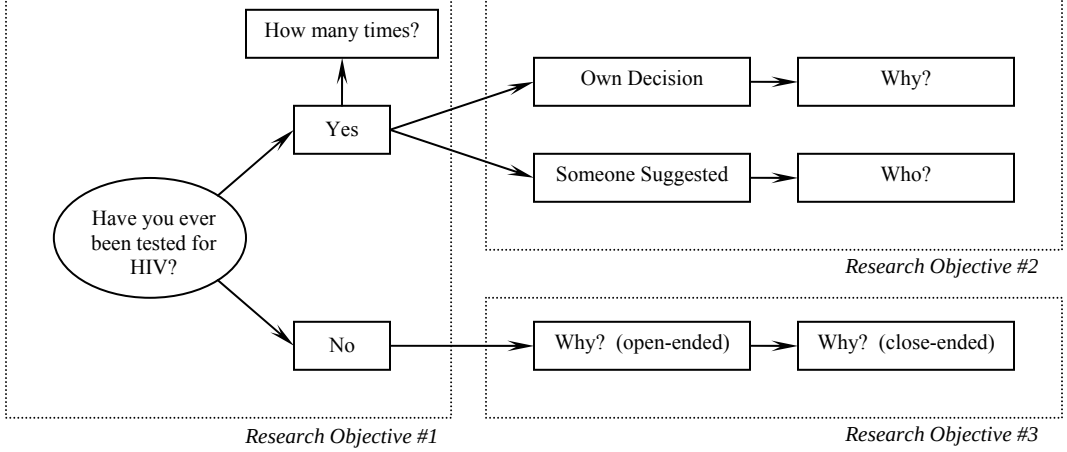

Figure 2. Main Research Variables of Interest

The second research objective was to investigate factors that differentiate people who independently decided to receive an HIV test from those who followed a suggestion to test. All participants who stated that they had been tested for HIV were asked, "Thinking of the most recent time you were tested for HIV, did you take the test because someone suggested that you should, or was it your own decision?" Responses were coded as "own decision" or "someone suggested." Depending on the response, participants were further questioned. Individuals who had independently decided to get tested were read a list of possible reasons for testing and were asked if each was a reason contributing to their decision to test (see Appendix F for this list of potential reasons). Participants who had followed a suggestion to test were asked "Who suggested that you get an HIV test?" Responses were categorized as "partner," "immigration authorities," "doctor," "insurance company," or "other." Probes were used to elicit the reasons for such suggestions (see Appendix G).

Finally, the third research objective was to examine the reasons people provided for deciding not to get tested for HIV. All participants who stated they had never been tested for HIV were asked two questions. The first was open-ended: "There are many reasons why people decide not to get tested for HIV. Please tell me why you have not had an HIV test to date." The second was closed-ended: Participants were read a list of potential reasons for not testing and asked if any of them were also reasons why he/she had not had an HIV test (see Appendix H for this list of potential reasons).

4.2.2 INDEPENDENT VARIABLES

The following independent variables were selected for investigation based on the empirical research discussed in the literature review, behavioural theory, and the author's hypotheses. See Appendix I for a complete list of these variables, their related questionnaire items, and a description of how the variables were created or scored.

4.2.2.1 Sociodemographic Variables

Basic sociodemographic information including age, gender, marital status, ethnicity, religion, and number of years spent living in Canada was examined in the analyses. Socio-economic indicators, such as level of education, personal income, and household income below the low income cut off, were also included.

4.2.2.2 Behavioural Variables

A number of behavioural variables that have been hypothesized to increase HIV risk and/or increase the likelihood of HIV testing were included in the analyses.

Drug Use. Participants were asked if they had ever used injection drugs, cannabis, chat, or other drugs. Frequency of heavy alcohol consumption was also assessed.

Sexual Behaviour. Information regarding sexual behaviour was also considered, including: the number of sexual partners in lifetime; the gender of these partners; whether any of these partners were born in Africa; whether the participant had concurrent partners in the previous 12 months; whether the participant knew or suspected that any of his/her regular partners were having sex with others in the previous 12 months; how often the participant used condoms with various types of partners; and whether condoms were used properly. Participants were not specifically asked if they had had sexual contact with a local partner while travelling to an endemic country; however, information was collected regarding the number of times the participant had travelled to sub-Saharan Africa since immigrating to Canada and was considered in the analyses. Additionally, all participants were asked if they had ever been diagnosed with a sexually transmitted infection, which was included in the analyses as a proxy measure of sexual risk[6].

Blood Transfusion. All participants were asked if they had ever received a transfusion of donated blood. Although not an active behaviour, a blood transfusion could have placed a person at higher risk of HIV and was therefore included in the analyses with the behavioural variables.

[6] The literature review found that having a "perceived high-risk partner" was related to testing behaviour, this information was not collected in the survey was therefore not included in the analyses.

4.2.2.3 Psychosocial Variables

A number of psychosocial variables were explored including: time spent with community members; social support from family members and friends; perceived personal risk; beliefs regarding the extent to which HIV/AIDS is problematic within the participant's own community; knowing an HIV-positive individual; stigmatizing attitudes toward persons with HIV/AIDS; HIV knowledge; access to health care; perceived importance of HIV testing; having ever had a doctor or other health care provider recommend an HIV test; and having ever been tested for HIV for immigration purposes[7].

4.2.2.4 Development of "Score" Variables

Three score variables were developed including: a stigma score, an HIV knowledge score and an access to health care score.

Stigma Score. This score was created from seven questionnaire items relating to participants' reactions to persons with HIV/AIDS (see Appendix I, #30). One point was added for every response indicating a negative reaction to persons with HIV/AIDS. Therefore, scores could range from 0 to 7 with higher scores indicating more negative attitudes toward persons with HIV/AIDS. Internal consistency was good (Cronbach's $\alpha = 0.61$[8]).

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[7] The literature review found that "perceived benefits of testing," "perceived barriers to testing," and "perceived testing norms" were associated with HIV testing behaviour. This information was not collected in the survey and therefore could not be included in the analyses.

[8] Scales created from dichotomous questionnaire items generally result in lower Cronbach's α coefficients, compared to scales created from items with more response options (i.e., Likert scales; Erin Harvey, personal communication, April 4, 2006).

Knowledge Score. This score was created from sixteen questionnaire items assessing HIV knowledge regarding transmission, treatment, and testing (see Appendix I, #31). One point was added for every correct response. Scores could range from 0 to 16 with higher scores indicating greater knowledge (Cronbach's $\alpha = 0.49$[8]).

Access to Health Care Score. Five questionnaire items assessing participants' access to health care services were incorporated into a single score (see Appendix I, #32). For each item, one point was added if they had received care in the past year, if there had NOT been a time in the past year when they felt they needed care but did not receive it, or if they had a family doctor. Scores could range from 0 to 5 with higher scores suggesting better access to health care services (Cronbach's $\alpha = 0.41$[8]).

4.3 DATA MANAGEMENT AND ANALYSIS

Analyses were conducted using data from all interviews that were completed and entered into the database on or before January 31, 2006. Prior to analyses, these data underwent a rigorous cleaning process[9].

A combination of descriptive and analytic statistical techniques was used. Three separate logistic regression models explored factors related to a) ever versus never testing, b) repeat versus non-repeat testing, and c) independent versus directive testing. Further examination of reasons for testing and not testing employed more descriptive statistical

[9] Raw data were examined for any unusual values through 1) manual reviews for impossible values and 2) computer programs which identified inconsistent or implausible responses. Unusual values were checked against the original survey.

methods. All statistical analyses were conducted using SAS 9.1.3 software (Cody & Smith, 2006; SAS OnlineDoc 9.1.3, 2006).

4.3.1 Univariate Analyses

Univariate analyses were conducted to describe each dependent and independent variable (e.g., mean, distribution). This process was used to describe characteristics of the sample, as well as to assess missing variables, distribution of responses, etc. In addition to simple univariate analyses, selected variables were also examined by gender and ethnicity to enrich the interpretation of the research findings.

4.3.2 Bivariate Analyses

Prior to logistic regression analyses, all bivariate relationships between the independent and dependent variables were used to assess crude associations, as well as to aid in collapsing categorical variables. Chi-square analyses were used for categorical variables. T-tests were used for continuous variables. Crude odds ratios were also calculated.

4.3.3 Multivariate Analyses

Binomial logistic regression was used for all multivariate analyses (Hosmer & Lemeshow, 1989; Katz, 2006; Kleinbaum & Klein, 2002; Pampel, 2000). As a general rule, independent variables with a p-value of 0.30 or less in the bivariate analyses were considered for entry into the multivariate analyses. Although this represented a liberal screening criterion for selection of candidate variables, it is similar to the 0.25 level recommended by Hosmer & Lemeshow (1989, p 86; based on work by Bendel & Afifi [1977] and Mickey & Greenland [1989]). This liberal criterion reduced the risk of prematurely discarding important variables; model-building techniques (described below) were later used to remove variables of little

importance. Certain sociodemographic variables (age, gender, ethnicity) and variables that were used in interaction terms of theoretical interest were included in the multivariate analyses regardless of significance at the bivariate level.

Missing Variables. The small sample size made it imperative to re-code missing values in order to prevent loss of participants in the analyses (and thereby further reducing the sample size and statistical power). Missing values for age (n=6) and annual personal income (n=17) were replaced with values predicted using multiple regression[10]. For the remaining independent variables, if there were five or fewer missing values, these observations were simply recoded into one of the existing response categories (e.g., one missing observation for "community perceived risk," was recoded into the existing "don't know" category). If there were more than five missing observations, a new response category was created (e.g., "declined" or "not applicable").

Treatment of Variables. Treatment of independent variables in the multivariate analyses was based on bivariate statistics. Ordinal variables were treated as continuous variables in the model if a visual examination of the cross-tabulation and the Mantel-Haenszel statistic suggested a linear relationship with the dependent variable. If support for a

[10] Multiple regression model predicting age, R^2=0.52; Multiple regression model predicting income, R^2=0.42. Crude odds ratios remained roughly the same regardless of whether these predicted values were included or excluded from the analyses. This provided support to include predicted values in the analyses in order to maximize sample size and overall statistical power.

linear relationship did not exist, ordinal variables were treated categorically[11]. Decisions to collapse categorical variables were based on cross-tabulations and crude odds ratios.

Model Building. For all three multivariate analyses, model building occurred in four steps. First, all independent variables were fit into a single full model (step 1). Next, three separate blocked logistic regression models were run: a) the first included only sociodemographic variables, b) the second included only behavioural variables, and c) the third included only psychosocial variables (step 2). Variables with a p-value of 0.25 or better in any of these four models were combined into two logistic regression models: a) one included sociodemographic and behavioural variables, and b) the other included sociodemographic and psychosocial variables (step 3).

Model building continued based on these two models and the full model. Variables with a p-value of 0.10 or better were included into a single "main effects" model (step 4). Once combined into this single model, any variables whose significance rose above p=0.10 were removed to create a final, more parsimonious, main effects model. Age, gender, and ethnicity were carried through to the final model regardless of significance level.

Gender Analysis. Gender analyses were conducted by stratifying each final main effects model by gender and comparing the significance level of variables between the "male" and "female" models. Gender interaction effects were tested for any variables whose

[11] Because the treatment of independent variables was based on its relationship to the dependent variables, some independent variables were treated differently between the three logistic regression models in this thesis (e.g., education, personal income, and number of close family members were treated as continuous variables in some models and as categorical in others).

significance level varied greatly between gender models. Significant or marginally significant gender interactions ($p \leq 0.10$) were added to the final models.

Interaction Analysis. Finally, other interactions of theoretical interest were tested in the final logistic regression models. These interactions included: 1) "number of times travel to Africa" by "having had an African sex partner"; 2) "gender" by "number of lifetime partners"; 3) "stigma score" by "time spent with community members"; and 4) "perceived risk" by "importance of testing." All interaction terms were independently tested in the models. Significant or marginally significant interactions ($p \leq 0.10$) were added to the final models.

Multicollinearity and Outliers. Once the final models were established, they were assessed for multicollinearity and outliers. Multicollinearity was assessed by examining the strength of association between independent variables using Pearson's r, Kendall's tau, and tetrachoric correlations[12] (Brown & Benedetti, 1977; Drasgow, 1986; SAS OnlineDoc 9.1.3, 2006). Outliers were identified by Pearson residuals of greater than ±2.5 (Katz, 2006, p. 141). To assess their impact on the final model, comparisons were made between models that included and excluded the outliers. Outliers were retained in the analyses if the responses appeared valid and no strong justification existed for their removal.

Once the final models were established, global statistics were calculated for the overall models. The amount of variance explained by each final model was assessed using

[12] According to Katz (2006) variables with correlation coefficients less than 0.8 do not generally pose a threat to the model (p. 69).

the coefficient of determination proposed by Cox and Snell (R^2; 1989, p. 208-209) and Nagelkerke's rescaled coefficient of determination (max-rescaled R^2; 1991). The goodness-of-fit of the models were evaluated using the Hosmer-Lemeshow statistic (Hosmer & Lemeshow, 1989, p. 140-5).

4.3.4 Descriptive Analyses

Descriptive analyses were used to explore a) the reasons people provided for independently deciding to test for HIV, b) who suggested that participants receive an HIV test and why, and c) the reasons people provided for not testing for HIV. The majority of these data were quantitative and hence descriptive statistics were used to explore the responses. A small number of open-ended text responses were collected through the use of probes and open-ended questions. Responses were initially reviewed for common themes and a coding system was drafted. This draft system was reviewed by a second coder to ensure clarity and completeness. Revisions were incorporated resulting in the final draft coding system for the open-text responses (see Appendix J). Hierarchical responses (i.e., items that were part of another theme but more specific) were generally coded separately so that decisions to analyse these data separately or aggregately could be made in the data analysis stage. Participant responses were coded by two independent coders (kappa coefficients ranged from 0.81 to 0.95). Discrepancies between coders were discussed and resolved.

5. RESULTS

5.1 SURVEY ADMINISTRATION AND RESPONSE

Surveys were administered by 18 different interviewers. The average interview length was 70 minutes (ranging from 20 to 150 minutes). Thirty-eight point three percent of the interviews took place in participants' homes, 44.3% in local organizations, and 17.5% at the University of Toronto. In 10.0% of the interviews (n=27), someone other than the interviewer and respondent was present. In half of the situations (51.9%; n=14) the person was only briefly present. When the third party was present for an extended period of time it was usually the participant's young child (n=9). Response rates did not differ when a third person was present.

The majority of participants (67.4%) had the self-completed portion of the questionnaire read to them, but recorded their own responses. Twenty-eight point five percent of participants read the questions and self-completed this section on their own. This section was not applicable to three percent (3.0%) of the participants.

Response rates were generally quite high (see Table 4). Twenty-seven of the 35 independent variables listed in Appendix I had response rates of 97% or better. Response rates were slightly lower for self-completed questionnaire items (average response rate = 90.7%); however even among these variables only one question had a response rate of less than 93% (75.7% responded to the question regarding having had an African sex partner). Response rates across interviewers and interview location were generally quite consistent; although some problems were identified. One interviewer did not administer the self-completed portion of the interview for five out of the six interviews he conducted.

Additionally, a wide range of response rates for the question regarding having had an African sex partner was noted across interviewer (38% to 100%) and location (home, 85%; organization, 75%; University of Toronto, 65%).

Table 4. Response Rates for Independent Variables

Demographic Variables	98.9%
Behavioural Variables	95.7%
Interviewer Recorded	98.5%
Self-Completed	90.7%
Psychosocial Variables	99.6%

Interviewers were asked to assess the participants' comprehension of the survey questions, comfort level, and the general reliability of the data. In 85.1% of the cases, the interviewer felt the participant understood all of the questions and had no problems answering. Fourteen point two percent of participants were judged to have had difficulty answering or to have appeared uncomfortable with some of the questions, but their responses were generally thought to be reliable. Only 0.8% of participants (n=2) were assessed as providing unreliable responses due to resistance or difficulty answering many of the questions[13]. Interview assessment information was missing for two participants.

[13] These assessments were based solely on the interviewers' perception. The generally favourable assessments provide support for reliability of the data. However, this was a subjective measure and therefore did not justify removing the two participants who were deemed "unreliable."

5.2 DESCRIPTION OF STUDY SAMPLE

Data collected from the first 271 interviews were obtained for use in the following analyses. One participant was excluded from the analyses due to incomplete interview data, resulting in a total sample size of 270.

5.2.1 DEMOGRAPHIC CHARACTERISTICS

Males and females from all five communities were represented (see Table 5). Overall, the sample had slightly more males than females (55.9% vs. 44.1%, p=0.052). Moreover, participants were not evenly distributed across communities ($\chi^2 = 34.85$, df = 4, p<.001)[14]. The sample contained a higher proportion of Ugandans (28.9% of the total sample), and a smaller proportion of Tanzanians (7.4% of the total sample). Among Somali participants, women were greatly under-represented (27.1% of Somalis). The average age of the sample was 35.7 years, ranging from 17 to 71 years. Males were slightly older than females (mean age 37.4 vs. 33.6, $p < 0.01$, respectively). Forty-three point seven percent (43.7%) of the participants were single, while 44.4% were married.

Table 5. Sample Distribution of Gender and Ethnicity

Ethnicity	Males	Females	Total (%)
Ethiopian	19	30	49 (18.1)
Kenyan	31	33	64 (23.7)
Somali	43	16	59 (21.9)
Tanzanian	11	9	20 (7.4)
Ugandan	47	31	78 (28.9)
Total (%)	151 (55.9)	119 (44.1)	270 (100.0)

[14] The final study sample will include an equal number of participants from each community (n=100), and approximately equal numbers of males and females from each community. This preliminary cut of the data did not have an even distribution due to differential recruitment rates during data collection.

The vast majority of participants were born in their country of ethnic origin (90.4%) and spent the entirety of their adolescent years (defined as 10 to 16 years of age) in Africa (79.63%). Only six participants were born in Canada. On average, immigrant participants had spent 9.9 years in Canada (ranging from less than a year to 44 years). The Tanzanian and Ugandan groups immigrated to Canada more recently than the Ethiopian, Kenyan and Somali groups (Tukey's post hoc analyses, $\alpha = 0.05$).

The study sample was approximately two-thirds Christian (63.5%) and one-third Muslim (33.6%). Very few people reported other religious beliefs. The Somali group was nearly exclusively Muslim (98.3%); Ethiopians, Kenyans and Tanzanians were predominantly Christian (77.6%, 70.3%, 75.0%, respectively) with significant Muslim proportions; and Ugandans were vastly Christian (93.5%).

Overall, this was a very highly educated sample with 60.0% having completed post-secondary education. The Somali group had less formal education when compared to the other groups (28.8% had completed post-secondary education; Tukey's post hoc test, $\alpha = 0.05$). Despite high levels of education, income was low. The average annual personal income was between $20,000 and $30,000. An astounding 45.5% of the total sample had household incomes below Canada's 2005 low income cut-off (Statistics Canada, Income Statistics Division, 2006). Somalis, Tanzanians, and Ugandans had higher rates of household poverty (50.9%, 52.9%, 58.6%, respectively) compared to Ethiopians and Kenyans (27.3% and 35.6%). This likely reflects more recent immigration among Tanzanians and Ugandans and lower education among Somalis since these differences were no longer significant when stratified by length of residence in Canada and level of education.

5.2.2 BEHAVIOURAL CHARACTERISTICS

Drug Use. Despite 31.1% of the sample stating that they had never had an alcoholic drink, alcohol was the most commonly used drug with 20.0% reporting heavy alcohol use (five or more drinks on one occasion) at least once per month in the past year. Cannabis was the second most commonly used drug with 15.5% of the sample reporting having ever used it in their lifetime, followed by chat (11.1%), cocaine/crack (0.74%), and ecstasy (0.37%). No participants reported ever injecting drugs[15]. No other drug use was reported.

Sexual Behaviour. The majority of the study participants were sexually active. Ninety-five point six percent (n=258) of the entire sample reported ever having had sexual intercourse[16]. Of the entire sample, 78.9% (n=213) reported sexual intercourse in the previous 12 months. Of those who had ever engaged in sexual intercourse, 47.9% had less than five sexual partners in their lifetime, with 8.7% reporting 20 or more lifetime partners. Thirteen point three percent of the participants had been diagnosed with an STI.

While only one male reported exclusive homosexual contact, 9.0% of the males and 2.8% of the females in the sample reported that their sexual partners had been both male and female. However, when stratified by ethnicity it became evident that while a high proportion of Somali (23.3%) and Ugandan (6.7%) males reported bisexual behaviour, not a single Ethiopian, Kenyan or Tanzanian male reported such behaviour. Neither reviews of anthropological literature, nor discussions with the Community Advisory Committee,

[15] Compare to lifetime illicit drug use in the general Canadian population: Cannabis (41.3%), Cocaine/Crack (8.0%), Ecstasy (2.9%), hallucinogens (8.4%), amphetamines (4.6%), heroin (0.7%; Tjepkema, 2004).
[16] Of those who were not sexually active, 92% were female with an average age was 22.9 yrs.

resulted in the identification of cultural rituals or behaviour that may explain these findings. Such high proportions among Somalis and Ugandans may be artefacts of the question's wording, language barriers (personal communication, Kimberly Gray, July 10, 2006), and/or poor cultural translation (Agans, Deeb-Sossa, & Kalsbeek, 2006). Participants may have misinterpreted the response option of sexual partners being "both male and female" as meaning one male partner and one female partner were present. Due to the uncertain reliability of this survey item, partner gender was excluded from further analyses.

Table 6. Proportion of Participants Engaging in Sexual Activity with African Partners, Concurrent Partners, and Partners who had Concurrent Sex.

	N (%)
African Sex Partner (12 mo)	**162**
None	29 (17.9)
Some	24 (14.8)
All	109 (67.3)
Sex with Concurrent Partners (12 mo)	**199**
No	161 (80.9)
Yes	38 (19.1)
Believes Partner had Concurrent Sex (12 mo)	**192**
No	103 (53.6)
Yes	20 (10.4)
Don't Know	69 (35.9)

The following data were based on the responses of the 213 participants who reported having had sex in the past year (see Table 6). The majority of participants (67.3%) reported that all of their sexual partners in the previous 12 months had been born in Africa. Overall, 19.1% of the respondents reported sex with concurrent partners in the previous 12 months. Over half (53.7%) of the respondents did not think their regular sexual partners were having concurrent sex with others; 10.4% believed that their regular sex partners had concurrent sexual partners; and over a third of the respondents (35.9%) were unsure. Condom use in the past year varied greatly depending on the type of partner a person was with. While only

30.7% of people reported using condoms "all of the time" with regular partners, this number increased to 81.5% with casual partners. Very few people reported sex with clients (n=1) or sex trade workers (n=6) in the past year and those who did all reported using condoms "all of the time" with these partners.

Other. Of the entire sample, 45.1% had travelled to sub-Saharan Africa since first coming to live in Canada. Those who had travelled to sub-Saharan Africa had made an average of 2.4 trips (ranging from 1 to 20) over an average of 9.9 years in Canada. Only 5.6% (n=15) of the sample had ever received a transfusion of donor blood.

