

**Identifying social network correlates of HIV testing
behaviour (VCT uptake) amongst UKZN students.**

Gary Parker

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Declaration

This thesis, unless specifically indicated to the contrary, is my own original work.

Name: _____

Signed: _____

Gary Parker on this the of November 2010.

Thesis supervisor's approval of this thesis for submission

As the candidate's supervisor I have/have not approved this thesis/dissertation for submission.

Signed: _____

Mr V. Solomon

Date: _____

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Abstract

South Africa has the highest burden of HIV and AIDS in the world, yet most of these infected people are unaware of their HIV status. HIV voluntary counselling and testing is shown to have manifold benefits in improving the quality and duration of life of those infected with HIV as well as preventing the spread of infection to HIV negative people. There is a clear need for research into this area.

This study therefore investigates the relationship between the social network correlates of HIV testing behaviour amongst a sample of the student population of the University of Kwa-Zulu Natal, Pietermaritzburg campus, using social network analysis and the theories of social learning and social influence as the lens through which to interpret the results. This was an empirical study using data that was collected using an anonymous, self-complete, all-of-campus student survey. Five hundred and sixty-six participants completed the survey. This study employed a cross sectional design and is based on a secondary data analysis of a larger project. The data were analysed using a stepwise multiple regression. The findings show that social network size and residential diversity of participants' social networks were significantly associated with VCT uptake. Participants with the smallest network size were more likely to have tested for HIV than those with the largest network size, while those with the most residentially diverse networks were more likely to have tested than those with the least diverse networks.

The findings suggest that some aspects of students' social networks influenced the likelihood of having tested for HIV, but social learning and social influence are not bound exclusively to an enabling or constraining role on VCT uptake. In order to better understand their influence, the prevailing social norms and information within a social network need to be established.

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Chapter 1: Introduction

Approximately two thirds (67%) of the global total of 33 million people living with HIV/AIDS live in sub-Saharan Africa. Almost half of all HIV infections occur in people between the ages of 15 and 24 years (UNAIDS, 2010). South Africa has the highest burden of HIV and AIDS in the world, yet the majority of these infected people are unaware of their HIV status (Mwamburi, Dladla, Qwana & Lurie, 2005). Voluntary counseling and testing for HIV infection has been shown to have numerous benefits by serving as an entry point into long term health care, improving the quality and duration of life, preventing the spread of the infection and serving as a vector for health information (Beardsell, 1994; Bhagwanjee, Petersen, Akintola, & George, 2008; Hutchinson & Mahlalela, 2006). Research conducted in 21 higher education institutions in South Africa showed a national prevalence rate of 3.4% amongst the students of those institutions (HEAIDS, 2010).

VCT has been studied in general populations but there is a clear need for sector specific information in this area (ILO, 2004, in Kakoko, Lugoe & Lie, 2006). This study explored the social network characteristics of a sample of the student population of the University of KwaZulu - Natal (UKZN), Pietermaritzburg (Pmb) campus. This took the form of descriptions of the structure and composition of peer networks among the sample of students and an investigation into the potential correlation between these network characteristics and the students' HIV voluntary counselling and testing (VCT) uptake.

VCT uptake is not necessarily based on individual, rational decision-making theories but may, like many other actions, be affected by social influences. Social network theory seeks to understand human behaviour by studying the patterns of ties that link members of social networks (Wellman, 1983). To this end, the study seeks to establish whether the social network size, nature of associations with peers; as well diversity of network peers across gender, race, residence, faculty and other social classifications/institutions influences the students' uptake of VCT. The hypothesis is that those students with larger networks, weaker social ties and a more diverse peer network will be more likely to engage in VCT uptake than those students with less diverse peer networks. This is underpinned by the assumption/hypothesis that students with larger, more diverse peer networks with weaker social ties have

increased access to information and resources in their networks and are therefore more open to social learning regarding VCT uptake. They would therefore be more likely to engage in VCT uptake, whereas those with peers from less diverse contexts will be exposed to less information and resources and subjected to greater social influence regarding VCT uptake.

Montgomery and Casterline (1996) postulate that *social learning* is argued to take place at an interpersonal level when actors in a social context provide information that shape a person's subjective beliefs about the nature and implications of undertaking certain behaviours. These actors may also function as resources to be tapped when a person wants to gather additional information. Social learning may also take place impersonally, when an information set is shaped by communications stemming from impersonal sources, such as mass media and other aggregate social structures. *Social influence* is related to the concepts of social learning and information sets but is nonetheless distinct. This term refers to the effects of interpersonal interactions that obtain their power from factors that are inherently "social" and that are expressed in individuals' preferences. A primary factor amongst those mentioned is the desire to avoid conflict within social groups, which appears to be a primary human motivation (Moscovici, 1985, in Montgomery & Casterline, 1996).

This dissertation begins with a review of relevant literature, in which the scope of the HIV/AIDS pandemic in Africa and South Africa is discussed. The importances of VCT as well as factors that impact on its uptake are then introduced. After outlining the theory of social network analysis, its application in health related studies are addressed. The methodology chapter outlines the study instruments and measures, as well as the data analysis that was employed in the study. It also deals with ethical issues in the study and the methodological limitations. The results section contains tables and graphs that indicate the findings of the study. The discussion chapter addresses the theoretical and practical implications of the study findings, as well as addressing its limitations and recommendations for future research.

Chapter 2: Literature Review

The aim of this chapter is to provide a summary of the body of research around HIV/AIDS in Africa and the value of HIV voluntary counselling and testing (VCT) in impacting on prevention and treatment thereof. The theories of social learning and social influence, their relationship with social network theory and their implications for health preventive behaviours are then outlined and discussed.

The vantage point from which this investigation was done was social network analysis (SNA) and it would therefore be useful to introduce the concept very briefly. Social network analysis is based on the understanding that social networks are constituted by individuals who are tied together by some type of interdependency – be it friendship, marriage, acquaintance or financial obligation. Social network analysis seeks to examine the nature, structure and characteristics of these relationships between individuals in order to understand and predict human action (Wellman, 2007).

2.1 HIV/AIDS in Africa

Sub-Saharan Africa bears a disproportionate burden of HIV infection with an estimated 1.9 million people newly infected with HIV in 2007 (UNAIDS, 2010). Approximately two thirds (67%) of the global total of 33 million people with HIV live in this region, with 75% of all AIDS deaths in 2007 occurring there (UNAIDS, 2010). It is estimated that at least half or more of all HIV infections (almost 7,000 daily) worldwide occur among young people aged between 15 and 24 years (UNAIDS, 2010). The situation is especially serious in developing countries where young people form a significant portion of the population and where the HIV epidemic has been most severe (UNAIDS, 2010). Large numbers of adolescents are being affected by the AIDS epidemic. Research suggests that this can lead to serious psychological, social, economic, and educational problems (Department of Education, 2001; Coombe, 2002, in Hartell, 2005). Universities in Africa have been shown to be high-risk environments (World Bank, 2001 in (Njagi & Maharaj, 2006)).

While the prevalence rate of HIV infection in South Africa is well documented as 10.6% in 2008, research into the prevalence of HIV infection among student

populations is rare both globally and in South Africa (UNAIDS, 2008). The results from these few studies show contrasting prevalence rates and are considered to have questionable reliability due to small the University of the Western Cape shows a 10% prevalence rate among students of both genders (Barnes, 2000). A study conducted on a larger scale in 2000 showed prevalence rates of 1.1% in students at the Rand Afrikaans University (Uys et al., 2002 in HEAIDS, 2010). The most recent prevalence study conducted in 21 higher education institutions in South Africa showed a national prevalence rate of 3.4% amongst the students of those institutions, while the student population of UKZN showed a prevalence rate of 6.1% (HEAIDS, 2010).

2.2 Factors influencing HIV infection

The major focus of HIV/AIDS interventions/preventions has been aimed at behaviour change on an individual level but there is no evidence yet of major behaviour change regarding HIV infection (UNAIDS, 2008). The Health Belief Model (HBM) is the most widely used conceptual framework in explaining health-related preventative behaviours and focuses on the attitudes and beliefs of individuals (Lupton, 1999). The Health Belief Model is a psychological model that attempts to explain and predict health behaviours with respect to individual perceptions such as perceived vulnerability to a risk, perceived self efficacy for undertaking preventative behaviour, and perceived severity of the threat in question (Bauman and Siegel, 1990). Findings from the 1998 South African Demographic and Health Survey suggest was that while awareness and knowledge about HIV and AIDS are high among adolescents in South Africa, substantial behavior change has not been forthcoming (Galloway, 1999).

Airhihenbuwa, Makinwa, Frith and Obregon (1999, in Parker, 2004) ascertained that this type of model does not provide an adequate framework for stimulating behaviour change. For one, this simple understanding of individual knowledge and action fails to take into account the contrasting macro environmental factors such as political, socioeconomic and cultural contexts that dominate respective regions. Added to this, is the assumption that decisions about HIV/AIDS prevention are based on rational choices born out of basic wishes. This is often not the case, especially in areas where the context is rife with gender inequalities and poverty. In instances like these, where

gender power relations are largely biased towards male-dominated decision-making, HIV preventative behaviours may well be overpowered (Shisana, Rice, Zungu, & Zuma, 2010).

In sub-Saharan Africa, women are significantly more likely than men to be infected with HIV (Kaufman, Shefer, Crawford, Simbayi, & Kalichman, 2008). Demographic and health surveys conducted in South Africa between 2005 – 2007 indicate that about 17% of women aged between 15 & 24 are HIV positive while only about 4% of their male counterparts are HIV positive (UNAIDS, 2008). In South African communities, sex is frequently perceived as an arena in which men lead women into sexuality, with the expectation that they will be submissive and passive (Shefer, Ratele, Strebel, & Shabalala, 2005 in (Kaufman, et al., 2008)). Kaufman et al. (2008) conducted a gender attitude survey among South African men being treated at an STI clinic in South Africa. The results showed that masculine ideology is related to sexual relationship power. The nature of the relationship is such that the greater the endorsement of traditional masculine ideology held by the male, the greater his decision making power in the sexual relationship. The model suggests that negative attitudes held by men towards women were associated with risky sexual behaviour among the sample surveyed. Research conducted by Pratt (1972) showed that couples in traditional conjugal relations displayed poorer preventative health behaviours than couples with more egalitarian conjugal relations (Langlie, 1977). Some characteristics of traditional conjugal visits included unequal power in decision making and strong differentiation of sex roles. Research conducted in disadvantaged contexts suggests that the combination of poverty and gender inequality create conditions where high-risk sexual behaviors become prevalent (Masanjala, 2007 in , Shisana, Rice et al. 2010). In southern Africa, there is an association between violence (particularly related to sex) and risks for HIV/STI infection (Ajuon et al. 2002 in Kalichman et al., 2005).

There is a definite and directional relationship between poverty and HIV infection. Analysis of findings from the 2005 South African National HIV Prevalence, HIV Incidence, Behaviour and Communication Survey show that people between the ages of 15 and 24 who reported to often be without cash are more likely to be infected with

HIV than their counterparts who report to never be without cash (Shisana, Rice et al. 2010).

2.3 HIV Counseling and Testing

South Africa is the country with the most people infected with HIV and a vast majority of this HIV-infected population is unaware of their HIV status (Mwamburi, Dladla, Qwana & Lurie, 2005). The benefits of HIV people knowing their HIV status have been well documented and are greater now than ever before. VCT can serve as an entry point into long term health care (Mola et al., 2006). Early detection of the virus can lead to a dramatic improvement in the quality and duration of an infected person's life if combination antiretroviral therapy is initiated. Aside from the significant benefits, as a result of early entry into anti-retroviral therapy, VCT should be conceptualised as part of the continuum of HIV prevention and care (Bhagwanjee, Petersen, Akintola, & George, 2008). A person that knows they are infected is much less likely to unknowingly transmit the disease to others (CASCADE Collaboration, 2000 in Bond, Lauby & Batson, 2005). Voluntary counseling and testing can also serve as an important medium of health information and promotion, stimulating changes in high-risk behaviours for those not infected, and adaptations in behaviour for those already infected (Allen et al., 1992; Beardsell, 1994; De Zoysa et al., 1995; Higgins et al., 1991; Voluntary HIV-1 Counseling and Testing Efficacy Study Group, 2000; Weinhardt et al., 1999; Wolitski et al., 1997, in Hutchinson & Mahlalela, 2006). In addition, one can only disclose one's HIV status to a partner if one knows it (Mwamburi et al., 2005).

It is important to note that there is a current shift from VCT to provider initiated testing (PIT) in the HIV/AIDS prevention and treatment arena. Researchers have raised compelling points for the implementation of provider initiated HIV testing (Leon, Naidoo, Mathews, Lewin, & Lombard, 2010; Strode, van Rooyen, Heywood, & Abdool Karim, 2005). These authors argue that routine PIT would allow more HIV infected people to gain access to treatment because it would capture those clients who are vulnerable to HIV infection but do not consider themselves to be at risk (ibid). Results from the Leon *et al.*, study show that provider initiated testing in clinical settings significantly increased the proportion of patients with sexually transmitted infections who tested for HIV (2010). This finding is echoed by research conducted

into the effectiveness of provider initiated testing in family planning services (Liambila et al., 2009). This study's results showed that, following the implementation of provider initiated testing, the proportion of clients requesting HIV testing increased significantly from 1% to 26% (ibid).

HIV-1 voluntary counselling and testing has been shown to be efficacious in promoting behaviour change – particularly with reducing unprotected intercourse between people: a randomized trial conducted across three sites in Kenya, Tanzania and Trinidad sought to determine the efficacy of VCT in reducing unprotected intercourse ("Efficacy of voluntary HIV-1 counselling and testing in individuals and couples in Kenya, Tanzania, and Trinidad: a randomised trial," 2000). Participants were randomly assigned into one of two study arms – one received HIV-1 VCT and the other basic health information. The results show that, in the VCT arm, the proportion of males reporting unprotected intercourse with non-primary partners declined by 35% while only 13% of those participants receiving only health information showed a reduction in unprotected intercourse. Amongst the female participants, 39% of the participants in the VCT arm showed a reduction in unprotected intercourse, against the 17% showing reduction with only health information. A longitudinal cohort study with a VCT arm and a non-VCT arm was conducted in central Mozambique (Mola, et al., 2006). Interviews around sexual activity were conducted at baseline, 4 months after VCT and 6 months after VCT in order to establish whether VCT contributed to positive health behavior change. The results indicate that, while condom use increased over time in both arms, participants in the VCT arm reported more frequent use of condoms during sexual activity.

These arguments have not been without controversy as some studies suggest the efficacy of VCT uptake is limited to achieving secondary prevention goals and does not appear to be an effective means for primary prevention (Wilson, Levinson, Jaccard, Minkoff & Endias, 1996; Landis, Earp & Koch, 1992; Ickovics, Morrill, Beren, Walsh & Rodin, 1994 in Solomon, Van Rooyen, Griesel, Gray, Stein & Nott, 2004). Additionally, there may be negative social consequences such as the disruption of relationships, stigma and discrimination (The Voluntary HIV-1 Counseling and Testing Efficacy Study Group, 2000).

While HIV testing behaviour and characteristics associated with it, has been studied amongst the general population, there is an obvious lack of sector specific information – particularly the student population of South Africa. This is reiterated by the International Labour Organisation, who expresses the need for studies that “contribute specifically to the multilateral effort to combat HIV/AIDS” (ILO, 2004, in Kakoko, Lugoe & Lie, 2006, p.554).

2.4 Uptake of VCT

In 2005, research into VCT uptake was undertaken in 12 countries whose population account for 47% of people living with HIV/AIDS in sub-Saharan Africa (Matovu & Makumbi, 2007). From this survey, it was revealed that only 12% of men and 10% of women (median percentages) had been tested for HIV and received their results (WHO/UNAIDS/UNICEF, 2007 in (Matovu & Makumbi, 2007)). Broader research suggests that as much as 80% of people living with HIV/AIDS in sub-Saharan Africa are not aware of their sero-status (UNAIDS, 2004).

VCT uptake amongst student populations in Africa is substantially higher than that of the general population. Research conducted among medical students in Nigeria showed that 50.7% of those surveyed had ever been tested for HIV (Daniyam, Agaba, & Agaba, 2010). A study conducted among medical students in Tanzania showed that 43.3% of students surveyed had ever had an HIV test (Vermeer, Bos, Mbwambo, Kaaya, & Schaalma, 2009). A national survey of Higher Education Institutions in South Africa to determine the prevalence of HIV infection among staff and students was conducted by the Higher Education AIDS Programme (HEAIDS) in 2008/2009 (HEAIDS, 2010). The findings of this research showed that 46% of the national student population had ever had an HIV test, while 42% UKZN’s student population had ever had an HIV test.

There are a number of factors that impact on the uptake of VCT. The commonest of these include lack of access to VCT services, lack of perceived risk and fear of stigma and discrimination (Kalichman & Simbayi, 2003 in (Matovu & Makumbi, 2007). Ironically, participating in VCT and the disclosure of one’s sero-status plays a vital

social role in reducing the stigma and discrimination around HIV/AIDS (King, 1999 in (Njagi & Maharaj, 2006)).

While knowledge of VCT is a powerful predictor of VCT uptake, the conventional approach of predicting behaviour change based on individual factors in the area of health preventative behaviour has been inadequate (Wringe et al., 2008). Studies conducted amongst Ugandan youths between the ages of 14-21, show that youth learn and decide about VCT uptake in the context of their peers and surroundings. A case study in Tanzania indicates that for many people who participate in VCT, family, friends and other members of their community played a significant role in recommending VCT services (Mamn et al., 2001 in Njagi & Maharaj, 2006).

Decisions to attend VCT services are thus not individually occasioned (Bufumbo & Kirumira, 2002). Research in Nigeria shows that the promotion of couples voluntary counselling and testing through distribution of written invitations by Influence Network Agents resulted in a dramatic increase in the number of couples seeking Voluntary HIV Counselling and Testing (Kibrell, 2003; Beyer, 2004). Social network factors were associated with wanting to know HIV status in South African rural areas (Mwamburi, Dladla, Qwana, Lurie 2005).

While individual correlates of VCT uptake are fairly well documented, there is a gap in the literature with regard to the social network correlates of VCT uptake amongst the student population, especially in South Africa.

2.5 Social learning and social influence

Social learning theory has its roots in the discipline of psychology – particularly in the areas of behaviourism and social psychology. Behaviourism is based on the belief that observable human (and animal) action can be explained by analysing a series of stimulus-response sequences. Stringent behaviourism supports a direct and unidirectional pathway between stimulus and response, while social learning theory advocates that there are mediating factors between these two poles (Stone, 1998).