5.2.3 PSYCHOSOCIAL CHARACTERISTICS

Most study participants reported spending "some of the time" (59.6%) or "most of the time" (30.0%) with community members. Fewer reported spending "none of the time" (3.0%) or "all of the time" (7.4%) with their community members. Over a quarter of the sample (28.5%) said they had no close family members living in the GTA. Very few people reported having no close friends living in the GTA (5.9%), with over half the sample (53.0%) reporting two to four close friends.

Individual perceived risk for contracting HIV was quite low. Over half of the sample (55.2%) stated they were at "no risk at all" for becoming infected. Despite low individual perceived risk, HIV was thought to be problematic within Toronto's East African communities. Forty point four percent of the respondents thought HIV was a major problem within their community; only 8.5% believed that HIV was not a problem.

The majority of participants knew an HIV-positive individual in either their home country or the East African community in Toronto (71.1%). Although most participants

expressed non-negative attitudes toward HIV-positive individuals, significant proportions reported stigmatizing beliefs. For example, 21.1% would not allow their child to be in the same classroom with an HIV-positive child and 11.9% would not be willing to work next to an HIV-positive individual. HIV knowledge was fairly high (average score=13.0 out of a possible score of 16; range 6 to 16).

Overall, access to health care was high. Most participants had a family doctor (85.6%), and 93.0% had had contact with a traditional health professional in past 12 months. Even with fairly high levels of access to health care, 24.8% of the participants reported that there had been a time in the previous 12 months when they felt they needed health care but did not receive it.

The vast majority of participants felt that it was "very important" to know one's HIV status by getting tested (92.6%) and just one participant said that it was "not important at all." Only 16.0% of the sample had ever had a doctor or other health care provider recommend an HIV test.

5.2.4 HIV TESTING CHARACTERISTICS

Testing rates were quite high within this sample. Three-quarters (75.6%; n=204) of the sample reported ever being tested for HIV, with 20.4% (n=55) indicating they have never been tested, and 3.3% (n=9) reporting that they did not know if they had ever been tested (response rate = 99.3%; see Figure 3). Among those who had been tested, 65.7% (n=134) had tested more than once (see Figure 4) and the average number of lifetime HIV tests was 2.6 (ranging from 1 to 16). An average of 3.6 years had elapsed since participants had had their most recent HIV test. When asked about their most recent test, 59.3% (n=121) stated

they had received the test because someone had suggested it, whereas 40.7% (n=83) made the decision independently (see Figure 5).

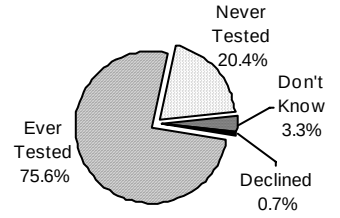

Figure 3. HIV Testing Behaviour of Entire Sample

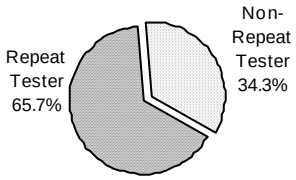

Figure 4. Proportion of Testers Who Have Had More Than One HIV Test

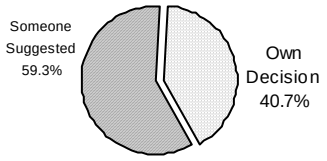

Figure 5. Proportions of Testers Who Decided to Test Based on Their Own Decision vs Someone's Suggestion

Immigration processes heavily impacted upon HIV testing within this sample. Twenty-one point five percent of the sample (n=58) came to live in Canada after 2001 when HIV testing became a mandatory component of immigration process[17]. Of all participants who reported ever testing for HIV, 71.1% (n=145) reported being tested for immigration purposes; 20.6% (n=42) said they had never tested for immigration purposes; and 7.8% (n=16) were not sure if they had been tested for immigration purposes. Even among those who came to Canada prior to 2002 when the immigration process began requiring mandatory testing, 63.5% reported having been tested for immigration purposes.

5.2.4.1 Community Differences

Differences in testing behaviour were evident between communities (see Table 7). Tanzanians, Ugandans, and Kenyans were more likely to have ever received an HIV test than Ethiopians and Somalis (χ^2 = 39.51, df=4, p<0.0001). These community differences

[17] Only two of the 58 participants who came to Canada in 2002 or later (and therefore should have received an HIV test for immigration purposes) reported never having had an HIV test, providing support for the general reliability of this question.

persisted even when all participants arriving in Canada after 2001 were excluded from the analyses. Therefore, these differences could not be explained as a result of participants from some communities being more likely to have immigrated after HIV testing became a mandatory component of the immigration process. Community differences were also noted for repeat testing (χ^2 = 41.05, df=4, p<0.0001) and decision to test (χ^2 = 20.09, df=4, p=0.0005). Interestingly, Ethiopian participants were least likely to have ever tested; however, Ethiopians who tested were most likely to test repeatedly and independently. Somali participants also had a low proportion that had ever tested, but were also least likely to test repeatedly or independently.

Table 7. Proportion of Participants Who Have "Ever," "Repeatedly," and "Independently" Tested by Ethnicity

	% Ever Tested (% before 2002[a])	% Repeat Tested	% Own Decision[b]
Ethiopian	53.1 (48.9)	92.3	69.2
Kenyan	81.3 (75.0)	63.5	50.0
Somali	59.3 (56.4)	22.9	17.1
Tanzanian	90.0 (87.5)	72.2	27.8
Ugandan	93.6 (95.8)	76.7	38.4
Total Sample	**75.6 (70.3)**	**65.7**	**40.7**

[a] Proportion of participants who arrived in Canada before 2002 which had ever tested.
[b] Proportion of "Testers" who independently decided to get tested for HIV.

5.2.4.2 Gender Differences

Gender differences were less clear. Overall, males were more likely to have ever been tested than females (81.5% vs. 68.1% tested; χ^2=9.46, df=3, p<0.0238). When stratified by community, gender differences in ever testing were only significant among Somali participants (79.0% males vs. 33.3% females; χ^2=9.98, df=1, p<0.0016). No gender differences were noted for repeat testing. Although a higher proportion of women claimed to have tested independently when compared to men (51.9% vs. 33.3%; χ^2=6.94, df=1,

$p<0.0084$), no significant gender differences were detected in any individual community, and no consistent trend was observed across communities.

5.3 FACTORS ASSOCIATED WITH HIV TESTING (RESEARCH OBJECTIVE 1)

5.3.1 FACTORS ASSOCIATED WITH EVER TESTING

Due to policy changes in 2002 that made HIV testing a mandatory component of the immigration process, these analyses only include individuals who immigrated to Canada before 2002 (n=202).

5.3.1.1 Bivariate Analyses

Bivariate analyses were conducted to assess crude associations between the independent variables and having ever been tested for HIV.

Sociodemographic Factors. Ethnicity was significantly associated with having ever tested for HIV, with Ugandans being most likely to have tested (97.9%) and Ethiopians being least likely (50.0%). Testing was most likely among participants who were 26 to 45 years old, male, and non-Muslim. Additionally, people who had ever received a test were more likely to have a higher education, have greater personal income, and to have resided in Canada for fewer years (see Table 8 and Table 9).

Table 8. Bivariate Associations Between Continuous Sociodemographic Variables and Ever Tested for HIV[a]

	Ever Tested			Never Tested			
	N[b]	Mean (Std)	$CI_{.95}$	N[b]	Mean (Std)	$CI_{.95}$	*p*-value[c]
Education	149	7.0 (1.7)	6.7-7.2	53	6.2 (1.6)	5.8-6.7	**0.0063**
Personal Income	142	4.7 (1.8)	4.4-5.0	46	3.5 (2.4)	2.8-4.2	**0.0040**
Years in Canada	149	11.3 (6.3)	10.3-12.3	53	16.2 (7.8)	14.0-18.3	**<.0001**

[a] Only those participants who came to live in Canada before 2002 were included in these analyses.
[b] Sample sizes vary due to missing values and survey skip patterns.
[c] *p*-values reported for t-tests

Table 9. Bivariate Associations Between Categorical Sociodemographic Variables and Ever Tested for HIV[a]

	N[b]	% Ever Tested (n)	*p*-value[c]	Unadjusted OR ($CI_{.95}$)[d]
Age	**200**		**<.0001**	
≤25 Years	39	46.2 (18)		0.17 (0.08-0.38)
26 to 45 Years *(ref)*	120	83.3 (100)		1.00
≥46 Years	41	73.2 (30)		0.55 (0.24-1.27)
Gender	**202**		**0.0250**	
Male *(ref)*	111	80.2 (89)		1.00
Female	91	65.9 (60)		0.48 (0.25-0.91)
Ethnicity	**202**		**<.0001**	
Ethiopian	44	50.0 (22)		0.02 (0.00-0.17)
Kenyan	47	76.6 (36)		0.07 (0.01-0.58)
Somali	49	63.3 (31)		0.04 (0.01-0.30)
Tanzanian	15	93.3 (14)		0.30 (0.02-5.19)
Ugandan *(ref)*	47	97.9 (46)		1.00
Religion	**202**		**0.0252**	
Muslim	77	64.9 (50)		0.49 (0.26-0.919)
Non-Muslim *(ref)*	125	79.2 (99)		1.00
Marital Status	**202**		**0.0751**	
Married/Common-Law	91	78.0 (71)		1.88 (0.96-3.684)
Widowed/Divorced/Separated	30	83.3 (25)		2.64 (0.91-7.653)
Single *(ref)*	81	65.4 (53)		1.00
Household Income < LICO[e]	**180**		**1.0000**	
No *(ref)*	114	76.3 (87)		1.00
Yes	66	75.8 (50)		0.97 (0.48-1.971)

[a] Only those participants who came to live in Canada before 2002 were included in these analyses.
[b] Sample sizes vary due to missing values and survey skip patterns
[c] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[d] Odds ratio for having ever tested for HIV
[e] LICO = Low Income Cut-Off

Behavioural Factors. In general, people who had ever tested for HIV reported more frequent heavy alcohol consumption in the previous 12 months and had travelled to sub-Saharan Africa more times since arriving in Canada. Participants who had no sexual partners in their lifetime were less likely than other participants to have ever been tested for HIV. People who had multiple sex partners in their lifetime had higher rates of testing compared to individuals reporting only one sexual partner; however, these differences were non-significant or only marginally significant. Additionally, individuals who did not know if their regular partners had had concurrent sex in the past 12 months were more likely to have ever tested for HIV than people who believe their partners had been faithful (see Table 10 and Table 11).

Table 10. Bivariate Associations Between Continuous Behavioural Variables and Ever Tested for HIV[a]

	Ever Tested			Never Tested			
	N[b]	**Mean (Std)**	**$CI_{.95}$**	**N[b]**	**Mean (Std)**	**$CI_{.95}$**	***p*-value[c]**
Freq. of Heavy Alcohol Consumption	149	1.4 (6.4)	0.3-2.4	53	0.2 (0.6)	0.08-0.4	**0.0352**
Traveled to Africa	146	1.9 (2.6)	1.5-2.3	52	1.0 (1.5)	0.6-1.4	**0.0030**

[a] Only those participants who came to live in Canada before 2002 were included in these analyses.
[b] Sample sizes vary due to missing values and survey skip patterns.
[c] *p*-values reported for t-tests

Table 11. Bivariate Associations Between Categorical Behavioural Variables and Ever Tested for HIV[a]

	N[b]	% Ever Tested (n)	*p*-value[c]	Unadjusted OR ($CI_{.95}$)[d]
Ever Used Cannabis	**202**		**0.6914**	
No *(ref)*	161	74.5 (120)		1.00
Yes	41	70.7 (29)		0.82 (0.39-1.77)
Ever Used Chat	**202**		**1.0000**	
No *(ref)*	172	73.8 (127)		1.00
Yes	30	73.3 (22)		0.97 (0.41-2.34)
# Lifetime Sex Partners	**190**		**<.0001**	
No Partners	12	8.3 (1)		0.05 (0.01-0.45)
One Partner *(ref)*	33	63.6 (21)		1.00
2-4 Partners	59	79.7 (47)		2.24 (0.86-5.79)
5-9 Partners	39	84.6 (33)		3.14 (1.02-9.66)
10-19 Partners	26	76.2 (20)		1.91 (0.60-6.05)
20+ Partners	21	85.7 (18)		3.43 (0.83-14.09)
African Sex Partner (12 mo)	**125**		**1.0000**	
No *(ref)*	25	80.0 (20)		1.00
Yes	100	77.0 (77)		0.84 (0.28-2.48)
Sex with Concurrent Partners (12 mo)	**150**		**1.0000**	
No *(ref)*	126	79.4 (100)		1.00
Yes	24	79.2 (19)		0.99 (0.34-2.90)
Believes Partner had Concurrent Sex (12 mo)	**144**		**0.0089**	
No *(ref)*	80	72.5 (58)		1.00
Yes	11	63.6 (7)		0.66 (0.18-2.49)
Don't Know	53	92.5 (49)		4.65 (1.50-14.40)
Always Used Condoms with Regular Partner (12 mo)	**148**		**0.5264**	
No *(ref)*	103	78.6 (81)		1.00
Yes	45	73.3 (33)		0.75 (0.33-1.68)
Always Used Condoms with Casual Partner (12 mo)	**46**		**1.0000**[†]	
No *(ref)*	7	85.7 (6)		1.00
Yes	39	79.5 (31)		0.65 (0.07-6.16)
Improper Condom Use (12 mo)	**87**		**0.4380**	
No	52	75.0 (39)		0.62 (0.21-1.83)
Yes *(ref)*	35	82.9 (29)		1.00
Ever Diagnosed with STI	**202**		**0.1146**	
No *(ref)*	173	71.7 (124)		1.00
Yes	29	86.2 (25)		2.47 (0.82-7.47)
Ever had Blood Transfusion	**202**		**0.4504**	
No *(ref)*	193	73.1 (141)		1.00
Yes	9	88.9 (8)		2.95 (0.36-24.16)

[a] Only those participants who came to live in Canada before 2002 were included in these analyses.
[b] Sample sizes vary due to missing values and survey skip patterns
[c] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[d] Odds ratio for having ever tested for HIV
[†] 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Psychosocial Factors. People who had tested for HIV had fewer close family members living in the Greater Toronto Area, held fewer stigmatizing attitudes toward persons living with HIV/AIDS, and had better knowledge regarding HIV/AIDS. Participants who knew someone who was HIV-positive were more likely to have ever undergone testing. Interestingly, every participant who reported that a doctor or other health care professional had suggested that they be tested for HIV also reported being tested for HIV at some point in their lifetime (see Table 12 and Table 13).

Table 12. Bivariate Associations Between Continuous Psychosocial Variables and Ever Tested for HIV[a]

	Ever Tested			Never Tested			
	N[b]	**Mean (Std)**	**$CI_{.95}$**	**N[b]**	**Mean (Std)**	**$CI_{.95}$**	***p*-value[c]**
# Close Family Members in GTA	149	1.5 (1.2)	1.3-1.7	53	1.9 (1.3)	1.5-2.3	**0.0379**
# Close Friends Members in GTA	149	2.3 (1.0)	2.2-2.5	53	2.3 (0.9)	2.1-2.5	**0.8247**
Stigma Score	149	1.4 (1.4)	1.2-1.7	53	2.0 (1.6)	1.6-2.5	**0.0126**
Knowledge Score	149	13.1 (1.7)	12.9-13.4	53	12.3 (1.8)	11.8-12.8	**0.0017**
Access to Care	149	4.4 (1.0)	4.2-4.6	53	4.0 (1.0)	3.7-4.3	**0.0890**

[a] Only those participants who came to live in Canada before 2002 were included in these analyses.
[b] Sample sizes vary due to missing values and survey skip patterns.
[c] *p*-values reported for t-tests

Table 13. Bivariate Associations Between Categorical Psychosocial Variables and Ever Tested for HIV[a]

	N[b]	% Ever Tested (n)	*p*-value[c]	Unadjusted OR ($CI_{.95}$)[d]
Time spent with Community	**202**		**0.1077**	
None/Some of the Time *(ref)*	115	78.3 (90)		1.00
Most/All of the Time	87	67.8 (59)		0.59 (0.31-1.10)
Individual Perceived Risk	**194**		**0.0586**	
No Risk *(ref)*	115	67.0 (77)		1.00
Low Risk	41	83.1 (49)		2.42 (1.11-5.29)
High Risk	18	80.0 (16)		1.97 (0.62-6.31)
Community Perceived Risk	**201**		**0.1304**	
Not a Problem *(ref)*	19	52.6 (10)		1.00
Minor Problem	53	71.7 (38)		2.28 (0.77-6.72)
Major Problem	84	76.2 (64)		2.88 (1.03-8.08)
Don't Know	45	80.0 (36)		3.60 (1.13-11.47)
Know Anyone with HIV/AIDS	**202**		**<.0001**	
No *(ref)*	64	51.6 (33)		1.00
Yes	138	84.1 (116)		4.95 (2.54-9.67)
Importance of Testing	**202**		**0.7466**[†]	
Not at All/ Somewhat Important *(ref)*	13	69.2 (9)		1.00
Very Important	189	74.1 (140)		1.63 (0.46-5.82)
Ever Received Recommendation to Test from Health Professional	**202**		**>.0001**	
No	172	69.2 (119)		- [f]
Yes	30	100.0 (30)		-

[a] Only those participants who came to live in Canada before 2002 were included in these analyses.
[b] Sample sizes vary due to missing values and survey skip patterns
[c] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[d] Odds ratio for having ever tested for HIV
[f] Could not be calculated due to quasi-complete separation of data points.
[†] 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

5.3.1.2 Multivariate Analyses

Model Building

Variable Selection. As described in the methods section of this thesis (see Section 4.3.3, p. 35), the model building process occurred through four steps. These steps can be reviewed in Appendix K and resulted in several variables (including age, gender, ethnicity, personal income, number of years in Canada, number of times traveled to sub-Saharan Africa, knowing someone with HIV/AIDS, and access to health care) being selected for inclusion in

a single main effects logistic regression model[18]. Once fitted in a single model, personal income had a *p*-value greater than 0.10 and was therefore removed from the final main effects model.

Gender Analysis. When the model was stratified by gender, quasi-complete separation of the data points resulted. This problem was resolved when ethnicity was removed from the model. When the stratified models were fitted without ethnicity, the only variable whose significance level varied between gender models was "access to health care." The gender interaction term for this variable was not significant in the model ($p>0.10$).

Interaction Analysis. Interaction terms were non-significant ($p>0.10$) for "number of African sex partners" by "number of times traveled to Africa" and for "stigma score" by "time spent with community members." The other two interaction terms ("number of lifetime partners" by "gender"; "perceived personal risk" by "perceived importance of testing") resulted in quasi-complete separation of the data. This problem persisted even when the variables in the interaction terms were further collapsed; therefore, no conclusions about these two interactions can be drawn.

Treatment of Variables. Throughout the multivariate analyses, age was treated as a categorical variable. The final logistic regression model was re-run with age being treated as a continuous variable. Age was much less significant when treated continuously ($p=0.9691$)

[18] Despite being extremely significant at the bivariate level, the variable 'ever received a recommendation to test from a health care professional' was excluded from these multivariate analyses because it resulted in quasi-complete separation of data points.

compared to categorically (p=0.0902), providing further support for treating age as a categorical variable.

Multicollinearity. In most cases, the independent variables were not significantly associated with each other. Those that were significant were only weakly to moderately correlated (ranging in absolute strength from 0.13 to 0.35). The absence of high correlations suggests that multicollinearity was likely not a problem in this model.

Outliers. Six outliers were identified in this model. Two of the outliers could not be removed from the model because they resulted in quasi-complete separation of the data[19]. When the other four outliers were removed from the model, three of the independent variables (age, gender, and access to health) became more significant but no drastic changes (i.e., direction of association reversed) were noted. Since there was no reason to believe that the responses provided by these outliers were invalid, all six outliers were included in the analyses.

Final Model

Based on the model building process described above, a final logistic regression model for having ever tested for HIV is presented in Table 14.

Sociodemographic Factors. Although neither age nor gender was statistically significant in the final model (p>0.05), a marginally significant trend indicated that

[19] These two outliers represent the only Tanzanian and Kenyan who reported never being tested for HIV. Of the outliers, they have the largest Pearson residuals (-8.99 and -6.62) and likely exert the most individual influence in the model; however, due to quasi-complete separation of the data, this influence cannot be assessed by removing them from the analyses.

individuals aged 25 to 45 years may be more likely to test than younger or older participants. Odds of testing varied across communities, with Ugandans being significantly more likely to have ever tested than Ethiopians, Kenyans, and Somalis. Participants who had spent a greater number of years living in Canada were less likely to have ever tested for HIV. Several demographic variables that were significant at the bivariate level (refer back to Table 8 and Table 9) were either dropped from the final logistic regression model during the model building process (i.e., education, personal income, religion) or were no longer significant in the final model (i.e., age, gender).

Behavioural Factors. The only behavioural variable that was retained in the final model was "number of times traveled to sub-Saharan Africa." The odds of having ever tested for HIV became greater the more times a person traveled to Africa. Frequency of heavy alcohol consumption, number of lifetime sexual partners, and a belief that a regular partner had had concurrent sex were dropped from the logistic regression model despite being significantly associated with testing at the bivariate level (refer back to Table 10 and Table 11).

Psychosocial Factors. Knowing someone who was HIV-positive and having greater access to health care were associated with ever testing for HIV. Access to health care became more significant in the multivariate analysis than in the bivariate analysis. Number of close family members in the GTA, stigma scores, and knowledge scores were dropped from the final logistic regression model despite being independently associated with testing in the bivariate analyses (refer back to Table 12 and Table 13).

Table 14. Final Logistic Regression Model to Predict Ever Tested for HIV[a]

	OR ($CI_{.95}$)		p-value[b]
Sociodemographic Variables			
Age			**0.0902**
≤25 Years	0.35	(0.12-1.02)	
26 to 45 Years *(ref)*	1.00		
≥46 Years	0.44	(0.15-1.34)	
Gender			**0.1893**
Male *(ref)*	1.00		
Female	0.56	(0.24-1.33)	
Ethnicity			**0.0329**
Ethiopian	0.02	(<0.01-0.26)	
Kenyan	0.04	(<0.01-0.46)	
Somali	0.04	(<0.01-0.46)	
Tanzanian	0.14	(<0.01-3.15)	
Ugandan *(ref)*	1.00		
Years in Canada	0.87	(0.81-0.94)	**0.0002**
Behavioural Variables			
Travel to Africa	1.50	(1.13-1.98)	**0.0049**
Psychosocial Variables			
Know Anyone with HIV/AIDS			**0.0293**
No *(ref)*	1.00		
Yes	2.76	(1.11-6.87)	
Access to Care	1.74	(1.13-2.68)	**0.0126**
Model Statistics:			
Cox & Snell R^2=0.36 Nagelkerke max-rescaled R^2=0.52			
Hosmer-Lemeshow goodness-of-fit: χ^2=8.70 (df=8), p=0.3687			

[a] Only those participants who came to live in Canada before 2002 were included in these analyses.

[b] *p*-value reported for Wald chi-square statistic

5.3.2 FACTORS ASSOCIATED WITH REPEAT TESTING

Only participants who had been tested for HIV were included in these analyses (n=204).

5.3.2.1 Bivariate Analyses

Bivariate analyses were conducted to assess crude associations between the independent variables and repeat testing.

Sociodemographic Factors. Ethnicity was associated with repeat testing, with Ethiopians being most likely and Somalis being least likely be repeat testers. Repeat testing was more common among participants who were non-Muslim, married or single, and who had personal income of less than $10,000 per annum. Additionally, repeat testers were more likely to have a higher education and to have resided in Canada for fewer years (see Table 15 and Table 16).

Table 15. Bivariate Associations Between Continuous Sociodemographic Variables and Repeat Testing

	Correlation with # of times tested			Repeat Tester			Non-Repeat Tester			
	N[a]	r	*p*-value[b]	N[a]	Mean (Std)	$CI_{.95}$	N	Mean (Std)	$CI_{.95}$	*p*-value[c]
Education	204	0.16	**0.0245**	134	7.3 (1.5)	7.0-7.5	70	6.6 (1.7)	6.2-7.0	**0.0057**
Years in Canada	204	-0.12	**0.0845**	134	8.1 (6.8)	6.9-9.3	70	10.2 (6.6)	8.6-11.7	**0.0373**

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Pearson's r
[c] *p*-values reported for t-tests

Table 16. Bivariate Associations Between Categorical Sociodemographic Variables and Repeat Testing

	N[a]	% Repeat Testers (n)	*p*-value[b]	Unadjusted OR ($CI_{.95}$)[c]
Sociodemographic Variables				
Age	**202**		**0.1387**	
≤25 Years	28	64.3 (18)		0.78 (0.33-1.83)
26 to 45 Years *(ref)*	136	69.9 (95)		1.00
≥46 Years	38	52.6 (20)		0.48 (0.23-1.00)
Gender	**204**		**0.2925**	
Male *(ref)*	123	62.6 (77)		1.00
Female	81	70.4 (57)		1.42 (0.78-2.59)
Ethnicity	**204**		**<.0001**	
Ethiopian	26	92.3 (24)		3.64 (0.78-17.01)
Kenyan	52	63.5 (33)		0.54 (0.24-1.15)
Somali	35	22.9 (8)		0.09 (0.04-0.23)
Tanzanian	18	72.2 (13)		0.79 (0.25-2.53)
Ugandan *(ref)*	73	76.7 (56)		1.00
Religion	**204**		**<.0001**	
Muslim	57	36.8 (21)		0.79 (0.25-2.53)
Non-Muslim *(ref)*	147	76.9 (113)		1.00
Marital Status	**204**		**0.0039**	
Married/Common-Law	95	74.7 (71)		1.71 (0.90-3.25)
Widowed/Divorced/Separated	27	40.7 (11)		0.47 (0.16-0.97)
Single *(ref)*	82	63.4 (52)		1.00
Personal Income (Annual)	**196**		**0.0087**	
<$10,000	39	82.1 (32)		3.37 (1.39-8.18)
$10,000 to <$50,000 *(ref)*	132	57.6 (76)		1.00
≥$50,000	25	76.0 (19)		2.33 (0.88-6.22)
Household Income < LICO[d]	**190**		**0.4491**	
No *(ref)*	102	62.8 (64)		1.00
Yes	88	68.2 (60)		1.27 (0.70-2.32)

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[c] Odds ratio for being a repeat tester.
[d] LICO = Low Income Cut-Off

Behavioural Factors. Repeat testers reported more frequent heavy alcohol consumption in the previous 12 months. Higher proportions of repeat testers were found among people who had used cannabis, who had been previously diagnosed with an STI, and those who reported proper condom use in the past year (see Table 17 and Table 18).

Table 17. Bivariate Associations Between Continuous Behavioural Variables and Repeat Testing

	Correlation with # of times tested			Repeat Tester			Non-Repeat Tester			
	N[a]	r	*p*-value[b]	N[a]	Mean (Std)	$CI_{.95}$	N	Mean (Std)	$CI_{.95}$	*p*-value[c]
Freq. of Heavy Alc. Consumption	204	0.04	**0.5261**	134	1.6 (6.7)	0.5-2.8	70	0.4 (0.9)	0.2-0.6	**0.0384**
Traveled to Africa	201	-0.09	**0.1912**	132	1.2 (2.1)	0.8-1.6	69	1.8 (1.3)	1.2-2.3	**0.1116**

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Pearson's r
[c] *p*-values reported for t-tests

Table 18. Bivariate Associations Between Categorical Behavioural Variables and Repeat Testing

	N[a]	% Repeat Testers (n)	*p*-value[b]	Unadjusted OR ($CI_{.95}$)[c]
Ever Used Cannabis	**204**		**0.0361**	
No *(ref)*	174	62.6 (64)		1.00
Yes	30	83.3 (25)		2.98 (1.09-8.17)
Ever Used Chat	**204**		**0.8170**	
No *(ref)*	181	65.2 (118)		1.00
Yes	23	69.6 (16)		1.22 (0.48-3.12)
# Lifetime Sex Partners	**185**		**0.7063**	
0-1 Partners *(ref)*	28	53.6 (15)		1.00
2-4 Partners	66	63.6 (42)		1.52 (0.62-3.72)
5-9 Partners	44	65.9 (29)		1.68 (0.64-4.42)
10-19 Partners	28	64.3 (18)		1.56 (0.53-4.56)
20+ Partners	19	73.7 (14)		2.43 (0.69- 8.58)
African Sex Partner (12 mo)	**124**		**1.0000**	
No *(ref)*	23	65.2 (15)		1.00
Yes	101	67.3 (68)		1.10 (0.42-2.85)
Sex with Concurrent Partners (12 mo)	**157**		**0.5235**	
No *(ref)*	126	67.5 (85)		1.00
Yes	31	74.2 (23)		1.39 (0.57-3.37)
Believes Partner had Concurrent Sex (12 mo)	**152**		**0.2492**	
No *(ref)*	78	62.8 (49)		1.00
Yes	16	81.3 (13)		2.57 (0.67-9.76)
Don't Know	58	72.4 (42)		1.55 (0.74-3.25)
Always Used Condoms with Regular Partner (12 mo)	**156**		**0.0533**	
No *(ref)*	110	75.5 (83)		1.00
Yes	46	58.7 (27)		0.46 (0.22-0.96)
Always Used Condoms with Casual Partner (12 mo)	**52**		**0.4668**[†]	
No *(ref)*	10	80.0 (8)		1.00
Yes	42	64.3 (27)		0.45 (0.08-2.40)
Improper Condom Use (12 mo)	**95**		**0.0365**	
No	56	80.4 (45)		2.85 (1.14-7.12)
Yes *(ref)*	39	59.0 (23)		1.00
Ever Diagnosed with STI	**204**		**0.0451**	
No *(ref)*	172	62.8 (108)		1.00
Yes	32	81.3 (26)		2.57 (1.00-6.57)
Ever had Blood Transfusion	**204**		**0.7753**[†]	
No *(ref)*	190	65.3 (124)		1.00
Yes	14	71.4 (10)		1.33 (0.40-4.41)

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[c] Odds ratio for being a repeat tester.
[†] 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

Psychosocial Factors. Repeat testing was found to be more common among participants who spent less time with community members, had higher perceived risk, believed HIV was a major problem within their community, and had a doctor or other health care professional suggest that they be tested for HIV. Repeat testers held fewer stigmatizing attitudes toward persons living with HIV/AIDS, and had better knowledge regarding HIV/AIDS. "Access to health care" scores were positively correlated with number of HIV tests a person had (see Table 19 and Table 20).

Table 19. Bivariate Associations Between Continuous Psychosocial Variables and Repeat Testing

	Correlation with # of times tested			Repeat Tester			Non-Repeat Tester			
	N[a]	r	*p*-value[b]	N[a]	Mean (Std)	$CI_{.95}$	N	Mean (Std)	$CI_{.95}$	*p*-value[c]
# Close Family in GTA	204	-0.06	**0.3727**	134	1.3 (1.2)	1.1-1. 5	70	1.4 (1.1)	1.2-1.7	**0.4150**
# Close Friends in GTA	204	-0.06	**0.4144**	134	2.2 (1.0)	2.0-2.3	70	2.1 (0.9)	1.9-2.4	**0.8825**
Stigma Score	204	-0.17	**0.0157**	134	1.0 (1.1)	0.8-1.2	70	1.8 (1.5)	1.4-2.1	**0.0004**
Knowledge Score	204	0.07	**0.3335**	134	13.5 (1.5)	13.2-13.7	70	12.8 (1.9)	12.4-13.3	**0.0180**
Access to Care	204	0.17	**0.0144**	134	4.2 (0.9)	4.1-4.4	70	4.0 (1.2)	3.7-4.3	**0.1569**

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Pearson's r
[c] *p*-values reported for t-tests

Table 20. Bivariate Associations Between Categorical Psychosocial Variables and Repeat Testing

	N[a]	% Repeat Testers (n)	*p*-value[b]	Unadjusted OR ($CI_{.95}$)[c]
Time spent with Community	**204**		**0.0125**	
None/Some of the Time *(ref)*	135	71.9 (92)		1.00
Most/All of the Time	69	53.6 (37)		0.45 (0.25-0.83)
# Close Family Members in GTA	**204**		**0.1036**	
None	65	72.4 (47)		0.78 (0.27-2.27)
One	44	65.9 (29)		0.58 (0.19-1.75)
2-4	69	55.1 (38)		0.37 (0.13-1.03)
5+ *(ref)*	26	76.9 (20)		1.00
# Close Friends in GTA	**204**		**0.6569**	
None	13	76.9 (10)		1.67 (0.41-6.74)
One	23	56.5 (13)		0.65 (0.24-1.74)
2-4	108	65.7 (71)		0.96 (0.49-1.87)
5+ *(ref)*	60	66.7 (40)		1.00
Individual Perceived Risk	**195**		**0.0069**	
No Risk *(ref)*	101	55.5 (56)		1.00
Low Risk	68	72.1 (49)		2.07 (1.07-4.01)
High Risk	26	84.6 (22)		4.42 (1.42-13.75)
Community Perceived Risk	**203**		**0.0013**	
Not a Problem	11	27.3 (3)		0.12 (0.03-0.51)
Minor Problem	53	52.8 (28)		0.37 (0.18-0.76)
Major Problem *(ref)*	85	75.3 (64)		1.00
Don't Know	54	72.2 (39)		0.85 (0.39-1.85)
Know Anyone with HIV/AIDS	**204**		**0.3575**	
No *(ref)*	41	58.5 (24)		1.00
Yes	163	67.5 (110)		1.47 (0.73-2.97)
Importance of Testing	**204**		**0.5625**[†]	
Not at All/ Somewhat Important *(ref)*	14	57.1 (8)		1.00
Very Important	190	66.3 (126)		2.36 (0.69-8.04)
Ever Received Recommendation to Test from Health Professional	**204**		**0.0062**	
No *(ref)*	161	60.9 (98)		1.00
Yes	43	83.7 (36)		3.31 (1.39-7.89)
Tested for Immigration Purposes	**203**		**0.1760**	
No *(ref)*	42	59.5 (25)		1.00
Yes	145	69.7 (101)		1.56 (0.77-3.18)
Don't Know	16	50.0 (8)		0.68 (0.21-2.16)

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[c] Odds ratio for being a repeat tester.
[†] 25% of the cells have expected counts less than 5. Chi-Square may not be a valid test.

5.3.2.2 Multivariate Analyses

Model Building

Variable Selection. Model building methods have been described in the methods section of this thesis (see Section 4.3.3, p. 35). The model building process for repeat testing occurred though four steps which can be reviewed in Appendix L. Based on Appendix L several variables were selected for inclusion in a main effects model (including age, gender, ethnicity, religion, marital status, personal income, frequency of heavy alcohol use, cannabis use, improper condom use, ever diagnosed with an STI, time spent with community members, number of family members in the GTA, perceived personal risk, perceived community risk, stigma scores, ever received a recommendation to test from a health care professional, and ever tested for immigration purposes).

Once fitted into a single model, individual perceived risk and community perceived risk had *p*-values greater than 0.10 and were therefore removed from the model. "Improper condom use" was removed from the model because the odds of repeat testing did not differ between those reporting proper and improper condom use. After "improper condom use" was removed, the stigma score was no longer significant ($p>0.10$) and was also removed.

Gender Analysis. When stratified by gender, quasi-complete separation of the data points resulted. This problem was resolved when either "personal income" or "ever tested for immigration purposes" was removed from the model. Thus, two gender-stratified models were run – one without "personal income" and one without "ever tested for immigration

purposes." Significance levels of all independent variables differed across gender models[20]. Therefore, gender interactions for each independent variable were tested in the final main effects model. Only "gender" by "frequency of heavy alcohol consumption" was significant ($p \leq 0.10$) and added to the final model.

Interaction Analysis. The four other interaction terms of theoretical interest ("number of African sex partners" by "number of times traveled to Africa"; "stigma score" by "time spent with community members"; "number of lifetime partners" by "gender"; "perceived personal risk" by "perceived importance of testing") were also tested in the final main effects model and found to be non-significant ($p > 0.10$).

Treatment of Variables. To reduce the number of independent variables in the model[21], "number of close family members in the GTA" was collapsed into a dichotomous variable – "fewer than five" versus "five or more close family members." Once collapsed it became more significant in the model (from $p=0.0558$ to $p=0.0073$). The significance of other variables did not change in order of magnitude; however, "ever received a recommendation to test from a health care professional" went from $p=0.0926$ to 0.1065. Although this constituted a relatively small change in significance, it surpassed the cut-off for inclusion in the model ($p > 0.10$) and was therefore removed. This reduced the number of variables in the model to 20.

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[20] Differences between gender models were likely due to lack of power in the stratified models. Seventeen variable parameters were included in the model and there were only 123 and 81 participants in the male and female models, respectively.

[21] With the addition of the gender interaction term, 23 variables (including dummy variables) were retained in this model. The number of independent variables in a logistic regression model must be limited in order to maintain power (Hosmer & Lemeshow, 1989; Katz, 2006).

Although age was a continuous variable, it was treated categorically in the regression model. To ensure this treatment was appropriate, the final logistic regression model was re-run with age being treated as a continuous variable. Age was much less significant when treated continuously (p=0.7781) compared to categorically (p=0.0174), providing support for treating age as a categorical variable[22]. Both education and frequency of heavy alcohol consumption were ordinal variables but were treated continuously in the model. The model was re-run with these variables being entered categorically. Education was dropped from the model regardless of whether it was treated continuously or categorically. When treated categorically, frequency of heavy alcohol consumption became non-significant in the final model. However, since both the Mantel-Haenszel chi-square (p=0.0029) and a visual examination of the cross-tabulation suggested a linear relationship between frequency of heavy alcohol consumption and repeat testing, it remained in the model as a continuous variable.

Multicollinearity. Most associations between independent variables were non-significant and those that were significant were only weakly to moderately correlated with each other (ranging in absolute strength from 0.15 to 0.47). As no independent variables were highly correlated with each other, it is doubtful that multicollinearity jeopardizes the validity of the model.

Outliers. An examination of Pearson residuals identified five outliers. Most of the independent variables became more significant when these outliers were excluded from the

[22] This finding was expected as age showed a non-linear relationship with repeat testing.

analyses. These changes did not alter whether a variable was considered significant in the model ($\alpha = 0.05$). Directions of the associations were not affected by the exclusion of the outliers. Since there was no reason to believe that the responses provided by these outliers were invalid, they remained in the analyses.

Final Model

Based on the model building process described above, a final logistic regression model for repeat testing is presented in Table 21.

Sociodemographic Factors. Odds of repeat testing varied across communities. Ethiopians had significantly greater odds of repeat testing than any other community in the sample. Repeat testing was most likely among individuals who were 25 to 45 years of age, non-Muslim, married or living with a common-law partner, and those with the lowest personal income (<$10,000/annum). Non-significant trends also suggest that those in the highest income categories (≥$50,000) may also have elevated odds. Education and number of years spent living in Canada were significant at the bivariate level (refer back to Table 15 and Table 16) but were dropped from the final logistic regression model during the model building process. Age became more significant in the multivariate analyses.

Behavioural Factors. Odds of repeat testing were greatest among participants who reported ever using cannabis and those who had been diagnosed with a sexually transmitted infection. Improper condom use was associated with repeat testing at the bivariate level (refer back to Table 17 and Table 18) but not in the multivariate analysis.

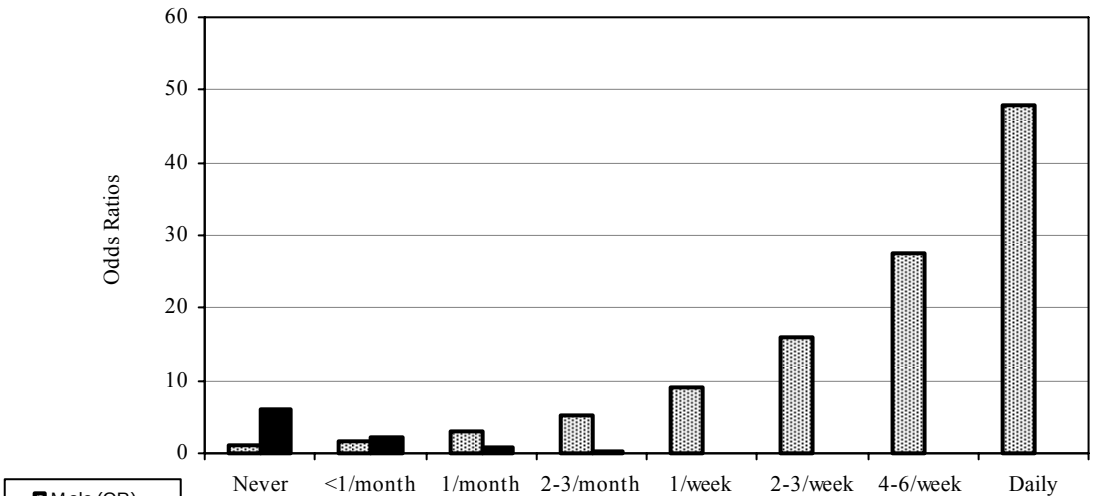
Table 21. Final Logistic Regression Model to Predict Repeat Testing

	OR ($CI_{.95}$)		p-value[a]
Sociodemographic Variables			
Age			**0.0100**
≤25 Years	0.15	(0.04-0.66)	
26 to 45 Years *(ref)*	1.00		
≥46 Years	0.27	(0.08-0.92)	
Gender			**0.0040**
Male *(ref)*	1.00		
Female	6.06	(1.77-20.70)	
Ethnicity			**0.0027**
Ethiopian	19.78	(1.96-199.63)	
Kenyan	0.13	(0.04-0.49)	
Somali	0.27	(0.05-1.57)	
Tanzanian	0.18	(0.04-0.94)	
Ugandan *(ref)*	1.00		
Religion			**0.0065**
Muslim	0.13	(0.03-0.56)	
Non-Muslim *(ref)*	1.00		
Marital Status			**0.0143**
Married/Common-Law	5.95	(1.77-19.94)	
Widowed/Divorced/Separated	2.41	(0.55-10.66)	
Single *(ref)*	1.00		
Personal Income			**0.0072**
<$10,000	7.94	(2.09-30.25)	
$10,000 - <$50,000 *(ref)*	1.00		
≥$50,000	3.12	(0.68-14.19)	
Behavioural Variables			
Freq. of Heavy Alcohol Consumption	1.74	(1.10-2.75)	**0.0179**
Ever Used Cannabis			**0.0030**
No *(ref)*	1.00		
Yes	13.02	(2.39-71.02)	
Ever Diagnosed with STI			**0.0147**
No *(ref)*	1.00		
Yes	6.16	(1.43-26.52)	
Psychosocial Variables			
Time Spent with Community			**0.0261**
None/Some *(ref)*	1.00		
Most/All	0.30	(0.10-0.87)	
# Close Family Members in GTA			**0.0079**
Less than 5 *(ref)*	1.00		
5+ *(ref)*	7.57	(1.70-33.69)	
Tested for Immigration Purposes			**<.0001**
No *(ref)*	1.00		
Yes	13.52	(3.45-52.93)	
Don't Know	0.84	(0.15-4.70)	
Interaction Terms			
Alcohol*Gender$_{(Female)}$	0.21	(0.08-0.59)	**0.0028**
Model Statistics:			
Cox & Snell R^2=0.46 Nagelkerke Max-Rescaled R^2=0.63			
Hosmer-Lemeshow goodness-of-fit: χ^2=4.35 (df=8), p=0.8239			

[a] *p*-value reported for Wald chi-square statistic

Psychosocial Factors. Participants who spent less time with community members, had five or more close family member living in the GTA, and reported having had an HIV test for immigration purposes in the past were the most likely to be repeat testers. Individual perceived risk and community perceived risk were both significantly associated with repeat testing at the bivariate level (refer back to Table 19 and Table 20), but not at the multivariate level. Neither "number of close family members" nor "tested for immigration purposes" were significant in the bivariate analyses but were highly significant in the final logistic regression model.

Interactions. A significant interaction effect was found between "gender" and "frequency of heavy alcohol consumption." Odds ratios for repeat testing (and 95% confidence intervals) were calculated for males and females in each alcohol consumption category (see Figure 6). As the frequency of heavy alcohol consumption increased, odds of repeat testing increased among males and decreased among females. Wide confidence intervals were noted for categories reflecting more frequent heavy alcohol consumption. These wide ranges were likely due to fewer participants, particularly fewer females, reporting frequent heavy alcohol consumption. As can be seen in Figure 6, the odds ratios for repeat testing only differed significantly between males and females in the lowest category of heavy alcohol consumption.



		Never	<1/month	1/month	2-3/month	1/week	2-3/week	4-6/week	Daily
Males	$LCL_{.95}$		1.10	1.21	1.33	1.46	1.61	1.77	1.95
	OR	1.00	1.74	3.02	5.25	9.12	15.84	27.52	47.82
	$UCL_{.95}$		2.75	7.54	20.70	56.82	155.99	428.28	1175.85
Females	$LCL_{.95}$	1.77	0.15	0.01	<.01	<.01	<.01	<.01	<.01
	OR	6.06	2.25	0.84	0.31	0.02	0.04	0.02	<.01
	$UCL_{.95}$	20.70	33.42	53.95	87.08	23.19	226.90	366.27	591.23

Figure 6. Interaction Effect of Heavy Alcohol Consumption by Gender on Repeat Testing

5.4 MOTIVATION FOR TESTING (RESEARCH OBJECTIVE 2)

5.4.1 FACTORS DIFFERENTIATING BETWEEN INDEPENDENT VS. DIRECTIVE TESTING

Only participants who had been tested for HIV were included in these analyses (n=204).

5.4.1.1 Bivariate Analyses

Bivariate analyses were conducted to assess which factors were independently associated with independent versus directive testing for participants' most recent HIV test.