There have been a variety of perspectives on social learning theory, all of which share 3 basic precepts:

- a) The consequences of a response – such as reward or punishment – will influence the likelihood of a person performing a particular behaviour in a given situation;
- b) humans are capable of learning through observing other's behaviour (vicarious learning) and
- c) humans are most likely to model their behaviour on others that they identify with. The extent to which one identifies with another is dependent on how similar the other is perceived to be to the individual in question.

Two of the most prominent thinkers in this school of thought have been Albert Bandura and Ronald Akers. Bandura was mainly focused on the cognitive aspect of mediation between stimulus and response. Akers' combined the operant conditioning of the classical behaviourists with the observational learning put forward by Bandura (Akers & Lee, 1996; Stone, 1998). He believes the processes involved in learning conforming behaviour are the same as those involved in learning deviant behaviour. This is useful for investigating public health issues. Because of its focus on learning conforming and deviant behaviour, Akers' social learning theory has been extensively used in explaining adolescent substance abuse (Akers & Lee, 1996; Stone, 1998).

Social learning can be understood to take place when actors in a social network provide information that plays a role in shaping an individual's beliefs about a certain

decision or action. Montgomery and Casterline (1996) provide a useful outline and explanation of the concepts of social learning and social influence in the context of fertility patterns and transitions. These constructs are based on the premises posited by sociologists that individuals are situated in varying structures of social interaction and that these structures exert influence that shape individual beliefs and/or norms. Montgomery and Casterline (1996) hinge their discussion on two premises: firstly, that individuals need to make decisions in environments that contain uncertainty and secondly, that an individual's behaviour is constrained to some degree. Building on these premises, the authors point out that, when individuals are faced with uncertainty around decisions, they seek to reduce the uncertainty by drawing on different sources for information. When making decisions, there are also constraints that make some decisions infeasible. While these constraints often take the form of something tangible, like monetary restrictions, they may also manifest in less quantifiable entities such as social hierarchy or other social influences.

Social learning is described using the example of an individual wanting to make a decision on a certain issue. In weighing the alternatives available to them, they refer to an information set, which is a summary of their knowledge of all the factors that may have a bearing on this decision. This information set also contains measures of uncertainty. Using the example of decision making around contraceptive use, Montgomery and Casterline (1996) outline five general headings under which these factors may be grouped:

1. Price and quality of product/service
2. Equations of motion
3. Measures of uncertainty
4. Command over future resources
5. Remaining constraints or costs.

Knowledge of the price and quality of a product or service is usually created through a combination of different sources: some personal, such as inferences from their own or others experiences and some impersonal, like advertisements and other media external to social interaction. Using a concept engendered by economists, Montgomery and Casterline (1996) suggest that *equations of motion* are central to the decision making process. These equations of motion are said to represent an

individual's perception of the link that exists between a decision or action taken at a certain time point, and the distribution of potential consequences thereof over time. The actions, communications and perceived traits of other individuals are often used in aiding the resolution of the measures of uncertainty that exists in any decision making process (Hedstrom, 1994 in Montgomery and Casterline, 1996). The command over future resources is a major factor especially in this example of contraceptive use. Raising children obviously involves economic investment; therefore, access to resources is a factor that impacts on this decision. There are other constraints and costs involved in decision making – some of which are social.

Social influence shares some constructs with social learning but is distinct in the sense that it describes effects of interpersonal interactions that obtain their power from factors that are inherently “social” (Montgomery & Casterline, 1996). The authors outline four broad categories that manifest:

- a) Avoidance of social conflict. Moscovici (1985 in Montgomery & Casterline, 1996) posits that one of the most powerful of these “social” factors is the desire to avoid conflict within groups. This is because differences in one's attitude, opinion and behaviours from members of one's social group may elicit several undesirable consequences: uncertainty over one's identity as a result of the lack of a stable frame of reference and the perception of differing interests may engender a sense of competition within the group may cause stress over the potential disintegration of the group. Heckathorn (1999) puts forward that the social sanctioning that takes place within social networks can arise either as an individual sanction based control – whereby an agent seeks to reward or punish another actor, or it can arise from network mediated control. The latter entails the network mobilizing itself to exert influence over the individual in response to the perceived collective reward or punishment.

The effect of community level beliefs is shown to be a powerful influence on the beliefs of individuals. A study conducted in China to investigate the effects of individual- and community-level knowledge, beliefs, and fear on stigmatization of people living with HIV/AIDS shows that the effects of beliefs at a community level are much more powerful than the effects of these

same variables at an individual level (Chen, Choe, Chen, & Zhang, 2007). An important note on this point is that this pressure towards “social conformity” is not necessarily diametrically opposed to social change. Experiments in social psychology suggest that deviant minorities can cause the changing of attitudes and beliefs of the majority (Moscovici, 1980 in Montgomery & Casterline, 1996).

- b) “Altruistic” ties. This describes situations where one component’s wellbeing is based (to one degree or another) on the wellbeing of another component in their social system.

- c) Hierarchical influence describes organized roles in society that allow the individuals that occupy them to exert influence over others. The power they exert over others may be due to their ability to sanction social or economic resources, or some deeper cognitive and/or emotional rationale. Either way, it is agreed that these hierarchical positions do exist in society – from parental influence over children, to religious leaders having influence over their followers. Economists perceive these influences as either constraints on individual behaviour, or as a set of undesirable consequences for those who consider behaviour deviant from these norms.

It is important to address SNA’s perspective on normatively guided behaviour. The network critique puts forward that analyses based on normative explanations overlook the ways in which network structures determine opportunities and constraints on behaviour. SNA does not reject the concept of normatively guided behaviour, but concentrates on the structural determination of norms rather than personal attributes and internalized norms (Mullins, 1973 in Wellman, 1983). Granovetter (2005) posits that norms present in denser social networks are clearer, more effectively enforced and adhered to. This is because in a dense social network, ideas, influences and information around ‘proper behaviour’ are more likely to be encountered repeatedly, rehashed and amended. Additionally, deviant behaviour in a dense social network is more difficult to hide and therefore is more likely to be chastised (Granovetter, 2005). Milgram’s (1974) classic experiment suggests

that analyses of structural constraints and opportunities on behaviour can be more fully explained through SNA (Wellman, 1983).

Montgomery & Casterline (1996) suggest that the social learning and social influence can be grouped under a broader concept – *social effect*. A final source of social effect suggested by the authors is *institutional constraint*. At first glance, this may appear too far removed from social learning and influence to be considered in the same group. However, if one considers that, according to social constructionist thinking, institutions are socially constructed, then the institution does indeed function as a medium through which the actions of individuals can affect the beliefs, attitudes and behaviour of others.

The impact of social learning and influence on health service utilisation has only been explored fairly recently. Andersen (1995) developed a model of health service utilisation that was designed to predict and explain health service utilisation. In the initial stages of the development of this model, the unit of analysis was the family. He later shifted the focus of the unit of analysis to the individual. More recently, he posits that the effects of social interactions and networks on health service utilisation lack consideration in empirical work in this area. Deri (2005) supports these thoughts and suggests that factors of an individual's social network are an important component in the utilisation of health services. She puts forward that social network contacts can provide valuable information on the details of the respective health system, can assist in the location of an appropriate health care provider and social networks may affect the perceived usefulness and desirability thereof. She conducted an important piece of research into social network factors that impact on health service utilisation in immigrants in Canada. By using data from national health records as well as questionnaires administered to the target population, she established that social networks play an important role in the utilisation of health services.

One of the criticisms of this type of research is that the contact availability is a proxy and assumes that individuals interact primarily with those living nearby and of the same ethnicity. This makes it difficult to indicate the causation of behaviour between a member of a social network and the network itself (Devillanova, 2008). Deri (2005) deals with this by adopting a methodology outlined by Bertrand et al. (2000 in Deri,

2005). Due to the fact that her sample population were immigrants, she was able to use the amount of people who lived in close proximity and spoke the same language as the participant as a marker of 'available contacts'. Her findings showed that, regarding the initial contact made with a health service provider, an individual's behaviour is affected by the behaviour of others in their social network. In line with the hypotheses of social learning and social influence, she, along with other research conducted around social networks and health service utilisation, posits that social networks affect behaviour through information and norms (Deri, 2005; Devillanova, 2008).

She categorised the results of her study into language groups that showed either high or low health service utilisation. Those language groups that demonstrated high service utilisation and had high contact availability showed increased access to health services. Deri's interpretation of this finding is that it highlights the role of information (2005). Those language groups that showed low levels of service utilisation and high contact availability reflected decreased access to service utilisation. This, she believes, emphasises the influence of norms in influencing behaviour. Her findings suggest that when a practice is common within a homogenous group, the flow of information can lead to increased adoption of that practice by the other group members. Conversely, when a practice is not common within a homogenous group, the normative influence of the group prevents the practice from being adopted by the other group members.

The presence of a social network member who encouraged health screening behaviour was found to be significantly associated with increased intention to participate in health screening behaviour in Americans of Mexican origin (Ashida, Wilkinson, & Koehly, 2010). Latkin (2004) conducted research around the social network correlates of near-fatal overdose in drug users. The results showed that a larger number of injection drug users in a participant's social network was significantly associated with drug overdose in the previous 2 years (Latkin, Hua, & Tobin, 2004). These finding highlights the positive or negative role of social learning and/or social influence in health behaviour.

The theories of social learning and social influence and their implications for health preventive behaviours dovetail with the approach of social network analysis.

2.6 Social network theory and analysis

Theories around dyadic relationships can be found as far back as the time of Descartes (Frie & Reis, 2001, in Kadushin, 2004). These theories address the issue of what extent to which an individual can be conceptualized as isolated from the external world. Descartes' philosophy purports that an individual's relationships follow from the attributes of the individual; other social thinkers like Buber (1923) contend that the individual cannot be understood fully outside of their relation with others (Kadushin, 2004). Using the dyadic relationship as the basic relational unit of analysis overlooks the structural form of social networks (which affects the flow of resources through different ties) and the effect of other ties on these dyadic relationships (Wellman, 1983). Social network analysis (SNA) shifts the focus away from the study of dyadic relationships, but instead hones in on the asymmetric ties interwoven in hierarchical social structures. SNA draws from a vast array of theories and has therefore been employed to address research questions in fields as diverse as psychiatry (Goldberg, Rollins, & Lehman, 2003), management and organisation (Morcol & Wachhaus, 2009), marketing, and even sports management (Quatman & Chelladurai, 2008). Denzin and Lincoln (2005) posit that the traditional distinctions between qualitative and quantitative research and the assumptions underpinning them are less easily distinguishable these days as a result of the integration of postmodern philosophies and modes of inquiry (Quatman & Chelladurai, 2008). In this vein, social network analysis is not bound to any one research paradigm because its theoretical underpinnings draw from such a wide variety of perspective and philosophical traditions.

A social network can be defined as a relatively stable pattern of relationships among "multiple interdependent and self-organizing elements...which also constitutes a self-organizing system as a whole" (Morcol & Wachhaus, 2009, p.45). Social network analysis emerged in the 1950s and 1960s as a method of describing or summarizing data on social ties. It began as a way of graphically representing information in order

to analyse data on social relations (Vera & Schupp, 2006). The majority of sociological research had, up until that time, been centered on the analysis of structural categories and conceptualizations such as age groups, classes and so on. In modern urban society, these categories of social organisation are becoming less and less appropriate as the diversity and geographic mobility of individuals and their “group organisation” transcends the traditional typology (Shulman, 1976). Anthropological study of cultural systems and normative rights is often confined to the relationships between individuals within bounded groups. This approach loses applicability when these relationships intersect these bounded groups or categories (Barnes, 1969 in Wellman 1983). Social network analysis has come to be used to attempt to explain human behavior from a relational perspective as opposed to explanations based only on categorical attributes of units of analysis. In a way, SNA adopts a more abstracted view of the actor in a social context by viewing them as points or nodes that comprise a complex network of ties between these points. This is not to say that SNA does not accept that individuals, or groups thereof, do possess inherent qualities that are meaningful to human action, but rather that the reciprocal relationships between individuals and society is where the focus should be laid when attempting to better understand human action (Vera & Schupp, 2006).

Social network analysis gives precise formal definition to aspects of the political, economic, or social-structural environment. Social network analysis sees the social environment as patterns or regularities in relationships among interacting units. These regular patterns are referred to as *structure*. Social network analysis is based on an assumption of the importance of relationships among interacting units. The theories, models and applications it covers are therefore expressed in terms of relational concepts or processes (Wasserman & Faust, 1994). Network analysis asks questions about who is linked to whom, the content of the linkages, the pattern they form, the relationship between the pattern and behaviour, and the relation between the pattern and other societal factors. Essentially, “the configurations of interlinked, and therefore interdependent, persons and groups are thus taken into account in trying to predict behaviour” (Boissevain, 1979, p.392).

The rationale behind using social networks as the unit of analysis for this study is informed by activity theory, where behaviour is seen to be mediated by factors that

are apparently not determined at the level of individual agency and action, but rather in the social model of action which that person adopts (Kelly, Parker & Warren 2001). Fisher (1988 in Kelly et al., 2001) postulates that when a person's social network has norms and values consistent with a particular way of thinking or acting, the group will exert normative and informational social influence supportive of this way of thinking or acting. Behavioural change within a social network is therefore believed to affect chains of relationships rather than isolated individuals (Kelly et al., 2001). Similarly, Doyal & Harris (1986) talk of the social character of action leading to the role of convention, tradition and rules in the determination of action. They suggest that there are conventions that humans adopt and, in so doing, enact social roles, which are not of our own logic and making. Social network theory produces a view where the attributes of individuals are less important than their relationships and ties with other actors within the network. This approach is functional for explaining many real-world phenomena because by mapping relationships between people using network analysis, informal communication patterns may be uncovered contrasted with their formal counterparts (University of Twente, 2007). The beauty of social network analysis is that it provides a formalised lexis for studying relational constructs and structural properties "that might otherwise be defined only in metaphorical terms" (Wasserman & Faust, 1994 p. 17).

Social network analysis has four theoretical propositions at its core:

- a. "Actors in all social systems are interdependent, not independent
- b. Actors are related through links that channel information, affection and other resources
- c. The structure of those relations both constrains and facilitates action
- d. The patterns of relations among actors define economic, political and social structures" (Wasserman & Faust, 1994, p. 4).

The implications of these assumptions are that individuals' capacities for action in society and the implications thereof are dependent on their individual attributes as well as the network of relations they find themselves embedded in (Vera & Schupp, 2006). Point "d" from the above list highlights the important notion held by SNA that the relationship between individuals and society is reflexive.

Generally speaking, the two main methodologies in SNA are *connectivity oriented* approaches and *positional analysis* (Gould, 2003 in Vera & Schupp, 2006).

Connectivity oriented approaches focus on the frequency and distance of the connections between the nodes in a social network while positional analyses are more concerned with the relative positions of nodes within a social network. The scale of the analysis determines whether a “whole-network” or “egocentric” approach will be used. The whole-network approach is one in which the structure of the entire network under investigation is evaluated to gain insight into social phenomena whereas the egocentric approach is concerned with individual actors and the characteristics of their network (Vera & Schupp, 2006). This study uses an egocentric approach where the participant (ego) is the focal point of the network and the connections to them are investigated (Shulman, 1976).

One of the central tenets of the Health Belief Model (HBM) is that of perceived risk (Lupton, 1999). Studies in Uganda suggest that communication in social networks regarding network members who have become infected with HIV or died from HIV related illness leads to increased personal exposure to consequences of the epidemic, thereby catalyzing the process of behavior change (Helleringer & Kohler, 2005). In this sense, social interactions play a vital role in the formation of the perception of risk to the individual. However, the ability for individuals to learn from the infection, illness and death of members of their social network are somewhat constrained. One of the major factors in this constraint is the long latency period of the illness makes it difficult to conceptualise particular risky sexual behaviours (or lack thereof) to infection and possible illness and death (Helleringer & Kohler, 2005).

The uptake of VCT in South Africa been low: only an estimated 18.4 % - 19% of the population have been tested for HIV and in fact know their serostatus. This low uptake would suggest that the VCT norm is not widely adhered to (Pettifor et al., 2004; Shisana and Simbayi 2002, in Swanepoel, (2006). Social network theory is thus useful and appropriate for answering this research problem as it offers an alternative perspective to the conventional interventions and preventions that have been aimed at an individual level.

2.7 Social network characteristics

This study investigated the impact of four social network characteristics on VCT uptake amongst the sample population: network size, proportion of weak ties, network density and network diversity. Network size is taken to be the number of alters the ego reports as having and network density is calculated as the proportion of actual ties that exist against the number of potential linkages available in the social network (Granovetter, 2005; Kohler, Behrman, & Watkins, 2001). The proportion of weak ties was calculated by dividing the number of “not close” friends by the total number of “close” and “not close” friends reported. For the purposes of this study, network diversity was measured as the proportion of ties reported across different predetermined qualitative categories such as age, gender, race and so on. These factors are all believed to have an effect on the behaviour of the individual. This study focuses on the effects these three properties have on the uptake of VCT of the sample population.

2.7.1 Network Size

Depending on the technique used to measure the number of ties in a person's social network, the size has been reported to range anywhere from 20 – 500 (Fyrand, Moum, Wichstrom, Finset, & Glennas, 2000; Roberts, Dunbar, Pollet, & Kuppens, 2009; Suarez, Lloyd, Weiss, Rainbolt, & Pulley, 1994). If one were to envisage a personal social network as a series of concentric circles grouped hierarchically, the closest friends could be seen to be the first ring around the ego. This inner circle can be understood to be the individuals from whom the ego would see regularly, confide in and receive advice and support from (Roberts, et al., 2009). Milardo (1992) posits that the average number of individuals in this first circle is five (Roberts, et al., 2009). Network size has also been found to have a positive correlation with socioeconomic status. The size of one's social network has been shown to correlate with the proportion of weak ties in that network, with larger networks having a greater proportion of weak ties (Roberts, et al., 2009).

Research investigating the relationship between social network characteristics and cancer screening in US Hispanic women showed that those participants who scored higher on a social network index were more likely to have had routine mammograms and pap smears than those who scored lower (Suarez, Ramirez, Villarreal, Marti, McAlister, Talavera & Perez-Stable, 2000). The social index used was a function of the number of close friends and relatives, frequency of contact and church membership and attendance. These findings are consistent with similar studies into social network correlates of cancer screening among minority women (Kang & Bloom, 1993; Suarez, et al., 1994).

2.7.2 Proportion of Weak Ties

Granovetter (1983) differentiates between “weak” and “strong” ties by suggesting that strong ties are the type that usually exist between family members and close friends and weak ties as the type that usually exist between acquaintances. Strong ties are the alters in a personal network who provide emotional, material and social support to the ego, while weak ties are the more distant acquaintances of the ego (Fischer, 1982 in Roberts et al., 2009). Because weak ties are generally more numerous and heterogeneous, they are posited to be an important access point for ideas, experience and information (Granovetter, 1983). Additionally, close ties generally move in similar circles to the ego, therefore, the information the ego receives tends to overlap with that already known (Granovetter, 2005). Strong ties usually connect a group of homogenous people, while weak ties usually transcend geographic and socio-demographic boundaries. This, coupled with the fact that weak ties generally move in different circles to the ego, means that they provide more novel information.

The presence of weak social ties is postulated to allow for increased information flow and social mobility (Granovetter, 1973). Additionally, Wellman (1983) asserts that availability of resources is to be found at the nodes and ties of one’s social network. In this sense, the larger one’s social network, the greater one’s access to informational, educational, financial and other resources. Birkel and Reppucci (1983) hypothesise that “open networks are more likely than dense networks to provide connections to other social systems, such as professional helping systems (in Montgomery & Casterline, 1996, p. 165). One of the critiques of the “strength of weak ties” theory in facilitating the adoption of preventative health behavior is that it

assumes that behavior can be transmitted simply through exposure (Centola, 2010). Centola (2007) posits that the social behavior is a much more complex process and adoption of a new practice requires multiple exposures and social reinforcement thereof (Centola, 2010).

Devillanova (2008) conducted research into health service utilisation amongst undocumented immigrants in Milan. The findings challenge the viewpoint that weak ties are important for health service utilisation. In this study, he focused on the effects social networks have on the informational component of influencing access to health services. This was done by establishing the referral source of the participants to a particular health service provider, as well as the time spent in the country before first accessing health care. The results showed that participants who were referred by a strong social tie (close friend or family member) reduced the time to first accessing health care by 30% (Devillanova, 2008).

The case for strong ties in influencing preventive health behaviours is echoed by a study among young African American and Latino women (Yee & Simon, 2010). This study investigated the role of social networks in contraceptive decision making. These findings show that close friends, mothers and sisters were the most important source of information as they allowed the participant to vicariously experience the different options of contraception or lack thereof.

Recent research conducted investigating the spread of behaviour through an online social network experiment also challenges the “strength of weak ties” hypothesis (Centola, 2010). In this study, the author created an internet based “health community” in which members would anonymously create a profile and were then matched with partners in the same study. Participants were randomly assigned either to a network with a high level of clustering (density), or a random network in which clustering was minimal. The participants could not contact each other directly but were kept abreast of the health related practices their partners had adopted by receiving invitations from their partners whenever they had adopted a new health practice. The findings indicated that network structure had a significant effect on behavioural diffusion. Networks with a higher level of clustering were more effective in the spread and adoption of health behaviour changes. These findings suggest that

social reinforcement from multiple sources is important in facilitating health preventative behaviour change (Centola, 2010).

While there is evidence both for and against the case for the “strength of weak ties”, the evidence for the role of strong social network ties is limited at this point. A major limitation of the Centola (2010) study, is that it was hypothetical and could not account for interpersonal relationships, social ties and other ‘real-world’ factors that impact on the spread and adoption of health preventative behaviours. For these reasons, the hypothesis of this study was that weak ties are associated with increased VCT uptake.

2.7.3 Network density

Network density represents the degree to which alters in the network are directly linked to one another (Shulman, 1976). It is calculated as the proportion of present ties against the number of possible ties in a network (Quatman & Chelladurai, 2008). A network where the alters are only linked to the ego and not each other can be described as a loose knit network, where a network where most of the alters are directly linked to each other as well as the ego can be described as close knit (Shulman, 1976). Another term for density amongst the alters in a network is network cohesion (Falci & McNeely, 2009). Generally speaking, larger social networks have lower density because there is a limitation on the number of close ties an individual can maintain (Granovetter, 2005).

“Dense networks exert considerable pressure on individuals within them to follow normatively-defined patterns of help-seeking. Depending on the degree to which values within the network concur with those of the professional helping system, this may serve to increase or decrease the likelihood of service utilisation” (Birkel & Repucci, 1983 in Montgomery & Casterline, 1996, p. 165). This position is supported by research conducted in mental health service utilisation which shows that individuals with dense networks were more likely to report coercion into mental health treatment than those with less dense networks (Pescosolido, Gardner, & Lubell, 1998). Bhagwanjee, Petersen et al. (2008) conducted qualitative research into mining-sector workers perspectives on VCT. Their study shows that one of the most powerful factors motivating the high VCT uptake amongst the sample was the group

nature of the testing conducted. This suggests that when testing is a normative behaviour, it is more likely to be adopted by other members of a social group.

2.7.4 Network Diversity

The construct of diversity has been described with a wide variety of terms (and their antonyms) that are often used interchangeably such as heterogeneity, inequality, disparity and dissimilarity. The literature on diversity is itself very diverse in defining the construct. For example, diversity can refer to biological, demographic, psychological or social factors. Social network diversity is a term that has been used fairly loosely in studies of social networks and their implications for health care (Barefoot, Gronbaek, Jensen, Schnohr, & Prescott, 2005). The Social Network Index is one such measure (Cohen, Doyle, Turner, Alper, & Skoner, 2003). This tool assesses participation in 12 types of social relationships including relationships with a spouse, parents, parents-in-law, children, close family members, close neighbors, friends, workmates, schoolmates, fellow volunteers, members of social, recreational or professional groups and members of religious groups. The tool is designed so that one point is assigned for each relationship for which respondents indicate that they speak to at least once every two weeks. This can be in person or telephonically (Cohen et al., 1997). This measure assesses the number of different relationship “types” one is involved with and this is understood to indicate “social network diversity”. In this sense, the more different types of relationships one maintains, the more “diverse” one’s social network is considered to be.

Helleringer and Kohler (2005) posit that when investigating the role and relevance of social interactions in adopting preventative behavior, it is crucial to note that the selection of social network members is not random. Engagement with social network members is often determined by the attitudes and preferences of the ego. They are therefore often selected systematically according to observed and unobserved characteristics. This often results in homophily of the network. The implications of network diversity on preventative health behavior are linked to those of the presence of weak ties. Homophily limits an individual’s social world in ways that impact on

the type of information they receive – the more homophilous their social network, the less novel the information they will receive (McPherson, Smith-Lovin, & Cook, 2001). The diversity of one's social network has been shown to play a significant role in diminishing the prevalent in-group tendencies (Sampson, 1984).

This study evaluates diversity across the categories of gender, race, residence, place of study, study course, social involvement and religion of the Participants "close friends" only. In this sense, the "type" of relationship is not the unit of analysis, but rather the within-unit differences in socio-demographic variables of the ego and alters under investigation. Harrison and Klein (2007) have a useful way of addressing the inconsistencies that arise in the concept of diversity used in social studies. They posit that the differences between individuals can more accurately be understood by distinguishing between *separation*, *disparity* and *variety*. Separation accounts for differences between individuals on a continuous attribute, disparity accounts for differences between individuals on a scale of hierarchy and variety describes the distribution of individuals across qualitative categories. In this study, the construct of diversity is best understood as *variety*. Research conducted around the impact of social network diversity on health preventive behaviours is very limited. A study investigating the role of network diversity suggests that increase in network diversity were associated with decreases in alcohol consumption and smoking (Cohen & Lemay, 2007).

The properties of network size, proportion of weak ties, density and diversity are hypothesised to impact the uptake of VCT in this sample population by affecting the decision making process of the members of the social networks. As mentioned earlier, social learning and social influence are two mechanisms believed to have a pivotal role to play in the decision making and action taking process of humans.

As pointed out in the literature review, the benefits of knowing one's HIV status are manifold; not only in terms of helping prevent further transmission of the virus, but also for the increased longevity and quality of life for infected persons. Establishing which structural factors of students' social networks influence their HIV testing behaviour, will aid in informing the planning, provision and promotion of student health services for the University of KwaZulu Natal as the greater study will provide

the necessary baseline data and estimate key parameters for the preparation of funding applications for a major longitudinal network study with this population. The study will provide analysis of the relationship between individual, social and structural characteristics and health behaviour in relation to HIV among a sexually active population in a high HIV-prevalence setting of a population that has hitherto been unavailable.

Additionally, the Health Belief Model (HBM) that is prevalent in public health today argues that preventive care taken by a person to prevent a particular disease depends on his or her perception and recognition that he or she is personally susceptible and that the disease will have severe implications for them (Lupton, 1999). The perceived threat to the disease is argued to not provide sufficient impulsion for preventive health action since certain modifying dynamics are not only individual, but also socially influenced. Huge amounts of resources have been allocated to intervention strategies with most being aimed at behavioural change on an individual level. While helpful, this type of intervention is argued to not be applicable to all situations, especially those where gender inequality, poverty, and other such factors are rife; ironically this is the case in areas most heavily hit by the HIV/AIDS epidemic. Research between social networks and VCT uptake is scarce, while studies show that social network characteristics have a definite impact on VCT uptake (Mwamburi, Dladla, Qwana, Lurie 2005). To this end, there is a need to better understand the contribution of social network characteristics to the epidemic dynamics and to the likely success of initiatives in the area of both prevention and health service utilisation.

Chapter 3: Methodology

3.1 Aims and Rationale

There is a clear need for a formal framework study among the student population in South Africa, but information at the moment is limited. This particular piece of research is a subsidiary study of a collaborative project between researchers at UKZN, Pietermaritzburg Campus and researchers at the Australian Research Centre in Sex Health and Society at La Trobe University. The two groups concerned recognized the need for better understanding of the social and structural correlates of health seeking and HIV prevention needs of the student population in South Africa. The aim of the overarching study was therefore to provide the baseline data to contribute to further research, whilst providing an immediate benefit in terms of health service planning for the university. This larger study is a network parameter estimation study being undertaken as a pre-cursor to a larger social and sexual network study. As part of this collaboration, the researcher was involved in the design of the questionnaire and was responsible for the initial cleaning and coding of the larger data set. For this study, the researcher conducted his own analysis. As part of the current network study, some health seeking and relationship practices data were collected.

The aim of this specific study was to identify social network correlates of VCT uptake behaviour among a high-risk population.

Questions of demographics, diversity of network partners across different faculties, as well as social institutions within and outside university were posed. The hypothesis was that students with larger social networks, a greater proportion of weak social ties, less dense and more diverse peer networks are more likely to engage in VCT uptake. This is because weak social ties allow for increased information flow and social mobility (Granovetter, 1973). Actors therefore have access to new information and their behaviour is thus more open to social learning as opposed to those students with

smaller, less diverse peer networks and strong social ties who may have behaviour constrained through the social influence of a highly connected network. A stepwise multiple regression was used to assess the correlation between these network characteristics and VCT uptake behaviour.

3.2 Data Collection

This was an empirical study using primary data that was collected using an anonymous, self-complete all-of-campus student survey (see Appendix A). This questionnaire was administered via an online survey with recruitment being accomplished through network posted notices and email invitations to participate. Participants were recruited through automated emails sent via the UKZN server to existing student email addresses. The survey was setup in such a way that students could begin the survey, save their progress if need be, fully complete the questionnaire at a later stage. The survey covered demographics, social network characteristics, health status and health seeking behaviour. The names of reported alters would appear automatically where necessary later in the survey process in order to minimize the reliance on the cognitive recall of the participant. Because social networks are the units of analysis in this investigation, social network analysis was a key model employed. Social network theory (or network analysis) can be understood to be the study of how the social structure of relationships around a person, group or organisation affects beliefs or behaviours (Centola; Deri, 2005; Langlie, 1977). This particular study attempted to identify possible correlations between structural factors of the students' social networks and their HIV testing behaviours. Quantitative data was produced and multiple regression techniques employed. With regard to the overarching study, the two teams of researchers jointly undertook the analysis. The data was stored at the LaTrobe University campus. Analysis consisted of descriptive, correlational and multi-factor regression analyses to address the health service utilisation aims of the study and parameter estimation analysis for the design of the formal network study.

3.2.1 Instruments and Measures

The survey covered three primary domains.

- i. Demographics: Including age, gender, racial identification, measures of socio-economic status, and university club and association membership.
- ii. Social network characteristics: Including size of social network, composition in terms of age, gender, and race, similarity in terms of university study course and residence.
- iii. Health status and health seeking: Including use of health services on and off campus, sources of health information, current health status, HIV testing history, HIV status and disclosure of status and HIV services used if HIV positive.

Participants were asked a number of demographic questions about themselves and were also asked to identify the number of friends in their social network. A distinction was made in the questionnaire between i) the number of close friends and the ii) number of people considered to be friends, but not close friends. The definition of “close friends” is obviously subjective, but the definition given in the questionnaire is “people that you see or talk to regularly and share your personal thoughts and feelings with”. The number of close friends that the participants could report on was 5. Social network sizes vary depending on the technique used to measure the number of ties in a person’s social network. Social network studies show that the size of an individual’s network can range anywhere from 20 – 500 (Fyrand, Moum, Wichstrom, Finset, & Glennas, 2000; Roberts, Dunbar, Pollet, & Kuppens, 2009; Suarez, Lloyd, Weiss, Rainbolt, & Pulley, 1994). Studies suggest that the average number of closest friends to the ego (those the ego would see regularly, confide in and receive advice and support from is five (Roberts, et al., 2009).

For the purposes of the current study, the word “Ego” is used to refer to the participants of the study and the word “Alter” refers to the social network members reported by the participants.

The nature of the relationships between the participant (ego) and these close friends (alters), as well as the relationship between the alters was investigated. The nature of the questionnaire was “alter-wise” as opposed to “question-wise”. The former approach measures the characteristics of each alter individually while the latter asks one question for all alters. The “alter-wise” approach has been shown to have greater validity than the “question-wise” approach because it relies less on cognitive memory when answering the questions (Vehovar, Lozar Manfreda, Koren, & Hlebec, 2008).

The questions were focused on the attributes of the alters across age, race, gender, faculty residence, study course as well as health service utilisation. While some participants recorded that they had more than 5 close friends, this study was only able to investigate the interrelationships between 5 “close” friends mentioned by the participants. Participants who reported zero close friends could not be included in the analyses of network size, proportion of weak ties, density and diversity. This limit of 5 close friends did restrict the reporting of the full extent of the social network characteristics of the ego past their closest friends, but this restriction had to be put in place in order to keep the survey completion time reasonable while asking detailed questions about the nature of these relationships. The second category of friends are defined in the questionnaire as “friends that you would see regularly, but would not consider close friends”.

3.3 Data Analysis

The characteristics of the students' social networks were the independent variables and VCT uptake was the dependent variable. Logistic regression, which models univariate and multivariate relationships, was used to find potential linear combinations of independent variables that predict the dependent variable (Tredoux & Durrheim, 2002). The continuous data elicited from the continuous variables were grouped in such a way that they could be analysed as categorical data. In order to achieve this, continuous data that were measured on a scale between one and zero were categorised on a scale of 1-5 as shown in table 1 in order to model them in a multivariate analysis.

In order to compare the difference effects on VCT uptake between each of the 5 categories, the logistic regression was modelled in such a way that one group was used as the reference category with which all other groups would be compared. In a logistic regression model where categorical or ordinal variables are used, a reference group is selected to compare with other categories (Hosmer & Lemeshow, 2000). The selection of a reference category is dependent upon the hypothesis of the study in question and/or the sample size within each category (ibid). In this study, the hypothesis was that participants with **greater** network, diversity, social & religious involvement would be more likely to have been tested for HIV. Consequently, the category that reflected the greatest network size, diversity etc would be selected as the reference category against which the other categories would be compared in the model. However, the sample size of the category also plays a role in the selection of a reference category. In some instances, those categories that showed the greatest network size, diversity etc had small sample sizes. This can be problematic as the smaller the sample size, the larger the confidence intervals (Hosmer & Lemeshow, 2000). In these instances, the group with the largest sample size was therefore

selected as the reference category in order to keep the confidence intervals as small as possible.

In the multivariate analyses, all independent variables were included in the model.

Continuous Score	Nominal Value
0.0 – 0.19	1
0.2 – 0.39	2
0.4 – 0.59	3
0.6 – 0.79	4
0.8 – 1.0	5

Table 1. Continuous scores of variables and the nominal values assigned.

Four factors of social networks were used in this analysis:

1. Social network size

Participants were asked about the number of “close” and “not close” friends they maintained. Calculations of density and diversity were based on the number and characteristics of the close friends. In order to allow the factors of size, density and diversity to be comparable, the size of the egocentric network was taken to be the number of close friends that the participant reported – with a limit of 5 close friends. This number was selected based on research conducted by Milardo (1992), which suggests that this is the average number of close friends reported in social network surveys (in Roberts, et al., 2009). The size of a participant’s social network was scored on a scale of 0 – 5 in the univariate and 1-5 in the multivariate analysis respectively.

2. Proportion of weak ties in the social network

For the purposes of this study, strong ties were considered to be the number of “close friends” reported by the ego and the weak ties as the number of “not close” friends that the ego reported.

Weak ties were taken to be the number of friends that the participants reported as seeing regularly, but did not consider “close friends”. This is a fairly limited definition of weak ties, as weak ties also extend to friends and/or acquaintances that people see rarely (Granovetter, 1973). Nonetheless, the proportion of weak ties in the ego’s social network was taken to be the ratio of close friends (strong ties) to friends reported as “not close” (weak ties).

3. Social network density

Network density represents the degree to which alters in the network are directly linked to one another (Shulman, 1976). It is calculated as the proportion of present ties against the number of possible ties in a network (Quatman & Chelladurai, 2008). A network where the alters are only linked to the ego and not each other can be described as a loose knit network, where a network where most of the alters are directly linked to each other as well as the ego can be described as close knit (Shulman, 1976). Another term for density amongst the alters in a network is network cohesion (Falci & McNeely, 2009). A density value can only be assigned to networks with at least 2 alters – those respondents with one or less alters were assigned a density score of zero. Network density scores can range on a continuous scale from “0” to “1”. A score of zero indicates a network in which none of the alters are directly connected to one another, while a density score of “1” is used for a network in which all the alters are directly connected to one another (Falci & McNeely, 2009). These continuous scores were categorised on a scale of 1 – 5.

A potential limitation of measuring network density in this study is that the possible kin relations between the ego and the alters were not recorded. It has been suggested by some that kin relationships in network studies be analytically separated from social relations with non-kin (Irving, 1977). The reason that this may be misleading is because kinsfolk tend to know each other whether the social interaction is meaningful or not. This is true of relationships between the ego and the alter, as well as the relationships between the alters. The relationship between alters was recorded and fortunately there were only a handful of cases where kin relationships were present between alters (less than 5).

4. Social network diversity

The diversity of the ego's social network was calculated across the following factors of the alters:

- Gender
- Race
 - Black
 - White
 - Indian
 - Coloured
 - Mixed Race
 - Other

And whether their alters shared any of the following with the ego:

- Tertiary study institution: due to the fact that all participants were students of UKZN, sharing tertiary study institution meant that the alter was also a student at UKZN.
- Residence: the options for places of residence were university residence, rented/shared student accommodation, rented house, own house.
- Study course: this refers to study courses within the UKZN programme.
- Religious institution: the options included Churches, Mosques, and other spiritual or religious gatherings.
- Social institution: these included sports clubs, drinking clubs, dance clubs etc.)