Table 22. Bivariate Associations Between Continuous Sociodemographic Variables and Independent vs. Directive Testing

	Own Decision			Someone Suggested			
	N[a]	Mean (Std)	$CI_{.95}$	N[a]	Mean (Std)	$CI_{.95}$	*p*-value[b]
Personal Income	78	4.2 (1.8)	3.8-4.7	118	4.1 (1.9)	3.8-4.5	**0.6786**
Years in Canada	83	10.1 (7.3)	8.5-11.7	121	7.9 (6.3)	6.8-9.0	**0.0214**

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for t-tests

Table 23. Bivariate Associations Between Categorical Sociodemographic Variables and Independent vs. Directive Testing

	N[a]	% Own Decision (n)	*p*-value[b]	Unadjusted OR ($CI_{.95}$)[c]
Sociodemographic Variables				
Age	**202**		**0.3124**	
≤25 Years	28	50.0 (14)		1.43 (0.63-3.23)
26 to 45 Years *(ref)*	136	41.2 (56)		1.00
≥46 Years	38	31.6 (12)		0.66 (0.31-1.42)
Gender	**204**		**0.0092**	
Male *(ref)*	123	33.3 (41)		1.00
Female	81	51.9 (42)		2.15 (1.21-3.83)
Ethnicity	**204**		**0.0005**	
Ethiopian	26	69.2 (18)		3.62 (1.39-9.42)
Kenyan	52	50.0 (26)		1.61 (0.78-3.30)
Somali	35	17.1 (6)		0.33 (0.12-0.90)
Tanzanian	18	27.8 (5)		0.62 (0.20-1.92)
Ugandan *(ref)*	73	38.4 (28)		1.00
Religion	**204**		**0.0572**	
Muslim	57	29.8 (17)		0.52 (0.27-1.00)
Non-Muslim *(ref)*	147	44.9 (66)		1.00
Marital Status	**204**		**0.0074**	
Married/Common-Law	95	29.5 (28)		0.38 (0.20-0.70)
Widowed/Divorced/Separated	27	44.4 (12)		0.73 (0.30-1.74)
Single *(ref)*	82	52.4 (43)		1.00
Education	**204**		**0.2212**	
Secondary Education or Less *(ref)*	47	29.8 (14)		1.00
Some/Completed Post Secondary	128	43.8 (56)		1.83 (0.90-3.75)
Post Graduate Degree/Diploma	29	44.8 (13)		1.92 (0.73-.01)
Household Income < LICO[d]	**190**		**1.0000**	
No *(ref)*	102	40.2 (41)		1.00
Yes	88	39.8 (35)		0.98 (0.55-1.76)

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[c] Odds ratio for independent testing
[d] LICO = Low Income Cut-Off

Sociodemographic Factors. Ethnicity was significantly associated with independent testing, with Ethiopians being most likely to have tested based on their own decision (69.2%) and Somalis being least likely (17.1%). Independent testing was more likely among females and participants who were single. People who had independently decided to test had resided in Canada for a greater number of years than individuals who reported following a suggestion to test (see Table 22 and Table 23).

Behavioural Factors. Higher proportions of independent testers were found among people who had used marijuana in their lifetime, and those who reported proper condom use (i.e., no condom slippage, breakage, or incorrect application) in the past year (see Table 24 and Table 25).

Table 24. Bivariate Associations Between Continuous Behavioural Variables and Independent vs. Directive Testing

	Own Decision			Someone Suggested			
	N[a]	**Mean (Std)**	**$CI_{.95}$**	**N[a]**	**Mean (Std)**	**$CI_{.95}$**	***p*-value[b]**
Freq. of Heavy Alcohol Consumption	83	2.0 (8.5)	0.1-3.8	121	0.7 (1.3)	0.4-0.9	**0.1651**
Traveled to Africa	81	1.5 (2.2)	1.0-1.9	120	1.4 (2.4)	0.9-1.8	**0.7499**

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for t-tests

Table 25. Bivariate Associations Between Categorical Behavioural Variables and Independent vs. Directive Testing

	N[a]	% Own Decision (n)	*p*-value[b]	Unadjusted OR ($CI_{.95}$)[c]
Ever Used Cannabis	**204**		**0.0023**	
No *(ref)*	174	36.2 (63)		1.00
Yes	30	66.7 (20)		3.52 (1.55-8.00)
Ever Used Chat	**204**		**0.2642**	
No *(ref)*	181	39.2 (71)		1.00
Yes	23	52.2 (12)		1.69 (0.71-4.04)
# Lifetime Sex Partners	**185**		**0.2398**	
0-1 Partners *(ref)*	28	32.1 (9)		1.00
2-4 Partners	66	48.5 (32)		1.99 (0.79-5.03)
5-9 Partners	44	43.2 (19)		1.60 (0.60-4.33)
10-19 Partners	28	25.0 (7)		0.70 (0.22-2.26)
20+ Partners	19	42.1 (8)		1.54 (0.46-5.14)
African Sex Partner (12 mo)	**124**		**0.1598**	
No *(ref)*	23	56.5 (13)		1.00
Yes	101	38.6 (39)		0.48 (0.19-1.21)
Sex with Concurrent Partners (12 mo)	**157**		**0.4192**	
No *(ref)*	126	39.7 (50)		1.00
Yes	31	48.4 (15)		1.43 (0.65-3.14)
Believes Partner had Concurrent Sex (12 mo)	**152**		**0.1937**	
No *(ref)*	78	34.6 (27)		1.00
Yes	16	43.8 (20)		1.469 (0.49-4.38)
Don't Know	58	50.0 (29)		1.889 (0.94-3.78)
Always Used Condoms with Regular Partner (12 mo)	**156**		**0.8590**	
No *(ref)*	110	40.9 (45)		1.00
Yes	46	43.5 (20)		1.111 (0.55-2.23)
Always Used Condoms with Casual Partner (12 mo)	**52**		**0.4815**[†]	
No *(ref)*	10	30.0 (3)		1.00
Yes	42	47.6 (20)		2.12 (0.48-9.33)
Improper Condom Use (12 mo)	**95**		**0.0272**	
No	56	58.9 (33)		2.56 (1.10-5.96)
Yes *(ref)*	39	35.9 (14)		1.00
Ever Diagnosed with STI	**204**		**1.0000**	
No *(ref)*	172	40.7 (70)		1.00
Yes	32	40.6 (20)		1.00 (0.46-2.15)
Ever had Blood Transfusion	**204**		**0.2603**	
No *(ref)*	190	39.5 (75)		1.00
Yes	14	57.1 (8)		2.04 (0.68-6.13)

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[c] Odds ratio for independent testing

Psychosocial Factors. Independent testing was more common among individuals with five or more close family members residing in the Greater Toronto Area and among people who felt HIV/AIDS was a major problem within their communities. Directive testing was more common among participants who believed they had no risk of contracting HIV and among those who reported being tested for immigration purposes. Participants who made the decision to test independently had better knowledge of HIV/AIDS (see Table 26 and Table 27).

Table 26. Bivariate Associations Between Continuous Psychosocial Variables and Independent vs. Directive Testing

	Own Decision			Someone Suggested			
	N[a]	Mean (Std)	$CI_{.95}$	N[a]	Mean (Std)	$CI_{.95}$	*p*-value[b]
# Close Friends in GTA	83	2.3 (0.9)	2.1-2.5	121	2.1 (1.0)	1.9-2.3	**0.1450**
Stigma Score	83	1.3 (1.2)	1.0-1.6	121	1.3 (1.4)	1.0-1.5	**0.8447**
Knowledge Score	83	13.6 (1.4)	13.3-13.9	121	13.0 (1.8)	12.7-13.4	**0.0191**
Access to Care	83	4.3 (0.9)	4.1-4.5	121	4.0 (1.1)	3.9-4.2	**0.1414**

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for t-tests

Table 27. Bivariate Associations Between Categorical Psychosocial Variables and Independent vs. Directive Testing

	N[a]	% Own Decision (n)	*p*-value[b]	Unadjusted OR ($CI_{.95}$)[c]
Time spent with Community	**204**		**0.2322**	
None/Some of the Time *(ref)*	135	43.7 (59)		1.00
Most/All of the Time	69	34.8 (24)		0.69 (0.38-1.25)
# Close Family Members in GTA	**204**		**0.0167**	
None	65	46.2 (30)		0.54 (0.21-1.36)
One	44	25.0 (11)		0.21 (0.07-0.59)
2-4	69	37.7 (26)		0.38 (0.15-0.96)
5+ *(ref)*	26	61.5 (16)		1.00
Individual Perceived Risk	**195**		**0.0075**	
No Risk *(ref)*	101	30.7 (31)		1.00
Low Risk	68	54.4 (37)		2.70 (1.42-5.10)
High Risk	26	46.2 (12)		1.94 (0.80-4.66)
Community Perceived Risk	**203**		**0.0187**	
Not a Problem	11	18.2 (2)		0.21 (0.04-1.02)
Minor Problem	53	28.3 (15)		0.37 (0.18-0.77)
Major Problem *(ref)*	85	51.8 (44)		1.00
Don't Know	54	40.7 (22)		0.64 (0.32-1.28)
Know Anyone with HIV/AIDS	**204**		**0.5972**	
No *(ref)*	41	36.6 (15)		1.00
Yes	163	41.7 (68)		1.24 (0.61-2.53)
Importance of Testing	**204**		**0.1639**	
Not at All/Somewhat Important *(ref)*	14	21.4 (3)		1.00
Very Important	190	42.1 (80)		2.67 (0.72-9.87)
Ever Received Recommendation to Test from Health Professional	**204**		**0.1616**	
No *(ref)*	161	43.5 (70)		1.00
Yes	43	30.2 (13)		0.56 (0.27-1.16)
Tested for Immigration Purposes	**203**		**<.0001**	
No *(ref)*	42	64.3 (27)		1.00
Yes	145	30.3 (44)		0.24 (0.12-0.50)
Don't Know	16	75.0 (12)		1.67 (0.46-6.09)

[a] Sample sizes vary due to missing values and survey skip patterns
[b] *p*-values reported for Fisher's Exact Test (when variable has only 2 categories) or Pearson Chi-Square (when variable has more than 2 categories).
[c] Odds ratios for independent testing

5.4.1.2 Multivariate Analyses

Model Building

Variable Selection. Model building methods have been described in the methods section of this thesis (see Section 4.3.3, p. 35). The model building process used to create the final regression model that predicts directive versus independent testing occurred though four steps which can be reviewed in Appendix M. Based on Appendix M, several variables were selected for inclusion in a main effects model (including age, gender, ethnicity, marital status, education, cannabis use, improper condom use, having received a blood transfusion, ever diagnosed with an STI, time spent with community members, number of close friends in the GTA, HIV/AIDS knowledge, access to health care, ever received a recommendation to test from a health care professional, and ever tested for immigration purposes). Once fitted into a single model, education had a *p*-value of greater than 0.10 and was therefore removed from the final main effects model.

Gender Analysis. When stratified by gender, the significance level of several independent variables differed across gender models[23], including: age, marital status, cannabis use, having received a blood transfusion, number of close friends in the GTA, HIV knowledge, and having ever received a recommendation to test from a health care professional. Gender interactions for each of these independent variables were tested in the final main effects model. None of the gender interactions were significant ($p > 0.10$).

[23] Differences between gender models were likely due to lack of power in the stratified models. Nineteen variable parameters were included in the model and there were only 123 and 81 participants in the male and female models, respectively.

Interaction Analysis. The four other interaction terms of theoretical interest ("number of African sex partners" by "number of times traveled to Africa"; "stigma score" by "time spent with community members"; "number of lifetime partners" by "gender"; "perceived personal risk" by "perceived importance of testing") were also tested in the final main effects model[24]. Only "perceived personal risk" by "perceived importance of testing" was significant (p=0.0457). In order to retain all participants in the logistic regression model, five participants who reported being HIV-positive (and had therefore skipped question regarding perceived risk) were classified as having high perceived risk. Because there were only 31 participants in the "high perceived risk" category it was possible that these five individuals were influencing the results. When these five participants were removed from the analyses, the interaction term was no longer significant (p=0.2208). Consequently, this interaction term was not included in the final model.

Treatment of Variables. The final logistic regression model was re-run with age being treated as a continuous variable. Age was less significant when treated continuously (p=0.6284) compared to categorically (p=0.3898), providing support for treating age as a categorical variable. Frequency of heavy alcohol consumption was a categorical variable but was treated continuously due to its ordinal nature. Analyses were re-run treating alcohol consumption categorically. As when it was treated continuously, frequency of heavy alcohol consumption was not associated with repeat testing and was dropped in the model building process.

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[24] Quasi-complete separation of the data resulted when 'perceived risk' by 'perceive importance' was included in the model. Perceived risk was collapsed ('no or low risk' versus 'high risk') to alleviate this problem.

Multicollinearity. Most of the independent variables were not associated with each other; those that were associated had weak to moderate correlations (ranging in absolute strength from 0.15 to 0.53). Since none of the independent variables were highly correlated, it is unlikely that multicollinearity posed a threat to the validity of the model.

Outliers. Pearson residuals identified six outliers. When these outliers were removed from the model, nearly all of the independent variables became more significant. While some of these changes were fairly large, only two variables – cannabis use and access to health care (which were already marginally significant) – crossed the alpha cut-off of 0.05 to become statistically significant. Removal of outliers did not change the direction of any association. Since there was no reason to believe that the responses provided by these outliers were invalid, they were retained in the final model.

Goodness-of-Fit. A final note needs to be made about the goodness-of-fit of this model. Hosmer and Lemeshow's test for goodness-of-fit was actually quite poor for this model (χ^2=15.26, p=0.0542). When ethnicity was excluded from the model, the goodness-of-fit improved substantially (χ^2=7.67, p=0.4664). Despite improvement in fit, parameter estimates, standard errors, and p-values remained similar. Since ethnicity was such a central variable to these analyses and since its inclusion did not impact upon any of the conclusion, it was decided that ethnicity would remain in the final model

Final Model

Based on the model building process described above, a final logistic regression model for independent versus directive testing is presented in Table 28.

Sociodemographic Factors. Neither age nor ethnicity was significantly associated with independent testing. Females were more likely than males to have made the decision to test on their own. Married participants were least likely (compared to single and separated/ widowed/divorced participants) to have independently decided to test. Ethnicity and number of years spent living in Canada were significant at the bivariate level (refer back to Table 22 and Table 23) but non-significant in the multivariate analyses.

Behavioural Factors. Cannabis use was only marginally significant in the model, with users being more likely to have tested independently on their most recent HIV test. The odds of independent testing were significantly greater among participants who reported proper condom use in the previous year and those who had had a blood transfusion. Having ever received a blood transfusion was not associated with independent testing at the bivariate level (refer back to Table 25).

Psychosocial Factors. Likelihood of independent testing was elevated among people with a greater number of close friends living in the GTA, with more knowledge of HIV/AIDS, who had not received a doctor's recommendation to test, and who had not tested for immigration purposes. A non-significant trend suggested that people with more access to heath care might be more likely to test independently. Individual perceived risk, community perceived risk, and number of close family members in the GTA, were associated with independent testing in the bivariate analyses but were dropped from the multivariate model (refer back to Table 26 and Table 27). Number of close friends in the GTA and receiving a recommendation from a health care professional became more significant in the logistic regression model compared to the bivariate results.

Table 28. Final Logistic Regression Model to Predict Independent vs. Directive Testing

	OR ($CI_{.95}$)		p-value[a]
Sociodemographic Variables			
Age			**0.3796**
≤25 Years	1.78	(0.59-5.41)	
26 to 45 Years *(ref)*	1.00		
≥46 Years	0.58	(0.19-1.74)	
Gender			**0.0482**
Male *(ref)*	1.00		
Female	2.44	(1.01-5.89)	
Ethnicity			**0.1756**
Ethiopian	1.93	(0.56-6.65)	
Kenyan	1.58	(0.60-4.17)	
Somali	1.33	(0.01-1.22)	
Tanzanian	1.45	(0.37-5.65)	
Ugandan *(ref)*	1.00		
Marital Status			**0.0121**
Married/Common-Law	0.28	(0.10-0.76)	
Widowed/Divorced/Separated	1.50	(0.39-5.72)	
Single *(ref)*	1.00		
Behavioural Variables			
Ever Used Cannabis			**0.0610**
No *(ref)*	1.00		
Yes	2.93	(0.95-9.01)	
Improper Condom Use (12 mo)			**0.0174**
No Sex in 12 Months	1.25	(0.31-5.10)	
Proper Condom Use	5.52	(1.61-18.95)	
Improper Condom Use *(ref)*	1.00		
No Condom Use	1.99	(0.56-7.07)	
Ever had Blood Transfusion			**0.0320**
No *(ref)*	1.00		
Yes	5.40	(1.16-25.23)	
Psychosocial Variables			
# Close Friends in GTA	1.67	(1.09-2.56)	**0.0197**
Knowledge Score	1.42	(1.08-1.86)	**0.0114**
Access to Care	1.44	(0.96-2.19)	**0.0765**
Ever Received Recommendation to Test from Health Professional			**0.0389**
No *(ref)*	1.00		
Yes	0.35	(0.13-0.95)	
Tested for Immigration Purposes			**0.0020**
No *(ref)*	1.00		
Yes	0.23	(0.08-0.62)	
Don't Know	1.56	(0.31-7.92)	
Model Statistics:			
Cox & Snell R^2=0.35 Nagelkerke max-rescaled R^2=0.47			
Hosmer-Lemeshow goodness-of-fit: χ^2=15.27 (df=8), p=0.0542			

[a] *p*-value reported for Wald chi-square statistic

5.4.2 REASONS FOR INDEPENDENT TESTING

Participants who reported that it was their own decision to get their most recent HIV test (n=83) were read a list of potential reasons for testing and asked if any contributed to their testing decision (see Appendix F). Participants indicating they had tested for a reason which was not included on the list were further probed for an explanation. The most common reasons for testing were due to concern that they had been exposed through sexual activity, to ensure that they were HIV negative before having sex without condoms, and because they had learned that a partner had concurrent sex during their relationship (see Table 29). Forty-eight participants supplied additional reasons that were not included in the list. These responses were coded and are reported in Table 29 under "Other" reasons. While many of these responses simply provided vague reasoning around wanting to know one's status (e.g., just wanted to know status, for own knowledge, to be confident health is ok, peace of mind), some other reasons for testing were also identified.

Table 29. Reasons for Independent Testing

Reason	N[a] (%[b])
May have been exposed through sexual activity	39 (47.0)
Ensure negative status before sex without condoms	33 (39.8)
Partner had concurrent sex during relationship	19 (22.9)
Symptoms of HIV/AIDS	2 (2.4)
Partner was/is HIV positive	2 (2.4)
May have been exposed through sharing needles	2 (2.4)
May have been exposed through a blood transfusion	1 (1.2)
Other[c]	48 (57.8)
Vague reasoning regarding wanting to know status	16
Prenatal testing/family planning	9
Part of a regular health check-up	8
Works in medical profession (i.e., needlestick injury)	4
Non-sexual/non-drug/non-work related exposure	3
"Regular" tester	2
Other	9

[a] 83 people responded; response rate = 100%
[b] Exceeds 100% because some participants provided multiple responses.
[c] If participants indicated they had tested for reasons not included on the list, they were probed for further information. These responses were coded and are listed under "Other" reasons for testing.

5.4.3 REASONS FOR DIRECTIVE TESTING

Participants who reported that someone suggested they take their most recent HIV test (n=121) were asked who suggested this test (see Appendix G). Over two-thirds tested (67.8%; n=82) at the request of immigration authorities, while over a fifth (22.3%; n=27) tested following a recommendation from a physician. Insurance companies, sexual partners, and "other" people accounted for smaller proportions (see Table 30).

Table 30. Who Suggested HIV Test and Why

Reason	N[a] (%[b])
Immigration Authorities	82 (67.8)
Doctor[c,d]	27 (22.3)
Prenatal Screening	*11 (9.1)*
Symptoms	*6 (5.0)*
Regular Health Check-up	*1 (0.8)*
Other Reason	*4 (3.3)*
Vague/Unclear	*1 (0.8)*
Insurance Company	8 (6.6)
Partner	2 (1.7)
Other Person	6 (5.0)

[a] 121 people responded; response rate = 100%
[b] Exceeds 100% because some participants provided multiple responses.
[c] 5 people did not provide a reason for doctor's suggestion
[d] If participants indicated a doctor suggested the test, they were probed as to why the doctor made the suggestion. These responses were coded and are listed under "Doctor"

Participants were probed regarding the reason their doctor suggested an HIV test (23 out of 27 participants provided responses; response rate=85.2). Prenatal screening was the most common reason (n=11; 40.7%), followed by symptoms of HIV (n=6; 22.2%). Several "other" reasons were cited including having a partner who was pregnant, preparation for surgery, part of a general health check-up, and having travelled to an endemic country.

5.5 MOTIVATIONS FOR NOT TESTING (RESEARCH OBJECTIVE 3)

5.5.1 REASONS FOR DECIDING NOT TO TEST

Participants were asked why they had not been tested for HIV if 1) they had never tested or 2) if they were unsure if they had tested (n=64). The question was initially framed as an open-ended item to elicit spontaneous responses, but was also followed by a close-item that listed potential reasons for not testing (Appendix H). Responses are reported in Table 31.

The most commonly reported reason for not testing was a belief that the participant was not at risk for contracting HIV (43.3% of respondents in the open-ended question; 81.7% in the close-ended question), followed by a belief that they did not need to test because they felt healthy (11.7% in open-ended; 81.7% in close-ended). Close-ended questioning also suggested that many participants had simply never thought about getting tested (65.0%). A recurrent theme among the spontaneous responses was that testing was "was not necessary" or "there was no reason" to test (18.3%), but these responses provided no further explanation; it was not clear *why* they felt it was not necessary or there was no reason to test (i.e., they did not believe they were at risk?; a partner had tested negative?; they would not have access to treatment if they tested positive?).

Table 31. Reasons Provided for Never Testing for HIV

Reason	Open-Ended Responses[a] N[c] (%[d])	Close-Ended Responses[b] N[c] (%[d])
Don't think you are at risk for HIV	26 (43.3)	49 (81.7)
Don't need to test because you feel healthy	7 (11.7)	49 (81.7)
Never really thought about getting tested	1 (1.7)	39 (65.0)
You could not face finding out you were HIV+/Not psychologically prepared	2 (3.3)	7 (11.7)
Afraid of how community would treat you if you tested positive.	0 (0.0)	11 (18.3)
Afraid of how your partner would react if you tested positive	0 (0.0)	6 (10.0)
Afraid that an HIV positive test may affect immigration status	0 (0.0)	1 (1.7)
Do not trust health professionals to keep test results confidential	0 (0.0)	1 (1.7)
Didn't know where to go for a test.	0 (0.0)	4 (6.7)
Couldn't take the time off to go for a test.	0 (0.0)	2 (3.3)
Additional reasons identified by open-ended item:		
Not necessary for me to test/No reason for me to test	11 (18.3)	-
I know I am not HIV+/I don't think I am HIV+	7 (11.7)	-
Doctor never suggested an HIV test	2 (3.3)	-
Has just not gotten around to testing/lazy	2 (3.3)	-
Other reasons	4 (6.7)	3 (5.0)
Vague/Unclear Response	10 (16.7)	N/A

[a] Reasons for not testing were first obtained using an open-ended question. Responses were coded, and presented here.
[b] Following the open-ended question, participants were read a list of potential reasons for not testing and asked if any were reasons why they had not tested. These responses are presented here.
[c] 60 people responded; response rate = 94%
[d] Exceeds 100% because some participants provided multiple responses.

Since low perceived risk was the most commonly cited reason for not testing, a further exploration was performed to assess the reasons behind this belief, as well as the actual risk behaviour previously reported by these participants. Participants' reasons for thinking that they were not at risk for contracting HIV were obtained from two sources: 1) responses from the open-ended item regarding reasons for not testing (see Appendix J, Codebook #3, codes 8.1 to 8.12) and 2) a probe used in conjunction with the close-ended item regarding reasons for not testing (see Appendix H, #8; Appendix J, Codebook #4). These reasons have been combined and presented in Table 32.