The network diversity of the aforementioned categories was calculated based on the degree to which the alters shared or differed from the ego across the above groupings.

For example, if a participant reported that a high proportion of his social network shared a study course with him or her, the calculated “study course diversity” (explained below) of the participant would be considered low. Alternatively, if the participant reported that his social network consisted of an equal number of alters who shared their study course with the participant as the number who did not share their study course, the calculated “study course diversity” score would be considered higher. The same holds for tertiary study institution diversity, residential diversity, religious diversity and social involvement diversity.

There are a number of indices that may be used to map the diversity of a social network. The most appropriate in this case is the Index of Quality Variation (IQV) (Agresti & Agresti, 1978). The IQV is a measure of statistical dispersion in nominal distributions (Blau, 1977; Blum, 1984). It is based on Blau’s Index (1977) which is a common measure of diversity in the social sciences. Blau’s index is based on earlier measures of biodiversity in ecosystems (Harrison & Klein, 2007). Essentially, the Blau Index measures the probability that two individuals selected at random from a population will be of a different predetermined category (Blau, 1977). Blau distinguishes between two general forms of differentiation in social structures: *heterogeneity* and *inequality* (Sampson, 1984). Heterogeneity talks to the distribution of a population among predetermined groups such as gender or race. Inequality denotes differences on graduated parameters such as income (Blum, 1984).

The formula for the Blau the index of diversity is $D = 1 - \sum_i^n P^2$ where D is the diversity score (on a continuous scale between 0 - 1), n is the number of individuals in each category and “ p ” denotes the proportion of individuals who belong to the group or category “ i ” (Blau, 1977). A diversity score of zero represents complete homogeneity and a score of 1 indicates complete heterogeneity. In other words, if the entire population belongs to group “ i ”, the D will equal “0”. If there are more population groups to potentially belong to and each individual under investigation belongs to one mutually exclusive group, the diversity score will approach “1”. The “diversity” of the network is dependent on the number of possible categories that may be factored into that variable. For example, for the construct of “race”, there are 4 categories listed in the questionnaire. The equation dictates that the maximum possible “heterogeneity” in this case would be 0.75. If there are only 2 categories,

like gender, then the maximum heterogeneity possible is 0.50. The diversity score of a network is therefore a function of the heterogeneity present in the population and the number of predetermined qualitative categories (Agresti & Agresti, 1978).

One of the limitations of Blau's index is that the diversity score is not comparable across diversity variables where the number of categories differ. In order to standardize the diversity scores obtained from the calculations, the Blau score by its theoretical maximum to give an IQV value between "0" and "1" (Agresti & Agresti, 1978; Harrison & Klein, 2007). For this study, IQV values between 0 – 1 were coded with scores between 1-5. This was a nominal value assignment and the values were selected arbitrarily. The IQV and Nominal Values were assigned as shown in table 2:

IQV Score	Nominal Value
0.0 – 0.19	1
0.2 – 0.39	2
0.4 – 0.59	3
0.6 – 0.79	4
0.8 – 1.0	5

Table 2. Index of qualitative variation scores and the nominal values assigned.

3.3.1 Limitations of using Blau's index and the IQV

The Blau index does not take into consideration **where** the variation lies across different race groups. It only indicates that there is or is not diversity. This means that if being black means you are more likely to test for HIV, then the more racially diverse a black person's network, it is possible that they may be less likely to test for HIV than black people with more homogenous networks (Rushton, 2008).

3.4 Methodological Limitations of this study

Conducting a web based survey of social network information has a number of limitations. The questionnaire requires the recall of a considerable amount of information which means that the cognitive effort of the participant has a definite effect on the quality of the data obtained. The questionnaire used in this study asked participants to name members of their social network, but this was done without any assistance. Other social network studies suggest that some type of assistance be offered. One example of this is a network generator where random first names are given and the participants are asked if they know anyone of that name (Shelley, Bernard, Killworth, Johnsen, & McCarty). The participants were not supervised in completing the questionnaires and therefore received no additional help, motivation to finish, feedback or guidance other than those inherent to the survey (Vehovar, et al., 2008). Additionally, research suggests that due to the high amount of information on the internet, there is a very real risk of participants losing attention quickly if the survey is not interesting enough (Couper et al. 2007 in (Vehovar, et al., 2008).

Participation in this research was incentivised. This may introduce a certain amount of bias in that participants may have been influenced more by the incentive than the contribution to science. The fact that only completed questionnaires made the participants eligible for the incentives may have influenced the quality of the completion thereof. Participants may have rushed to complete the questionnaire without giving meaningful answers to the questions. Volunteer bias, something inherent in any research where participation is required, may also have played a role in this research. Volunteer bias can be understood as the bias that may arise by virtue of the fact that volunteers tend to be inherently different to people who do not volunteer for research. Amongst other factors, volunteers are argued to be of higher social status and intelligence (Heiman, 2002). This may influence the outcomes of this research.

Issues of validity arise when attempting to measure “relational data”. This will become apparent in the definition of the terms used in the questionnaire surrounding

the identification and classification of “friends”. Firstly, how one defines a friend is susceptible to different constructions from person to person. Additionally, how one defines a “close” friend as opposed to one that is “not close” is a highly subjective affair. How “regularly” one sees a friend is also subjectively constructed. The issue of social desirability may also be a factor threatening the validity of this study. There may be pressure on the participants to report a) perceived socially desirable health practices, b) high/low numbers of “close”/”not close” friends, c) membership of sport/social/religious institutions and so on.

3.5 Ethical Considerations

The overarching study has been approved by the UKZN Social Science Research Ethics Committee and the LaTrobe REC. A copy of both approval letters is attached (Appendix A, and Appendix B). In addition, as required for the larger study, legal opinion from the University legal advisor has been obtained in order for permission to be granted to mass mail the students and to place notices on the University local area network notice system. Permission has been granted by the relevant University authorities. (Appendix C)

3.5.1. Recruitment incentives

In order to obtain the most comprehensive sample possible a number of prize-based incentives were offered. Contact details for prize eligibility were de-linked to completed survey data to maintain anonymity- by the IT department for electronic completions. The prizes offered were sufficient to provide a completion incentive, but not such that they engendered undue inducement. The participants were eligible to win prizes one of ten Apple iPod shuffles based on a random draw basis.

3.5.2. Potential risks for participants

Any potential risk for participants in disclosure of any information was assured through complete anonymity of the online questionnaire. The opportunity to enter contact details for eligibility for the draw for the mp3 players was a completely separate process and completely de-linked from the survey itself. There was no possibility of relating any contact details from the submitted surveys. The online survey format offered complete anonymity compared with emailed surveys which were not used in this study.

3.5.3. Informed consent

Informed consent was ensured by virtue of the fact that the participant could not proceed to the question section of the survey without acknowledging their informed consent to the research. It was therefore passive consent, endorsed by the act of completing the questionnaire rather than signing a consent form. This offered an additional layer of anonymity in this study.

3.5.4. Participant beneficence

Participation will indirectly benefit participants, as the information will be used as baseline data to contribute to further research, whilst providing an immediate benefit in terms of health service planning for the university. They may well reap the benefits of these outcomes during their time at UKZN.

The survey contained mainly multiple-choice questions. These were useful for generating time-economic answers from the participants, as well as making analysis less arduous (Loewenthal, 2001). Where necessary, open-ended questions have been included for questions where forced choices were not conducive, for example, areas of residence.

3.5.5. Confidentiality

The survey was anonymous and this was ensured by virtue of the fact that it is not possible for the researchers to establish the identity of the participants who submitted the respective surveys.

The personal details of the participants were delinked from the questionnaires. The personal information of the participants was only accessible after submission of the survey, via a redirection to a separate, unlinked site.

3.5.6. Data Storage

The data were stored on DVD's in a locked box in the home of the researcher. Only the researcher had access to a key to the box. The data will be stored for five years. The data will be stored for research purposes: a psychology research masters dissertation.

Chapter 4: Results

This chapter describes the outcomes of this investigation. It begins with a demographic profile of the study participants and goes on to discuss some of the descriptive statistics thereof as mentioned in the previous chapter, multiple logistic regression was used to determine if there was any association between the independent variables and VCT uptake in the study population and the significance levels of these possible associations are presented as a Wald Chi-square statistic. The hypothesis of the current study was that students with larger social networks, a greater proportion of weak social ties, less dense and more diverse peer networks would be likely to engage in VCT uptake because the greater presence of weak social ties would allow for increased information flow and social mobility (Granovetter, 1973). On the other hand, participants with smaller, denser, less diverse networks with fewer social ties would be more vulnerable to social influence which would constrain the uptake of VCT (Montgomery & Casterline, 1996).

4.1 Descriptive statistics

The sample consisted of 566 participants.

Ego Gender				
Gender	Frequency	Percent	Cumulative Frequency	Cumulative Percent
F	327	57.77	327	57.77
M	239	42.23	566	100.00

Table 3. Gender distribution.

As shown in table 3, there were a fairly even proportion of female and male participants with 57.77% and 42.23% respectively. All of the participants were registered as UKZN students.

Ego Faculty				
Faculty	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Education	15	2.65	15	2.65
Humanities, Development and Social Sciences	275	48.59	290	51.24
Engineering	5	0.88	295	52.12
Science and Agriculture	157	27.74	452	79.86
Law	26	4.59	478	84.45
Management	88	15.55	566	100.00

Table 4. Faculty distribution

Most of the participants were registered under the faculty of Humanities, Development and Social Sciences (HDSS) (48.59%) and Science & Agriculture (27.74%). This is shown in table 4.

Ego Race				
Race	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Black	341	60.25	341	60.25
Indian	70	12.37	411	72.61
White	122	21.55	533	94.17
Mixed Race	33	5.83	566	100.00

Table 5. Race distribution.

Table 5 shows that the majority of participants were black (60.25%), with white participants representing 21.55%, Indians 12.37% and mixed race 5.83%. None of the participants who were eligible for analysis reported themselves as being “Coloured”. We assume that they reported themselves as being “Mixed Race”.

Ego Test HIV				
Test HIV	Frequency	Percent	Cumulative Frequency	Cumulative Percent
No	305	53.89	305	53.89
Yes In The Last 12 Months	261	46.11	566	100.00

Table 6. Ego HIV test.

Three hundred and five participants (53.89%) reported never having tested for HIV while 261 (46.11%) reported that they had tested for HIV within the last 12 months as shown in table 6. No participants reported having tested more than 12 months previously – this is reflected on in the discussion section.

Ego HIV Result				
HIV Result	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Negative	246	43.46	246	43.46
Positive	5	0.88	251	44.35
Won't Say	10	1.77	261	46.11
Not Tested	305	53.89	566	100.00

Table 7. Ego HIV result.

Table 7 shows the reported HIV results of the participants. Of the 261 participants who reported that they had tested, 246 (94.26%) reported that they tested HIV negative. Five participants (1.92%) reported a HIV positive result while 10 participants (3.83%) did not want to disclose their results.

4.2 Univariate and Multivariate Analysis of Social Network Factors

Univariate and multivariate multiple logistic regression was used to test for associations between the independent variables and the outcome variable (VCT uptake). The Wald Chi-Square statistic was used to indicate the association between the independent and dependent variables. Comparisons between categories within each variable were conducted relative to one of the groups being a reference group. The reference group in each table is indicated by “Ref” in parentheses. The effect estimate tests whether the effect of each category on the outcome variable is different from that of the selected reference group.

4.2.1 Network Size

Ego Network size				
Network Size	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	20	3.53	20	3.53
1	42	7.42	62	10.95
2	115	20.32	177	31.27
3	109	19.26	286	50.53
4	82	14.49	368	65.02
5	198	34.98	566	100.00

Table 8. Ego Network Size.

Table 8 shows the distribution of participants across social network size. The reason that a network size of “0” was not included in the multivariate analysis is because participants with a network size of 0 could not have other network characteristics calculated.

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Network size			
0	0.55 (0.20 - 1.48)	0.1125	0.2354
1	2.30 (1.15 - 4.58)		0.0183
2	1.13 (0.71 - 1.79)		0.6051
3	0.93 (0.58 - 1.49)		0.7688
4	1.28 (0.76 - 2.14)		0.3547
5	1.0 (ref)		

Table 9. Univariate analysis of network size.

Table 9 shows that the univariate analysis showed no statistically significant association between social network size and likelihood to test for HIV ($p = 0.1125$). While the association was not statistically significant, participants with the smallest network size of 1, were 2.30 times more likely to have tested for HIV than those with the largest network size of 5 and this effect is significant ($OR = 2.30, p = 0.0183$).

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Network size			
1	2.12 (0.70 - 6.44)	0.0435	0.1841
2	0.64 (0.29 - 1.40)		0.2624
3	0.59 (0.28 - 1.26)		0.1725
4	1.30 (0.69 - 2.42)		0.4176
5	1.0 (ref)		

Table 10. Multivariate analysis of network size.

As shown in table 10, the multivariate analysis also shows a statistically significant association between network size and likelihood to test ($p = 0.0435$). A linear trend was not evident but differences between the groups were significantly different. Most

notably, participants with network size of 1 were 2.12 times more likely to test than those with the largest network size of 5. Figure 1 shows the network size categories, plotted against the odds ratios of having tested for HIV.

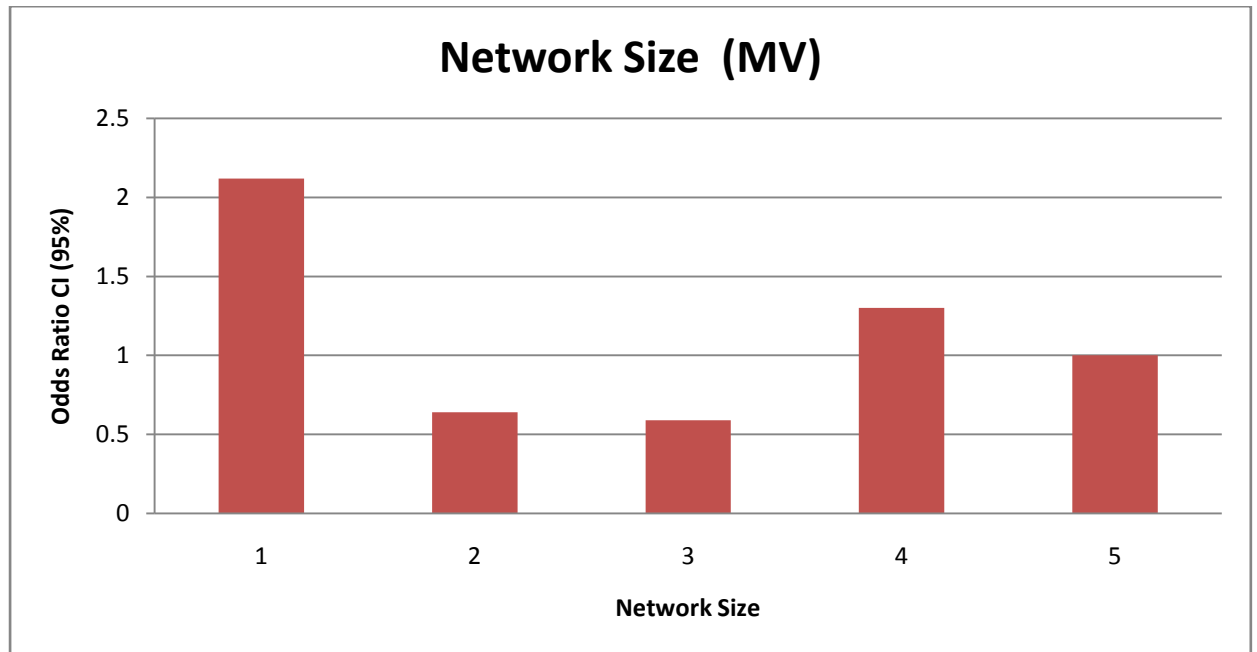


Figure 1. Graph of network size against odds ratio of VCT uptake (multivariate).

4.2.2 Proportion of weak ties

Proportion of Weak Ties in Ego Network (Frequency Missing = 13)				
Proportion (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0 - 0.19 (1)	7	1.27	7	1.27
0.20 - 0.39 (2)	26	4.70	33	5.97
0.40 - 0.59 (3)	81	14.65	114	20.61
0.60 - 0.79 (4)	241	43.58	355	64.20
0.80 - 1 (5)	198	35.80	553	100.00

Table 11. Distribution of proportion of weak ties in ego's social network.

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Proportion of weak ties (Cat)			
0 – 0.19 (1)	0.24 (0.03 - 2.04)	0.1779	0.1914
0.20 – 0.39 (2)	1.24 (0.54 - 2.82)		0.6103
0.40 – 0.59 (3)	1.56 (0.92 - 2.62)		0.0957
0.60 – 0.79 (4)	1.39 (0.95 - 2.03)		0.0921
0.80 – 1.0 (5)	1.0 (ref)		

Table 12. Univariate analysis of proportion of weak ties.

Table 11 shows the distribution of the proportion of weak ties in the participants' social networks. Table 12 shows that the proportion of weak ties in the participants' social networks was not significantly associated with the outcome variable ($p = 0.1779$) in the univariate analysis.

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square p-value)	Effect estimate p-value

		pvalue)	
Proportion of weak ties (Cat)			
0 – 0.19 (1)	0.09 (0.01 - 1.00)	0.3854	0.0495
0.20 – 0.39 (2)	1.16 (0.43 - 3.13)		0.7667
0.40 – 0.59 (3)	1.01 (0.53 - 1.92)		0.9757
0.60 – 0.79 (4)	1.03 (0.64 - 1.68)		0.8957
0.80 – 1.0 (5)	1.0 (ref)		

Table 13. Multivariate analysis of proportion of weak ties.

Table 13 shows that the multivariate analysis also showed no significant association between the proportion of weak ties in a participant’s social network and the outcome variable (0.3854). However, there was a significant difference between participants with scores in category 1 and those with scores in category 5. Participants with the lowest proportion of weak ties in their social networks (category 1) were 91% less likely to have tested for HIV than those with the highest proportion of weak ties in their social network (OR = 0.09, p = 0.0495). Figure 2 shows the proportion of weak ties, categorised into one of five categories, plotted against the odds ratios of having tested for HIV.