Additionally, reported risk behaviour collected in the interview was examined for participants who believed they were not at risk for contracting HIV. Of those who did not test for HIV because they believed they were not at risk: 81.6% had had sexual intercourse, 49.0% had more than one partner in their lifetime and 20.4% had five or more partners. In the past year, 10.2% engaged in concurrent sex, 20.4% believed their partner had concurrent sex or did not know if their partner had concurrent sex, 61.2% did not use condoms all of the time, and 10.2% reported improper condoms use.

Table 32. Reasons for Believing "Not at Risk"

Reason[a]	N[b] (%)[c]
Has not been exposed/engaged in "risky" behaviour	4 (7.8)
Few Sexual Partners	
Not sexually active	12 (23.5)
Only has one sexual partner	17 (33.3)
Has had few sexual partners/no casual partners	3 (5.9)
Condom Use/Precautions	
Uses condoms/no unprotected sex	7 (13.7)
Uses condoms/no unprotected sex with casual partners	4 (7.8)
Careful/takes precautions	7 (13.7)
"Safe" Sex Partners	
Trusts partner/past partners	6 (11.8)
Partner is faithful/Partner does not have sex with others	2 (3.9)
No HIV-positive sex partners	3 (5.9)
Non-Sexual Risk	
Does not use drugs/inject drugs/share needles	7 (13.7)
Has not had a blood transfusion	2 (3.9)
Other reasons	5 (9.8)
Vague Response	7 (13.7)

[a] Open-ended text responses were obtained from 1) an open-ended question regarding why people had not tested and 2) probes used in conjunction with a close-ended question regarding reasons for not testing. These responses were coded and then combined into this single table.
[b] 51 people provided responds; response rate = 100%
[c] Exceeds 100% because some participants provided multiple responses.

The specific reasons provided for not being at risk for HIV were often inconsistent with other data provided in the interview. Two of the twelve people who said they were "not sexually active" reported having had sexual intercourse in the past. Of those who said they

were not at risk because they only had “one sexual partner,” only five had reported just one sexual partner in their lifetime and three reported ten or more partners in their lifetime. Persons who attributed their perceived lack of risk to condom use did not necessarily use condoms properly; and those who thought they were not at risk because they used condoms with casual partners did not necessarily use condoms with regular partners.

6. DISCUSSION

Previous evidence suggests that persons who have emigrated from HIV endemic countries experience higher rates of HIV infection and delayed diagnosis (Adrien et al., 1999; Boyd et al., 2005; Burns et al., 2001; Courturier et al., 1998; del Amo et al., 2001; Public health Agency of Canada, 2005; Remis & Merid, 2004; Saul et al., 2000). However, no research has investigated HIV testing behaviour of immigrant populations in Canada, and limited research as been conducted elsewhere (Fenton et al., 2002; Interagency Coalition of AIDS and Development, 2006). The current analyses have provided a preliminary glimpse at testing behaviour among five East African communities residing in Toronto. Although much more work needs to be done before a complete picture can be presented, many interesting findings were uncovered.

6.1 TRENDS IN TESTING BEHAVIOUR

6.1.1 GENERAL TESTING TRENDS

Rates of ever testing and repeat testing were quite high in this study population and were generally more comparable to rates observed in other high risk groups rather than in the general population. Three-quarters (75.6%) of participants reported being tested at least once in their lifetime. This compared to 32% to 38% in studies of other immigrant and migrant populations (Fenton et al., 2002; Stolte et al., 2003); 30% to 35% in general population studies (Houston et al., 1998; Inungu, 2002; McGarrigle et al., 2005; Renzi et al., 2001); and 62% to 97% in high-risk populations (i.e., men who have sex with men, injection drug users; Do et al., 2005; Houston et al., 1998; Kellerman et al., 2002; Pugatch et al., 2006; Schwarcz et al., 2004). Two-thirds (65.7%) of the current study population were classified as repeat

testers which is more akin to rates observed among gay men (62% to 72%) than heterosexuals (32% to 40%; Leaity et al, 2000; Hightow et al., 2004; Norton et al., 1997).

Based on these findings, it is tempting to adopt an optimistic outlook of testing behaviour in Toronto's East African communities. While these numbers do provide reason for optimism, they must also be considered within the context of immigration. Given that 71.1% of testers reported having been tested for immigration purposes, it is likely that the immigration process has inflated testing rates in this population. Moreover, a third (32.8%) of testers had not re-tested since arriving in Canada, despite an average of almost six years since their most recent HIV test. This is particularly concerning as evidence suggests that 30-40% of HIV infections are contracted after arriving in Canada (Remis & Whittingham, 1999). Assuming appropriate counselling and treatment are available, HIV testing should prove clinically and preventively beneficial regardless of reason for testing; however, if testing occurs only when required and not following high-risk behaviour such benefits are likely to be limited.

Despite the heavy influence of immigration on testing behaviour, active testing was commonly reported. When questioned about their most recent HIV test, 40.7% had actively decided to seek out testing. It is reassuring that more people reported active testing than in a previous study of migrant populations in Amsterdam (28% in Stolte et al., 2003); however, it remains concerning that the majority of most recent tests were still initiated through a passive process and that a substantial proportion of the sample had never been tested for HIV.

6.1.2 COMMUNITY DIFFERENCES

Large differences in testing rates were noted across communities. In general, Ugandans had the highest rates of testing and Somalis had the lowest rates of testing. Community differences may be a result of HIV prevalence and governmental response to the epidemic within participants' home country. For example, in the early 1990's Uganda became known as the country hardest hit by AIDS and the government responded with a remarkable effort to control the epidemic (Parkhurst, 2005). It is conceivable that this experience resulted in the high rates of HIV testing and repeat testing observed in this study. In contrast, the long-term political instability of Somalia and the fact that Somalia's limited prevalence data suggest lower rates relative to other African states (World Health Organization, 2004) might explain the lower rates of testing among Somali participants.

Testing trends among Ethiopian participants were particularly noteworthy. Ethiopians were the least likely to have ever tested for HIV; yet compared to the other participants, Ethiopians who did test were much more likely to test repeatedly and independently. Reasons for this pattern are unclear.

6.1.3 GENDER DIFFERENCES

Overall, no gender differences were noted for "ever testing" for HIV, but females were more likely to test independently. When examined by ethnicity, a notable gender difference was observed for rates of ever testing among Somali participants and was staggering in its magnitude (79.0% males vs. 33.3% females). Although this difference may be partially

explained by gender differences in risk behaviour[25], it may also be indicative of broader gender inequities in the Somali community. Broader gender inequities are particularly alarming as it is well documented that gender inequity leads to poorer health outcomes for women, particularly with respect to HIV (Theobald, Tolhurst, & Squire, 2006).

6.2 DETERMINANTS OF TESTING

6.2.1 EVER TESTED

Sociodemographic Determinants. Nearly all of the sociodemographic variables were independently associated with having ever tested for HIV. Ever testing for HIV was associated with being 25 to 45 years of age, male, non-Muslim, more highly educated, wealthier, and a newer resident of Canada. Ethnicity was also associated. These associations were generally as expected based on the literature review. After controlling for other variables, only ethnicity and number of years in Canada remained significantly associated with testing. Both of these associations may be mediated by perceptions of risk.

Ethnicity and length of residence in Canada have the potential to affect perceived risk, which in turn could influence testing behaviour. As discussed earlier, differences in HIV prevalence and governmental response vary across country of origin. These differences likely effect perceptions of risk across ethnicity. Furthermore, qualitative studies involving people from African and Caribbean communities in Canada and Australia have documented perceptions that HIV/AIDS is localized within Africa or white gay populations and that it is

[25] Gender differences in number of sexual partners were noted across all communities. Although differences in number of sex partners were more pronounced in the Somali group, the fact that gender differences in testing were only noted in the Somali group suggests that risk behaviour may not fully explain this difference.

does not affect their communities in Canada or Australia (African and Caribbean Council on HIV/AIDS in Ontario, 2006; University of Melbourne, 2006; Tharao et al., 2006). Therefore, a person may feel more distanced from HIV risk the longer he or she resides in Canada and as a result feel less motivation to test.

Behavioural Determinants. Compared to sociodemographic factors, relatively few behavioural variables were independently associated with ever testing for HIV. Testers were more likely to report frequent heavy alcohol consumption, having had at least one sexual partner in their lifetime, being unsure if their partner had concurrent sex partners, and more travel to sub-Saharan Africa. After other variables were controlled for, only travel to sub-Saharan Africa remained significantly associated with ever testing for HIV. Participation in risk behaviour during visits to Africa might explain this association. Alternatively, travel to an HIV endemic country may simply amplify perceived salience of HIV, thereby elevating perceived risk and prompting testing.

Other studies have reported that risk behaviour is common during visits to countries of origin (Gras et al., 1999). This information was not collected by the current study. In an attempt to compensate for this lack of information, an interaction effect was assessed between "number of times traveled to Africa" and "having had a sex partner born in Africa." Although this was clearly a poor proxy measure of risk behaviour during visits to Africa (sex with a partner born in Africa did not necessarily occur during a visit to Africa and could have easily occurred in Canada), this was the best proxy measure available. Therefore, while this interaction effect was not significant in the model, it clearly does not rule out this explanation.

Psychosocial Determinants. Several psychosocial factors were associated with testing, including having fewer close family member in the Greater Toronto Area, knowing someone with HIV/AIDS, holding fewer stigmatizing beliefs about HIV, having more HIV knowledge, and having received a recommendation to test from a doctor or other health care professional. After controlling for other variables knowing someone with HIV and access to health care were significantly associated with testing.

While both stigma and knowledge dropped out of the final model, this may have been due to the inclusion of "knowing someone with HIV." In an exploratory factor analysis all three of these variables loaded highly onto a single factor. In the final model, knowing someone with HIV/AIDS may have acted as a proxy measure for stigma and knowledge, causing these two variables to be dropped from the analyses.

Access to health care scores were associated with testing; however, it is unclear why this association exists. For the most part, access to health care was assessed by *how much* the participant accessed care rather than their *ability* to access health care. It is possible that a third variable, such as health consciousness, was associated with both accessing health care services and testing for HIV. Alternatively, it is possible that individuals who experienced greater barriers to accessing health care (i.e., no OHIP coverage, language barriers) accessed services less and that similar barriers also reduced their ability to access testing services. More research is needed to understand this pathway, as policy implication will differ depending on the true nature of this relationship.

Finally, HIV testing was strongly associated with having had a doctor or other health care professional recommend testing at the bivariate level. In fact, every single participant

who reported receiving a recommendation had tested for HIV at some point in his or her lifetime. This variable could not be examined in the multivariate analyses because it resulted in quasi-complete separation of the data. Regardless, such a strong independent association suggests that encouraging health care professionals to appropriately recommend HIV tests could have a remarkable impact on testing in this population.

6.2.2 REPEAT TESTING

Sociodemographic Determinants. Nearly all of the sociodemographic variables remained significantly associated with repeat testing even after other variables were controlled for. Repeat testers were more likely to be between 25 and 45 years of age, non-Muslim, married, and have a lower income. Ethnicity was also associated with repeat testing. The direction of associations between sociodemographic characteristics and repeat testing were generally consistent with the literature, as well as with the association observed for "ever testing."

Slightly surprising was the fact that lower income was related to a higher likelihood of repeat testing since higher education was also associated with repeat testing. This might be due to the fact that a high proportion of students fell into the lowest income category. Additionally, a non-significant trend suggested that individuals in the highest income category also had elevated rates of repeat testing. This trend might have been significant in a larger sample with greater power[26].

[26] For this sample size (n=204) and variable distribution, power to detect a difference in income was only 0.77 (α=0.05); if the sample size was increased to 500, power would increase to 0.99.

Behavioural Determinants. Fewer behavioural variables were associated with repeat testing compared to sociodemographic variables. Independent associations suggest that repeat testers were more likely to report frequent heavy alcohol consumption, having ever used cannabis, proper condom use in the past year, and a previous STI diagnosis. After adjusting for other variables, cannabis use and STI diagnosis remained significantly associated with repeat testing.

While the current analyses demonstrated that cannabis use was associated with repeat testing, it does not offer an explanation for why this might be. Other studies have shown that marijuana use is associated with condom non-use (Houck et al., 2006; Kingree & Betz, 2003). Reported condom use was not associated with repeat testing in the study; however, it remains a possibility that cannabis use was acting as a proxy measure of risky behaviour which in turn produced motivation for repeat testing. An alternative explanation may be that individuals who use cannabis may hold more liberal attitudes which foster proactive repeat testing.

Psychosocial Determinants. Several psychosocial factors were associated with repeat testing, including less time spent with community members, higher individual and community perceived risk, lower stigma scores, greater HIV knowledge and a doctor's recommendation to test. After adjusting for other variables, time spent with community members, number of close family member in the GTA, and having tested for immigration purposes became significantly associated with repeat testing.

Amount of time spent with community members was used to assess participants' degree of involvement within their communities. Less community involvement was

associated with elevated levels of repeat testing. People from Toronto's African and Caribbean communities identified fear of isolation, rejection and gossip within their communities as a barrier to HIV testing (African and Caribbean Council on HIV/AIDS in Ontario, 2006). It is feasible that individuals who were further removed from their communities experienced less fear of discrimination within their community, and thus fewer barriers to testing. Even after controlling for other variables, having five or more close family members living in the GTA was associated with a greater likelihood of repeat testing suggesting that social support might be important to testing.

Inclusion of ethnicity in the final model may have caused many variables that were independently associated to become non-significant. Levels of education, perceived risk, stigma, and HIV knowledge all varied across communities in a pattern consistent with both their independent associations with repeat testing and the rates of repeat testing observed across communities. Hence it is likely that controlling for ethnicity resulted in these variables becoming non-significant. The relationship between ethnicity and HIV testing may be partially mediated by these variables, as well as other variables that are not controlled for in these analyses (i.e., HIV prevalence/government response in home country; cultural beliefs regarding health and disease). Ethnicity likely impacts upon testing behaviour through an indirect and complex causal pathway; further research involving mediational analyses is needed to better understand this relationship.

Interaction Effect. A significant interaction effect between gender and frequency of heavy alcohol consumption was noted for repeat testing. Among males the odds of repeat testing increased with frequency of heavy alcohol consumption, while among females the odds decreased with more frequent heavy alcohol consumption. It is possible that females

with the heaviest alcohol consumption were younger than their male counterparts and therefore had less opportunity to test on multiple occasions. A three-way interaction analysis involving age, gender, and heavy alcohol consumption could confirm this relationship; however, the current sample size is not large enough to run such an analysis[27].

It is important to note that while the overall interaction trend was significant, the confidence intervals were extremely wide and the odds of repeat testing were only significantly different for males and females in the lowest heavy alcohol consumption category. A larger sample size may narrow the confidence intervals; however, if cultural norms prohibit heavy alcohol use it may be difficult to recruit enough heavy drinkers to make a considerable difference.

6.2.3 INDEPENDENT VERSUS DIRECTIVE TESTING

Sociodemographic Determinants. Independent testing was associated with ethnicity, being female, single, and residing in Canada for a greater number of years. Once other factors were controlled for, only gender and marital status remained predictive of independent versus directive testing.

Several differences were noted between this model and the models predicting ever and repeat testing. Firstly, while persons who were 25 to 45 years of age were more likely to have ever tested and to have tested repeatedly, age did not seem to influence whether

[27] A preliminary analysis involving these three variables (age, gender, heavy alcohol consumption), suggested that females with the heaviest alcohol consumption were in fact younger than males with the heaviest alcohol consumption. However, the number of people in the heaviest alcohol consumption categories was small, making it difficult to draw any conclusions.

someone tested independently or directively. Secondly, unlike ever and repeat testing, neither age nor socioeconomic indicators (i.e., education and income) were determinants of independent or directive testing. This is also inconsistent with a study of migrant groups in Amsterdam which found active testers to have higher levels of education and to come from middle-income households (Stolte et al., 2003). It is unclear why this association was absent in the current study. Finally, this was the only model in which ethnicity was not significant in the final model (though it was significant at the bivariate level). This is likely explained by inclusion of "tested for immigration" in the model, as Ugandans, Tanzanians, and Somalis had lowest rates of independent testing, and also had highest rates of testing for immigration purposes.

Other studies have found that passive testing was more common among women than men, largely due to prenatal screening programs (McGarrigle et al., 2005; Renzi et al., 2001; Stolte et al., 2003). The reverse (albeit weak) association was found in the current analyses, with women being most likely to test independently despite prenatal screening being the most common reason doctors recommended testing. The gender effect created by prenatal screening programs might have been masked in the current study by the comparatively high proportion of both male and female participants testing for immigration purposes.

Behavioural Determinants. At the bivariate level, independent testing was associated with cannabis use and proper condom use. After adjusting for other variables, proper condom use and having received a blood transfusion were predictive of independent testing. Cannabis use remained marginally significant. The predictive nature of proper condom use suggests that those who are most cautious are also the most likely to be proactive testers.

Psychosocial Determinants. Prior to adjustment, independent testing was associated with number of close family members in the GTA, higher perceived individual and community risk, more knowledge, having tested for immigration purposes. After adjusting for other variables, having more friends and better HIV knowledge were both related to independent testing. Not surprisingly, individuals who reported ever receiving a doctor's recommendation to test or testing for immigration purposes were more likely to test directively. Since HIV knowledge was associated with independent testing, interventions aimed at increasing knowledge may be effective in promoting active testing in this population.

6.2.4 SUMMARY AND SYNTHESIS OF DETERMINANTS

Sociodemographic variables were very much associated with HIV testing behaviour, though they frequently became non-significant after controlling for other variables. In fact, all of the sociodemographic variables examined in these analyses, except household income below the poverty line, were associated with at least one of the modeled testing behaviour. The directions of the associations were generally consistent with those reported in the literature.

Ethnicity was consistently associated with both having ever received an HIV test, and repeat testing. These associations persisted even after other variables were controlled for. Ethnicity was also associated with independent versus directive testing at the bivariate level. This suggests that while Toronto's East African communities may have some shared experiences and characteristics, it is inappropriate to assume homogeneity across communities. HIV/AIDS interventions to increase testing behaviour may not be perfectly transferable across communities.

Alarmingly, risk behaviour was overwhelmingly not associated with testing behaviour. Neither condom use nor having had concurrent partners was significantly associated in any of the three dependent variables (ever tested, repeat tester, decision). While number of lifetime sex partners was associated with ever testing at the bivariate level, it was no longer significant after adjusting for other independent variables. Improper condom use was associated with both repeated and independent testing – however, this association was such that those who used condoms improperly (and were therefore at more risk for contracting HIV) were least likely to test repeatedly or independently. Another study involving African communities in the United Kingdom also failed to find an association between risk behaviour (i.e., condom use and number of sex partners) and HIV testing. However, studies in non-immigrant populations have found significant associations between risk behaviour and HIV testing (Houston et al., 1998; Maguen et al., 2000; McGarrigle et al., 2005; Renzi et al., 2001).

Social networks appear to influence testing behaviour. Some aspects of community involvement may deter testing, while having a strong support network of close family and friends may promote repeated and independent testing. Further research would be required to understand these relationships.

6.3 MOTIVATION FOR TESTING/NOT TESTING

Before beginning this discussion, it is important to note some limitations of the open-ended questionnaire items and probes. Although all interviewers received training on how to administer the questionnaire, open-ended responses were typically short and many responses were vague or unclear. Despite limited data, these responses complement the close-ended

items by offering a glimpse at issues that may have been otherwise overlooked and providing direction for future research investigating the motivations behind testing behaviour in this population.

6.3.1 INDEPENDENT TESTING

Reasons for independent testing were consistent with reported risk behaviour. Fear of exposure through sexual activity was the most commonly cited reason, while fear of exposure by other means (i.e., sharing needles, blood transfusion) was a much less common reason for testing.

The second most common reason for independent testing was to ensure HIV negative status before having sex without condoms. It is excellent that people were trying to prevent transmission by finding out their status before having unprotected sex; however, if both partners did not test for HIV as well as other STIs, or if the relationship was not truly monogamous, this type of testing could produce a false sense of security and actually increase risk of HIV and other STIs.

6.3.2 DIRECTIVE TESTING

Immigration authorities were by far the most common persons to initiate directive testing, followed by physicians. This pattern was consistent regardless of whether participants immigrated before or after mandatory testing was incorporated into the Canadian immigration process. Prenatal screening was the most commonly cited reason for a doctor's recommendation. While prenatal testing is important, it is limited in that it only targets a small proportion of the population – pregnant women. It is also concerning that the second most common reason for doctor initiated testing was in response to symptoms and that only

one person had a doctor suggest an HIV test as part of a regular health check-up. This seems to indicate that physicians are not encouraging the proactive testing behaviour necessary for early diagnosis and all its related benefits.

6.3.3 NON-TESTING

The most common reason people reported for not having had an HIV test was a belief that they were not at risk for contracting HIV. This was consistent with findings in the literature review that suggested black Africans had low perceived risk for contracting HIV (MCR Collaborative Study Group, 1996). Despite this belief, people with low perceived risk reported engaging in risk behaviour including having multiple and concurrent sex partners, and improper and/or non-use of condoms. Therefore, while perceived lack of risk was a frequently cited reason for not testing for HIV, it does not appear that this perception accurately reflects risk.

Several interesting differences were noted between the open- and close-ended questions. Spontaneous responses obtained from the open-ended question tended to produce reasons suggesting an assumption of HIV-negative status (e.g., I don't think I am at risk; I feel healthy; it is not necessary for me to test; I know I am not HIV positive). Very few participants spontaneously cited reasons relating to the consequences of testing positive (e.g., psychological well being; treatment in the community; relationship with partner; immigration status) and no participants stated reasons relating to the testing process (e.g., confidentiality of results; knowing where to get tested; taking time off). Responses to the close-ended items also suggested an implicit assumption of HIV negative status, but direct questions regarding the testing process and consequences suggested that these also represent potential barriers to testing. These differences may be suggestive of complex and multi-layer reasoning

surrounding the testing decision. True qualitative research is needed to fully understand such motivations.

6.4 STRENGTHS AND LIMITATIONS

As in the case of all research, this study has both strengths and limitations. An undeniable strength is its community participatory approach. The feasibility study, Community Advisory Committee, informal discussions with community members, and pre-test of the interview questionnaire imparted valuable community feedback, which was then incorporated into the study design and survey instrument. These community participatory aspects were vital to ensure community acceptance and participation. Furthermore, this study has contributed knowledge to an under-studied field of research, and has the potential to enhance the health of a vulnerable population (see Section 6.5).

Many of the most obvious limitations of this study were an effect of the small sample size. Quasi-complete separation of the data was commonplace and rendered certain analyses impossible (i.e., some interaction terms could not be examined; doctor's recommendations could not be further studied). Lack of power may also have been problematic, particularly as many independent variables were included in the final models (Hosmer & Lemeshow, 1989; Katz, 2006). Even with a small sample many significant differences were noted; however, this does not preclude the possibility that other variables may have failed to reach significance due to insufficient power. Power calculations for selected variables indicate that power was indeed low, but would increase considerably for several variables if the sample size were to be increased (see Appendix N). This problem will be lessened when the analyses are re-run with the full study sample.

Several study limitations relate to the interview questionnaire. First, despite efforts to make the questionnaire culturally sensitive and appropriate, the extremely sensitive nature of the questions may have caused a social desirability bias (Elam & Fenton, 2003). To reduce this bias, a self-completed questionnaire was used to collect the most sensitive data (Dare & Cleland, 1994; Davoli et al., 1992; Johnson et al., 1994). Although self-completed response rates were generally quite high a bias may have still occurred. Secondly, cultural interpretations of certain words, phrases, or questions may differ from the general Canadian population and between communities (Agans et al., 2006). This seemed particularly problematic while collecting information on partner gender and other similar problems may have gone unidentified. Finally, the current analyses were based on secondary data, and as such, study variables were restricted to information collected in the interview. Therefore, certain variables of interest could not be examined (e.g., risk behaviour during visits to HIV endemic countries, perceived benefits of testing).

Other biases were created through the sampling and selection processes. Firstly, this sample was largely a convenience sample. Therefore, generalizability to entire communities is not possible because some sub-populations were likely missed in the recruitment process (i.e., individuals with less community involvement). Secondly, self-selection likely resulted in a sample biased with more open attitudes toward sexual practices and HIV/AIDS issues, as well as fewer stigmatizing beliefs about HIV/AIDS (Fenton, Johnson, McManus, & Erens, 2001). Thirdly, although HIV testing was an optional study component (and was not used in these analyses), it may have influenced certain participants, particularly those strongly opposed to testing or holding strong HIV/AIDS stigma, to decline an invitation to participate in the study. This may have resulted in a sample more open to testing and repeat testing than

the community at large. Finally, the study excluded all individuals who were not fluent in English. This subset of the population may be less familiar with the health care system (including testing facilities) and unable to access services due to language barriers. Therefore, individuals facing the greatest barriers to testing may have been systematically excluded from this study. Language barriers seemed to a pose a larger problem within the Somali community (Kimberly Gray, personal communication, July 31, 2006).

6.5 PUTTING IT INTO PRACTICE: PRACTICAL IMPLICATIONS

The PRECEDE-PROCEED Planning Model is a widely used framework that guides the development of health promotion programs (see Appendix O; Carlson & McDonald, 2002). According to this model, it is imperative that behaviour be understood before intervention strategies are designed or implemented. This process can be applied to the development of strategies and interventions that promote HIV testing in Canada's black, African and Caribbean communities. Initial steps have already been undertaken to 1) understand perceptions of HIV/AIDS in these communities (step #1 in Appendix O; African and Caribbeaan Council on HIV/AIDS in Ontario, 2006; Calzavara et al., 2000; Tharao et al., 2006) and 2) assess rates of HIV within these communities (step #2 in Appendix O; Public Health Agency of Canada, 2005b; Remis & Merid, 2004; Remis & Whittingham, 1999; Remis et al., 2006).

The current study has built on this previous work to gain a better and more specific understanding of HIV testing behaviour in these populations and factors that are associated

with this behaviour (step 3, in Appendix O). Looking through the lens of the PRECEDE-PROCEED model, factors associated with HIV testing can be identified as predisposing[28], reinforcing[29], or enabling factors[30] (step #4 in Appendix O). To the extent that these factors can be manipulated, public health professionals can design interventions and strategies to promote and facilitate HIV testing behaviour. Unchangeable factors associated with testing (i.e., many sociodemographic variables) can be used to target interventions in an appropriate and effective manner (Carlson & McDonald, 2002). This study has identified several predisposing and enabling factors which can be used to inform public health strategies.

6.5.1 TARGETING INTERVENTIONS

From the current study, sociodemographic characteristics associated with HIV testing can be thought of as "predisposing" factors. Many of these characteristics cannot be changed but offer valuable information for targeting interventions. For example, promotion of HIV testing may be most beneficial among youth and persons with lower levels of education and income, as these groups were least likely to test. Additionally, interventions designed to target ethnocultural communities should ensure they are reaching all members of the community and not just recent immigrants.

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[28] *Predisposing factors* are "antecedents to behavior that provide the rationale or motivation for the behavior" (Green and Kreuter, 1999, 153), such as high-risk behaviour, knowledge of modes of transmission and testing processes, perceived risk, beliefs regarding importance of testing, and having received a doctor's recommendations.

[29] *Reinforcing factors* are "those factors following a behavior that provide continuing reward or incentive for the persistence or repetition of the behavior" (Green and Kreuter, 1999, 153) such as social support.

[30] *Enabling factors* are antecedents to behavior that allow a motivation to be realized" (Green and Kreuter, 1999, 153), such as access to health care or knowledge of testing sites.

6.5.2 DESIGNING INTERVENTIONS AND STRATEGIES

Interventions are important to promote HIV testing among these communities. Changeable "predisposing" and "enabling" factors identified in the current analyses can be used to inform the design of such interventions. For example, a high proportion of people reported that they had not tested because they had "never really thought about getting tested." Therefore, public visibility of HIV may be a factor that predisposes people to testing and can easily be manipulated in public health campaigns. Similarly, campaigns should also strive to increase HIV knowledge and reduce stigma within these communities, as both of these factors were associated with testing behaviour and can predispose and enable people to test. In addition to being used in the design of new interventions, this information can also be incorporated into existing initiatives.[31]

Due to community differences, interventions to increase testing behaviour may not be perfectly transferable across communities. Unfortunately, due to lack of resources, it would not be feasible to develop an individual campaign for each community. Broader interventions could be devised which take advantage of the similarities between the communities. These wide-scale interventions could then be complemented by smaller efforts initiated by individual community groups (i.e., community organizations taking the lead to educate their community in a culturally appropriate manner) and by increasing awareness

[31] For example: The African and Caribbean Council on HIV/AIDS in Ontario has already initiated a campaign to raise awareness about HIV/AIDS among African and Caribbean communities in Ontario. The campaign focuses on fighting against HIV/AIDS stigma, knowing HIV status by getting tested, and practicing safer sex. (more information is available online at http://www.preventaids.ca).

among services providers regarding the differences among communities and how to appropriately deal with these differences.

Strategies should be designed to encourage physicians to screen their patients for HIV risk and recommend testing when appropriate. The independent association between receiving a doctor's recommendation to test and having ever tested for HIV was very strong (suggesting that a doctor's recommendation predisposes and/or enables a person to test). Despite this strong association, very few people reported that their doctor had recommended an HIV test as part of a regular health check up. Furthermore, many people reported not testing for HIV because of a perceived lack of risk but also reported engaging in risk behaviour. Hence, a doctor's recommendation to test based on risk behaviour and framed in the context of a regular health check-up has enormous potential to promote testing (Anderson et al., 2005; Fernandez, Bowen, et al., 2003). However, it is imperative that such screening be done in an appropriate and sensitive manner and should be based on risk behaviour rather than ethnic background.

As a final note, it is important that any interventions targeting Toronto's African communities must be designed with extreme sensitivity to ensure interventions do not stigmatize these communities.

6.6 CONTINUING THE WORK: IMPLICATIONS FOR FUTURE RESEARCH

The current analyses were extremely useful to the extent that they have described testing behaviour in Toronto's East African communities and provided an initial understanding of factors associated with testing. The first step in continuing research should be to conduct the current analyses using the full study sample. However, improving upon this study alone will

not provide all of the answers necessary to fully understand and promote testing in this population.

Additional community-specific research may be appropriate and justifiable within Canada's larger ethnocultural communities, particularly if evidence suggests these communities are culturally and behaviourally unique. For example, Canada is home to a large Somali population and Somali study participants were distinctive not only in their testing behaviour, but also in their sociodemographic, behavioural and psychosocial profiles. In such instances, community-specific research initiatives may be better equipped to understand the cultural intricacies related to health behaviour.

Moreover, the lack of association between behavioural variables and testing is quite concerning and needs to be further investigated. The data collected by the EAST study does not offer an explanation for this lack of association. One explanation may be that people do not realize their behaviour places them at risk for contracting HIV. Alternatively, they may be well aware that their behaviour places them at risk but barriers exist that inhibit testing. Until this is understood, proactive testing cannot effectively be encouraged. High caliber qualitative research is needed to truly understand testing behaviour.

Finally, motivations and barriers to testing need to be better understood in these populations. The current findings suggest that motivations behind testing behaviour, particularly non-testing behaviour, may be complex and multi-layered. Until these motivations and barriers are better understood, it will be difficult to promote testing in these communities.

7. CONCLUSIONS

This was the first Canadian study to investigate testing behaviour in immigrant communities originating from HIV-endemic countries. Rates of testing were found to be quite high and immigration processes heavily impacted upon testing behaviour. Despite high rates of testing, the majority of most recent tests occurred through a passive process and a substantial proportion of the sample had never tested. Given the growing prevalence of HIV among persons from HIV-endemic countries, it is crucial to raise awareness of HIV and promote testing within these communities. The current investigation has provided an excellent foundation for understanding HIV testing behaviour in these populations. Many determinants and motivations of testing behaviour have been identified and can be used to inform public health efforts to promote testing. Nevertheless, a great deal of research is still needed to fully understand testing behaviour in these populations.

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Appendix A:
Immigration and HIV Testing

Prior to January 15, 2002, HIV testing was not regularly performed on persons immigrating to Canada. After this date, Citizenship and Immigration Canada (in consultation with Health Canada) put forth a new policy that made HIV testing mandatory for all applicants who are 15 years of age and over, as well as on those children who have received blood or blood products, have a known HIV positive mother, or are potential adoptees.

Canada's immigration law does not contain a condition inclusively denying all HIV-positive immigrants. Rather, policy states that applicants can be denied a visa or entry into the country if they are deemed "medically inadmissible" because:

i) they are "likely to be a danger to public health or public safety"; or
ii) they "might reasonably be expected to cause excessive demand on health or social services".

Since 1991, it has been the Government of Canada's policy that persons living with HIV/AIDS do not represent a threat to public health by virtue of their serostatus; therefore HIV-positive applicants are not denied based on a threat to public health.

However, applicants for permanent residence may be denied based on 'excessive demand' if:

i) the anticipated costs would likely exceed the costs of health and social services for the average Canadian resident (calculated by the Canadian Institute for Health Information on an annual basis); or
ii) the demand would add to existing wait lists for those services and would increase the rate of mortality and morbidity in Canada by denying or delaying access to those services to Canadian citizens or permanent residents.

Estimated financial burden of permanent residence applicants is calculated for a five-year period; however, this can be extended to a 10 year period if there is evidence that significant costs are likely to be incurred beyond five years (such as in the case of HIV infection). The contributions the individual is expected to make to Canada, whether economic or social, are not taken into account.

Certain classes of permanent resident applicants are exempt from denial due to "excessive demand" including:

i) a person who has applied for permanent residence as a refugee or "person in similar circumstances" or who has been deemed "in need of protection" whether applying from inside or outside Canada.
ii) a person who is the spouse, common law partner or dependent child of a Canadian citizen or permanent resident who is sponsoring them as a "family class" applicant.

Short-term visitors (less than six months) are not required to disclose known seropositivity; nor are they routinely tested for HIV. Except in rare circumstances where it is believed that a health condition of the applicant will likely require health or social services during the persons stay in Canada (such as hospitalization), applications for short-term visitors should not be denied due to "excessive demand". Temporary residents whose stay will exceed 6 months (e.g., studying or working for a longer period) will be assessed on a case-by-case basis to determine if excessive demand is likely.

Reference: Canadian HIV/AIDS Legal Network. (June 2005). *Questions & Answers: Canada's Immigration Policy as it Affects People Living with HIV/AIDS.* Retrieved November 1 2005 from http://www.aidslaw.ca/Maincontent/reports.htm#imm.

Appendix B:
Description of Studies Investigating Covariates of HIV Testing

Author	Study Design	Sample
HIV Testing		
Fenton et al., 2002	Cross-sectional community based survey	▪ Migrants from five sub-Saharan African Communities residing in London (Congo, Kenya, Uganda, Zambia, Zimbabwe). ▪ Recruitment in social and commercial venues frequented by the 5 communities. ▪ N=748 (396 men, 352 women) ▪ Median length of UK residence was 6 yrs
Gage & Ali, 2005	Cross-sectional population based survey	▪ Married men aged 15-59 living in Uganda ▪ Recruited a nationally representative sample ▪ N =1,167
Kalichman & Simbayi, 2003	Cross-sectional community based survey	▪ Men and women living in a black township in Cape Town, South Africa. ▪ Recruited from multiple venues ▪ N=500
Houston et al., 1998	Cross-sectional population based survey	▪ Representative sample of Canadian population aged 15 yrs and older. ▪ Recruitment through national random digit telephone dialling. ▪ N=3,123
Renzi et al., 2001	Cross-sectional population based survey	▪ Representative sample of Italian heterosexual population aged 18-49 yrs. ▪ Recruitment through national random sampling of telephone subscribers. ▪ N=2,603 (1,219 men and 1,384 women).
McGarrigle et al., 2005	Cross-sectional population based survey	▪ Stratified probability sample of the British general population aged 16-44 yrs. ▪ N=12,110
Inungu et al., 2002	Cross-sectional population based survey	▪ Non-institutionalized population in the United States. ▪ Used a multistage cluster probability design to recruit a representative sample of households. ▪ N=32,440
Maguen et al., 2000	Cross-sectional convenience sample	▪ American gay, lesbian, bisexual, and transgendered youth. ▪ Recruited from a regional conference for gay, lesbian, bisexual, and transgendered youth. ▪ N=117
Flowers et al., 2003	Cross-sectional community based survey	▪ Scottish gay men. ▪ Recruitment in all commercial gay venues in Edinburgh and Glasgow, Scotland. ▪ N=803
Repeat HIV Testing		
Jayaraman et al., 2004	Cross-sectional survey	▪ All newly diagnosed HIV cases in Alberta between 2000 and 2001. ▪ Testing history for HIV was reviewed ▪ N=398
Fernandez, Perrino, et al., 2003	Cross-sectional community based survey	▪ Hispanic men who have sex with men, aged 18 yrs or older, who were seronegative and who had been tested for HIV (United States). ▪ Recruitment in public venues ▪ N=538
Hightow et al., 2004	Retrospective Cohort Study	▪ All newly diagnosed HIV-infected subjects and randomly selected HIV-uninfected subjects attending an American STD clinic. ▪ N=508
Leaity et al., 2000	Cross-sectional survey	▪ Persons attending a same-day HIV testing clinic (London, England). ▪ All clinic attenders were invited to participate. ▪ N=1580
Norton et al., 1997	Cross-sectional survey	▪ Persons attending an HIV testing clinic (London, England). ▪ All clinic attenders were invited to participate. ▪ N=1060

Appendix C:
Summary Chart of Factors Associated with HIV Testing

	Sociodemographic Variables							Behavioural Variables								Psychosocial Variables						
	Age	Gender	Ethnicity	Marital Status	Education	Income/Social Class	Area of Residence	Multiple Sex Partners	Unprotected Penetrative Sex	STI Diagnosis	Perceived High-Risk Partner	History of Paying for Sex	New Sex Partner from Abroad	Men who have Sex with Men	Drug Use	Perceived Risk	Perceived Barriers to Testing	Perceived Benefits of Testing	Perceived Norm	HIV+ Friend/Relative	HIV/AIDS Knowledge	Knowledge of Test Site
HIV Testing																						
Fenton et al., 2002	✓	ns[a]	✓	✓	✓	-	-	ns	-	✓	-	-	-	-	-	✓	-	-	-	-	-	-
Gage & Ali, 2005	✓	n/a	-	n/a	✓	✓	✓	-	-	-	-	✓	-	-	-	-	-	-	-	ns	✓	✓
Kalichman & Simbayi, 2003	ns	ns	ns	ns	✓	-	-	ns	✓	✓	-	✓	-	-	✓	-	✓	✓	-	-	ns	-
Houston et al., 1998	✓	✓[a]	-	✓	✓	✓	✓	-	-	-	✓	-	-	✓	✓	-	-	-	-	-	-	-
Renzi et al., 2001	✓	✓[a]	-	-	ns	-	-	✓	-	-	-	ns	-	-	ns	-	-	-	-	✓	-	-
McGarrigle et al., 2005	✓	ns[a]	✓	✓	-	ns	✓	✓	-	✓	-	ns	✓	✓	✓	✓	-	-	-	-	-	-
Inungu, 2002	✓	✓	✓	✓	✓	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maguen et al., 2000	✓	✓	ns	-	-	-	-	-	✓	-	-	-	-	-	✓	✓	✓	-	-	-	-	-
Flower et al., 2003	✓	n/a	-	-	ns	-	ns	-	✓	-	-	-	-	n/a	-	-	✓	✓	✓	-	-	-
Repeat Testing																						
Jayaraman et al., 2004	ns	ns	-	-	-	-	✓	-	-	-	-	-	-	ns	✓	-	-	-	-	-	-	-
Fernandez, Perrino, et al., 2003	✓	n/a	n/a	n/a	✓	-	-	✓	ns[b]	✓	ns	-	-	n/a	ns	ns	-	-	-	-	-	-
Hightow et al., 2004	✓	ns	✓	ns	-	-	-	-	-	ns	-	-	-	ns	ns	-	-	-	-	-	-	-
Leaity et al., 2000	ns	-[a]	ns	-	-	-	ns	-	✓	✓	-	-	-	-[c]	-	-	-	-	✓	✓	-	-
Norton et al., 1997	✓	-[a]	-	-	-	-	-	-	✓	✓	-	-	-	-[c]	-	-	-	-	✓	✓	-	-

✓ = significantly associated with HIV testing ns = not significantly associated with HIV testing n/a = not applicable to the study – = factor not examined in study

[a] Analyses were stratified by gender.
[b] Not significant at 0.05 level, however marginally significant at 0.10 level.
[c] Analyses were stratified by sexual orientation.

Appendix D:
Description of Studies Investigating Reasons for Testing/Not Testing

Author	Study Design	Sample
Including African Immigrant Populations		
Boyd et al., 2005)	Retrospective Review	▪ British persons 18 yrs or older presenting with a first positive HIV-1 test. ▪ Recruited from 2 hospitals in London, England ▪ N=494 (179 white, 270 black African, 45 black Caribbean)
Burns et al., 200	Retrospective Reveiw	▪ Adults (African and non-African) attending 2 HIV clinics in London between 1982 and 1995 and Jan. 1998-Dec. 1999. ▪ N=386 (143 born in Africa and 143 considered to be non-African)
Erwin et al., 2002	Cross-sectional Survey	▪ Patients attending an HIV outpatient clinic in London. ▪ New and existing patients were asked to participate in the study. ▪ N=392 (64% white, 26% black African, 10% other ethnic groups who were e excluded from analysis)
MRC Collaborative Study Group, 1996	Analysis of baseline data from a prospective cohort study	▪ British and Irish HIV+ women, aged over 18 yrs ▪ Recruited from clinics in both Britain and Ireland ▪ N=400 (65% white, 29% black, 2% black Caribbean, 2% South Asian)
African Populations		
Muller et al., 1992	Cross-sectional survey	▪ Clients attending the AIDS Information Centre in Kampala, Uganda ▪ Recruited 250 HIV-positive and 250 HIV-negative consecutive clients; 86 consecutive couples; 200 consecutive clients who were HIV-negative the previous year and were attending for a repeat test. ▪ N=786
van Dyk & van Dyk, 2003	Cross-sectional survey	▪ South African adults; 57.2% black, 27.4% white, 8.6% coloured, 6.5% Asiatic, and 0.3% other. ▪ A convenience sample recruited from across the country by students enrolled in an HIV/AIDS Care and Counselling distance education course. ▪ N=1,422
Western General Populations		
Inungu, 2002	Cross-sectional population based survey	▪ Representative sample of American general population aged 18 yrs or older. ▪ N=32,440
Leaity et al., 2000	Cross-sectional survey	▪ Persons attending a same-day HIV testing clinic (London, England). ▪ All clinic attenders were invited to participate. ▪ N=1580
McGarrigle et al., 2005	Cross-sectional population based survey	▪ Stratified probability sample of the British general population aged 16-44 yrs. ▪ N=12,110
Renzi et al., 2001	Cross-sectional population based survey	▪ Representative sample of Italian heterosexual population aged 18-49 yrs. ▪ Recruitment through national random sampling of telephone subscribers. ▪ N=2,603 (1,219 men and 1,384 women).
Wortley et al., 1995	Cross-sectional population based survey	▪ Recently diagnosed Persons with AIDS in 11 US states, aged 18 and older. ▪ Depending on the state, three different recruitment procedures were used: 1) attempts were made to contact all recent diagnoses PWA in the state, 2) a random sample of all persons recently diagnosed in the state, or 3) all recently diagnosed people at selected medical facilities. ▪ N=2441
High-Risk Populations		
Riess et al., 2001	Qualitative interview with brief quantitative survey	▪ High-risk drug users in three northern California counties ▪ Recruited through outreach workers, counsellors and program staff. ▪ N=66
Bonney et al., 2004	Cross-sectional survey	▪ Low income minority women residing in the United States ▪ Recruited at an urgent care center. ▪ N=143
Flower et al., 2002	Systematic Literature Review	▪ International literature concerning HIV testing among gay and bisexual men from 1985 to 2001

Appendix E:
Members of Research Team

Principal Investigator:	Liviana Calzavara, PhD [1, 2]
Co-Principal Investigator:	Esther Tharao, MEd [3]
Co-Investigators:	Ann Burchell, MSc [1] Robert S. Remis, MD [2] Ted Myers, PhD [1, 2] Carol Swantee, BSc, MLT [4] Catherine Chalin, PhD [2]
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Appendix F:
Interview Questionnaire - List of Reasons for Deciding to Test

Question: **Why did you decide not to get tested for HIV?** *[List is read to respondent]*	Yes	No
1. You think you might have been exposed to HIV through sexual activity	1	0
2. Your partner was/is HIV positive	1	0
3. You were concerned that you might have been exposed to HIV through sharing needles	1	0
4. You found out your partner had sex with other people during your relationship	1	0
5. You were concerned you might have been exposed to HIV through a blood transfusion	1	0
6. You had signs or symptoms of HIV/AIDS disease	1	0
7. You wanted to make sure you were HIV negative so you and your partner could have sex without condoms	1	0
8. Other *[probe]*	1	0

Appendix G:
Interview Questionnaire – Who Suggested HIV Test?