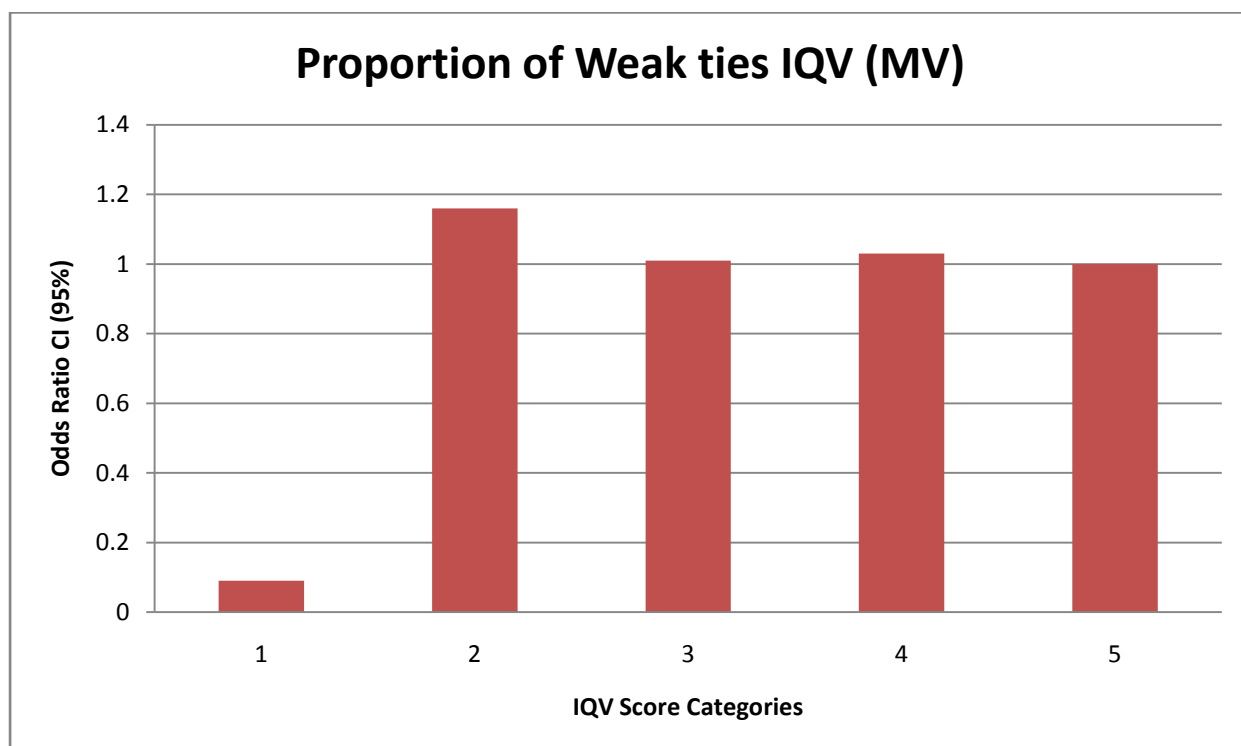


Figure 2. Graph of proportion of weak ties Index of Qualitative Variation (IQV) scores against odds ratio of VCT uptake (multivariate)

4.2.3 Network Density

Network Density (Frequency Missing = 20)				
Density (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0 - 0.19 (1)	55	10.07	55	10.07
0.20 - 0.39 (2)	65	11.90	120	21.98
0.40 - 0.59 (3)	64	11.72	184	33.70
0.60 - 0.79 (4)	90	16.48	274	50.18
0.80 – 1 (5)	272	49.82	546	100.00

Table 14. Distribution of network density scores.

Table 14 shows that the majority of participants' (49.82%) social networks fell into the category 5 which is the category of minimum network density.

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value

Network density (Cat)			
0 – 0.19 (1)	1.22 (0.68 - 2.18)	0.9309	0.5023
0.20 – 0.39 (2)	1.01 (0.59 - 1.73)		0.9770
0.40 – 0.59 (3)	0.91 (0.53 - 1.58)		0.7499
0.60 – 0.79 (4)	1.12 (0.70 - 1.81)		0.6289
0.80 – 1.0 (5)	1.0 (ref)		

Table 15. Univariate analysis of network density.

Univariate analysis showed no significant association between network density and VCT uptake, as shown in table 15 ($p = 0.8437$).

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Network density			
0 – 0.19	1.41 (0.69 - 2.85)	0.4753	0.3425
0.20 – 0.39	0.77 (0.38 - 1.57)		0.4739
0.40 – 0.59	0.71 (0.34 - 1.47)		0.3585
0.60 – 0.79	1.21 (0.65 - 2.27)		0.5509
0.80 – 1.0	1.0 (ref)		

Table 16. Multivariate analysis of network density

Table 16 shows that the multivariate analysis also showed no significant association between network density and VCT uptake ($p = 0.9698$).

4.2.4 Network Diversity

4.2.4.1 Gender Diversity

Gender Diversity (Frequency Missing = 20)				
Diversity IQV (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0 - 0.19 (1)	178	32.60	178	32.60
0.60 - 0.79 (4)	122	22.34	300	54.95
0.80 - 1 (5)	246	45.05	546	100.00

Table 17. Distribution of gender diversity IQV scores

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Gender Diversity IQV (Cat)			
0 - 0.19 (1)	1.0 (ref)	0.5494	
0.60 - 0.79 (4)	0.85 (0.53 - 1.35)		0.4855
0.80 - 1.0 (5)	0.81 (0.55 - 1.19)		0.2821

Table 18. Univariate analysis of gender diversity

Table 17 shows the distribution of gender diversity scores across the different categories. Univariate analysis of the gender diversity of participants' social networks (shown in table 18) showed no statistically significant association between gender diversity in their social networks and likelihood of having been tested for HIV ($p = 0.5494$).

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Gender Diversity IQV (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.5503	
0.60 – 0.79 (4)	0.82 (0.41 - 1.62)		0.5618
0.80 – 1.0 (5)	0.75 (0.44 - 1.26)		0.2746

Table 19. Multivariate analysis of gender diversity

The results of the multivariate analysis of this factor are similar to the univariate results. Table 19 shows that there was no significant association between gender diversity in the participant’s social network and their likelihood of VCT uptake (p = 0.5503).

4.2.4.2 Racial Diversity

Racial Diversity (Frequency Missing = 50)				
Diversity IQV (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0 - 0.19 (1)	399	77.33	399	77.33
0.40 - 0.59 (3)	68	13.18	467	90.50
0.60 - 0.79 (4)	36	6.98	503	97.48
0.80 - 1 (5)	13	2.52	516	100.00

Table 20. Distribution of racial diversity IQV scores

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Racial Diversity IQV (Cat)			
0 - 0.19 (1)	1.0 (ref)	0.2503	
0.40 - 0.59 (3)	0.99 (0.59 - 1.65)		0.9623
0.60 - 0.79 (4)	0.63 (0.31 - 1.27)		0.1978
0.80 - 1.0 (5)	2.50 (0.76 - 8.25)		0.1327

Table 21. Univariate analysis of racial diversity

Table 20 shows that the majority of participants' social networks fell into the least racially diverse category (1). The results of the univariate regression show no significant association between the racial diversity of a participant and their likelihood to have tested for HIV ($p = 0.2503$). This is presented in table 21.

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Racial Diversity IQV (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.3237	
0.40 – 0.59 (3)	1.06 (0.56 - 1.99)		0.8599
0.60 – 0.79 (4)	0.78 (0.34 - 1.76)		0.5473
0.80 – 1.0 (5)	3.08 (0.84 - 11.21)		0.0883

Table 22. Multivariate analysis of racial diversity

As shown in table 22, the multivariate results show that there was no significant association between the racial diversity of a participant’s social network and their likelihood of testing for HIV ($p = 0.3237$). It is worth noting however, that participants with scores in category 5 (most diverse) were 3.08 times more likely to have tested for HIV than participants with scores in category 1 (least diverse) and this finding approached significance ($OR = 3.08, p = 0.0883$). Figure 3 shows the racial diversity IQV scores, categorised into five categories, plotted against the odds ratios of having tested for HIV.

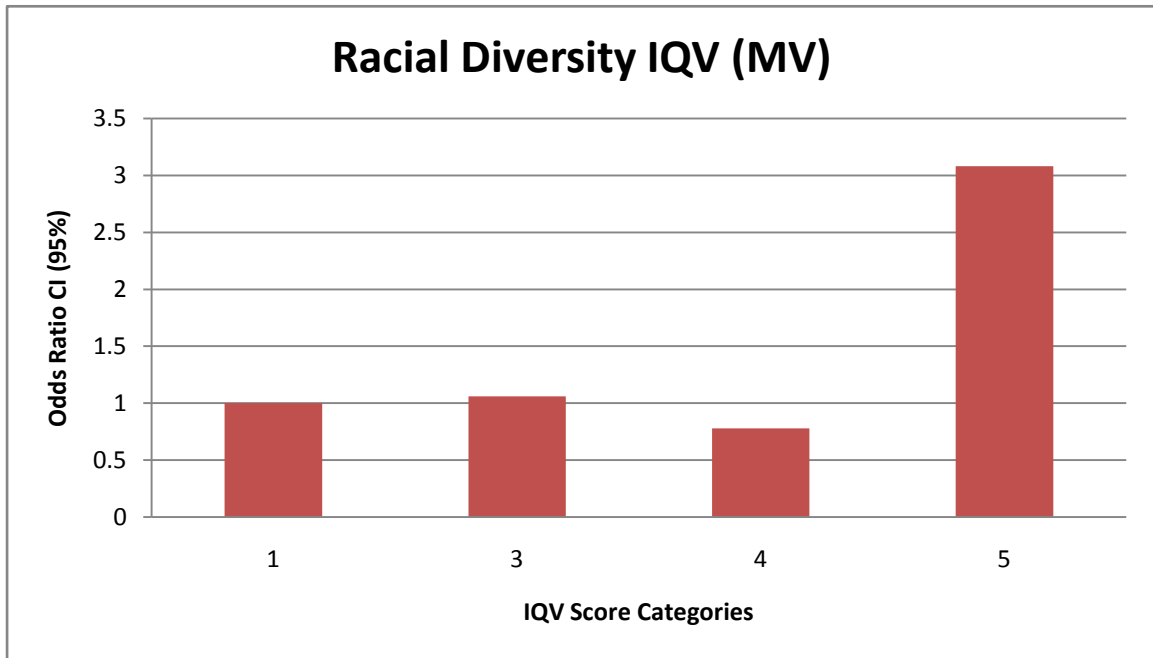


Figure 3. Graph of racial diversity IQV scores against odds ratio of VCT uptake (multivariate)

4.2.4.3 Residential Diversity

Residential Diversity (Frequency Missing = 20)				
Diversity IQV (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0 - 0.19 (1)	303	55.49	303	55.49
0.60 - 0.79 (4)	87	15.93	390	71.43
0.80 - 1 (5)	156	28.57	546	100.00

Table 23. Distribution of residential diversity IQV scores

As shown in table 23, the majority of participants' social networks (55.49%) fell into the lowest category of residential diversity.

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Residential Diversity IQV (Cat)			
0 - 0.19 (1)	1.0 (ref)	0.0073	
0.60 - 0.79 (4)	0.83 (0.51 - 1.35)		0.4563
0.80 - 1.0 (5)	1.72 (1.17 - 2.54)		0.0064

Table 24. Univariate analysis of residential diversity

Univariate analysis results show that the residential diversity of a participant's social network members is significantly associated with the likelihood of their having tested for HIV (0.0073) although there was no significant trend. As shown in table 24, participants with IQV scores in category 4 were 17% less likely to have tested than those with scores in category 1 (OR = 0.83, p = 0.4563). This effect was not significantly significant. Participants with the most residentially diverse social networks (scores in category 5) were 72% more likely to have tested for HIV and this difference was statistically significant (OR = 1.72, p = 0.0064). This is graphically represented in figure 4.

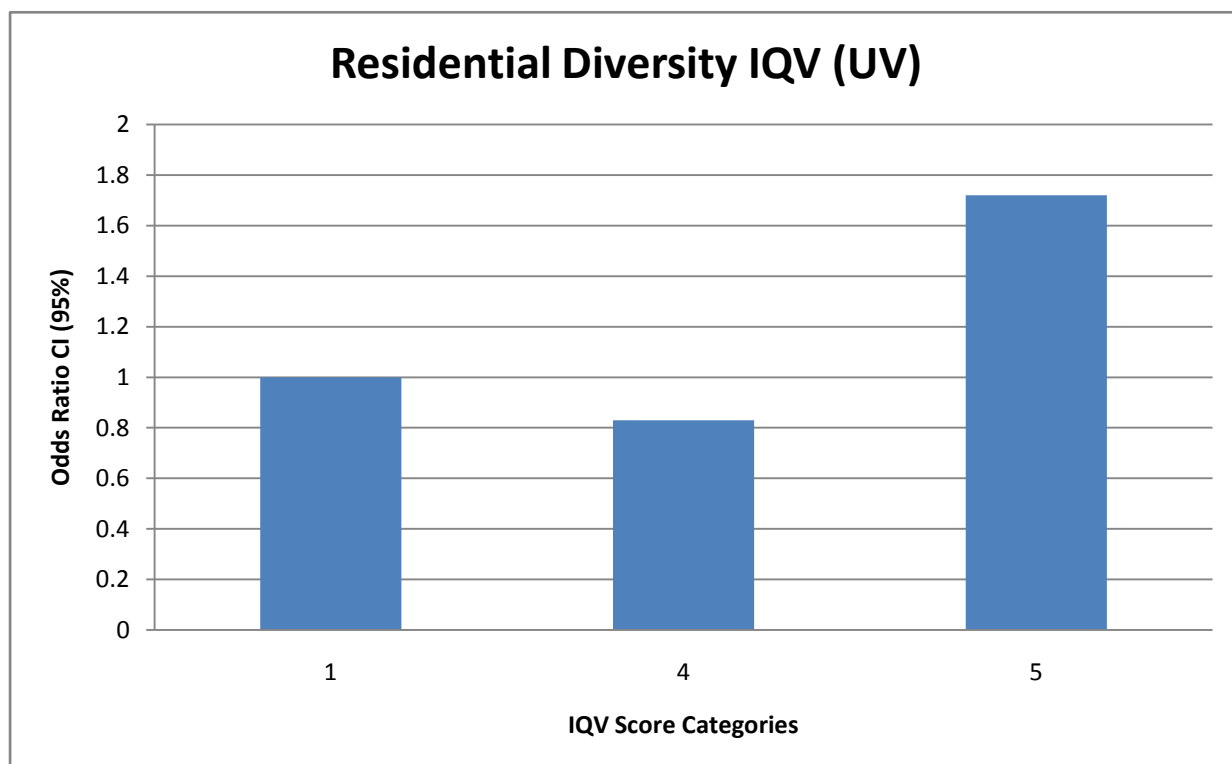


Figure 4. Graph of residential diversity IQV scores against odds ratio of VCT uptake (univariate)

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Residential Diversity IQV (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.0143	
0.60 – 0.79 (4)	0.84 (0.44 - 1.59)		0.5878
0.80 – 1.0 (5)	1.87 (1.16 - 3.00)		0.0096

Table 25. Multivariate analysis of residential diversity

Table 25 exhibits that the multivariate analysis results also show a statistically significant association between residentially diverse social networks and the likelihood of VCT uptake ($p = 0.0143$) but there was no significant trend. Participants with IQV scores in category 4 were 16% less likely to have tested for HIV than those with scores in category 1 but this effect was not statistically

significant (OR = 0.84, $p = 0.5878$). Participants with the most residentially diverse social networks (scores in category 5) were 87% more likely to have tested for HIV and this difference was statistically significant (OR = 1.87, $p = 0.0096$). The residential diversity scores, categorised into five categories, are plotted against the odds ratios of having tested for HIV in figure 5.

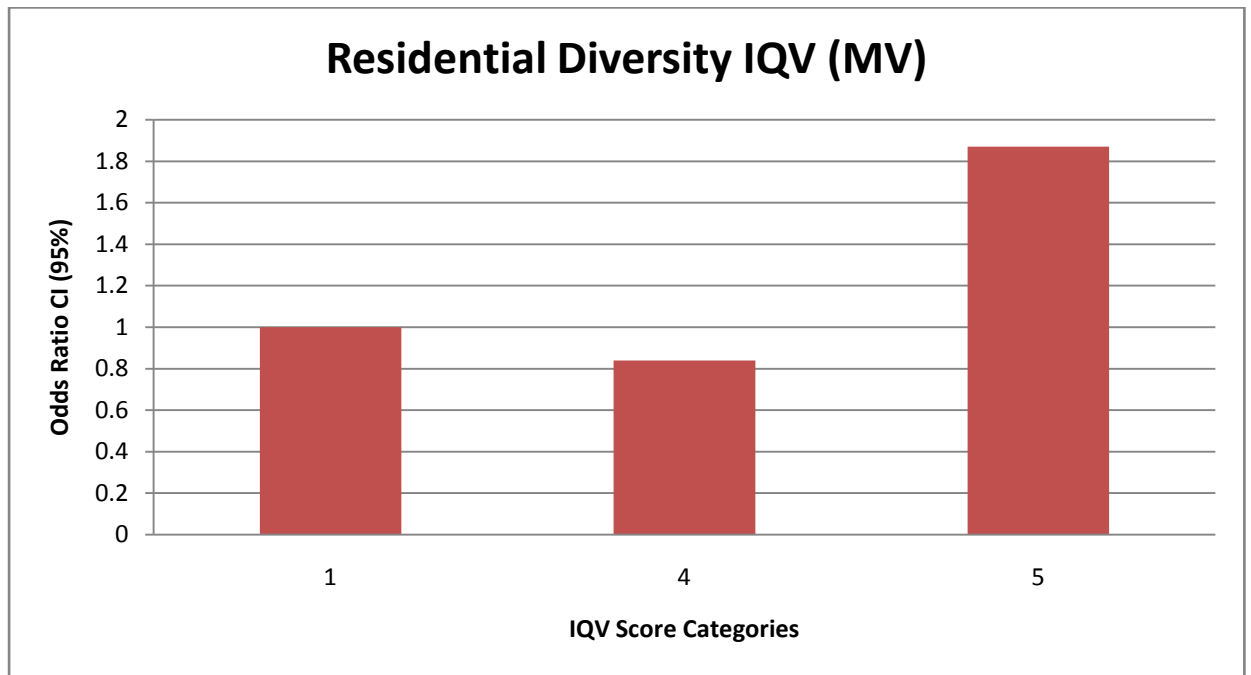


Figure 5. Graph of residential diversity IQV scores against odds ratio of VCT uptake (Multivariate)

4.2.4.4 Tertiary Study Institution Diversity

Tertiary Institution Diversity (Frequency Missing = 20)				
Diversity IQV (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent

0 - 0.19 (1)	228	41.76	228	41.76
0.60 - 0.79 (4)	107	19.60	335	61.36
0.80 – 1 (5)	211	38.64	546	100.00

Table 26. Distribution of tertiary institution diversity IQV scores

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Tertiary Institution IQV (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.4165	
0.60 – 0.79 (4)	0.78 (0.49 - 1.23)		0.2847
0.80 – 1.0 (5)	1.06 (0.73 - 1.54)		0.7618

Table 27. Univariate analysis of tertiary institution diversity

Table 26 shows the distribution of tertiary institution diversity IQV scores. Diversity of alters' tertiary institution showed no statistically significant association with the VCT uptake of participants in the univariate analysis ($p = 0.4165$). Compared to participants with IQV scores in category 1, participants with scores in category 4 were 22% less likely to have tested for HIV (OR = 0.78, $p = 0.2847$) while participants with scores in category 5 were 6% more likely to have tested (OR = 1.06, $p = 0.7618$). This is shown in table 27.

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Tertiary Institution IQV (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.2989	

0.60 – 0.79 (4)	0.99 (0.52 - 1.89)		0.9729
0.80 – 1.0 (5)	1.42 (0.86 - 2.36)		0.1721

Table 28. Multivariate analysis of tertiary institution diversity

The multivariate analysis also showed no statistically significant association between tertiary institution diversity and VCT uptake ($p = 0.2989$). This is presented in table 28.

4.2.4.5 Study Course Diversity

Study Course Diversity (Frequency Missing = 20)				
Diversity IQV (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent

0 - 0.19 (1)	263	48.17	263	48.17
0.60 - 0.79 (4)	88	16.12	351	64.29
0.80 – 1 (5)	195	35.71	546	100.00

Table 29. Distribution of study course diversity IQV scores

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Study Course Diversity IQV (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.7521	
0.60 – 0.79 (4)	0.93 (0.57 - 1.52)		0.7830
0.80 – 1.0 (5)	1.11 (0.77 - 1.62)		0.5657

Table 30. Univariate analysis of study course diversity

Table 29 shows the distribution of study course diversity IQV scores. There was no significant association between the study course diversity of participants' social networks and HIV testing in the univariate analysis ($p = 0.7521$). This is shown in table 30.

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Course Diversity IQV (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.4414	
0.60 – 0.79 (4)	1.04 (0.54 - 1.97)		0.9156

0.80 – 1.0 (5)	1.34 (0.84 - 2.14)		0.2215
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Table 31. Multivariate analysis of study course diversity

As presented in table 31, the multivariate analysis results also showed no significant association between Study course diversity and HIV testing ($p = 0.4414$).

4.2.4.6 Social Involvement Diversity

Social Involvement Diversity				
Diversity IQV (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0 - 0.19 (1)	413	72.97	413	72.97
0.60 - 0.79 (4)	57	10.07	470	83.04
0.80 – 1 (5)	96	16.96	566	100.00

Table 32. Distribution of social involvement diversity IQV scores

Table 32 shows that the majority of participants' social involvement diversity IQV scores fell into category 1, the lowest possible category of diversity.

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Social involvement Diversity (CAT)			
0 – 0.19 (1)	1.0 (ref)	0.5673	
0.60 – 0.79 (4)	1.02 (0.59 - 1.78)		0.9345
0.80 – 1.0 (5)	1.27 (0.82 - 1.98)		0.2883

Table 33. Univariate analysis of social involvement diversity.

Social involvement diversity of participants' social networks was showed no statistically significant association with VCT uptake ($p = 0.5673$) in the univariate analysis. This is represented in table 33.

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Social involvement Diversity (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.8694	
0.60 – 0.79 (4)	0.88 (0.44 - 1.75)		0.7144
0.80 – 1.0 (5)	1.09 (0.63 - 1.89)		0.7629

Table 34. Multivariate analysis of social involvement diversity

Table 34 shows that the multivariate analysis of social involvement diversity and VCT uptake also yields no significant association ($p = 0.8694$).

4.2.4.7 Religious Institution Diversity

Religious Institution Diversity				
Diversity IQV (Cat)	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0 - 0.19 (1)	453	80.04	453	80.04
0.60 - 0.79 (4)	43	7.60	496	87.63
0.80 – 1 (5)	70	12.37	566	100.00

Table 35. Distribution of religious institution diversity IQV scores

Univariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Religious Diversity (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.2614	
0.60 – 0.79 (4)	0.78 (0.41 - 1.48)		0.4552
0.80 – 1.0 (5)	1.42 (0.86 - 2.36)		0.1705

Table 36. Univariate analysis of religious institution diversity.

The distribution of religious institution diversity scores was not uniform with the majority of participants' social networks showing low diversity IQV scores (table 35). Univariate analysis showed no significant association between the religious diversity of a participant's social network and their VCT uptake ($p = 0.2614$). This is shown in table 36.

Multivariate analysis			
Variable	OR (95% CI)	Global null hypothesis (Wald Chi-Square pvalue)	Effect estimate p-value
Religious Diversity (Cat)			
0 – 0.19 (1)	1.0 (ref)	0.2614	
0.60 – 0.79 (4)	0.58 (0.26 - 1.29)		0.1812
0.80 – 1.0 (5)	1.31 (0.69 - 2.47)		0.4085

Table 37. Multivariate analysis of religious institution diversity.

Multivariate analysis also showed no significant association between the religious diversity of a participant's social network and their VCT uptake ($p = 0.4249$). This is presented in table 37.

These findings refute the hypothesis that students with larger social networks would be likely to engage in VCT uptake. It can be seen that participants with the smallest

social network size were more likely to have tested for HIV. However, the findings do lend support to the hypothesis that diversity in social networks may enable VCT uptake as residential diversity was significantly associated with VCT uptake. There was no evidence for or against the hypothesis that participants with less dense social networks with a greater proportion of weak social ties would be more likely to have tested for HIV. These findings are discussed further in the discussion chapter

Chapter 5: Discussion

The aim of this was to identify social network correlates of VCT uptake behaviour among the student population of UKZN. Specifically, the network size, proportion of weak ties, density and diversity were investigated to better understand their impact on the likelihood of VCT uptake. Diversity of peers was calculated across race, residence, religious involvement, tertiary study institution and social involvement. The findings were interpreted using the theory of social learning and social influence outlined by Montgomery and Casterline (1996).

The hypothesis of this study was that students with larger social networks, a greater proportion of weak social ties, less dense and more diverse peer networks were more likely to have engaged in VCT uptake. The theory underlining this hypothesis is that of social learning, whereby increased exposure to novel ideas and experiences facilitates the uptake of help and health seeking behaviour. Social learning is purported to take place when actors in a social network provide information that plays a role in shaping an individual's beliefs about certain decisions or actions (Montgomery & Casterline, 1996). Conversely, those participants with smaller, denser, less diverse networks with a lower proportion of weak ties would be more susceptible to social influence and therefore likely to adhere to the norms of their social network regarding health screening behaviour. Given that the estimated VCT uptake amongst the UKZN student population is 42%, it would be reasonable to

assume that the uptake of VCT is not a powerful social norm in this population (HEAIDS, 2010). Social learning is hypothesised to enable VCT uptake while social influence is hypothesised to constrain the uptake of VCT.

The findings of this study showed that the network size ($p= 0.0435$) and residential diversity of the participant's social networks were statistically significantly associated with the likelihood of having tested for HIV (Univariate: $p = 0.0073$; Multivariate: $p = 0.0143$). While the associations between the aforementioned variables were significantly associated, there was not a clear trend evident. In other words, there was no evidence of a 'dose-response' effect, where an increase in one variable results in the linear increase of the outcome variable. However, when the variables were categorised into the IQV scores as discussed in the methodology chapter, it became evident that there were significant differences in their effect on VCT uptake. Rather than identifying clear linear trends that indicate a predictive, dose-response type relationship between the independent variables and VCT uptake, these results highlight the different roles played by social learning and social influence in influencing the uptake of VCT.

The most notable differences in the categories measuring network size was that participants with the smallest network size were more likely to have tested for HIV than those participants with the largest. This finding refutes the hypothesis that small social networks constrain VCT uptake through social influence. With regard to network diversity, the findings showed that participants with the most residentially diverse social networks were more likely to have tested for HIV than those participants with the smallest. This finding is in line with the hypothesis that social learning through diverse social networks enables VCT uptake.

5.1 VCT Uptake

Reported VCT uptake amongst the sample group of 566 in this study was 261 (46.11%). While there were differences between the VCT uptake in the current study and figures reported from other studies, the rates were relatively similar. The VCT uptake in the current study is slightly higher than the figure reported in the results of the HIV prevalence survey conducted by HEAIDS in 2008/2009 of 42% uptake amongst UKZN students (HEAIDS, 2010). It is also slightly higher than the reported VCT uptake amongst medical students in Tanzania of 43.3% but lower than the reported VCT uptake in Nigerian medical students of 50.7% (Daniyam, Agaba, & Agaba, 2010; Vermeer, Bos, Mbwambo, Kaaya, & Schaalma, 2009). No participants reported VCT more than 12 months prior to the research being conducted. This is an interesting piece of information. The reasons behind this may be manifold. It is possible that, given the relatively young age of most students, the practice of VCT was not popular 12 months prior to completing the questionnaire. It seems more likely however, that the recent advent of VCT uptake could be explained by the effectiveness of VCT promotion campaigns and general awareness thereof in within 12 months before this research was conducted.

With regard to prevalence of HIV, five participants in this study (1.92%) reported a HIV positive result while 10 participants (3.83%) did not want to disclose their results (ibid). The HEAIDS (2010) survey showed a national HIV infection prevalence of 3.4% in the student population and 6.1% prevalence in the UKZN student population. The findings of the current study reflect a lower prevalence than the HEAIDS (2010)

survey. This may be because the current study relies on self report rather than objective HIV testing.

5.2 Network Size

The size of a participant's social network is a complex variable to model as it influences other aspects of the social network such as the number and proportion of weak ties, the density and diversity of the network. Larger networks generally have a greater number and proportion of weak ties, lower density and greater diversity of alters (Roberts et al., 2009). Therefore, interpretation of associations between network size and the VCT uptake in this study needs to be taken cautiously. In this study, the size of the participants' social networks showed a statistically significant association with the likelihood of VCT uptake in the multivariate analysis ($p = 0.0435$). While there was no clear linear association between the independent and outcome variables, there were clear differences between the various network sizes and the likelihood of having tested for HIV.

Odds ratios between network size and VCT uptake showed that participants with a network size of 1 (the smallest possible) were 2.12 times more likely to have tested for HIV than those with a network size of 5 (the largest possible). When comparing those participants with social network sizes of 4 against those with network size of 5, the likelihood of the former having been tested for HIV was 30% greater than the latter.

At first glance, these findings suggest that a very small network size enables VCT uptake amongst this population. This is contrary to research conducted into the relationship between social network characteristics and cancer screening uptake amongst Hispanic women in the USA (L. Suarez et al., 2000). The results of this

study showed that participants with a greater level of 'social integration' were more likely to have had routine mammograms and pap smears than those who scored lower. The degree of social integration was a function of the number of close friends and relatives, frequency of contact and church membership and attendance (L. Suarez, et al., 2000).

However, when comparing participants with network sizes of 2 and 3 against those with network sizes of 5, they were 36% and 41% less likely to have been tested respectively which supports the hypothesis that larger social networks were associated with increased health service utilisation (Kang & Bloom, 1993; Lucina Suarez, Lloyd, Weiss, Rainbolt, & Pulley, 1994; L. Suarez, et al., 2000).

The interpretation of these findings is complex as the significant association may be explained by the nature of the relationships within the social networks, rather than the size thereof (Israel, 1982). While there was lack of a clear trend between network size and VCT uptake, the complexity in the interpretation of these results may be important in understanding the role of social learning (information flow) and social influence (norms) in this study sample. Deri (2005) suggests that in networks with high contact availability and high service utilisation, the role of information flow is important in enabling the service utilisation. In networks with high contact availability and low service utilisation, she suggests social norms are constraining the uptake of health service utilisation.

In this study, the likelihood of VCT uptake in the smallest networks (category 1) is higher than that of the larger network (category 5). Yet in slightly bigger networks (categories 2 & 3) the likelihood of VCT uptake is lower than those in larger networks (category 5). This suggests that the role of social learning and social influence on VCT uptake is not a straightforward concept. Theoretically, smaller social networks should be denser, less diverse, have a lesser number and proportion of weak ties, and therefore be more susceptible to social influence (Roberts, Dunbar, Pollet, & Kuppens, 2009). This means that the members of these networks should have less access to new ideas, information and resources than participants in larger social networks (Granovetter, 1973).

An interpretation based on this theory would be that the prevailing social norm in the smallest social networks (category 1) was one where HIV testing was encouraged. In the slightly larger social networks (categories 2 & 3), whose members were less likely to have tested for HIV than those with the largest network size, an interpretation based on the theories of social learning and social influence would be that either:

- i. The prevalent social norm would have been one that discouraged HIV testing or
- ii. These relatively small networks were less likely to test for HIV as a result of lack of new information and resources.

When network size was analysed individually, its association with VCT uptake was not statistically significant. This lends credence to the position that network size alone may not be an accurate predictor of health service utilisation – in this case VCT uptake. Participants with the smallest network size of 1, showed an odds ratio of OR = 2.30 in the univariate analysis when compared with those with a network size of 5. This means that these participants were 2.30 times more likely to have tested for HIV than those with the largest network size of 5 and this difference is significant ($p = 0.0183$).

The relationship between network size and network density, diversity and proportion of weak ties is one that may be more useful in attempting to understand these findings.

5.3 Proportion of Weak Ties

The findings of this study showed no significant association between the proportion of weak ties and the likelihood of VCT uptake in either direction. This means that any substantial argument for or against the ‘strength of weak’ ties hypothesis cannot be made.

In the multivariate analysis however, there was a significant difference in effect between networks with the lowest diversity IQV scores (category 1) and those with the highest diversity IQV scores (category 5). Those with category 1 scores were 91% less likely to have tested for HIV than those in category 5 ($p = 0.0495$). This finding suggests that, while the proportion of weak ties in a social network are not significantly associated with the uptake of VCT in this population, when analysed together with the other variables, a low proportion of weak ties may constrain VCT uptake to some degree. The potential constraint of low proportions of weak ties on VCT in this study is in line with the argument for the role of weak ties in influencing health service utilisation (Granovetter, 1973). This finding is contrary to research conducted by Yee (2010), Devillanova (2008) and Centola (2010). Their studies all suggest that strong ties in social networks are important in the uptake of health services through the transmission of related information as well as the modelling of this behaviour to the ego.

5.4 Network Density

The density of social networks was not significantly associated with VCT uptake in this study. Dense networks are believed to exert substantial pressure on the group members to follow normatively identified patterns of help seeking behaviour (Montgomery & Casterline, 1996). The fact that there was no significant association in either the univariate or multivariate analysis suggests that density does not appear to play a role in the normative influence to either test or not in this group. Centola (2010) suggests that dense networks are useful in the transmission on information and uptake of health preventive behaviours but in this study, there was no evidence to support this finding. The possible reasons for this lack of association between variables may be due to the confidential nature of VCT. Emphasis is placed on the discrete nature of VCT so consultation with others seems less likely in any case. While the Yee & Simon study shows mothers and sisters play a substantial role in influencing contraceptive behaviours, the nature of VCT is quite distinct (2010).

5.5 Diversity

Network diversity was measured across gender, race, residence, tertiary institution, study course, social involvement and religious institution of the alters. The results showed that there was no significant association between the diversity of the participants' social networks and VCT uptake across any categories except for residential diversity. This was true for both the univariate and multivariate analyses. Residential diversity was measured as the proportion of alters in the ego's social network who shared a residence with the ego against those who did not share a residence with the ego. Therefore, for the purposes of the current study, a participant with the most residentially diverse social network would be someone who had equal numbers of close friends living with them as not living with them. A participant with the least residentially diverse network would be someone with either all of their reported close friends living with them, or all of their reported close friends not living with them.

The univariate analysis showed that residential diversity alone was significantly associated with VCT uptake. While no linear trend was apparent, the odds ratios showed that participants with the most residentially diverse social networks were 72% more likely to have tested for HIV than those with the lowest residential diversity ($p = 0.0073$). The multivariate results showed that participants with the most residentially diverse social networks were 87% more likely to have tested for HIV ($p = 0.0143$). This means that participants who had some of their close friends residing with them and some not residing with them were more likely to have been tested for HIV than those who either had most or all of their close friends living with them, or very few or none of their close friends living with them.

According to this understanding, the most residentially diverse participants had close ties that lived with other people, as well as with the ego. An interpretation of these findings based on social learning and social influence theory would be: given that there were alters in the ego's network that lived with people other than the ego, those alters would have had access to more and unique information which could then have been disseminated to the ego. This may lend support to the theory of weak ties enabling increased uptake of health services through social learning – although the information would be through a proxy. In other words, other people in the alters'

networks, would provide information to the ego which may have influenced VCT uptake. The potential constraint on VCT uptake from social influence may have been mitigated by the diversity of the participants' networks. The diversity of one's social network is suggested to play a significant role in mitigating prevailing in-group tendencies (Sampson, 1984).

It is useful to consider the research conducted by Deri (2005) when interpreting these results. The participants in this study with low residential network diversity can be grouped into two categories:

1. Those who shared residence with most or all of their reported close friends and
2. Those shared a residence with very few or none of their reported close friends.

Using the theories of social learning and social influence as the frame of reference, those participants who resided with most or all their close friends would be subjected to some degree of normative social influence (Deri, 2005; Montgomery & Casterline, 1996). In light of the fact that their likelihood of VCT uptake was lower than those with the highest residential diversity, it would follow that the prevailing group norm would be to not test for HIV.

Those who reported sharing a residence with very few or none of their reported close friends would therefore have either resided alone, with their family or with people they did not consider close friends (weak ties). Considering that 341 of the 566 participants (60.25%) reported either living in a campus residence or in a rented/shared student accommodation, it would be reasonable to assume that a fair proportion of these participants shared residence with those that they did not consider close friends. This seems counterintuitive because the concept of greater diversity is usually associated that of weak ties (Granovetter, 1973; Roberts et al., 2009). According to Granovetter's (1973) theory, these weak ties should provide the participants with sources of novel information, resources and strategies for help seeking behaviour. The fact that those participants with the most residentially diverse networks were more likely to have tested for HIV than those with the least diverse suggests that the role of weak ties in enabling health service utilisation in this instance was not very effective. This may lend support to those studies that advocate the

importance of strong ties in enabling health service utilisation (Devillanova, 2008; Yee & Simon, 2010).

While racial diversity was not significantly associated with VCT uptake, there was a difference between two of the categories that approached significance ($p = 0.0883$). Participants with scores in category 5 (the most diverse) were 3.08 times more likely to have tested for HIV than participants with scores in category 1 (the least diverse). This finding is in line with the study conducted by Cohen and Lemay (2007) whose results show that increased network diversity is associated with health preventive behavior.

5.6 Limitations and Recommendations for Future Research

The most significant limitation of this study was that the VCT uptake of the participants' alters was not established. In order to investigate the role of social learning and social influence on the uptake of VCT in a population, knowing the health service utilisation practices of the alters is imperative. Because this information was not available in this study, the role of social learning and social influence on VCT uptake could only be interpreted speculatively. Unfortunately, acquiring this information was not possible as it was important to keep the survey completion time to a minimum. Additionally, relying on the self report of participants regarding their alters' VCT uptake would in all likelihood be rather inaccurate.