Question: **Who suggested that you get an HIV test?** *[Do NOT read list. Choose all that apply]*	Yes	No
1. Your partner Probe: Why did your partner want you to get tested?	1	0
2. Immigration Authorities	1	0
3. Your doctor. Probe: Can you please tell me more about the reasons your doctor suggested the test?	1	0
4. Your insurance company	1	0
5. Other – Who? Probe: Why did they suggest the test?	1	0
6. You had signs or symptoms of HIV/AIDS disease	1	0

Appendix H:
Interview Questionnaire - List of Reasons for Deciding NOT to Test

Question: **Can you tell me if any of the following were also reasons why you have not had an HIV test? Please tell my yes or no for each reason.**	Yes	No
1. You could not face finding out you were HIV positive	1	0
2. You were afraid that an HIV positive test may affect your immigration status	1	0
3. You do not trust health professionals to keep your test results confidential	1	0
4. You are afraid of how your community would treat you if you tested positive	1	0
5. You are afraid of how your partner would react if you tested HIV positive	1	0
6. You feel that you don't need to test because you feel healthy	1	0
7. You never really thought about getting tested	1	0
8. You don't think you are at risk for HIV because you are careful. IF YES, PROBE**:** Why don't you think you are at risk?	1	0
9. You didn't know where to go for a test	1	0
10. You couldn't take the time off to go for a test	1	0
11. Other (PROBE):	1	0

Appendix I:
Independent Variables and Related Questionnaire Items

Variable	Question	Response Options
Demographic Variables		
1. Age	What is your date of birth?	dd/mm/yy
2. Gender	You are…	1 Male 2 Female
3. Ethnicity	What ethnic group do you belong to? [read list]	1 Ethiopian 2 Kenyan 3 Somali 4 Tanzanian 5 Ugandan
4. Religion	What, if any, is your faith or religion? [do not read list]	1 Non/agnostic/atheist 2 Christian (please specify type) 3 Muslim 4 African traditional (please specify type) 5 Hindu 6 Other (please specify)
5. Marital Status	What is your current marital status? [do not read list. Probe to determine category]	1 Married 2 Living common-law 3 Separated 4 Divorced 5 Widowed 6 Single

6. Education	What is the highest level of education that you have completed?	1 No Formal education 2 Some elementary/primary 3 Completed elementary/primary 4 Some secondary 5 Completed secondary 6 Some college/some university 7 Completed college 8 Bachelors degree 9 University above Bachelors 10 Masters degree 11 PhD/MD
7. Personal Income	What is your best estimate of your **total personal income**, before taxes and deductions, from all sources in the past 12 months? [read list until answer chosen]	1 Less than $5,000 2 $5,000 to less than 10,000 3 $10,000 to less than 20,000 4 $20,000 to less than 30,000 5 $30,000 to less than 40,000 6 $40,000 to less than 50,000 7 $50,000 to less than 60,000 8 $60,000 to less than 70,000 9 $70,000 to less than 80,000 10 $80,000 or more 77 Don't know 99 Declined

8. Household Income below LICO	This variable assess whether household incomes falls below Canada's 2005 Low Income Cut Offs. The variable has been created from the survey item collecting household income data and LICOs (described below). What is your best estimate of the **total combined income**, before taxes and deductions, of all household family members from all sources in the past 12 months? [read list until answer chosen] 01 less than $5,000 02 $5,000 to less than 10,000 03 $10,000 to less than 20,000 04 $20,000 to less than 30,000 05 $30,000 to less than 40,000 06 $40,000 to less than 50,000 07 $50,000 to less than 60,000 08 $60,000 to less than 70,000 09 $70,000 to less than 80,000 10 $80,000 or more Family Size / LICOs, 2005* / Corresponding Income Category 1 / $20,778 / <$20,000 2 / $25,867 / <$30,000 3 / $31,801 / <$30,000 4 / $38,610 / <$40,000 5 / $43,791 / <$40,000 6 / $49,389 / <$50,000 7+ / $54,987 / <$50,000 *Statistics Canada, Income Statistics Division, 2006	0 No 1 Yes

9. Years in Canada	All participants were asked: "In what year did you first come to Canada to live?" Year of arrival was then subtracted from the year in which the interview took place to obtain the number of years spent living in Canada.	Years in Canada = [Year of Interview] – [Year arrived in Canada]
Behavioural Variables		
10. Injection Drug Use	Have you ever injected drugs that were not prescribed by a doctor?	1 No 2 Yes 7 Don't know 9 Declined
11. Frequency of Heavy Alcohol Consumption	In the past 12 months, how often have you had 5 or more drinks on one occasion?	0 Never 1 Less than once a month 2 Once a month 3 Two to three times a month 4 Once a week 5 Two to three times a week 6 Four to six times a week 7 Daily 77 Don't know 99 Declined

12. Other Drug Use	Have you ever tried or used the following? a) Marijuana, cannabis, or hashish ("pot", "dope") b) Cocaine or crack ("coke", "freebase") c) Speed, amphetamines, or crystal meth d) Ecstasy ("E") e) Hallucinogens, PCP, or LSD ("acid", "peyote") f) Sniff glue, gasoline, or other solvents g) Heroin h) Steroids, such as testosterone, dianabol, or growth hormones, to increase your performance or to change your physical appearance i) Chat ("khat", "mira") j) Other (specify)	0 No 1 Yes
13. # of Lifetime Partners	How many people in your lifetime, including men and women, did you have sexual intercourse with? This includes people you may have had sex with only one time. [self-completed]	0 0 1 1 2 2 to 4 3 5 to 9 4 10 to 19 5 20 or more 7 Don't remember 9 Don't want to answer
14. Partner Gender	Have these sexual partners been: [self-completed]	1 All male? 2 Both male and female? 3 All female? 9 Don't want to answer
15. African Sex Partner	How many of these people [partners in past 12 months] were born in Africa? [self-completed]	0 None of them 1 Some of them 2 All of them 9 Don't want to answer
16. Concurrent Partners	In the past 12 months, did you have sexual intercourse with more than one partner during the same time period? [self-completed]	0 No 1 Yes 9. Don't want to answer

17. Believes Partner had Concurrent Sex	In the past 12 months, do you think that any of your regular sexual partners, including your spouse or boyfriend/girlfriend, had sexual intercourse with someone else while you were also in a sexual relationship with them? [self-completed]	0 No 1 Yes 7 I don't know 8 Not applicable (i.e., no regular partners in past 12 months) 9 Don't want to answer
18. Condom Use with Regular Partners	In the past 12 months, how often did you use condoms with [your regular partners]?	1 None of the time 2 Some of the time 3 Most of the time 4 All of the time 8 Not applicable
19. Condom Use with Casual Partners	In the past 12 months, how often did you use condoms with [your casual partners]?	1 None of the time 2 Some of the time 3 Most of the time 4 All of the time 8 Not applicable
20. Improper Condom Use	This variable assesses whether condoms were used properly and without difficulty on occasions when condoms were used in the past year. This variable was created based on the following survey items: In the past 12 months, when you used condoms, 1. Did the condom ever break or slip off? 2. Was the condom always put on before sexual intercourse? 3. Was the condom ever taken off and then you continued to have sexual intercourse without the condom? This variable was coded as "no" (there had been no improper condom use in the past 12 months) when participants reported that 1) the condom never broke/slipped, 2) that it was always put on before intercourse, and 3) that it was never taken off prematurely.	0 No 1 Yes

21. STI Diagnosis	There are several diseases or infections that can be transmitted during sex. These are sometimes called sexually transmitted diseases or infections. Have you ever been diagnosed with a sexually transmitted infection such as gonorrhea, syphilis, herpes, genital warts or chlamydia?	0 No 1 Yes 7 Don't know 9 Declined
22. Blood Transfusion	Have you ever received a blood transfusion or blood products?	0 No 1 Yes (specify country, year, own blood/donor blood) 7 Don't know
23. Travel to sub-Saharan Africa	b) [Since you have arrived in Canada/During your life in Canada], how many times have you traveled to sub-Saharan Africa?	Open-ended
Psychosocial Variables		
24. Time with Community	Please tell me how often you spend time with members of your community, that is, people from [insert community]. This does not include the time you spend with your family members at home.	1 None of the time 2 Some of the time 3 Most of the time 4 All of the time 8 Not applicable
25. # Close Family Members in GTA	About how many of your **close** <u>family members and relatives</u> live in the Greater Toronto Area? By close we mean family members that you feel at ease with and that you could talk to about private matters and call upon for help. [read list]	0 None 1 One 2 Two to four 3 Five to nine 4 Ten or more 7 Don't know 9 Declined
26. # Close Friends in GTA	Approximately how many **close** <u>friends</u> do you have who live in the Greater Toronto Area? By close we mean friends that you feel at ease with and that you could talk to about private matters and call upon for help. [read list]	0 None 1 One 2 Two to four 3 Five to nine 4 Ten or more 7 Don't know 9 Declined

27. Perceived Personal Risk	I would like you think about whether you feel you are at risk for contracting HIV/AIDS. I would like you tell me on a scale of 0 to 5, with 0 being no risk at all and 5 being a lot of risk, what do you feel your personal risk of contracting HIV/AIDS would be?	0 No risk at all 1 2 3 4 5 A lot of risk 7 Don't know 8 Not applicable (i.e., HIV positive) 9 Declined
28. Perceived Community Risk	Please tell me to what extent you believe [HIV/AIDS] is a problem in the [Ethiopian/Kenyan/Somali/Tanzanian/Ugandan] community in Toronto.	1 Not a problem 2 Minor problem 3 Major problem 7 Don't know
29. Knowing someone with HIV/AIDS	This variable assesses whether the participant knows anyone in Toronto's East African community or in their home country who is HIV-positive. This variable was created from two survey items: a. Do you <u>know</u> anyone in the East African community in Toronto who is HIV-positive or has been diagnosed with AIDS? This includes people who have died from AIDS. b. Do you <u>know</u> anyone in your home country who is HIV-positive or has been diagnosed with AIDS? This includes people who may have died from AIDS. If participants responded 'yes' to either of these survey items, this variable was coded as 'yes'. Otherwise, it was coded as 'no'.	0 No 1 Yes

30. Stigma Score	This variable was created from the seven survey items listed below: 1. If a member of your family got infected with the AIDS virus, would you want it to remain a secret?* 2. If a teacher has the AIDS virus but is not sick, should he or she be allowed to continue teaching in school? 3. If a member of your family became sick with the AIDS virus would you be willing to care for them in your household? 4. If you had a child in school, would you allow him or her to be in the same classroom with another child who is infected with the AIDS virus? 5. Would you eat in a restaurant where the cook is infected with the AIDS virus? 6. Would you be willing to work next to or near a person who you know is infected with the AIDS virus? 7. Would you tell a close family member if you found out you were infected with the AIDS virus? Stigma scores were calculated by adding one point for every response of 'no' (*with the exception of the first question, in which case one point is added for a response of 'yes'). Greater scores indicated more negative attitudes toward persons with HIV/AIDS. Internal consistency of this variable was good (cronbach's $\alpha = 0.61$)	Score ranging from 0 to 7.

31. HIV Knowledge Score	This variable was created from several survey items assessing HIV knowledge (listed below). *Transmission Knowledge (true/false):* A person can get HIV/AIDS from 1. Attending school with someone who has HIV/AIDS* 2. Sharing needles for drug use with someone who has HIV/AIDS 3. Receiving a blood transfusion 4. Being bitten by a mosquito or other insect* 5 Shaking hands with a person who has HIV/AIDS* 6. Sharing plates, forks, or glasses with someone who has HIV/AIDS* 7. Having sex without a condom with someone who has HIV/AIDS 8. Sharing needles for ear piercing with someone who has HIV/AIDS 9. A mother can pass HIV to her baby through breast-feeding 10. A mother can pass HIV to her baby when giving birth *Treatment/Testing Knowledge (agree/disagree):* 1. HIV/AIDS is a sickness that attacks the immune system 2. There is a cure for HIV/AIDS* 3. There are medications that allow a person infected with HIV to live longer 4. You are confident that health care professionals in Canada always keep results of HIV tests confidential 5. You always have to give your name when you get an HIV test in Canada* 6. You know where to go to get an HIV test if you wanted one in Canada A single knowledge score was calculated by adding one point for every response of 'true/agree' to statements without asterisks and one point for every response of 'false/disagree' to statements with asterisks. Greater scores indicated more knowledge of HIV/AIDS.	Score ranging from 0 to 16.

32. Access to Health Care	A single variable was created to assess participants' level of access to health care. Several survey items, described below, were incorporated into this measure. 1. Do you have a medical or family doctor? 2. When was the last time you had a physical check-up? a) Never b) Less than 1 year ago c) 1 year to less than 2 years ago d) 2 years to less than 3 years ago e) 3 years to less than 4 years ago f) 4 years to less than 5 years ago g) 5 or more years ago 3. When was the last time you had your blood pressure taken by a health professional? a) Never b) Less than 6 months ago c) 6 months to less than 1 year ago d) 1 year to less than 2 years ago e) 2 year to less than 5 years ago f) 5 or more years ago 4. In the past 12 months in Canada, have you had contact with any of the following professionals concerning your physical or mental health? [do not count when they were an overnight patient] a) Family doctor or general practitioner b) Eye specialist or doctor (ophthalmologist or optometrist) c) Any other specialist medical doctor (such as a surgeon, allergist, orthopaedist, gynaecologist, HIV specialist, or psychiatrist) d) Nurse or nurse practitioner e) Dentist or orthodontist f) Chiropractor g) Physiotherapist h) Social worker, counsellor, or social welfare officer	Score ranging from 0 to 5.

	i) Psychologist j) Speech, audiologist, or occupational therapist k) Dietician/nutritionist l) Other (specify) 5. During the past 12 months in Canada, was there ever a time when you felt that you needed health care but you did not receive it? This includes times you did not try to access health care, but felt you should have. An 'Access to Care' Score was created by adding ▪ One point if the participant had a family doctor ▪ One point if had a physical check-up in the past year ▪ One point if had blood pressure taken within the past year ▪ One point if they had contact with any health care professional in the past year ▪ One point if they reported that there had NOT been a time in the past year when they thought they needed health care but did not receive it. Greater scores indicate more access to health care.	
33. Importance of Testing	How important do you think it is for people to know if they have HIV/AIDS by getting tested? Would you say… [only read 1st three options]	1 Very important 2 Somewhat important 3 Not at all important 4 Depends on risk (please specify) 7 Don't know 9 Declined
34. Doctor's Recommendation for testing	Has a doctor or other health care provider ever suggested you get an HIV test?	0 No 1 Yes 7 Don't know for sure 9 Declined
35. Tested for Immigration	Have you ever been tested for HIV for immigration purposes?	0 No 1 Yes 7 Don't know for sure 9 Declined

Appendix J:
Codebook for Open-ended Text Variables

CODEBOOK #1:

"Other" reasons for deciding to get tested for HIV?

Vague reasoning around wanting to know status (i.e., wanted to know status/Confirm negative status/make sure they are healthy/peace of mind)

1. Prenatal Testing
2. Family Planning (to know status before becoming pregnant/starting family)
3. Beginning a new relationship (does not indicate so condoms do not have to be used)
4. Part of a regular health check-up
5. Regular tester
6. Works in the medical profession – high risk of exposure (does not include needlestick injuries)
7. Work-related needlestick injury
8. Non-work related needle exposure
9. May have been exposed through non-sexual/non-needle/non-work related means
10. Had symptom of a sexually transmitted infection
11. Other reasons (clear response, but does not fit into any of the above categories)
12. Vague Response (unclear response, not sure what respondent meant)
13. Recode into one of the previous responses *(do not code responses as 14 – use sub-categories)*
    - 13.1. Might have been exposed through sexual activity
    - 13.2. Partner was/is HIV positive
    - 13.3. Might have been exposed through sharing needles
    - 13.4. Partner had sex with other people
    - 13.5. Might have been exposed through blood transfusion
    - 13.6. Signs or symptoms of HIV/AIDS
    - 13.7. Wanted to make sure you were HIV- so you and you partner could have sex without condoms.

CODEBOOK #2:

Why did your doctor suggest an HIV test?

1. Prenatal screening
2. Symptoms
3. Part of general health check-up
4. Partner was pregnant
5. Preparation for surgery
6. Other reasons (clear response, but does not fit into any of the above categories)
7. Vague Response (unclear response, not sure what respondent meant)

CODEBOOK #3:

Please tell me why you have not had an HIV test to date (responses to open-ended question).

1. Not psychologically prepared/scared
2. Afraid that an HIV positive test may affect immigration status
3. Do not trust health professionals to keep test results confidential
4. Afraid of how community would treat him/her if he/she tested positive.
5. Afraid of how his/her partner would react if he/she tested HIV positive
6. Don't need to test because he/she feels healthy
7. Never really thought about getting tested
8. Doesn't think he/she is at risk for HIV *(do not code responses as "8" – use sub-categories)*
    - 8.1. I am not at risk/I have not been exposed to HIV
    - 8.2. Only has one sexual partner
    - 8.3. Partner is faithful/Partner does not have sex with other people
    - 8.4. Trusts partner/past partners
    - 8.5. Not sexually active
    - 8.6. Uses condoms/no unprotected sex
    - 8.7. Uses condoms/no unprotected sex with casual partners
    - 8.8. Careful/takes precautions (does not specifically refer to condom use)
    - 8.9. Has had few sexual partners/no casual partners
    - 8.10. Does not use drugs/inject drugs/share needles
    - 8.11. Has not had a blood transfusion
    - 8.12. Sex partners were not HIV-positive (but does not indicate that these partners actually tested negative)
9. Didn't know where to go for a test.
10. Couldn't take the time off to go for a test.
11. Has just not gotten around to testing/is lazy
12. Sex partner tested negative for HIV, therefore participant assumes he/she is also negative.
13. I know I am not HIV+/I don't think I am HIV+
14. It is not necessary for me to test/There is no reason for me to test
15. Doctor never suggested an HIV test
16. Other reasons (clear response, but does not fit into any of the above categories)
17. Vague Response (unclear response, not sure what respondent meant)

CODEBOOK #4:

Why don't you think you are at risk? (responses to probe in close-ended question)

1. I have not been exposed to HIV/I have not done anything that puts me at risk
2. Only has one sexual partner
3. Partner is faithful/Partner does not have sex with other people
4. Trusts partner/past partners
5. Not sexually active
6. Uses condoms/no unprotected sex
7. Uses condoms/no unprotected sex with casual partners
8. Careful/takes precautions (does not specifically refer to condom use)
9. Has had few sexual partners/no casual partners
10. Does not use drugs/inject drugs/share needles
11. Has not had a blood transfusion
12. Sex partners were not HIV-positive (but does not indicate that these partners actually tested negative)
13. Other reasons (clear response, but does not fit into any of the above categories)
14. Vague Response (unclear response, not sure what respondent meant)

Appendix K:
Model Building for Logistic Regression Model to Predict Having Ever Tested for HIV

	Full Model		Individual Blocked Models[b]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**
Sociodemographic Variables			***Sociodemographic Model***					
Age		0.6326		0.1149		0.7894		0.1296
≤25 Years	0.42 (0.07-2.50)		0.33 (0.10-1.03)		0.71 (0.18-2.75)		0.32 (0.10-1.05)	
26 to 45 Years *(ref)*	1.00		1.00		1.00		1.00	
≥46 Years	0.99 (0.21-4.64)		0.57 (0.19-1.73)		0.72 (0.22-2.32)		0.54 (0.18-1.59)	
Gender		0.9468		0.1234		0.9493		0.2842
Male *(ref)*	1.00		1.00		1.00		1.00	
Female	0.96 (0.27-3.43)		0.52 (0.22-1.20)		1.04 (0.36-2.97)		0.62 (0.26-1.49)	
Ethnicity		0.0396		0.0455		0.0381		0.0395
Ethiopian	0.02 (<0.01-0.29)		0.04 (<0.01-0.33)		0.03 (<0.01-0.29)		0.03 (<0.01-0.28)	
Kenyan	0.02 (<0.01-0.31)		0.08 (<0.01-0.68)		0.05 (<0.01-0.49)		0.07 (<0.01-0.63)	
Somali	0.04 (<0.01-0.99)		0.04 (<0.01-0.45)		0.05 (<0.01-0.55)		0.05 (<0.01-0.58)	
Tanzanian	0.18 (<0.01-8.85)		0.14 (<0.01-2.64)		0.16 (<0.01-3.97)		0.14 (<0.01-3.10)	
Ugandan *(ref)*	1.00		1.00		1.00		1.00	
Religion		0.3014		0.6114	-	-	-	-
Muslim	2.74 (0.41-18.50)		0.75 (0.24-2.30)					
Non-Muslim *(ref)*	1.00		1.00					
Marital Status		0.3383		0.5745	-	-	-	-
Married/Common-Law	0.45 (0.09-2.22)		0.89 (0.29-2.71)					
Widowed/Divorced /Separated	1.55 (0.18-13.46)		1.85 (0.39-8.79)					
Single *(ref)*	1.00		1.00					
Education	0.90 (0.61-1.32)	0.5750	1.09 (0.82-1.46)	0.5564	-	-	-	-
Personal Income	1.22 (0.88-1.69)	0.2313	1.17 (0.91-1.49)	0.2148	1.05 (0.82-1.36)	0.6952	1.21 (0.97-1.50)	0.0995

	Full Model		Individual Blocked Models[b]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**
Years in Canada	0.86 (0.78-0.94)	0.0006	0.89 (0.84-0.96)	0.0009	0.87 (0.81-0.94)	0.0006	0.89 (0.84-0.95)	0.0007
Behavioural Variables			***Behavioural Model***					
Freq. of Heavy Alcohol Consumption	1.64 (0.84-3.25)	0.1523	1.50 (0.95-2.37)	0.0856	1.53 (0.86-2.73)	0.1514	-	-
# Lifetime Sex Partners		0.4353		0.0611		0.4126	-	-
0 Partners	0.06 (<0.01-2.29)		0.04 (<0.01-0.34)		0.03 (<0.01-1.25)			
1 Partners	1.52 (0.29-8.03)		0.59 (0.22-1.61)		0.91 (0.25-3.29)			
2-4 Partners	0.72 (0.17-3.07)		0.94 (0.37-2.37)		1.14 (0.34-3.79)			
5+ Partners *(ref)*	1.00		1.00		1.00			
Don't Know/Declined	0.55 (0.04-7.11)		0.42 (0.08-2.28)		0.58 (0.07-4.79)			
Believes Partner had Concurrent Sex (12 mo)		0.4440		0.0698		0.3400	-	-
No *(ref)*	1.00		1.00		1.00			
Yes	0.39 (0.04-3.72)		0.93 (0.24-3.70)		0.47 (0.08-2.97)			
Don't Know	2.32 (0.53-10.19)		4.79 (1.47-15.64)		2.73 (0.74-10.02)			
Not Applicable	0.85 (0.20-3.60)		1.41 (0.56-3.57)		1.04 (0.32-3.34)			
Ever Diagnosed with STI		0.2339		0.5169		0.1990	-	-
No *(ref)*	1.00		1.00		1.00			
Yes	3.87 (0.42-36.33)		1.49 (0.45-4.95)		3.15 (0.55-18.13)			
Travel to Africa	1.62 (1.15-2.29)	0.0062	1.29 (1.03-1.62)	0.0265	1.55 (1.12-2.13)	0.0074	-	-
Psychosocial Variables			***Psychosocial Model***					
Time spent with Community		0.2377		0.8053	-	-		0.6942
None/Some *(ref)*	1.00		1.00				1.00	
Most/All	0.49 (0.15-1.61)		0.91 (0.44-1.89)				0.84 (0.34-2.05)	
# Close Family Members in GTA	1.39 (0.79-2.43)	0.2544	0.82 (0.60-1.12)	0.2009	-	-	1.08 (0.73-1.59)	0.6930

	Full Model		Individual Blocked Models[b]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**	**OR ($CI_{.95}$)**	**p-value[c]**
Individual Perceived Risk		0.7177		0.4985				
No Risk *(ref)*	1.00		1.00f		-	-	-	-
Low Risk	1.69 (0.42-6.78)		1.60 (0.68-3.76)					
High Risk	2.28 (0.16-32.17)		1.63 (0.45-5.94)					
Community Perceived Risk		0.6566		0.6544	-	-	-	-
Not a Problem *(ref)*	1.00		1.00					
Minor Problem	1.72 (0.27-10.84)		1.07 (0.30-3.78)					
Major Problem	3.31 (0.45-24.24)		0.90 (0.25-3.23)					
Don't Know	2.84 (0.42-19.09)		1.72 (0.44-6.78)					
Know Anyone with HIV/AIDS		0.0633		0.0009	-	-		0.0400
No *(ref)*	1.00		1.00				1.00	
Yes	2.97 (0.94-9.37)		3.61 (1.70-7.69)				2.61 (1.05-6.54)	
Stigma Score	0.90 (0.63-1.28)	0.5442	0.90 (0.71-1.15)	0.3859	-	-	-	-
Knowledge Score	1.10 (0.82-1.48)	0.5196	1.17 (0.95-1.43)	0.1336	-	-	1.17 (0.94-1.47)	0.1653
Access to Care	1.67 (0.94-2.98)	0.0806	1.41 (1.00-1.98)	0.0513	-	-	1.70 (1.10-2.64)	0.0174
Ever Received Recommendation to Test from Health Professional[d]	-	-	-	-	-	-	-	-

Note: Only those participants who came to live in Canada before 2002 were included in these analyses.