Additionally, it would be very useful to establish the norms of the social networks in order to better understand the role of norms in influencing behavior as well as the information possessed by the social network members in order to better understand the role of social learning.

A possible way forward would be to conduct a more comprehensive social network study amongst a smaller sample population where the health service utilisation of the network alters can be established.

Another limitation was that the IQV categories and their division into five sections were selected arbitrarily. One of the major drawbacks was that for diversity IQV scores, there were often cases where no scores were yielded that fell into categories two and three. The result was that the analysis was rather broad. Future studies should look to set more categories in order to allow for more detailed analysis.

There were cases where participants did not answer certain questions. These missing frequencies are documented in the results section.

The issue of social desirability may also have been a factor threatening the validity of this study. There may have been pressure on the participants to report a) perceived socially desirable health practices, b) high/low numbers of "close"/"not close" friends, c) membership of sport/social/religious institutions and so on. In order to combat this, it is recommended that a number of social desirability questions be inserted into possible future questionnaires. Participants who appear to be answering these

questions unrealistically due to the pressure to elicit socially desirable responses may be excluded from the analysis or at least taken into consideration when interpreting the results.

Chapter 6: Conclusion

The findings of this study refute the hypothesis that students with larger social networks would be likely to engage in VCT uptake as it can be seen that participants

with the smallest social network size were more likely to have tested for HIV. Nonetheless the findings do lend support to the hypothesis that diversity in social networks may enable VCT uptake as residential diversity was significantly associated with VCT uptake. The findings did not show evidence for or against the hypothesis that participants with less dense social networks with a greater proportion of weak social ties would be more likely to have tested for HIV.

It was hypothesised that social learning and social influence would have contrasting roles in affecting VCT uptake with social learning enabling it and social influence constraining it. The results of this study suggest that this is not the case and that social learning and social influence play roles in both enabling and constraining the uptake of VCT in this population. Social network size and residential diversity of networks were shown to be significantly associated with VCT uptake in the sample group. There was no linear trend present, but investigations between categories showed that there were significant differences between social networks showing varying levels of network size and diversity. Some of the findings from the study were in line with already existing theories on the role of social learning and influence while other findings were contrary to published studies in this area. This suggests that social learning and social influence are not bound exclusively to an enabling or constraining role on VCT uptake. In order to better understand their influence, the prevailing social norms and information within a social network need to be established.

References:

- Akers, R. L., & Lee, G. (1996). A LONGITUDINAL TEST OF SOCIAL LEARNING THEORY: ADOLESCENT SMOKING. *Journal of Drug Issues*, 26(2), 317.
- Agresti, A., & Agresti, B. F. (1978). Statistical Analysis of Qualitative Variation. *Sociological Methodology*, 9(ArticleType: research-article / Full publication date: 1978 / Copyright © 1978 John Wiley & Sons), 204-237.
- Ashida, S., Wilkinson, A. V., & Koehly, L. M. (2010). Motivation for Health Screening: Evaluation of Social Influence Among Mexican-American Adults. *American Journal of Preventive Medicine*, 38(4), 396-402. doi: DOI: 10.1016/j.amepre.2009.12.028
- Barefoot, J. C., Gronbaek, M., Jensen, G., Schnohr, P., & Prescott, E. (2005). Social network diversity and risks of ischemic heart disease and total mortality: findings from the Copenhagen City Heart Study. *American Journal of Epidemiology*, 161(10), 960-967.
- Barnes, T. (2000). *The impact of HIV/AIDS on the University of the Western Cape*. Cape Town: Education Policy Unit, University of the Western Cape.
- Beyer A. (2004). Implementing a community-based model for the promotion of couples' voluntary counseling & testing in two African capital cities: similarities, differences & lessons learned. *Int Conf AIDS*. 2004 Jul 11-16; 15: abstract no. MoPeD3927. Retrieved from <http://gateway.nlm.nih.gov/MeetingAbstracts/102280215.html> on 13/3/2007.
- Beardsell, S. (1994). Should wider HIV testing be encouraged on the grounds of HIV prevention? *AIDS Care*, 6(1), 5-19.
- Bhagwanjee, A., Petersen, I., Akintola, O., & George, G. (2008). Bridging the gap between VCT and HIV/AIDS treatment uptake: perspectives from a mining-sector workplace in South Africa. *African Journal of AIDS Research (AJAR)*, 7(3), 271-279.

- Blau, P. M. (1977). *Inequality and Heterogeneity*. The Free Press, New York.
- Blum, T. C. (1984). Racial inequality and salience: An examination of Blau's theory of social structure. *Social Forces*, 62(3), 607-617.
- Boissevain, J. (1979). Network Analysis: A Reappraisal *Current Anthropology*, June 20(2): (392-394). Retrieved from <http://links.jstor.org/sici?sici=0011-3204%28197906%2920%3A2%3C392%3ANAAR%3E2.0.CO%3B2-5> on 13/3/2007.
- Bond, L., Lauby, J., & Batson, H. (2005). HIV testing and the role of individual- and structural-level barriers and facilitators. *AIDS Care, February*. 17(2): (125-140). Retrieved from <http://web.ebscohost.com/ehost/pdf?vid=8&hid=16&sid=63641e25-10db-4f14-9bc7-e2e5cf3c379a%40sessionmgr103> on 13/3/2007
- Bufumbo L, & Kirumira E.K. (2002). Generation of hypotheses about how youth learn and decide about VCT/ RH among youths ages 14-21 years: the case of Kampala, Uganda.. *Int Conf AIDS*. 2002 Jul 7-12; 14: abstract no. TuPeD4995. Retrieved from <http://gateway.nlm.nih.gov/MeetingAbstracts/102249838.html> on 13/3/2007.
- Centola, D. The Spread of Behavior in an Online Social Network Experiment. *Science*, 329(5996), 1194-1197.
- Chen, J., Choe, M. K., Chen, S., & Zhang, S. (2007). The effects of individual- and community-level knowledge, beliefs, and fear on stigmatization of people living with HIV/AIDS in China. *AIDS Care*, 19(5), 666-673.
- Cohen, S., Doyle, W. J., Turner, R., Alper, C. M., & Skoner, D. P. (2003). Sociability and Susceptibility to the Common Cold. *Psychological Science*, 14(5), 389-395. doi: 10.1111/1467-9280.01452

Cohen, S., & Lemay, E. P. (2007). Why Would Social Networks Be Linked to Affect and Health Practices? *Health Psychology, 26*(4), 410-417. doi: Doi: 10.1037/0278-6133.26.4.410

Daniyam, C. A., Agaba, P. A., & Agaba, E. I. (2010). Acceptability of voluntary counselling and testing among medical students in Jos, Nigeria. [Article]. *Journal of Infection in Developing Countries, 4*(6), 357-361.

Deri, C. (2005). Social networks and health service utilisation. *Journal of Health Economics, 24*(6), 1076-1107.

Devillanova, C. (2008). Social networks, information and health care utilisation: Evidence from undocumented immigrants in Milan. *Journal of Health Economics, 27*(2), 265-286.

Efficacy of voluntary HIV-1 counselling and testing in individuals and couples in Kenya, Tanzania, and Trinidad: a randomised trial. (2000). *Lancet, 356*(9224), 103.

Fako, T.T. (2006). Social and psychological factors associated with willingness to test for HIV infection among young people in Botswana. *AIDS Care, April 18*(3). Retrieved from <http://web.ebscohost.com/ehost/pdf?vid=4&hid=16&sid=63641e25-10db-4f14-9bc7-e2e5cf3c379a%40sessionmgr103> on 14/3/2007

Falci, C., & McNeely, C. (2009). Too Many Friends: Social Integration, Network Cohesion and Adolescent Depressive Symptoms. *Social Forces, 87*(4), 2031-2061.

Fyrand, L., Moum, T., Wichstrom, L., Finset, A., & Glennas, A. (2000). Social network size of female patients with rheumatoid arthritis compared to healthy controls. *Scandinavian Journal of Rheumatology, 29*(1), 38-43.

- Galloway, M.R. (1999). High levels of knowledge but low behaviour change. *AIDS Bulletin*, 8(4), 28.
- Goldberg, R. W., Rollins, A. L., & Lehman, A. F. (2003). Social network correlates among people with psychiatric disabilities. *Psychiatric Rehabilitation Journal*, 26(4), 393-402.
- Granovetter, M. S. (1973). The Strength of Weak Ties. *The American Journal of Sociology*, 78(6), 1360-1380.
- Granovetter, M. (2005). The Impact of Social Structure on Economic Outcomes. *The Journal of Economic Perspectives*, 19(1), 33-50.
- Harrison, D. A., & Klein, K. J. (2007). What's the difference? Diversity constructs as separation, variety, or disparity in organizations. *The Academy of Management Review*, 32(4), 1199-1228.
- HEAIDS, (2010). HIV prevalence and Related factors – *Higher Education Sector Study, South Africa, 2008–2009*. Pretoria: Higher Education South Africa
- Heiman, G.W. (2002). *Research Methods in Psychology*. 3rd Edition. Houghton Mifflin Company. Boston & New York.
- Helleringer, S. p., & Kohler, H.-P. (2005). Social networks, perceptions of risk, and changing attitudes towards HIV/AIDS: New evidence from a longitudinal study using fixed-effects analysis. *Population Studies*, 59(3), 265-282.
- Hosmer, D.W. & Lemeshow, S. (2000). *Applied logistic regression*. 2nd Edition. John Wiley & Sons, Inc. Canada.
- Hutchinson. P.L. & x. Mahlalela. X. (2006). Utilisation of voluntary counseling and testing services in the Eastern Cape, South Africa. *AIDS Care*, July. 18(5): (446-455). Retrieved from

<http://web.ebscohost.com/ehost/pdf?vid=11&hid=109&sid=63641e25-10db-4f14-9bc7-e2e5cf3c379a%40sessionmgr103> on 13/3/2007.

Irving, H. W. (1977). Social Networks in the Modern City. *Social Forces*, 55(4), 867-880.

Israel, B. A. (1982). Social networks and health status: linking theory, research, and practice. *Patient Counselling & Health Education*, 4(2), 65-79.

Kalichman, S. C., Simbayi, L. C., Kaufman, M., Cain, D., Cherry, C., Jooste, S., & Mathiti, V. (2005). Gender Attitudes, Sexual Violence, and HIV/AIDS Risks Among Men and Women in Cape Town, South Africa. *Journal of Sex Research*, 42(4), 299.

Kakoko, D.C., Lugoe, W.L., & Lie, G.T. (2006). Voluntary testing for HIV among a sample of Tanzanian teachers: A search for socio-demographic and socio-psychological correlates. *AIDS Care*, August. 18(6): (554-560)
<http://web.ebscohost.com/ehost/pdf?vid=14&hid=117&sid=63641e25-10db-4f14-9bc7-e2e5cf3c379a%40sessionmgr103>

Kang, S. H., & Bloom, J. R. (1993). Social support and cancer screening among older black Americans. *Journal of the National Cancer Institute*, 85(9), 737-742.

Kaufman, M. R., Shefer, T., Crawford, M., Simbayi, L. C., & Kalichman, S. C. (2008). Gender attitudes, sexual power, HIV risk: a model for understanding HIV risk behavior of South African men. *AIDS Care*, 20(4), 434-441.

Kelly, K., Parker, W. & Lewis, (2001). Reconceptualising behaviour change in the HIV/AIDS context. Retrieved from www.cadre.org.za on 15/4/2007.

Kimbrell K. (2003). A successful model for couples' VCT promotion in two African capitals. *Antivir Ther.* 8 (Suppl.1): abstract no. 1197. Retrieved from <http://gateway.nlm.nih.gov/MeetingAbstracts/102263471.html> on 15/3/2007.

- Kohler, H.-P., Behrman, J. R., & Watkins, S. C. (2001). THE DENSITY OF SOCIAL NETWORKS AND FERTILITY DECISIONS: EVIDENCE FROM SOUTH NYANZA DISTRICT, KENYA. *Demography*, 38(1), 43-58.
- Langlie, J. K. (1977). Social Networks, Health Beliefs, and Preventive Health Behavior. *Journal of Health and Social Behavior*, 18(3), 244-260.
- Latkin, C. A., Hua, W., & Tobin, K. (2004). Social network correlates of self-reported non-fatal overdose. *Drug and Alcohol Dependence*, 73(1), 61-67. doi: DOI: 10.1016/j.drugalcdep.2003.09.005
- Leon, N., Naidoo, P., Mathews, C., Lewin, S., & Lombard, C. (2010). The impact of provider-initiated (opt-out) HIV testing and counseling of patients with sexually transmitted infection in Cape Town, South Africa: a controlled trial. *Implementation Science: IS*, 5, 8-8.
- Liambila, W., Askew, I., Mwangi, J., Ayisi, R., Kibaru, J., & Mullick, S. (2009). Feasibility and effectiveness of integrating provider-initiated testing and counselling within family planning services in Kenya. *AIDS* 23(Suppl 1), S115-S121.
- Lupton, D. (1999). *Risk*. London: Routledge.
- Matovu, J. K. B., & Makumbi, F. E. (2007). Expanding access to voluntary HIV counselling and testing in sub-Saharan Africa: alternative approaches for improving uptake, 2001â€“2007. *Tropical Medicine & International Health*, 12(11), 1315-1322.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a Feather: Homophily in Social Networks. *Annual Review of Sociology*, 27, 415-444.
- Mola, O. D., Mercer, M. A., Asghar, R. J., Gimbel-Sherr, K. H., Gimbel-Sherr, S., Micek, M. A., & Gloyd, S. S. (2006). Condom use after voluntary counselling

and testing in Central Mozambique. *Tropical Medicine & International Health*, 11(2), 176-181.

Montgomery, M.R. & Casterline, J.B. (1996). Social learning, social influence, and new models of fertility. *Population and Development Review*, Vol. 22, Supplement: Fertility in the United States: New patterns, new theories. (151-175). Retrieved from <http://links.jstor.org/sici?sici=0098-7921%281996%2922%3C151%3ASLSIAN%3E2.0.CO%3B2-V> on 13/10/2007

Morcol, G. k., & Wachhaus, A. (2009). Network and Complexity Theories: A Comparison and Prospects for a Synthesis. *Administrative Theory & Praxis (M.E. Sharpe)*, 31(1), 44-58.

Mwamburi, D.M., Dladla, N., Qwana, E., & and lurie, M.N. (2005). Factors Associated with Wanting to Know HIV Results in South Africa. *AIDS Patient Care and STDs*. 19(8) 518-25. Retrieved from <http://web.ebscohost.com/ehost/pdf?vid=7&hid=116&sid=63641e25-10db-4f14-9bc7-e2e5cf3c379a%40sessionmgr103> on 13/3/2007

Njagi, F., & Maharaj, P. (2006). Access to voluntary counselling and testing services: Perspectives of young people. *South African Review of Sociology*, 37(2), 113-127.

Parker, W. (2004). Rethinking conceptual approaches to behaviour change: The importance of context. Retrieved from www.cadre.org.za on 13/3/2007.

Pescosolido, B. A., Gardner, C. B., & Lubell, K. M. (1998). How people get into mental health services: Stories of choice, coercion and "muddling through" from "first-timers". *Social Science & Medicine*, 46(2), 275-286. doi: 10.1016/s0277-9536(97)00160-3

- Quatman, C., & Chelladurai, P. (2008). Social Network Theory and Analysis: A Complementary Lens for Inquiry. *Journal of Sport Management*, 22(3), 338-360.
- Roberts, S. G. B., Dunbar, R. I. M., Pollet, T. V., & Kuppens, T. (2009). Exploring variation in active network size: Constraints and ego characteristics. *Social Networks*, 31(2), 138-146.
- Rushton, M. (2008). A Note on the Use and Misuse of the Racial Diversity Index. *Policy Studies Journal*, 36(3), 445-459.
- Sampson, R. J. (1984). Group size, heterogeneity, and intergroup conflict: A test of Blau's Inequality and Heterogeneity. *Social Forces*, 62(3), 618-639.
- Shisana, O., Rice, K., Zungu, N., & Zuma, K. Gender and poverty in South Africa in the era of HIV/AIDS: A quantitative study. *Journal of Women's Health*, 19(1), 39-46.
- Shelley, G. A., Bernard, H. R., Killworth, P., Johnsen, E., & McCarty, C. Who knows your HIV status? What HIV + patients and their network members know about each other. *Social Networks*, 17(3-4), 189-217.
- Shulman, N. (1976). Network Analysis: A New Addition to an Old Bag of Tricks. *Acta Sociologica (Taylor & Francis Ltd)*, 19(4), 307-323.
- Solomon, V., Van Rooyen, H., Griesel, R., Gray, D., Stein J. & Nott, V. (2004). Critical Review and Analysis of Voluntary Counselling and Testing Literature in Africa. Retrieved from www.hst.org.za/uploads/files/vct.pdf on 13/3/2007.
- Stone, D. (1998). Social Cognitive Theory Retrieved 28 September 2010, 2010, from <http://www2.yk.psu.edu/~jlg18/506/SocialCognitiveTheory.pdf>
- Strode, A., van Rooyen, H., Heywood, M., & Abdool Karim, Q. (2005). Scaling up HIV testing in resourceconstrained settings: Debates on the role of VCT and

Routine 'Opt-in or Opt-out' HIV Testing. *Southern African Journal of HIV Medicine* 6(3), 45-48.

Suarez, L., Lloyd, L., Weiss, N., Rainbolt, T., & Pulley, L. (1994). Effect of social networks on cancer-screening behavior of older Mexican-American women. *Journal of the National Cancer Institute*, 86(10), 775-779.

Suarez, L., Ramirez, A. G., Villarreal, R., Marti, J., McAlister, A., Talavera, G. A., Perez-Stable, E. J. (2000). Social networks and cancer screening in four U.S. Hispanic groups. *American Journal of Preventive Medicine*, 19(1), 47-52. S

Swanepoel, P. (2006). Persuading South Africans at risk of HIV/AIDS to voluntarily present themselves for counseling, testing and referral (VCT): Using theory and empirical evidence in formative research for VCT message design. Retrieved from http://www.epidasa.org/documents/Swanepoel_artikel_Persuading_SA.PDF on 15/4/2007.

UNAIDS (2010). *Report on the global AIDS epidemic*. Executive Summary. Switzerland: Geneva.

University of Twente (Online). Network Theory and Analysis in Organizations. Retrieved from http://www.tcw.utwente.nl/theorieenoverzicht/Theory%20clusters/Organizational%20Communication/Network%20Theory%20and%20analysis_also_within_organizations.doc/ on 13/3/2007.

Vehovar, V., Lozar Manfreda, K., Koren, G., & Hlebec, V. (2008). Measuring ego-centered social networks on the web: Questionnaire design issues. *Social Networks*, 30(3), 213-222.