[b] This column contains three separate models: 1) sociodemographic model, 2) behavioural model, 3) psychosocial model. Each of these models was run separately and does not include any variables from the other blocks of variables.

[c] *p*-value reported for Wald chi-square statistic

[d] This variable could not be included in analyses because it resulted in quasi-complete separation of data points (all persons who reported receiving a recommendation also reported ever testing).

Appendix L:
Model Building for Logistic Regression Model to Predict Repeat Testing

	Full Model		Individual Blocked Models[a]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**
Sociodemographic Variables			***Sociodemographic Model***					
Age		0.0104		0.0997		0.0674		0.0075
≤25 Years	0.10 (0.02-0.60)		0.52 (0.17-1.62)		0.51(0.15-1.72)		0.16 (0.04-0.68)	
26 to 45 Years *(ref)*	1.00		1.00		1.00		1.00	
≥46 Years	0.18 (0.04-0.90)		0.39 (0.15-1.01)		0.30 (0.10-0.90)		0.25 (0.08-0.81)	
Gender		0.1747		0.4297		0.3610		0.8845
Male *(ref)*	1.00		1.00		1.00		1.00	
Female	2.56 (0.66-9.91)		0.73 (0.33-1.60)		1.53 (0.61-3.83)		1.08 (0.39-3.02)	
Ethnicity		0.0735		0.0079		0.0233		0.0630
Ethiopian	21.02 (1.55-284.97)		4.79 (0.90-25.49)		4.20 (0.76-23.31)		11.56 (1.40-95.64)	
Kenyan	0.22 (0.04-1.19)		0.44 (0.18-1.08)		0.36 (0.13-0.97)		0.46 (0.15-1.42)	
Somali	0.88 (0.08-10.39)		0.17 (0.04-0.71)		0.22 (0.04-1.07)		0.69 (0.11-4.22)	
Tanzanian	0.25 (0.03-2.36)		0.78 (0.21-2.88)		0.75 (0.17-3.44)		0.46 (0.09-2.33)	
Ugandan *(ref)*	1.00		1.00		1.00		1.00	
Religion		0.0518		0.1019		0.0427		0.0226
Muslim	0.12 (0.01-1.02)		0.38 (0.12-1.21)		0.29 (0.09-0.96)		0.17 (0.04-0.78)	
Non-Muslim *(ref)*	1.00		1.00		1.00		1.00	
Marital Status		0.0128		0.0525		0.0153		0.0460
Married/Common-Law								
Widowed/Divorced /Separated	16.30 (2.53-104.86)		2.88 (1.18-7.05)		5.40 (1.69-17.23)		4.72 (1.33-16.75)	
Single *(ref)*	3.69 (0.57-23.93)		1.36 (0.42-4.45)		1.75 (0.47-6.48)		1.81 (0.42-7.78)	
	1.00		1.00		1.00		1.00	
Education	0.86 (0.56-1.34)	0.5060	1.05 (0.80-1.37)	0.7433	-	-	-	-
Personal Income		0.0113		0.0311		0.0106		0.0441
<$10,000								
$10,000 - <$50,000 *(ref)*	1.00		1.00		1.00		1.00	
≥$50,000								

	Full Model		Individual Blocked Models[a]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**
Years in Canada	1.01 (0.89-1.15)	0.8448	0.97 (0.92-1.03)	0.2810	-	-	-	-
Behavioural Variables			***Behavioural Model***					
Freq. of Heavy Alcohol Consumption	1.35 (0.86-2.11)	0.1945	1.45 (1.03-2.03)	0.0321	1.34 (0.96-1.87)	0.0849	-	-
Ever Used Cannabis		0.0350		0.2827		0.1199	-	-
No *(ref)*	1.00		1.00		1.00			
Yes	8.48 (1.16-61.88)		1.98 (0.57-6.91)		2.91 (0.76-11.20)			
Believes Partner had Concurrent Sex (12 mo)		0.5578		0.4818	-	-	-	-
No *(ref)*	1.00		1.00					
Yes	2.27 (0.26-19.84)		2.44 (0.55-10.84)					
Don't Know	2.14 (0.44-10.32)		1.17 (0.50-2.76)					
Not Applicable	7.46 (0.35-157.40)		2.78 (0.49-15.68)					
Always Used Condoms with Regular Partner (12 mo)		0.1624		0.0140		0.2731	-	-
No	7.12 (0.85-59.85)		4.25 (1.52-11.85)		2.46 (0.69-8.80)			
Yes *(ref)*	1.00		1.00		1.00			
Not Applicable	6.16 (0.52-73.64)		1.0 (0.20-5.04)		3.83 (0.56-23.77)			
Improper Condom Use (12 mo)		0.0556		0.0568		0.0403	-	-
No Sex in 12 Months	0.04 (<0.01-1.18)		0.94 (0.15-5.73)		0.28 (0.04-1.95)			
Proper Condom Use	1.68 (0.22-12.89)		4.11 (1.39-12.14)		3.08 (0.84-11.32)			
Improper Condom Use *(ref)*	1.00		1.00		1.00			
No Condom Use	0.225 (0.03-1.80)		1.29 (0.45-3.72)		0.60 (0.16-2.33)			
Ever Diagnosed with STI								
No *(ref)*	1.00	0.0706	1.00	0.2049	1.00	0.0661	-	-
Yes	5.46 (0.87-34.35)		1.93 (0.70-5.34)		3.03 (0.93-9.85)			
Travel to Africa	0.91 (0.69-1.20)	0.5038	0.92 (0.78-1.08)	0.2904	-	-	-	-

	Full Model		Individual Blocked Models[a]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**
Psychosocial Variables			***Psychosocial Model***					
Time Spent with Community		0.0040		0.1195	-	-		0.0144
None/Some *(ref)*	1.00		1.00				1.00	
Most/All	0.11 (0.03-0.50)		0.55 (0.25-1.17)				0.27 (0.09-0.77)	
# Close Family Members in GTA		0.1619		0.2220	-	-		0.0984
None	0.09 (0.01-0.87)		0.45 (0.12-1.63)				0.16 (0.03-0.93)	
One	0.08 (<0.01-0.83)		0.44 (0.12-1.67)				0.12 (0.02-0.74)	
2-4	0.11 (0.01-0.97)		0.28 (0.08-0.95)				0.15 (0.03-0.73)	
5+ *(ref)*	1.00		1.00				1.00	
Individual Perceived Risk								
No Risk *(ref)*		0.8568		0.0210	-	-		0.0478
Low Risk	1.00		1.00				1.00	
High Risk	1.43 (0.38-5.43)		2.95 (1.26-6.92)				3.42 (1.20-9.78)	
	1.03 (0.15-7.00)		3.43 (1.06-1.08)				3.41 (0.82-14.21)	
Community Perceived Risk		0.1364		0.0998	-	-		0.0877
Not a Problem	0.02 (<0.01-0.56)		0.20 (0.04-1.12)				0.07 (0.01-0.63)	
Minor Problem	0.50 (0.12-2.08)		0.45 (0.18-1.10)				0.42 (0.13-1.33)	
Major Problem *(ref)*	1.00		1.00				1.00	
Don't Know	0.51 (0.13-2.03)		0.98 (0.39-2.44)				0.74 (0.23-2.36)	
Stigma Score	0.64 (0.38-1.06)	0.0850	0.65 (0.49-0.87)	0.0041	-	-	0.89 (0.61-1.29)	0.5312
Knowledge Score	1.00 (0.71-1.40)	0.9764	1.11 (0.90-1.38)	0.3173	-	-	-	-
Access to Care	1.22 (0.73-2.03)	0.4489	1.40 (0.99-1.96)	0.0539	-	-	1.35 (0.91-2.00)	0.1343
Ever Received Recommendation to Test from Health Professional		0.0302		0.0035	-	-		0.0483
No *(ref)*	1.00		1.00				1.00	
Yes	8.26 (1.22-55.72)		5.08 (1.71-15.11)				3.85 (1.01-14.67)	

	Full Model		Individual Blocked Models[a]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**
Tested for Immigration Purposes		0.0005		0.0002	-	-		0.0002
No *(ref)*	1.00		1.00				1.00	
Yes	18.57 (2.22-155.66)		3.35 (1.34-8.35)				6.62 (1.91-22.98)	
Don't Know	0.25 (0.02-3.04)		0.26 (0.07-1.00)				0.18 (0.04-0.96)	

[a] This column contains three separate models: 1) sociodemographic model, 2) behavioural model, 3) psychosocial model. Each of these models was run separately and does not include any variables from the other blocks of variables.
[b] *p*-value reported for Wald chi-square statistic

Appendix M:
Model Building for Logistic Regression Model to Predict Independent Versus Directive Testing

	Full Model		Individual Blocked Models[a]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]
Sociodemographic Variables			***Sociodemographic Model***					
Age		0.8382		0.5742		0.9045		0.3463
≤25 Years	1.50 (0.33-6.70)		1.14 (0.43-3.05)		1.27 (0.43-3.78)		1.07 (0.34-3.35)	
26 to 45 Years *(ref)*	1.00		1.00		1.00		1.00	
≥46 Years	0.80 (0.20-3.18)		0.61 (0.23-1.61)		0.94 (0.32-2.75)		0.45 (0.15-1.33)	
Gender		0.2859		0.1906		0.0463		0.1966
Male *(ref)*	1.00		1.00		1.00		1.00	
Female	1.83 (0.60-5.53)		1.56 (0.80-3.05)		2.37 (1.01-5.54)		1.74 (0.75-4.02)	
Ethnicity		0.1294		0.0247		0.0802		0.1039
Ethiopian	1.97 (0.37-10.50)		2.69 (0.91-7.96)		2.75 (0.83-9.05)		2.75 (0.73-10.38)	
Kenyan	0.84 (0.25-2.85)		1.79 (0.80-4.03)		1.44 (0.60-3.45)		1.44 (0.55-3.75)	
Somali	0.08 (0.01-0.82)		0.31 (0.08-1.23)		0.26 (0.05-1.27)		0.29 (0.06-1.43)	
Tanzanian	1.23 (0.22-7.00)		0.65 (0.20-2.14)		0.81 (0.23-2.89)		0.69 (0.18-2.67)	
Ugandan *(ref)*	1.00		1.00		1.00		1.00	
Religion		0.2181		0.8429		0.5694		0.7257
Muslim	2.58 (0.57-11.71)		1.11 (0.38-3.25)		1.41 (0.43-4.55)		1.24 (0.37-4.20)	
Non-Muslim *(ref)*	1.00		1.00		1.00		1.00	
Marital Status		0.0042		0.0030		0.0385		0.0056
Married/Common-Law	0.17 (0.04-0.66)		0.28 (0.13-0.61)		0.31 (0.12-0.79)		0.24 (0.09-0.66)	
Widowed/Divorced/ Separated	2.10 (0.37-11.85)		0.77 (0.24-2.41)		0.79 (0.24-2.67)		1.24 (0.33-4.67)	
Single *(ref)*	1.00		1.00		1.00		1.00	

	Full Model		Individual Blocked Models[a]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**	**OR ($CI_{.95}$)**	**p-value[b]**
Education		0.0676		0.3114		0.0733		0.4198
Secondary Education or Less *(ref)*	1.00		1.00		1.00		1.00	
Some/Completed Post Secondary	1.07 (0.28-4.12)		1.32 (0.53-3.28)		1.42 (0.51-3.93)		0.86 (0.30-2.45)	
Post Graduate Degree/Diploma	4.93 (0.89-27.43)		2.52 (0.73-8.72)		4.31 (1.08-17.17)		1.79 (0.46-6.99)	
Years in Canada	0.96 (0.88-1.06)	0.4531	1.06 (1.00-1.12)	0.0349	1.05 (0.99 -1.12)	0.1030	1.03 (0.96-1.11)	0.4548
Behavioural Variables			***Behavioural Model***					
Freq. of Heavy Alcohol Consumption	1.23 (0.83-1.81)	0.3044	1.17 (0.89-1.52)	0.2576	-	-	-	-
Ever Used Cannabis		0.0092		0.0101		0.0452	-	-
No *(ref)*	1.00		1.00		1.00			
Yes	8.71 (1.71-44.48)		3.88 (1.38-10.92)		3.03 (1.02-8.95)			
Chat		0.6610		0.8390	-	-	-	-
No *(ref)*	1.00		1.00					
Yes	0.69 (0.13-3.61)		0.90 (0.31-2.71)					
# Lifetime Sex Partners		0.1475		0.1588		0.1933		
0-1 Partners	2.57 (0.54-12.14)		1.39 (0.51-3.80)		0.63 (0.19-2.09)			
2-4 Partners	4.52 (1.26-16.25)		2.36 (1.11-5.01)		1.95 (0.79-4.82)			
5+ Partners *(ref)*	1.00		1.00		1.00			
Don't Know/Declined	2.10 (0.38-11.57)		1.71 (0.52-5.62)		1.17 (0.34-4.09)			
African Sex Partner (12 mo)		0.2230		0.9547		0.9924	-	-
No *(ref)*	1.00		1.00		1.00			
Yes	2.02 (0.65-6.28)		1.02 (0.47-2.21)		1.00 (0.45-2.26)			

	Full Model		Individual Blocked Models[a]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]
Believes Partner had Concurrent Sex (12 mo)		0.2511		0.6581	-	-	-	-
No *(ref)*	1.00		1.00					
Yes	4.27 (0.60-30.45)		1.69 (0.51-5.55)					
Don't Know	3.15 (0.89-11.14)		1.25 (0.56-2.79)					
Not Applicable	1.80 (0.23-13.87)		0.65 (0.16-2.73)					
Improper Condom Use (12 mo)		0.0096		0.0198		0.0433	-	-
No Sex in 12 Months	2.08 (0.17-24.13)		2.95 (0.58-15.05)		0.81 (0.20-3.25)			
Proper Condom Use	11.87 (2.44-57.79)		3.59 (1.39-9.29)		3.00 (1.02-8.81)			
Improper Condom Use *(ref)*	1.00		1.00		1.00			
No Condom Use	2.92 (0.61-13.95)		1.17 (0.46-2.96)		0.96 (0.30-3.03)			
Ever had Blood Transfusion		0.0074		0.0329		0.1249	-	-
No *(ref)*	1.00		1.00		1.00			
Yes	16.20 (2.11-124.30)		3.77 (1.11-12.77)		2.85 (0.75-10.89)			
Psychosocial Variables			***Psychosocial Model***					
Time spent with Community		0.3068		0.1858	-	-		0.1904
None/Some *(ref)*	1.00		1.00				1.00	
Most/All	0.58 (0.20-1.66)		0.60 (0.28-1.28)				0.55 (0.23-1.35)	
# Close Family Members in GTA		0.3907		0.0954	-	-		0.2047
None	0.25 (0.04-1.58)		0.36 (0.10-1.24)				0.31 (0.07-1.32)	
One	0.18 (0.02-1.35)		0.19 (0.05-0.73)				0.24 (0.05-1.11)	
2-4	0.25 (0.04-1.49)		0.30 (0.09-0.94)				0.25 (0.07-0.93)	
5+ *(ref)*	1.00		1.00				1.00	
# Close Friends in GTA	1.97 (1.16-3.37)	0.0125	1.17 (0.81-1.68)	0.4076	-	-	1.42 (0.92-2.20)	0.1104

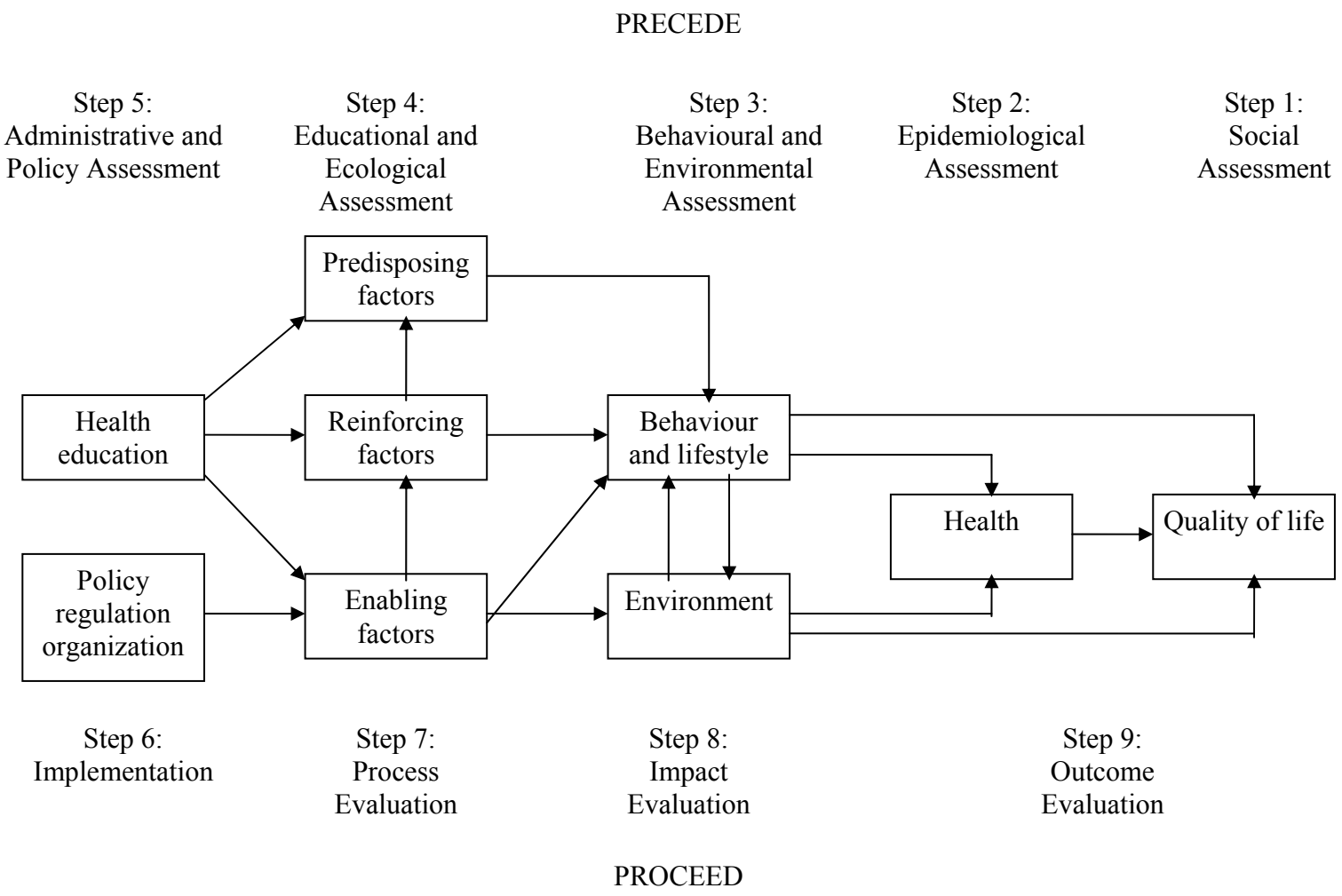
	Full Model		Individual Blocked Models[a]		Sociodemographic/ Behavioural Model		Sociodemographic/ Psychosocial Model	
	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]	OR ($CI_{.95}$)	p-value[b]
Individual Perceived Risk		0.2996		0.1021	-	-		0.1813
No Risk *(ref)*	1.00		1.00				1.00	
Low Risk	1.28 (0.45-3.64)		2.29 (1.07-4.95)				2.08 (0.88-4.91)	
High Risk	0.37 (0.08-1.82)		1.38 (0.50-3.80)				0.96 (0.29-3.20)	
Community Perceived Risk		0.8955		0.4099	-	-	-	-
Not a Problem	0.70 (0.08-6.07)		0.31 (0.06-1.71)					
Minor Problem	0.64 (0.20-2.02)		0.58 (0.24-1.38)					
Major Problem *(ref)*	1.00		1.00					
Don't Know	0.87 (0.26-2.89)		0.86 (0.38-1.93)					
Knowledge score	1.63 (1.16-2.29)	0.0049	1.14 (0.91-1.42)	0.2648	-	-	1.27 (0.98-1.66)	0.0765
Access to care	1.61 (0.97-2.67)	0.0651	1.41 (1.00-2.01)	0.0533	-	-	1.49 (1.01-2.21)	0.0454
Importance of Testing		0.2077		0.3068	-	-		0.4575
Not at All/Somewhat Important *(ref)*	1.00		1.00				1.00	
Very Important	3.49 (0.50-24.33)		2.19 (0.49-9.85)				1.87 (0.36-9.67)	
Ever Received Recommendation to Test from Health Professional		0.0251		0.0111	-	-		0.0168
No *(ref)*	1.00		1.00				1.00	
Yes	0.26 (0.08-0.84)		0.32 (0.14-0.77)				0.29 (0.11-0.80)	
Tested for Immigration Purposes		0.0011		0.0010	-	-		0.0308
No *(ref)*	1.00		1.00				1.00	
Yes	0.14 (0.03-0.67)		0.30 (0.13-0.69)				0.48 (0.15-1.49)	
Don't Know	3.54 (0.47-26.78)		1.90 (0.47-7.75)				3.13 (0.59-16.54)	

[a] This column contains three separate models: 1) sociodemographic model, 2) behavioural model, 3) psychosocial model. Each of these models was run separately and does not include any variables from the other blocks of variables.
[b] *p*-value reported for Wald chi-square statistic

Appendix N:
Power Calculations for Selected Independent Variables using Sample Distributions and Alpha (0.05, 2-tailed)

	Ever Testing		Repeat Testing		Independent Testing	
	N=202	N=500	N=204	N=500	N=204	N=500
Age	0.98	1.00	0.40	0.79	0.24	0.54
Gender	0.61	0.94	0.18	0.36	0.77	0.99
Ethnicity	0.97	1.00	1.00	1.00	0.94	1.00
# Lifetime Sex Partners	0.96	1.00	0.22	0.49	0.33	0.69
Ever Diagnosed with STI	0.34	0.68	0.48	0.85	0.05	0.05
Time Spent with Community	0.36	0.71	0.72	0.98	0.23	0.49
Individual Perceived Risk	0.30	0.64	0.79	0.99	0.79	0.99

Appendix O:
The PRECEDE-PROCEED Planning Model



Source: Green & Kreuter, 1999, p.34.