Vera, E. R. n., & Schupp, T. (2006). Network analysis in comparative social sciences. *Comparative Education*, 42(3), 405-429.

- Vermeer, W., Bos, A. E. R., Mbwambo, J., Kaaya, S., & Schaalma, H. P. (2009). Social and cognitive variables predicting voluntary HIV counseling and testing among Tanzanian medical students. *Patient Education and Counseling*, 75(1), 135-140. doi: DOI: 10.1016/j.pec.2008.08.022
- Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. Cambridge: Cambridge University Press.
- Wellman, B. (2007). The network is personal: Introduction to a special issue of Social Networks. *Social Networks*, 29(3), 349-356. doi: DOI: 10.1016/j.socnet.2007.01.006
- Wringe, A., Iningo, R., Urassa, M., Maiseli, G., Manyalla, R., Chagalucha, J., . . . Zaba, B. (2008). Uptake of HIV voluntary counselling and testing services in rural Tanzania: implications for effective HIV prevention and equitable access to treatment. *Tropical Medicine & International Health*, 13(3), 319-327.
- Yee, L., & Simon, M. (2010). The Role of the Social Network in Contraceptive Decision-making Among Young, African American and Latina Women. *Journal of Adolescent Health*, 47(4), 374-380. doi: DOI: 10.1016/j.jadohealth.2010.03.014

Appendices:

Appendix A

Documentation of Student Social Networks Survey conducted online

This hardcopy is a close representation on paper of the survey as conducted online (released to students 20th May, 2008).

The anonymous Student Social Networks survey at <http://surveys.ukzn.ac.za/ssn/index.php?sid=1&lang=en> requires consent as the first step; without consent respondents cannot proceed. Once a respondent has completed the survey, regardless of how diligently, an opportunity is given to register for the prize draw at [http://surveys.ukzn.ac.za/ssn/index.php?sid=13528&ticket=\[completion_control_value\]](http://surveys.ukzn.ac.za/ssn/index.php?sid=13528&ticket=[completion_control_value]) where contact details are requested. The draw can only be entered when exiting the main survey.

Formatting Conventions:

Survey Title

Page heading

Page description

Question

***Mandatory question**

Help

Answers

Answers

Answers

[Annotations of software functionality.]

Student Social Networks

WIN one of TEN iPod shuffles by taking part in this survey!

This survey is part of a study looking at aspects of student social life and health seeking and HIV prevention needs of the student population at UKZN, Pietermaritzburg campus. This survey focuses on the role of friendship networks, affiliations and health service use that are key components of student well-being. We hope to use the information to study these issues in greater detail in order to be able to design interventions and tailor service provision for the student population.

The survey is being conducted by Dr Jeffrey Grierson, Prof Anthony Smith and Prof. Marian Pitts of the Australian Research Centre in Sex, Health and Society at La Trobe University, Australia and Prof. Graham Lindegger, Prof. Kevin Durrheim and Mr. Vernon Solomon of the School of Psychology, University of KwaZulu-Natal, South Africa.

Consent to Participate

Your agreement to take part in this survey

*** By completing this online survey I understand that:**

This survey is voluntary and completely anonymous. I understand that I must be eighteen years or older in order to participate in the survey.

No personal identifying information will be collected within the survey. All the answers you give are confidential. This means that no one apart from the researchers will see your answers. The data (without any identifying details) will be kept in a secure password protected folder by the University of KwaZulu-Natal and Latrobe University for a period of five years for comparison with future studies and for the purposes of future research funding applications. Results from the survey will appear in reports, peer reviewed publications and conference presentations. No identifying details will appear in these publications.

The survey will take between 15 and 20 minutes to complete. If there are any questions you do not wish to answer, just skip them. None of the questions are expected to cause any distress or discomfort. If you don't feel comfortable answering a question leave it blank.

There will be ten prizes awarded by random draw for submitted surveys. If you wish to be included in the prize draw, please complete the separate prize draw application which will be accessible only once after submitting the survey. Please note that there will be no link between the contact details for the prize draw and the contents of your separately submitted survey.

By choosing "I consent" below, I understand that I give my voluntary informed consent to participate in the survey. I also understand that I may terminate my participation at any time during completion and prior to pressing the final submit button.

Thank you for your time and thoughtfulness in responding to this questionnaire.

I do not consent

I consent

If you have any questions or concerns about the survey please contact us:

solomon@ukzn.ac.za or telephone 033 260 5680.

You may access any reports or publications arising from the study by visiting the ARCSHS website (www.latrobe.edu.au/arcshs) or by contacting us (see details below) and being added to our mailing list.

If you have any complaints or queries that the researchers have not been able to answer to your satisfaction, you may contact:

Student Social Networks Survey

The Social Science Research Ethics Committee, Faculty of Management and Human Sciences,
University of KwaZulu-Natal, 031 260 2325 or the Chairperson of the Social Science Research Ethics
Committee TEERTOMA@ukzn.ac.za

Or

The Ethics Liaison Officer, Human Ethics Committee, La Trobe University, Bundoora, Victoria, 3083,
(phone: (+613) 9479 1443, e-mail: humanethics@latrobe.edu.au)

Please note: The survey will cancel itself after long periods of inactivity. **There is absolutely no need to rush**, just don't leave it alone for very long. If need be, save the survey and return to it later with the "Save" button below.

Exit Student Social Networks Survey

[Forced exit if consent not given.]

Exit Survey

You did not consent - cannot proceed.

Thank you for your interest in this survey. However, you cannot proceed without giving your explicit consent in the first question. If you wish to complete the survey after all, please restart the survey and then give your consent.

Please close this window to exit the survey.

[All subsequent depend on consent having been given.]

Background

Firstly, we would like to get some background information about you.

Gender

Female

Male

Year of Birth

Only numbers may be entered in this field

Type a four-digit year, 19xx

Are you a registered student at UKZN, Pietermaritzburg campus?

Yes

No

How many years have you been studying?

Only numbers may be entered in this field

In which Faculty are you registered?

Choose only one of the following

Faculty of Education

Faculty of Humanities, Development & Social Sciences

Faculty of Engineering

Faculty of Science & Agriculture

Faculty of Law

Faculty of Management

Other

What subjects are your majors?

Major1

Major2

Major3

Are you a South African citizen or a permanent resident in South Africa?

Yes

No

If not, of what country are you a citizen?

Where were you born?

Country:

Nearest city/town:

What is your home language (mother tongue)

What other languages do you speak?

(OtherLanguage1

OtherLanguage2

OtherLanguage3)

What is your race (how would you identify yourself)?

Choose only one of the following

Please choose one of the following:

Black

Coloured

Indian

White

Mixed race - Please specify

Other - Please specify

Please enter your comment here:

Residence and Employment

Where do you live during term?

Choose only one of the following

Please choose one of the following:

- Campus residence. Please specify which one by name
- Pietermaritzburg- off campus, rented, student-shared accommodation (digs). Please specify the suburb/area this is in
- Parents'/family home. Please specify the suburb/area this is in
- Other rented accommodation. Please specify the suburb/area this is in
- Own home - rented. Please specify the suburb/area this is in
- Own home - owned. Please specify the suburb/area this is in
- Other type of accommodation. Please specify type of accommodation and the suburb/area this is in
- Please enter your comment here:

Where do you live outside term time, i.e. during university breaks/vacation periods?

Choose only one of the following

- Pietermaritzburg- off campus, rented, student-shared accommodation (digs)
- Pietermaritzburg - parents'/family home
- Other SA city/town - parents'/family home
- Outside SA - parents'/family home
- Own home - rented
- Own home - owned
- Other

Where is your home? Please identify the following regarding your permanent outside term place of residence.

- Country:
- Province:
- District/Town/City:
- Suburb:
- Postal code:

Are you currently in paid employment?

Choose only one of the following

- Employed full-time
- Employed part-time or casual

Not employed in the work force

Please specify number of hours per week of part-time or casual employment

Only numbers may be entered in this field

Memberships

Are you a member of any of the following types of clubs, groups or societies at

UKZN? Please name them in each category.

Sporting clubs:
Social clubs/cultural:
Community outreach groups:
Religious groups:
Political:
Drinking clubs:
Other - please specify:

**Are you a member of any of the following types of clubs, groups or societies off
campus? Please name them in each category.**

Sporting clubs:
Social clubs/cultural:
Community outreach groups:
Religious groups:
Political:
Drinking clubs:
Other - please specify:

Substance use

Do you smoke tobacco regularly?

Yes
No

Do you drink alcohol regularly?

Yes
No

Do you smoke dagga (marijuana /dope/grass) regularly?

Yes
No

Do you use any other drugs/substances regularly?

Yes
No

If Yes, please specify the other drugs/substances that you use regularly:

Friends

Now we would like to ask some questions about your A) close friends and B) not so close friends.

A) Thinking about friends, how many are close friends, that is, people that you see or talk to regularly and share your personal thoughts and feelings with?

Number of close friends:

Choose only one of the following

None

One

Two

Three

Four

Five

More than five

Please specify the number of your close friends:

Only numbers may be entered in this field

[Conditional on number of close friends >5]

B) How many are friends that you would see regularly, but would not consider close friends? Number of regular not close friends:

Only numbers may be entered in this field

Close Friends

[Conditional on number of close friends ≥ 1 or unspecified.]

Now just thinking about your close friends, how many of your close friends are

- Under 16 years old
- 17-18 years old
- 19-20 years old
- 21-22 years old
- 23-24 years old
- 25-29 years old
- Over 30 years old

If you are not sure about your friends' ages, please just make your best guess. (Only numbers may be entered.)

Thinking about these close friends, how many are male and female?

- Male
- Female

Only numbers may be entered

How many of your close friends are ... ?

- Black
- Coloured
- Indian
- White
- Mixed race
- Other - please specify:

[Alternative Notes depending on number of close friends specified:]

Note that the numbers in each of the three questions above should sum up to: Two - the number of close friends you gave on the previous page.

Note that the numbers in each of the three questions above should sum up to: more than five, but you did not specify how many. Please return to the previous page and enter the number of close friends that you have .

Note that the numbers in each of the three questions above should sum up to the total number of close friends given on the previous page, but you did not choose a number. Please return to the previous page and tell us how many close friends you have.

Thinking about your close friends, how many were your friends this time one year ago?

Only numbers may be entered in this field

Close Friends continued

[Conditional on number of close friends ≥ 1 ; maximum 5.]

***We are going to ask you a few questions about your [two/ three/ four/ five] close[est] friend[s]. Please give them a nickname, initials, or first name (anything that helps you to remember them):**

If you prefer not to give names of any sort, please type Friend 1, Friend 2, etc.

*First close friend:

*Second close friend:

*Third close friend:

*Fourth close friend:

*Fifth close friend:

[Conditional on number of close friends specified.]

Friend XX

Questions about your first close friend, XX

[Conditional on number of close friends ≥ 1 ; one set per close friend, maximum 5.]

Now thinking about your first close friend, XX (think of their name), please indicate whether:

XX shares the same course of study as you?

Yes
No

XX is gender

Female
Male

XX is also a student at UKZN on the Pietermaritzburg campus?

Yes
No

XX is (race)

Choose only one of the following

Black
White
Indian
Coloured
Mixed race
Other

XX belongs to the same church, temple, mosque, or other similar religious group that meets regularly as you?

Yes
No

XX belongs to one or more of the same clubs, groups or organisations as you?

Yes
No

If Yes, please specify to which clubs, groups, or organisations both you and XX belong:

XX shares the same residence as you (i.e. digs, or res, or neighbourhood)?

Yes
No

Friend XX continued

More about your close friend XX

[Conditional on number of close friends ≥ 1 ; one set per close friend, maximum 5.]

How long have you known XX?

Years:

Months:

Only numbers may be entered.

How important is XX in your life?

Not important 1 2 3 4 5 Very Important

How often are you in communication with XX?

Choose only one of the following

Every day

Every week

Every month

Every year

Less frequently

Eg. by phone, email, SMS, letters, etc., but not meeting in person

How often do you spend time together with XX?

Choose only one of the following

Every day

Every week

Every month

Every year

Less frequently

I.e. meeting in person, not remote communication such as phone, email, letters, etc.

Does XX

Yes Uncertain No

smoke tobacco?

drink alcohol?

smoke dagga?

use other drugs/substances?

To what extent does XX provide you with

Very seldom Rarely Sometimes Often Very often

emotional support?
financial or other material support?
important information?

To what extent do you provide XX with

Very seldom Rarely Sometimes Often Very often
emotional support?
financial or other material support?
important information?

**Thinking about your relationship with XX, to what extent are your interactions
positive or negative?**

1 2 3 4 5
Positive Negative

**How often do you disagree strongly with XX about things that are important to
you?**

1 2 3 4 5
Rarely Often

Friend XX and Friend YY

We now want you to describe the relationship between your friends XX and YY.

[Conditional on number of close friends ≥ 2 ; one set per pair, maximum 10.]

Do these two people know each other?

Choose only one of the following

Yes

Uncertain

No

[All following in this group conditional on “Yes”.]

How would you describe the relationship between these two people?

Check any that apply

In a romantic/sexual relationship together

Friends

Acquaintances

Siblings

In conflict with each other

Other:

How long have these two people known each other (your best guess)?

Years:

Months:

Numbers only.

Thinking about the relationship between these two people, to what extent are their interactions positive or negative?

Positive 1 2 3 4 5 Negative

How often do these two people disagree strongly about things that are important to them?

Seldom 1 2 3 4 5 Often

How sure are you about your answers above about the relationship between these two people?

Not sure 1 2 3 4 5 Very sure

Health

Which of these services on PMB campus have you used in the last year?

Check any that apply

- Student Health Clinic
- Student Counselling Service
- Student accommodation
- Financial aid
- Residence Life officer
- HIVAN
- Other:

Which of these off-campus health services have you used in the past year?

Check any that apply

- Government/public health clinic
- Government hospital
- Private Doctor
- Pharmacy
- Traditional healer
- Other:

In general, would you say your health is

Choose only one of the following

- Excellent
- Very good
- Good
- Poor
- Very Poor

Have you ever had a test for any of the following or any of the following health checks?

Eyes

Choose only one of the following

- No
- Yes, in the last 12 months
- Yes, but more than 12 months ago

Dental check-up

Choose only one of the following

- No
- Yes, in the last 12 months
- Yes, but more than 12 months ago

Career test and counselling

Choose only one of the following

- No
- Yes, in the last 12 months
- Yes, but more than 12 months ago

TB

Choose only one of the following

- No
- Yes, in the last 12 months
- Yes, but more than 12 months ago

If 'Yes' what was your most recent result?

Choose only one of the following

- TB negative
- TB positive
- Don't know
- I would rather not say

Sexually transmitted infection

Choose only one of the following

- No
- Yes, in the last 12 months
- Yes, but more than 12 months ago

If 'Yes' what was your most recent result?

Choose only one of the following

- STI negative
- STI positive
- Don't know
- I would rather not say

HIV/AIDS

Choose only one of the following

- No
- Yes, in the last 12 months
- Yes, but more than 12 months ago

If 'Yes' what was your most recent result?

Choose only one of the following

- HIV negative
- HIV positive
- Don't know
- I would rather not say

Where do you get most of your health information?

Check any that apply

- From my parents
- Teachers
- Lecturers
- From other family members
- From friends
- From my regular doctor
- From other health care providers
- From campus health services
- From pamphlets
- From the media (radio, television, newspaper)
- From the internet
- Other:

Sexual Relations

[Potentially answers may have a number AND one of 'none' or 'rather not say' checked due to workaround of software limitations.]

At what age did you first have sex? Age in years:

Only numbers may be entered in this field

Not sexually active
I would rather not say

How many sexual partners have you had in your life so far?

Only numbers may be entered in this field

None
I would rather not say

How many sexual partners have you had in the past 12 months?

Only numbers may be entered in this field

None
I would rather not say

How many sexual partners do you currently have?

Only numbers may be entered in this field

None
I would rather not say

How many of these current sexual partners are.... (numbers only)

Male
Female
Black
White
Indian
Coloured
Other
I would rather not say

Do you live with or cohabit with any of these sexual partners?

Yes
No

Racial Attitudes

Use the questions below to describe, in general, *how you feel* about people of different groups in South Africa.

White South Africans

1 2 3 4 5 6 7 8 9 10
Negative Positive
Cold Warm

Black South Africans

1 2 3 4 5 6 7 8 9 10
Negative Positive
Cold Warm

Indian South Africans

1 2 3 4 5 6 7 8 9 10
Negative Positive
Cold Warm

Coloured South Africans

1 2 3 4 5 6 7 8 9 10
Negative Positive
Cold Warm

Privacy

In principle, in a possible future study, how comfortable would you be in providing ...

	Extremely uncomfortable	A little uncomfortable	Indifferent	Somewhat comfortable	Very comfortable
your own name?					
your friends names?					
the names of your sexual partner(s)?					

Is there anything else you would like to tell us about your social life or social activities as a student that we haven't asked about?

Thank You!

You have completed answering the questions in this survey.

Click on 'Submit' now to complete the process and save your answers.

If you want to check any of the answers you have made, and/or change them, you can do that now by clicking on the [[<< prev](#)] button and browsing through your responses.

A Note On Privacy

This survey is anonymous.

The record kept of your survey responses does not contain any identifying information about you unless a specific question in the survey has asked for this. If you have responded to a survey that used an identifying token to allow you to access the survey, you can rest assured that the identifying token is not kept with your responses. It is managed in a separate database, and will only be updated to indicate that you have (or haven't) completed this survey. There is no way of matching identification tokens with survey responses in this survey.

Thank you for participating in this survey!

REGISTER NOW to enter the prize draw!

If you do NOT want to register for the prize draw, please close this window. (You will not be able to register for the draw later.)

Prize Draw

Enter the draw to win an iPod shuffle

You must be registered to enter the prize draw

You may register for the draw if you wish to win a prize.

Enter your details below, and an email containing the link to enter this draw will be sent immediately.

First Name:

Last Name:

Email Address:

Security Question:

Thank you for registering to enter the prize draw.

An email has been sent to the address you provided with access details for the draw. Please follow the link in that email to proceed.

Check your spam folder if the email does not arrive soon.

Student Social Networks Survey

[After following link in registration email.]

As a token of appreciation for completing the Student Social Networks survey you now have the opportunity to enter the draw to win one of the iPod shuffle prizes!

Contact Details

Provide contact details to enter the prize draw, please.

Note: This information is NOT connected in any way to the anonymous survey that you completed to qualify for the prize draw.

***Please give your name and UKZN student number:**

First name:

Last name:

Student number:

Please provide details how you may be contacted if you are a winner:

Email address:

Alternate email address:

Telephone number:

Cellphone number:

Alternate telephone number:

Complete as many as apply.

Good Luck! Winners will be notified in the second semester.